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No Child Left Behind and Administrative Costs: A Resource Dependence Study of Local School Districts

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Abstract: This study considers the impact of federal funding on the administrative expenditures of local school districts since the passage of the No-Child-Left-Behind (NCLB) Act of 2001. Under NCLB, federal education funds were made contingent upon a variety of accountability and reporting standards, creating new administrative costs and challenges for local school districts. According to the premises of resource dependence theory, these increases in administrative costs will likely be most pronounced among those local districts with the greatest reliance on federal revenue. Repeated measures models are constructed for a multi-state sample of public school districts to test the extent to which these policy changes may be influencing administrative expenditures at the local level. While effect sizes are small, the results do demonstrate a significant resource dependence effect, suggesting that districts with greater reliance on federal revenue are experiencing larger increases in administrative expenditures over time.

Keywords: No child left behind; resource dependence theory; fiscal federalism; education policy.

El Acta *No Child Left Behind* y Costos Administrativos: Un Estudio de la Dependencia de Recursos de los Distritos Escolares

Resumen: Este estudio analiza el impacto de los fondos federales en los gastos administrativos de

los distritos escolares desde la aprobación de la legislación NCLB de 2001. En virtud de la ley NCLB, los fondos federales para la educación ponían como condición una variedad de medidas de responsabilidad educativa y presentación de informes, que generaron nuevos costos administrativos y desafíos para los distritos escolares. De acuerdo con las premisas de la teoría de dependencia de recursos, estos aumentos en los costos administrativos probablemente serán más pronunciados entre los distritos con mayor dependencia de ingresos federales. Generamos modelos de medidas repetidas para una muestra multi-estatal de distritos escolares públicos para poner a prueba el grado en que estos cambios de políticas influirían en los gastos administrativos de los distritos. Mientras que los tamaños del efecto son pequeños, los resultados demuestran un efecto significativo en la dependencia de recursos, lo que sugiere que los distritos con mayor dependencia de ingresos federales están experimentando mayores incrementos en sus gastos administrativos.

Palabras clave: NCLB; teoría de la dependencia de recursos; federalismo fiscal; política educativa.

A Legislação No Child Left Behind e os Custos Administrativos: Um Estudo de Recursos Distritos Escolares Dependência

Resumo: O presente estudo analisa o impacto dos recursos federais para as despesas administrativas dos distritos escolares, desde a adoção da legislação NCLB em 2001. De acordo com NCLB, o financiamento federal para a educação tinha como condição uma série de medidas responsabilização educacional e relatórios, gerando novos custos administrativos para os distritos escolares. De acordo com os pressupostos da teoria da dependência de recursos, estes aumentos de custos administrativos tendem a ser mais pronunciada entre os distritos com maior dependência das receitas federais. Geramos modelos de medidas repetido para uma amostra multi-estado de distritos escolares públicos para testar em que medida estas mudanças de políticas afetariam os custos administrativos dos distritos. Enquanto os efeitos de tamanhos são pequenos, os resultados mostram um efeito significativo na dependência de recursos, o que sugere que os distritos com maior dependência das receitas federais estão enfrentando maiores aumentos nas despesas administrativas.

Palavras-chave: NCLB; teoria da dependência dos recursos; federalismo fiscal; política educacional.

Introduction¹

Despite a tradition of local control, public school districts in the United States operate in an open systems context that is increasingly shaped by federal education policy. The federal government's role in K-12 education has expanded substantially over the past half century (Birman & Porter, 2002), with federal education expenditures increasing by \$60 billion since the initial passage of the Elementary and Secondary Education Act (ESEA) in 1965 (Guthrie, Springer, Rolle, & Houck, 2007). The reauthorization of ESEA in 2001 under the No Child Left Behind Act (NCLB) led to more direct federal involvement in public education than at any time prior. Specifically, NCLB conditioned the receipt of Title 1 funds on several standards-based and accountability reforms, creating a variety of new administrative challenges for local school districts (McDermott & Jensen, 2005). This shift was in line with current practices of American federalism, in which the federal government has increasingly relied on conditional spending arrangements to achieve policy objectives at the state and local level (McDermott & Jensen, 2005).

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This *conditioning* of federal education dollars under NCLB altered the policy environment for public school districts, thus raising significant questions about organizational behavior and administrative costs at the local level. This article specifically examines how the changes implemented under NCLB have influenced administrative expenditures among local school districts with varying levels of federal resource dependence. The aggregate increase in administrative costs associated with NCLB has been documented in previous studies (see Mathis, 2005 for discussion), but according to the premises of resource dependence theory these increases will likely be exacerbated among those districts with the greatest reliance on federal revenues. This article seeks to explain the relationship between resource dependencies and administrative costs over time, using a multi-state sample and a longitudinal research design.

Examination of these issues is important for several reasons. First, while federal contributions remain small in comparison to state and local funding, they can be comparatively large for high poverty districts that are unable to generate sufficient revenue from their local tax-bases (Riddle & Osorio-O'Dea, 2002). This means that any adverse impacts arising from resource dependencies would be most pronounced among at-risk districts, which could jeopardize core instructional missions in these districts. Furthermore, from a policy perspective, this analysis speaks to the practice of fiscal federalism in education policy, specifically the extent to which conditional funding may be impacting the goal of improved equity in resources. Finally, from a theoretical perspective, this analysis provides a unique opportunity to assess resource dependence theory in the context of public school districts, thereby adding an important element to the body of literature on RDT in public organizations.

The section below briefly situates the policy changes adopted under NCLB in the larger context of federal education policy and its historical development over the past half century. This is followed by a discussion of resource dependence theory and how it serves as a framework for examining the impact of these changes on the organizational behavior of public school districts.

NCLB and the Education Policy Environment

Though the governance and administration of K-12 education in the United States is traditionally situated at the local level (Grissom & Herrington, 2012), school districts are also embedded within a broader external environment which influences their organizational behavior and outcomes. These environmental influences range from micro level concerns, such as community and student-body characteristics, to macro level factors, such as state and federal regulations (DiPaola & Tschannen-Moran, 2005; Simon, 1999). Among the most significant constraints imposed by this environment are organizational dependencies on external sources of information, legitimacy, and resources. For many districts, these dependencies are increasingly shaped by federal education policy (Fusarelli, 2002; Grissom & Herrington, 2012).

