Examining the Relationship Between Educational Outcomes and Gaps in Funding: An Extension of the New York Adequacy Study

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Abstract

In 1993, the Campaign for Fiscal Equity (CFE) challenged New York State's school financing system on the grounds that it failed to provide students sufficient opportunity for a sound basic education in New York City. CFE prevailed in 2003, after the case went before the New York Court of Appeals, and the state's funding system was determined to be unconstitutional and ordered to be altered to ensure "adequate" funding. The final decision decreed that before any remediation take place, an objective study be conducted to determine how much it would cost to provide an "adequate" education for all public school students in the state, upon which this article is based. While a professional judgment approach forms the centerpiece of the work, components of the analysis draw on other methodological tools (i.e., public engagement, expert panels, and successful schools) to further support the results. We find that for a majority of districts significantly higher levels of spending are required if the state wishes to provide a sound basic education to all public school students. Furthermore, the results show a clear negative relationship between the district-level shortfall in spending and educational outcomes across virtually all student subpopulations.

What is the cost of providing all New York public school students a full opportunity to meet the Regents Learning Standards?

Introduction

Estimating the costs of adequacy is a complex undertaking with no one "right" answer. In part, this conclusion results from the fact that we simply do not know enough about "what works" in terms of educational resources and practices. However, it also arises from our inability to agree on exactly what we are trying to accomplish in our public schools. To estimate the costs of adequacy really requires making assumptions about both the goals for our schools and "what works" to accomplish these goals. With these issues as a backdrop, this article presents an examination and extended analysis of the *New York Adequacy Study* conducted by Chambers *et al*. (2004a, b), which attempted to cost out an "adequate" education for all children in New York State.[1]

While the *New York Adequacy Study (NYAS)* emphasized the use of a professional judgment approach to build a cost estimate, the study also utilized some unique elements that distinguish it from previous *costing-out* studies.[2] First, it incorporated a significant element of public engagement that gathers valuable public input on adequacy goals while building public awareness and support for the project and its final recommendations. Second, an analysis designed to identify schools that were beating the odds (i.e., schools that had exceptional results given the composition of students they were serving) was conducted. We utilized the list of schools that were beating the odds along with other nomination processes to recruit some of the participants for the professional judgment panels. We also compared the staffing patterns in these schools against average performing schools, and provided this analysis to the professional judgment panels during the review process.

The final results of the NYAS suggest that over the 2001-02 school year, the public schools in New York State spent about $31.71 billion to educate its students, excluding home-to-

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[1] In what follows, we refer to a "costing out" study as one designed to estimate the costs of an *adequate* education.
[2] See, for example, Baker, Taylor, and Vedlitz (2003) for a comprehensive review of the literature on the approaches for addressing adequacy.

school transportation and debt service.[3] Based on these results an additional $6.21 to $8.40 billion would have been necessary in this same school year to achieve *adequacy* representing a 19.6 to a 26.5 percent increase.[4] It was found that about 520 districts would have required additional funds, while the remaining 160 districts in the state were already spending at "adequate" levels.[5] These estimates reflect the amounts of additional funds necessary to bring all of the 520 districts currently not spending at adequate levels up to the adequacy standard established for this study without any impact on those 160 districts currently spending at or above these "adequate" levels.[6]

In addition to an overview of the procedures used in the core approach of the NYAS, two extensions to the original costing-out analysis are included in this article. First, an index of student need and district scale is introduced that can be used to formulate a sustainable and objective foundation funding formula (i.e., one that is easy to update and difficult for districts to manipulate to their benefit). Second, we show a clear negative relationship between the resource adequacy gap found across the majority of New York public schools and their academic performance.

The remainder of the paper will be organized as follows: Section 2 provides the background and motivation for this research stemming from the recent high profile educational adequacy court case in New York State; Section 3 presents the general costing-out methodology and novel elements incorporated in the approach; the main results of the study including an extended analysis of adequacy gap in New York schools are contained in Section 4; the final section summarizes and provides some concluding remarks.

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[3] Analysis of expenditures on school transportation services and the debt service to acquire land and build school facilities was beyond the scope of the study. Moreover, the $31.71 billion does not include federal (e.g., Head Start) and state funding for pre-kindergarten programs not administered by the Department of Education. The federal allocation to New York for the Head Start program alone would have added at least $399 million (federal allocation for the 2001 fiscal year) to this total.

[4] As will be seen later in this paper, we formally defined adequacy as providing to all students a *"full opportunity to meet the Regents Learning Standards"*.

[5] The analysis omits districts designated as "Special Aid" as well as those with a minimal teaching staff.

[6] That is, the additional expenditures are calculated assuming a "hold-harmless" provision which essentially means that districts that already have access to sufficient resources would not lose any state aid as would be the case under a redistributive system or "Robin Hood" (taking from the rich and giving to the poor) approach.

The Legal Foundation for "The New York Adequacy Study"

The concept of education funding "adequacy" was initially raised in New York State by the Court of Appeals in its 1982 decision in *Levittown v. Nyquist*, 57 N.Y.2d 57 (1982), which found that the state's constitution guaranteed all New York children an opportunity for a "sound basic education." The Court did not, however, attempt at that time to define a "sound basic education."

In response to *Levittown*, the New York State Education Department convened a task force to define this critical term. That group decided that a "sound basic education" could best be defined not in the abstract, but in terms of learning standards. This decision led to an extensive state-sponsored research and public engagement process culminating in 1996 in the issuance of the *Regents Learning Standards*. The Regents Learning Standards establish detailed expectations for student achievement in seven academic content areas. In order to obtain a high school diploma, New York students must pass a set of Regents Examinations based on these standards.

Implementation of the Regents Learning Standards has led to extensive reforms in what and how schools teach and how classroom teachers are prepared and certified. However, there had not yet been a systematic attempt by the state to determine the amount of funding necessary to implement these reforms and to ensure that all schools have the resources needed to provide students an opportunity to meet the state's challenging new standards. The research results reported in this paper were intended to remedy that gap.[7]

In 1993, the Campaign for Fiscal Equity (CFE) challenged the state's school financing system on the grounds that it failed to provide students sufficient opportunity for a sound basic education in New York City. CFE prevailed at the trial level and in 2001 State Supreme Court Justice Leland DeGrasse declared New York State's school finance arrangements unconstitutional. The decision was appealed and implementation of a remedy was consequently delayed.

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[7] While the success of schools depends on effective allocation of resources and implementation of programs in school districts, it must be recognized that the school success also depends on other individuals and institutions to provide the health, intellectual stimulus, and family support upon which public school systems can build. Schools cannot and do not perform their role in a vacuum, and this is an important qualification of conclusions reached in any study of adequacy in education.

In June of 2002, the state's intermediate appellate court, the Appellate Division, First Department, reversed Justice DeGrasse's decision. The New York Court of Appeals, the state's highest court, subsequently accepted jurisdiction of the case, and its final decision, issued in June of 2003, reversed the Appellate Court's decision and largely upheld the trial court's original decision. Thus, New York State's current education funding arrangements were definitively determined to be unconstitutional and required to be altered to ensure that funding is "adequate."

The Court of Appeals decision emphasizes the need for 21st century students to achieve academically at levels enabling them to perform productively in the economy and engage in civic activities such as voting in an informed manner and serving effectively as a juror. The New York State Board of Regents for reasons similar to those stated by Justice DeGrasse adopted the concept of "Learning Standards". Consequently, this research project's quest for "adequate" school funding relies upon the Regents Learning Standards as the performance criteria.

Methodology

The NYAS objective was to determine the amount of revenues for each district that should, at a minimum, be sufficient to provide an opportunity for all students to meet the Regents Learning Standards. However, districts vary widely in both the needs of the student bodies they serve as well as the costs they face in terms of hiring staff and purchasing non-personnel resources. With this in mind, the methodology used to calculate adequate necessary expenditures should be adjusted for cost variations beyond a local school districts' immediate control.

While a professional judgment approach formed the centerpiece of this work, components of the analysis draw on other methodological tools and models that interact and further support the results of the professional judgment model. These other methods include a strong public engagement component, econometric analysis of the teacher labor market, statistical analysis to identify schools that are beating the odds," and current research on school effectiveness. The following section will take each of these methodological components in turn.

