Economic Determinant Analysis of Student Academic Performance in Mississippi Public Schools

Debra Monroe-Lax, Jae-Young Ko

Department of Public Policy and Administration, Jackson State University, 101 West Capitol St., Jackson, MS 39201

Emails: debra.a.monroe-lax@students.jsums.edu, jae-young.ko@jsums.edu

Phone: 601-979-8781
Abstract

The purpose of this study is to assess statistical significance and strength of association between economic determinants and academic performance of public school students in the state of Mississippi. It is hypothesized that public school districts with higher economic security leads to higher academic achievement. The school performance data and the economic indicators of one hundred forty-six school districts in Mississippi were obtained through the Mississippi Department of Education Children’s First Annual Report for school year 2012-2013 and the Annie E. Casey Foundation Kids Count Datacenter for 2013. We tested the hypotheses using bivariate and multi-regression analysis.

The findings indicated that students’ academic performance indicators (i.e., average ACT score, graduation rate, and dropout rate) were found to correlate with economic factors (i.e., per-pupil expenditure, median household income, poverty school district, and unemployment rate). The results also showed that median household income is a better predictor than per-pupil expenditures for student performance, due to financial unpredictability of federal grant-based financial aids to multiple poor school districts. The study suggests that while students’ performance is linked to the school learning environment, the status of students’ families’ economic circumstances is also important as the central role for the students’ academic success.
Introduction

The continuous debate on what constitutes student achievement among K-12 public schools in the nation has led to numerous educational reform efforts but far fewer solutions. Academic literature which seeks to explain why some public school systems in the United States excel while others, seemingly, despite best efforts continue to, fail have been the foremost focus for policy reform. More so than not economic research on school expenditures have been rigorously sought out to explain this phenomenon (Hanushek, 1986; Hedges, Laine, and Greenwald, 1994). Spending more dollars to boost student academic achievement has been viewed as the panacea to improving school performance—but how such resources should be adequately allocated have not been vetted nearly to that extent (Hanushek, 1989).

Like many other states, Mississippi state lawmakers are challenged with fully funding K-12 education (Putnam & Cabrera, 2015). Decisions that are made in favor or against adequate funding has it consequences which are made known publicly through student performance as measured by outcomes such as standardized tests, graduation rates and dropout rates. For instance, the national average composite American College Testing (ACT) score for the 2012-2013 school year was 20.7 to that of 18.9 in Mississippi, which ranked 49th among other states. The national high school graduation rate was 81% as compared to 76% in Mississippi which ranked 43rd among other states. The national high school dropout rate was 6.8% whereas in Mississippi it was 13.9% (U.S. Census Bureau, 2015; National Center for Education Statistics 2015; and National and State ACT Profile Report, 2015).

Several causes have been vetted to explain the differences in student achievement. The most common causes have been school expenditures (Greenwald et al.,1996) and family economic background (Coleman et al., 1966; Hanushek, 1989). The question of which is the better predictor or has the greater impact on student achievement is still debated until present day. For instance, the national average per pupil expenditures for the 2012-2013 school year was $10,700 whereas in Mississippi it was $8,130 which ranked the fifth lowest among other states. During that same school year Utah had the lowest per-pupil expenditures ($6,555; ACT score 20.8; graduation rate 83%) while New York had the highest ($19,818; ACT score 23.1; graduation rate 85%). The controversy of what constitutes adequate school expenditures to enhance student performance is not made apparent in this instance considering student achievement in Utah was higher than in the U.S. and in Mississippi; albeit per-pupil expenditure was lower than both (U.S. Census Bureau, 2015; National Center for Education Statistics, 2015; and National and State ACT Profile Report, 2015).

Factors commonly associated with family economic background as an input to explaining differences in student performance has been generally centered on the wealth and education of the parents of students rather than the lack thereof (Hanushek,1989). For instance, in 2013, the median household income in Mississippi was $40,194 which ranked the lowest in the nation and was nearly $12,000 lesser than the national average of $51,847. The average unemployment rate was 8.7% which ranked the fourth highest in the U.S while the national figure showed 7.4% for individuals who were jobless or looking for a job.