Traditionally, federal education policy has focused on addressing inequities in resource allocation by providing supplemental support to school districts with high populations of historically disadvantaged students (Hanushek, 1989). This goal was explicitly set forth in Title 1 of the Elementary and Secondary Education Act (ESEA) of 1965, and through four and a half decades of federal education reforms, "Title 1 has remained the cornerstone of federal education policy" (Gordon, 2008, p. 302). However, over time the nature of Title 1 funding has evolved (McDonnell, 2005). Initially, the law's primary focus was assisting in the education of disadvantaged students, particularly in high-poverty districts, and the earliest conditions placed upon local school districts were primarily limited to matters of fiscal accountability (McDonnell, 2005). Over subsequent reauthorizations of Title 1, federal goals evolved, and by 1994 the Improving America's Schools Act

(IASA) introduced the concepts of standards based reform and accountability into federal education policy. This shift reflected the emerging belief that schools should demonstrate accountability with regard to their use of federal funding. (See McDonnell, 2005, for a full discussion).

While IASA was the first reauthorization of Title 1 to establish standards-based reforms, the Department of Education never aggressively administered the law (McDermott & Jensen, 2005). These reforms did not become systematically enforced at the federal level until the No Child Left Behind Act (NCLB) of 2001. NCLB also reauthorized Title 1, building on the reforms introduced under IASA. For the first time, the continuation of Title 1 funding was made contingent upon verifiable performance outcomes (Gordon, 2008), marking a significant expansion of the federal government's influence in K-12 education (Goertz, 2005).

This shift toward stricter contingent funding under NCLB was in line with current practices of American federalism, namely an increasing tendency on the part of federal legislators toward greater exertion of policy influence through conditional financial arrangements (McDermott & Jensen, 2005). Due in part to Supreme Court rulings against excessive congressional interpretations of the Commerce Clause, federal lawmakers have increasingly looked to the use of conditional grants as a means of achieving federal policy objectives in policy domains that exceed their constitutional grasp (Christensen & Wise, 2009; Wise, 2001). Because the receipt of these grants by state and local agencies is (at least theoretically) optional, Congress' authority to attach conditions to the receipt of federal grant monies has been widely upheld by the Supreme Court (Christensen & Wise, 2009; Wise, 2001). Well-known examples of this practice include the conditioning of federal highway dollars on state level policy outcomes such as the adoption of a 55 mile per hour speed limit and a uniform legal drinking age (Richardson & Houston, 2009). In education policy, NCLB marked the first major use of contingent grants as a strictly enforced policy tool, leading to what some have seen as an encroachment on the part of the federal government into K-12 education (McDermott & Jensen, 2005).

This policy shift raises important organizational questions for public school districts, as previous research has shown that contingent funding arrangements tend to significantly influence the organizational structure and behavior of local government and nonprofit organizations. According to Smith (2006), these arrangements can compel organizations to "... adopt new administrative procedures, add professionals, institute new financial management practices, and in some cases, modify physical structures", all leading to an increase in administrative expenses (Smith, 2006, p. 235). Specifically in the case of Title 1 funding, McDonnell (2005) notes that the implementation of NCLB has required school districts to change both their priorities and their organizational behavior. For example, recent research found that school administrators in this policy environment are compelled "... to design entirely new formal organizational structures in their schools that support tighter coupling between policy, administration, and instruction" (Spillane & Kenny, 2012, p. 551). These organizational responses are consistent with the basic premises of resource dependence theory, which argues that organizations manage their resource dependencies, at least in part, by responding to environmental requirements in order to secure needed resources (Pfeffer & Salancik 1978). The theory, which is discussed further below, also suggests that these responses will be exacerbated in organizations with greater reliance on the resources in question.

Resource Dependence Theory

Resource dependence theory argues that organizations are neither self-contained nor self-sufficient, making their relationships with the external environment of utmost importance to their effective operation. The theory, which was originally proposed by Pfeffer and Salancik (1978), draws

from an open systems (e.g., Katz & Kahn, 1978) perspective, which views organizations as embedded in broader environments where they interact with and are influenced by other organizations. RDT adds a level of specificity to the general open systems approach, suggesting that a particular form of external contingency, namely resource dependencies, is of unique importance. In other words, not only are organizations influenced by what happens in their external environments, but they are also often dependent on other actors and organizations within these environments for essential resources. To the extent that these dependencies are critical to an organization's survival, managing them becomes a top organizational priority. Consequently, Pfeffer and Salancik (1978) tended to situate the primary challenges of management *outside* of the organization in the external environment. As a result, RDT is concerned with the ways in which organizations respond to and manage their resource dependencies, how those decisions shape organizational structure/behavior, and the subsequent power dynamics that emerge.

Since its introduction, RDT "... has become one of the most influential theories in organizational science and strategic management" (Hillman, Withers, & Collins, 2009, p. 1404). Most commonly, RDT has been applied to the analysis of private sector concerns, where it has helped to explain organizational behaviors such as mergers and acquisitions, joint ventures, board strategies, and executive successions to name a few (Hillman et al., 2009). Though RDT has been applied to public and voluntary sector concerns with less frequency, it has by no means been absent. Several studies have, either directly or indirectly, applied a resource dependence perspective to government and nonprofit organizations, with several high quality papers coming out in recent years (e.g., Garrow, 2011; MacIndoe, 2013; Malatesta & Smith, 2011; Mosley, 2012). In general, these studies have found RDT to be useful for explaining the behavior of public organizations in specific contexts, but a consensus has not yet emerged to the same degree that it has in private sector research (see Hillman et al., 2009).

While RDT has generally not been applied directly to the study of K-12 school districts, it has been used in some analyses of higher education, where it has proved to be a useful theoretical framework for examining educational institutions. In an early application of the theory to higher education, Tolbert (1985) used RDT in conjunction with institutional theory (e.g., DiMaggio & Powell, 1983; Meyer & Rowan, 1977) to study administrative structure in American universities. Her analysis found a significant resource dependence effect, whereby levels of dependence on various revenue sources helped (in part) to explain the prevailing administrative structures across institutions. Subsequently, Slaughter and Leslie (1997) showed how changes in resource dependencies led to corresponding changes in the organizational behavior of academic institutions, including changes in institutional expenditure patterns as well as in faculty efforts/behaviors. More specifically, their work showed how decreases in non-contingent government funding led American universities to seek "substitute revenues" (such as research grants), which caused these institutions to shift their labor orientation and administrative structures toward the maintenance of these new resources. According to Slaughter and Leslie (1997), one of the consequences of this shift has been an increased institutional focus on academic research, which has necessarily come at the expense of student instruction.

