

# Political Corruption, Economic Incentive, Educational Resource Input, and the Quality of Human Capital: A Panel Analysis Over Twenty-Five Years for the Fifty U.S. States

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## Abstract

This paper uses panel regression analysis on annual data for the fifty states for the period 1980 to 2004 to estimate the potential impact of political corruption on the quality of human capital, as measured by mean state student performance on scholastic aptitude math and verbal exams. The findings are consistent with the hypothesis that political corruption has a negative effect on the quality of human capital, and, as a result, a detrimental effect on economic growth. In addition, the results of the paper suggest that economic incentive also matters for educational performance, and that, unlike the findings of some earlier studies, input into the educational process, in terms of expenditure per pupil, has a positive effect on educational performance.

**Keywords:** Human Capital, Corruption, Educational performance

## 1. Introduction

Studies using international data suggest that corruption has a negative effect on economic growth (Mauro, 1995). One of the possible paths by which corruption may exert a damaging negative influence on economic growth is through its effect on human capital. The study of human capital focuses on income distribution and returns on investment in human capital as measured by income variances in society (Mincer, 1970). In an international setting, human capital is becoming more and more important as a factor in international competition with the emergence of the knowledge economy. In a knowledge economy, value is placed on knowledge-based productivity rather than resource-based productivity typically associated with an industrial economy (Levine, 2001). In recent years, governments, banks and researchers have attempted to measure and evaluate countries based on a Knowledge Economic Index (KEI). This index offers a new view of productivity that, along with theoretical measurement models, attempts to incorporate the value of knowledge into the valuation of production. Seen as a key factor in the development of wealth among countries, knowledge is recognized as a valuable resource and strong education systems are cited as essential for economic development in a knowledge economy (World Bank, 2010). This lends increasing importance to the assessment of the impact of financial resources on educational outcomes.

This paper serves to analyze the effects of corruption on educational outputs and utilizes an economic perspective to identify potential relationships between corruption, economic motivation, economic inputs and the development of human capital. An economic view of resources and the influence of corruption across states provide a new perspective on the connection between inputs and student outcomes. The integration of economic theory and educational theory, combined with a panel analysis considers the relationships between these variables in a way that has not been considered in prior studies.

In order to accomplish these objectives, this paper is organized to address three specific objectives. The first is to see whether state political corruption has a negative effect on the quality of human capital as measured by mean state scholastic aptitude test scores in verbal and math tests. The second is to see whether an economic motivational variable is relevant for educational performance. If an economic motivational variable is important, then the omission this variable may be a serious problem in models that attempt to explain educational performance. It could lead some studies to the economically non-intuitive statistical result that greater educational spending categorically has no impact on educational performance. When one increases educational input in a setting in which there is little or no economic motivation, it should be expected, not surprising, that an increase in educational inputs has little or no effect on performance. The third purpose of the paper is to see whether, once one accounts for an economic motivational variable, increased educational spending per student increases educational performance.

The paper is divided into six sections. The second section briefly highlights some of the pertinent literature. The third section discusses a simple production function style model that incorporates political corruption, resource expenditure, and economic motivation as arguments to explain educational quality. In addition, the third section identifies the variables that are used in the empirical analysis, their sources, and their relevance. The fourth section presents the results of regression runs across states and over time on a panel consisting of fifty states and twenty-five years of data. The fifth section provides a brief discussion and conclusion and the sixth and final section addresses limitations of the study.

## 2. Literature

### 2.1 *Economic Impact of Corruption*

While the consequences of corruption on an economy are discussed in economic literature, the relationship between corruption and the economic investment in human capital is considered in this study.

Corruption may take many forms within a given society. Politicians have incentive to distribute public resources to special interests, and simultaneously have an expectation of receiving personal resources in exchange to such distributions. In addition, public employees may claim benefits to which they are not entitled or provide preferential treatment in exchange for personal resources. In performing their duties, public employees may avoid performing necessary job duties, neglect oversight of employees or resources, or secure resources from sources that provide individual incentives (Hopkins, 2002).