Overall, Mississippi ranked the highest of people living in poverty (24%) among the other states as well as above the national average (15.8%). Moreover, children living in poverty accounted for 34% of the population whereas nationally it was 22%. Lastly, children by household head’s educational attainment ranked the lowest and accounted for 19% of
individuals with a bachelor’s degree whereas nationally it was 13% (U.S. Census Bureau, 2015; Kids Count Datacenter, 2015; Bureau of Labor Statistics, 2015).

With ongoing changes in public education reform, the challenge of creating educational policies that are inclusive and adequately fully funded has been a critical problem not only for lawmakers at the local, state, and federal level but public school teachers and officials alike. Nonetheless, there still remains a lack of empirical evidence to determine which criteria are the best predictors of student achievement (Hanushek, 1986).

Proposed Hypotheses

The present study seeks to build upon processes employed in similar studies that have utilized the economic model to analyze educational production functions of school resources on students’ educational outcomes. To that end, this study examines four primary questions and propose corresponding research hypotheses:

Research Question 1:
Is there a relationship between student achievement and schools that receive more funding than schools receiving less funding?

$H_1$
It is hypothesized that higher expenditures per pupil leads to higher student achievement (achievement indicators: ACT score, graduation rate and dropout rate).

Research Question 2:
Do families’ income explain the differences in student achievement?

$H_2$
It is hypothesized that students from families with higher median household income achieve better in school (achievement indicators: ACT score, graduation rate and dropout rate).

Research Question 3:
Does the location of a school district within a community impact student achievement?

$H_3$
It is hypothesized that higher poverty school districts leads to lower student achievement (achievement indicators: ACT score, graduation rate and dropout rate).

Research Question 4:
Does the unemployment rate within a school district impact student achievement?

$H_4$
It is hypothesized that higher unemployment rates leads to lower student achievement (achievement indicators: ACT score, graduation rate and dropout rate)
The commonality shared among both conservative and liberal lawmakers alike is that funding for public schools should at a minimum provide the basic materials essential to learning in a nurturing environment that fosters academic excellence and growth. On the other hand, not so common among lawmakers and educational advocates is the issue of inequities in public school funding and its legitimacy. More importantly is the issue of whether the level of funding for schools enhance student achievement.

Previous research on the effectiveness of school expenditures on students’ educational outcomes have been controversial among scholars in the field. This has been demonstrated in a study conducted by economist Hanushek (1986) whose research revealed a consistent showing of no systematic relationship between school expenditures on student performance. Hanushek findings were later challenged by Greenwald et al (1996). In reanalyzing the same data as had Hanushek (1986), Greenwald et al (1996) findings indicated a systematic positive relationship between school expenditures on student performance.

Standardized tests have long been considered the foremost common measure of educational outcomes on student performance. To a lesser extent has been graduation rates, dropout rates and college continuation (Hanushek, 1986). In a previous study conducted by Ram (2004) utilizing Scholastic Assessment Test (SAT) scores to measure school achievement findings concluded that per pupil expenditures were positive and highly statistical significant (2004). A more recent study (Bibb, McNeal, & Hall, 2012) conducted on the school systems in Tennessee to assess the relationship between per pupil expenditures and student achievement as measured by ACT rather than SAT scores resulted in findings that were statistically non-significant (2012).

In 1997 the Mississippi Adequate Education Program (MAEP) was passed by the state legislature which required lawmakers to fully funds public school districts by providing specific allocation to meet the needs of students from low performing schools as they were presented with more challenges than wealthier school districts (Putnam et al., 2015). Since the passing of this Act in 1997, public school districts have only been fully funded twice; underfunded since 2009. Nonetheless, in 2015 the Mississippi Legislature approved a $2.5 billion school spending package for fiscal year 2016 which was considered an increase of $109.9 over the previous fiscal year but still falls short of being fully funded according to the MAEP requirements by roughly $211 million ("Executive Budget Recommendation", 2014).