More recently, Fowles (2014) applied RDT in a panel study of U.S. colleges and universities, and he found that universities with greater dependence on tuition revenues tended to spend more on educational activities. He argues that this is consistent with the predictions of RDT, and that these institutions are responding to the interests of those stakeholders upon which they are most heavily dependent. In each case, these applications of RDT to higher education have found resource dependencies to impact the organizational behavior of academic institutions due to the conditions and expectations attached to revenue sources by external actors. This suggests that the application of

RDT to K-12 institutions is appropriate, especially in the post-NCLB environment discussed above, where considerable conditions have been attached to the continuation of Title 1 funding.

Of particular concern in the case of NCLB are two important elements of resource dependence theory: (1) the contingencies and/or conditions often associated with resource dependencies, and (2) the potential influence exerted by dominant actors in cases of asymmetrical dependence. On the first matter, Pfeffer and Salancik (1978) note that external resource providers often attach conditions to the continuation of resource provision. Frequently these conditions come in the form of accountability and reporting standards, which have become a centerpiece of both fiscal federalism in general and federal education policy specifically over recent years. In the case of NCLB, these contingencies/conditions include requirements for reporting on student outcomes, teacher qualifications, and the scientific validity of curricula and teaching practices to name a few (McDermott & Jensen, 2005).

On the second matter, and based on premises established in prior research (e.g., Emerson, 1962; Jacobs, 1974), Pfeffer and Salancik (1978) note several conditions which are likely to “affect the extent to which an organization will comply” with such external demands (p. 44). Chief among these conditions are the recipient’s degree of dependence on the resource in question, the viability of alternative sources, and the extent to which the resource provider is codependent on the recipient for additional outcomes. In the case of education policy, as in many local government contexts, these factors vary on a district-to-district basis. For example, while federal policymakers are dependent on local school districts to achieve their goal of educating at-risk students, districts vary in the degree to which they depend on federal funds to achieve these goals. Thus based on the premises of RDT, a local school district’s efforts toward compliance would be expected to increase proportionally with its degree of dependence on federal revenues.

Prior to the establishment of these contingencies under NCLB, it appears that dependence upon federal revenue did not, in and of itself, necessitate higher administrative overhead costs for public school districts, at least relative to their more locally funded counterparts. For example, in an earlier application of structural contingency theory to school district expenditures in the state of Washington, Simon (1999) found both federal and state revenues to have a stabilizing effect, resulting in lower administrative expenditures per pupil in comparison to districts with less reliable sources of revenue. A later analysis of school district resource allocations conducted by Baker (2003) found mixed evidence suggesting that federal revenue did not lead to increases in administrative expenditure shares, though it was related to increased administrative staffing shares. In each of these studies, administrative costs were most significantly influenced by organizational factors such as size, and school-level factors such as student body characteristics (i.e., poverty and special needs).

These previous studies have helped to broaden our understanding of the relationship between resource dependencies and administrative costs within local school districts. However, both of these analyses were conducted using data that predated the implementation of NCLB, and both were inherently cross-sectional in nature. Given the policy changes instituted under NCLB, new questions have arisen regarding the potential effects of federal revenue on the administrative costs of local school districts, particularly for districts that are heavily reliant on federal revenues. As suggested by RDT, due to a lack of viable alternatives (i.e. a weak or unreliable local tax base), heavily resource dependent school districts are likely to respond to new accountability demands even more aggressively in order to maintain their existing revenue flows.

If school districts are now responding to federal education policy by altering their organizational behavior/resource allocations in order to secure and manage federal funding streams, and if this trend is pronounced among more heavily resource dependent districts, one result may be an increase in administrative expenses at the local level, especially for school districts serving large

populations of at risk pupils. This would be significant in the sense that it would mark a shift from previous trends (i.e., Baker, 2003; Simon, 1999) and challenge the wisdom of overly encumbering Title 1 funding with accountability and reporting requirements. The remainder of this article empirically tests these concerns to determine if federal policy has fundamentally influenced administrative costs within local school districts, and if so, to what extent.

Research Design

Data Sample

This analysis uses longitudinal data provided by the National Center for Education Statistics (NCES). In total, ten years of data were drawn for a seven state sample of public school districts. These data range from the 2000-01 school year (prior to the passage of NCLB) through the 2009-10 school year, which was the most recent year for which complete data were available at the time of this writing. Given the public policy focus of this research, only traditional public school districts were included in the sample. Nontraditional entities such as charter schools, private schools, and special needs schools (i.e. schools for the blind, deaf, etc.) were excluded from this analysis.² After removing all observations for which complete data were not available, the final sample included a total of 1,790 public school districts.³

The seven states included in this sample account for a number of important distinctions. The sample contains at least one state from each primary Census region, as well as a mix of state sizes and demographics. More importantly, the sample includes a mix of public school funding mechanisms, which represent an important distinction in state policy environments. The state funding mechanisms in Pennsylvania, Tennessee, and Washington are classified as *foundation programs*, while Connecticut, Vermont, and Wisconsin use an alternative approach known as *district power equalizing* (DPE) systems. North Carolina, which is included as a control state, is the only state currently using a *flat grant system* at the state level, which generally leads to greater equality in spending across districts than is seen under the other systems. Because the primary focus of this analysis is on the relationship between resource dependencies and administrative costs over time, the specifics of these state funding mechanisms are not discussed in detail here. For a more thorough discussion of these distinctions, see Verstegen (2011).

² To the extent possible, schools on Military Bases and Native American Territories were also excluded from this analysis as outliers with regard to federal revenue.

