The Impact of Education Finance Litigation Reform on Resource Distribution: Is There Anything Special About Adequacy?

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0. Abstract

Two of the most prominent principles championed in school finance-related policy are equity and adequacy. The thick of empirical literature related to equity and adequacy has focused on the effect of court-mandated reform on resource distribution – a logical bridge considering both are derivatives, legally, of the United States Constitution and the legal system has been a primary driver compelling school finance reform. For example, 36 states had their respective state funding mechanisms challenged on equity grounds, while 37 states had the constitutionality of their respective funding mechanisms challenged on adequacy grounds. And, of these states, state funding mechanisms were ruled unconstitutional on 27 occasions. This article reports the results of a study on the impact of court-mandated reform on resource allocation patterns and whether differences exist between equity versus adequacy rulings. Results of whether there are fundamental resource allocation differences as a consequence of court-mandated reform based on adequacy versus equity grounds are mixed.

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1. Introduction

Two of the most prominent principles championed in school finance-related policy are equity and adequacy. Both are derivatives, legally, of the United States Constitution's equal protection clause in the 14th Amendment and have affected United States public education system more so than any other reform in the last three decades. By way of example, 36 states have had their state funding mechanism challenged on equity grounds since California's *Serrano v. Priest* (1971), while 37 states had the constitutionality of their funding mechanism challenged on adequacy grounds since Kentucky's *Rose v. Council for Better Education* (1989). And, of these states, state funding mechanisms were overturned on 27 occasions.

Despite the fact that existing theoretical scholarship suggests adequacy and equity portend substantively different conceptualizations of resource distribution (Guthrie, 2004; Ladd & Hansen, 1999; Odden & Clune, 1998; Clune, 1994), there are no national scale studies that empirically unravel the differential impact of equity- versus adequacy-based reform on resource distribution. Given such, this paper contributes to increasing scholarly and public interest in educational adequacy by using two national datasets - the Census of Governments: School System Finance F-33 File and the Longitudinal School District Fiscal-Nonfiscal (FNF) File – to answer the following questions:

- What is the impact of court mandated reform on resource distribution?
- Do different resource distribution patterns exist following equity and adequacy-based reform?
- If different resource distribution patterns exist, does adequacy-based reform further reduce inequality or perpetuate the "right" kind of inequality (i.e. inequality resulting from a state funding mechanism taking into account varying needs of different types of students)?

How to make sense of what is meant by school finance equity and adequacy in terms of the distribution of educational provisions, however, is a tricky proposition given the presence of multiple definitions for interpreting these concepts. Equity in its broadest sense refers to fairness in the distribution of educational goods and services, whereas adequacy espouses that a sufficient level of resources be available to all students, thus providing them opportunity to at least reach a level of proficiency defined by state standards.

In the context of this paper, we interpret equity as horizontal equity and adequacy as vertical equity. Horizontal equity advocates equal treatment to all similarly situated students within a jurisdiction. Vertical equity, conversely, advocates the unequal treatment of those for whom an equal outcome or condition is desirable, but for whom different treatment or opportunity is necessary to achieve it. In a system that promotes horizontal equity, for example, all students would receive the same resources regardless of their gender, age, needs, race, skills, and so on. In a system that promotes vertical equity, on the other hand, all resources would be distributed differently to each subgroup of students based on defined differences in background characteristics. As articulated by Underwood (1995) and Ladd and Hansen (1999),[2] vertical equity is very much aligned with the more contemporary notion of educational adequacy especially when dealing with educational inputs. Given such, this analysis' discussion of equity refers to horizontal equity while its discussion of adequacy refers to vertical equity.

The subsequent analysis is divided into 6 sections. In section 2, we differentiate equity from contemporary adequacy and review notable literature on school finance reform, outlining in section 3 the data source, data development procedures, and variable coding methods used in the study. In section 4, the analytic strategies employed are addressed. Section 5 presents summary

[2] Ladd & Hansen refer to adequacy as equity II, a remnant of its birth in the equity education finance reform movement.

statistics for education spending and inequality of education resource distribution. In section 6, we detail results from our empirical analysis of court-mandated reform based on equity versus adequacy. Finally, in section 7, implications for policy and recommendations regarding the logical next steps for further investigation of the impact of equity versus adequacy litigation on public school resource distribution are discussed.

2. Relevant Literature on Equity and Adequacy

As the summary of relevant literature below indicates, recent academic studies have not differentiated between equity and adequacy-based reform on a national scale. This is due both to data limitations and the fact that education finance as a field of scholarly study has become increasingly interested in micro-level analysis of resource distribution patterns, methods for operationalizing educational adequacy, and whether a redistribution of resources impacts student outcomes and/or neighborhood and housing components. Regardless of the imperative for a shift in the focus of scholarly thinking, it is vital to know whether differences between equity and adequacy exist.

Until recently, data limitations did not permit for a national scale study of court-mandated reform that encompassed both equity and adequacy era reform. In 1998, for example, Murray, Evans, & Schwab (1998; hereafter referred to as MES) conducted the most comprehensive analysis of court-mandated reform on resource allocation.[3] They generated a nationwide panel dataset with more than 16,000 districts and estimated a series of econometric models to assess whether funding disequilibrium had decreased within and between states between 1972 and 1992. Key among a host of findings, MES concluded that as a result of court-mandated reform

[3] Other studies of similar magnitude were conducted by Corcoran, Evans, Godwin, Murray, & Schwab, 2003; Card & Payne, 2002; Evans, Murray, & Schwab, 1999; Wyckoff, 1989; Silva & Sonstelie, 1995).

intrastate inequality was dampened to the point that disparities between states were greater than disparities within states; spending rose in the lowest and median spending school districts and remained constant in the highest spending districts; and increased spending was a result of higher taxes and not a reallocation of resources from other government expenditure categories such as hospitals, health care, and highways. However, Kentucky was the only state whose finance system had been overturned on adequacy grounds prior to 1992.

Education finance as a field of scholarly study has begun to shift focus away from large scale national comparisons and more to micro-level analysis of resource distribution to determine how individual schools within a district compare financially. Such within-district studies were first explored by Summers & Wolfe (1978) and most recently championed by Stiefel, Berne, & Rubenstein (1998), Betts, Reuben, & Dannenberg (2000), Iatarola & Stiefel (2003), and Roza & Hill (2004). Many of these studies contrast horizontal and vertical equity principles. However, within-district analyses do not permit state-by-state renderings of resource allocation patterns – the very level from which funding mechanisms are designed. Without a nationally representative data set containing sufficient fiscal and non-fiscal information disaggregated to the school-level such an analysis remains unfeasible.

The desire of modern policy makers to gather information regarding the costs of offering services geared toward elevated performance has further propelled researchers to develop methods to operationalize educational adequacy. Recent studies conducted by many of the field's leading scholars espouse several technical approaches to costing out educational adequacy (AIR & MAP, 2004; Duncombe, 2002; Reschovsky & Imazeki, 1999; Augenblick & Myers, 1997; Duncombe & Yinger, 1999; Guthrie & Rothstein, 1999; Odden, Fermanich & Picus, 2003).[4]

[4] For a description of these methods see Imazeki & Reschovsky, 2005; Downes, 2004; Guthrie, 2004; Duncombe & Lukemeyer, 2002; Taylor & Keller, 2003; Guthrie & Rothstein, 2001.

Even though these projects represent the most advanced techniques presently available for costing-out adequacy, it is evident that policy makers are asking adequacy-related education finance questions far faster than social scientists and education finance policy specialists can reasonably supply answers (Guthrie, 2004).