Moreover, on the November 2015 General Election ballot two initiatives were included in an effort to address the adequate and efficient support of public schools in Mississippi. In doing so an amendment to the state constitution (Section 201: Educational opportunity for public school children) was proposed in favor of or against the initiatives. The election results revealed that Measure #42 was defeated. Initiative Measure #42 was in favor of amending section 201 of the state constitution which ballot summary read as follow:

Initiative Measure #42 would protect each child’s fundamental right to educational opportunity through the 12th grade by amending Section 201 of the Mississippi Constitution to require that the State must provide and the legislature must fund an adequate and efficient system of free public schools. This initiative would also authorize the chancery courts of this State to enforce this section with appropriate injunctive relief.
Alternative Measure #42A which was against Initiative Measure #42 stance on amending the state constitution which ballot summary read as follow:

This constitutional amendment is proposed as a legislative alternative measure to Initiative Measure No. 42 and would require the Legislature to provide, by general law, for the establishment, maintenance and support of an effective system of free public schools.

A shift in focus from school expenditures to family economic background to help explain the differences in students’ performance have been evident in previous research which asserts that socioeconomic status is far more important on a student’s performance than expenditure per pupil. Historically, the importance placed on family economic background was reflected in a landmark report known as the Coleman Report (1966) in response to the Civil Rights Act of 1964 which directed the U.S. Department of Education to address an overwhelming concern of equal education opportunity for minority students in public schools in the nation. The National Center for Education Statistics undertook this massive endeavor by administering an array of survey tools to public school students, teachers, and school officials alike in an attempt to shed light on the present state of affairs.

One question in specific that the study sought to answer was the extent to which students learn and its impact on standardized achievement tests. The report findings indicated that school quality and level of school funding had far less impact on school achievement than family economic background, students’ peers, and community influences (1966).

Research studies have shown that poor performing public schools places harsh demands on teachers to enhance student performance. To offset this pressure, parental involvement in the home environment and school activities have been seen as the key component to this missing link. A study conducted by Okpala (2001) pointed out that parental involvement and per pupil expenditures were not statistical significant in explaining math achievement scores. Okpala (2001) further argued that “the effectiveness of parental involvement depends on type of involvement, ethnicity, family income, and home environment” (2001, 115). Similarly, Caldas & Bankston (1999) explained that school spending had little to do with measured performance and that students from single parent-households were more likely to perform lower academically than peers from two-parent homes. Caldas et al (1999) further noted that unlike two-parent families, single-parenting was a much stronger predictor than race or poverty level as measured by student achievement (1999). Moreover, Parcel and Dufur (2001) emphasized that students from families with post-secondary degrees and with higher income levels were more likely to perform better and achieve higher academically in school than students whose parents lacked those abilities (2001).

An additional aspect of family economic background on school performance dealt with the amount of wealth and income within a school district or as Oates (1969) indicated the quality of local public schools within the community. Oates argued that since the majority of the local public budgets, which relies on property tax, was designated to K-12 education an increase in per pupil expenditure should naturally correlate with higher property values in communities. In contrast, low-income families were more likely to live in high poverty school districts where there was far more monthly renters than homeowners which drastically reduces the amount of property tax wealth collected from a given community which has a direct negative effect on local per pupil expenditure (1969).
While inequalities in funding of local public school districts remains a present issue to-date, the U.S. Supreme Court (1973) ruled in the landmark case on San Antonio Independent School District v Rodriguez that reliance on property taxes for school expenditures was not unconstitutional and did not violate the Fourteenth Amendment, equal protection clause; regardless of expenditure disparities across districts (Putnam et al., 2015).