³ In cases of incomplete data, only those years or observations for which data were not available were removed from the sample. For instance, observations for a school district may have been removed for one or more of the ten years due to incomplete data without removing the district entirely from the analysis. This strategy is appropriate given the methodological techniques employed, which are not sensitive to unbalanced data (See Heck, Thomas, & Tabata, 2010 for discussion).

Table 1
Profile of Sample States

States	N	U.S. Census Region†	State Funding Mechanism‡	2000 Census Population†	2010 Census Population†
Connecticut	165	Northeast	DPE	3,405,565	3,574,097
North Carolina	115	South	Flat Grant	8,049,313	9,535,483
Pennsylvania	499	Northeast	Foundation	12,281,054	12,702,379
Tennessee	135	South	Foundation	5,689,283	6,346,105
Vermont	204	Northeast	DPE	608,827	625,741
Washington	254	West	Foundation	5,894,121	6,724,540
Wisconsin	418	Midwest	DPE	5,363,675	5,686,986

Note. † Source: United States Census Bureau

‡ Source: Verstegen (2011), retrieved from <http://dx.doi.org/10.14507/epaa.v19n21.2011>

Dependent Variables

Based on previous conventions (Baker, 2003; Monk & Hussain, 2000), this study considers both the *base* and *share* effects of school district expenditures. *Base Effects* represent total expenditures per pupil for a given expenditure category, while *Share Effects* represent the percentage (or share) of *Total Current Expenditures* spent on each category. The inclusion of both base and share effects allows for an understanding of not only dollar changes in the administrative spending categories over time, but also changes in the proportion of current expenditures dedicated to these functions. In total, this analysis considers six dependent variables, including base effects for (1) *Administrative Expenditures*, (2) *Support Service Expenditures*, and (3) *Instructional Expenditures*, as well as share effects for the same three spending categories. Based on the NCES data definitions, *Administrative Expenditures* refer narrowly to those expenditures associated with the offices of the principal and superintendent, as well as to expenditures associated with the school board. *Support Service Expenditures* provide a broader measurement of administrative overhead; they include those traditional administrative expenditures as well as additional costs such as business expenses and data processing. In the case of base effects, each category is measured in hundreds of dollars per pupil.

Independent Variables

In order to measure the impact of resource dependencies on administrative expenditures, independent variables are included for both federal and state resource dependence. Given the focus of this paper, these are the variables of primary concern to this analysis. *Federal Dependence* is operationalized as the average annual percentage of total revenues derived from federal sources over the ten-year period ranging from the 2000-01 through 2009-10 school years. In like manner, *State Dependence* is measured as the average annual percentage of total revenues derived from state sources over the same period. These ten year averages are used in order to capture each district's general level of dependence on these funding sources, while minimalizing the influence of abnormal fluctuations such as local bond sales, short range federal grants, etc. It should be noted that the bivariate correlation between federal and state dependence was statistically significant at the $p \leq 0.05$ level, but the Pearson correlation coefficient (r) was only 0.297, suggesting that the variables were not highly collinear.⁴

⁴ To avoid perfect multi-collinearity, local revenues were excluded from this analysis. This choice was based on the theoretical importance of federal and state revenue to this analysis.

Table 2
School District Resource Dependence by State (As a Percentage of Total Revenue)

States	N	Federal Dependence		State Dependence	
		\bar{x}	S	\bar{x}	s
Connecticut	165	3.29	2.27	32.91	16.91
North Carolina	115	10.91	3.48	62.36	6.92
Pennsylvania	499	4.86	2.86	40.95	16.25
Tennessee	135	11.68	2.96	53.78	9.67
Vermont	204	3.01	1.96	74.26	23.89
Washington	254	9.55	4.51	65.54	6.23
Wisconsin	418	5.11	2.10	48.09	15.94
TOTALS	1790	5.97	3.91	50.60	19.71

Note. Source: 10 year revenue source averages from 2000-01 through 2009-10 school years; taken from NCES ELSi system, available at <http://nces.ed.gov/ccd/elsi/tableGenerator.aspx>

Additionally, several control variables are also included in this analysis in order to account for known drivers of administrative overhead in public school districts. These include measures of size as well as measures of student composition. Both total enrollment⁵ and the number of operational schools in the district are included to account for economies of scale in administration. In each case, the logarithmic transformation is utilized due to the likelihood of diminishing marginal returns (see Baker, 2003; Simon, 1999). The percentage of students eligible for the federal free and reduced lunch program⁶ is also included, as well as the percentage of students on individualized education plans (IEP), as student body characteristics are known to be major drivers of administrative costs (see Baker, 2003; Simon, 1999). On top of these important control variables, dummy variables are included for each state in the sample, with North Carolina excluded as the reference category. It should be noted that additional state level variables are not included in this analysis. Since the primary goal is to identify the relationship between resource dependencies and administrative costs over time, dummy variables are sufficient to capture any significant variation at the state level. These dummy variables will not identify any underlying factors driving this variation, so additional research might be necessary if significant variation is present at the state level.

Statistical Models

In total, six repeated measures, random effect⁷ models are constructed for this analysis; one for each dependent variable. This approach allows us to examine the relationship between resource

⁵ Districts reporting less than 100 total students were not included in this analysis.

⁶ It should be noted that original diagnostics revealed a Pearson *r* correlation of 0.70 between the *federal dependence* and *free/reduced lunch* variables. Given the nature of federal education funding, multi-collinearity between these two variables is not unexpected. In order to gauge the impact of this multi-collinearity on the models, subsequent models were run excluding federal dependence. The removal of this variable did not significantly alter the parameter estimates or statistical significance of the FRL variable in any of the models, so both variables were retained given their theoretical relevance.

⁷ Note that both the time and group effects are treated as random in these models, despite the acknowledged potential for some unobserved heterogeneity among these data (i.e. unobserved correlation between the higher level group/district effects and the lower level time-varying predictors). The decision to use this approach instead of the more common fixed effects approach was based on several factors: (1) this analysis

dependencies and administrative costs over time, and it accounts for variation both within and across school districts. Each model uses the 2000-01 school year as a baseline and then examines how resource dependencies influence the rate of change in administrative costs annually over a 10-year period (until 2009-10). This approach allows us to see what the relationship between these variables was prior to NCLB, as well as how it has progressed over time since the law's passage (2001) and implementation (2003). These models were constructed using the IBM SPSS Mixed Models module. For a comprehensive discussion of this methodology, see Heck, Thomas, and Tabata (2010).