A rapidly growing body of literature examines if redistribution of resources impacts such education outcomes as SAT or ACT scores, standardized reading and math scores, drop out rates, and/or private school attendance patterns (Roy, 2004a; Clark, 2003; Card & Payne, 2002; Hoxby, 2001; Husted & Kenny, 2000; Downes & Figlio, 1998). Findings from these investigations run the gamut. Card & Payne (2002), for example, draw a series of random samples of SAT scores to model the impact of school finance reform on student outcomes. Their results suggest that redistribution of resources narrows the distribution of SAT scores. Hoxby (2001) tests the impact of school finance equalization schemes on private school attendance patterns and drop out rates. She finds that school finance equalization schemes reduce dropout rates for students from disadvantaged backgrounds, while others increase private school attendance patterns dependent upon marginal tax rates. Clark (2003) tests whether the Kentucky Education Reform Act (KERA) impacted student ACT scores. She finds no evidence that KERA narrowed the gap in test scores between wealthy and less wealthy districts. These studies play an important role in understanding the impact of school finance equalization schemes and the redistribution of resources on educational outcomes; however, they still do not explicitly differentiate adequacy-based reform from equity.

In a similar vein, several studies have examined the impact of court and legislative finance reform on housing and population heterogeneity (Roy, 2004b; Dee, 2000; Aaronson, 1999). For example, Dee (2000) examines how court-mandated reforms have impacted housing

values and residential rents in targeted districts, while Aaronson (1999) provides evidence that court and legislative school finance reforms alter neighborhood income homogeneity. Most recently, Roy's (2004b) case study of Michigan's Proposal A found an increase in housing stock and property values in low socioeconomic areas, which implies a decline in neighborhood sorting.

Existing studies, on the whole, are mute on providing a national rendering of equity versus adequacy-based reform on resource distribution. By building upon the data set, data development procedures, and quantitative methodology used in MES's seminal work, this study sets out to not only fill the apparent void in the existing knowledge base, but also contribute important information concerning differential impact of equity and adequacy finance reform on resource allocation. Existing theoretical scholarship makes clear adequacy heralds a new wave of education finance reform. Yet, there are no empirical assessments establishing if there is anything special about adequacy.

3. Data Source, Data Development and Coding Procedures

This study employs district level data on expenditure by function to evaluate the impact of court-mandated reform on resource distribution patterns and whether equity versus adequacy-based reform are fundamentally different. More specifically, this section describes the data sources, data development, and coding procedures used to ask the following questions: (1) What is the impact of court mandated reform on resource distribution; (2) Do different resource distribution patterns exist following equity and adequacy-based reform; and (3) If different resource distribution patterns exist, does adequacy-based reform further reduce inequality or

perpetuate the "right" kind of inequality (i.e. inequality resulting from a state funding mechanism taking into account varying needs of different types of students).

Data Source

The primary data for this study are drawn from the Census of Governments: School System Finance F-33 File. A census of governments has been taken in every year ending in either 2 or 7 since 1957, as required by Title 13, United States Code, Section 161. The census covers three main areas – government organization, public employment, and government finances. This study relies on the government finances F-33 file, which contains revenue, expenditure, debt, and asset information for public elementary and secondary education. More specifically, our analyses of the F-33 data file spans a 30 year period (1972-2002) and focuses on expenditure figures.

A secondary data set, the Longitudinal School District Fiscal-Nonfiscal (FNF) File, was used for a series of derived analyses to better understand the meaning of primary results. The FNF file is collected collaboratively by the National Center for Education Statistics of the United States Department of Education and the Governments Division of the United States Bureau of the Census. All data are generated from the annual Common Core of Data survey and Common Core of Data School District Finance survey.[5] The FNF file contains fiscal information for the academic years 1989-1990 through 1999-2000 and nonfiscal information for academic years 1988-1989 through 2000-2001. Thus, it is ideal for testing hypothesis about longitudinal trends. Our analysis of the FNF file spans an 11 year period (1990-2000).

[5] Though these data sources are generated collaboratively differences do exist. The two data files, for example, differ in the inclusion in the NCES file of state government expenditures for and on behalf of school districts in certain subtotals, and in the classification of certain revenues as being from local or state sources, and in the inclusion of state-chartered charter school districts. In addition, the data files differ in name. Census refers to its data file as the *Annual Survey of Local Government Finances: School Systems* and NCES refers to theirs as the *Common Core of Data, School District Finance Survey*.

Data Development

In many respects data development procedures for both data sets mirror those employed by MES as a portions of our data were obtained from Dr. Sheila Murray. Four states (i.e., Alaska, Hawaii, Montana, and Vermont) and the District of Columbia were deleted from both data files. Alaska was removed from the data set because of its unique governance structure for education and that only a sample of districts had finance data reported in 1982.[6] The state provides much of the financial support of local education agencies and, in several regions, no local governments are organized to collect taxes. In 1997, 19 of Alaska's 53 school districts were completely dependent upon state and federal support to operate their respective school systems. As a result of the sizable variance in expenditures among Alaska's city and borough school districts, it is difficult to generate a legitimate comparison of inter-district inequities.

Hawaii and the District of Columbia were deleted from the data set since the school systems are a single district. Hawaii is a state operated school system with only one district, and the District of Columbia has only one school district within its jurisdiction. The governance structures in Hawaii and DC effectively mean that all funds are allocated to one source. Given that district information is a crucial unit for generating equity statistics and that it is not possible to examine disparities in expenditures over time and across multiple units, Hawaii and DC were excluded from both data sets.

Montana and Vermont were deleted since they are predominantly comprised of independent school districts. In 1997, for example, Montana operated 447 school districts, of which all are independent. Vermont operated 292 school districts, of which all were independent. The remaining 46 states in our sample were restricted to unified, regular, and currently operating

[6] Hussar and Sonnenberg (2000) note that, "There were 33 districts on the F-33 for Alaska in 1982, which was a universe year. This was the same number reported in 1981, which was a sample year, and substantially less than in the two closest universe years of 1980 (52 districts) and 1987 (55 districts)" (A2.7).

school districts to minimize fiscal disparities between unified and independent, vocational or special education, and nonoperating school districts.

Non-unified school districts were removed from the analysis because they are different in scale and organizational goals and, as a result, costs typically vary (Odden & Picus, 2003). While some finance studies have combined standardized non-unified districts' revenues with those of unified districts or used pupil-weights to combine all district types (O'Leary & Moskowitz, 1995), we did not attempt to reconcile differences across different district types considering more than 90 percent of all public school students are educated in unified school districts. Any district with zero or missing enrollment and expenditures was also deleted.

An expenditure measure, as opposed to a revenue measure, was used to calculate three horizontal equity measures since reporting of expenditure measures is more consistent over time. Sates have been required to use accounting principles identified in the *Financial Accounting for Local and State School Systems* or the *Financial Accounting for Local and State School Systems 1990* for expenditure data and not revenue data. Thus, using an expenditure measure is likely to create more consistent comparisons across districts and states.

This study relies on total current spending for elementary and secondary education programs. Even though authors of more contemporary finance studies prefer instructional expenditures over current expenditures as their measure of choice (Hussar & Sonnenberg, 2000), we are temporally bound since only the current expenditure accounting code has been consistently reported from 1972-2002. Given such, we must concede to such limitations as geographic variation in operating expenditures and discrepancies in the definition of current expenditures. For instance, in many states, the coding of purchased items as a current expenditure or capital expenditure registers as the cost of the item. Approximately half of all

states use a capitalization threshold to determine whether expenditure should be counted as property or a current expenditure, though this dollar threshold in 1999 ranged from $250 (Hawaii) to $5,000 (Georgia, Massachusetts, Montana, and Texas).

Current expenditures do have several advantages. First, current expenditure is one of the items used to calculate a state's per pupil expenditure that is then used in the funding formula for allocating Title I funds. Current expenditure is therefore subject to audit by the Inspector general's Office of the United States Department of Education. Second, instructional expenditures which are used in lieu of current expenditures do not capture less wealthy or smaller districts' deferment of capital expenditures and maintenance to keep class sizes and teacher salaries at par with neighboring districts (Hussar & Sonnenberg, 2000). There are inevitable constraints regardless of using current or instructional expenditure as a spending variable. Nevertheless, we still believe current expenditures are the most comparable expenditure for cross-state examinations.[7]

We converted total current expenditure to per-pupil terms by dividing the district total current expenditure by the total enrollment number in the district. Furthermore, all expenditure data was deflated to 2002 dollars using the Bureau of Labor Statistics' Consumer Price Index inflation calculator which uses the average Consumer Price Index for a given calendar year.

