Alternative Formulas for Funding Jamaica's High Schools

Stephen M. Barro

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This study was carried out under a contract from the World Bank, with the cooperation of the Jamaican Ministry of Education, Youth, and Culture (MOEYC). All views expressed are solely the author's and do not necessarily reflect the opinions or policies of either the World Bank or MOEYC.

Preface

This inquiry into the financing of public high schools in Jamaica has been carried out under a contract with the World Bank, in conjunction with preparatory work for the ROSE II (Reform of Secondary Education) project. It was conducted in cooperation with Jamaica's Ministry of Education, Youth, and Culture (MOEYC). Ms. Kin Bing Wu, Senior Education Economist in the Bank's Department of Human Development, Latin America and the Caribbean Region, administered the contract, organized contacts with MOEYC, and exercised general oversight over the study.

The author gratefully acknowledges the assistance of Mr. Wesley Van Riel, who, under contract to the Bank, undertook and successfully completed the difficult task of assembling school-by-school data on the finances of Jamaica's high schools.

Also acknowledged is the assistance in gathering and interpreting information provided by a number of MOEYC staff members, especially in the Planning and Development Division. In particular, Ms. Valerie Been, the Director of Planning, and Ms. Barbara Allen arranged access to statistical and other information sources, facilitated contacts with other staff members, and helped to explain various aspects of Jamaica's education and education finance systems.

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I. Introduction

How resources or funds should be distributed to individual schools is a universal issue in education finance. Every country with a publicly financed school system has had to address it, either explicitly or implicitly, and to devise and implement a practical solution. As one would expect, the allocation mechanisms developed by different countries are highly diverse, reflecting intercountry differences in education systems, legal frameworks, and general philosophies of public sector finance. The resulting distributional outcomes also vary widely, especially with respect to the degree and pattern of fiscal inequality among schools.

In Jamaica, a fund distribution process has evolved under which (1) the national education ministry apportions resources—meaning mainly teaching positions—to schools largely on a discretionary basis, (2) each school's level of funding depends strongly on the characteristics, and hence the salaries, of the teaching personnel that the school is able to attract and retain, and (3) each school's budget for resources other than personnel is determined (at the secondary level) mainly by the school's ability to collect tuition fees from students. The result, as will be seen, is a markedly uneven distribution of funds among high schools, with some schools able to spend more than twice as much per pupil as other schools in the same category. The policy questions thus arise of whether a system that yields this sort of financial disparity is acceptable, or, if not, what alternative fund allocation method might replace it.

To help illuminate these issues, the World Bank has commissioned an inquiry into the possibility of replacing Jamaica's current method of allocating funds to secondary schools with a new, formula-based approach. This inquiry, referred to as the "formula study," has been carried out in cooperation with Jamaica's Ministry of Education, Youth, and Culture (MOEYC) and in conjunction with the ROSE II (Reform of Secondary Education) project, a large-scale World Bank-sponsored effort to upgrade the quality of Jamaican secondary education. The present report summarizes the information gathered during the inquiry and presents the study's findings and conclusions.

Study Objectives

The general purpose of this inquiry is to assess the feasibility of equalizing and rationalizing the distribution of resources among Jamaica's secondary schools by developing a new formula-based fund allocation system. To that end, the study has sought to accomplish the following specific objectives:

- To review, and to place in international perspective, Jamaica's current approach to allocating resources and funds to secondary schools.
- To assess the distribution of funds and resources under the current system (specifically, the distribution among individual high schools) and to document interschool variations.

- To identify potentially applicable funding formulas and formula factors, taking into account, where appropriate, the methods used by other countries to fund local education units or individual schools.
- To evaluate the availability and adequacy of data needed to construct promising fund allocation formulas, and to identify needed data improvements.
- To simulate the school-by-school allocations of funds that would be produced by selected alternative formulas and to compare the resulting interschool distributions with the actual distribution under the existing system.
- To assess the implications of introducing a new formula-based funding system, including not only the distributional implications but also the implications for such things as cost sharing (student fees) and the teacher personnel system.

Scope and Limitations

The study's scope can be characterized in terms of the types of schools covered, the pertinent time period, and the categories of expenditure taken into account in the analysis of fund distributions.

Coverage of schools. Although the option of using formulas to distribute funds to individual schools applies, in principle, to public schools serving all grade levels, this study focuses exclusively on the financing of Jamaica's public high schools. In part, this limitation reflects the study's status as an adjunct of ROSE II, which is a reform effort focused solely on secondary schooling. Because of this connection, the study's purview is necessarily limited to the secondary sphere; it does not extend to the primary or preprimary levels. Further, although Jamaica's secondary education sector includes not only high schools, which serve pupils in grades 7 through 11 or 13, but also the grade 7-9 portions of all age schools and primary and junior high (P&JH) schools, which serve grades 1-9, it has not been feasible to include the latter in this inquiry. Clearly, it would make no sense to consider funding only the grade 7-9 portions of the grade 1-9 schools by formula, along with the high schools, while the larger grade 1-6 portions of the same schools continued to be funded under the current system. It would be unacceptable on technical grounds to treat whole high schools and the grade 7-9 portions of all age and P&JH schools as comparable units, to which a single fund allocation formula could apply. For instance, there would be ambiguity as to what fraction of the latter schools' funding is attributable to grade 7-9 pupils and unavoidable arbitrariness in estimating the grade 7-9 shares of outlays for such things as school administration, maintenance, and utilities. A more sensible analytical strategy would be to extend the inquiry to cover all types of Jamaican primary and secondary schools if the initial work on high schools makes the formula approach seem promising.

Time period. The statistics contained in this report pertain to the single most recent year for which data were available when the analytical work commenced. Specifically, all the statistics on expenditure and revenue variations are for the financial year running from April 2000 to March 2001, and all the statistics on enrollment and school personnel are from MOEYC's School Census of October 2000. Although it would have been beneficial in some respects to

have data for multiple years—e.g., trends in inequality and the stability of fund distributions could have been examined—time and resource constraints, coupled with the difficulty of assembling data for even a single year (see Section II), ruled out the development of a multiyear dataset.

Expenditure categories. The analyses of funding levels and fund distributions in this report cover current, or recurrent, expenditures only; capital outlays are excluded. A related, potentially important limitation is that funds provided by external donor agencies for special, limited-duration, projects also are excluded. Under Jamaica's current system of accounting for education costs, it appears that such funds are included in the capital outlay budget even if they are used to procure resources usually classified as recurrent, such as the services of instructional personnel.

Excluded from the analysis, for lack of data, are funds that certain schools receive from private sources other than tuition fees. Among these excluded items are income from endowment funds, school fees other than officially approved tuition charges, donations from parents and other parties, and support from churches or other affiliated institutions. Such items are not reflected in MOEYC's financial records. In addition, certain public outlays attributable to high school-level education that do appear in the education budget are excluded because they are not readily attributable to particular schools. Among these are funds for school nutrition programs, teacher training, and various centrally administrated support programs.

The analysis of fund distributions in this report focuses on variations in total recurrent outlay per pupil. Although it would be worthwhile to examine, in addition, interschool variations in the composition of spending and in spending for particular education functions or resource categories, data limitations preclude such disaggregation. It is not currently feasible to measure consistently, for example, the amounts that different schools spend on such things as compensation of classroom teachers, school administration, and instructional materials and equipment.

Data limitations also restrict in other ways the types of fund allocation formulas that can be considered and the manner in which fund distributions can be analyzed. For instance, the lack of school-by-school data on family income or the incidence of poverty not only prevents comparisons of the per-pupil outlays of schools serving richer and poorer pupils but also precludes the construction of formulas containing an explicit income or poverty factor. As will be seen, other data limitations significantly constrain the available options for taking account of interschool variations in educational needs and costs.

Organization

The organization of the remainder of the report closely reflects the list of study objectives set forth above.

Section II begins with a description of Jamaica's current method of financing high schools and then turns to an empirical analysis of the resulting distributions of funds and resources. The latter covers expenditure differences among types of high schools, spending disparities among

individual schools, interschool variations in real resources (staffing ratios and staff qualifications), and relationships between the financial and real-resource variables.

Section III reviews alternative funding mechanisms, including formulas used by other countries, that might be considered in devising a new, formula-based funding mechanism for Jamaica. The discussion covers the roles of different formula factors (indicators of educational needs, education costs, etc.), associated problems of measurement, details of formula design (including mathematical specifications), and implications of shifting to a formula-based approach.

Section IV then demonstrates, through a series of simulation exercises, how the interschool distribution of funds would be altered and how the pattern of financial disparities would be changed if selected formulas from among those presented in Section III were used to allocate money to schools.

II. The Distribution of Funds and Resources under the Existing System

The main reason for considering alternative approaches to financing Jamaica's high schools is that funds and resources are very unevenly distributed under the existing system. This section of the report documents the sources, patterns, and extent of financial inequality. It is intended to provide the foundation for the identification, development, and assessment of alternative fund allocation mechanisms in Sections III and IV. The examination of the current situation begins with a brief review of the existing allocation mechanisms and processes and then turns to an empirical analysis of the resulting interschool distributions. The latter covers expenditure differences among the major categories of Jamaican high schools—the former secondary (traditional) and former comprehensive high schools and the technical-vocational schools; spending disparities among the individual high schools within and across the aforesaid categories; interschool variations in real resources—meaning mainly numbers and qualifications of teaching personnel and other staff; and relationships between expenditures and the real-resource variables.

Key Features of the Current System

A combination of features of Jamaica's current school finance system results in the substantially unequal distribution of resources and funds we see today. The following summary of key features is selective rather than comprehensive, emphasizing those aspects of the system that appear to most strongly influence the interschool distribution of funds. It is also incomplete in that it only refers briefly to the discretionary elements of the existing resource allocation process rather than describing how they actually work. The discretionary aspects would not be easy for any outsider to comprehend fully. At the least, an inquiry into the matter would require extensive discussions with participants at both the fund-disbursing (MOEYC) end and the fund-receiving (school level) end of the allocation system.

Because the alternative formulas to be considered later are based in large part on foreign prototypes, this summary of the Jamaican system is framed partly in international-comparative

terms. The following remarks on system features focus both on similarities to other national systems, which may make certain foreign models applicable, and on differences from other systems, which make a specifically Jamaican solution necessary.

Structural Aspects

The following aspects of the institutional structure and the system of governance of education in Jamaica set the stage for the distribution of funds:

Centralization. The national government of Jamaica is responsible for generating all public funds for schools, and the national education authority—the Ministry of Education, Youth, and Culture (MOEYC)—is directly responsible for distributing education funds to the individual schools. There is no role for subnational units of government, such as parishes, municipalities, or any regional or local education authorities to exercise any autonomous decision-making authority with respect to the generation or allocation of funds. (Regional education offices exist, but they are administrative subdivisions of MOEYC, not autonomous bodies responsible to local constituencies.)

Many other countries, in contrast, assign the main responsibility both to generate and to allocate education funds to regional—that is, state or provincial—education authorities, each of which finances the schools within its own territory. In the United States and Canada, for instance, it is the states and provinces, respectively, not the national government, that have the main responsibility for supporting the schools.

Single-stage allocation. Reflecting the centralized nature of the system, resource allocation in Jamaica is a single-stage process, in which resources and/or funds flow directly from the national ministry to the individual schools, with no intermediate apportionment among geographical units or regional or local jurisdictions. This means (assuming that the single-stage structure will be retained) that a fund allocation formula would have to be designed to calculate as many fund allotments as there are schools—150-plus allotments if the formula were limited to high schools, more than 950 allotments if all primary and secondary schools were to be covered.

In many other countries, funds are allocated in two or even three stages. Britain, Canada, and the United States all have two-stage processes, in which the national or state/provincial authorities first distribute funds to local agencies—local education authorities (LEAs), school boards, and school districts, respectively—and the local agencies, in turn distribute funds or resources among their schools. In this particular respect, Jamaica's system more closely resembles those of such highly centralized continental European countries as France and the Netherlands than those of the major English-speaking countries.

Schools as the budgetary units. In Jamaica, the budgetary and management units in education, and hence the units to which the government must allocate funds or resources, are the individual schools, each of which has its own governing board. Each school is empowered to receive funds, to hire teachers and other staff (but see the next point, below), and to expend funds to purchase other resources. As already noted, Jamaica has no intermediate-level units to perform

these functions—no municipal school systems, local education authorities, or school districts, such as exist in many other countries. (Proposals to create such units apparently have been put forth and discussed in Jamaica, which means that this aspect of the system could change in the future.)

Jamaica is unusual in this respect but not unique. In most countries, individual schools do not receive or disburse substantial amounts of funds; only relatively minor financial transactions, such as purchases of materials and supplies, take place at the individual-school level. In Britain, however, the individual schools are funded by formula, and some individual schools (those that have "opted out" of LEAs) have taken on responsibility for the full range of financial transactions. This makes the British prototype particularly interesting for Jamaica, as I discuss further below.

Schools as financial agents. Another noteworthy feature of the Jamaican structure is the coexistence of "partially bursar-paid" and "fully bursar-paid" methods of managing the finances of individual schools. Under the former, a school's teachers are paid directly by MOEYC; under the latter, MOEYC gives the schools funds (subventions) to pay the teachers themselves. Under both approaches, schools receive subventions to pay nonteaching personnel. None of the schools can be considered fiscally autonomous, not even those in the fully bursar-paid group, because it is MOEYC that approves each school's budget in detail and determines how many teachers a school can employ. Nevertheless, the bursary system provides both a framework and a body of real-world experience for the type of school-level financial management that presumably would emerge under a formula-based fund distribution system. Jamaican schools thus may be better equipped than the schools of most other countries for the school-level fiscal decentralization that logically would accompany a formula-based distribution of funds.

One implication of the structural features just outlined is that Jamaica's formula design issues more closely resemble those facing state, provincial, or local education authorities in large (or federated) countries than those facing the national authorities. For instance, each of the largest local school districts in the United States—districts such as Los Angeles, Chicago, and Dade County (Miami)—enrolls several hundred thousand pupils and must allocate resources among several hundred schools. Each U.S. state and Canadian province must distribute funds among anywhere from a few dozen to over 1000 local districts or school boards. Each British LEA must apportion funds among up to several hundred schools. Ideas potentially useful to Jamaica can be drawn from the methods used by these subnational education agencies.

The Fund Allocation Process

The present large disparities in per-pupil spending among Jamaican high schools are partly attributable to two features of the country's fund allocation process:

Allocation of staff positions rather than allocation of funds. In Jamaica, as in most other countries, what individual schools receive from the pertinent authority is primarily not money but rather certain allotments of physical or "real" resources—in particular, allotments of teacher and other staff positions. This point is somewhat obscured in the Jamaican context by the

fact that money for paying teaching staff does flow from MOEYC to those schools designated "fully bursar-paid," to be dispensed to teachers by the school bursars. But the bursars act in these situations merely as financial agents of the Ministry. The reality is that it is the size and composition of a school's staff that determines how much money the school receives, not that the school receives a certain fund allotment that it can decide how to spend. Because staffing determines funding, rather than the other way around, each school is encouraged to hire the most qualified teachers it can, without regard to how much such teachers cost. Given that some schools are much more attractive than others to the better-qualified teachers, the result is wide interschool variation in the makeup of the teaching force, with correspondingly wide variation in per-pupil spending for teachers.

The same sort of clustering of highly qualified, expensive teachers in certain schools occurs in other countries that allocate staff positions rather than funds, but it generally poses less of an equity problem than in Jamaica because local education agencies exert at least partial control over teacher assignment. Even so, staffing inequities have sometimes elicited drastic remedies—as in Los Angeles, where litigation was required to balance teacher qualifications among schools. The type of system that seems to deal with this aspect of equity most effectively, however, is that used in Britain. Under the British system, local education authorities distribute education funds—not staff allotments—to the schools and (by law) give the schools broad authority to decide for themselves how this money shall be spent. Each school has to decide, therefore, what tradeoff it is willing to make between teacher numbers and teacher quality. The introduction of a system for distributing funds—not staff positions—to the schools would move Jamaica decisively in the British direction.

Discretionary rather than formula-based allocation. Distributions to local authorities and to individual schools, whether of funds or resources, are controlled by formulas in most countries. Discretionary allocation processes, where they exist, usually apply only very narrowly—e.g., to purchases of instructional equipment, to special projects or programs, or in emergency situations. In Jamaica, however, funds and resources, including the most important resource, teaching positions, are not distributed by formula but instead are apportioned largely at the Ministry's discretion. Although certain formula-like elements, such as standards for pupil/teacher ratios, do exist, they apparently are nonbinding. A school's allotment of teacher positions does not automatically increase when enrollment rises or decline when enrollment falls, even though the staffing standard would suggest that it should. As will be seen from the empirical analysis later in this section, there are large deviations from proportionality of teaching staff to number of pupils.