The generic form for these models is depicted below, where Formula 1 represents the model at level one (repeated measures), and Formulas 2 and 3 represent the model at level two (school district level). In each of the models, time is treated as a level one repeated measure, where $\pi_{1i}(time)_{ii}$ describes the sample of school districts' average rate of change in a dependent variable per unit of time (Formula 1), and $\pi_{2i}(time)^2_{ii}$ represents the quadratic transformation of the *time* variable, which depicts changes in the rate of change, such as an acceleration or deceleration in the trend (Heck et al., 2010). The *time* variable is simply a re-coding of *year* on a scale of zero through nine, with the earliest year (2000-01) coded as zero so that the intercept (π_{0i}) is interpreted as a district's initial level of the dependent variable at the start of the time-series. The four control variables discussed above are entered as level one, time-varying covariates. In other words, the values for these variables change on an annual basis. Their parameter estimates can therefore be interpreted as modifying the change in administrative expenditures at each subsequent interval. In each case, these variables (as well as the resource dependence variables) were centered for ease and relevance of interpretation.

$$(1) Y_{i,t} = \pi_{0i} + \pi_{1i}(time)_{ii} + \pi_{2i}(time)^2_{ii} + \pi_{3i}(enrollment)_{ii} + \pi_{4i}(schools)_{ii} + \pi_{5i}(SES)_{ii} + \pi_{6i}(IEP\ Students)_{ii} + \varepsilon_{ii}$$

At level two, the model includes randomly varying intercept and slope parameters (r_{0i} and r_{1i}), as well as the state dummy variables. Most importantly, the measures of federal and state resource dependence are included as level two variables (Formula 2), which is necessary given their measurement as ten year averages. The parameter estimates for level two variables are only interpreted as influencing the initial intercept for each district. This means that cross-level interaction terms are also necessary in order to gauge the cumulative impact of these variables over time. As shown in Formula 3, these interactions are included between each of the level two variables and the *time* variable at level one. For the purposes of this analysis, the interaction between *federal dependence* and *time* (time*federal dependence) is of primary concern, as this will depict the impact of federal resource dependence on the rate of change in administrative expenditures over time since the implementation of NCLB.

is interested in shedding light on the broader, ongoing relationship between resource dependencies and administrative costs. This makes a random effects approach theoretically appropriate for inferential reasons. (2) Furthermore, fixed effect models have been found to be most appropriate and effective when there is significant within-group variation on the time-varying predictors. When predictor variables have little variation over time, as is often the case with these data, the standard errors for fixed effect models tend to be large, leading to imprecise parameter estimates (Allison 2009). (3) Finally, conducting fixed effect models where N= 1,790 school districts would substantially and unduly reduce statistical power, while simultaneously ignoring rich and important cross-sectional variation. For a more complete discussion of these issues, see Allison (2009) and Clark and Linzer (2013).

$$(2) \pi_{0i} = \beta_{00} + \beta_{01}(\text{Federal Dependence})_i + \beta_{02}(\text{State Dependence})_i + \beta_{03}(\text{Connecticut})_i + \beta_{04}(\text{Pennsylvania})_i + \beta_{05}(\text{Tennessee})_i + \beta_{06}(\text{Vermont})_i + \beta_{07}(\text{Washington})_i + \beta_{08}(\text{Wisconsin})_i + r_{0i}$$

$$(3) \pi_{1i} = \beta_{10} + \beta_{11}(\text{time*Federal Dependence})_i + \beta_{12}(\text{time*State Dependence})_i + \beta_{13}(\text{time*Connecticut})_i + \beta_{14}(\text{time*Pennsylvania})_i + \beta_{15}(\text{time*Tennessee})_i + \beta_{16}(\text{time*Vermont})_i + \beta_{17}(\text{time*Washington})_i + \beta_{18}(\text{time*Wisconsin})_i + r_{1i}$$

Results

Table 3 reports the results of repeated measures models for each of the *base* expenditure variables. These models examine changes in per pupil expenditures by spending category over the 10-year period under consideration. Because each variable has been mean-centered and North Carolina has been excluded as the reference category, the intercepts can be interpreted as a North Carolina school district's base expenditures for the initial time-period (2000-01), assuming mean levels of each covariate. From there, the parameter estimates for each covariate and each state dummy variable modify the regression equations on a district-by-district basis. As mentioned above, the base expenditure variables are measured in hundreds of dollars per pupil. Because this analysis is chiefly concerned with the relationship between resource dependencies and administrative costs since the passage of NCLB, the primary focus of this discussion is on (1) the *time* variables, which explain the rate of change in each dependent variable over time, (2) the *federal dependence* and *state dependence* variables, which demonstrate the impact of resource dependencies on the initial intercepts, and (3) the combined interaction effects for these variables (i.e., *time*federal dependence*), which show how these resource dependencies have influenced the rate of change in each dependent variable over time. Results for the additional control variables are briefly discussed at the conclusion of this section.

As Table 3 shows, the parameter estimate for *time* is positive and statistically significant in each of the base expenditure models. This suggests that per pupil expenditures in each category have increased on an average annual basis for the ten years in question, *ceteris paribus*. For instance, the estimate for support service expenditures increases 1.138 (or approximately \$114) for each time interval. As an example, consider a North Carolina school district with average values for each covariate. The initial intercept for support service expenditures would be 64.74, with the growth rate identified as $64.74 + 1.138(\text{time})$. These numbers simply suggest that per pupil expenditures have been increasing across each category over the ten years in question. More germane to this analysis is how these rates of change have been influenced by resource dependencies.

Because they are treated as time-invariant, level two variables, the parameter estimates for *federal dependence* and *state dependence* should only be interpreted as influencing a school district's initial intercept for each dependent variable. As shown in Table 3, federal dependence was not significantly related to either administrative expenditures or support service expenditures in the base models. In other words, there was no statistically significant relationship between federal resource dependence and administrative costs in the 2000-01 school year. This is consistent with the belief that dependence on federal revenue did not increase administrative expenditures pre NCLB, though it should be noted that both Simon (1999) and Baker (2003) actually found federal revenue to be negatively related to administrative costs in their studies. Federal dependence was positively related to instructional expenditures in the initial period (2000-01), which may be expected given the nature

and purpose of federal funding at that point. In contrast, state revenue was negatively related to base expenditures in the initial time period for each of the three spending categories.