Given that education is publicly funded, the issue of corruption holds relevance when considering the public distribution of funds, the choices regarding the effective deployment of resources, and the potential outcomes for student learning. Hanushek (1997) stated that, the structure of legislative funding presumes that spending decisions are best made by individual school districts, as they would be highly motivated to deploy resources effectively. At the same time, both the states and the federal government maintain a broad range of requirements and regulations to exert control over local districts' actions, which suggests "considerable distrust of the motivations and/or abilities of the local districts" (Hanushek, 1997, p. 154). At the same time, he noted that, in order for legislators and local districts to direct funding in ways that would improve student performance, one must know which initiatives would be most effective (Hanushek, 1997).

An initial review of the literature on the subject of corruption provides a number of articles that evaluate the economic impact of corruption. Mauro (1995) analyzed a cross-section of countries and found that corruption reduced economic growth by lowering physical investment. He also suggested that low levels of corruption may lead to high investment and growth (Mauro, 1995). Meon and Sekkat (2005) also analyzed the effects of corruption on the economy noting that corruption has a negative effect on both economic growth and investment.

One study that looked at the potential pathways by which corruption may negatively affect economic growth is the article by Pak Hung Mo (2001). Using the corruption perception index of Transparency International as a measure of corruption in a cross-country panel, Mo found that corruption exerts a negative effect on economic growth. This negative effect operates through three distinct channels: by reducing the level of physical investment in a country; by lowering the amount of investment in human capital; and by increasing political instability that results from the generation of unjustified income differences (Mo, 2001).

Political corruption may be detrimental to the quality of educational human capital for two reasons. First, corruption is likely to distort incentives (Mo, 2001) which, when applied to the field of education may affect the budgeting of educational funds within the legislature as well as the use of funds within the schools themselves. Such corruption could lead to misappropriation of funds, resource misallocation, and inefficiency. Second, corruption reduces the rate of return of investment in legitimate productive activities (Mo, 2001), thereby suggesting that both productivity gains as well as investment of resources in human would be reduced.

Aside from the issue of corruption, Chubb and Moe (1990) express skepticism that normally functioning democratic institutions are compatible with an efficient educational system. They indicate that democratic institutions, due to the very nature of democracy itself, fail to put adequate pressure on poorly performing schools to improve or that they do not sufficiently encourage successful schools. This suggests that corruption within a democratic institution may meet little resistance, and has broad implications for poorly performing schools.

Much of the literature on the topic of political corruption considers corruption across countries using published corruption indices as proxies for corruption. Mauro (1995) analyzed institutional factors and corruption to assess the impact of these factors on economic growth. We could not identify any similar established index of corruption to provide a proxy for measuring corruption across states within the U.S., so the data was compiled using data described in the Methods section of this study.

### *2.2 Economic Motivation and the Gini Index*

This study employs the Gini index as a measure of inequality of income, which may serve as a form of incentive or economic motivation within a society (Aghion, Caroli & Garcia-Penalosa, 1999). The Gini index has evolved as a principal measure of inequality within the field of economics within the last century, and may be used to measure the dispersion of a distribution of many types of data (Xu, 2004). While often used as a means to measure general income or resource disparity between countries, the Gini index has been used within the context of education to evaluate disparities in family income, school resources, funding (Baird, 2008; Peternick, et al., 1997; Wyckoff, 1992) and inequality in educational attainment (Mayer, 2000; Thomas, Wang & Fan, 2001).

Both the field of education and the field of economics consider the concept of human capital in terms of accumulated education and suggest that human capital serves to support economic returns to individuals and society (Mincer, 1970; Thomas, Wang & Fan, 2001). Hanushek (2006, p. 869) notes the importance of long-term academic outcomes and states that “future incomes of individuals are related to their past investments”. While economic theory suggests that income inequality provides incentive for greater productivity (Aghion, Caroli, & Garcia-Penalosa, 1999), educational inequality has been shown to be counter-productive for economic growth within a society (Thomas, Wang & Fan, 2001).

In support of the view of economic inequality as a motivator, Aghion, Caroli and Garcia-Penalosa (1999, p. 1615) state that “the conventional textbook approach is that inequality is good for incentives and therefore, good for growth, even though incentive and growth considerations might (sometimes) be traded off against equity”. The term incentive and motivation are often used interchangeably in economic literature.