Outliers in the F-33 file were removed according to the same algorithm used by MES. In each state, districts with per-pupil expenditure greater than 150 percent of the 95th percentile un-weighted per-pupil expenditure or less than 50 percent of the 5th percentile un-weighted per-pupil expenditures were removed.

[7] We are grateful to William Fowler and Frank Johnson of the National Center for Education Statistics for providing detailed information concerning financial accounting practices and reliability of spending categories across states.

Considering a second data set was utilized to test a series of hypothesis resulting from our initial findings, we evaluated the comparability of the F-33 and FNF panel data files. The correlation between state-level per-pupil expenditures in 1997 is .99. The correlation between Theil Index, Coefficient of Variation, and natural logarithm of Federal Range Ratio in 1992 was .959, .957, and .89, respectively.

Coding Procedures

There are multiple avenues of school finance equalization which has led some studies to make distinctions among reform heterogeneity. Aaronson (1999), for example, builds off of Card & Payne (1997), Hoxby (1996), Advisory Commission on Intergovernmental Relations (1996), and Downes & Shah (1995) by using several categorizations of reform that include: court mandated; legislative directed; prospending and antispending initiatives; funding formula changes; and tax and expenditure limitation laws. The court system has nonetheless been a primary driver compelling school finance reform (Lukemeyer, 2003; Guthrie, Garms, & Pierce, 1988). Indeed, court directives initially focused on equity based reform and then later centered on adequacy based reform (Guthrie, Springer, & Watral, 2004; Underwood, 1995; Levine, 1991; Thro, 1991). By capitalizing on this logical break we are able to distinguish between equity and adequacy era reform as dictated by court construction.

There nevertheless exists error when relying upon court mandated reform as an indicator for differentiating adequacy from equity-based reform. First, even though *Rose v. Council* (1989) is generally documented as demarcating adequacy from equity-based finance litigation, New Jersey's *Robinson v. Cahill* (1972), Washington's *Seattle v. State* (1978), and West Virginia's *Pauley v. Kelly* (1979) included adequacy criterion that had equity consequences. Second, a non-court mandated reform state does not necessarily mean a state has not experienced school

funding system alterations. As a result of not taking into consideration alternative avenues to school finance equalization we believe our models will yield conservative estimates of court mandated reform.

Insert Table I Here

Table I displays court rulings on the constitutionality of school-finance systems by state from 1971 to present. The table indicates whether a settlement was reached or the court made a ruling and, if the court did make a ruling, whether the court's decision overturned or upheld the state funding mechanism. Thirty-six states had their state funding mechanism challenged on equity grounds, while 37 states had the constitutionality of their funding mechanism challenged on adequacy grounds. Of these states, state funding mechanisms were overturned on 27 occasions.

The information contained in Table I was used to create a series of indicator variables indicating if a court system ever overturned a state's school funding mechanism. There is disagreement among studies concerning court rulings on unconstitutional finance systems. Baicker & Gordon (2004) noted, for example, that Card & Payne (2002) list New Jersey rulings in 1989 and 1991, whereas Murray, Evans, & Schwab (1998) and Corcoran et al. (2003) only list a 1990 decision. We will further add that Baicker & Gordon (2004) code Rhode Island's school financing system being ruled unconstitutional in 1995. Even though Superior Court Judge Needham declared the financing system unconstitutional in 1994, the Rhode Island Supreme Court reversed the Judge Needham's decision in 1995. The Supreme Court not only determined the Constitution did not require an "equal, adequate, and meaningful" education, but also noted the General Assembly maintained authority over the education system. This study relies upon the Campaign for Fiscal Equity's ACCESS Project, Murray, Evans, & Schwab (1998), and Dayton

(1996) to generate Table I and where such discrepancies surfaced filing dates and decisions were verified through Westlaw.

The first variable created, *overturned*, is a dummy variable and was used to indicate if a state's finance system was ever overturned on equity or adequacy grounds or on a combination thereof (0 = not overturned, 1 = overturned). This variable permits us to model the impact of court-mandated reform based on equity and/or adequacy grounds on horizontal equity measures.

The coding procedure for the *overturned* variable, however, is not without limitations considering it was coded according to the first time a state's finance system was considered inequitable and/or inadequate. The Connecticut State Supreme Court in *Horton v. Meskill* (1977, 376 A.2d 359), for example, ruled the state finance system inequitable and then, approximately 15 years later, ruled the system inadequate in *Sheff v. O'Neill* (1996, 678 A.2d 1267). Indeed, nine of the 27 states that have had their finance system ruled unconstitutional fall into this category.[8]

The dummy variables, *overturned equity* and *overturned adequacy*, were created to help alleviate this problem and more accurately model whether a difference between equity and adequacy exist (0 = not overturned, 1 = overturned). *Overturned adequacy* was used to indicate if a state's finance system was ever overturned on adequacy grounds. In doing so, we can more effectively model whether adequacy is different from equity or all other finance suits. This coding procedure also permits us to capture the effect of court decisions that were decided on equity and adequacy grounds. The focus of this paper, however, is in comparing equity versus

[8] These states include Arkansas, Connecticut, Kansas, Michigan, Montana, New Jersey, New York, Tennessee and West Virginia. Kansas and New York, however, do not affect data coding procedures since their decisions occurred after our last data point. Furthermore, Montana was eliminated from our study.

adequacy school finance reform, thus interpretation of equity versus equity and adequacy suits and adequacy versus equity and adequacy suits are not incorporated.[9]

Three continuous variables, *years after overturned*, *years after overturned adequacy*, and *percent free and reduced price lunch status* were created. *Years after overturned* and *years after overturned adequacy* are necessary since it is likely that reform takes several years to effect local and state policy following a funding system being considered unconstitutional. A non-linear specification of the *years after overturned* variables will also be modeled to see if the impact of court-mandated reform diminishes after a certain number of years. *Percent free and reduced price lunch status* was used as a proxy for students requiring additional resources.

4. Analytic Strategy

The analytic framework used to evaluate differential effects of equity versus adequacy court-mandated reform on resource distribution is based on two sets of equations: a state and year fixed effects model and a two-stage regression model. This section explains our approach to exploring differences in equity and adequacy and provides an explanation for each equation.[10]

State and Year Fixed Effect Model

The first set of analyses relied on a state and year fixed effects model. A fixed effects estimator was selected to control for observed and unobserved time invariant characteristics of the state that could be correlated with the states measured level of inequality. Despite the omission of any relevant time invariant effects, fixed effects estimators are robust where

[9] There are four court case decisions that explicitly contained components of equity and adequacy. They are *Kasayulie v. State* (1997, Alaska), *Lake View School District No. 25 v. Huckabee* (2001, Arkansas), *Skeen v. Minnesota* (1993), and *Campbell County School District v. State* (1995, Wyoming). Alaska is a non-issue since it is eliminated from the data set. A fifth suit containing both equity and adequacy criterion, *Williston Public School District v. State*) is pending in North Dakota.

[10] Discussion of the three measures of inequality are contained in Appendix A given the sizable number of publications detailing their components (see, for example, Hussar & Sonnenberg, 2000; Murray, Evans, & Schwab, 1998; Berne & Stiefel, 1984).

specification errors would typically obfuscate how inequality changes within a state as dictated by the legal system. Dummy variables are used for all years to account for time trends present across all states in a given year.

The first model reported can be expressed as:

$$Y_{it} = \alpha_0 + \alpha_1 overturned_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (1)$$

where, Y_{it} is one of the three inequality measures, α_0 is the average difference in inequality between states overturned and not overturned by court cases, $overturned_{it}$ is the status of litigation in state *i* at time *t*, μ_i is the state fixed effect, η_t is the year fixed effect, and ϵ_{it} is a random error term. A negative significant coefficient on *overturned* would indicate that court-mandated reform reduces the level of within state inequity.