Jamaica's current system appears to leave considerable room for negotiation between school officials and MOEYC over such basic matters as how many teaching positions a school shall receive. As noted earlier, it has not been possible in this study to investigate how this negotiation process unfolds. Nor has any information been gathered on the rationales underlying the MOEYC decisions that yield substantial variations in pupil-teacher ratio. The process, to this observer, remains a black box. Nevertheless, there is little doubt about the causal connection between the discretionary staff allocation process and interschool spending disparities.

The Teacher Personnel System

Certain features of Jamaica's teacher personnel system have contributed importantly to the present pattern of expenditure disparity among schools. These features would be difficult to reconcile with a formula-based, pupil-driven approach to funding schools. Left unaltered, they would pose a formidable barrier to distributing funds more equitably.

Individual schools as the employers of teachers. A highly unusual feature of the Jamaican system, from an international perspective, is that teaching personnel, even though paid by MOEYC, are not considered employees of the Ministry but rather employees of the individual schools. Although MOEYC specifies how many teachers each school may employ, it has very little control over the makeup of a school's teaching force. The Ministry does not assign teachers to schools. Instead, schools are free to recruit and select teachers themselves. MOEYC apparently is obliged to pay whatever teachers a school succeeds in hiring according to the nationally uniform negotiated salary scale. This means that schools able to recruit highly qualified teachers (trained university graduates) receive substantially more money per teacher, and hence more money per pupil, than schools forced to employ mainly teachers with lesser qualifications. This arrangement, whereby the better teachers a school attracts, the more money the school receives, virtually guarantees a high degree of financial inequality among schools.

Rigidities in the teacher personnel system. Apart from the point just mentioned, other provisions of Jamaica's teacher personnel system have contributed to the present pattern of fund distribution and would be likely to complicate efforts to alter it. MOEYC apparently has little, if any, ability to redeploy teachers among schools, even by such benign methods as offering financial incentives. Mechanisms apparently are lacking for individual teachers to transfer among schools or to seek promotions in schools other than where they are currently employed without losing seniority rights. Further, a school's ability to terminate or replace teachers, or even to reduce teaching positions when enrollment falls, apparently is severely restricted. The question arises, therefore, of what would happen if a new funding formula significantly redistributed funds among schools, making it necessary to redistribute teachers as well. Clearly, reconciling the two systems—funding and personnel—would be one of the major challenges in implementing any formula-based approach.

The Cost-sharing scheme

Without a doubt, the most distinctive element of Jamaica's method of financing high school education is the role played by the country's cost-sharing scheme. First implemented in 1994-95, that scheme requires pupils' families to pay tuition fees, which vary in amount from school to school. (The range of fees in 2000-01 was from J$4000 to J$8500 per pupil.) Under an associated financial assistance program, MOEYC provides grants to compensate schools for the inability of some families to pay these fees, or to pay them in full. The combined income from tuition fees and financial assistance payments covers, on average, about 14 percent of the annual cost of operating the schools.

The cost-sharing scheme aggravates the fiscal disparity problem and, if retained, would complicate the task of designing an equitable fund allocation formula. As will be shown below, the distribution of cost-sharing income among high schools is even more unequal than the distribution of MOEYC subventions and salary payments, so the net effect of cost sharing is to amplify the differences in spending per pupil. Further, the requirement that high schools cover all or most of their nonpersonnel expenditures (for materials, school maintenance, utilities, etc.) with cost-sharing funds means that the cost-sharing scheme probably distorts resource allocation patterns within the schools. If Jamaica were to adopt a formula-based approach to fund allocation in the future while retaining the cost-sharing scheme, it would be necessary to write complex provisions into the formula to compensate for the schools' unequal capacities to collect cost-sharing funds. This would substantially complicate the task of designing an equitable fund distribution formula.

* * * *

Summing up, the key points concerning fund distribution under the existing system are as follows: First, MOEYC allocates teaching positions to individual high schools on a discretionary basis, giving rise to disparities in the pupil/teacher ratio. Second, MOEYC pays the salaries of whatever types of teachers schools succeed in hiring. Because some schools are much better able than others to attract highly qualified, high-salary teachers, the result is substantially unequal per-pupil spending for teacher compensation. Third, the cost-sharing scheme amplifies the spending disparities because the same schools as can attract the higher-paid teachers generally are able to collect more cost-sharing funds per pupil.

Data Sources and Data Problems

Before turning to the empirical analysis of fund and resource distributions, several points need to be made about the data on which the analysis depends. These data come from multiple MOEYC datasets, produced by different offices within the Ministry, which have been merged to support the assessment of current disparities in this section and the simulations of alternative funding formulas in Section IV.

The most crucial data, those needed to estimate the total 2000-01 recurrent outlays of individual high schools, have been assembled from a number of data files maintained by MOEYC's Finance Division, plus separate data files on the cost-sharing scheme compiled by the MOEYC Policy Analysis and Research Unit. Enrollment data from the October 2000 School Census, conducted by the Statistics Section of the Ministry's Planning and Development Division, have been used to translate total school outlays into outlay per pupil. Personnel data from the same School Census have been used to analyze variations in real resources among the schools.

Unfortunately, determining the amount spent by, or for, each high school in a given financial year has proven to be a more difficult undertaking than initially expected, and the accuracy of the figures produced is questionable in several respects. Without going into full detail at this

point, the main difficulties and sources of uncertainty regarding data reliability can be summarized as follows:

1. The school-level finance data are fragmented. Data on MOEYC's subvention payments to schools, data on direct government payments for teacher compensation, data on funds derived from the cost-sharing scheme, and data on approved school budgets must all be pieced together to arrive at an estimate of the total funds expended by, or available to, each high school.
2. The only dataset that offers itemized expenditure figures, the approved budget estimates for each school, is of limited value for analyzing spending disparities because it takes no account of supplemental outlays, sometimes of substantial magnitude, approved during the financial year.[1]
3. The Finance Division's data on the total government subvention paid to each school (kept as handwritten ledger entries!) offer no information about the composition of spending and commingle payments for services provided in a given fiscal year with payments in arrears for services provided in earlier years. These features obscure the true annual cost of operating each school.
4. MOEYC's direct spending for teacher compensation (i.e., direct payments to teachers employed in the "partially bursar-paid" schools) had to be estimated from monthly payroll tabulations for each school. The Finance Division was unable to provide a tabulation summing up the payments made to each school's teachers during the 12 months of the financial year. The monthly payroll figures, like the subvention data, commingle current salary payments and payments in arrears.
5. Different data items from the aforesaid datasets have had to be used to quantify the outlays of high schools funded wholly by subventions (the "fully bursar-paid" schools) and high schools whose teachers are paid directly by MOEYC (the "partially bursar-paid" schools). This calls into question the comparability of outlay figures between the two groups of schools.
6. None of the Finance Division datasets covers either the tuition fees or the financial assistance payments that schools receive under the cost-sharing scheme. The only source of data on cost-sharing income is a special annual survey, conducted by the Ministry's Policy Analysis and Research Unit, which is not coordinated with, or fully consistent with, the other finance data collections, and to which not all schools respond.
7. Certain funds received by high schools are not covered by any of the aforementioned datasets. These include income from fees other than the officially approved tuition fees; income from endowment funds; donations from parents, alumni, or other parties; and contributions from parent or affiliated institutions, such as the churches associated with some traditional high schools.

[1] Itemized data on actual expenditures also are collected from schools, but with a two-year lag and with many schools failing to submit reports.

8. All the aforementioned datasets appear to be adversely affected to varying degrees by missing data items, anomalies, internal inconsistencies, and instances of nonreporting by schools.

The upshot is that the currently available data on 2000-01 expenditure by schools are less complete and consistent than one would have hoped. Outlay figures may have been inflated by the inclusion of some payments in arrears, to an extent that is both unknown and not necessarily uniform across schools. The figures for fully bursar-paid and partially bursar-paid schools probably are less than fully comparable. The need to estimate teacher compensation from figures on monthly salary payments has detracted from the quality of data for the latter set of schools. Data gaps and anomalies have introduced errors into the total outlay figures for some individual schools.

Accordingly, the figures presented below should be viewed cautiously, especially the figures pertaining to particular schools. (Some possibly anomalous results for individual schools are noted in the text.) Fortunately, as will be seen, the broad findings concerning the extent and pattern of fiscal disparity among high schools are sufficiently clear-cut that they are unlikely to have been materially altered by data shortcomings. Future data enhancements, therefore, can be expected to alter the details but not the essence of the results.

Differences in Funding among Categories of Schools

A portion of the variation in per-pupil spending among Jamaica's high schools—but only a minor fraction, as it turns out—reflects expenditure differences among certain broad school categories. The variations considered here are those observed when high schools are classified by (a) school type, (b) region, (c) enrollment size stratum, and (d) urban or rural location. The following are brief explanations of these classifications:

- *Classification by school type*. Jamaica has recently changed its typology of high schools. Today the main distinction is between the group of 135 academic and general high schools (now referred to simply as "high schools") and the much smaller group of vocational schools. The latter comprises 14 technical-vocational schools and the already-mentioned 3 small vocational-agricultural schools. Previously, a further distinction was made within the academic/general category between "secondary" and "comprehensive" high schools, numbering 59 and 76, respectively. The former were (and generally still are) more academically oriented and prestigious. This analysis preserves the secondary-versus-comprehensive distinction, even though it is officially obsolete, and examines funding differences between the two groups.
    - *Classification by region*. All of Jamaica's public schools, including the high schools, are grouped for administrative purposes into six geographical regions. The most important distinction from a financial perspective is that between the Kingston metropolitan area (Region 1) and the rest of the country.

- *Classification by enrollment size*. Apart from the small agricultural schools, Jamaica's high schools serve from just over 300 to just over 2500 pupils. The schools have been grouped for purposes of this analysis into five enrollment strata spanning that range.
- *Classification as urban or rural*. This two-way classification is taken from the *School Profiles 2000-2001* report produced by MOEYC's Planning and Development Division. Whether any further locational distinctions would be useful (e.g., central-city vs. suburban, large vs. small town) may be a question worth pursuing.

Because of the data shortcomings discussed above, it has not been possible to use a single, uniform method to calculate total spending for all high schools. Instead, one method must be used for the fully bursar-paid schools and a different method must be used for the partially bursar-paid schools. For the former, total spending, exclusive of cost sharing, is represented by the total MOEYC subvention, as reported in the Finance Division's "subvention books." For the latter, total spending, again exclusive of cost sharing, is the sum of (a) the subvention reported in the same subvention books, which, for these schools, covers only outlays other than compensation of teaching staff, and (b) estimated outlay for teacher compensation. The latter has been calculated for this exercise as 12 times the amount paid by MOEYC in March 2001 for the gross salaries of each school's teachers.[2]

Table 1 compares average 2000-01 spending per pupil, estimated as just described, among all the aforementioned categories of schools. It presents two kinds of averages for each school group, labeled, respectively, "average for school category as a whole" and "average of per-pupil outlays of individual schools." The averages for a category as a whole are calculated by adding up the total spending of all schools in that category, adding up the enrollments of the same schools, and then dividing the sum of outlays by the sum of enrollments. The averages of the second kind are calculated by dividing each school's total spending by its enrollment and then taking the average (mean) of these individual-school figures. The two methods yield different results because different schools have different numbers of pupils. In effect, the first method yields a pupil-weighted average, in which each school is given a weight proportional to its enrollment, while the second method yields an unweighted average outlay per pupil, in which all schools count equally.

[2] According to officials of the Finance Division, estimating annual teacher compensation in this manner is better than adding up the actual gross salary figures for all 12 months of the financial year because some months' gross salary payments include substantial payments in arrears. The March 2001 figures are said to include only minimal, if any, payments in arrears, making them the most suitable to use as a basis for estimation. Further investigation is needed of the variability of gross salary payments over the 12 months of the financial year.

Table 1: Average Outlay Per Pupil by Category of School, Jamaican High Schools, 2000-01

Category of school	Number of Schools	Number of Pupils Enrolled	2000-01 Funds Per Pupil: Average for School Category as a Whole (Pupil-Weighted Average): Outlay Excluding Cost-sharing income	Cost-sharing income (Fees+ Financial Assistance)	Total Outlay Including Cost Sharing	2000-01 Funds Per Pupil: Average of Per-Pupil Outlays of Individual Schools: Outlay Excluding Cost-sharing income	Cost-sharing income (Fees+ Financial Assistance)	Total Outlay Including Cost Sharing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All schools (except agricultural)	148	189,026	27,826	4,557	32,383	28,788	4,566	33,353
High schools by school type								
High schools (academic/ general)	134	171,756	27,209	4,500	31,709	28,113	4,497	32,611
Former secondary highs	59	78,735	29,283	5,698	34,981	29,884	5,838	35,722
Former comprehensive highs	75	93,021	25,453	3,485	28,939	26,720	3,443	30,163
Technical-vocational high schools	14	17,270	33,962	5,125	39,087	35,243	5,221	40,464
High schools by enrollment size								
≤800 pupils	25	14,528	32,575	4,454	37,029	33,265	4,449	37,714
801 to 1200 pupils	40	40,152	28,469	4,120	32,589	28,577	4,120	32,697
1201 to 1600 pupils	48	65,634	28,659	5,113	33,772	28,775	5,152	33,927
1601 to 2000 pupils	21	36,876	27,205	4,611	31,815	27,188	4,633	31,822
>2000 pupils	14	31,836	23,849	3,947	27,796	23,837	3,938	27,775
High schools by region								
Region 1: Kingston	45	55,465	32,390	5,448	37,838	33,820	5,292	39,112
Region 2: Port Antonio	12	13,293	26,706	4,007	30,713	27,136	3,896	31,033
Region 3: Brown's Town	16	20,647	24,163	4,422	28,584	25,011	4,597	29,608
Region 4: Montego Bay	19	27,480	25,057	3,539	28,596	25,682	3,589	29,271
Region 5: Mandeville	24	26,903	27,325	4,605	31,930	28,342	4,754	33,096
Region 6: Old Harbour	32	45,238	26,210	4,278	30,488	26,397	4,219	30,616
Urban high schools	111	148,398	28,435	4,749	33,184	29,352	4,781	34,133
Rural high schools	37	40,628	25,599	3,855	29,455	27,095	3,919	31,015

Each of the two methods has been used in Table 1 to average three different expenditure variables: outlay per pupil exclusive of cost-sharing income, cost-sharing income per pupil, and outlay per pupil including cost-sharing income. Columns 3 to 5 of the table show the results produced by the pupil-weighted method; columns 6 to 8 show the unweighted averages. All figures in the table, except for those in the first row, exclude the three vocational-agricultural schools. As already noted, these schools are not comparable to the other high schools, and their inclusion would distort the results.

Figures on per-pupil spending by type of school are presented in MOEYC's annual *Education Statistics* volumes, so the results pertaining to this classification should be familiar. The technical-vocational high schools, as a group, spend about 25 percent more than the academic/general high schools, exclusive of cost-sharing income—J$33,962, as compared with J$27,209 per pupil. That difference declines to about 23 percent when cost-sharing income is in-

cluded. Within the academic/general group, the former secondary high schools spend an estimated 15 percent more per pupil (excluding cost sharing) than the former comprehensive high schools—J$29,283, as compared with J$25,453. But when cost-sharing income is included, the difference between these subgroups rises sharply to 21 percent (J$34,981, compared with J$28,939). This widened gap reflects the large difference—64 percent—between the J$5,698 in cost-sharing income per pupil received, on average, by the former secondary highs and the J$3,485 per pupil received by the former comprehensive highs.

Note that the unweighted per-pupil spending figures for each school type shown in columns 6 and 8 of the table generally are higher by 3 or 4 percent than the corresponding pupil-weighted figures in columns 3 and 5. This is because outlay per pupil tends to decrease with increasing school enrollment. As the breakdown by enrollment size shows, schools enrolling 800 pupils or less spend about 14 percent more per pupil (cost sharing included) than high schools in general—J$37,029 per pupil, as compared with J$32,383 for all schools combined. At the other end of the size spectrum, schools with enrollments greater than 2000 pupils spend about 14 percent below the all-school average.

Spending per pupil is sharply higher in the Kingston area (Region 1) than in any other region. The Kingston figure, J$37,838 including cost-sharing income, is about 17 percent higher than the corresponding countrywide average. The region with the next-highest spending, Mandeville (Region 5), spends close to the national-average level, while the lowest-spending region, Montego Bay (Region 4), spends only J$28,596 per pupil, or 12 percent below the national average. Taken together, these figures translate into a 32 percent difference in outlay per pupil between the highest-spending and the lowest-spending regions.