At the same time, Cornia and Court (2001) suggest that inequality must be at a balanced level in order to provide an incentive or motivation for achievement. Extreme inequality (either too high or too low) can depress economic growth. Total lack of inequality removes incentive for increased effort as noted in certain socialist economies in the 1980s. Conversely, high inequality can lead to inefficient economies and can have a detrimental effect on education and the development of human capital. The researchers suggest that Gini coefficients of 25 to 40 appear to provide efficient levels of economic growth, and those societies seeking to reduce poverty should aim for a Gini index in the low level (25) of the efficiency range. They rationalize that economic inequality at the lower level of the range would generate the same economic growth with a faster decline in poverty levels (Cornia and Court, 2001).

In developing this study, we recognize that there is an issue with regard to the interpretation of motivation itself. While this paper takes an economic view of motivation, we recognize that motivation has been studied from other perspectives. Weiner (1990) in his “History of Motivational Research in Education,” noted the many dimensions and perspectives regarding the study of motivation. He explored the perspective of various researchers and educational psychologists who have studied motivation in an effort to identify factors that stimulate learning. The review also discussed the view that the educational research regarding motivation is confounded by the research on learning. He noted that academic performance has often be interpreted as a sign of motivation in the literature, and recognized that many variables related to learning and outcomes are inseparable or, at least, not individually identifiable. In performing this study, we recognize that the interpretations of motivation, as well as the foundational views of motivation, are varied. We believe that an economic perspective of motivation may offer a view that is relevant for policy and funding of education in the future (Weiner, 1990).

### *2.3 Educational Resources and Productivity*

The literature investigating educational productivity, which looks into the reasons for school effectiveness, is quite extensive. While the concept of productivity originates in the field of economics and centers around the relationship between economic inputs and outputs, the concept of productivity has been applied to the field of education. Within

the context of an education system, productivity generally refers to the use of inputs or resources to produce educational outcomes (Ladd & Hansen, 1999).

Reynolds, Teddlie, Creemers, Sheerens and Townsend (1999) categorized the U.S. literature on the subject into four different stages of development, noting the evolution in the literature regarding educational resources and productivity. They note that research in the 1960's began with a focus on the outcomes resulting from the application of resources while, by early 1970, research centered on the concepts of 'effective schools' and school outcomes. As the decade progressed, the 'effective school' practices evolved into targeted programs for improvement in school performance. Toward the late 1980's, research considered contextual factors and integrated previous theories on school effectiveness (Reynolds, et al., 1999).

Since that time, Reynolds et al. (1999), noted a decline in research on school effectiveness within the U.S. as compared with other countries and attribute the decline to a number of factors, including growing criticism of effective schools theory and the emergence of research that suggested that economic inputs did not affect student achievement (Reynolds, et al., 1999). They did indicate, however, that other countries such as the United Kingdom and the Netherlands actively pursued research in this field, noting increasing sophistication of their research methods.

A second review published by The National Research Council (1999), sorts past research efforts on the basis of whether researchers use an input-output approach, an educational practice, or an institutional approach in their research methodologies.

For the purposes of the present study, the major focus is the overall finding of the early input output studies with regard to educational performance and total educational expenditures. The frequently quoted original empirical study supporting the economically unpalatable theme that money does not matter for student educational achievement was the Coleman Report in the 1960s (Coleman et al. 1966). Using a sample of four thousand schools, Coleman and his colleagues concluded that, across schools, differences in school resources had little effect on achievement. The Coleman Report was quickly followed by a host of other empirical studies looking into the matter. Subsequently, Hanushek reviewed the outcomes of a substantial number of these studies and, collaborating Coleman, concluded that, overall, the studies, as a group, did not support any real systematic relationship between school spending and student achievement (Hanushek 1986, 1989, 1997).

The Coleman and Hanushek position of no resource effect on achievement, while taking on the auspices of conventional wisdom, has not gone completely unchallenged. Hedges, Laine and Greenwald (1994a) performed a meta-analysis on the same studies used by Hanushek, noting a significant, positive relationship between resource input and educational performance. They also cited as a methodological limitation of the Hanushek study noting that it employed a tally of previous research outcomes and, therefore, did not address the magnitude of the statistical effects.