Of most importance to this study is the interaction term between federal dependence and time, which is positive and statistically significant in each expenditure model. In short, this means that as federal resource dependence increases, a district's rate of growth in each spending category also increases significantly above and beyond the average. As hypothesized in this study, while federal resource dependence was not significantly related to administrative costs pre-NCLB, it has been significantly related to local school districts' growth in administrative expenditures since the passage of NCLB. This suggests a shift from previous trends, most likely due to the contingencies associated with NCLB. This increase was largest in the case of support service expenditures, where $\beta = 0.023$. It should be noted that the effect sizes associated with these relationships tend to be small, though it should also be pointed out that the parameter estimates for these interaction terms have an ongoing effect for each subsequent time interval. Furthermore, while the data demonstrate a directional shift in the relationship between federal resource dependence and administrative expenditures post-NCLB, the offsetting increase in instructional expenditures, may suggest that this change has not necessarily "disadvantaged" these local districts from an instructional perspective, at least up to this point.

Table 3
Base Expenditure Models (in \$100's per pupil)

Variables†	Administration	Support Services	Instruction
<i>District Level Variables</i>			
Intercept	22.726**	64.742**	99.530**
Enrollment (log)	-2.253**	-6.320**	-8.333**
Operational Schools (log)	1.476**	4.992**	6.477**
Free Lunch Eligible (%)	0.004*	0.012**	0.011**
Individualized Education Plan (%)	0.010**	0.063**	0.116**
Federal Dependence	0.002	0.039	0.274**
State Dependence	-0.031**	-0.131**	-0.211**
<i>States</i>			
Connecticut	-1.167**	2.421**	5.493**
Pennsylvania	-2.242**	0.191	0.116
Tennessee	-3.436**	-9.788**	-9.040**
Vermont	-2.686**	-0.775	4.360**
Washington	-2.077**	-0.501	-3.686**
Wisconsin	-2.011**	1.216*	-0.214
<i>Trend & Interactions</i>			
Time	0.200**	1.138**	1.405**
Federal Dependence*Time	0.004**	0.023**	0.022**
State Dependence * Time	-0.002**	-0.008**	-0.010**
Connecticut*Time	0.534**	1.744**	2.735**
Pennsylvania*Time	0.176**	0.621**	1.002**
Tennessee*Time	0.101**	0.119	-0.184
Vermont*Time	0.484**	1.446**	2.422**
Washington*Time	0.165**	0.410**	0.596**
Wisconsin*Time	0.218**	0.314**	0.501**
Time (Quadratic)	-0.010**	-0.019**	0.019**
-2LL	40915.210	75166.767	84613.031
Null -2LL	60590.043	103124.171	116158.486

Note. † Random effects estimates not shown. All random effects were significant at the $p \leq .001$ level.

* $p \leq .10$; ** $p \leq .05$

Contrary to federal dependence, parameter estimates for the interaction between state dependence and time are negatively related to base expenditures in each case, which means that the rate of growth in expenditures was generally smaller for school districts with more reliance on state funding. This suggests that the relationship between state revenue and administrative expenditures has not changed in response to NCLB, while the relationship between federal revenue and expenditures indeed does appear to have changed. It is also important to note that the quadratic transformation of *time* is negatively related to base expenditures in each administrative category (administration and support services). This suggests that the acceleration of growth in these

categories has slowed over more recent years (Heck et al., 2010). This could imply that administrative costs accelerated most quickly in the immediate response of local school districts to the requirements of NCLB, and that this trend is now abating as local school districts become more accustomed to and adept at managing these external resource contingencies. However, the data still suggest that administrative growth is higher among local school districts with greater reliance on federal revenue.

Table 4 provides results for the expenditure share models, which examine changes in the share of total current expenditures devoted to each spending category. As the data demonstrate, the average growth rate (*time*) was negative and statistically significant for both administration and instruction as a percentage of total current expenditures, but was positive and significant for support service expenditures. This suggests that the percentage of total current expenditures dedicated to support services increased over the ten years, while the percentage dedicated to instruction and traditional administration decreased, *ceteris paribus*. It should be noted that this does not necessarily imply a reduction in per pupil administrative or instructional expenditures, as shown in the base expenditure models (Table 3). This trend is intriguing, as it suggests that aggregate increases in administrative overhead arising from NCLB are largely occurring in functions associated with the broader support service expenditures category (i.e. business expenses and data processing), rather than in the traditional offices of the superintendent and principal. Future research might consider a disaggregation of the support service categories in order to better identify which specific administrative functions have been most significantly impacted by the requirements of NCLB.

As in prior studies (Baker, 2003; Simon, 1999), federal resource dependence was negatively related to the share of expenditures dedicated to both administration ($\beta = -0.035$) and support services ($\beta = -0.115$) in the initial time period (prior to NCLB). Like the base effect models above, federal dependence was positively related to the initial intercept for instructional share. The interaction term for federal dependence and time shows that school districts with greater reliance on federal funds saw larger than average shifts toward support services over the ten years ($\beta = 0.009$), along with larger than average decreases in instructional share over the same time ($\beta = -0.009$). The coefficient for the administrative share model was not statistically significant, though state dependence had a negative impact on the growth of administrative share over time ($\beta = -0.001$). Once again, the effect sizes for these relationships are small, but as noted above, the parameter estimates associated with these interaction terms continue to accrue over time. Most importantly, these data do demonstrate a distinct resource dependence effect, where districts with greater reliance on federal revenue are experiencing a larger shift in the percentage of total current expenditures dedicated to support services over time. As was the case in the base spending models above, this differs from the pre-NCLB trend, as suggested by both previous studies (Baker, 2003; Simon, 1999) and the level two resource dependence variables.