The second model reported can be expressed as:

$$Y_{it} = \alpha_0^{'} + \alpha_1^{'} overturned_{it} + \alpha_2^{'} overturned_{it} \times overturned adequacy_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (2)$$

where, Y_{it} is one of the three inequality measures, $\alpha_0^{'}$ is the average difference in inequality index between states overturned by equity cases and states never overturned, $\alpha_2^{'}$ is the average difference in inequity index between states overturned by equity and states overturned by adequacy cases in state *i* at time *t*, μ_i is the state fixed effect, η_t is the year fixed effect, and ϵ_{it} is a random error term.

This model enables us to differentiate the impact of court-mandated reform based on equity versus adequacy grounds since $\alpha_0^{'}$ is the average index for states that have never been overturned, $\alpha_0^{'} + \alpha_1^{'}$ is the average index for states overturned by an equity ruling, and $\alpha_0^{'} + \alpha_1^{'} + \alpha_2^{'}$ is the average index for states overturned by an adequacy ruling.

These two models only enable us to discern differences between equity and adequacy to a limited extent. Although adequacy cases do not aim at equalizing per-pupil expenditures, if low socioeconomic students predominantly attend schools with below-average per-pupil expenditure, then an adequacy ruling will essentially have the same effect as an equity ruling, in that a transition to a system that guarantees an adequate education to everyone will require spending more on these students. If this is the case, then there will not be much difference in practice in the response to adequacy rulings versus equity rulings. Hence, it is reasonable to compare adequacy to equity rulings with respect to the same criteria – horizontal measures of inequality.

An adequacy finance reform cynic, however, may hastily reason there are no differences in equity and adequacy reform given that an adequacy ruling as measured by horizontal equity could have the same effect as an equity ruling. Therefore, a second set of analyses using a two-stage regression model and the FNF data file is employed to further understand resource allocation patterns following equity and adequacy rulings.

Two-Stage Regression Model

The second set of analyses utilizes the FNF data file and a two-stage regression model. Although our two-stage model could be run as a single procedure, using two-stages has a couple important features. Most notably, the two-stage procedure provides a fine reduction of observations permitting us to illustrate diversity in district wealth and their relation to per-pupil expenditures. All second-stage models are estimated by weighted least squares, using as weights the inverse sampling variance of the estimated correlation between per pupil expenditure and district wealth.

The two-stage specifications are used to examine whether adequacy rulings requires per-pupil expenditures to be higher in districts serving low socioeconomic students than in districts

serving high socioeconomic students. For example, if a state starts from a position of relatively equal per-pupil expenditure, an adequacy ruling could actually promote an increase in inequality by raising spending in the poorest districts above spending elsewhere. It would not be reasonable to look at measures like the Theil Index and Coefficient of Variation to see if adequacy cases are having an effect. Moreover, the interesting question from this perspective is not inequality per se, but whether these cases lead to the right kind of inequality – inequality resulting from a state funding mechanism taking into account varying needs of different types of students.

A restricted and unrestricted two-stage regression model was used to further explore these issues. The restricted model can be expressed as:

$$PPE_{kit} = \beta_0 + \beta_1 state_{kit} \times PCTFRL_{kit} + \mu_i + \varepsilon_{kit} \quad (3)$$

$$\beta_1 = \pi_0 + \pi_1 overturnedadequacy_{it} + \mu_i + \varepsilon_{it}$$

where, PPE_{kit} is current per-pupil expenditure in district *k* in state *i* at time *t*, β_0 is the intercept, β_1 is the average correlation between percent students eligible for free and reduced price lunch and current per-pupil expenditure in a state, $overturnedadequacy_{it}$ is the status of adequacy litigation in district *k* in state *i* at time *t*, μ_i is the state fixed effect, and ϵ_{it} is a random error term.

The unrestricted model can be expressed as:

$$PPE_{kit} = \beta_0^{'} + \beta_1^{'} state_{kit} \times PCTFRL_{kit} + \mu_i + \eta_t + \varepsilon_{kit} \quad (4)$$

$$\beta_1^{'} = \pi_0^{'} + \pi_1^{'} overturned_{it} + \pi_2^{'} overturned_{it} \times overturnedadequacy_{it} + \mu_i + \varepsilon_{it}$$

where, PPE_{kit} is current per-pupil expenditure in district *k* in state *i* at time *t*, $\beta_0^{'}$ is the intercept, $\beta_1^{'}$ is the average correlation between percent students eligible for free and reduced price lunch and current per-pupil expenditure in a state, $overturned_{it}$ is the status of all litigation in state *i* at

time *t*, $overturnedadequacy_{it}$ is the status of adequacy litigation in state *i* at time *t*, μ_i is the state fixed effect, and ϵ_{kit} is a random error term.

In both models, the first stage was run eleven times, once for each year in the FNF data file. The $\beta_1^{'}$ coefficient in the first stage was recorded for each state and used as the dependent variable in stage two. In running these models, we are not interested in the causal relationship between low socio-economic status and per-pupil expenditure. Rather, *PCTFRL* is used as a proxy for students requiring additional resources, and $\beta_1^{'}$ is used as the dependent variable in the second stage to distinguish the difference in the pattern in each state for each year. One would typically prefer to use a more comprehensive set of school, student, and community characteristic variables such as poverty status, limited English proficiency classification, high mobility, learning disability status, and property wealth to model whether additional money is creating the "right" kind of inequities. Unfortunately, the FNF file only contains the percent free and reduced lunch students. Moreover, limited time and resource prevented merging additional variables from other datasets.[11]

In the second stage of equation 3, a positive significant coefficient on overturned adequacy would indicate that more money per-pupil was allocated to low wealth districts when a state's funding mechanism was overturned on adequacy grounds. In the second stage of equation 4, a positive and significant coefficient on the interactive term would indicate that more money per-pupil was allocated to low wealth districts when a state's funding mechanism was overturned by adequacy opposed to equity. These models are critical not only for determining the magnitude and direction of the impact of court-mandated reform based on adequacy grounds, but also if

[11] For instance, MES were able to control for log household income, log school enrollment, the proportion of the population that is black, the fraction of households with children of school age, the fraction of adults without a high-school degree, the fraction of adults with a high-school degree, and the fraction of the population in poverty by linking their data file with the School District Mapping Project.

resource allocation patterns resulting from court-mandated adequacy and equity reform are different.

Even though we removed outliers during data development, it remains feasible that outliers, leverage, and influence points will surface after modeling relationships between dependent and independent variables, thus prompting unwanted changes in regression coefficients and unwanted influence on standard errors. *RStudent*, hat-values, *DFFITS*, and *COVARTIO* values were calculated to identify if these points exist in our data; and, if so, appraise how these points may affect model estimates. Results indicate no suspect values that warrant discussion.

The next section presents summary statistics and results from our investigation of court-mandated finance reform on traditional horizontal equity measures using a state and year fixed effects estimator.

5. Trends in Education Spending and Inequality of Education Resource Distribution

Unlike in most nations, public education in the United States is primarily the responsibility of local and state governments – a result of the United States constitution defaulting plenary authority to state and local control. Therefore, principal financial support for schools arrives chiefly from local and state sources. During the 2001-2002 academic year, for example, public elementary and secondary schools received 41.1 percent and 50.25 percent of their budget from local and state sources, respectively, while the federal government contributed the remaining 8.65 percent.

Near equivalent contribution from local and state sources in funding public education has not always been the norm. Throughout most of history, education was largely supported by local

sources of taxation such as property tax, tuition and transportation fees, and earnings on investment. Well into the 1930s, local funding sources made up over 80 percent of all public school revenues, after which redistribution of resources increasingly occurred as states began adopting foundation aid programs. However, change occurs slowly and, even as late as 1972, local sources still supplied more than half of all public school expenditures.