In response, Hanushek (1997) maintained that there is little relationship between school resources and student outcomes, and suggested the potential for positive outcomes from additional resource allocations, even though the data indicated that such gains are infrequent. He also offered potential reasons for this conclusion, focusing on the effectiveness of resources. He suggested that the political economy may influence the ways in which school districts utilize resources and this may have considerable impact on the potential for gains in student performance. While some districts may use their resources effectively, he noted that ineffective use of resources could actually be detrimental to gains in student performance (Hanushek, 1997).

In response to Hanushek (1997), Hedges, Laine, and Greenwald (1994b) maintained that the relationship between resources and student performance is positive and significant, and suggest that the focus of further study should be on analyzing the magnitude of the positive relationship.

Research by Peltzman (1993) noted that, despite increases in overall spending on education, changes in political priorities and the rise of unions is correlated with the decline in student performance between 1960 and 1970. He suggested that competition among pressure groups for distribution of resources may have signaled a shift in the ways in which resources were utilized within school districts. He further states that schools are poorly organized to support allocation of resources in ways that improve student performance (Peltzman, 1993). As school districts shifted the ways in which they utilize resources over time, this may affect student achievement when viewed from a historical perspective (Hanushek, 1997; Peltzman, 1993). Using this theory, the level of spending may be less a factor than the political decisions employed in utilization.

Ladd and Hansen (1999) echo the idea that the effectiveness is dependent upon linking deployment to educational goals. They suggest that bureaucracy may interfere with productivity improvement initiatives and can contribute to a lack of accountability in terms of resources and educational outcomes.

Despite this ongoing discussion in the literature, Hanushek (1997) states that, while he found no significant increase in outcomes as a result of additional resources, the lack of sufficient resources would certainly result in a decline in student achievement.

Although these resource-based studies consider the potential impact of resources on educational outcomes, they fail to give adequate weight to the economic motivational dimension provided by unequal income distribution, which may influence educational performance.

#### 2.4 Measurement of Education Productivity

This study uses SAT scores generated between years 1980 – 2004 to analyze student performance. Hanushek and Kimko (2000) suggest that math and science skill serves as a reasonable proxy for the measurement of human capital. SAT scores have been used frequently in the literature as a measure of student performance (Hanushek, 2006; Peltzman, 1993). Hanushek (2006) performed an analysis of 376 studies of educational outcomes noting that 75% of them measured student performance using standardized test scores. Using SAT scores as the basis for measuring student performance offers a long-term perspective on student performance. At the same time, SATs are taken on a voluntary basis and may not reflect overall performance of all eligible students (Hanushek, 2006).

In measuring the affect of income disparity on SAT scores, the College Board provided 2010 data showing that students with family incomes of more than \$200,000 showed test results that were 29.9% higher in Critical Reading, 27.4% higher in Mathematics, and 31.3% higher in Writing than students whose families earned between \$0 and \$20,000 annually (College Board, 2010). This disparity suggests that income inequity is related to disparity in SAT results on an individual level. This is consistent with the literature that links low education levels to lower income (Thorbecke & Charumilind, 2002).

In addition to the relationship between income and SAT scores, the literature indicates that disparity in SAT scores is generally interpreted to reflect differences in school quality (Hanushek, 2006).

How are SAT scores linked to the discussion of human capital? Hanushek and Kimko (2000) indicate that math and science ability serve as a appropriate measures of human capital and are integral to the evaluation of skill levels of the labor force. Research also indicates that students' skill-based test performance has a long-term impact on future earnings (Murnane, Willett, Duhaleborde & Tyler, 2000).

### 3. Method

#### 3.1 Procedure

In an effort to evaluate the relationship between corruption, human capital, resource input and income differentiation, this study employs a simple production function for educational quality. It consists of a single equation with its associated partial derivatives. The single equation that makes up the model is as follows.

$$Q = f(C, I, M, \mathbf{Z}) \quad \delta Q / \delta C < 0, \delta Q / \delta I > 0, \delta Q / \delta M > 0 \quad (1)$$

In the equation, Q represents the quality of human capital in the form of education, C is the extent of public corruption, I represents the amount of resource input into the educational process, M represents the level of economic motivation, and  $\mathbf{Z}$  is used to represent other potential cultural and environmental variables of relevance, which for purposes of this study, considers population.