While the U.S. Supreme court ruling was unsuccessful in meeting the demands of poverty school districts, an earlier enactment (Elementary and Secondary Education Act of 1965) had been created to provide financial support to children from low-income families to afford them an equal opportunity to education by raising standards in an effort to close the achievement gap and enhance student performance. A further need for education reform effort was laid out in a report entitled “Nation at Risk” (1983) which emphasized that American school systems were failing students and if not effectively corrected would only serve to threaten the economic competitiveness of the workforce (Denning, 1983).

Additionally, the reauthorization of the ESEA Act of (1965) titled “No Child Left Behind” in 2001, has been the last major federal reform effort initiated to close the achievement gap and enhance student performance among the most educational disadvantaged students in the nation. The amendment to this Act required public schools to demonstrate yearly academic progress as measured by statewide standardized tests administered to students on an annual basis. In this instance, schools are held accountable for students’ progress and performance and if repeatedly consecutive yearly improvement fails to be shown may result in public school closure and reopening as a charter school ("No Child Left Behind Act", 2001).

Methods

Research Design

This study is an investigation of the relationship between economic determinant and student achievement of K-12 students in the state of Mississippi. The study consists of a quantitative cross-sectional research to determine numerically association for data collected at one given timeframe. The sample population in this study consisted of 146 out of 152 (due to missing data) school districts in Mississippi. Within those districts there were 1,058 schools serving 492,847 students; of which approximately 133,300 were attending high school.

Data Collection

Data for the study were collected from the on-line searchable database of the Mississippi Department of Education Children’s First Annual Report for school year 2012-2013 (http://reports.mde.k12.ms.us/data). The data extracted from this report, per school district, contained one predictor variable (per-pupil expenditures) and each of the explained variables (average ACT score, graduation rate and dropout rate). Data were also extracted from the on-line searchable database of the Annie E. Casey Foundation Kids Count Datacenter for 2013 (http://datacenter.kidscount.org). The data from this search contained the remaining predictor variables (median household income, poverty school district and unemployment rate).

Data Analysis

In analyzing the data collected, descriptive statistics were utilized to describe the characteristics and values of variables of the sample population of the data collected for the
predictor and explained variables (not included in article). Next, bivariate correlation analyses were utilized to indicate the strength and significance of correlation between the predictor and explained variables. Finally, to test the hypotheses, standard multiple linear regression analyses were performed to examine all possible correlations between the predictor and explained variables.

Results

Bivariate Correlations

Pearson’s Correlation was performed to examine the relationship between student performance indicators (ACT scores, graduation rate, and dropout rate) and economic determinant predictors (per-pupil expenditure, median household income, poverty school district and unemployment rate), using SPSS. As shown in Table 1 each of the economic determinants is highly correlated and statistically significant.

The per pupil expenditure predictor is positively correlated with dropout rate but negatively correlated with ACT score and graduation rate, which seems against the hypothesis. Increased expenditure is expected to decrease dropout rates and increase graduation rates. However, the results indicate that as per pupil expenditures increase in a given year high school dropout rates are expected to do so as well, but ACT scores and graduation rates will likely decrease.

After checking the data carefully, the schools in the Delta region, which are heavily financed by federal grants, still show higher dropout rates and lower graduation rates, compared with other school districts in other regions in the State, which invest lower per pupil expenditure, attributable to lower federal grant-based funding. In sum, the correlation between per pupil expenditures and each of the explained variables resulted in weak to moderate strength of associations, ranging between .22 and -.51.

The median household income predictor is positively correlated with ACT score and graduation rate but is negatively correlated with dropout rate. This indicates that an increase in median household income equates to higher ACT scores and graduation rates, and lower dropout rates. In sum, the correlation between median household income and each of the explained variables resulted in moderate to weak strength of associations, ranging between -.28 and .53.

The poverty school district predictor is positively correlated with dropout rate but is negatively correlated with ACT score and graduation rate. This indicates that students living in high poverty school districts are less likely to perform well on the ACT and more likely than not to graduate high school, while at the same time not being at risk of dropping out of high school. In sum, the correlation between poverty school district and each of the explained variables resulted in high to weak strength of associations, ranging between .36 and -.72.