The 37 high schools that MOEYC classifies as rural, which enroll about 21 percent of the country's high school pupils, spend about 11 percent less per pupil, on average, than the 112 high schools classified as urban. Note, however, that the regional effect and the urban-rural effect on spending are, to a large extent, one and the same. One cannot tell, just by looking at the averages displayed in Table 1, whether it is being urban that "explains" the Kingston region's high level of spending, or whether it is the Kingston area's above-average spending that produces the apparent urban-rural differential.

Spending Disparities among Individual Schools

Although the differences in spending between broad categories of high schools are significant, they are small compared to the within-category differences among individual schools. To illustrate, compare the difference in average per-pupil outlay between the former secondary high schools and the former comprehensive high schools with the difference between the highest-spending one-fifth and the lowest-spending one-fifth of schools within either group. As noted above, the intergroup difference is about 15 percent (cost sharing excluded). But the comparably calculated difference in spending between the top and bottom quintiles of former secondary highs is over 56 percent, and that between the top and bottom quintiles of former comprehensive highs is 58 percent (see below). Clearly, inequality among individual schools, not inequality between school types, is the major component of Jamaica's school finance disparities.

Over many years of dealing with issues of equity, specialists in school finance have developed multiple statistical indicators of fiscal disparity. These have been used in innumerable studies of expenditure variations among U.S. states, among local school districts or school boards within particular U.S. states or Canadian provinces, and, much more rarely, among a particular district's schools. Some of these indicators are familiar and straightforward—for instance, the standard deviation and the range from highest to lowest spending per pupil. Others are more specialized and computationally elaborate.[3] For the purposes of this inquiry, a few of the simpler indicators should suffice. The measures presented below include:

- The standard deviation of per-pupil spending.
- The coefficient of variation in per-pupil spending (the standard deviation expressed relative to the mean).
- The range ratio, which is the ratio of the maximum value to the minimum value of outlay per pupil.
- The restricted (95th percentile to 5th percentile) range ratio, which is the ratio of outlay per pupil of the 95th percentile school to outlay per pupil of the 5th percentile school. The rationale for excluding the highest and lowest 5 percent of schools is to prevent undue influence of extreme cases ("outliers") on the results.
- The interquartile range ratio, which is the ratio of outlay per pupil of the 75th percentile (3rd quartile) school to that of the 25th percentile (1st quartile) school. This statistic indicates how tightly schools are clustered in the middle half of the distribution.
- Ratios of average outlay per pupil among quintiles: specifically, the ratio of outlay per pupil in the highest-spending quintile of schools to that in the lowest-spending quintile of schools, and the ratios of outlay per pupil in the top and bottom quintiles of schools to outlay per pupil in the middle (3rd) quintile.[4]

Values of these statistics have been calculated for the following sets of schools: all high schools except agricultural, all general/academic high schools (i.e., all schools except technical-vocational and agricultural), the former secondary high schools, the former comprehensive high schools, and the technical-vocational high schools.

Consider, first, the variations in per-pupil spending among the whole set of Jamaica's high schools (except the three agricultural schools). The disparity statistics for these 148 schools, pre-

[3] The standard reference to indicators of disparity in education finance is Robert Berne and Leanna Stiefel, *The Measurement of Equity in School Finance*, Baltimore, MD: Johns Hopkins University Press, 1984. This book explains in detail the advantages, disadvantages, and appropriate uses of the different indicators.

[4] The quintile averages presented here are averages for the category as a whole; that is, they are calculated by adding up the expenditures of all schools in a quintile and dividing that sum by the sum of the enrollments of all schools in the quintile. The results are different, in general, from those that would be obtained by calculating an unweighted average of the individual-school values of per-pupil spending.

sented in Table 2, provide multiple perspectives on the extent and pattern of inequality, as follows:

The difference in per-pupil spending between schools at the top and bottom ends of the expenditure distribution is dramatic: The ratio of maximum to minimum per-pupil spending is 3.9 to 1 with cost sharing excluded, or 3.5 to 1 with cost sharing included. When both the top 5 percent and the bottom 5 percent of schools are omitted, the ratio of high to low per-pupil spending (the 95th percentile to 5th percentile ratio) falls to 2.0 (1.9 with cost sharing included)—a less extreme but still very substantial degree of interschool disparity. Putting it more concretely, some Jamaican high schools are able to spend in excess of J$50,000 per pupil per year, while others must make do with only slightly over J$20,000 per pupil per year. Schools near the top of the per-pupil spending scale include a number of technical-vocational high schools, such as St. Andrew, Kingston, Dinthill, and Vere; such former secondary highs as Munro, Priory, and Hampton; and such former comprehensive highs as St. Anne's and Haile Selassie. Those at the bottom, all former comprehensive high schools, include such schools as Maldon, Kellits, Grange Hill and Greater Portmore. (The estimated spending figure for the last of these, below J$19,000 per pupil, seems implausibly low, however, and may reflect some sort of data aberration.)

Unlike the range-ratio statistics, which are influenced only by amounts spent at the extremes of the expenditure distribution, the standard deviation and coefficient of variation take the per-pupil outlays of all schools into account. The value of the coefficient of variation shown in Table 2—0.22 both with and without cost sharing—indicates that roughly two-thirds (68 percent, assuming a normal distribution) of all schools have per pupil outlays in the range from 22 percent below to 22 percent above the mean. This corresponds to a range of variation in spending (cost sharing included) from about J$26,000 to J$41,000 per pupil per year.

A different perspective on expenditure variations is obtained by ranking high schools in order of decreasing spending per pupil, dividing the list of schools into five groups (quintiles) containing equal numbers of schools, and then comparing the average amounts spent per pupil by the schools in each quintile. As shown in Table 2, the average per-pupil outlay of the schools making up the first (highest-spending) quintile is about 1.4 times as great as that of the schools in the third (middle) quintile, and about 1.7 times as great as that of the schools in the fifth (lowest-spending) quintile. By almost anyone's standard, these indicator values signify a substantial degree of inequality in per-pupil spending.

Finally, the extent to which per-pupil outlay varies among high schools is brought out, perhaps more effectively, by the distribution diagram in Figure 1. This diagram shows the number of high schools whose outlays fall into various spending-per-pupil brackets. The lowest bracket includes schools that spent less than J$21,000 per pupil in 2000-01, the highest is for schools that spent J$48,000 per pupil or more, and the intervening brackets correspond to J$3,000 increments in per-pupil outlay. As can be seen, 7 of the 149 schools spend less than J$24,000 and 31 spend less than J$27,000, while at the other end of the scale, 18 schools spend J$42,000 per pupil or more.

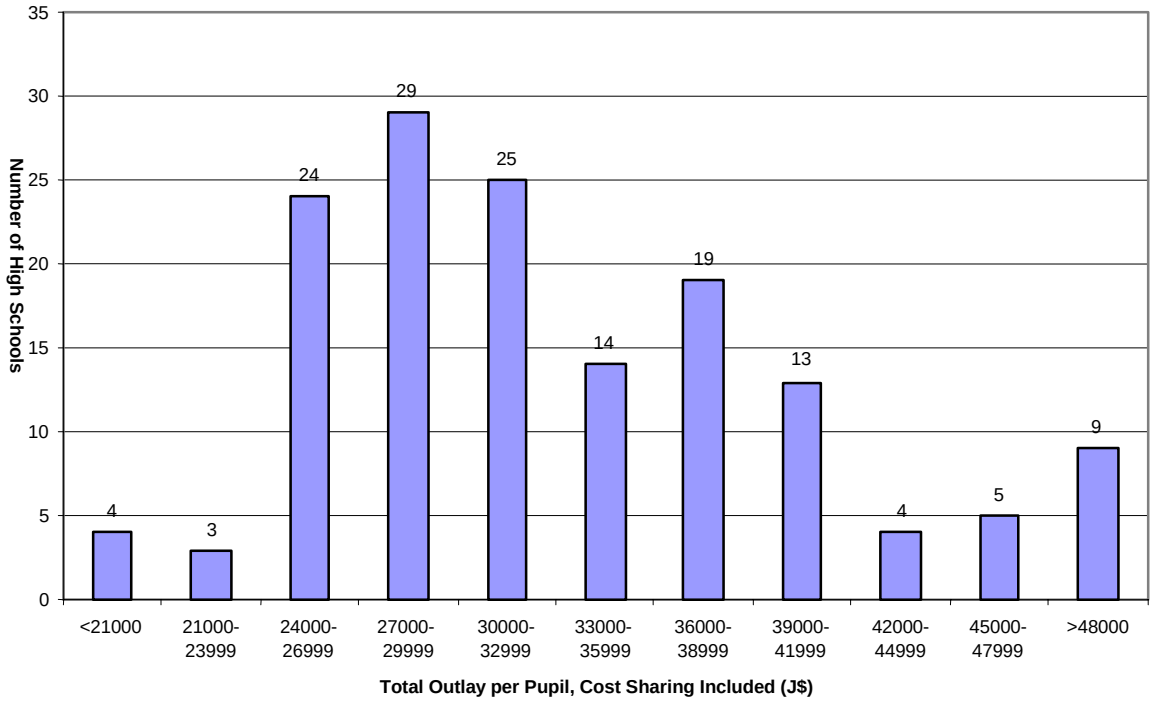
Table 2: Disparities in Outlay per Pupil among Jamaican High Schools, 2000-2001 (All High Schools Except Agricultural)

Indicator	Outlay Excluding Cost-Sharing Income (1)	Cost Sharing Income (Fees Total + Financial Assistance) (2)	Outlay Including Cost Sharing (3)
Average outlay per pupil			
Mean of individual school values	28788	4566	33353
Mean for school category as a whole	27826	4557	32383
Standard deviation	6456	1708	7354
Minimum	14776	1634	18719
5th percentile	21103	2511	24971
1st quartile (Q1)	24282	3241	27923
2nd quartile (median)	27565	4062	31903
3rd quartile (Q3)	31898	5844	37039
95th percentile	42480	7711	47760
Maximum	57814	10038	64870
Coefficient of variation	0.22	0.37	0.22
Ratio: maximum/minimum	3.91	6.15	3.47
Ratio: 95th percentile/5th percentile	2.01	3.07	1.91
Ratio: 3rd quartile/1st quartile	1.31	1.80	1.33
Average outlay per pupil by quintile			
Quintile 1 (highest)	37291	6691	43983
Quintile2	30885	5375	36260
Quintile 3 (middle)	27695	4304	31999
Quintile 4	24713	3755	28468
Quintile 5 (lowest)	21908	3353	25261
Ratios of quintile averages			
highest quintile/middle quintile	1.35	1.55	1.37
lowest quintile/middle quintile	0.79	0.78	0.79
highest quintile/lowest quintile	1.70	2.00	1.74

Tables 3 to 6 provide the same kinds of disparity statistics as Table 2, but for more narrowly defined categories of high schools. The indicators in Table 3 pertain to the 134 academic/general schools. Tables 4 and 5 cover, respectively, the 59 former secondary high schools and the 75 former comprehensive high schools. Table 6, which covers the 14 technical-vocational schools, presents the more limited set of statistics that the small size of that category allows.

Restricting the expenditure comparison to general/academic schools (Table 3) has some moderating effect on the disparity statistics. The ratio of the 95th to 5th percentile values of per-pupil outlay (excluding cost sharing) falls from 2.01 to 1.80; the coefficient of variation declines from .22 to .20. This modest reduction in the degree of interschool variation is due to the exclusion of some high-spending technical-vocational high schools. That the resulting decline in measured inequality is small reinforces the point that spending differences between different types of high schools—in this case, between the technical-vocational and the general/academic schools—account for only a minor fraction of Jamaica's interschool variation in spending.

Fig. 1. Disparities in Per-Pupil Outlay, Jamaica High Schools 2000-01
(All High Schools Except Agricultural)



Separate disparity statistics for the former secondary and former comprehensive high schools are shown in Tables 4 and 5, respectively. The coefficients of variation in per-pupil spending (exclusive of cost sharing) for the two categories are 0.15 and 0.22, respectively, as compared with the aforesaid figure of 0.20 for the two categories combined. The ratio of per-pupil spending in the highest-quintile schools to per-pupil spending in the lowest-quintile schools (cost sharing included) is 1.57 for the former secondary schools, 1.58 for the former comprehensive schools, and 1.66 for the combined groups (from Tables 4, 5, and 3, respectively). The small difference between the last of these figures and the first two further affirms that the spending difference between the two school categories is small compared with the within-category variations.

Clearly, it is not the mixing together of two historically distinct sets of schools—secondary (traditional) and comprehensive—that accounts for the observed degree of variation in spending within the full set of 134 schools.

Table 3: Disparities in Outlay per Pupil among Jamaican High Schools, 2000-2001
(All Former Secondary and Former Comprehensive High Schools)

Indicator	Outlay Excluding Cost-Sharing Income (1)	Cost Sharing Income (Fees + Financial Assistance) (2)	Total Outlay Including Cost Sharing (3)
Average outlay per pupil			
Mean of individual school values	28113	4497	32611
Mean for school category as a whole	27209	4500	31709
Standard deviation	5619	1734	6499
Minimum	14776	1634	18719
5th percentile	21056	2466	24659
1st quartile (Q1)	24082	3143	27702
2nd quartile (median)	27012	3955	31803
3rd quartile (Q3)	31337	5681	36552
95th percentile	37947	7819	45899
Maximum	49380	10038	52621
Coefficient of variation	0.20	0.39	0.20
Ratio: maximum/minimum	3.34	6.15	2.81
Ratio: 95th percentile/5th percentile	1.80	3.17	1.86
Ratio: Q3/Q1	1.30	1.81	1.32
Average outlay per pupil by quintile			
Quintile 1 (highest)	34930	6731	41662
Quintile2	30424	5193	35618
Quintile 3 (middle)	27156	4293	31449
Quintile 4	24441	3628	28069
Quintile 5 (lowest)	21706	3329	25035
Ratios of quintile averages			
highest quintile/middle quintile	1.29	1.57	1.32
lowest quintile/middle quintile	0.80	0.78	0.80
highest quintile/lowest quintile	1.61	2.02	1.66

Table 4: Disparities in Outlay per Pupil among Jamaican High Schools, 2000-2001 (Former Secondary High Schools)

Indicator	Outlay Excluding Cost-Sharing Income (1)	Cost Sharing Income (Fees + Financial Assistance) (2)	Total Outlay Including Cost Sharing (3)
Average outlay per pupil			
Mean of individual school values	29884	5838	35722
Mean for school category as a whole	29283	5698	34981
Standard deviation	4539	1671	5728
Minimum	21592	2279	25871
5th percentile	22892	3339	26623
1st quartile (Q1)	26364	4628	31885
2nd quartile (median)	30041	5867	35734
3rd quartile (Q3)	32863	6876	39137
95th percentile	37018	8444	45755
Maximum	42560	10038	50812
Coefficient of variation	0.15	0.29	0.16
Ratio: maximum/minimum	1.97	4.40	1.96
Ratio: 95th percentile/5th percentile	1.62	2.53	1.72
Ratio: Q3/Q1	1.25	1.49	1.23
Average outlay per pupil by quintile			
Quintile 1 (highest)	35149	7863	43012
Quintile2	31719	6590	38309
Quintile 3 (middle)	30103	5623	35726
Quintile 4	27190	5128	32317
Quintile 5 (lowest)	23638	3838	27476
Ratios of quintile averages			
highest quintile/middle quintile	1.17	1.40	1.20
lowest quintile/middle quintile	0.79	0.68	0.77
highest quintile/lowest quintile	1.49	2.05	1.57

Table 5: Disparities in Outlay per Pupil among Jamaican High Schools, 2000-2001
(Former Comprehensive High Schools)