The negative partial derivative between the quality of educational human capital and public corruption means that public corruption is expected to have a negative effect on educational quality. This would be consistent with the literature on projected expectations for consequences of corruption (Chubb & Moe, 1990; Mo, 2001).

$$\delta Q / \delta C < 0$$

The literature on the impact of increased resources is divided between some researchers who have found no significant increase in student outcomes (Coleman, et al., 1966; Hanushek, 1986, 1989, 1996, 1997, 2006) and those who have found a positive impact to student outcomes (Hedges, Laine, & Greenwald, 1994a, 1994b). To test the impact of additional resources on student performance, this study predicts that increased resource input leads to improvement in the quality of educational capital.

$$\delta Q / \delta I > 0$$

Lastly, it is anticipated that income disparity may serve as an economic motivator (Aghion, Caroli, & Garcia-Penalosa, 1999), and that economic motivation has a positive effect on educational human capital quality.

$$\delta Q / \delta M > 0$$

The literature notes that people, including parents and students, respond to incentives. As parents perceive a greater return on investment from education, their incentive to support education for their children increases (Thorbecke & Charumilind, 2002). A fundamental presupposition of economics is that behavior depends on incentives. Thus, the model maintains that the greater the reward, the greater the perceived reward, from engaging in an activity, the more motivated people will be to undertake an activity, and the more energy and effort they will devote to the activity. One can consider two important factors in educational performance, educational inputs and motivation. If inputs and motivation are high, then performance will be high, but if inputs and motivation are low, then performance will be low. Now, what is important, indeed critical to realize, is that, when there is little expected reward from an activity, even if inputs into an activity are enormous, then performance is still likely to be poor. A fortiori this is apt to be the case for student educational performance in a school environment in which education is provided free.

This study further assumes that student expectations on the rewards from differences in school performance are formed by looking at the current distribution of income and evaluating its sources. The more people feel that inequality in the distribution of income is due to differences in school performance, and, the greater is the inequality in the distribution of income due to differences in school performance, the more motivated students will be to perform well in school. In the very extreme, if income is distributed equally, that is, if there is absolutely no inequality in distribution of income in society, then, assuming no intrinsic value to education itself, there is no incentive to perform well in school, that is, the motivation for school performance is absolutely non-existent. In this situation, high levels of educational input will be accompanied by low levels of educational performance and increasing educational expenditures per student will have no effect on student performance.

Hanushek (2006) did point out that, contrary to the economic assumption that individuals make decisions regarding investments in education and expected future benefits, in the case of education, parents serve as trustees to make many educational choices for students. Those choices made by parents on behalf of children may include such things as choice of school district, and may be influenced by expected future returns on educational investment. From an economic standpoint, this study maintains that income disparity serves as a motivator, whether directly or indirectly via parent choice.

### 3.2 Variable Sources

The panel data set for the analysis consists of six variables for the fifty states in the United States for the twenty-five year period from nineteen eighty to two thousand and four. The six variables in the panel, followed, in parenthesis, by their assigned variable names for the paper, are the math scholastic aptitude scores (MATHSAT), the verbal scholastic aptitude score (VERBALSAT), political corruption (PUBCORRUPT), the Gini income coefficient (GINI), real expenditures per pupil (REALEXPPERPUPIL), and population per square mile (POPDEN).

The average yearly state scholastic aptitude verbal (VERBALSAT) and math (MATHSAT) scores for high school seniors for the years 1981 to 1984 and 1990 to 2004 are abstracted from the college board website (College Board 2009). The years 1985 to 1989 and 1980 come from the Duke University Economics Department website (Duke University 2009).

