Evaluation of New York School Funding

Report Brief 7: Approaches to Estimating the Cost of Educational Adequacy

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Introduction

State school funding policies are intended to support the programs and services needed to provide all children an equal opportunity to achieve outcome goals. In other words, state funding policies should achieve adequacy. In an ideal world, school funding formula targets would be set according to accurate measures of the cost of achieving these outcomes. To inform the design of school funding policies, states must have some basis for determining the amount of funding each school district would need to meet the educational adequacy goals set by the state. This adequacy-based cost information would account for differences across settings in the price of resources (e.g., teacher salaries) and needs of the student populations served (e.g., children in poverty), as well as differences in other factors that may affect the perpupil costs of achieving common outcome goals (e.g., enrollment size and school/district remoteness).

The basis used by the New York State Department of Education (NYSED) for setting the cost targets in New York State's Foundation Aid formula is an analysis proposed by Standard & Poor's known as the "successful schools" approach. In New York's application of this approach, the average spending on general education instruction in a set of high-performing school districts is calculated after applying other adjustments, including an "efficiency filter," which limits the sample of districts considered to only those with the lowest spending within the high-performing pool.¹ Even at the time it was first adopted and applied to New York's Foundation Aid formula in 2007, academic researchers described the successful schools approach as inappropriate for determining costs and highly vulnerable to political manipulation (Baker et al., 2008). Additionally, the approach of taking the average spending of districts that meet a specific performance threshold provides no information on the differential costs associated with serving different types of students within different educational contexts. In the nearly 20 years since this method was introduced to guide Foundation Aid, it has been largely disregarded in favor of more rigorous methods that have been used with increased frequency across states and in the academic literature.

The purpose of this brief is to provide an overview of the most up-to-date, credible, and rigorous methods for measuring costs that can be used to guide the future development of a state school funding formula that meets New York's constitutional obligation to provide all

¹ Specifically, as reported in Center for Educational Equity (2024b), NYSED defined a successful school district as one that over a 3-year period had on average 80% of its students achieving "level-3" scores (on a four-level scale) on the state-required fourthand eighth-grade English language arts and mathematics exams, and an average score of 65 or more across six different high school Regents exams. However, no justification was provided for the 80% figure or why they used an average across all tests rather than on each test.

students an opportunity to a sound basic education. As reported in an earlier bulletin briefing, a sound basic (adequate) education in this context requires that students have the opportunity to obtain the knowledge and skills needed to function productively as civic participants and therefore meet the state outcome goals (Center for Educational Equity, 2024a). The following details the methodological approaches that can be used to provide an empirical foundation for developing a new funding formula that will support a sound basic education for all students. Given that each approach has strengths and limitations, when timeline and budget afford, multiple approaches can be used to capitalize on the strengths of various approaches while offsetting the limitations of each approach when used in isolation.

Approaches to Estimating Adequacy

Approaches used to estimate the cost of providing an adequate education have typically fallen into two categories:

- Input-oriented analyses identify the staffing, materials, supplies and equipment, physical space, and other elements required to provide specific educational programs and services capable of producing the desired educational outcomes for identified student populations being served in various settings.
- **Outcome-oriented analyses** start with student outcomes that are generated by the programs and services offered by existing schools and districts. This type of analysis relates the spending on these programs and services to the level of student outcomes, while taking into account different student populations and the characteristics of the settings in which they are served.²

Both approaches consider the desired outcomes goals (Duncombe & Yinger, 1999), but they differ in how they estimate the costs in reaching these goals. Input-oriented analyses work forward, starting with the resources (inputs) necessary to achieve the desired outcomes and measuring their associated costs. Outcome-oriented analyses work backwards, starting with the outcomes achieved and linking these outcomes to spending on inputs. Ideally, the two approaches would be used in concert.

² Note that the approach can also be used to *identify* schools and districts with relatively high outcomes given their existing characteristics and spending levels (i.e., those that are more efficient). After identifying schools and districts that are more efficient, deeper investigation can be conducted to explore the programmatic decisions and patterns of resource allocation associated with their success.

Input-Oriented Cost Analysis

There is one basic method for conducting input-oriented analyses, which has been referred to with two names: the Ingredients Method and Resource Cost Modeling (RCM; Chambers, 1999, 2001; Chambers & Hartman, 1981; Levin, 1983; Levin & McEwan, 2001; Levin, McEwan, et al., 2018). For the remainder of this brief, we use the latter term (RCM) to describe input-oriented analyses. RCM involves three basic steps:

- Identify the various types of resources, or "ingredients," and quantities of resources necessary to implement a set of educational programs and services for an entire school, district, or statewide system.
- 2. Determine the prices for these resources (e.g., hourly/yearly compensation for labor).
- 3. Combine the necessary resource quantities with their corresponding prices and sum these individual costs across all resources to determine the total cost.³

RCM was applied in both Illinois and Alaska in the early 1980s to determine the statewide costs of providing the desired (implicitly "adequate") level of programs and services (Chambers & Parish, 1982, 1984), long before it was first used in the context of school finance adequacy litigation in Wyoming in 1997 (Guthrie et al., 1997). It has since been used by researchers at the American Institutes for Research[®] (AIR[®]) and other leading education finance experts as a key method for estimating the cost of educational adequacy (Augenblick, Palaich and Associates, 2014).⁴

Prior to the modern emphasis on outcome standards and assessments, input-oriented analyses focused on tallying the resource needs of education systems designed to provide a given set of curricular requirements, programs, and services for all children. Modern analyses instead begin with a set of educational goals—or the student outcomes the system is intended to achieve—and then use consultants or expert panels to identify the inputs needed to achieve these goals. In both cases, the empirical method involves tallying inputs, attaching prices, and summing costs.