Public Engagement

As implemented in the NYAS, public engagement helped establish a publicly acceptable definition of the desired goals of the New York public education system, which were subsequently used to guide the deliberations of the professional judgment panels. In addition,

the public engagement process provided widespread public awareness of the project and sought broad input on what might be required to achieve adequacy. This campaign helped to draw many citizens into the process by offering them an outlet for their concerns, and it offered them some insight into the factors that were being taken into account in the analysis.

However, the public engagement also played another important role in the study. As will be seen in the following description of the professional judgment model, at the end of that process, public engagement provided a check on the deliberations of the educators who, in the end, were responsible for presenting and justifying their recommendations to a broad group of stakeholders representing the constituencies that participated in the public engagement process. In turn, the interaction between the public engagement and professional judgment processes provided a system of checks and balances that ensured the adequacy cost measures were justifiable, as the panels had to show that they were not the result of excessive and unnecessary specification of resources on their part.

The Professional Judgment Model (PJM)

Chambers and Parrish (1982, 1984) pioneered means for involving informed educators in the process of designing costing-out models. This approach is now commonly referred to as the professional judgment model (PJM). These early studies were primarily oriented around input models that focused on specifications of detailed service delivery systems to meet the needs of diverse student populations.

There are four elements that distinguish the current work in New York from the original PJM and more recent applications of the approach (e.g., Guthrie et al., 1997; Augenblick, 1997, 2001; and Augenblick and Myers, 2002) from the earlier work of Chambers and Parrish. First, the goals established in the NYAS for the professional judgment panels (subsequently referred to as PJPs) are clearly focused more on *student outcomes* (i.e., the Regents Learning Standards) rather than an input standard. The key phrase in the *statement of outcomes* to which we asked the panels to direct their deliberations follows:

"Your job is to design an instructional program that will provide all students in the school a full opportunity to meet the Regents Learning Standards, and to attain a Regents diploma."[8]

A second distinguishing element of the NYAS application of the PJM is that we asked the professional judgment panels to begin their deliberations by *designing instructional programs at each school level*. It is only after thinking about the content and structure of the instructional programs that we asked the panels to develop the resource specifications necessary to achieve the desired results for children. In this way, the panels begin by building a foundation that incorporates a comprehensive and structured theory of action before fitting the program with the specific resources that will be necessary for implementation.

A third distinctive feature of the NYAS was that we designed the professional judgment process to support a *more integrated approach* to meeting the diverse needs of students. The original model organized separate panels to develop delivery systems for the various categories of children. The current process organizes educators to work together immediately to think about the instructional needs of all students in a more integrated fashion, and permits the educators to decide how to reflect the needs of the diverse groups of students to be served.

The final notable feature of the NYAS was the organization of eight independent PJPs to provide comprehensive instructional program designs and two additional sub-panels to address any additional needs of special education students. Districts in New York State were divided into four representative categories based on their urbanicity, relative needs, and types of communities in which they were located.[9] Two independent PJPs were selected from each of the four categories of districts. A total of 56 educators participated on these eight PJPs.[10] We selected the special education panels from among the special educators original eight PJPs, and asked them to review the program designs and to account for any special education resources that were not included by the original PJPs.

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[8] For the full statement of desired educational outcomes, the reader is referred to the full report (see Exhibit 2-1on page 17 in Chambers et al (2004a)).

[9] The research team used the New York State Education Department's *Needs to Resource Capacity* categories in conjunction with the *locale* codes devised by the National Center for Education Statistics (NCES) to classify the school districts. The four categories included New York City Public Schools, the other urban districts including the Big Four (Albany, Buffalo, Rochester, and Syracuse), suburban low and average need districts, and districts in rural communities. For a more detailed account of the district categorization method please see Appendix B in Chambers et al. (2004b).

[10] Each panel consisted of a superintendent, special educator, elementary school principal, middle school principal, high school principal, school business official, and classroom teacher.

The PJM as implemented in New York included the organization of two panels beyond the initial ten PJPs: a *PJP Review Team* and a *Stakeholder Panel*. Members of the *PJP Review Team* were selected from among the original PJPs to represent the panels. The *Stakeholder Panel* consisted of the *PJP Review Team* members plus non-educators who represent various parties with an interest in the financing of education. The stakeholders represented parents, taxpayers, the state legislature, the governor's office, school board members, and the business community. Many of these stakeholders had also been involved during the public engagement component at the outset of the study.

It is interesting to note that both the concept and duties of the *PJP Review Team* and the *Stakeholder* panels were similar to the organization of the PJM as originally designed by Chambers and Parrish in the Illinois (1982) and Alaska (1984) studies. The counterpart to the *PJP Review Team* in these original studies consisted of one representative from each of the program-specific panels to review and compare delivery systems and arrive at agreement regarding final specifications.[11] Since a more integrated approach was used in New York, the *PJP Review Team* in this case took on a slightly different role of reviewing the synthesis of more comprehensive PJP deliberations developed by the research team, making suggestions for revisions, and interpreting the programmatic implications.

As mentioned above, the *Stakeholder Panel* was organized to provide a check on the deliberations and recommendations of the PJPs in their specification of the necessary resources to meet the adequacy objective. It provided an opportunity for the educators and non-educators to interact with one another and for the *PJP Review Team* members to justify their specifications and accept input from the non-educators for consideration in the final resource specifications.

At the outset of the process, we asked the panels to specify the programs using the minimal level of resources they felt were necessary to achieve the desired results for all children. It is also important to note that PJP participants were told prior to their deliberations that a subset of panel members would be selected to participate on the *PJP Review Team* and would be asked to represent, interpret, and explain the rationale for the program designs, resource specifications,

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[11] The PJPs in the Illinois and Alaska studies were divided according to various instructional programs such as regular education, special education, programs for English language learners, vocational education, and compensatory education programs. Under the NYAS, a more integrated approach was utilized where separate PJPs were organized around the four types of districts listed above (see footnote 9), each conducting deliberations of the necessary resources required to provide a comprehensive instructional program that would adequately serve student populations with varying needs (i.e., students in poverty, special education, etc.)

and recommendations made by the PJPs. We believe that the fact that they were going to be held accountable for their recommendations acts as a check on the process.

The Utilization of the Econometric Analysis

The availability of the large-scale databases maintained by New York State's Education Department made it possible to undertake econometric analyses of education-related costs. The NYAS relied upon econometric tools and standard labor market models to ascertain differences in the costs of comparable school personnel (teachers) from one geographic region to another within New York.[12]

The NYAS also utilized econometric tools to explore the variations in the patterns of projected per-pupil expenditures. Specifically, once the projections for each district were developed from the professional judgment model, the research team examined the patterns of variation in the costs of adequacy and how these related to variations in pupil needs and the scale of school and district operations.

Beating-the-Odds **Analysis**

The NYAS also incorporated an analysis to identify schools that exhibit exceptional results given the composition of the students they serve. To do this analysis, the research team began by constructing indices of student performance for New York schools, and then used econometric/statistical methods to identify those schools that were determined to be successful or "*beating the odds*."[13, 14] These schools were unusually successful in producing high student performance relative to what researchers conventionally would predict given the characteristics of students served. To ensure consistent success for a significant length of time schools were

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[12] The analysis of teacher markets and development of the geographic cost of education indices for the NYAS was carried out as a collaborative effort between Jay Chambers and Lori Taylor and followed the hedonic wage methods described in previous studies by each of these authors. Logistic regression models were also used to explore the patterns of teacher turnover in New York State. For an overall review of the methods used here see Chambers (1981, 1997) and for more recent examples, see the work of Taylor, Chambers, and Robinson (2004) and Taylor (2004).

[13] This was achieved via regression analysis similar to that found in Stiefel, Rubenstein, and Schwartz (1999). For a more detailed account of the successful schools analysis see Chambers *et al*. (2004a, b).

[14] The outcomes included in our analysis of successful schools include percentage of students meeting the Regents Learning Standards requirements for English and mathematics (for high schools) or students on a trajectory to do so (for elementary and middle schools), student attendance, and dropout rates (for high schools only).

labeled "successful" (i.e., beating the odds) by the research team if they maintained superior performance, on average, over a four-year period.