We were unable to locate any established index to use for corruptions by state; therefore, this data was compiled for this study. The political corruption variable (PUBCORRUPT) uses the yearly number of federal convictions of corrupt public officials by state. The Public Integrity Section of the Criminal Division of the United States Justice Department, in their annual report to Congress, provides figures on the number of federal prosecutions of corrupt public official convictions of public officials by judicial districts (U.S. Department of Justice, Public Integrity Section, 1980-2005). The annual judicial district numbers were tallied to obtain the number of convictions by state.

The Gini coefficient of annual real state personal income inequality (GINI), is employed in the paper as a motivational variable for the years 1963 through 2003 (Guetzkow, 2009). Guetzkow calculates the Gini coefficients using the annual March Current Population Survey for smoothed data on total family income. The figures are adjusted to 2002 dollars by using the consumer price index deflator for all urban consumers (Guetzkow, 2009).

The measure of real 2005 dollar spending per student (REXPPERPUPIL) is the current expenditure per pupil in average daily attendance in public elementary and secondary schools by state divided by the U.S. GDP deflator for 2005. As the U.S. GDP deflator data is quarterly, the mean of the four quarters during the year is used as the yearly deflator in the conversion of annual nominal expenditures per pupil into real expenditures per pupil. The GDP deflator was obtained from the St. Louis Federal Reserve (St. Louis Federal Reserve, 2009). The Federal Reserve's original source for the data comes from the U.S. Department of Commerce. Current expenditures per pupil in

average daily attendance were obtained from the Department of Education's Digest of Current Educational Statistics (U.S. Department of Education 1990, 1999, 2000, & 2005).

The overall state environmental variable, population density (POPDEN), is equal to state population divided by the area of the state in square miles. Yearly state population comes from the United States Census Bureau (U.S. Census Bureau 2009). The area of each state in square miles was obtained from the Enchanted Learning website (Enchanted Learning, 2009).

The only missing values in the data set are on the public corruption variable for the years 1997 and 1999 for the State of New Mexico. Without these two missing values, the entire panel of data would be balanced for the fifty states over the twenty-five year period.

## 4. Results

### 4.1 Educational Performance Panel Regressions

Table I shows the results of regressions of the quality of human educational capital, measured by average state high school senior math and verbal SAT scores, on a set of variables proposed by the theoretical model in the second section of the paper.

Table 1 is organized as follows. The first column lists the independent variables. Each of the four subsequent columns shows the results of an individual regression run. The four different regression runs are numbered at the very top of the columns in the first row. The second row shows the estimating technique used in the equation and the third row identifies the dependent variable in the equation, math scholastic aptitude scores (MATHSAT) or verbal scholastic aptitude scores (VERBALSAT). The first pair of equations in Table 1, equations (1) and (2), shows the regression of mean state math sat scores and mean state verbal sat scores on public corruption and the three other explanatory variables using ordinary least squares. The second pair of equations, equations (3) and (4) re-estimates equations (1) and (2) using period seemingly unrelated regression (SUR).

For any given variable and equation, the top most value in the body of the table shows the estimated coefficient for the selected variable and equation. The individual t-statistic for the coefficient is underneath the estimated coefficients in parenthesis. Variables significant at the one percent level of significance or better are marked with a single asterisk beneath the individual t-statistic. The last three rows of the table show the R squared value (RSQ), the number of observations (N), and the Durbin Watson statistic (DW) for the four equations in the table.

Together, the four variables in the equations estimated by ordinary least squares (equations (1) and (2)) explain over twenty-one percent of the variation in math SAT scores in the panel data, and over twenty-seven percent of the variation in verbal SAT scores. Although there are indications of serial correlation with the two ordinary least squares equations evidenced by their low Durbin-Watson statistics, when the equations are re-run again using period seemingly unrelated regressions (period SUR), which adjusts for both serial correlation and heteroskedasticity, the findings are quite comparable to the least squares results, and the Durbin-Watson statistics move close to two.

### 4.2 Analysis

The results lend support to each of the three hypotheses put forth in the paper. First, they corroborate the hypothesis that the quality of human capital in a state is sensitive to the level of political corruption in a state. Political corruption (POLCORRUPT) is negative and significant at the one percent level of significance in each of the four equations appearing in the table.