The trend in percent distribution of revenue by source from 1972 to 2002 reflects state governments increasing monetary involvement in support of education. Not only did local revenue as a percentage of total revenue generated decrease by almost one-quarter, but also the dispersion among states was reduced by one-third. The sizable increases in state governments' share of total revenue are a result of scholars advocating that a right to a government funded or provided activity should be equally available to all students within a state.

Insert Table II and III Here

One can deduce from Table II that inflation-adjusted expenditures increased nearly two-fold per-pupil from 1972 to 2002. A significant contribution to increased expenditures was the increased number of identified students with disabilities enrolled in schools, the dramatic reductions in class size, and growing level of non-instructional costs (Parish, 2001; Brewer, Krop, Gill, & Reichardt, 1999; Hanushek & Rivkin, 1997). Nevertheless, the amount of money invested in education has outstripped the rate of general price inflation for the last 50 years.

Figure I contains graphic representations of national inequality trends in resource distribution by the three horizontal equity measures computed in this study from 1972 – 2002. The shaded data point depicts the average level of inequality in the United States for each year, while the corresponding trend line is used to represent change. Each graphic further contains "whiskers" that show the range of values for the 46 states included in the study.

Insert Figure I Here

Figure I illustrates that a relatively constant level of mean inequality from 1972 to 1982 with a sizable spike in the range and standard deviation of values in 1977. For example, the range in the coefficient of variation increased from 17.47 to 21.11, and the standard deviation increased 17 percent from 3.53 to 4.14. Inequality dampened from 1982 to 1987, during which it remained relatively static until a precipitous drop during the 1990s. Though average inequality remained constant, the range marks intensified variability in inequality. Indeed, the standard deviation for the coefficient of variations increased 18.9 percent and the range of values for the measures of inequality closely resembled those of the mid-1970s.

The 1990s signified change as legislators and governors, egalitarians and education advocates, sought finance equality and adequacy (Guthrie, 2004). During this time, social inequalities garnered increasing national attention as technological improvements and e-generation[12] growth marked the single longest period of continuous economic expansion in United States history. Not only did the range of values decrease following this recessionary period, but also the variability of inequality reached the sample low for all three measures of inequality. Furthermore, the mean coefficient of variation, Theil Index, and Log$95^{th}/5^{th}$ values decreased by 15.36, 34.97, and 16.8 percent from 1972-2002 and 15.89, 42.85, and 20.19 percent from 1990-2000, respectively.

6. Results – The Impact of Court Ordered Reform on Inequality

The primary objective of this study is to assess the impact of court-mandated school finance reform on education resource distribution and whether differences exist in court-

[12] Generation that has grown up with the Internet as a common and necessary facet of life, particularly in terms of communication and the expenditure of disposable income.

mandated finance reforms that are based on equity versus adequacy justification. This section presents and discusses the results of the fixed effect estimator and two-stage regression model.

State and Year Fixed Effect Estimator: 1972 – 2002 (F-33)

Table IV contains results from a series of state and year fixed effects models using the F-33 data file where the dependent variables are horizontal equity measures. Model 1 is a restricted model suggesting the impact of court-mandated reform is a significant predictor of inequality when controlling for state and year fixed effects at the α equals .05 level. The negative coefficient signs further indicate that court-mandated reform decreases resource inequality – a result very similar to MES's original analyses.

Insert Table IV Here

Finance reform may be implemented over several years following court-mandated reform, thus it is plausible that a reduction in inequality will manifest several years after a court mandate. *Years after overturned* variable was used to capture this potential lag, though Model 2 yields no significance for all three measures of inequality. Furthermore, the parameter estimates remain statistically insignificant when a second degree polynomial is added as indicated in Model 3.

Model 4 is an unrestricted model in which we permit the coefficient on adequacy to differ from the coefficient on equity. The model approximates that the impact of court-mandated reform based on equity grounds is a significant predictor of inequality when controlling for state and year fixed effects at the α equals .05 level. The interactive term, however, is not statistically different from zero, thus suggesting no statistically significant differences between adequacy and equity cases. By suggesting adequacy era reform is more apparent than real makes for an

exceptionally intriguing model and finding in light of the prevalence of adequacy era reform. However, there are plausible explanations requiring further inquiry.

One possibility why adequacy reform is not statistically different from equity reform is that there has not been enough time for the effect of adequacy rulings to show up. To explore whether an insufficient number of observations is a plausible explanation for the effect of equity rulings not being statistically different from adequacy rulings, we modeled equity rulings over a similar span of years. That is, since the effect of adequacy rulings is restricted to observations over three time points (i.e., 1992 to 2002) we modeled whether the impact of court mandated equity reform, which is already known to reduce inequality, can be detected when using two truncated datasets each with three time points (i.e., 1972 to 1982 and 1977 to 1987).

From 1972 to 1982 funding mechanisms were ruled unconstitutional seven times with a mean year of overturned equaling 1975, while from 1977 to 1987 courts overturned funding mechanisms five times with a mean of 1978. *Overturned* was nearly significant (p=.1026) in the 1977 to 1987 dataset when the coefficient of variation was the dependent variable. Nonetheless, *overturned* in all other models did not even verge on significant at the $\alpha = .10$ level. Thus, insufficient data points is a plausible explanation for adequacy reform not being statistically different from equity reform.

Some scholars have also criticized using the Census of Government F-33 file, asserting that observations taken every fifth year are not refined enough to capture finance system changes (see, for example, Reed, 1998).[13] Though we believe the data span utilized by MES to assess the impact of *all* court-mandated reform sufficiently captures finance system changes, it is plausible

[13] Reed (1998) also critiques MES' approach of eliminating all non-unified districts since court mandated finance reform in such states as New Jersey targeted independent school districts. An F test suggests, however, that the *overturned* and *years after overturned* parameters are not significantly different when New Jersey is eliminated from dataset.

that adequacy reform is not mature enough to be captured by quinquennial census data. Given such, the FNF data file is likely to prove the more relevant and credible data source for analyzing the resource allocation patterns resulting from court-ordered adequacy-based reform. These results are presented below.

State and Year Fixed Effect Estimator: 1990 – 2000 (FNF)

The models contained in Table V use the FNF data file and mirror the specifications presented in Table IV. The first model in Table V, labeled Model 7, approximates that the impact of all court-mandated reform is once again a significant predictor of inequality when controlling for state and year fixed effects at the α=.05 level or greater. However, the magnitudes of the coefficient are deflated when the federal range ratio and coefficient of variation are dependent variables. A marked increase in the coefficient of determination for all models in Table V is expected given FNF's longitudinal nature.

Insert Table V Here

The most notable difference between F-33 and FNF results is evident when comparing Models 4, 5, and 6 in Table IV to Models 10, 11, and 12 in Table V, respectively. Model 4 and 10, for example, are unrestricted models approximating the impact of court-mandated reform based on equity grounds is a significant predictor of inequality when controlling for state and year fixed effects at the α=.05 level. When using the FNF file, however, court-mandated adequacy reform has a positive sign and is statistically different from zero. This outcome suggests that adequacy reform is statistically different from equity reform; adequacy is reducing inequality compared to no court-mandated reform; and adequacy is decreasing inequality to a lesser extent then equity reform.

Before concluding adequacy and equity reform truly espouse different reform agendas, the next section presents results from a two-stage random coefficient model using the FNF data file.

Two-Stage Random Coefficient Model: 1990 – 2000 (FNF)

Table VI presents results from a series of restricted two-stage models using year and state fixed effects. These models test whether adequacy reform directs school resource inequity in the "right" direction. That is, does adequacy reform result in more money being distributed to low wealth districts? Models 16 and 17 are of particular interest.