The primary use of the *beating-the-odds* analysis was to provide a method for identifying particularly successful schools from which to solicit nominations for professional judgment panel participants.[15] In addition, we used the state personnel data system to reveal the staffing patterns in those schools that were deemed to be beating the odds and provided these profiles to representatives of the professional judgment panels to be considered as part of the *PJP Review Team* deliberations in preparation for their review of the synthesis of the PJP program designs and specifications. Specifically, we provided information to the *PJP Review Team* about the staffing patterns of the schools identified as *beating the odds,* and also provided comparative staffing pattern data for the average schools in New York State.

Current Research

Educational policy literature contains a number of empirical studies of the consequences of educational settings and instructional strategies on student performance. Several of these studies have suggestive findings, both positive and negative, about such things as class and school size, early intervention programs, and professional development. The NYAS research team distilled and synthesized these data and provided an objective description of some of the mainstream educational research as background for PJP deliberations.

We also engaged the services of three external experts on programs for English language learners, disadvantaged youth, and students with disabilities to review the instructional program designs and the resource specifications of the original PJPs. We provided the comments from these experts to the *PJP Review Team* as input for consideration during their deliberations.

What Professional Judgment Panels Were <u>Not</u> Expected to Accomplish

Panels were not asked to determine levels of service involved in transporting students, maintaining and operating buildings, operating the central district office, or providing food services. Similarly, debt service and major facility construction matters were not within the purview of the PJPs. In the final analysis (i.e., after all PJP deliberations were complete), the research team reincorporated cost estimates for district office functions as well as the

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[15] This selection process is described in further detail below.

maintenance and operations of district and school buildings. However, no analysis of the expenditures on home-to-school transportation services, debt service for school facilities, or provision of food services was carried out as part of this project.[16]

PJPs were also not asked to impute dollar costs to the instructional programs they designed. Relying on district-level labor-market adjusted professional salary figures for educators and state mean costs for fringe benefits, the research team imputed these costs. Similarly, the PJPs were not asked to develop sophisticated cost adjustments for economies and diseconomies of scale accompanying large or necessary small schools and school districts. The research team used statistical methods in combination with the PJP specifications to estimate school and district scale economies. However, a subsequent meeting of the *PJP Review Team* was convened to review and revise these cost projections that accounted for the impact of small school size on resource specifications.

Finally, the PJPs were not asked to reform other, often quite important, components of New York's education system. School district consolidation, charter schools, decentralization of authority in large districts, school board structural reform, and a long list of other possible changes might well be considered as significant reforms to undertake. However, they were not the focus of PJP deliberations. Rather, their role was to develop appropriate delivery systems to achieve desired student outcomes.

An Overview of the NYAS Phases

Exhibit 1-1 provides an overview of the organization of the project so the reader can see how the various steps in the process fit together and relate to one another.

- *Phase 1* of the project focused on the public engagement and the beating-the-odds analyses.[17] The results of the beating-the-odds analysis were initially used to identify schools and districts from which we could solicit nominations of highly qualified

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[16] Exclusion of these components is not to say that they are not important. Both interact in significant ways with any effort to address the adequacy of funding for educational services, but require specialized analyses that were beyond the original scope of the NYAS.

[17] The public engagement processes were designed by the Campaign for Fiscal Equity (CFE). Immediately prior to the implementation of the public engagement process, CFE organized the Council for Costing Out (CCO), which encompassed a multitude of organizations and agencies with an interest in education and school finance in New York State. It is through the CCO that the NYAS research team was able to establish linkages with numerous agencies that facilitated the legitimacy of the study and helped gain access to necessary data during the course of the project. The CCO also provided a linkage to organizations from which the research team was able to obtain nominations for those who might participate in the professional judgment process.

educators to participate on one of the PJPs. The members of the PJPs were ultimately selected by the NYAS research team based on responses to our solicitation efforts and on nominations that came out of the public engagement process.

- *Phase 2* of the process included the meetings and deliberations of the professional judgment panels including eight general education panels and two focused on special education.

- *Phase 3* included three components: namely, a statistical synthesis of the initial PJP resource specifications into several school prototypes, an analysis of teacher markets and geographic cost differences, and an examination of the most up-to-date fiscal data to estimate spending on district level functions that were not included as part of the professional judgment process.[18]

- *Phase 4* included development of the initial estimates of the cost of the school prototypes, which were used to derive school-level cost functions (for elementary, middle and high school-levels) with respect to student need (measured percent of students eligible for free or reduced lunch, enrolled in special education, or designated as English language learners) and school size. The school-level cost functions in conjunction with the Phase 3 analyses on geographic cost differences and district-level expenditures were applied to real school/district data in order to project preliminary numbers related to the cost of adequacy. This phase also included reviews of the school program designs and subsequent resource specifications by an external panel of experts.

- *Phase 5* included meetings of the *PJP Review Team* and the *Stakeholder Panel* along with open public engagement forums that presented the preliminary results of the analysis to the public. During this phase of the project, there were two stages of revisions made to

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[18] The analysis of teacher markets was performed to ascertain how much more or less it costs to recruit and employ comparable resources across different geographic locations in New York State. Four alternative models were used to estimate patterns of teacher compensation. These included a model that estimated separate equations for each of four years from 1998 to 2002, a pooled cross-section time series model across these years, one that adjusted estimates for teacher turnover, and a teacher fixed-effects model. The availability of multiple years of data on individual school personnel permitted the analysis to compare and identify consistent patterns in cost differences over time. Each showed similar patterns that are highly correlated with one another (i.e., all pairwise correlations between the four models were above 0.97). Depending on the model, districts with the highest teacher personnel costs were estimated to pay anywhere from 40 to approximately 60 percent more than the lowest cost districts for comparable teachers. The model finally selected for use in this report reflected the smallest range of cost differences among the four alternatives considered and was chosen because it controlled more effectively than the others for differences across districts in the qualifications of the teacher workforce. This is in keeping with the goal to isolate the impact of factors affecting personnel costs that are outside local control.

the school prototypes based on the deliberations of the *PJP Review Team* and the combined meetings between the *Stakeholder Panel* and the *PJP Review Team.*

- **Phase 6** included recalculating costs using resource specification modifications by the *PJP Review Team* and the production of the final report, which brought all of the various pieces together.

[INSERT EXHIBIT 1 HERE]

It is important to note that the NYAS use of the professional judgment approach combined with public engagement contributes to both the understanding of "what works" and the identification of goals and objectives. First, it draws on the experiences of *highly qualified* professional educators who have been successful by some measures in serving children. Public engagement expands this perspective to include non-educators (e.g., taxpayers, parents, the politicians who represent them, school board members, and the business community) who also have an interest in the success of public schools.

In addition, the professional judgment approach along with public engagement provides some flexibility in thinking about the measurement and relative priorities on various educational outcomes and the relationship between student outcomes, broadly conceived, and school resources. Unlike other methodologies for costing out adequacy that depend heavily upon achievement test scores as outcome measures, the professional judgment approach does not rely entirely upon a narrow set of student outcome measures. In the design of the programs on which the adequacy cost estimates are ultimately based, the educators who participate in the professional judgment process inevitably consider a range of outcomes that extends well beyond the traditional student achievement test scores. The Regents Learning Standards themselves incorporate schooling experiences that extend beyond just the content of the New York State examinations.

Ranges of Cost Estimates

The final range of cost estimates presented in the introduction reflects the fact that "costing-out" educational adequacy is not an exact science. These analyses rely primarily on professional judgment concerning the resources necessary to achieve the desired results for children with varying sets of circumstances in terms of need and school size. While primary cost estimates were calculated for the original resource specifications put forth by the initial ten PJPs,

further estimates resulted from a twice-convened *PJP Review Team* whose purpose was to review and modify the original specifications. The estimates also rely on assumptions about other factors likely to affect resource costs. An important example discussed below is the potential change in district central administration that might be needed to support the instructional program descriptions derived through professional judgment. These alternative specifications and assumptions that affect the overall cost estimate for the state are described in detail in the full report. It is perfectly reasonable to question the assumptions put forth here and different assumptions would almost certainly lead to different cost estimates. For this reason, full transparency regarding the processes underlying this study, the assumptions used, and their effect on cost are essential. To this end, the following narrative describes how we arrived at a range of adequacy cost estimates.