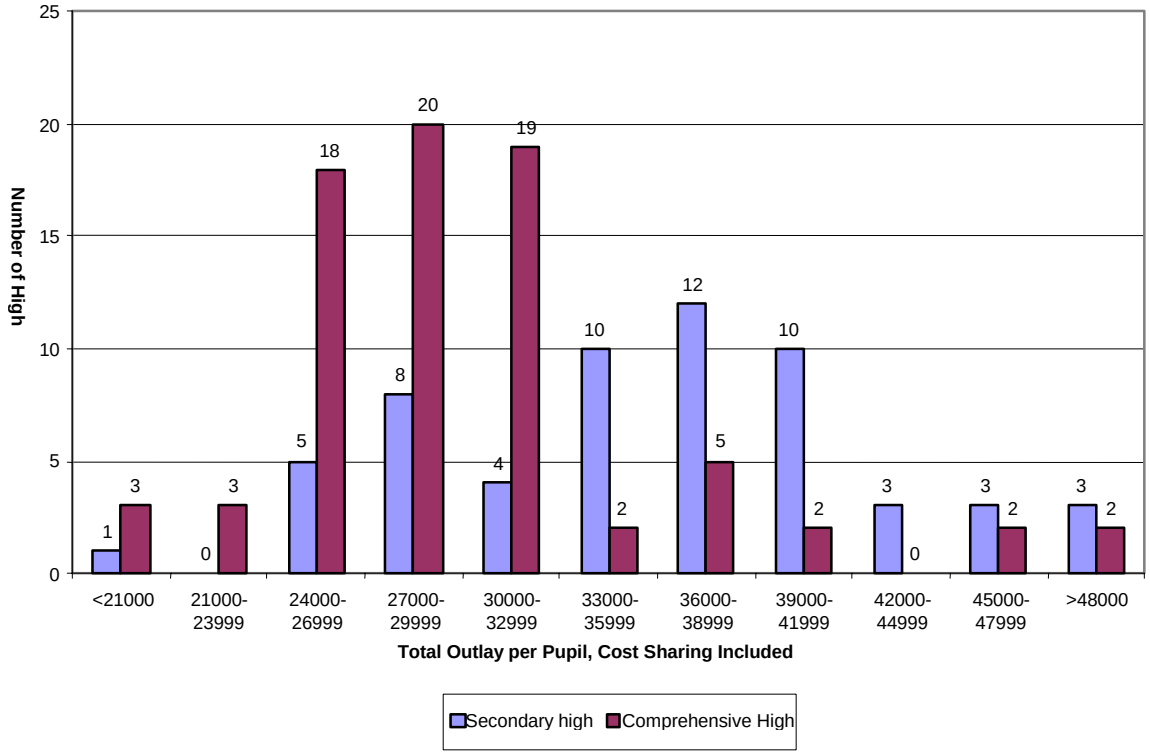
Indicator	Outlay Excluding Cost-Sharing Income (1)	Cost Sharing Income (Fees + Financial Assistance) (2)	Total Outlay Including Cost Sharing (3)
Average outlay per pupil			
Mean of individual school values	26720	3443	30163
Mean for school category as a whole	25453	3485	28939
Standard deviation	6011	812	6034
Minimum	14776	1634	18719
5th percentile	20598	2334	23627
1st quartile (Q1)	23271	2871	26192
2nd quartile (median)	25419	3288	28690
3rd quartile (Q3)	28817	3955	31999
95th percentile	39205	4610	42315
Maximum	49380	6284	52621
Coefficient of variation	0.22	0.24	0.20
Ratio: maximum/minimum	3.34	3.85	2.81
Ratio: 95th percentile/5th percentile	1.90	1.98	1.79
Ratio: Q3/Q1	1.24	1.38	1.22
Average outlay per pupil by quintile			
Quintile 1 (highest)	34441	3456	37897
Quintile2	27565	3972	31537
Quintile 3 (middle)	25210	3543	28753
Quintile 4	23546	3410	26956
Quintile 5 (lowest)	20867	3183	24050
Ratios of quintile averages			
highest quintile/middle quintile	1.37	0.98	1.32
lowest quintile/middle quintile	0.83	0.90	0.84
highest quintile/lowest quintile	1.65	1.09	1.58

Table 6: Disparities in Outlay per Pupil among Jamaican High Schools, 2000-2001 (Technical-Vocational High Schools)

Indicator	Outlay Excluding Cost-Sharing Income (1)	Cost Sharing Income (Fees + Financial Assistance) (2)	Total Outlay Including Cost Sharing (3)
Average outlay per pupil			
Mean of individual school values	35243	5221	40464
Mean for school category as a whole	33962	5125	39087
Standard deviation	9939	1307	10919
Minimum	22282	3334	25978
5th percentile	25000	3569	28461
1st quartile (Q1)	27541	4304	32493
2nd quartile (median)	32101	4880	37098
3rd quartile (Q3)	41146	6393	47821
95th percentile	51897	7124	58241
Maximum	57814	7251	64870
Coefficient of variation	0.28	0.25	0.27
Ratio: maximum/minimum	2.59	2.18	2.50
Ratio: 95th percentile/5th percentile	2.08	2.00	2.05
Ratio: Q3/Q1	1.49	1.49	1.47
(Too few observations to show quintile averages for these schools)			

The foregoing finding does not imply, however, that the distribution of spending per pupil is the same for the former secondary highs as for the former comprehensive highs. As can be seen from Figure 2, the two distributions occupy different positions on the spending-per-pupil scale. Most of the former comprehensive highs (57 out of 75) are clustered in the J$24,000 to J$33,000 spending brackets, with only a few in the higher expenditure brackets. In comparison, the largest concentration of former secondary highs (34 out of 59) is in the J$33,000 to J$42,000 brackets, although a significant subgroup of secondary highs (18 schools) spends less. What the foregoing disparity statistics indicate, and the diagram demonstrates, is that the schools in each group (and in the larger combined group) are dispersed to more or less the same degree around their respective group averages.

Fig. 2. Disparities in Per-Pupil Outlay, Jamaica High Schools 2000-01
(Former Secondary High Schools and Comprehensive High Schools)



The disparity statistics for technical-vocational high schools, in Table 6, indicate that there is at least as much financial inequality among the 14 schools making up this small group as among schools in the much larger academic/general group. Although the technical-vocational group as a whole spends more, on average, than other Jamaican high schools, some technical-vocational schools are not high-spending at all. The per-pupil outlay of one such school, Marcus Garvey, is low enough to place it in the bottom quintile of all high schools, and the per-pupil outlays of three others, Knockalva, St. Mary, and St. Thomas, fall below the all-school average.

Although the cost-sharing scheme generates only about 14 percent of all funds for high schools, the distribution of that 14 percent is of particular interest because of the linkage between cost-sharing income and expenditures for nonstaff resources. High schools are expected, except in special circumstances, to pay for all their instructional materials and equipment, textbooks, utilities, and minor building maintenance with funds derived from the two forms of cost-sharing income, tuition fees and financial assistance payments. The distribution of that income has a very strong influence on the manner in which nonstaff resources are apportioned among schools.

Tables 1 to 6 all include disparity statistics pertaining specifically to cost-sharing income. What these tables show, generally speaking, is that cost-sharing funds are distributed more unequally than other school funds. Table 1 shows sharp differences in cost-sharing income per pupil between certain categories of schools. The former secondary high schools and the technical-vocational high schools collect 64 percent and 47 percent more cost sharing money per pupil, respectively, than the former comprehensive high schools. High schools in the Kingston region collect anywhere from 18 percent to 54 percent more than schools in other individual regions. Looking at the disparity statistics for all 148 high schools in Table 2, both the coefficient of variation and the 95th-to-5th percentile ratio are more than one and one-half times greater for cost-sharing income than for other school funds. When only the academic/general high schools are considered (Table 3), the difference in degree of inequality is even more striking: the coefficient of variation in cost-sharing income per pupil, 0.39, is nearly twice as great as that for the main body of school spending. The statistics for the former secondary high schools (Table 4) also show much more inequality in cost-sharing funds than in other school funds. There are two deviations from this pattern, however: Interschool variations in cost-sharing income among the former comprehensive high schools (Table 5) are only slightly greater than variations in other funding, and variations in cost sharing receipts among the technical-vocational schools (Table 6) are slightly smaller than the variations in other school spending.

The differences in distributions of cost-sharing income between the former secondary and former comprehensive highs are of particular interest. Figure 3 shows that the two distributions overlap to only a limited degree. Most former comprehensive highs receive J$2500 to J$5000 per pupil in cost-sharing income; only 3 out of 75 receive more than the latter amount. But most former secondary high schools (42 out of 59) receive J$5000 or more in cost-sharing funds per pupil; only 11 receive J$4000 per pupil or less. This is why we see much greater variability in cost-sharing income per pupil among all academic/general schools (Table 3) than among schools within the separate former secondary and former comprehensive groups (Tables 4 and 5).

Disparities in Real Resources

The educational consequences of spending disparities depend not on numbers of dollars per se but rather on the real resources that different numbers of dollars buy. As the number of dollars per pupil increases, schools can use the incremental funds (1) to employ more teachers—that is, to offer a lower pupil/teacher ratio, (2) to employ teachers with higher qualifications—which, in the Jamaican context, means teachers who are university graduates or, better, trained university graduates, (3) to employ more experienced teachers, (4) to employ more nonteaching (administrative and ancillary) personnel per pupil, or (5) to purchase more nonstaff resources—instructional materials, equipment, etc.—per pupil. To appreciate the implications of fiscal inequality, therefore, we need to consider interschool variations in resources as well as in dollars, and then to see how the two are related.

Fig. 3. Disparities in Cost-Sharing Income among Jamaica High Schools 2000-01
(Former Comprehensive High Schools and Former Secondary High

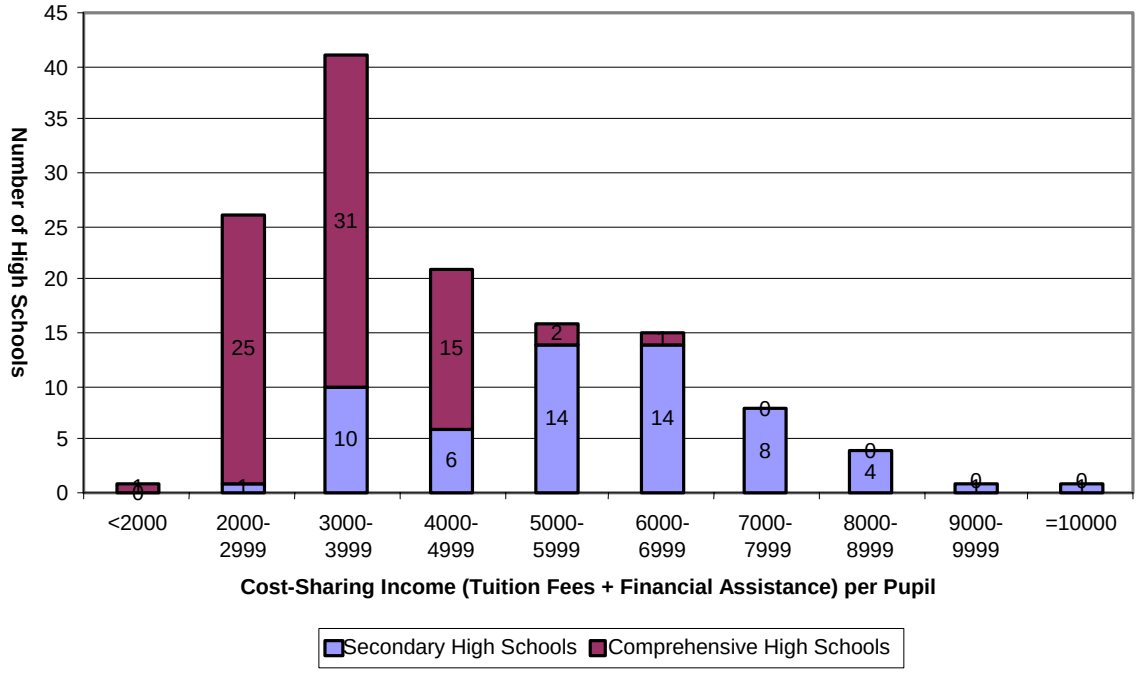


Table 7 presents some basic statistics on the resource disparities. The measures shown, calculated from data for the 148 nonagricultural high schools, are essentially the same as those used above to characterize variations in spending. Except for the average values for the set of schools as a whole, these are all unweighted measures, which means that all schools count equally, regardless of how many pupils each school enrolls.

One can say, very roughly, that the degree of variation in the pupil-teacher ratio among schools is about 70 to 80 percent as great as the variation in spending per pupil. For instance, the coefficient of variation in the pupil/teacher ratio is .15, as compared with a coefficient of variation in spending per pupil of .22 (from Table 2); likewise, the ratio of the 95th to 5th values of the pupil/teacher ratio is 1.7, as compared with a ratio of the 95th to 5th percentiles of spending of around 2.0. In absolute terms, 90 percent of all schools have ratios between 14 and 24 pupils per teacher.

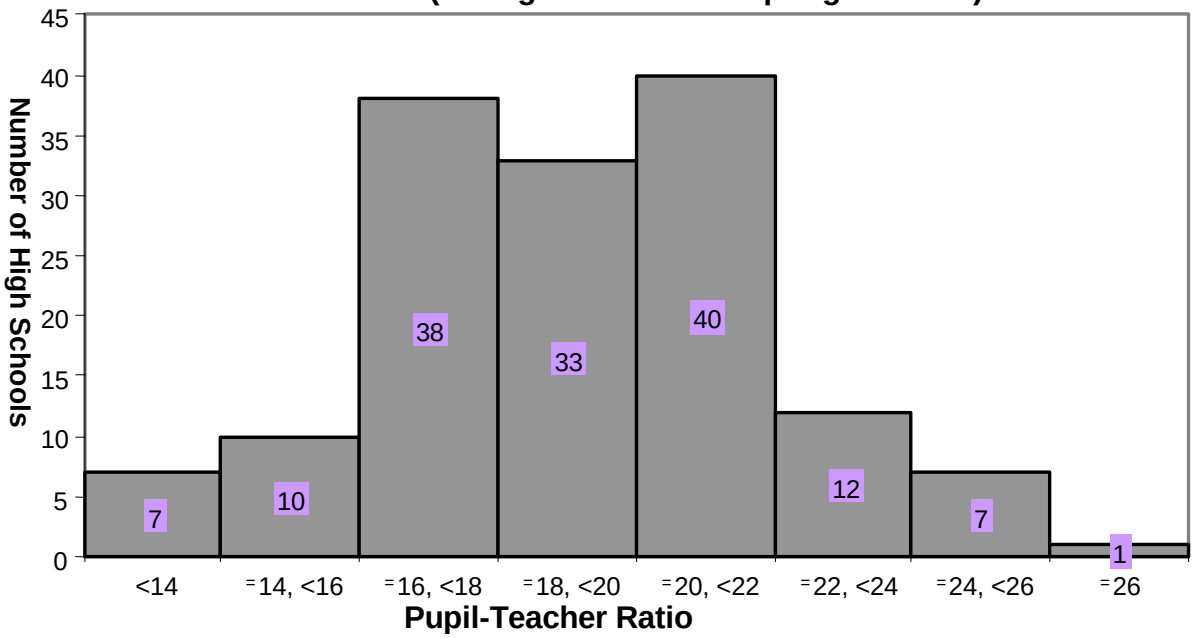
Table 7: Disparities in Resource Measures among Jamaican High Schools, 2000-01 (All High Schools Except Agricultural)

Indicators	Teachers per 1000 Pupils	Pupil/ Teacher Ratio	Percent University Graduates	Percent Trained University Graduates	Average Teacher Experience (Years)	Admin + Ancillary Staff per 1000 Pupils
Mean for category as a whole	53.2	18.8	31.6	23.8	--	20.7
Mean of individual school values	53.6	19.1	29.7	22.5	13.7	23.6
Standard deviation	9.0	2.9	16.9	12.5	2.4	12.9
Minimum	33.6	11.1	0.0	0.0	7.0	6.8
5th percentile	42.0	14.1	9.2	6.5	10.3	11.1
1st quartile	47.1	17.1	17.1	12.5	12.0	16.0
Median	52.2	19.2	25.7	19.7	13.0	20.1
3rd quartile	58.3	21.2	39.5	30.3	15.0	26.6
95th percentile	70.7	23.8	62.3	41.9	18.0	50.9
Maximum	90.2	29.7	78.9	63.4	23.0	89.5
Coefficient of variation	0.17	0.15	0.57	0.56	0.18	0.55
Ratio: maximum/minimum	2.68	2.68	a	a	3.29	13.12
Ratio: 95th percentile/5th percentile	1.68	1.68	6.75	6.40	1.75	4.60
Ratio: 3rd quartile/1st quartile	1.24	1.24	2.31	2.43	1.25	1.66
Means by type of school						
Former secondary highs	54.7	18.6	42.0	29.9	12.8	23.1
Former comprehensive highs	51.3	19.9	20.9	17.1	14.3	22.6
Technical-vocational highs	60.8	17.2	25.6	19.7	13.1	30.3

The last three rows of Table 7 show the mean values of the teacher/pupil and pupil/teacher ratios (and other resource variables) for the three main categories of schools—former secondary highs, former comprehensive highs, and technical-vocational highs. The difference in means between the first two categories seems surprisingly small: The former secondary highs have only about a 7 percent higher ratio of teachers to pupils than the former comprehensive highs. Technical-vocational schools have a higher mean staffing ratio than the academic/general schools, but still only 11 percent above that of the former secondary schools. Clearly, the variations in teacher/pupil ratio within the former secondary and former comprehensive categories are considerably larger than the intercategory difference.

Another perspective on the variation in pupil/teacher ratio is provided by the distribution diagram in Figure 4. This diagram shows that while most schools (111 out of 148) have pupil/teacher ratios between 16 and 22, 17 schools have ratios of less than 16, while another 20 schools have ratios of 22 or more.