Insert Table VI Here

Model 16 approximates the impact of court-mandated reform based on equity and the impact of court-mandated reform based on adequacy. The model suggests that equity reform and adequacy reform are not significant at the α=.05 level, thus indicating that equity and adequacy reform are not significant predictors of the association between per-pupil expenditure and district wealth. While one should always caution against interpreting a non-significant coefficient, it is interesting to note the positive sign on court-mandated adequacy reform. That is, if this coefficient was statistically significant, states that have their funding mechanism ruled unconstitutional on adequacy grounds are more likely to direct additional money to low wealth districts overtime. Further, the opposite appears for equity mandated reform.

Model 17 compares whether differences between equity and adequacy reform exist as measured by the association between per-pupil expenditure and district wealth. The reform coefficient is negative and the interactive term is positive. These coefficient, however, are not statistically significant and therefore indicate that the association between per-pupil expenditure and district wealth are not significantly different in states subjected to equity versus adequacy

reform. It is interesting to note the negative sign on the equity term and positive sign on the adequacy term. If these models were statistically significant, one could infer that increased inequality resulting from adequacy reform when compared to equity reform is not an unfulfilled promise, but instead a consequence of adequacy reform allocating additional resources to low socio-economic status districts.

7. Conclusion

The purpose of this study was to examine the impact of court-mandated finance reform on resource allocation and whether differences exist between equity versus adequacy-based reform. Results suggest that court-mandated equity reform decreases resource inequality. These results are supported when using both the Census of Governments F-33 data file and the National Center for Education Statistics FNF data files. These results are very similar to those reported in MES's seminal study of court-mandated school finance reform as well as subsequent studies replicating and/or mirroring their work.

This article also suggests that court-mandated adequacy reform decreases resource inequality. Both the F-33 and FNF data files suggested that adequacy reform reduces inequality in comparison to an absence of court mandated reform when using traditional horizontal equity measures as the dependent variable and controlling for state and year fixed effects. That is, finance mechanisms in states ruled unconstitutional by a state supreme court are on average more equitable when compared to states that have not had their funding mechanism ruled unconstitutional.

Results concerning whether different resource distribution patterns exist following court-mandated equity versus court-mandated adequacy reform are mixed. The F-33 data file does not suggest statistically different resource distribution patterns following equity versus adequacy

reform when using traditional horizontal equity measures as the dependent variable. The FNF data file, on the other hand, suggested that equity and adequacy reform are different – different in that court mandated adequacy reform does not decrease inequality as much as equity based reform.

In an attempt to unravel this apparent difference in resource distribution patterns, we hypothesized that resource distribution patterns associated with adequacy based reform take into account students varying needs. By focusing additional resources to low wealth districts adequacy based reform would therefore cause the "right kind" of inequality. The signs associated with both the equity and adequacy reform coefficients indicated that resource distribution patterns following adequacy based reform resulted in the allocation of additional resources to low wealth districts. However, the coefficients were not statistically significant; and, as a result, we are unable to determine whether there is anything special about adequacy.

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Appendix A: Measures of Inequality

Horizontal equity is used as our theoretical base for equity measurement. As noted in the background section, horizontal equity describes the equal treatment of equals, which specifies that students who are in similar situations should receive equal shares. Since the dataset constructed does not contain information about students' situations, we assume that within each state, horizontal equity is reached if the average district per-pupil expenditure is more equitable. In order to control for the skewness in student population across districts, we weighted the per-pupil expenditure by student enrollment in each district.

In *The Measurement of Equity in School Finance*, Berne and Stiefel (1984) provide eleven measures for horizontal equity – the range, the restricted range, the federal range ratio, the standard deviation, the standard deviation of logarithms, the coefficient of variance, the McLoone index, the Gini coefficient, the Theil Index, 95th percentile to 5th percentile ratio, and the Atkinson's Index. Different measures can be used for different purposes. For example, when interested in the whole distribution, coefficient of variance is used, whereas the McLoone index is used when people are interested in the bottom of the distribution. For this research, we followed MES' (1998) procedures and used three of their four inequality measures – Theil Index, coefficient of variation, and the natural logarithm of the Federal Range Ratio. Each is described in detail below.

Thiel Index. The Thiel Index was developed by Henri Thiel in 1975 as a measure of information exchange and then later identified by education finance scholars as an adequate measure of dispersion for horizontal equity (Hussar & Sonnenberg, 2000). Unlike the other measures of inequity, the distribution of the Theil index is approximately normal. It can be expressed as:

$$Thiel = \frac{\left(\left(\sum P_i x_i \ln x_i\right) - \left(\sum P_i x_i \ln \overline{M}\right)\right)}{\sum P_i x_i}$$

where, P_i equals student enrollment in school district i, X_i equals Per-pupil expenditures in school district i, and $\overline{M}$ equals the weighted mean per-pupil expenditure for all pupils in each state. Equality in per-pupil expenditure is reached when the value of Theil Index equals to zero.

Coefficient of Variation. The coefficient of variation is the standard deviation divided by the mean. It measures how tightly the per-pupil expenditure in all the states' school districts cluster about the mean statewide expenditure (Augenblick, Meyers, & Anderson, 1997). The coefficient of variation is inversely related to equity. If all schools spent exactly the same amount per student, the coefficient of variation would be zero. The coefficient of variation can be expressed as:

$$CofV = \frac{\left(\frac{\sum P_i (M - x_i)^2}{\sum P_i}\right)^{1/2}}{\overline{M}}$$

where, P_i equals the student enrollment in school district i, x_i equals per-pupil expenditure in school district i, and $\overline{M}$ is the mean per-pupil expenditure for all students in each state. According to the equation, the index of coefficient of variance is very sensitive to the extreme values of the whole distribution.

Natural Logarithm of Federal Range Ratio. This inequality measure drops the districts with per-pupil expenditure on both top and bottom 5th percentiles. The 95th percentile per-pupil expenditure then is divided by the 5th percentile per-pupil expenditure. The natural logarithm of the 95th percentile over 5th percentile ratio indicates how much larger the 95th percentile expenditure is than the 5th percentile expenditure. The measure is expressed as:

$$LgFRR = LN\left(\frac{X}{Y}\right)$$

where, X is the 95th percentile of per-pupil expenditure in a state and Y is the 5th percentile of per-pupil expenditure in a state.

Table 1
State Court Rulings on Constitutionality of School Finance Systems, 1971 - 2004