Estimation Stages and Central Administration Costs

"Adequate" cost estimates were made based on resource specifications made at each of three stages of the professional judgment process:

Stage 1-Initial PJP Meetings. Stage 1 estimates are based on the initial specifications developed by the ten original PJPs that met during the summer of 2003.

Stage 2-PJP Review Team Meeting #1. Stage 2 estimates include revisions made by the *PJP Review Team* at its first meeting in December of 2003. This meeting took place immediately prior to the meeting of the *Stakeholder Panel.* These revisions included refined estimates of the variations in the enrollment patterns for add-on programs such as preschool as well as other slight changes in the resource specifications made by the *PJP Review Team.*

Stage 3-PJP Review Team Meeting #2. Stage 3 estimates include final revisions of the resource specifications by the *PJP Review Team* during its January 2004 meeting. This meeting focused on interpreting the synthesis of program specifications, services for English language learners, and evaluation of small school resource specifications.

  Central Administration, Maintenance, and Operations Costs. To compare the school program costs derived from the PJP process with current spending in the state, it was necessary to add cost estimates for such district-level functions as central administration and maintenance and operations, which were not included in the PJP process. Two alternative approaches were used to provide lower and upper bound cost estimates. The method used to calculate a lower

bound simply assumed that existing spending on these district-level functions would remain constant (i.e., that expenditure on central district administration functions do not change with respect to increases in school-level program costs). The alternative approach assumed that spending on at least some district-level functions would need to change in proportion to changes in spending on instructional programs derived from the PJP process. In order to account for the responsiveness of district-level expenditures to changes in the instructional program fiscal files from the New York Office of the State Comptroller (the ST-3 data) were used to identify those line items normally supported by schools versus districts. Overhead ratios (i.e. the ratio of actual district-level to school-level expenditures) were then formulated for each district and applied to the projected adequate school-level expenditures to determine those associated at the district-level. While a more precise analysis of district-level functions was beyond the scope of this study, it was felt that these parameters provide reasonable bounds for considering administrative costs within this context.

Brief Overview of Final Instructional Programs

In general, the analysis of school program costs derived from the finalized work of the PJPs show lower per-pupil costs for larger schools, higher per-pupil costs for schools with greater numbers of students who live in poverty, who require ELL services, or who are eligible for special education services. Reflecting the judgment of the panels, poverty was seen to have a substantial influence on cost, especially at the elementary level. The instructional program designs included resources to reduce class sizes and to utilize teaching specialists at all levels. This was especially true in the early grades (i.e., kindergarten through 6th grade) in order to support improved reading and math programs where suggested class sizes ranged from 14 to 16 students. The panels also specified resources for early education and extended day and summer school programs, especially for schools with higher proportions of students in poverty. Early education programs were included to help students prepare for the traditional school-level grades. The extended time programs were directed toward students currently unable to master the requisite skills during normal school hours. These programs were especially focused on children from economically disadvantaged families.[19]

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[19] Detailed descriptions of the schooling programs designed by the panels can be found in Appendices D and E in Chambers et al. (2004b) for general and special education, respectively.

The Results

Stage 3 Cost Estimates

Exhibit 2 displays the bottom line cost estimates for *Stage 3* for the entire state and for each of six categories of school districts classified according to the "*needs to resource capacity" (NRC)* index. The *NRC* is a technical measure used by the New York State Education Department (NYSED) to capture the relationship between a school district's pupil needs and its local taxable wealth and, hence, determine groups of schools that can be considered as similar.[20]

Based on the PJP specifications at Stage 3, it is estimated that New York State would have to have spent an additional $7.16 billion in 2001-02 (see Exhibit 2) to ensure all districts would have access to adequate levels of spending (i.e., to provide all students with an opportunity to meet the Regents Learning Standards). This assumes spending remains unchanged in districts at or above "adequate" spending levels. This represents an increase of 22.6 percent (i.e., a total spending level of $38.87 billion) over the actual spending levels of $31.71 billion in that same year.[21]

[EXHIBIT 2 GOES HERE]

Based on these results, New York City Schools, enrolling approximately 37 percent of the state's students, would require an additional $4.45 billion in 2001-02 dollars, an increase of 39 percent. Districts with average (NRC 5) and high (NRC 3 and 4 combined) indexes of needs to resource capacity, accounting for 30.7 and 14.1 percent of the statewide enrollment, would require additional expenditures on the order of $1.23 billion and $0.99 billion, respectively. Districts in the four big urban cities outside of New York City (approximately 4.6 percent of state enrollment) would need an additional $0.41, billion.

Alternative Cost Estimates

Differing assumptions regarding how many stages of the PJP process to include and how to calculate district-level functions leads to different cost estimates. Exhibit 3 below presents

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[20] This descriptive passage is taken from the NYSED document "What is a Similar School?", which can be viewed and downloaded in its entirety at http://www.emsc.nysed.gov/repcrd2003/information/similar-schools/guide.html.
[21] Neither of these figures, the estimate of needed $7.16 billion or the $31.71 billion in actual spending, include home-to-school transport, district debt service, facility construction costs, inter-district tuition payments, or food services.

adequacy cost estimates at the different stages (1, 2, and 3) of the professional judgment process. In addition, it also displays the impact of allowing for some growth in spending on district-level functions (overhead costs) that might be associated with changes in spending on instruction.

[EXHIBIT 3 GOES HERE]

Compared to total current spending of $31.71 billion, the Stage 1 specifications correspond to an additional $6.16 billion to achieve adequacy in New York public schools. An additional $6.81 billion would be required to achieve adequacy at Stage 2, which reflects revised estimates of the projected enrollments in the preschool and elementary extended time programs as well as modified resource configurations at the middle and high schools.[22] At Stage 3, the *PJP Review Team* recommended an increase in the resources specified for ELL students in response to comments made during the December 2003 meeting of the *Stakeholder Panel.* The additional costs of adequacy at Stage 3 were estimated to be $7.16 billion.

The additional $8.35 billion cost of the modified Stage 3 estimate is highest because it includes spending on district-level functions that, to some degree, were assumed to grow in proportion to changes in instructional spending. The $7.16 billion figure is based on the assumption that there is no change in central administrative and maintenance and operations expenditures: that is, it assumes that districts are spending essentially what they were before on these central office and maintenance and operations services.

Thus, the estimates of total expenditures range from a low of $37.87 billion to a high of $40.06 billion. Using current (i.e., 2001-02) spending as a base, these estimates suggest that the additional investment required to achieve *adequacy* in New York State public schools ranges from 19.4 to 26.3 percent.

Patterns of Cost Differences

Using the simulation models developed for the NYAS, it can be shown that, for any given district *i*, the projected cost can be calculated as the product of a BASE COST (i.e., the pupil-weighted average of the standardized projected cost across all districts), the implicit

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[22] The only change between Stages 1 and 2 at the elementary level was in the projected number of students who would be enrolled in the preschool programs and the extended time programs. There were no changes in the resource configurations in the preschool and elementary extended time programs. Chambers et al. (2004a) contains a more detailed account of how the specified resource configurations and targeted enrollments changed over the three stages of the professional judgment process.

geographic cost of education index for district i [IGCEI(i)], and need-scale index for district i [NEEDSCALE(i)].[23]

(eq. 1) PROJ_COST(i) = BASE_COST $\times$ IGCEI(i) $\times$ NEEDSCALE(i)

It is important to recognize that one of the components implicit in the need-scale index is the inclusion of actual data on spending to reflect district-level functions.[24] Thus, using the need-scale index in a school funding formula could potentially create incentives for districts to inflate spending on district-level functions in order to drive up their projected costs. Avoiding this incentive requires a multivariate regression approach that includes factors reflecting the components of the need-scale index to generate a predicted value of this measure. To this end, we used multivariate regression analysis to sort out the variations in the need-scale index using the following independent variables to estimate a model capable of yielding a predicted need-scale index:[25]

Need

- Indicator of elementary school district to capture the composition of enrollments and schools by grade-level that affects the types of schools included in the projected costs for each district
- Percent of students eligible for federally subsidized free and reduced lunch
- Percent of students identified as ELL
- Percent of students identified as special education

Scale

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[23] The IGCEI = the ratio of projected cost of adequacy to the standardized cost of adequacy where the standardized cost equals the cost of the PJP programs at state-wide, pupil-weighted average rates of compensation (salaries and benefits) for personnel.