Figure 4: Variations in Pupil-Teacher Ratio among Jamaican High Schools (All High Schools Except Agricultural)



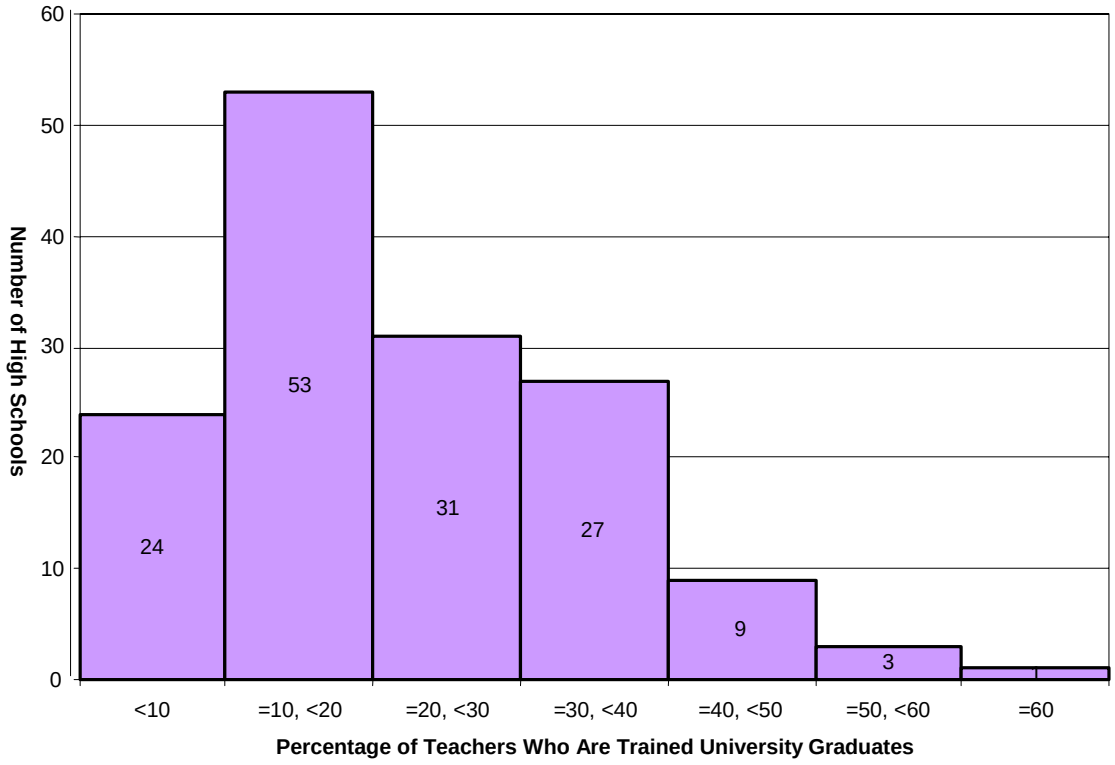
Turning from teacher quantity to teacher attributes presumably related to quality, Table 7 shows that the percentage of a school's teaching force made up of university graduates—and, more particularly, trained university graduates—is highly variable. The range of variation as measured by the 95th-to-5th percentile ratio is over 6 to 1 for both variables (the ratio of the maximum to the minimum cannot be calculated because one school, Maldon High, is reported as having zero graduate teachers). The high coefficients of variation, .56 and .57, or more than two and one-half times the corresponding coefficient for per-pupil spending, confirm that these teacher qualifications are very unevenly distributed. The percentages of university-educated teachers reported by some schools are in the single digits, while several schools claim percentages of 60 or more.

Here, the differences between types of high schools are significant. The percentage of university graduates in the teaching forces of the former secondary highs is twice as great, on average, as in the former comprehensive highs (42 percent, as compared with 21 percent), and the percentage of trained university graduates is 75 percent greater (30 percent, as compared with 17 percent). The technical-vocational schools also have higher percentages of such teachers than the former comprehensive schools (22 percent and 15 percent higher, respectively).

Figure 5 provides a fuller picture of variations in the percentage of teachers who are trained university graduates. It shows that the percentage is below 10 for 24 of the 148 high schools and below 20 for another 53 high schools, but greater than 40 for 13 high schools and

between 30 and 40 for another 27 schools. In sum, there is much greater unevenness in the distribution of highly qualified teachers—those with graduate degrees and graduate degrees plus training—than in either the distribution of teachers in general (pupil/teacher ratio) or the distribution of education funds.

Figure 5: Variations among High Schools in the Percentage of Teachers Who Are Trained University Graduates
(All High Schools except Agricultural)



The teacher experience measure represented in Table 7 requires explanation because it is not quite what the label might lead one to expect. No measure of experience, as such, is provided by the annual School Census. Such a variable would indicate, ideally, the number of years each teacher in a school has actually been engaged in teaching or, barring that, the years of experience credited for purposes of salary determination. But such a measure is not provided by the Census. The data item that comes closest is the year in which an individual was first "appointed to education service." The differences between 2001 and that year, averaged over all the teachers in a school, provides the rough proxy for teacher experience that has been used in this analysis. It is far from an ideal measure, as it does not take into account such things as periods not employed in teaching or periods performing functions other than teaching following the year of first appoint-

ment. Nevertheless, it was the best experience-related measure that could be identified in the available datasets.

The experience proxy exhibits slightly greater variability among schools than does the teacher/pupil ratio: a coefficient of variation of 0.18 and a 95th-to-5th percentile range of 1.75. The differences in this variable between types of high schools are not great. Still, it is interesting to observe that the former comprehensive highs have more senior teachers, on average, than the generally higher-spending former secondary highs (14.3 and 12.8 years since first appointment, respectively). It would be unwise to put too much stock in this result, however, given the measurement problems.

Finally, another surprising finding of this examination of resource disparities is that there is considerably greater inequality in the interschool distribution of nonteaching staff than in the distribution of teachers. As shown in Table 7, the coefficient of variation in nonteaching (administrative and ancillary) staff per 1000 pupils is 0.55, as compared with a value of only 0.17 for the corresponding teacher statistic. The 95th-to-5th percentile ratio is 4.6 for nonteaching staff but only 1.7 for teaching staff. These are very difficult results to explain, considering that nonteaching staff nominally are financed with subventions specifically designated for that purpose and supposedly allocated on a quasi-formula basis. Some of the administrative-ancillary staff figures reported by individual schools seem inordinately high, relative to the averages for the pertinent school categories. This is an area in which further investigation is needed to make sense of the results.

Relationships between Resources and Funding

The final question addressed here is how the variations in resource variables relate to the previously discussed variations in per-pupil spending. Two ways to examine these relationships are, first, to look at correlations between the resource variables and spending per pupil, and second, to compare values of the resource variables between higher-spending and lower-spending groups of schools.

Table 8 presents the coefficients of correlation between each of five resource variables (generally the same variables as appear in Table 7) and each of two expenditure variables, per-pupil outlay exclusive of cost sharing and per-pupil outlay including cost sharing. The two staffing ratios, teachers per 1000 pupil and administrative and ancillary staff per 1000 pupils, show moderate correlations with per-pupil spending—coefficients of 0.62 to 0.68. The two teacher qualification variables, percent university graduates and percent trained university graduates, show positive but weaker correlations, with coefficients in the range 0.37 to 0.50. The proxy variable for teacher experience, however, shows essentially zero correlation with spending. Further inquiry would be needed to determine whether this result reflects reality—that there is no tendency for schools with more experienced staffs to spend more per pupil, the experience factor in teacher salary scales notwithstanding—or whether it merely reflects the shortcomings of the proxy measure.

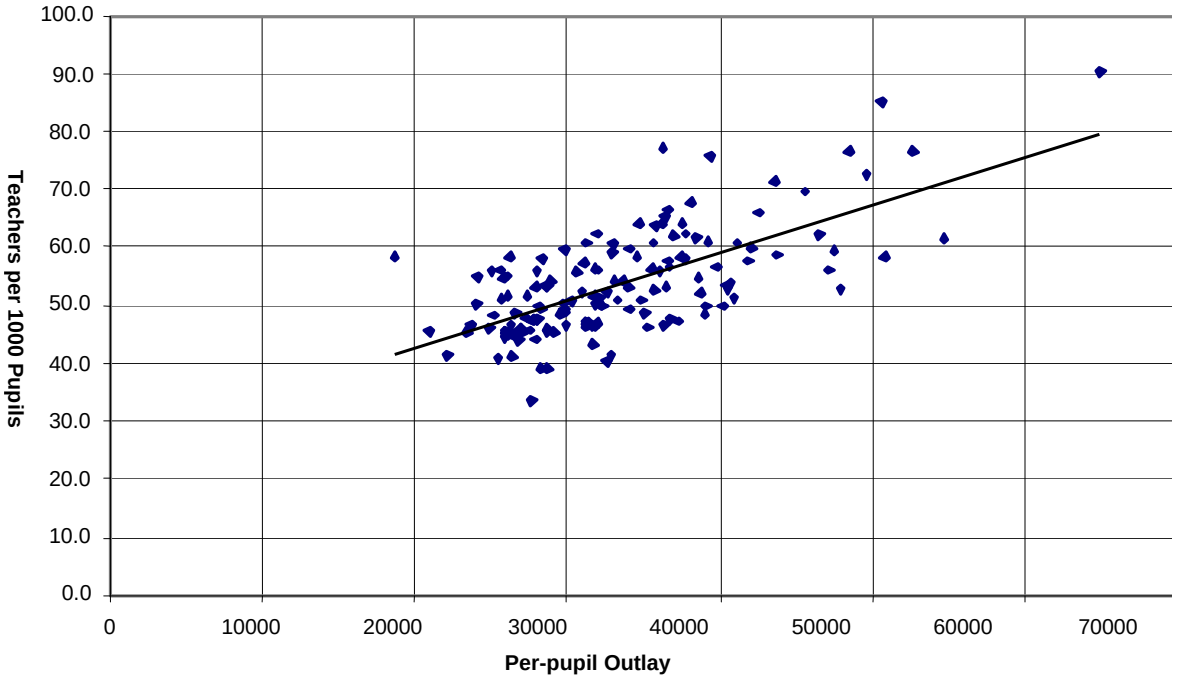
Table 8 Coefficients of Correlation between Resource Variables and Per-Pupil Outlay (All High Schools Except Agricultural)					
	Resource Variables				
Expenditure Variable	Teachers Per 1000 Pupils	Percent University Graduates	Percent Trained University Graduates	Average Years of Experience	Administrative and Ancillary Staff Per 1000 Pupils
Per-pupil outlay excluding cost sharing	0.68	0.41	0.37	0.09	0.66
Per-pupil outlay including cost sharing	0.68	0.50	0.45	0.01	0.62

The relationship between a school's teacher staffing ratio (teachers per 1000 pupils) and its level of funding is further illuminated by the scatter diagram in Figure 6. The diagram shows both the general positive relationship between the two variables, indicated by the upward-sloping fitted line, and the considerable variability of the staffing ratio among schools with similar levels of funding per pupil.

Additional information about the form of the relationship between spending and resource variables is conveyed by the following set of bar charts (Figures 7 to 10). Each of these charts groups schools by expenditure quintiles; that is, the farthest-left bar in each diagram represents the highest-spending one-fifth of schools (quintile 1), the bar next to it represents the second highest-spending one-fifth (quintile 2), and so forth. The bar heights indicate the average value of the resource variable in question for all high schools in each quintile group. Thus, for example, we can see from Fig. 7 that the highest-spending quintile of schools has an average teacher staffing ratio of 62.0 teachers per 1000 pupils (which corresponds to a pupil/teacher ratio of 16.1, while the lowest-spending quintile has an average ratio of 48.3 teachers per 1000 pupils, corresponding to a pupil/teacher ratio of 20.7.

Similarly, Figures 8 and 9 show the percentages of university-graduate and trained-university-graduate teachers employed, on average, by the schools in each expenditure quintile. What is most notable about these charts is the marked difference between the highest-spending 40 percent of schools (quintiles 1 and 2 combined) and the lowest-spending 60 percent (quintiles 3, 4, and 5). As shown in Fig. 8, the average percentage of university-graduate teachers is about 43 percent for schools in the former group, as compared with only around 20 percent for those in the latter group. Likewise, the average percentage of trained university-graduate teachers is (from Fig. 9) around a little over 30 percent for the former group but only around 17 percent for the latter. The information about the shape of the distribution that the diagrams convey—namely, that there is a dichotomy between the higher-spending 40 percent and the lower-spending 60 percent of schools—is not something that would be apparent from the standard disparity statistics.

Figure 6: Relationship between Per-Pupil Outlay and Teacher/Pupil Ratio (All High Schools Except Agricultural)



In the case of administrative and ancillary staff (Fig. 10), there is a sharp difference between the highest-spending quintile of schools and all the others, plus a further drop between quintiles 3 and 4. The average number of reported administrative and ancillary staff members per 1000 pupils is 34.8 for quintile but less than 25.0 for all other quintiles, and only 15.6 for quintile 5. It is possible that the pattern depicted in Fig. 10 is an artifact of data anomalies, but further investigation is needed to determine whether this is so.

One set of data that would facilitate a more thorough analysis of the relationship between spending and resources currently is not available—namely, data on the average compensation (salary plus allowances) of the teachers employed in each school. With that information, it would be possible to determine more definitively the extent to which differences in per-pupil outlay translate into differences in teacher/pupil ratios, as opposed to differences in teacher attributes. Although information on particular teacher qualifications (such as the percentage of graduate teachers) is helpful in this regard, it does not yield as clear or complete a picture as data on salary variations would make possible. As a start, the data MOEYC now uses to calculate direct salary payments to individual teachers could be used to compute the average salary of teachers in each partially bursar-paid school. The relationship between average salary amounts and per-pupil spending could then be analyzed for that set of schools. Whether the data are in hand to do the same for teachers in the fully bursar-paid schools needs to be investigated.

Figure 7: Teacher/Pupil Ratio in Relation to Outlay Per Pupil

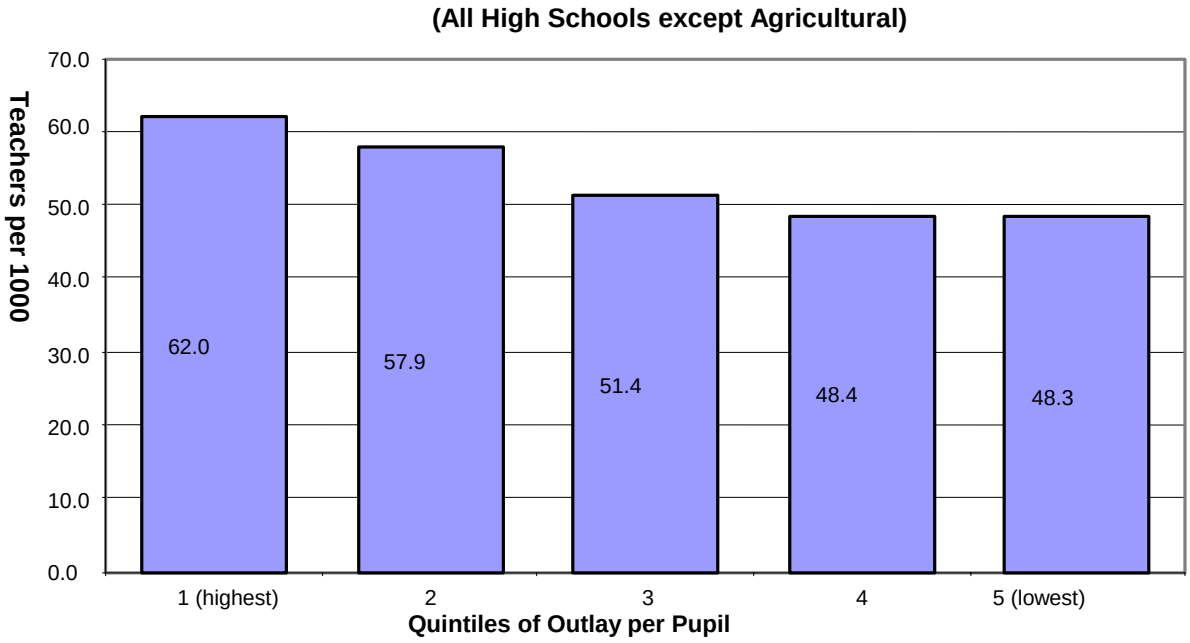


Figure 8: Percentage of Graduate Teachers in Relation to Outlay per Pupil

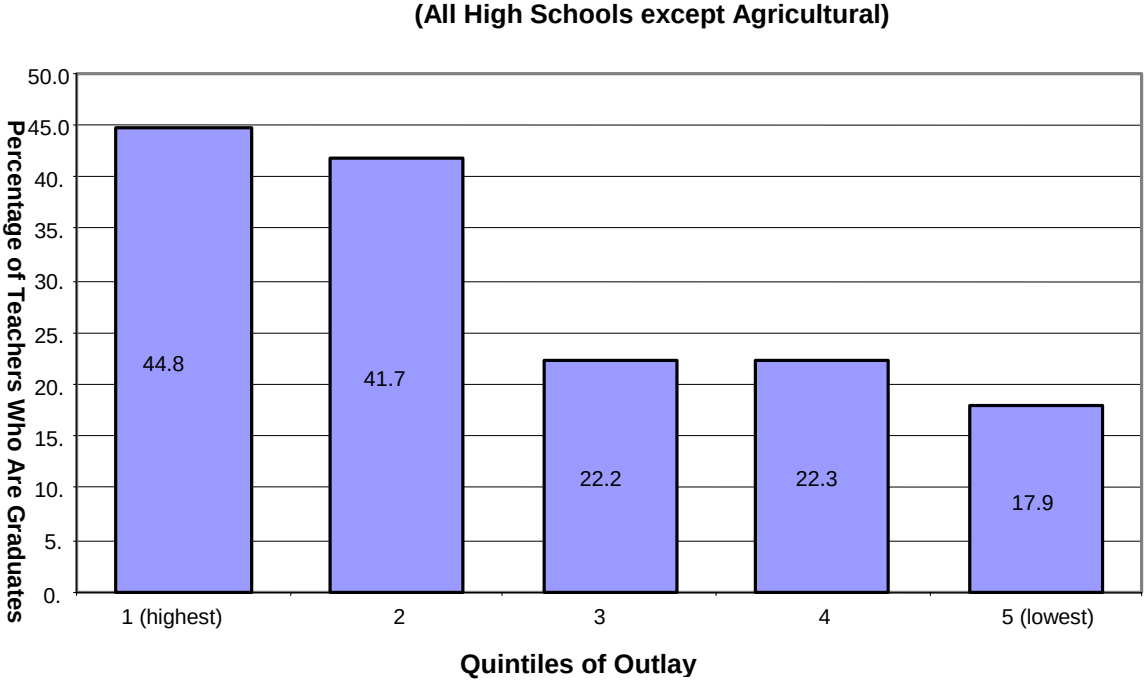


Figure 9: Percentage of Trained Graduate Teachers in Relation to Outlay per Pupil

