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Explaining State-Level Student Dropout Rates: The Impact of Exit Exams and Public School Resources

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This paper examines one key indicator of school performance, the dropout rate among the public school students at the state level from 1998 to 2002, using a pooled, cross-sectional time series research design. In this analysis the effects of high stakes testing (i.e., exit exams required for graduation), funding levels, and other school resources are examined. The results indicate that exit exams have no statistically significant effects upon dropout rates. Per pupil expenditures do not seem to reduce dropouts and may in fact have a positive effect at the state level. However, the analysis indicates that high pupil to teacher ratios and population change increase dropout rates. In addition, collective bargaining among public school teachers is found to reduce dropout rates. These findings indicate that much of the fear that exit exams will lead to massive dropout rates is misplaced.

Key Words: Kentucky, Education Policy

Many educators, parents, and scholars have been concerned with the problem of students dropping out of school without receiving a diploma for some time now. This is a matter of general policy concern because there is considerable evidence that dropping out of high school is related to many undesired consequences. For example, high school dropouts earn less, are less likely to remain in the labor force, are more likely to be unemployed, are less likely to be healthy, and are more likely to be incarcerated than individuals who graduate from high school (Laird, DeBell, and Chapman 2006).

Some scholars have argued that the amount of spending at the K-12 education level impacts the dropout and graduation rates of students. Clune (1994) and Collins (2004), among others, contend that adequate funding is often lacking to provide enough resources to enable students to reach state educational standards and more general academic goals. However, much of

the extant literature on the financing of schools shows that figuring out how much is “enough” when it comes to resources for education is a difficult task (see, generally, West and Peterson 2007). Not “enough” funding for resources is usually argued to have an adverse impact on dropout rates. Even if there is “enough” funding, there is not an easy way to know for sure that the resources are being distributed in a way that will reduce dropout rates.

In recent years, several states have begun to require high school students to pass exit exams before graduation. This step has been adopted to ensure that graduating seniors meet at least some level of academic proficiency, and to motivate students, teachers, and parents to make sure that proficiency is achieved. However, some critics (e.g., Amrein and Berliner 2002; Berliner and Nichols 2007; McNeil, *et al.* 2008) contend that these “high stakes tests have all kinds of undesirable consequences for student learning and dropout rates. Although this research has been met with significant criticism, particularly on methodological grounds (see, e.g., Raymond and Hanushek 2003; Greene and Winters 2005; Wilkins 2008), it seems intuitively plausible to contend that students who fail or who fear failing an exit exam might become discouraged and drop out of school.

This paper will examine the effect that funding levels, other measures of school resources, and exit exams have upon dropout rates in public school systems across the United States. A number of additional factors, relating to the demographic and socioeconomic background of students and their schools will also be studied.

LITERATURE REVIEW

Approximately five percent of the high school students in the United States drop out each year and a rising number of these students are obtaining a General Educational Development (GED) certificate rather than a regular diploma. The percentage of GED passers in the United States between the ages of 16-24 has increased over the years 1996-2002 (U.S. Department of Education, National Center for Education Statistics 2006).

One possible cause of this problem might be an inadequate amount of resources devoted by schools to keeping students on track for graduation. A lack of funds (or a skewed distribution of funds among schools and school districts) has long been blamed for a number of problems facing public education. Usually these distributional issues have been attributed to the dependence of public school systems on local property-tax revenues. These differences in revenues have led to some disparities in expenditures between rich and poor school districts (see, e.g., Biddle and Berliner, 2002). These differences also lead to disparities in student access to services and programs, some of which may affect the propensity of a student to remain in school.

Initial efforts to eliminate disparities in revenues and expenditures among districts in states have been difficult, with questionable impacts upon

measurable school and student performance. Yet one of the more recent developments made in response to these funding disparities has been a shift in focus from the effort to equalize educational spending to one creating adequacy in educational funding for all districts. Adequacy, not equality, was the key consideration in court litigation determining the constitutionality of state school-finance arrangements, starting with Kentucky's Supreme Court case *Rose v. Council for Better Education* (1989) 790 S.W.2d 186, Ed. Law Rep. 1289 (Clune 1994). Instead of emphasizing equality in per-pupil spending, courts now stress provision of high minimum outputs as the primary goal in financing schools (Clune 1994).