Second, the results lend credence to the notion that economic motivation is related to student performance. Inspecting the table reveals that the Gini coefficient on income (GINI) is positive and significant at the one percent level of significance in each of the equations. From the quantitative evidence in the table, it certainly appears as though greater variance in expected future incomes is positively related to higher levels of human capital.

Third, as theorized, if an equation estimating educational performance includes a motivational variable, then the statistical results indicate that educational input is not inconsequential for student performance, but rather, that increases in educational input enhances educational performance. All the equations in table I include the motivational variable GINI, and real state expenditure per pupil (REXPPERPUPIL) is found to be positive and significant at the one percent level of significance in these equations. In addition, the predicted impact of real state expenditure per pupil on educational performance is not small. Looking at the coefficient of real expenditure per pupil in the math equation estimated by period SUR indicates that an increase in state expenditures per student by a thousand dollars in real 2005 dollars was related to an average state math SAT scores increase of two and a half points.

The other two elements in the equation, the constant term (CONSTANT) and population density (POPDEN) also act reasonably.

If one assumes that the motivational variable and the student resource input variable enter multiplicatively in Cobb-Douglas style fashion in the educational quality production function (equation (1)), and then one takes logarithms of both sides, one obtains an alternative logarithmic specification that can be used for estimation. This specification is likely to be more realistic since one expects nonexistent student educational performance when either resource inputs into the educational process are zero or economic motivation is zero. The results of estimating the logarithmic specification for math and verbal SAT scores using ordinary least squares and period SUR are given in table II.

The outcome shown in Table 2 is similar to Table 1. Once again, all the variables in each of the four equations have their theoretically anticipated signs and are highly significant. Once again, the results tend to substantiate the three hypothesis of the paper.

## 5. Conclusion

The panel regression analysis of the paper suggests that the quality of human capital can be increased by reducing political corruption, that student motivation is positively related to student performance, and that higher per pupil expenditure has a positive effect on educational quality once economic motivation and other variables are taken into account.

Well then, does money matter? The data indicate that resources are positively related to academic outcomes; however, increased student performance may depend on the effective deployment of resources towards initiatives that are directly related to improving student outcomes as suggested by Ladd & Hansen (1999) and Peltzman (1993). If political corruption causes money to be spent ineffectively, inefficiently, and solely in response to rent-seeking political forces, then it is unlikely that more money will have much positive effect on school performance (Ladd & Hansen, 1999; Peltzman, 1993). The issue of linking resource deployment to student outcomes may contribute to differences in student performance. Ideally, of course, in any situation, one would hope that money is allocated so that the incremental increase in the quality of human capital per dollar spent is the same in all uses. In this way, one maximizes the effect dollars spent to increase educational quality.

This article suggests that there are conditions under which spending matters for educational performance and conditions for which it may not. Educational school expenditures for school systems in which there is a lack of student motivation, is likely to be just a waste of taxpayer money. Similarly, in line with Peltzman (1993), spending more money in corrupt school systems seems to be of no avail. In addition, the findings of the paper also suggest that in order to improve educational performance and increase economic growth through enhancement and improvement of human capital, there needs to be, not just increases in expenditures, but that steps must be taken to create an environment in which increases in educational expenditures lead to improved student outcomes. Public officials, administrators, and everyone involved in the educational process must be held strictly accountable so that there is little or no corruption and that spending decisions are driven by the priority to improve educational outcomes. In the literature, Hanushek (1997) and Peltzman (1993) indicate that the ways in which school districts utilize resources affect student outcomes, indicating that the issue of accountability and targeted spending must become high priorities for the efficient use of resources.

In addition, the literature also notes that the potential for differential income serves as an incentive to individuals. This suggests, consistent with our findings, that individuals who perceive the potential for reward based on their efforts will be more motivated to achieve. Thorbecke and Charumilind (2002) note that parent support for education increases when they perceive a greater return on investment from education. A potential concern for the educational system thus arises when students do not perceive the value of education in terms of its potential affect on their future earnings due to their socio-economic situation or their level of self-efficacy. As a result, motivation to work hard in school may be viewed as futile. Given the potential for such a negative scenario, policies must be enacted to increase the real future rewards of education and to make both students and parents aware of these rewards.