(All High Schools except Agricultural)

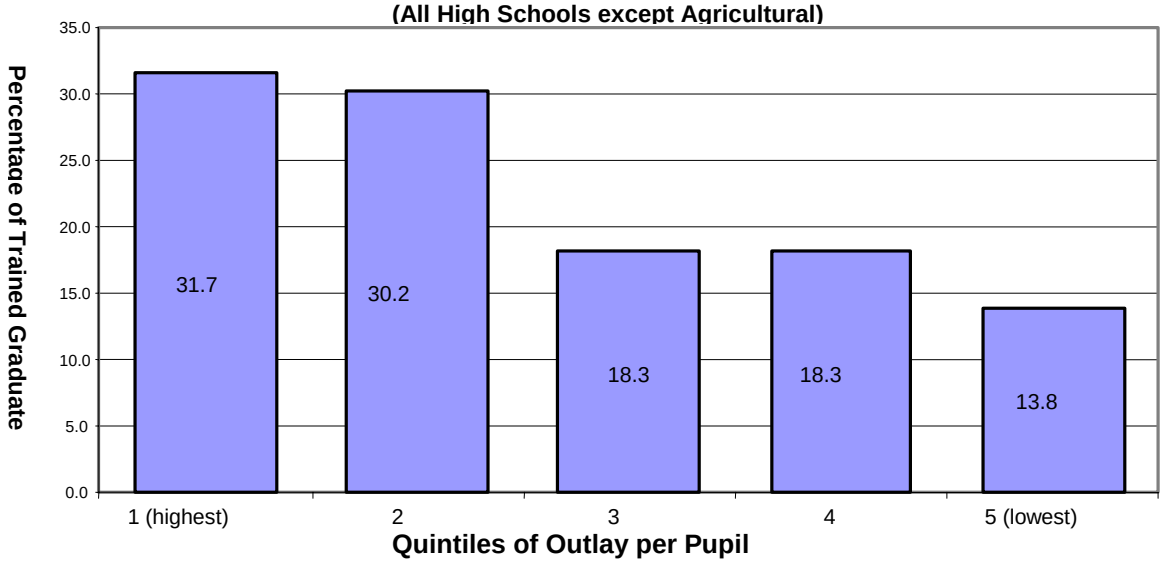
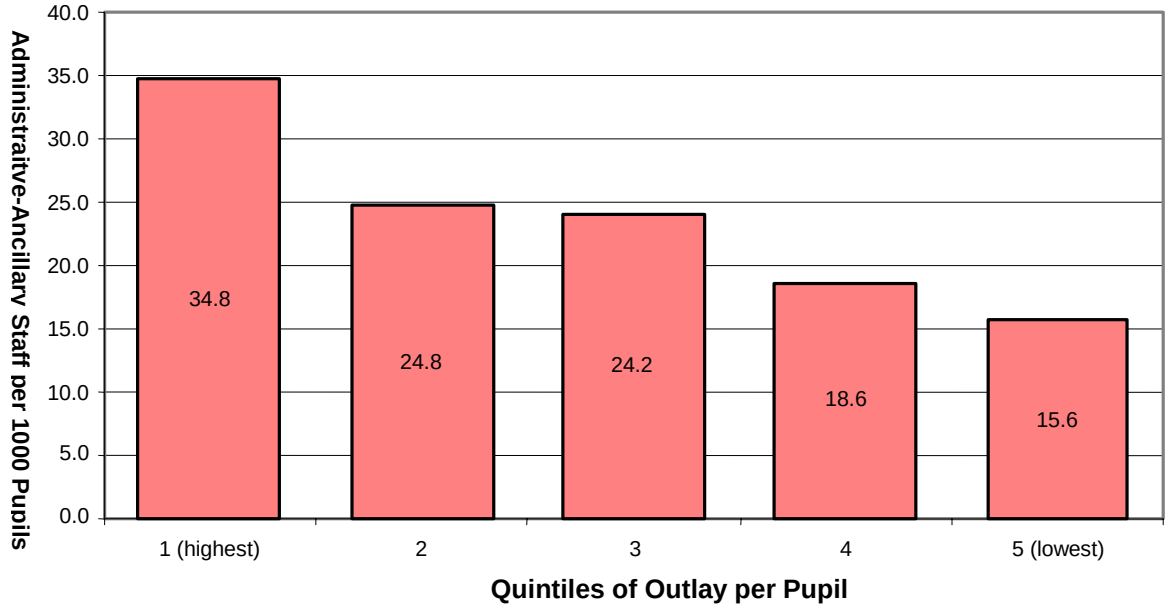


Figure 10: Administrative-Ancillary Staff/Pupil Ratio in Relation to Outlay per Pupil

(All High Schools except Agricultural)



Main Findings

The general findings of this exercise are that, first, the amount of money spent per pupil varies widely among Jamaica's high schools; second, differences between broad categories of high schools—in particular, the former secondary highs, former comprehensive highs, and technical-vocational highs—are not nearly as important as variations among individual schools; third, variations in such real-resource measures as the pupil/teacher ratio and the percentage of trained graduate teachers also are substantial; and fourth, there is a clear relationship between the variations in resources and the variations in funding. More specifically, during the 2000-01 financial year,

- The range of variation in per-pupil spending among Jamaica's high schools, even setting aside the top 5 percent and bottom 5 percent of schools, was more than 2 to 1. Some high schools spent just over J$20,000 per pupil in 2000-01; others were able to spend J$50,000 per pupil or more.
- The difference in per-pupil spending between the average former-secondary high school and the average former-comprehensive high school was only a fraction as large (one-third to one-fourth, depending on whether cost sharing is included) as the difference in per-pupil spending between the top quintile and the bottom quintile of the high schools within either group. In other words, there is several times more variability in spending among the schools within each category than there is between the different types of high schools.
- Spending per pupil was about 33 percent higher in small schools (under 800 pupils) than in large schools (over 2000 pupils); about 26 percent higher in the Kingston region than in the rest of the country; and about 11 percent less for rural than for urban schools.
- Disparities in cost-sharing income per pupil were more than 50 percent greater, in relative terms, than disparities in other school funds. Thus, it is clear that the cost-sharing scheme makes a disproportionately large contribution (relative to its share of total funding) to spending disparities among Jamaica's high schools.
- Interschool variations in the teacher/pupil ratio were about 70 to 80 percent as great as, and moderately correlated with, variations in per-pupil spending. The difference in the teacher/pupil ratio between former secondary and former comprehensive highs was a surprisingly small 7 percent.
- The percentages of a school's teacher who are graduates and trained graduates are highly variable among schools—about 2.5 times as variable, in fact, as per-pupil spending. The percentages of such teachers in school teaching forces are 100 percent greater and 75 percent greater, respectively, in former secondary than in former comprehensive high schools.
- Both the teacher/pupil and administrative staff/pupil ratios were moderately correlated with spending per pupil; the percentages of graduate and trained graduate teachers were less strongly, but still significantly, correlated (in a relationship that appears to be nonlinear); and teacher experience, represented by a crude proxy, was not correlated at all.

These findings, together with the many additional findings presented earlier, provide a base of comparison for assessing proposed changes in Jamaica's system for distributing funds and resources to schools. Whether and to what degree a proposed alternative promises to reduce the disparities documented here is—or should be—a major criterion for judging what consideration that alternative deserves.

III. Alternative Allocation Formulas: Conceptual Framework

This section of the report deals at the conceptual level with a variety of formula-based approaches to fund distribution that might be considered for use in Jamaica. It reviews pertinent formula designs and formula factors and considers how they might be applied in, or adapted to, Jamaican circumstances. The topics addressed range from general principles of school finance, such as fiscal equalization and adjustment for variations in educational needs, to specific operational questions concerning data availability, measurement, and calculation methods. Selected formulas from among those discussed here are demonstrated empirically in Section IV.

Many of the ideas laid out below derive from approaches used or considered in other countries, especially the three major English-speaking countries, the United States, Canada, and the United Kingdom. The methods and formulas used in these countries seem to offer some useful models of potential solutions—or at least elements of solutions—for Jamaica. The Jamaican secondary education system has several distinctive features, however, that preclude easy replication of fund distribution methods used elsewhere. As noted in Section II, one very important special feature is that the individual school, not some larger entity like a school district, municipality, or regional authority, is the relevant fund-receiving unit and the employer of teachers and other staff. Another is that Jamaica has a cost-sharing scheme, under which a portion of the funding of each high school is derived from tuition fees. Consequently, any formulas based on foreign prototypes would have to be adapted to reflect these and under Jamaican realities.

As already explained, although the policy option of distributing funds to individual schools by formula is relevant, in principle, to all schools and grade levels, the present report covers only the financing of Jamaica's public high schools. Most of what is said in this section is applicable, however, to the financing of schools in general, without regard to grade level. For instance, such concepts as differential weighting of pupils, adjustments for differences in educational needs, and allowances for geographical cost differentials would be just as relevant to the primary and even preprimary level as to the high schools. (Of course, certain issues, such as the treatment of cost sharing and the question of academic-versus-vocational cost differences are specific to the high school level.) Therefore, should there be interest in the future in examining funding formulas that cover Jamaican primary as well as secondary education, the following exposition should provide an adequate foundation, with relatively minor additions or amendments, for the broadened inquiry.

The allocation mechanisms considered here would depart sharply from Jamaica's current method of financing high school education, first, by distributing funds—not staff positions or

other physical resources—to the schools, and second, by distributing the funds according to mathematical formulas, not at the Ministry's discretion. The allocation of funds under each such formula would be based on the number of pupils in a school, plus other arguably relevant factors. Although the class of formulas fitting this description is large, it is not all-encompassing. It excludes at least the following two formula types:

- Formulas that determine the number of staff positions but not the level of funding for each school, allowing the makeup of each school's staff, and hence the average compensation per staff member—and consequently outlay per pupil—to vary as it does under the existing system. Such options are not discussed here because they offer only modest potential gains in fiscal equity.
- Formulas that allocate funds among geographical units or units of subnational government (parishes, localities) rather than to individual schools. Such formulas could become policy-relevant in the future (discussions of decentralization of education responsibilities to the parish level apparently have taken place) but are not compatible with Jamaica's current system of education governance.

The organizing principle of this section is to progress from simpler to more complex funding formulas. The discussion begins with the simplest possible formula, one that would give a uniform flat grant per pupil to every high school. A quick review of the shortcomings of a simple flat grant highlights the main additional factors that, arguably, need to be taken into account to produce a rational and equitable distribution of funds. These include variations in educational needs, costs of educational services, the capacity to raise income from tuition fees, and—as some would argue—the makeup of the existing teaching staff. A separate subsection is devoted to each of these factors and its implications for formula design.

The Simplest Option: A Uniform Flat Grant Per Pupil

The simplest formula-based method of allocating funds to schools would be to give every high school in Jamaica the same fixed allotment of funds per student—say, for example, a uniform J$35,000 per pupil per year. Clearly, this would not be an acceptable option or one that would seriously be proposed. It would have the virtue of simplicity, and perhaps a surface appearance of equity, but would neglect multiple good reasons for intentionally allocating more money per pupil to some schools than to others. Nevertheless, a simple flat grant provides a useful starting point and standard of reference for considering other options. In particular, it immediately raises the issue, critical to all the options considered here, of how the number of pupils in a school should be counted, and it provides the natural springboard for considering what relevant factors would be omitted if allocations were based exclusively on pupil counts.

How Should Pupils Be Counted?

The notion of giving each school a uniform grant per pupil raises an issue relevant to almost any proposed funding formula: How should the number of pupils in a school be counted? The main alternatives available to Jamaica seem to be to distribute funds according to the number of pupils enrolled, according to the number actually attending school, or perhaps according to some combination of the two. Enrollment data for each school are available from the Annual School Census, which MOEYC conducts on a specified day in October of each year. That these enrollment figures normally are not updated during the year seems to rule out any sort of average enrollment indicator.[5] Schools do report attendance regularly, however, which means that average daily attendance (ADA) can be calculated, either for a whole school year or some specified shorter period, and used as a formula factor.

Allocations based on attendance would differ considerably from allocations based on enrollment. According to *Jamaica School Profiles, 2000-2001*, the reported high school attendance rate (attendance as a percentage of enrollment) averages about 86 percent but ranges from less than 70 percent in some schools to as high as the 90 to 95 percent in others. It follows that the pupil counts, and hence the fund allocations, of some individual schools could be as much as 10 percent higher, while those of other schools could be as much as 20 percent lower, under an attendance-based formula than under an otherwise similar enrollment-based formula.

An argument favoring the attendance variable is that attendance is, in some respects, a better measure than enrollment of the actual workload of a school; that is, teachers may have to instruct, on an average day, only, say, 85 percent as many pupils as are registered at a school. Further, it is said that linking funding to attendance should create an incentive for school officials to try hard to boost the attendance rate. But a counter-argument is that a low attendance rate may be symptomatic of serious educational problems facing a school, making it inappropriate to penalize a school financially for its low attendance. A possible compromise would be to use a composite of enrollment and attendance—perhaps some sort of average (not necessarily equally weighted) of the two variables

An important practical issue concerns the lag between the time pupils are counted and the financial year for which funds are to be allocated. Enrollment figures from Jamaica's October school census are almost six months old by the April 1 beginning of the next financial year and almost 18 months old by the time that financial year ends. ADA figures for the school year ending before the start of the financial year in question would be even older; the lag would be from June or August of one year to April of the next year. But an advantage of ADA is that it can be calculated for any portion of a school year. For example, MOEYC could use ADA for the first four, or even the first six, months of a school year, September through December or February, to allocate funds for the financial year beginning the following April. This would substantially reduce the lag. Moreover, ADA figures could be updated during the year, and allocations to

[5] Some U.S. states base their fund allocations on an indicator called Average Daily Membership (ADM), which is essentially an average of the number of pupils officially enrolled at a school (or in a school district) on each day of the school year.

schools could be adjusted accordingly. Of course, enrollment numbers also could be generated more than once a year if the enrollment reporting system were suitably modified.

A related concern is that a formula-based approach could create an incentive for school officials to inflate their pupil counts. Basing funding on ADA could induce officials to overstate attendance or, at least, to define loosely what constitutes a pupil's presence at school. An enrollment-based formula also could stimulate over-reporting—for instance, counting pupils who have departed or dropped out. Clearly, monitoring the accuracy of school-reported pupil counts—and, for that matter, of all school-reported data used to calculate fund entitlements—would have to be an integral part of any formula-based allocation system.

Why a Flat Grant Per Pupil Would Not Suffice

Although almost any reasonable funding formula would have to be based in large part on the number of pupils served by each school, allocating funds according to pupil numbers alone would not be acceptable. The following paragraphs summarize the reasons why it is educationally appropriate as well as equitable to provide more public funds per pupil to some high schools than to others. The following subsections then explore the corresponding adjustment factors in detail.