State	Case	Year	Decision	Type of Case
Alabama	*Alabama Coalition for Equity v. Hunt (Harper v. Hunt)*	1993	Overturned	Equity and Adequacy
	Alabama Coalition for Equity v. Folsom	1997	Vacated remedy order	Equity and Adequacy
Arizona	*Shofstall v. Hollins*	1973	Upheld	Equity
	Roosevelt Elementary School District No. 66 v. Bishop	1994	Overturned	Adequacy
	Roosevelt Elementary School District No. 6 v. Jane D Hull et al	2002	Upheld	Adequacy
Arkansas	*Dupree v. Alma School District No. 30*	1983	Overturned	Equity
	Lake View School District N. 25 v. Huckabee	2002	Overturned	Equity and Adequacy
	Lake View School District N. 25 v. Huckabee	2004	Upheld	Equity and Adequacy
California	*Serrano v. Priest*	1971	Overturned	Equity
	Serrano v. Priest	1977	Overturned	Equity
	Serrano v. Priest	1986	Upheld	Equity
	Williams v. State	2004	Settlement	Adequacy
Colorado	*Lujan v. Colorado State Board of Education*	1982	Upheld	Equity
	Haley v. Colorado Department of Education		Pending	Adequacy
Connecticut	*Horton v. Meskill*	1977	Overturned	Equity
	Sheff v. O'Neill	1996	Overturned	Adequacy
	Sheff v. O'Neill	2003	Settlement	Adequacy
Delaware	*no litigation*			
Florida	*Coalition for Adequacy and Fairness in School Funding v. Chiles*	1996	Upheld	Adequacy
Georgia	*Thomas v. Stewart* and *McDaniel v. Thomas*	1981	Upheld	Equity
Idaho	*Thompson v. Engleking*	1975	Upheld	Equity
	Idaho Schools for Equal Educational Opportunity v. Evans	1998	Upheld	Adequacy
Illinois	*Committee for Educational Rights v. Edgar*	1996	Upheld	Adequacy
Indiana	*Lake Central v. State, No. 56*	1987	Withdrawn	Equity
Iowa	*Coalition for a Common Cents Solution v. State*	2002	Pending	Adequacy
Kansas	*Caldwell v. State*	1972	Overturned	Equity
	Knowles v. State Board of Education	1976	Overturned	Equity
	Unified School District No. 299 v. Kansas	1994	Upheld	Adequacy
	Montoy v. State	2003	Overturned	Adequacy
Kentucky	*Rose v. Council for Better Education*	1989	Overturned	Adequacy
	Tyler Young, et al. v. Daniel L. Williams, et al. and Related Action		Pending	Adequacy
Lousianna	*School Board v. Louisiana*	1987	Upheld	Equity
	Charlet v. Legislature of State of Lousianna	1998	Upheld	Adequacy
	Jones v. Lousianna Board for Elementary and Secondary Education		Pending	Equity and Adequacy
Maine	*M.S.A.D. #1 v. Commissioner*	1995	Upheld	Equity
Maryland	*Somerset County Board of Education et al. v. Horbeck et al.*	1983	Upheld	Equity
	Bradford v. Maryland State Board of Education	2000	Overturned	Adequacy
Massachusetts	*Mc Duffy v. Secretary of the Executive Office of Education*	1993	Overturned	Adequacy
	Hancock v. Driscoll	2004	Overturned	Adequacy
Michigan	*Milliken v. Green* and *Governor v. State Treasurer*	1973	Upheld	Equity
	East Jackson Public Schools v. State of Michigan	1984	Upheld	Equity
	Durant v. State	1997	Overturned	Adequacy
Minnesota	*Skeen v. Minnesota*	1993	Upheld	Equity and Adequacy
	Minnesota NAACP v. Minnesota	1994, 2000	Settlement	Adequacy
Mississippi	*no litigation*			
Missouri	*Committee for Educational Equality v. State*	1993	Overturned	Adequacy
	Committee for Educational Equality v. State	2004	Pending	Adequacy
Nebraska	*Gould v. Orr*	1993	Upheld	Equity
	Douglas County v. Johanns		Pending	Adequacy
Nevada	*no litigation*			
New Hampshire	*Claremont New Hampshire v. Governor*	1993	Overturned	Adequacy
	Claremont New Hampshire v. Governor	1997	Overturned	Adequacy
	Claremont New Hampshire v. Governor	1999	Overturned	Adequacy
	Claremont New Hampshire v. Governor	2002	Overturned	Adequacy

Table 1 (Continued)

New Jersey	*Robinson v. Cahill*	1973	Overturned	Equity
	Robinson v. Cahill	1976	Overturned	Equity
	Abbot v. Burke	1990	Overturned	Adequacy
	Abbot v. Burke	1994	Overturned	Adequacy
	Abbot v. Burke	1998	Overturned	Adequacy
	Abbot v. Burke	2000	Overturned	Adequacy
New Mexico	*Alamagordo v. Morgan*	1973	Settlement	Equity
	Zuni School District v. State	1998	Overturned	Adequacy
New York	*Board of Education, Levittown v. Nyquist*	1982	Upheld	Equity
	Board of Education City School District, Rochester v. Nyquist	1987	Upheld	Equity
	Campaign for Fiscal Equity v. State of New York	2003	Overturned	Adequacy
North Carolina	*Britt v. North Carolina State Board of Education*	1987	Upheld	Equity
	Leandro v. State	1997	Overturned	Adequacy
	Hoke County v. State	2002	Overturned	Adequacy
North Dakota	*Bismark Public School District No. 1 v. North Dakota*	1993	Upheld	Equity
	Williston Public School District v. State		Pending	Equity and Adequacy
Ohio	*Board of Education of the City School District of Cinncinati v. Walter*	1976	Upheld	Equity
	DeRolph v. State of Ohio	1997	Overturned	Adequacy
	DeRolph v. State of Ohio	2000	Overturned	Adequacy
	DeRolph v. State of Ohio	2002	Overturned	Adequacy
Oklahoma	*Fair School Finance Council of Oklahoma v. Oklahoma*	1987	Upheld	Equity
Oregon	*Olsen v. Oregon*	1976	Upheld	Equity
	Coalition for Education Equity v. Oregon	1991	Upheld	Equity
	Withers v. State	1995	Upheld	Equity
	Withers v. State	1999	Upheld	Equity
Pennsylvania	*Dansen v. Casey*	1979	Upheld	Equity
	Dansen v. Casey	1987	Upheld	Equity
	PA Association of Rural and Small Schools v. Case and *Marrero v. Commonwealth*	1998	Upheld	Equity
	Powell v. Ridge		Pending	Adequacy
Rhode Island	*City of Pawtucket v. Sundlun*	1995	Upheld	Equity
South Carolina	*Richland County v. Campbell*	1988	Upheld	Equity
	Abbeville County School District v. State		Pending	Adequacy
South Dakota	*Bezdichek v. South Dakota*	1994	Upheld	Adequacy
Tennessee	*Tennessee Small School Systems v. McWheter*	1993	Overturned	Equity
	Tennessee Small School Systems v. McWheter	1995	Overturned	Adequacy
	Tennessee Small School Systems v. McWheter	2002	Overturned	Adequacy
Texas	*Rodriquez v. San Antonio Independent School District*	1973	Upheld	Equity
	Englewood Independent School District v. Kirby	1989	Overturned	Equity
	Edgewood v. Kirby (Edgewood II)	1991	Overturned	Equity
	Carrollton-Farmers v. Edgewood (Edgewood III)	1992	Overturned	Equity
	Edgewood v. Meno et al. and Bexar Co. Education District et al. (Edgewood IV)	1995	Upheld	Equity
	West Orange-Cove Consolidated ISD v. Nelson	2004	Overturned	Adequacy
Utah	*no litigation*			
Virginia	*Scott v. Commonwealth*	1994	Upheld	Equity
Washington	*Northshore School District v. Kinnear*	1974	Upheld	Equity
	Seattle School District No 1 of King County v. State	1978	Overturned	Equity
	Seattle School District No 1 of King County v. State (Seattle II)	1982	Overturned	Equity
West Virginia	*Pauley v. Kelly*	1979	Overturned	Equity
	Pauley v. Gainer	1995	Overturned	Adequacy
	Tomblin v. State Board of Education	2003	Upheld	Adequacy
Wisconsin	*Buse v. Smith*	1976	Overturned	Equity
	Kuko v. Grover	1989	Upheld	Equity
	Vincent v. Voight	2000	Upheld	Equity
Wyoming	*Washakie v. Herchler*	1980	Overturned	Equity
	Campbell County School District v. State	1995	Overturned	Equity and Adequacy
	Campbell County School District v. State (Campbell II)	2001	Upheld	Equity and Adequacy

Sources: ACCESS (2004), Murray, Evans, & Schwab (1998), John Dayton (1996).