Identifying the cost of achieving outcome goals using input-oriented approaches requires hypothesizing how student resources are related to outcomes in order to identify the appropriate types and quantities of resources to meet the outcome goals. Two primary approaches have been taken to hypothesize the resource requirements for achieving desired outcomes with specific populations of children educated in particular settings:

• **Professional judgment:** The professional judgment (PJ) approach involves convening focus groups to propose the resource quantities needed to achieve specific outcomes at

³ The total cost across all resources is calculated as $Total Cost = \sum_{i=1}^{n} Quantity_i * Price_i$, where i is an index of the individual resources used.

⁴ For example, see the cost studies performed by AIR in California (Chambers et al., 2006; Levin, Brodziak, et al., 2018), Delaware (Atchison, 2023), New Mexico (Chambers et al., 2008), and New York (Chambers et al., 2004).

prototypical schools that represent a range of contexts that can be found across a state. Specifically, the prototype schools are defined by their varying levels of common cost factors including student needs, scale of operations (enrollment size), and geographic setting (degree of rurality, population density, etc.) that typically occur in a state. Costs are then estimated from the resources specified by the focus groups and their variation with respect to cost factors is analyzed.

• Evidence based: The evidence-based (EB) approach involves the compilation of published research studies on existing school interventions that have proved effective in producing specific outcomes for specific student populations served in particular settings and deriving from these various studies both the resources used and their associated costs. These interventions are chosen as models because they are deemed adequate in their particular school and district contexts (needs of students served, scale of operations, geographic setting), although the generalizability of the combination of various resources derived from research studies performed in a variety of contexts to schools/districts in a given target state that is different from where the research was performed is unknown.

Many studies have used PJ and EB as mutually exclusive approaches. Ideally, one would want to ensure that the expert educators selected to serve on PJ panels are well versed in the latest research that the EB approach draws upon. To this end, some well-designed PJ studies have provided panelists involved in the focus groups with research briefs containing research evidence on best practices with respect to educational programming and resource allocation (Atchison et al., 2023; Chambers et al., 2008; Levin, Brodziak, et al., 2018). However, even under the best "hybrid" application of the two input-oriented approaches, the resulting cost estimates are based on hypothesized resource requirements deemed necessary to produce the desired outcome goals.

Outcome-Oriented Cost Analysis

The primary tool of outcome-oriented cost analysis is the Education Cost Model (ECM).⁵ ECMs focus on schools or districts to evaluate the relationship between aggregate per-pupil spending and student outcomes given the contextual conditions or cost factors under which the outcomes are produced. Salient cost factors include scale of operations (the existence of diseconomies of scale where per-pupil production costs are higher for districts or schools with very small enrollments), geographic variation in the price of resources, and the needs of the student populations served, which may require greater or fewer resources to achieve common outcome goals. A thorough ECM, therefore, considers spending as a function of (a) measured outcomes, (b) student population characteristics (student needs), (c) characteristics of the

⁵ For a review of cost model analyses, see Duncombe and Yinger (2011) and Gronberg, Jansen, and Taylor (2011).

educational setting (economies of scale, population sparsity, etc.), (d) regional variation in the prices of inputs (such as teacher wages), and (e) other factors affecting spending that are unassociated with outcomes.⁶

Identifying statistical relationships between spending and outcomes under varied conditions requires high-quality measures of desired outcomes, spending, and cost factors as well as enough schools or districts that exhibit sufficient variation in the conditions under which they operate. The result of the ECM is an estimated cost for each district or school that is necessary for achieving a given level of student outcomes. Through further analysis these cost targets can be used to estimate a base per-pupil amount and funding adjustments for student needs and other cost factors that could be applied in a weighted student funding formula.

ECM models can also be useful for exploring how otherwise similar schools or districts operate more or less *efficiently* (i.e., produce different levels of outcomes with the same amount of spending or the same level of outcomes with different amounts of spending). That is, the ECM can reveal differences across schools and districts in terms of their relative efficiency. Once schools or districts that are more efficient have been identified, patterns of resource allocation and use of specific programming can be investigated to better understand best practices in terms of the use of specific inputs. An analysis incorporating efficiency was recently completed in Colorado to reveal that more efficient schools had higher teacher salaries, more experienced teachers, and lower student to teacher ratios, highlighting the importance of the teacher workforce to improving outcomes in that state (Atchison et al., 2024).

Methodological Strengths and Weaknesses of Approaches to Estimating Adequacy

Each approach to estimating the cost of providing adequacy has strengths and weaknesses. We begin with the two input-based approaches and then discuss the ECM approach.