Variations in pupil populations and educational needs. The makeup of the pupil population varies from one high school to another. High schools differ, first, in the distribution of pupils by grade level, a factor that impinges on finance to the extent that instruction is more resource-intensive at some grade levels than at others. Some schools enroll high percentages of poor, disadvantaged, low-achieving, or otherwise difficult-to-serve pupils, while others are "elite" schools, serving mainly children from better-off, better-educated families. The former schools can be said to "need" more resources, in the sense that they generally would have to provide more instructional and other services per pupil to achieve specified educational goals. Further, schools offer different mixes of academic and vocational education—activities that have different resource requirements. Arguably, a better match of resources to needs, and hence greater equity, could be attained by taking explicit account of the makeup of each school's pupil population than by pretending that all pupils are educationally equivalent.

Variations in the cost of services. Apart from variations in needs for educational services, the cost of providing a given level of services can be expected to vary among places and schools. For example, a school with an old, dilapidated building may have to spend more on building maintenance than the average school, just to keep its facilities functioning. A small school may have to spread its fixed costs (e.g., the principal's and the bursar's salary) over fewer pupils, making its unit costs higher. A school in a "volatile" area may have to incur extra expenses for security. More important, some Jamaican high schools undoubtedly have to pay more than others to attract and employ equivalent teaching staff. Differences in housing prices, for example, may make some localities more expensive to live in than others, requiring schools either to offer offsetting pay differentials or to choose from less-qualified applicants. Concerns about crime in certain urban neighborhoods and difficulties of access to remote rural areas are other location-specific factors likely to translate into higher costs for a given quality of teacher. Thus, there is

an equity-based rationale for taking cost as well as need differentials into account in distributing funds among schools.

Unequal access to cost-sharing income. A formula that has the appearance of distributing public funds equitably will not necessarily yield equitable results if schools have unequal access to other sources of funds. In Jamaica, unequal access to nonpublic funds is a built-in feature of the existing cost-sharing scheme. Some schools have been authorized to charge higher tuition fees than others, and some are more able than others to collect the approved amounts from parents. Although MOEYC provides financial assistance payments on behalf of pupils unable to pay the set fees, or to pay them in full, these payments compensate only fractionally for the resulting differences in fee income. Moreover, schools apparently vary widely in access to other outside income, such as contributions from churches and other affiliated organizations and remittances from abroad. There is an argument, therefore, for distributing public funds in a manner that adjusts at least for the interschool differences in cost-sharing income, if not for differences in the other outside funds as well.

Variations in makeup of the teaching staff. Because different schools employ widely varying percentages of the more expensive types of teachers—trained teachers, graduate teachers, teachers with substantial experience—spending per pupil for teacher compensation, and hence total spending per pupil, is substantially greater in some schools than in others. If the total secondary education budget were held constant as an enrollment-based formula was introduced, the currently well-off schools would receive sharply lower allocations, leaving them unable to support their existing, relatively high-priced staffs. The schools currently making do with less qualified, less experienced teachers, on the other hand, would receive substantial new funds. Although this redistribution would be equity-enhancing, it might also entail greater dislocations than the system could suddenly absorb. Of course, a large increase in the total secondary education budget could cushion the effect by allowing the currently better-funded schools to maintain their staffs while other schools were "equalized up." But barring that, the question arises of whether the formula itself should be designed to compensate, fully or partially, temporarily or permanently, for the present uneven distribution of higher- and lower-priced teachers and the correspondingly unequal distribution of spending.

Each of the major factors just mentioned—variations in pupil composition and educational needs, in the cost of services, in access to outside funds, and in the makeup of existing teaching staffs—provides justification for including certain adjustment factors, in addition to the basic pupil-count factor, in a fund distribution formula. The following sections consider what indicators might be used to represent each factor and how such indicators might be taken into account, singly or in combination, in calculating each school's allotment of funds.

Pupil Composition and Educational Need

The general principle of adjusting allocations to reflect differences in pupil composition and educational needs is widely accepted among education finance experts. The concrete issues are how the needs of each school's pupils should be measured or represented and how, and to what degree, need differentials should be taken into account in the fund allocation formula.

Measuring Needs

The most common approach is to represent relative needs for educational services in terms of certain presumably need-related characteristics of a school's pupil population. These characteristics may include the numbers (or percentages) of pupils enrolled in different grade levels, the number pursuing different programs, and the number who are from low-income families or otherwise disadvantaged or who have various disabilities or handicaps. An alternative to taking account of the pupils' own economic circumstances, which may not be feasible, is the less direct approach of focusing on socioeconomic characteristics of the locality or community in which a school is situated. For instance, extra funds might be directed to schools in areas with low per capita income or high poverty or high welfare-dependency rates. Such local-area indicators may be reasonably valid substitutes for pupil-specific need factors when each school serves a well-defined territory, but they become less so, obviously, in cases where schools draw pupils from a wider geographical area. A third approach is to represent a school's needs in terms of educational performance indicators, as, for instance, by providing extra support to schools with low test scores or low retention or completion rates.

Characteristics of pupils. In practice, the choice of which need-related pupil, area, or school characteristics to use as formula factors often is constrained, if not dictated, by data availability. Only rarely, for example, would a government have data on pupils' family income by school, so using the number of pupils in each school with family income below a specified threshold is unlikely to be feasible. In the United States, the lack of such data has forced states to rely on various proxies for low income or poverty, such as the percentage of pupils eligible for free or reduced-price school lunch (a means-tested benefit) or the percentage of pupils from households receiving certain state welfare benefits. In Britain, the national formula for distributing education funds to local authorities takes into account the percentage of local residents receiving certain income-support (welfare) benefits, the percentage of the local population belonging to certain ethnic-minority (immigrant) groups, and the number of single-parent families. Despite some significant shortcomings, such indirect indicators have been widely accepted, of necessity, as factors on which to base the distribution of public funds.

Data limitations unquestionably play a major role in determining how differential educational needs can be represented in Jamaica. It would be easy, of course, to take account of inter-school variations in the distribution of pupils by grade level, but measuring variations in the incidence of poverty or disadvantage promises to be difficult. Everyone agrees that there are vast socioeconomic and educational disparities among Jamaica's high schools. Further, there seems to be a body of common knowledge or conventional wisdom regarding the status of particular schools. Some public high schools are universally recognized as "elite" institutions, serving children from the upper strata of society; others are known to exhibit the whole spectrum of innercity socioeconomic pathologies or rural poverty-related problems. Nevertheless, it remains unclear how such classifications might be made objective and how the differences might be reflected in quantitative formula factors.

Jamaica, like other countries, generally does not collect data on the family income of individual pupils and therefore has no direct measures of average income or poverty by school. The

question is whether any suitable proxy measures might be available. The proxy commonly used in the U.S., the rate of participation in school nutrition programs, apparently would not work in Jamaica because rates of participation in such programs generally are high and eligibility is not necessarily means-tested. Also unavailable, it appears, is any suitable indicator of participation in, or eligibility for, welfare or income support programs. At the moment, it seems unlikely that any "off the shelf" proxy for disadvantage or poverty will be identified.

A possibility perhaps worth exploring is that information gathered in connection with the existing financial assistance scheme might provide the base for a future school-level indicator. Under this scheme, families that find it difficult to pay the tuition fees imposed by their children's high schools can apply to MOEYC for financial assistance. A determination is made as to whether the family has sufficiently limited means to warrant a tuition subsidy and, if so, whether that subsidy should cover full tuition or some fraction of tuition. One can envision using as a poverty proxy the percentage of pupils in a school who qualify for financial assistance payments, perhaps with a distinction between full and partial assistance or some form of differential weighting to reflect the degree of assistance. But certain features of the financial assistance scheme raise doubts about the workability of this approach. Determinations regarding family needs and subsidy amounts now are made on a case by case basis by school guidance counselors, apparently through a discretionary process involving considerable subjective judgment, though subject to the approval of MOEYC's regional offices. The criteria and methods applied by different guidance counselors are unlikely to be uniform enough across schools to yield a valid indicator. Further, the variability of authorized tuition fees from school to school itself ensures that "ability to pay" will mean different things in different schools. But these conditions need not be permanent. A move toward greater standardization in the future could make the financial assistance figures into a usable indicator of need. (As noted later, such standardization would be a significant equity-enhancing measure in its own right.)

It appears that one dimension of educational need considered very important in the U.S. and Canada has little relevance in Jamaica, namely, the incidence of pupils with various types of handicaps or disabilities. The fund distribution formulas of some U.S. states assign differential weights to pupils in as many as a dozen different disability categories—visual and hearing impairment, physical handicap, various degrees of mental impairment or learning disability, and so forth. The funding levels associated with some of these conditions are double or more the amount spent per "regular" pupil. In Jamaica, however, it appears that the special education needs of such pupils would be addressed, if at all, in designated special education institutions. Special services apparently are not normally provided in the regular high schools, and data on the incidence of disabilities in such schools are not collected. If correct, this implies that it would be neither necessary nor feasible to take the incidence of disabilities into account in a new high school funding formula.

Local-area characteristics. An issue worth investigating is whether local-area economic statistics could be used as proxies for the need-related characteristics of different schools. Because it was not possible during this study to review the organization and coverage of Jamaica's local statistics, only the following general observations can be offered:

The basic issue is whether it is possible to associate particular local areas for which economic statistics exist (statistics on family income, poverty, etc.) with the student bodies of particular high schools. If each high school drew its pupils from a particular geographical area, and if local statistics were collected for the same area, the answer would be "yes." One would be able to say that high school A draws pupils from an area with X percent low-income families, high school B from an area with Y percent low-income families, and so forth. The percentage of low-income families in each school's catchment area could then be construed as a need indicator and incorporated into the fund allocation formula. Some countries do use such indicators in formulas for distributing education funds to municipalities, counties, or local education authorities—units for which economic statistics normally are available—but generally not for the subsequent distribution to individual schools.

In the case of Jamaica, two factors cast serious doubt on the potential usefulness of local-area statistics as proxies for educational needs. First, under Jamaica's single-stage allocation system, funds or resources flow directly from MOEYC to the individual schools, without any intermediate distribution among parishes, municipalities, or other local units for which economic statistics are likely to be produced. This means, among other things, that the local areas for which statistics do exist may contain multiple high schools, each with a different socioeconomic makeup. For example, a town might have two high schools, one serving mainly the children of the town's better-off families, the other serving mainly children from lower-income families. Income statistics for the town as a whole would not give a correct impression of the socioeconomic makeup of either school. Second, and perhaps more important, Jamaica seems to have essentially an open enrollment system in its high schools, involving various processes of selection and self-selection, under which many pupils attend school outside their area of residence. Out-of-area attendance probably is less common in rural areas than in and around the cities. Still, it seriously restricts the usefulness, and detracts from the validity, of local-area statistics as proxies for educational needs.

Educational performance indicators. The idea of using test scores or other educational performance measures to represent a school's relative educational needs is attractive for two reasons. First, performance measures would provide a more direct reading than any other indicator of the magnitude of the educational problems facing a school. One would not have to base allocations on implicit inferences about the effects of pupil, family, or community characteristics on pupils' ability to learn. Second, test scores and other performance measures (attendance, dropout, and completion rates, etc.) are available for each school. There is even a Jamaican precedent: The World Bank's ROSE II (Reform of Secondary Education) apparently has used test scores to allocate funds for school improvement projects among participating secondary schools. Specifically, such funds have reportedly been apportioned according to the number or percentage of pupils in each school who scored below "mastery of reading" on a primary school-leaving examination, the Grade Six Achievement Test (GSAT). This particular indicator is illustrative of a class of performance-based educational indicators potentially suitable for incorporation into a general school funding formula.

Jamaica administers multiple nationwide examinations to its secondary school pupils and primary school leavers, the results of which could be used to produce an index of educational

need. It would not be necessary to choose a single test score; a composite of multiple test scores could be developed. Items other than test scores, such as a school's dropout rate, could be incorporated into a broader composite. Alternative ways to use test scores as need indicators also could be considered. For example, instead of adhering to the ROSE formulation cited above, one could develop a need index based on the average test scores of all of a school's pupils, not just on the number of pupils who score low.

Test scores generally do not enter into the formulas that other countries use to distribute education funds (the author cannot cite any specific example of such use), and there are arguments against using them for that purpose in Jamaica. Apart from issues concerning the validity of the tests themselves, a major objection to providing more money per pupil to schools whose pupils score low is that doing so could create a perverse incentive: The prospect of gaining financially by reporting poor performance could motivate some schools to keep their scores down. For this reason, constructing a need indicator from scores on a test that the high schools themselves administer, or a test for which high schools prepare their own pupils, probably would not be an acceptable approach.

The method used by the ROSE project circumvents the latter problem, however. The test in question, the GSAT, is administered by the primary schools attended by 6th grade completers, not by the high schools these pupils subsequently enter. Therefore, the likelihood of test-score manipulation or a perverse incentive effect is greatly lessened.[6] But using the test scores of 6th graders to allocate funds for high schools serving grades 7 to11 or 7 to13 is problematic in another respect. As measures of the performance of entering pupils, such scores would indicate how difficult a task each high school faces, but they would not yield any information about how well-prepared the high school is to accomplish that task. In other words, the scores would reflect problems at the primary schools from which the test takers came rather than problems at the high schools to which they are going. The validity of using 6th grade scores to represent educational needs in the "senior" grades of high schools—grades 10 and above—seems particularly questionable. Thus, considerable further thought should precede any decision to link allocations to tests or other performance measures.

High-need categories of schools. If it turns out that no sound, quantitative indicators can be found to satisfactorily represent the large disparities in educational challenges among Jamaica's high schools, a fall-back position would be to define certain school categories, the members of which would be given extra resources to cope with their special needs. For instance, one could introduce into a funding formula an "inner city" factor, which has the effect of increasing the allocations of schools so designated by a specified multiple, say, 1.1 or 1.2. Or, one might introduce an "impacted school" category, not necessarily defined in terms of school location, to which problem-ridden schools would be assigned on the basis of multiple factors.

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[6] Because the ROSE project covers not only high schools but also all age and P&JH schools, it will be basing allocations, to some extent on the test scores of grade 6 pupils who will be entering grade 7 at the same school. Therefore, some reason for concern about manipulation exists. But because the formulas covered by this discussion pertain only to high schools, they would not be affected by this problem.

Both the criteria and the process for assigning schools to one of these special categories would have to be spelled out carefully. Although in many cases it probably would be self-evident whether a school belongs to a high-need group—there would be little doubt, for example, about some of the severely troubled former comprehensive high schools of West Kingston—less clear-cut cases may pose problems. This is especially so if imprecisely defined and/or subjective factors are to be taken into account—something that may well be necessary, given the data deficiencies. It would be desirable to set up, in advance, a systematic discretionary process, specifying how and by whom judgments would be made about the proper classification of borderline schools.

Incorporating Need Factors into a Formula

The device most commonly used in the United States and Canada to represent the varying educational needs of fund-receiving units (usually local school districts or school boards) is the *weighted pupil formula*. In essence, such a formula replaces the head count of a school's pupils (either enrollment or attendance) with a weighted pupil calculation that assigns different weights to different pupil categories. As a simple example, suppose that pupils with ordinary, or regular, educational needs are assigned a weight of 1.0, while pupils from families with income below the poverty level, deemed to require extra educational services, are assigned an extra weight of 0.25; that is, each poor pupil counts as the equivalent, for purposes of resource allocation, of 1.25 regular pupils. A school's weighted pupil count depends, then, on both its head count and the percentage of its pupils from below-poverty families. A school with 1000 pupils, 100 of whom are from poor families, would have a weighted pupil count of 1000 x 1.0 + 100 x 0.25, or 1025; another school with 1000 pupils, but with 40 percent from poor families, would have a weighted count of 1000 x 1.0 + 400 x 0.25, or 1100. In this example, the weighted pupil approach would give the second school 7.3 percent more funding (1100/1025 = 1.073) than the first one.

The weighted pupil approach commonly is used by U.S. states to assign differential weights to pupils at different grade levels, pupils with different types of disabilities, or handicaps, and pupils who qualify as disadvantaged. Some state weighting systems are quite complex. It is normal, for example, for a state formula to assign different weights to kindergarten, primary, middle-school, and high-school pupils; to allow different supplemental weights for perhaps a dozen types of mental and physical disability (or to disabilities of different severity); and to give extra weight to pupils who are eligible for free or reduced-price school lunch (a proxy for low income) or who have limited proficiency in English.