Adequacy, however, is difficult to define as measure. There are no universally accepted methods available to determine adequate funding levels for different types of students. The relationship between educational inputs and outputs has never been fully understood and figuring out the level of resources that are needed to produce a certain level of achievement is challenging (see Hanushek 1986; 1989; 2003). Certain students and school systems may require higher levels of resources to achieve desired performance goals, therefore a crucial part of an adequate system would contain additional resources for students that have special needs. Odden (1999) notes that because of this, adequate funding will most likely vary depending on student and district characteristics. Many state constitutions require that the state education system be 'thorough and efficient,' 'uniform,' or 'equally open to all'. State courts have applied these standards in various ways in many court cases over the last three decades (see West and Peterson 2007).

As stated earlier, extant empirical research is mixed on the question of whether expenditures on school resources have a positive effect on most students' outcomes. The same is true with exit exams. Amrein and Berliner found evidence linking exit exams and dropout rates but Carnoy and Loeb (2002) and Greene and Winters (2004) found no evidence of such a relationship. Rumberger (2001) summarized extant research by saying that dropping out is a complex process and that many factors, including personality traits, the home environment, prior educational experiences, economic conditions, contribute to dropout decisions over a long period of time. Still other factors that could come into play include GED acquisition policies, retention policies, compulsory school attendance laws, labor-market opportunities and policies, graduation requirements, teenage pregnancy, family wealth and income, parental educational background, and prior student academic achievement (Rumberger 2004; Landis and Reschly, 2011). Intuitively, one would suspect that exit exams increase dropping out, but the empirical research calls that into question. Possibly students in states with exit exams are motivated to work harder to attain proficiency in the tested subject matter, or perhaps the level of performance needed to pass is set so low by

state policymakers that the impact of the exams is negligible (see Greene and Winters, 2004; cf. Borg, Plumlee, and Stranahan, 2007).

In any case, more research on these phenomena is warranted. In the analysis reported here, the effects of state-required exit exams and state-level school resources are examined. Other factors that might affect state level dropout rates are also included as control variables.

DATA AND METHODS

The method of analysis that utilized here is a pooled, cross-sectional time series analysis. Because of the structure of the data, with states by year as the unit of analysis, ordinary-least-squares regression is not appropriate. Pooled cross-sectional data often suffers from autocorrelation, which, while not biasing the coefficients, does lead to smaller standard errors. Also, analysis of such data may suffer from heteroscedasticity, which again will underestimate the standard errors (Sayrs, 1989). Tests of the data showed that both autocorrelation and heteroscedasticity were a problem, so the use of OLS would have led to an over-estimation of the statistical significance of the independent variables. To overcome these problems the analysis used regression with panel-corrected standard errors, and accounted for heteroscedasticity and autocorrelation (Beck and Katz 1995).

Initially, the analysis used data from 1998-2002 for all fifty states. The limited availability of data for some independent variables for certain states make it difficult to examine a longer time period. In any case, this time period approximates that examined by Amrein and Berliner. Ultimately, the analysis was conducted on the thirty-eight states for which adequate amounts of data were available. Dropout rate is defined here as the event dropout rates that measure the percentage of public school students in grades 9-12 who dropped out of school between one October and the next. More specifically "the event dropout rate estimates the percentage of public high school students who left high school between the beginning of one school year and the beginning of the next without earning a high school diploma or its equivalent (e.g., a General Educational Development certificate, or GED). It can be used to track annual changes in the experiences of students in the U.S. school system" (Laird, DeBell, and Chapman 2006, 1). These data were reported by the states to the U.S. Department of Education, National Center for Education Statistics.

While the dependent variable in the state-level analysis is dropout rate, the principal independent variables are pupil/teacher ratios, number of teachers, salary of teachers, per pupil expenditures, median income, and the presence of exit exams. Per pupil expenditures is defined here as the average current expenditures per pupil in a given year. Per capita expenditures is the amount of dollars spent, divided by the U.S. Census Bureau estimated resident population, as of July 1, the previous year. Estimates also reflect revisions based on the 1990 Census of Population. Data on the number of teachers and

average salary of teachers was taken from the Common Core of Data (CCD) set. The Common Core of Data (CCD) is a program within the U.S. Department of Education's National Center for Education Statistics (NCES) and was one of the two main sources for the independent and dependent variables. The other main source was the U.S. Census Bureau website census.gov. The NCES annually surveys all public schools, education agencies, and all state agencies throughout the United States. The CCD has three divisions of information: general descriptive information on schools and school districts, data on students and staff, and fiscal data. Data on collective bargaining of teachers by state was derived from the NCES *Schools and Staffing Survey* (1994).