A strength of the PJ approach is that it provides rich information on the types of resources specified by the panelists and how these are intended to support programming, which could be used to guide actual resource use. In addition, because the outcome goals used in the PJ approach are not limited to those that are observed empirically, the PJ approach can accommodate a wider and richer set of goals than the outcome-oriented ECM approach which relies on empirical data. For example, in addition to achievement on standardized assessments, the outcome goals used in the PJ process could also include civic engagement or social-

⁶ Report Brief 3 in our series provides a more in-depth exposition of the ECM approach (Baker et al., 2024).

emotional learning outcomes, even though those are not measured consistently across all schools and districts in a state.

The greatest shortcoming of the PJ approach is that the link between resources and outcomes is hypothetical (i.e., based on the opinion of expert educators as opposed to being empirically observed). As a result, there is no way to formally test whether the association between the PJ panels' planned programs and corresponding collections of resources necessary to support them will actually meet the outcome goals or represent the most efficient way to produce the desired student outcomes. A common concern is that the specifications from the PJ approach are too rich and may not represent the lowest cost solutions to meet the outcome goals (Hanushek & Lindseth, 2009). Finally, PJ fails to use existing data to examine the link between resources and outcomes across the full spectrum of contexts. It is impractical to use the RCM process to gather data on adequate resources for prototypical schools across all possible contexts in a state; the best that can be done is to develop programs and calculate corresponding costs for a sample of the school contexts that exist. Therefore, the applicability of the calculated costs resulting from the PJ approach can be limited and will tend to be less generalizable when the number of contexts costed out is small or when the sample of contexts costed out is not representative of the population of schools that exist across the state.

A strength of the EB approach is that it provides an empirical linkage between the types of interventions from which resource costs are derived and student outcomes, contingent on the rigor of the research studies chosen. However, where the objective is to determine comprehensive, institutional costs of meeting specific outcome goals across varied contexts, the EB approach used in isolation falls short. Research evidence can be useful for identifying specific interventions and the resource inputs that may yield positive outcomes; however, it rarely addresses the organization and resources of whole institutions, which is the purpose of adequacy studies. Evidence on an array of interventions cobbled together does not constitute solid evidence on an entire institution (inclusive of administrative structures, etc.). Similarly, one cannot assume that the outcome impacts of a variety of individual interventions would be realized when all are simultaneously implemented. In addition, the results of a given EB model may not be applicable in contexts that are different from those in which the evidence was gathered.⁷

A key strength of the ECM approach is that, unlike PJ, it does not rely on a hypothetical relationship between resources and outcomes. Instead, ECM makes use of the empirical relationship between spending, outcomes, and cost factors. Furthermore, because it includes

⁷ For a critique of the EB approach, see Hanushek (2007).

data on *all* schools or districts in a state, the results are representative of all contexts and do not suffer the lack of generalizability of the two input-based approaches (especially in the case of EB).

One weakness of the ECM approach is that outcomes used in this approach are limited to those that are measured consistently across all schools in the state (i.e., for which there are data). As a result, the costs estimated using this approach may be understated, given that there are likely educational goals that are not captured through statewide administrative data. A second weakness is that the results are not able to shed light on the types of programs and resource configurations that were used to produce student outcomes. In other words, the ECM approach does not describe how resources are used to produce better outcomes.

Conclusion

The approaches to estimating the cost of providing an adequate education fall into two general categories, with input-oriented approaches focused on summing the cost of a collection of resources hypothesized to generate adequate outcomes and outcome-oriented approaches using administrative data to determine the relationships between outcomes and educational spending to estimate the spending level needed to reach a target outcome level.

Given the benefits and limitations of the two input-oriented approaches (PJ and EB) and the outcome-oriented approach (ECM) outlined above, future research should consider innovative ways to use multiple approaches concurrently to leverage their strengths and minimize their weaknesses when budget and timeline allow. We have found that the ECM approach can be complemented by PJ and vice versa (Baker & Levin, 2014). For example, whereas the ECM can only accommodate outcomes for which there is data that is consistently collected for all schools or districts, the outcomes used in the PJ approach can be broader and do not have to be measured. As another example, whereas the PJ approach lacks a direct empirical (observed) link between resources and outcome measures, this is a strength of the ECM approach. In short, an approach that incorporates both input and outcome-oriented can emphasize the strengths of each approach while allaying concerns about the weaknesses of each approach.

As an example, AIR recently completed an adequacy study in Delaware using both PJ (where evidence was incorporated into the PJ approach) and ECM (Atchison et al., 2023). In that study, we used both approaches as independent methods and then compared the resulting cost estimates. We observed a high level of consistency, serving to validate both approaches. The study leveraged the strengths of both approaches, with the PJ approach incorporating a broader goals statement and providing rich descriptions of resources specified to meet the

goals statement by the PJ panels. The ECM approach provided an empirical link between the cost estimates and a target level of outcomes while incorporating data from all schools in the state. Although this is one example, there may be other innovative ways of incorporating multiple methods of cost estimation.

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