[24] Whether the projections use the lump-sum or combined lump-sum/ratio approach is used to calculate spending on district-level functions, these figures still represent values that vary by d

[25] See Appendix C of Chambers et al. (2004b), for details of the regression analysis on the need-scale index. The analysis presented in the text reflects five regressions run on sub-samples of districts that were divided by enrollment category from the smallest districts (i.e., less than 1,000 pupils enrolled) to the largest districts (i.e., greater than 10,000 students enrolled).

- District size in various functional forms.[26]

As shown in Exhibit 4, geographic cost variations, the scale of district operations and differences in pupil need all play distinct roles in accounting for variations in the estimated cost of achieving adequacy. The exhibit displays the value of each of three indices that reflect the relative variations in the geographic cost differences, the scale of district operations, and pupil needs on the costs of adequacy. All three indices are centered on a pupil-weighted average of 100 and the pupil-weighted, average value of each index is displayed for each of the *NRCs* in New York State.

Analysis of the variations in the patterns of scale and need revealed that the five large urban districts tended to exhibit relatively high projected expenditures based on pupil needs, all else equal, and relatively lower projected expenditures associated with scale of operations. New York City and other districts in the New York metropolitan area tend to exhibit the highest geographic cost differences associated with the salaries of school personnel.

[INSERT EXHIBIT 4 HERE]

Adjustments in the Numbers Over Time

As indicated previously, all of the above estimates are based on data for the 2001-02 school year. Use of the predicted need index in future years would require adjusting the base cost figure (BASE_COST) by a statewide index to appropriately reflect inflation. The need and implicit geographic cost index are not likely to change dramatically over short periods of time, say three to five years. The current numbers used to estimate geographic costs for this study use four years of data, with the correlations from one year to the next being well above 0.90. Moreover, previous research on this topic has shown remarkable stability in these indices over time (see, for example, Chambers, 1981, 1997, and Taylor, Chambers, and Robinson, 2004).

For the most part, the need/scale index reflects variations in district size, the percentage of students in poverty, ELL and special education. Major changes from one year to the next in

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[26] Often linear and squared terms are used for enrollment to reflect the curvilinear relationship between spending and district size. The research team initially followed that convention. Moreover, because there are complex patterns of spending with respect to some of the district-level functions across the state, we also experimented with higher powers of enrollment and other variables such as sparsity of population to pick up the effects of school and district size on both instructional and non-instructional spending. In the end, rather than relying solely on the results where a functional form is imposed via estimation of a quadratic or some higher order polynomial, the relationship between the need/scale index and district enrollment was ultimately estimated with five separate enrollment category-specific equations.

these characteristics are unusual. What the need/scale index is intended to do is reflect major differences across districts in the relative needs of the students served and the effects of district size.

With this in mind, one could consider simply using the predicted need/scale index itself as a constant for the immediate future. That is, one could simply assign a value of the need/scale index to each district and retain that value for a period of three to five years. Changes in allocations to the district over time would be impacted only by inflation, which would be applied to the base expenditure level.

Every three to five years, the adequacy study should be updated with new need index numbers. Subsequent studies could include updated analyses of teacher costs and meetings of a select group of educators to review the standards and resource specifications upon which the current estimates are built.

An advantage to using the need/scale index rather than a pupil-weighted system is that it is simple in concept and reduces the incentives for districts to increase enrollments of selected populations (e.g., special education or ELL) in order to increase funding. Moreover, marginal changes in these categories of students are not likely to have a significant impact on the actual costs of serving the students.

School District Performance and the Adequacy Gap

For each district in New York State, we calculated the ratio of the projected expenditures necessary to achieve adequacy to actual expenditures, and we refer to this as the "adequacy gap". The adequacy gap essentially measures the need of a district relative to its current condition in the context of the level of resources it employs. Given a set amount of resources, districts with higher proportions of pupils in poverty, students with disabilities, or ELL students, or lower levels of actual current spending have larger adequacy gaps.

Exhibits 5a, 5b, and 5c show how the adequacy gap relates to actual performance of the districts with respect to 4th, 8th and 12th grade attendance and pass rates of various student groups (e.g., general education students, minorities, economically disadvantaged, and disabled) on state achievement tests.[27] To distinguish between those districts with high versus low relative need (relative to their actual expenditure), we have divided districts into quintiles based on the

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[27] The 12th grade outcomes are based on the cohort of students that entered high school in the 1998-99 school year.

distribution of the calculated adequacy gap.[28] In each chart, the rightmost group of bars corresponds to the bottom 20 percent of the adequacy gap distribution and represent districts with the lowest adequacy gap (ratio of needs to actual resources), while the leftmost group of bars in each chart denote districts in the top 20 percent of the distribution or those with the largest adequacy gap (the relatively neediest districts).

Putting the performance measures on the vertical axis, we would expect that districts with the poorest performance levels would exhibit the largest adequacy gaps. Indeed, with few exceptions, one observes that districts with larger adequacy gaps exhibit lower attendance rates and lower pass rates for virtually every subgroup of students including general education, minorities, economically disadvantaged, and disabled students at each of the three grade levels (4th grade, 8th grade, and 12th grade).[29]

[EXHIBITS 5a, 5b, AND 5c GO HERE]

- **Attendance rates.** Attendance rates consistently decline as one goes "up" the adequacy gap distribution. Moreover, this phenomenon worsens as grade level increase. The districts in the bottom 20 percent of the adequacy gap distribution exhibit an average elementary school attendance rate of 96 percent, while the top 20 percent shows an average of 92 percent. For middle schools, there is a 96 percent average attendance rate among districts in the lowest adequacy gap quintile, whereas the average attendance rate is 88% among schools in districts with the highest relative need. At the high school level, the highest versus lowest attendance rates range from 94 percent for the bottom adequacy gap quintile to 84 percent for the highest.

- **General education pass rates.** Districts with adequacy gaps in the bottom 20 percent of the adequacy gap distribution exhibit 4th grade pass rates for general education students of 85 versus 54 percent for the bottom 20 percent of the districts. Middle schools, while having a noticeably lower average general education pass rates, present a remarkably similar pattern; the pass rate drops from 70 percent for districts with the lowest relative need by almost half, to 37 percent for those districts with the greatest relative need. For

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[28] The distribution of the adequacy gap, including the threshold values distinguishing groups (i.e., the 20th, 40th, 60th and 80th percentiles), is presented in Appendix A.

[29] P-values resulting from all pairwise tests of equality of average pass/attendance rates between adequacy gap groups are presented in Appendix B. In general, significant differences in mean outcomes are found between the two lowest need categories (the bottom 20% and 20–40 %) and those in the upper three need quintiles (40–60% and above).

the 12th grade students, the comparable average pass rates are 96 versus 82 percent for the bottom and top 20% of districts with respect to the adequacy gap.

- **Minority pass rates.** Districts with adequacy gaps in the bottom 20 percent exhibit average 4th grade pass rates for minority education students of 81 percent versus 50 percent for the bottom 20 percent. Again, similar drops in the average 8th and 12th grade minority pass rates are found with increases in the district adequacy gap. Middle school minority pass rates vary from 65 to 33 percent for the least to most needy schools, while similar figures for the 12th grade students are 94 and 77 percent, respectively.

- **Economically disadvantaged pass rates.** Interestingly enough, the district average pass rates for economically disadvantaged students do not exhibit a similar pattern to those found above. For the 4th grade economically disadvantaged population the average pass rate jumps from 41 percent in districts with the least relative need up to 48 and 47 percent in the second and third adequacy gap quintiles, respectively, back down to 44 in the fourth, and up to 49 percent in the most needy districts. The 8th grade average pass rates display a similar erratic pattern. Strangely enough, the average district pass rate among economically disadvantaged 12th graders experiences a consistent *increase* (from with respect to relative district need. This result may be driven by in-kind services offered to these types of students whose resource expenditures have not been picked up in our calculation of actual current expenditures.

- **Disabled pass rates.** District average pass rates among special education students is also shown to plummet as need increases: from 52 to 21 percent, 21 to 5 percent, and 80 to 51 percent for elementary, middle and high schools respectively.