Table II

Summary of Percent Distribution of Revenue and Total Per Pupil Expenditure by Source and Measures of Inequality

	1972	1977	1982	1987	1992	1997	2002
Percent Distribution of Revenue*							
Local							
Mean	53.7	49.7	47.3	45.0	45.4	44.0	41.1
Maximum	89.9	86.7	88.9	90.5	87.9	86.8	62.42
Minimum	23.8	19.3	18.3	12.6	13.2	14.6	13.84
Standard Deviation	16.4	14.8	16.0	15.4	14.9	14.0	11
State							
Mean	43.9	41.1	45.4	48.5	48.2	48.7	50.25
Maximum	70.9	63.7	73.7	74.5	74.7	72.2	71.95
Minimum	9.0	8.1	7.7	6.4	8.5	9.3	31.51
Standard Deviation	15.8	12.4	14.4	14.0	13.6	12.7	10.01
Federal							
Mean	2.5	9.2	7.3	6.5	7.0	7.4	8.65
Maximum	9.0	18.5	16.7	15.8	16.4	14.1	16.8
Minimum	0.0	4.1	2.9	2.7	3.6	3.6	4.2
Standard Deviation	1.9	4.1	3.1	2.6	2.6	2.6	2.9
Per Pupil Expenditure ($2002)**							
Local	2365	2439	2347	2810	3411	3444	3742
State	1715	2195	2482	3181	3367	3641	4310
Federal	399	447	386	410	479	501	691
Total	4479	5081	5215***	6400***	7257	7585	8742
Measures of Inequality							
Log of Federal Range Ratio	0.4564	0.4629	0.4611	0.4301	0.4285	0.3668	0.3819
Coefficient of Variation	14.9096	15.3907	15.3798	14.6575	14.5385	12.6031	13.0280
Thiel Index	0.0114	0.0121	0.0120	0.0110	0.0108	0.0080	0.0085

* Excludes Hawaii and District of Columbia.

** Expenditure per pupil in fall enrollment from Digest of Education Statistics Table 166.

*** Estimated figures due to changes in data collection procedures that began in 1980-1981 academic year. Estimate produced by National Center for Education Statistics.

National Center for Education Statistics.

Table III

Summary of Total Per Pupil Expenditure by Source and Measures of Inequality

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Per Pupil Expenditure ($2002)*											
Federal	347	358	392	394	406	404	398	405	436	462	495
State	2899	3024	3060	3310	3290	3510	3595	3693	3824	3987	4134
Local	3205	3226	3228	3286	3339	3257	3222	3260	3334	3408	3421
Total	6451	6608	6680	6990	7034	7171	7216	7358	7595	7857	8049
Measures of Inequality											
Natural Log of Federal Range Ratio	0.428	0.4299	0.4284	0.4133	0.3985	0.379	0.3741	0.3675	0.3658	0.3611	0.3561
Coefficient of Variation	14.33	14.4955	14.0647	13.7811	13.4742	12.9734	12.7809	12.4957	12.3505	12.2263	12.3662
Thiel Index	0.011	0.0108	0.0103	0.0098	0.0093	0.0086	0.0084	0.0079	0.0077	0.0075	0.0077

* Expenditure per pupil in fall enrollment from FNF data file.

Table IV

Fixed Effects Estimates, Inequality in Total Current Expenditure Models, 1972 - 2002

Parameter Estimates and Standard Errors

	Dependent Variable: Natural Log of Federal Range Ratio					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
overturned	-0.03605**	-.0318**	-.02105	-.0426**	-.03996**	-.030384
	(0.01698)	(.0179)	(.0237)	(.0204)	(.0206)	(.02771)
years after overturned	…	-.00092	-.00333	…	-.00119	-.002996
		(.0012)	(.00368)		(.00128)	-0.00372
years after overturned (quadratic)	…	…	.0000895	…	…	.0000686
			(.000128)			(.000133)
overturned * overturned adequacy	…	…	…	.0131	.01891	0.01587
				(.0228)	(.02359)	(.02434)
R^2	0.7127	.7133	.7138	.7131	.7140	.7143
	Dependent Variable: Coefficient of Variation					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
overturned	-1.77669**	-1.0453**	-.71240322	-1.5580***	-1.42986**	-.1.19493858
	(.4984)	(.5243)	(.69379)	(.5982)	(.6017)	(.8099)
years after overturned	…	-.05041	-.12488	…	-.06313*	-.1075
		(.0361)	(.10776)		(.0373)	(.1087)
years after overturned (quadratic)	…	…	.00276	…	…	.00168
			(.00377)			(.003877)
overturned * overturned adequacy	…	…	…	.5883	.8947	.82023
				(.6674)	(.6893)	(.7113)
R^2	.7412	.7430	.7436	.7420	.7440	.7449
	Dependent Variable: Theil Index					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
overturned	-0.00171**	-0.0014*	-0.00064	-.0020**	-.0018234**	-.0010864
	(0.00072)	(0.00076)	(0.001)	(.00087)	(.00087)	(.00118)
years after overturned	…	-0.000065	0.00066	…	.0000787	.0002179
		(0.00005)	(0.000156)		(.000054)	(.000158)
years after overturned (quadratic)	…	…	0.0000062	…	…	.0000053
			(0.00015604)			(.00000562)
overturned * overturned adequacy	…	…	…	.0006	.000961	-.0007271
				(.00097)	(.001001)	(.001032)
R^2	0.7237	0.7253	0.72664	.7241	.72685	.7272

Standard errors in paranthesis.

* p < .10; ** p <.05; *** p <.01

Table V

Fixed Effects Estimates, Inequality in Total Current Expenditure Models, 1990 - 2000

Parameter Estimates and Standard Errors

	Dependent Variable: Natural Log of Federal Range Ratio					
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
overturned	-.020481***	-.02213**	-.00855	-.0634***	-.060358***	-.04555**
	(.010797)	(.010815)	(.01165)	(.0177)	(.01813)	(.01870)
years after overturned	…	.0022	-0.00366	…	.001167	-.00473*
		(.001445)	-0.0025		(.001524)	(.00254)
years after overturned (quadratic)	…	…	.000239	…	…	.000231***
			(.00008019)			(.00007978)
overturned * overturned adequacy	…	…	…	.0469***	.04273***	.04084**
				(.0154)	(.0163)	(.0162)
R^2	.8793	.8779	.88030	.8796	.8798	.88198
	Dependent Variable: Coefficient of Variation					
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
overturned	-.72449**	-.7217**	-.43790	-1.4689***	-1.5561***	-1.2471**
	(.3005)	(.30205)	(.32681)	.4952	(.50784)	(.52591)
years after overturned	…	-.00425	-.13302*	…	-.03334	-.0156**
		(.0404)	(.07058761)		(.04267552	(.07136099)
years after overturned (quadratic)	…	…	-.004992**	…	…	.004815**
			.00225			(0.002244)
overturned * overturned adequacy	…	…	…	.8133*	.93267**	.8933**
				(.4307)	(.45721)	(.45558)
R^2	.9039	.9038	.90491	.9046	.90475	.9057
	Dependent Variable: Theil Index					
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
overturned	-.001685***	-.0017***	-.001165**	-.0028***	-.002894***	-.00231***
	(.000457)	(.00459)	(.000496)	(.00075)	(.000773)	(.000798)
years after overturned	…	.0000168157	-.0002242761**	…	-.0000249484	-.0002572511**
		(.00006)	(.000107)		(.000065)	(.0001083)
years after overturned (quadratic)	…	…	.00000935***	…	…	.0000091***
			(.0000034)			(.0000034)
overturned * overturned adequacy	…	…	…	.0012*	.00134*	.001265*
				(.00066)	(.000696)	(.000692)
R^2	.879312	.8793	.8813	.8803	.8803	.8822

Standard errors in paranthesis.

* p < .10; ** p <.05; *** p <.01

Table VI

Two-Stage Estimates, Association Between Total Current Expenditure and Students Requiring Additional Resources, 1990 - 2000 [1]

Parameter Estimates and Standard Errors

	Model: Year and State Effects				
	Model 13	Model 14	Model 15	Model 16	Model 17
overturned	.8646	…	…	…	-1.6389
	(1.5405)				(4.3677)
overturned equity	…	-5.7189	…	-7.1293	…
		(4.2496)		(4.4189)	
overturned adequacy	…	…	1.0938	1.7744	…
			(1.4747)	(1.5313)	
overturned * overturned adequacy	…	…	…	…	2.5621
					(4.1821)
R^2	.8918	.8922	.8919	.8925	.8919

[1] Second-stage models are estimated by weighted least squares, using as weights the universe sampling variance of the estimated correlation
Standard errors in paranthesis.

* p < .10; ** p <.05; *** p <.01

Figure 1: Trends in Inequality by Measure of Inequality and Year