The unemployment rate predictor is positively correlated with dropout rate but negatively correlated with ACT score and graduation rate. This indicates that as unemployment climbs high school dropout rates will likely increase while scores on the ACT will decrease and graduation rates will decline. In sum, the correlation between the unemployment rate and each of the explained variables resulted in moderate to weak strength of associations, ranging between .25 and -.56.
Table 1. Bivariate Correlations between Economic Determinants and Student Achievement Indicators (**p<0.01)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Composite ACT Score</th>
<th>Graduation Rate</th>
<th>Dropout Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per-pupil Expenditure</td>
<td>-.512**</td>
<td>-.241**</td>
<td>.224**</td>
</tr>
<tr>
<td>Median Household Income</td>
<td>.532**</td>
<td>.331**</td>
<td>-.284**</td>
</tr>
<tr>
<td>Poverty School District</td>
<td>-.718**</td>
<td>-.383**</td>
<td>.361**</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>-.555**</td>
<td>-.263**</td>
<td>.249**</td>
</tr>
</tbody>
</table>

Multiple Linear Regressions

In Table 2 a standard multiple regression using stepwise method was performed to assess the ability of four economic determinants (per pupil expenditure, median household income, school poverty district, and unemployment rate) to predict K-12 students’ composite ACT scores. The multiple regression model with all four predictors produced $R^2=.570$, $F (2, 137) = 90.948$, p<0.01.

As can be seen in Table 2 poverty school districts and per pupil expenditure had significant negative regression weights, this indicates that students who live in high poverty school districts with increased expenditures per pupil are expected to perform lower on the composite ACT test. Unemployment rate and median household income predictors (not shown in the model) were found to be non-significant as it did not relate to the criterion (composite ACT scores) after controlling for all the other predictors in the model.

Table 2. Standard Multiple Regression of Economic Determinants on Composite ACT Scores

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>23.953</td>
<td>.622</td>
<td></td>
<td>38.540</td>
<td>.000</td>
</tr>
<tr>
<td>Poverty Districts</td>
<td>-.093</td>
<td>.009</td>
<td>-.611*</td>
<td>-9.929</td>
<td>.000</td>
</tr>
<tr>
<td>Per Pupil Expenditure</td>
<td>.000</td>
<td>.000</td>
<td>-.259*</td>
<td>-4.203</td>
<td>.000</td>
</tr>
</tbody>
</table>

$R^2=.570$

Adjusted R Square .564

No. Observations (N=139)

In Table 3 a standard multiple regression using stepwise method was performed to assess the ability of four economic determinants (per pupil expenditure, median household income, school poverty district, and unemployment rate) to predict graduation rates. The multiple regression model with all four predictors produced $R^2=.147$, $F (1, 141) = 24.246$, p<0.01. As can be seen in Table 3 the only significant predictor of the four variables was poverty school district which has a significant negative regression weight.
This indicates that living in a high poverty school district decreases the rate at which students should complete high school. Per pupil expenditure, unemployment rate, and median household income as predictors of graduation rates were found to be non-significant and therefore did not contribute to the multiple regression model (not shown in the model).

Table 3. Standard Multiple Regression of Economic Determinants on Graduation Rates

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>85.388</td>
<td>2.476</td>
<td></td>
<td>34.481</td>
<td>.000</td>
</tr>
<tr>
<td>Poverty Districts</td>
<td>-.328</td>
<td>.067</td>
<td>-.383**</td>
<td>-4.924</td>
<td>.000</td>
</tr>
<tr>
<td>(R^2=.147)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R Square</td>
<td>.141</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. observations</td>
<td>(N=142)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In Table 4 a standard multiple regression using stepwise method was performed to assess the ability of four economic determinants (per pupil expenditure, median household income, school poverty district, and unemployment rate) to predict dropout rates. The multiple regression model with all four predictors produced \(R^2=.130\), \(F(1, 124) = 20.631, p<0.01\). As can be seen in Table 3 the only significant predictor of the four variables was poverty school district which has a significant positive regression weight.