- **Retention rates.** A final result shows the average retention rate (defined as 1 minus the dropout rate) among public high school students to be approximately 10 percent lower in districts with the highest relative need compared to that found amongst the lowest need districts.

Concluding Remarks

This paper offers reflections resulting from fifteen months of exploration of the various dimensions of educational adequacy. The NYAS research team organized a cadre of 56 highly qualified educators to develop the design and resource specifications necessary to deliver an

"adequate" program of educational services. In this context, "adequacy" was defined in terms of a set of consensus-based outcome goals and learning standards for the public school students in New York State. The process involved a series of meetings with ten professional judgment panels with follow-up meetings of a subset of the original panel members to review a synthesis of the specifications.

During the course of this process, we introduced a review of the educational research and analyses of schools that were *beating the odds* in serving the particular student populations they enrolled. In addition, the team developed an approach to measuring geographic differences in the cost of school personnel around the state.

For the sake of transparency, this report has presented "adequacy" cost estimates at the various stages of the process so individuals reviewing this work would be able to track each component and what was changed over the course of the analysis. The additional money required to bring those districts currently spending below "adequate" levels up to "adequacy" required anywhere from $6.21 to $8.40 billion depending on the stage in the process and assumptions made pertaining to expenditures on certain overhead functions.

Implementation of the "adequacy" models presented in this report implies a significant expansion of the instructional program for both school-aged as well as preschool children. In addition to bolstered K-12 programs, the "adequacy" cost model includes preschool programs for 3 and 4 year olds. While there are a number of programs already in existence within the state, the model projects a significant increase in the number of children participating in preschool. In many districts, full implementation of the model will require hiring more school personnel. As a surplus of all these categories of needed personnel is unlikely, successful implementation will require significant planning. For example, more university students will need to be encouraged to become teachers, and the teacher training capacity of the state will need to be enhanced. In the short run, increased salaries may be needed to attract those already holding credentials but working elsewhere back into the teaching profession and to reduce turnover among those already employed as teachers. Also, additional funding will be needed for facilities, which are not currently accounted for in the projections presented in this study.[30]

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[30] In the recent report of the panel of special masters appointed by Judge Leland DeGrasse, it was concluded that the New York City public schools needed an additional $9.2 billion for facilities over a five year period to provide their 1.1 million students a "sound basic education." (see http://www.schoolfunding.info/news/litigation/11-30-04nyspecialmasters.php3).

The state needs to work in concert with local school district decision makers to make this process as smooth as possible. New York does not want to replicate the California experience with the Class Size Reduction Program (see Bohrnstedt and Stecher, 2002), where school districts were not able to recruit and employ enough qualified teachers in the short period of time they were given. In turn, the quality of teachers suffered and the program failed to deliver the improvements in student outcomes it had hoped for.

At the same time, the additional education resources included in these "adequacy" models may make education a more attractive field in which to work. Adequate resources may translate into more professional development, better instructional materials, and/or smaller class sizes. Furthermore, if hiring is done in a deliberate manner in which teachers are assigned to positions for which they are certified, the resulting jobs will prove to be more attractive that may make it easier to attract and retain teachers.

Also, although the PJPs derived instructional designs by which schools could construct an adequate opportunity to meet the Regents Learning Standards, the NYAS research team does not recommend that the programs or resource specifications developed by the PJPs specific components of these models become mandates for local practice. That is, in no way are the resource specifications meant to be prescriptive. Rather, it is important to note that decisions about how funds are used and the implementation of instructional models should remain in the purview of local decision makers and not be subject to state mandates. Local decision makers are in a better position to understand and respond to the needs of the communities and the students they serve.

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Exhibit 1: Overview of Project Components

Phase 1

| Public Engagement | ⟷ | Beating-the-Odds Analysis |

Phase 2

| New York City | Urban/High Need | Average/Low Need Suburban | Small Towns & Rural |

General Education Professional Judgment Panels (PJPs)

| 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 |

Special Education Professional Judgment Panels (PJPs)

| 1 | 2 |

Phase 3

| Teacher Markets & Geographic Cost of Education Index | → | Synthesis |

| District Administration/ Maintenance & Operations |

| Review PJP Team | | External Experts |

Phase 4

| Costing-Out & Preliminary Analysis |

Phase 5

| Public Engagement Forums | → | Stakeholder Panel |

Phase 6

| Final Report |

Exhibit 2 - Total Expenditure Required to Bring All Districts to "Adequate" Spending Levels (Total Expenditure in Bold)

Total Expenditure (in billions)

Category	Total	Additional	Actual
Overall	$38.87	$7.16	$31.71
New York City	$15.86	$4.45	$11.41
Big Four Urban Cities	$1.91	$0.41	$1.50
High NRC - Other Urban and Suburban	$3.06	$0.54	$2.52
High NRC - Rural	$2.28	$0.45	$1.83
Average NRC	$10.53	$1.23	$9.30
Low NRC	$5.23	$0.09	$5.15

Need to Resource Categories

■ Total Additional Expenditure Required to Bring All Districts to "Adequate" Spending Levels
■ Actual Total Expenditure from the NYSED Fiscal File

* Note: actual and additional expenditures may not add up exactly to totals (in bold) due to

Exhibit 3 - Total Actual and Projected Expenditures by Simulation Model

Total Expenditure (in Billions) vs Simulation Model

Simulation Model	Total Expenditure (in Billions)
Actual Total Expenditure from the NYSED Fiscal File	$31.71
Stage 1 - Actual Overhead Only	$37.87
Stage 2 - Actual Overhead Only	$38.52
Stage 3 - Actual Overhead Only	$38.87
Modified Stage 3 - Combination of Actual and Estimated Overhead	$40.06
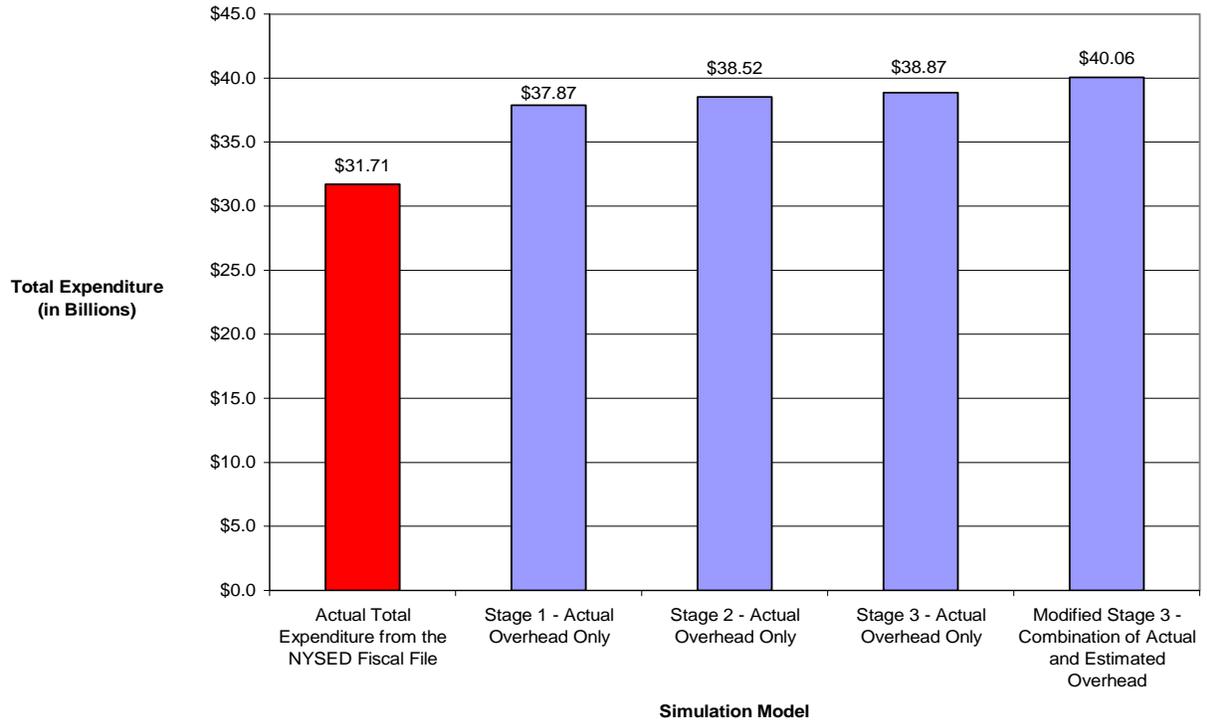
Exhibit 4 - Relative Scale and Need Indices and Implicit GCEI by Need to Resource Capacity Category Based on Model Using Actual School Enrollment