## 6. Limitations

In performing this study, several limitations must be noted. Although we attempt to evaluate the relationship between political corruption, economic motivation, educational resources, and quality of human capital, we recognize that the outcomes may also be affected by factors that are impossible to measure or impossible to separate as distinct variables.

In addition, we have employed the concept of income inequality as a measure of motivation and recognize that this view of motivation stands in contrast to the concept of behavioral or student motivation that is covered extensively

in education literature. Although researchers have studied the various factors that may influence student motivation, we utilized income disparity, which serves as a motivational factor within the economic literature, to determine the impact on student outcomes across states. Our study considers variables at the state level, and does not consider individual data or sources of motivation. This decision reflects a broad economic focus on the relationships between the test variables.

It would be nice to have a measure of corruption specifically related to school districts, state education departments, and other agencies directly involved in education of students. Lacking such direct data, we compiled data based on corruption within the states but recognize that the lack of direct data serves as a limitation of this study.

We must also acknowledge that student outcomes, as represented in this study by SAT scores, may reflect the cumulative effect of many years of learning as well as investment of resources as noted by Hanushek (2006). If this is the case, one could argue that the SAT scores for any given year reflect cumulative values whereas the study data related to spending and corruption is linked to specific years. Although we do not address this issue, our use of panel data analysis does look at data across both time and states for each year. It is our belief that this approach provides a rigorous analysis of the potential relationships between the data, and addresses to the extent possible, the issue of the cumulative investment in education and student outcomes.

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Table 1. Panel Regressions Estimating the Effect of Political Corruption and Other Variables on Average Math and Verbal Scholastic Aptitude Scores for the Fifty States for the Years 1980 through 2004

	(1)	(2)	(3)	(4)
	ORDINARY LEAST SQUARES	ORDINARY LEAST SQUARES	PERIOD SUR	PERIOD SUR
	MATHSAT	VERBALSAT	MATHSAT	VERBALSAT
CONSTANT	399.56 (26.13) *	226.96 (11.74) *	437.80 (70.22) *	322.54 (32.62) *
PUBCORRUPT	-.21371 (-4.56) *	-.42729 (-7.20) *	-.04707 (-4.33) *	-.08665 (-4.74) *
GINI	307.14 (7.07) *	690.79 (12.58) *	184.66 (11.32) *	390.70 (14.35) *
REXPPERPUPIL	.00025 (4.03) *	.00466 (5.90) *	.00249 (7.58) *	.00539 (11.63) *
POPDEN	-74.44 (-10.85) *	-72.31 (-8.33) *	-46.80 (-3.56) *	-58.67 (-3.40) *
RSQ	.212	.279	.982	.975
N	1048	1048	1048	1048
DW	.097	.245	1.774	1.618

Table 2. Panel Regressions Estimating the Effect of Political Corruption and Other Variables on the Log of Average Math and Verbal Scholastic Aptitude Scores for the Fifty States for the Years 1980 through 2004

	(1)	(2)	(3)	(4)
	ORDINARY LEAST SQUARES	ORDINARY LEAST SQUARES	PERIOD SUR	PERIOD SUR
	LOG (MATHSAT)	LOG VERBALSAT	LOG MATHSAT	LOG VERBALSAT
CONSTANT	6.18 (65.68) *	6.10 (49.17) *	6.07 (129.97) *	5.74 (82.08) *
PUBCORRUPT	-.00042 (-4.68) *	-.00088 (-7.42) *	-.00009 (-4.47) *	-.00002 (-4.91) *
LOG(GINI)	.2388 (7.64) *	.5446 (13.21) *	.1434 (11.82) *	.3201 (15.60) *
LOG(REXPPERPUPIL)	.0373 (4.12) *	.0770 (6.57) *	.0382 (7.96) *	.0915 (13.31) *
POPDEN	-.1376 (-10.90) *	-.1383 (-8.25) *	.0858 (-3.35) *	-.1148 (-3.43) *
RSQ	.220	.296	.999	.999
N	1048	1048	1048	1048
DW	.104	.264	1.75	1.618