Table 4. Standard Multiple Regression of Economic Determinants on Dropout Rates

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>5.338</td>
<td>1.963</td>
<td></td>
<td>2.720</td>
<td>.007</td>
</tr>
<tr>
<td>Poverty Districts</td>
<td>.241</td>
<td>.053</td>
<td>.361**</td>
<td>4.542</td>
<td>.000</td>
</tr>
<tr>
<td>(R^2=.130)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R Square</td>
<td>.124</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. Observations</td>
<td>(N=139)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This indicates that students living in a high poverty school district has an increased chance of dropping out of high school within a given year. Per pupil expenditure, unemployment rate, and median household income as predictors of graduation rates were found to be non-significant and therefore did not contribute to the multiple regression model (not shown in the model).

**Discussion**

The purpose of this study was to examine the relationship between economic determinants and student performance to ascertain which predictor best explained student educational outcomes. Previous works examining economic determinants have produced mixed
evidence as to the role schools play on students’ abilities to succeed in academic settings. This study serves to build upon and expand existing works in the field by introducing four predictor variables in relation to three school performance indicators, without controlling for race, which allows for a broader discussion on the issue from one given study. Four research questions were examined to guide this study.

The first research question was “Is there a relationship between student achievement (composite ACT scores, graduation rates and dropout rates) and school funding level? It was hypothesized that higher expenditures per pupil leads to higher student achievement. It was found that an increase in per pupil expenditures is statistically positively correlated with only ACT scores. However, it had a significant negative effect which, in part, refutes the stated hypothesis that as per pupil expenditures increases so should ACT scores. Further, no relationship existed between the two remaining explained variables (graduation rate and dropout rate) and per pupil expenditures.

The second question was “Do families’ economic affluence explain the differences in student achievement?” It was hypothesized that students from families with higher median household income achieve better in school. The median household income was found to be significant in explaining student achievement indicators (composite ACT score, graduation rates or dropout rates) as educational outcomes.

The third question was “Does the location of a school district within a community impact student achievement?” It is hypothesized that higher poverty school districts leads to lower student achievement. Poverty school districts were found to be significant and the best predictor across all three indicators in relation to student achievement. Findings indicated that higher poverty school districts leads to lower composite ACT scores, a decrease in high school graduation rates, and an increase in dropout rates. These findings are not surprising since numerous research studies have shown that poverty causes an assortment of societal ills and living in a school district that has majority low-income families and a low property tax-base only strengthens the argument in the literature in this regard.

The fourth and final question was “Does the unemployment rate within a school district impact student achievement?” It is hypothesized that higher unemployment rates leads to lower student achievement. Unemployment rate was not significant in explaining student achievement indicators (composite ACT score, graduation rates or dropout rates).

**Conclusion**

The relationship between each of the predictor and explained variables for bivariate correlations were highly statistically significant; but weak to moderate in magnitude. Whereas, the multiple regression model was found to be far less effective in explaining the relationship of the dependent variables. Further only two of the four predictors (Poverty School District and Per-pupil Expenditure) were found to be statistical significant in the multiple regression model which were also weak to moderate in size.

Accordingly, the results showed that poverty school districts were found to be highly statistically significant and the best predictor across all three indicators in relation to student
achievement, which indicated that higher poverty school districts leads to lower composite ACT scores decrease in high school graduation rates and an increase in dropout rates. In essences, these findings are not surprising since numerous research studies have shown that poverty causes an assortment of societal ills and living in a school district that has majority low-income families and a low property tax-base only strengthens the argument in the literature in this regard.

A feat that appears to be greater than mandating states to fully fund public schools. Nonetheless the problem is just as real and as equally as important to enhancing student achievement. Based on the findings the question now becomes how to lift school districts out of poverty? A discussion among policymakers should be concentrated on how residents living in high poverty school districts can increase their property tax-base.

References

Political Economy, 77(6), 957. http://doi.org/10.1086/259584