	Scale Index	Need Index	Implicit GCEI
Overall	100	100	100
1-NYC	93	114	104
2-Big 4 Urban Cities	97	115	96
3-High NRC-urban suburban	101	103	98
4-High NRC-rural	111	91	92
5-Average NRC	104	89	97
6-Low NRC	104	85	102

Index Value

Needs to Resource Category

☐ Scale Index ☐ Need Index ☐ Implicit GCEI

Exhibit 5a - District Average 4th Grade Attendance/Pass Rates Across Adequacy Gap Quintile
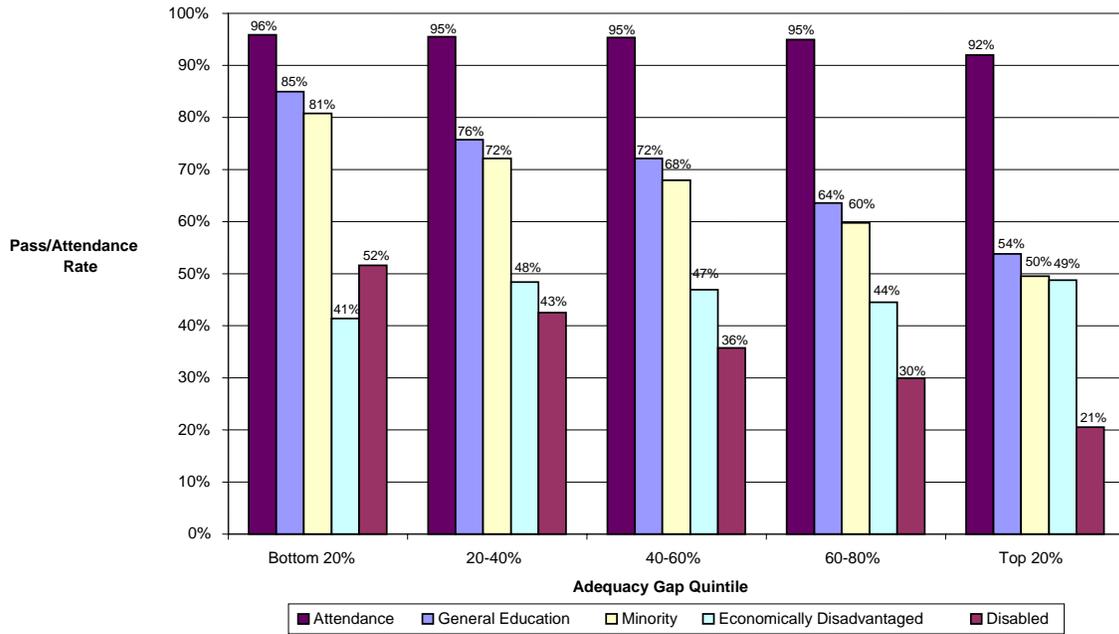
Pass/Attendance Rate

Adequacy Gap Quintile	Attendance	General Education	Minority	Economically Disadvantaged	Disabled
Bottom 20%	96%	85%	81%	41%	52%
20-40%	95%	76%	72%	48%	43%
40-60%	95%	72%	68%	47%	36%
60-80%	95%	64%	60%	44%	30%
Top 20%	92%	54%	50%	49%	21%

Adequacy Gap Quintile

■ Attendance ☐ General Education ☐ Minority ☐ Economically Disadvantaged ■ Disabled

* Pass rate is defined as the lower of the percentages of test takers scoring at level 3 or above on the English and mathematics CTB tests.

Exhibit 5b - District Average 8th Grade Attendance/Pass Rates Across Adequacy Gap Quintile
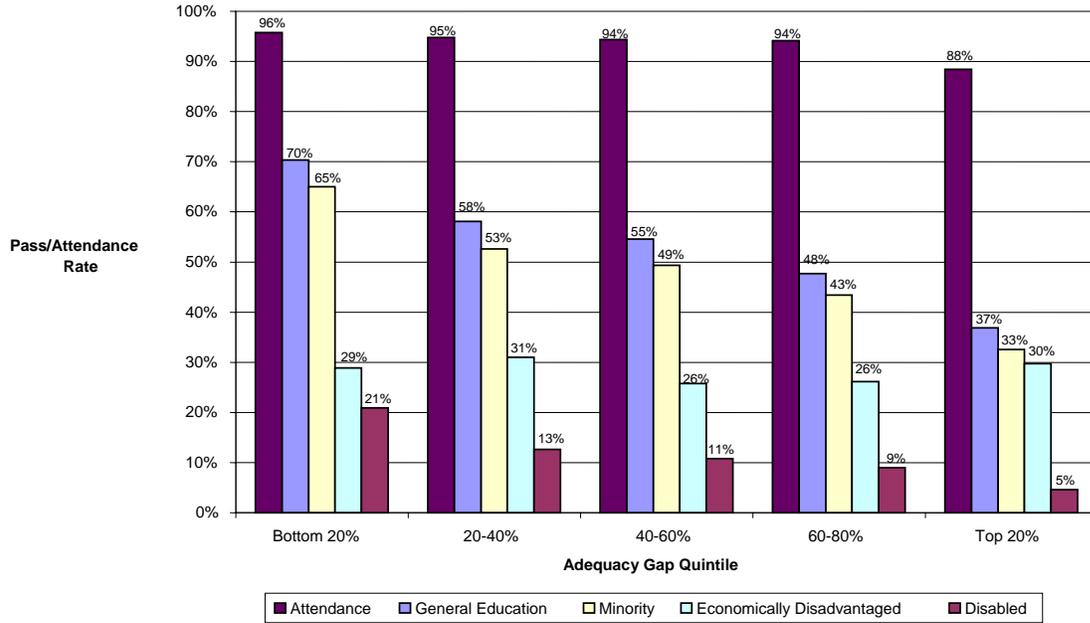
* Pass rate is defined as the lower of the percentages of test takers scoring at level 3 or above on the English and mathematics CTB tests.