Median income was taken from the U.S. Census Bureau site for each year and state. All dollar figures were converted to constant dollars using the price deflators posted on the Department of Labor Bureau of Labor Statistics web site (U.S. Bureau of Labor Statistics 2009). States having exit exams were assigned a score of 1 and the states that did not have exit exams with a score of 0, using the listing of eighteen "high-stakes testing states" provided by Amrein and Berliner (2002).

Additional variables are added as controls. These include the percentage of public school teachers in the state covered under collective bargaining for the state, and the percentage change in population in the state for the period from 1998 to 2002. The collective bargaining variable is included because many scholars believe that teacher unionization may have adverse (see Peltzman 1993; Peltzman 1996; Hoxby 1996) or alternatively beneficial (Steelman, Powell, and Carisis 2000; Milkman 1997) impacts on student outcomes. Other research indicates that collective bargaining has no net effect on dropout rates (Lovenheim, 2009). The population change variable is included because significant movement of households could affect recorded dropout rates in two ways. First of all, movement of students across districts could cause school officials to lose track of students, thereby causing them to be recorded as dropouts, whether they have actually quit school or not. Secondly, frequent movement of households could affect dropout rates in a causal way if transient students fail to adjust to new surroundings. Once discouraged by a new move, they may do badly in school and drop out altogether.

For this analysis we controlled for autocorrelation using the Wooldridge (2002) test, which is especially designed for panel data. After discovering significant autocorrelation, panel-corrected standard errors were used in making the estimations. We also estimated model with an AR1 autocorrelation structure, using STATA. Ironically, the results, summarized in Tables 1, are not strikingly different from results derived from using ordinary least squares regression with year dummy variables included to impose stationarity. Some observations were notable outliers, but excluding them

from the data set did not substantially affect the findings. The next section discusses these results.

Table 1. State Level Dropout

Variables	Rate 1998-2002	Coefficients (Z-Ratios)
(Constant)		-20.341*
		-2.87
States Has Exit Exam		.0191
		.957
Per Pupil Expenditures (\$1000s)		.403*
		2.07
Pupil to Teacher Ratio		.39*
		3.58
Average Teacher Salary		-.0001
		-1.62
Percentage of Public School Teachers Covered under Collective Bargaining		-.0175*
		-3.92
Median Family Income (\$1000)		-.00001
		-.64
Population Change		19.757*
		2.58
p		.6752597
R square		.6675
Wald χ^2		68.52
Number of Observations		184

DISCUSSION

Table 1 reports statistical results for the primary model containing the variables discussed in the section on data and methods. This model evaluates the effect of expenditures, pupil teacher ratios, median income, and exit exams on dropout rates. The z-ratios indicate the statistical significance of the independent variables. First of all, per pupil expenditures seem to lead to slightly increased dropout rates. In other words, the more spending per pupil

means that there will be an increased dropout rate, although the effect is relatively small in a substantive sense. However, the ratio of students to teachers increases dropout. Presumably a state that wished to reduce dropout by reducing the student-to-teacher ratio would have to increase expenditures in that functional category, even though the analysis reveals that the overall effect of expenditures in general is to increase the dropout rate. As expected, population change increases dropout while, less obviously, the extent of collective bargaining reduces it.

Some of the most important results are those that are not statistically significant. For example, exit exams do not appear to have any impact whatsoever upon dropout, nor does state-level median family income. The non-effect of exit exams differs from the conclusions reached by Amrein and Berliner, although it is consistent with other research. The lack of impact for median family income may be highly aggregated nature of the variable. Virtually all education research, using individual students as the units of analysis, finds that socioeconomic status is related to student outcomes, but state-level measures of the same variable may not have a discernible effect. Teacher salaries also have no effect, which could also be a result of the level of aggregation or the failure to control for labor market characteristics (Loeb and Page 2002).

CONCLUSION

This study describes some fairly controversial findings (and non-findings). Exit exams at the state level do *not* appear to affect dropout rate, as some education researchers have argued. Per pupil expenditures appear to increase dropout at the state level. High pupil-teacher ratios, which should be affected by per pupil expenditure levels, appear to increase dropout rates. This suggests that how money is spent may be much more important than how much is spent. Collective bargaining of school teachers, which may affect the demand for more expenditures and more teachers, also seems to reduce dropout rates.

Obviously research on these issues should not stop here. Ideally, analysis on smaller units of analysis such as individual schools and even individual students should examine these relationships more closely. A better measure would be at the level of the individual school. Better still would be measures of dropout with the individual student as the unit of analysis. Perhaps then some of these complex relationships will be understood.

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