Collectively, these results demonstrate a weak to moderate resource dependence effect, whereby districts with greater reliance on federal revenue have seen larger increases in administrative overhead than those with less federal dependence in the post-NCLB era. The largest increase in administrative overhead seems to come in the broader support services category rather than the traditional administration category. These trends do not demonstrate a per pupil decrease in instructional spending among heavily resource dependent districts, but they do suggest a growing distinction in the allocation of expenditure shares among those districts as compared to their more locally or state funded counterparts. Furthermore, these findings show larger base dollar increases in administrative overhead among more heavily resource dependent districts, which may raise concerns over both efficiency and instructional focus in already *at-risk* districts.

Table 4
Expenditure Share Models (as a % of Total Current Expenditures)

Variables†	Administration	Support Services	Instruction
<i>District Level Variables</i>			
Intercept	18.410**	40.053**	54.001**
Enrollment (log)	-1.116**	-1.214**	1.254**
Operational Schools (log)	0.444**	0.991**	-0.945**
Free Lunch Eligible (%)	0.002	0.003	-0.009**
Individualized Education Plan (%)	-0.007**	-0.002	0.005
Federal Dependence	-0.035**	-0.115**	0.063**
State Dependence	-0.003	-0.015**	0.005
<i>States</i>			
Connecticut	-2.417**	0.562	1.267**
Pennsylvania	-3.043**	0.705*	0.503
Tennessee	-2.421**	-4.651**	5.755**
Vermont	-3.602**	-1.223**	3.741**
Washington	-2.344**	1.895**	-1.456**
Wisconsin	-2.668**	1.991**	-0.280
<i>Trend & Interactions</i>			
Time	-0.095**	0.277**	-0.284**
Federal Dependence*Time	0.001	0.009**	-0.009**
State Dependence * Time	-0.001**	-0.001	0.001
Connecticut*Time	0.197**	0.110**	-0.128**
Pennsylvania*Time	0.152**	0.061	-0.088**
Tennessee*Time	0.169**	0.298**	-0.385**
Vermont*Time	0.211**	0.131**	-0.131**
Washington*Time	0.130**	-0.028	0.026
Wisconsin*Time	0.202**	-0.042	-0.019
Time (Quadratic)	-0.010**	-0.022**	0.026**
-2LL	35288.015	59918.007	60789.309
Null -2LL	41188.598	66068.120	66866.524

Note. † Random effects estimates not shown. All random effects were significant at the $p \leq .001$ level.

* $p \leq .10$; ** $p \leq .05$

For the most part, the additional control variables behaved largely as expected. Enrollment was negatively related to both base and share effects for the two administrative overhead categories, and was positively related to instructional share. The number of operational schools was positively related to administrative expenditures in both the base and share effect models, as was the percentage of IEP students. Perhaps surprisingly, socioeconomic status was not a major driver of expenditures in most models. As noted above, this was not due to multi-collinearity concerns, as the effect size and significance of the *free and reduced lunch* variable was not altered when *federal dependence* was removed from the models. Growth rates in base expenditures (Table 4) seemed to be highest among the Northeastern states, and Tennessee did not differ significantly from the reference

category (North Carolina) in two of the three base effect models. This may suggest a meaningful regional distinction in spending patterns, but this trend was less evident in the share effect models. Future studies might consider more specific drivers of state level variation, which was not a significant concern in this analysis.

Discussion

In 1999, two years prior to the passage of NCLB, Simon's analysis concluded that dependence on federal revenue was not associated with larger administrative expenditures in public school districts. Since that time, the passage of NCLB has significantly altered the policy environment for public schools, making the continuation of Title 1 funding contingent upon new standards and accountability requirements. These changes have led to increased testing, tracking, and reporting requirements for school districts, among other administrative responsibilities (McDermott & Jensen, 2005). This study has considered the extent to which these changes in the federal policy environment have influenced the resource allocations of local school districts, particularly with regard to administrative costs. As predicted by resource dependence theory, school districts with heavy reliance on federal funding have experienced larger than average increases in administrative costs and administrative share over the last ten years, most likely in an effort to manage and maintain these revenue streams.

From a theoretical perspective, these results contribute to the growing body of literature on resource dependence theory in public organizations, and more specifically, they provide some support for the application of RDT in local school districts. The findings demonstrate a significant relationship between resource dependence and administrative costs, even after controlling for the policy effect of NCLB and other known drivers of administrative overhead. Consistent with the aforementioned premises of RDT, these findings suggest that organizational responses to external conditions are proportional to the degree of dependence exhibited by the recipient organization (Pfeffer & Salancik, 1978). This is consistent with the results of other recent studies, which have found resource dependency effects among the behavior of nonprofit service providers (Garrow, 2011; Mosley, 2012), the design of public contracts (Malatesta & Smith, 2011), the social structure of policy networks (Park & Rethemeyer, 2012), and the expenditure patterns of colleges and universities (Fowles, 2014). The overall relevance of RDT to public school districts is certainly in need of further examination, but these findings suggest that further analysis should be a worthwhile pursuit.

With that said, the interaction between RDT and institutional theory, which was explored in the aforementioned study of American universities conducted by Tolbert (1985), may help in part to explain the small effect sizes found in this study. Institutional theory (e.g., DiMaggio & Powell, 1983; Meyer & Rowan, 1977) attempts to explain how and why organizations adapt both structurally and behaviorally to the prevailing norms and expectations within their broader institutional environments. While RDT argues that organizations adapt in an effort to manage external resource dependencies, institutional theory suggests that many adaptations are made in an effort to maintain "legitimacy", regardless of an institution's level of physical/capital resource dependence. According to Tolbert (1985), when organizational behaviors become "institutionalized" as prevailing norms, responses based on varying levels of resource dependence will be attenuated, as all organizations will adopt similar practices in response to "isomorphic" pressures.

This is certainly relevant to the case of NCLB, as all participating school districts face some level of accountability and reporting requirements, regardless of their varying levels of resource dependence. To the extent that the administrative practices adopted in response to these

requirements become institutionalized norms, all institutions will experience some level of increased costs, which will in part hide the overall effect. The resource dependence effect that remains in the additional variation is thus smaller than might be expected in the absence of strong isomorphic pressures. These factors do not nullify the relevance of RDT for analyses of K-12 school districts, but they do suggest that the theory might be most appropriate for explaining organizational behaviors in response to more “voluntary” policy arrangements. One potential opportunity for future research in this area may be the federal Race to the Top (RTT) program, which was passed as part of the American Recovery and Reinvestment Act of 2009. Because RTT is based largely on voluntary actions at the state level, more telling comparisons may be possible as further data become available.