Exhibit 5c - District Average 12th Grade Attendance/Pass Rates Across Adequacy Gap Quintile
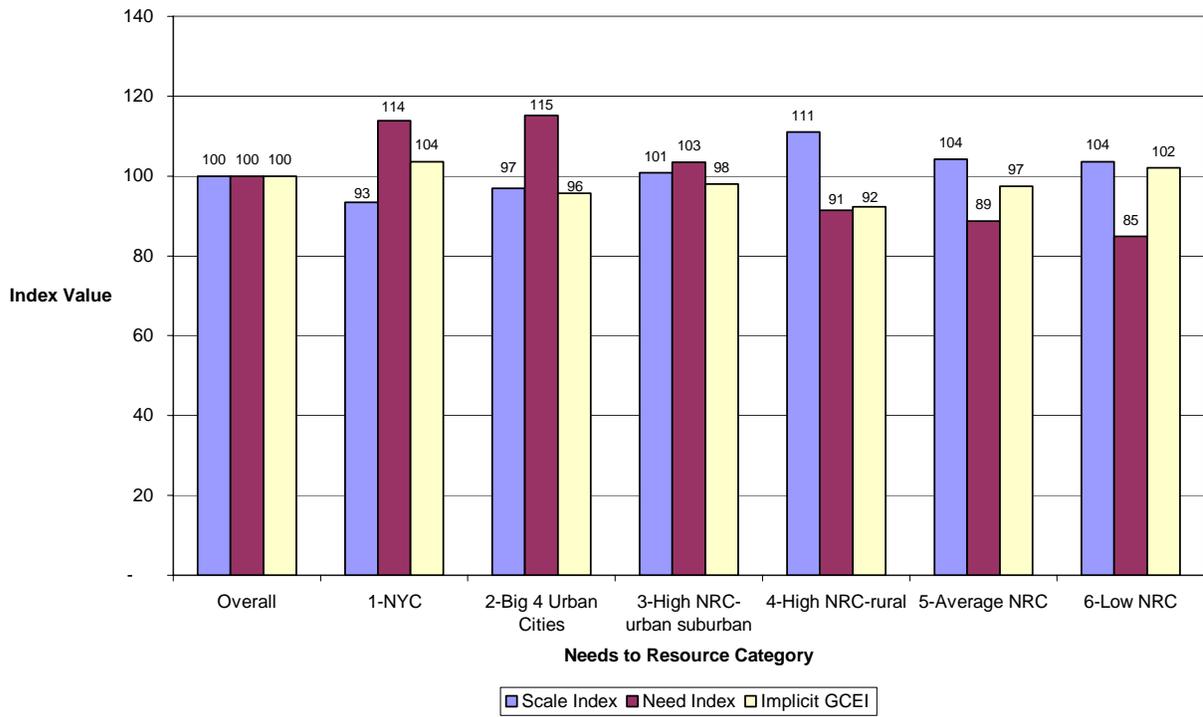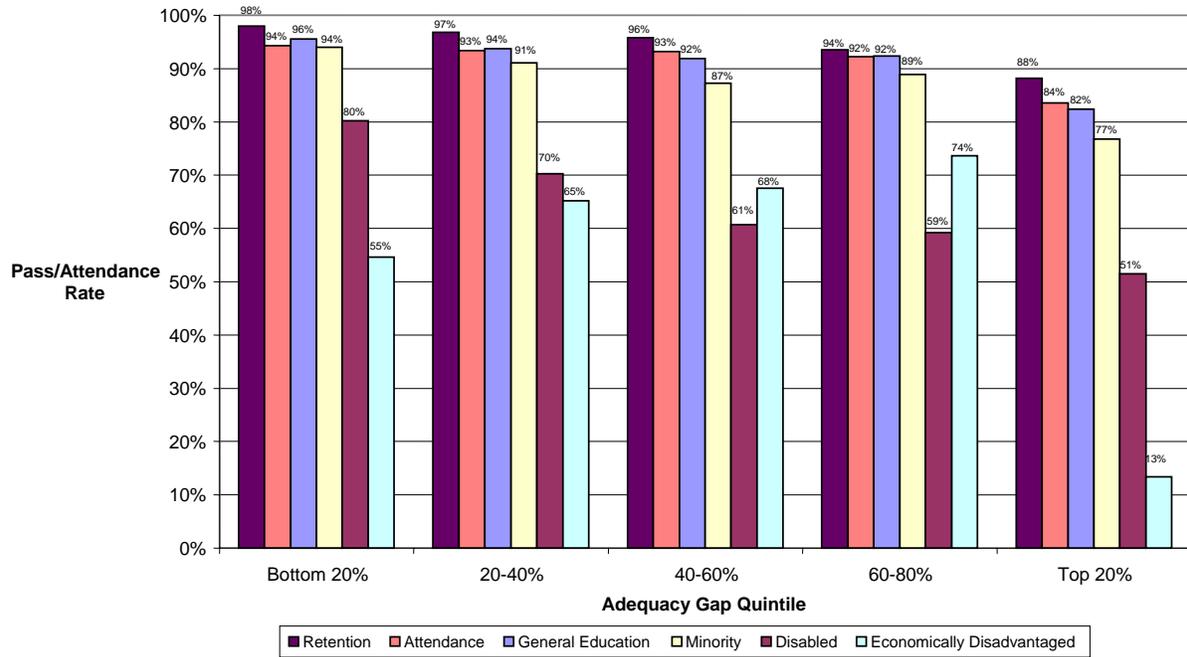

* Pass rate is defined as the lower of the percentages of test takers scoring at 65 or above on the English and mathematics Regents exams.

Appendix A – Distribution of Adequacy Gap						
Percentile	Min	20th	40th	60th	80th	Max
Adequacy Gap Value	0.52	0.96	1.07	1.16	1.24	1.54
Mean adequacy gap equal to 1.10 with a standard deviation of 0.16.						

Appendix B.1 – P-values from T-tests of Equality of District Average 4th Grade Attendance Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.04	.			
40 – 60 %	0.04	0.76	.		
60 – 80 %	0.22	0.39	0.30	.	
Top 20 %	0.53	0.14	0.12	0.53	.

Appendix B.2 – P-values from T-tests of Equality of District Average 4th Grade General Education Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.01	.		
60 – 80 %	0.00	0.02	0.66	.	
Top 20 %	0.00	0.00	0.99	0.61	.

Appendix B.3 – P-values from T-tests of Equality of District Average 4th Grade Minority Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.00	.		
60 – 80 %	0.00	0.00	0.45	.	
Top 20 %	0.00	0.00	0.76	0.59	.

Appendix B.4 – P-values from T-tests of Equality of District Average 4th Grade Economically Disadvantaged Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.01	.			
40 – 60 %	0.00	0.91	.		
60 – 80 %	0.00	0.50	0.39	.	
Top 20 %	0.00	0.18	0.12	0.50	.

Appendix B.5 – P-values from T-tests of Equality of District Average 4th Grade Special Education Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.00	.		
60 – 80 %	0.00	0.02	0.74	.	
Top 20 %	0.00	0.04	0.42	0.67	.

Appendix B.6 – P-values from T-tests of Equality of District Average 8th Grade Attendance Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.19	.		
60 – 80 %	0.01	0.50	0.98	.	
Top 20 %	0.00	0.20	0.95	1.00	.

Appendix B.7 – P-values from T-tests of Equality of District Average 8th Grade General Education Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.01	.		
60 – 80 %	0.00	0.04	0.50	.	
Top 20 %	0.00	0.00	0.59	0.21	.

Appendix B.8 – P-values from T-tests of Equality of District Average 8th Grade Minority Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.00	.		
60 – 80 %	0.00	0.01	0.21	.	
Top 20 %	0.00	0.00	0.91	0.26	.

Appendix B.9 – P-values from T-tests of Equality of District Average 8th Grade Economically Disadvantaged Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.03	.			
40 – 60 %	0.34	0.11	.		
60 – 80 %	0.02	0.94	0.09	.	
Top 20 %	0.02	0.89	0.07	0.82	.

Appendix B.10 – P-values from T-tests of Equality of District Average 8th Grade Special Education Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.08	.		
60 – 80 %	0.00	0.25	0.43	.	
Top 20 %	0.00	0.27	0.63	0.87	.

Appendix B.11 – P-values from T-tests of Equality of District Average 12th Grade Retention Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.42	.		
60 – 80 %	0.00	0.08	0.32	.	
Top 20 %	0.00	0.05	0.21	0.76	.

Appendix B.12 – P-values from T-tests of Equality of District Average 12th Grade Attendance Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.01	.			
40 – 60 %	0.01	0.85	.		
60 – 80 %	0.00	0.66	0.52	.	
Top 20 %	0.01	0.97	0.83	0.70	.

Appendix B.13 – P-values from T-tests of Equality of District Average 12th Grade General Education Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.12	.			
40 – 60 %	0.08	0.74	.		
60 – 80 %	0.87	0.05	0.03	.	
Top 20 %	0.12	0.85	0.91	0.07	.

Appendix B.14 – P-values from T-tests of Equality of District Average 12th Grade Minority Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.01	.			
40 – 60 %	0.00	0.23	.		
60 – 80 %	0.01	0.55	0.06	.	
Top 20 %	0.00	0.13	0.55	0.04	.

Appendix B.15 – P-values from T-tests of Equality of District Average 12th Grade Economically Disadvantaged Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.15	.		
60 – 80 %	0.00	0.06	0.60	.	
Top 20 %	0.00	0.16	0.99	0.60	.

Appendix B.16 – P-values from T-tests of Equality of District Average 12th Grade Special Education Pass Rates Across Adequacy Gap Quintile					
Adequacy Gap Quintile	Bottom 20 %	20 – 40 %	40 – 60 %	60 – 80 %	Top 20 %
Bottom 20 %	.				
20 – 40 %	0.00	.			
40 – 60 %	0.00	0.04	.		
60 – 80 %	0.00	0.52	0.13	.	
Top 20 %	0.00	0.06	0.90	0.18	.