The small effect sizes found in this study may also be due in part to the nature of the expenditure categories used in the analysis. Because the *instructional*, *administrative*, and *support service* expenditure categories are broadly defined, containing a variety of different functions in each, it is possible that some important changes in organizational behavior are not being detected by these data. For example, recent research by Dee and Jacob (2010) found significant shifts in the allocation of instructional time post NCLB, with more instructional effort being shifted toward tested subjects such as math and reading, at the expense of untested subjects such as social studies and the humanities. While this change marks a significant shift in organizational behavior, it would not necessarily show up as a net change in instructional expenditures using the NCES data. If the resources in question (i.e. teacher salaries) were shuffled around but remained within the same expenditure category, then the impact of the policy change on organizational behavior would be missed. The same could be said of changes in administrative structure/behavior made in an effort to manage resource dependencies in response to NCLB. If any such changes did not involve the addition of new resources or the transfer of existing resources across these broad expenditure categories, then they would not show up as part of the resource dependence effect in these data.

Regardless of the reasons behind these small effects sizes, the results of this analysis do help to improve our understanding of how resource dependencies impact local school districts in the post NCLB environment. Most notably, these results demonstrate a clear shift in the relationship between resource dependencies and administrative costs from that shown in pre-NCLB studies (i.e. Baker, 2003; Simon, 1999). In response to changes in federal policy, local school districts appear to have altered their organizational behavior, resulting in a significant change in internal resource allocations. Furthermore, while the effect sizes are small on a per interval basis, the ongoing impact of these changes over time can be significant, particularly if the observed trend continues into the future. For instance, if managing resource dependencies and maintaining revenue streams leads to a perpetuation of these trends, then over time the distribution of resources *within* school districts will become increasingly inequitable, even if the distribution of resources *across* school districts appears to be equalizing. It should be emphasized that this analysis is not sufficient to either demonstrate or predict a continuation of this trend far into the future; additional research will be required in order to answer that question.

These research findings have implications for local school districts as well as for federal policy makers. At the local level, concerns emerge with regard to organizational dynamics and performance. As Pfeffer and Salancik (1974, 1978) have noted, given the importance of external resources to organizational survival, internal organizational power tends to accrue to those subunits that are most effective at procuring and maintaining resources. In the case of school districts, as administrative offices become of greater importance in the acquisition and maintenance of financial resources, one result may be a shift in organizational power toward these administrative offices or positions, potentially at the expense of instructional personnel. The nature of organizational decision

making could thus be shifted by these emerging power dynamics. There is at least limited evidence of this already, as research from the Center for Education Policy (2006) has suggested that reactions to the law have led to reductions in teacher autonomy over decisions such as curriculum adoption, pedagogical practices, and the scheduling of tests.

These increases in administrative overhead raise not only potential organizational concerns for local school districts, but also potential instructional concerns as well. Several previous studies have suggested that such increases in bureaucracy at the district level can have a negative impact on student performance and educational outcomes. For instance, Anderson, Shughart, and Tollison (1991) found evidence of what they termed a “bureaucratic substitution effect”, whereby local school districts with larger administrative staffs (on a per pupil basis) tended to exhibit lower standardized test scores as well as lower graduation rates, *ceteris paribus*. Perhaps most famously, Chubb and Moe (1990) argued that excessive school bureaucracy could limit innovativeness and discretion among teachers, thereby impeding optimal educational performance, particularly in those schools where bureaucracies were most sizeable. More recently, Bohte (2001) found that higher levels of bureaucracy were associated with lower standardized test scores as well as lower SAT scores. It should be noted that there has been significant disagreement with these arguments (see Smith & Meier, 1994, 1995) and that in each of these studies, administration/bureaucracy was measured in terms of administrative staffing rather than administrative expenditures, which are used in this study.

These results also raise concerns from a macro-policy perspective, particularly with regard to the use of contingent funding policies such as NCLB in public education. To the extent that these policy arrangements may create a disadvantage for resource dependent school districts (i.e. through increased administrative shares), then they could prove counterproductive to the original goals of federal education policy, namely reducing resource inequities and increasing educational outcomes for at-risk students. Because schools receiving the largest shares of federal revenue tend to be serving large populations of at-risk/low SES students, these policies could raise significant equity concerns if the resource dependence effect is cumulative over time. The resource dependence effect appears small enough in this case that it does not warrant significant policy adjustments on these grounds; however this effect could presumably be exacerbated by future policy reforms if additional contingencies are imposed on local school districts. Regardless of effect size, it appears that the weight of federal contingencies falls most heavily on those districts with the greatest need for federal aid. While this may make sense from an accountability perspective, it could ultimately prove detrimental to the central goal of federal education policy.

This analysis serves as a “first-look” at these data post NCLB, and while it demonstrates a definite shift in trends over time, some limitations are evident in the research design. For instance, these models do not account for additional changes in education policy over the time-series under consideration. While Race to the Top, which was passed as part of the American Recovery and Reinvestment Act of 2009, was not a factor during this time, changes in other areas, such as the Improving Head Start for School Readiness Act (2007), may have influenced administrative behaviors/expenditures across this sample. Furthermore, changes in policy within the individual states, such as the expanded use of charter schools and other non-traditional alternatives to public schooling, may also have impacted administrative costs and behaviors in part or all of the sample.

As mentioned above, the design is also limited by the nature of the expenditure categories under consideration, which are not able to account for significant shifts in resources or changes in organizational behavior within these broad categories. Additional research may be necessary to account for the impact of these limitations. Future work may also consider the extent to which the trends observed in this analysis are continuing beyond the 2009-10 school year or if they are

beginning to abate as NCLB nears ten years since its initial implementation. As time and data accrue, the impact of Race to the Top (2009) on administrative costs and behaviors should also be considered. While this seven state sample provides for a robust analysis, a three level model conducted on a national sample would also serve to alleviate any lingering concerns over external reliability. Collectively, these results provide some support for the hypothesis that resource dependencies have led to greater administrative costs in the wake of NCLB, but further research is required in order to better understand the extent of this relationship and its ramifications for both federal policy and local behavior.

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