The same type of pupil-weighting approach could be applied in Jamaica. Consider, first, differential weighting of high school pupils by grade level. Although direct information seems to be lacking on the amount per pupil spent on grade 7-9 (junior high) pupils, as compared with pupils in higher grades, the available estimates of spending per grade 7-9 pupil in all age and P&JH schools are sharply lower than the amount spent per pupil in high schools. This suggests that a lower weight for the grade 7-9 pupils than for pupils in grades 10 and above may be appropriate. Further, the fact that MOEYC's norms for pupil-teacher ratio are lower for high schools with grades 12 and 13 (6th form) than for high schools not offering these grades suggests that a

greater weight should be assigned to each pupil in grades12 and 13 than to each pupil in grades 10 and11.

Thus, Jamaica might want to consider a scheme for differential weighting by grade level of the form

$$E^* = a_0E_{7\text{-}9} + a_1E_{10\text{-}11} + a_2E_{12\text{-}13},$$

where E* is a school's weighted pupil count, the subscripted E's are numbers of pupils at the indicated grade levels, and the a's are the weights assigned to each grade stratum (for example, 1.0 for grades 7-9, 1.3 for grades 10-11, and 1.5 for grades 12-13). Or, equivalently, one could write the weighting formula as

$$E^* = E + b_1E_{10\text{-}11} + b_2E_{12\text{-}13},$$

where E is the school's total enrollment in all grades and b_1 and b_2 are the *incremental* weights assigned to pupils in grades 10-11 and grades 12-13, respectively. For example, the incremental weights consistent with the illustrative weights of 1.3 and 1.5 given in the preceding example would be $b_1 = 0.3$ and $b_2 = 0.5$.

Suppose now that Jamaica also decided to assign extra weight to pupils considered poor, and suppose, setting aside the previously discussed problems of measurement, that it were able to identify an indicator, or a proxy measure, of the number of poor pupils, E_p, in each school. The simplest way to accommodate this additional factor would be to add a poverty term to the preceding equation:

$$E^* = E + b_1E_{10\text{-}11} + b_2E_{12\text{-}13} + b_pE_p,$$

where b_p is the incremental weight to be assigned to each poor pupil (e.g., an incremental weight of 0.25, indicating that each poor pupil is given 1.25 times the weight of a regular pupil). This method can be faulted, however, for treating the add-on for each poor pupil as a fixed amount, without regard to the pupil's grade level. The solution to this problem is to introduce a multiplicative rather than additive poverty factor:

$$E^* = (E + b_1E_{10\text{-}11} + b_2E_{12\text{-}13})(1 + b_pp),$$

where $p = E_p/E$, the fraction of the school's enrollment deemed to be poor.[7]

[7] Note that the adjustment for poverty in this illustration applies uniformly to the enrollment figures for all grade levels, even though the pupil poverty rate might vary from one grade stratum to another. Ideally, one would make a separate adjustment for each stratum. But in practice it will be difficult to find even an adequate single poverty measure for a school, much less a set of poverty proxies applicable to particular grade levels.

To illustrate the combined effects of the different weights, suppose that a school has 1000 pupils, of whom 500 are in grades 7-9, 300 in grades 10-11, and 200 in grades 12-13; that 35 percent of all pupils are poor; and that the weights for the various pupil categories are those given in the foregoing examples. The weighted pupil count for the school would be calculated as

$$E^* = [1000 + 0.3(300) + 0.5(200)][1 + .25(.35)] = 1294.1.$$

In this example, the poverty adjustment itself, an incremental weight of 0.25 applied to 35 percent of the pupils, adds 8.75 percent to the hypothetical school's weighted pupil count.

In principle, the same weighted-pupil approach could be used to channel extra resources to schools that exhibit low educational performance. For instance, either instead of or in addition to assigning extra weight to poor pupils, the weighted-pupil calculation could assign extra weight to pupils who score below a specified cutoff score on an achievement test (or below a specified composite score on a set of performance tests). The adjustment factors could be additive or multiplicative, as in the foregoing illustrations of different poverty adjustments. Alternatively, the adjustment could be based on the average test scores of all the school's pupils, not just on the number who score low. It would then be necessary to specify a particular mathematical relationship between the average test score and the adjustment factor to be applied to the weighted pupil count for each school.

The weighted pupil formulation is not well-suited to accommodate need factors that do not represent percentages of pupils with particular characteristics but rather measure attributes of a school as a whole. Some previously mentioned examples of such attributes are the poverty rate in the area where the school is situated, the school's average score on a test, and the school's membership in a designated high-need group (the last being a zero-or-one categorical variable). Such variables are most readily incorporated into a formula as multiplicative need factors.

To illustrate, one could begin with a simple flat grant formula, $G = kE$, where G is the grant to the school, E is enrollment, and k is the flat grant per pupil, and then modify it by inserting a multiplicative index of relative need, yielding $G = kNE$. Suppose that we want N to reflect the amount, if any, by which the local-area poverty rate exceeds the average poverty rate for Jamaica as a whole. This could be accomplished by setting $N = 1 + c(P - P_0)$, subject to $P - P_0 \geq 0$, where P and P_0 are the local-area poverty rate and the national poverty rate, respectively, and c is a parameter set to control the rate at which n increases with increasing P. Or, suppose that we want N to be a multiplier greater than 1 (e.g., 1.2 or 1.3) for impacted inner city schools but to have the value 1.0 for all other schools. This could be done simply by setting $N = 1 + cX$, where X is 1 if a school belongs in the "impacted" category but 0 otherwise, and c is the amount by which the multiplier is to exceed 1.0 (e.g., 0.2 or 0.3). More generally, the index N could be calculated as a product of several factors, where each factor is an indicator reflecting a particular aspect of need, as in the foregoing two examples.

Variations in the Cost of Services

It is important to distinguish conceptually between adjustments for differences in needs for educational services and adjustments for differences in the cost of providing a given set of services. The former would compensate for interschool variations in the difficulty of the educational task. The latter are intended to offset variations in the prices of educational resources or, in some cases, variations in circumstances (such as differences in school size) that make equivalent services more resource-intensive in some schools than in others. The two kinds of adjustments are not substitutes for each other. Nor are need and cost differentials necessarily correlated, as the former mainly reflect characteristics of a school's pupils while the latter depend primarily on the school's physical attributes and location.

Costs are likely to vary more widely and the need for cost adjustments to be correspondingly more urgent in a large country than in a compact country like Jamaica. In the United States, large interstate and interregional variations in the cost of labor are reflected in variations in teacher salaries, and consequently in the unit cost of educational services. Geographical differences in prices of land, buildings, transport, utilities, and other goods and services add to the variation in unit costs. It has been estimated that unit costs range from as much as 18 percent below the national average in some states to as much as 15 percent above the national average in others.[8] Even within a state, cost variations can be substantial. Major urban centers usually have the highest costs, but remote rural areas also may have higher costs than other localities in the same state. To adjust for these variations, some states incorporate cost adjustment factors, or cost indexes, into their school funding formulas. Florida's formula, for example, includes a county-level price index, according to which (circa 1999) relative cost factors ranging from 0.91 to 1.07 enter multiplicatively into the calculation of allocations to different counties. Texas uses a cost-of-education index derived from a statistical model to adjust allocations to its more than 1000 local school districts.[9] Some cost differentials undoubtedly exist in Jamaica, e.g., between urban and rural areas and perhaps between major tourist centers and other parts of the country, but it is not evident, pending empirical inquiry, whether the magnitudes are such as to make the issue of education cost adjustments important.

Adjusting for cost variations is not an easy matter. The principal difficulty is that the most important element of cost variation, variation in the price of teachers, is not directly observable but must be inferred. In Jamaica, as in many other places, teachers are paid according to a salary scale that is essentially uniform across schools. If some schools are less attractive than others to teachers, salaries in the less attractive schools do not adjust upwards to compensate; rather, the lesser attractiveness is likely to show up in lower qualifications or quality, on average, of the

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[8] See, e.g., Jay Chambers, *Public School Teacher Cost Differences Across the United States*, National Center for Education Statistics, NCES 95-758, Washington, DC, October 1995. This paper contains many references to the cost-of-education literature.

[9] Descriptions of the school finance formulas of all 50 U.S. states and all 10 Canadian provinces, including cost indexes and other adjustment factors, can be found in National Center for Education Statistics, *Public School Finance Programs of the United States and Canada: 1998-99*, NCES 2001-309, available on CD-ROM, Washington, D.C., April 2001.

teachers that such schools are able to hire. Even where teacher salary scales do vary (as, e.g., among local school districts in the United States), the salary figures one observes confound true price variations with variations in teacher quality. Consequently, to adjust correctly for cost differences, one would have to estimate what equivalent teachers—hypothetical teachers of constant quality—would be paid in different places. This is a difficult and data-intensive analytical task. In comparison, measuring variations in the costs of other resources used in education is straightforward. But because teacher compensation accounts for so large a share of the total education budget, quantifying differences in the cost of teachers is the heart of the problem.

Various methods have been used by U.S. scholars to construct indexes of interstate and interdistrict variations in the cost of teachers, some of which have been incorporated into broader indexes of the cost of education as a whole. The easiest and crudest approach has been to use existing cost-related indicators, such as indexes of general wage levels for regions or states as proxies for an index of the cost of teachers. But this approach is significantly flawed. The more respectable analytical efforts involve estimation, using econometric models, of what teachers in each state or area would be paid under specified standard conditions, and/or in the absence of teacher-quality variations.[10] Such models tend to be elaborate and demanding of data, and there are conflicting views as to how they should be constructed. The whole subject is too complex and technical to pursue here. Suffice it to say that producing a defensible set of education cost factors for different places in Jamaica would require a substantial data collection and analytical effort—and one whose success could not be guaranteed.

For the time being, it appears that only limited steps can be taken to incorporate cost differentials into a funding formula. One possibility is that adjustments for differences in certain nonteacher costs could be derived directly from historical data on expenditures. This might apply, for instance, to costs of utilities and building maintenance. Another possibility is that existing wage data—e.g., for urban and rural areas or for parishes—might be used to represent costs of nonteaching personnel. This suggestion is speculative, however, as its feasibility would depend on what kinds of subnational wage statistics Jamaica maintains. As to a more general cost adjustment, the only realistic short-run prospect seems to be to apply differential cost factors to broad categories of schools. For instance, one could introduce an urban (or innercity) school multiplier, a rural school multiplier, or both into a funding formula, on the grounds that costs of providing educational services are higher in such places than in the rest of Jamaica. The main objection to doing so is, of course, that the magnitudes of the multipliers would have to be based more on subjective judgment than on well-founded estimates of relative costs. Still, if the alternatives are to introduce such multipliers or to do nothing at all—particularly in a case where it is generally agreed that significant albeit not-well-quantified cost differences exist—the former may be the better option.

A separate question concerning cost variations is whether a funding formula should adjust for differences in unit costs between schools of different types—specifically, in the case of Ja-

[10] For references to the different methodologies used for constructing cost-of-education indexes, see Chambers, op. cit., and Walter W. McMahon, "Intrastate Cost Adjustments," in *Selected Papers in School Finance, 1994*, National Center for Education Statistics, NCES 96-068, Washington, DC, 1996.

maica, between technical-vocational and academic high schools. Per-pupil spending for the former exceeded per-pupil spending for the latter by about 23 percent in 1999-2000.[11] (Another significant distinction, that between high schools with and without university-preparatory "sixth form" programs, can be handled by differential weighting by grade level, as discussed above.) Some have argued against differential weighting on equity grounds, suggesting that there is no justification for spending more on pupils who voluntarily enroll in technical-vocational schools than on pupils who choose academic or general high schools.[12] On the other hand, it seems hard to deny that there are real cost differences between academic and vocational programs. Some of the latter must spend substantial amounts for materials and equipment, and some have safety concerns that limit the pupil/staff ratio. So, if MOEYC intends to continue offering technical-vocational programs, it may also have to continue supporting their somewhat higher unit costs. Whether past differences in per pupil spending accurately reflect the cost difference between school types is a different question, however, and one that would be difficult to address without carrying out detailed comparative cost studies of the different types of schools.

Unequal Access to Cost-Sharing Income

The Cost-Sharing System: Tuition Fees and Financial Assistance Payments

If Jamaica's high schools were fully government-funded, there would be no reason, by definition, to discuss variations in the schools' capacities to raise money from other sources. But full government funding is not the country's current policy. Instead, there is an official cost-sharing scheme, under which MOEYC authorizes each high school to charge a specified tuition fee. These tuition fees generally vary by type of school, with the former secondary high schools usually, but not always, charging higher fees than the former comprehensive high schools. (In some instances, a school may set different fees for pupils at different grade levels.) An associated financial assistance program provides government subsidies to the schools to make up for the inability of some pupils' families to pay the specified fees, or to pay them in full. Each high school, therefore, receives both tuition fee payments from pupils' households and financial assistance payments from MOEYC in addition to its main government subvention and, in the case of the partially bursar-paid schools, its allotment of government-paid teaching staff.

The MOEYC-approved fees vary by more than a factor of two among schools, ranging in 2000-01, in most cases, between J$4000 and J$8500. It is not entirely clear (at least to the author) how the fee-setting process works or why the fees are as variable as they are. One major consideration is said to be the view of each school's officials as to what the pupils' parents are likely to be able and willing to pay. This amount varies, depending on the school's reputation

[11] The expenditure figures exclude three small vocational-agricultural schools, enrolling only a few hundred pupils in total, that have per-pupil outlays nearly three times as high as the rest of Jamaica's high schools.

[12] A complicating factor in this discussion is that some of the academic or general schools, those until recently called "comprehensive," also offer vocational programs, but neither the numbers of their pupils who participate in vocational programs nor spending for such programs appears to be reported separately. There is no way to tell, therefore, whether there is a difference between per-pupil outlays for vocational and academic education within the multiprogram schools as well as between the technical-vocational and academic institutions.

and the economic level of its clientele. Another factor is the school's perceived needs, and hence its proposed budget, or approved budget, for nonstaff resources—that is, instructional materials, equipment, utilities, routine building maintenance, etc. As the system is presently structured, such outlays are supposed to be funded largely, if not entirely, from cost-sharing income.[13] But how these two considerations are balanced or reconciled is unclear. Is the school's tuition fee set to cover the school's alleged needs or its MOEYC-approved budget for nonstaff outlays, or is the budget for nonstaff outlays determined by the fees (and financial assistance payments) that school officials (or MOEYC) think the school will be able to collect? Further, the existence of the financial assistance scheme adds to the mystery: If MOEYC provides financial assistance payments to make up for the difference between the nominal tuition fee and what the families of a school's pupils are deemed able to pay, what is it that induces or compels schools with low-income pupils to hold their fees down? Clarification of these matters would make it easier to devise sound proposals for making the cost-sharing system more equitable.

Regarding fee collections, MOEYC has documented wide variations in the rates at which different high schools succeed in collecting tuition fees and inducing families to apply for financial assistance. Generally, schools with the lower tuition fees, which tend to serve lower-income pupils, seem to be the least successful in both respects.[14] Thus, while most schools fall short to some degree of collecting the full cost-sharing income (tuition payments plus financial assistance) to which they are theoretically entitled, the least well-off schools fall short by larger percentages. The result is that actual cost-sharing income per pupil—the sum of fees paid by families and MOEYC's financial assistance payments—is much more variable among schools than the tuition fees themselves. As will be shown in Section IV, some schools received less than J$2000 in combined tuition fee payments and financial assistance per pupil in 2000-01, while others received more than J$8000 per pupil—a range of variation of more than 4 to 1.

The Relationship between Funding Formulas and Cost Sharing

The situation just described raises two major issues concerning the design of a fund allocation formula for Jamaica's high schools:

- First, what should be the relationship between the fund allocation formula and the cost-sharing scheme? If a formula-based approach were adopted, would cost sharing remain a separate component of the school finance system as it is today, or would the distribution of all funds for the high schools, including funds now derived from cost sharing, be controlled by the new formula?

[13] MOEYC is able to provide some supplemental funding for nonstaff expenditures in cases where schools are affected by serious "shortfalls" in cost-sharing income. It seems difficult to obtain information on how many such cases there are and how much supplemental funding is involved, but both the number of cases and the amounts are said to be small.

[14] Rates of fee collection and patterns of compliance are documented in a series of annual reports on the cost-sharing scheme prepared by the Policy Analysis Unit in MOEYC's Planning and Development Division.

- Second, assuming that the main reason for adopting a formula-based approach would be to enhance equity, but assuming also that the principle of cost sharing is to be retained, how can the formula be designed to equalize for interschool variations in the capacity to generate cost-sharing income?

With respect to the first issue, four different relationships between the existing cost-sharing scheme and a new formula-based system can be envisioned, as follows:

Option A. Leave the cost-sharing scheme unchanged and design a new fund allocation formula that applies to the main body of school funding—that is, to all the funds now allocated as MOEYC subventions and direct salary payments. In essence, this option would distribute by formula funds for compensation of all school personnel, teaching and nonteaching, but most outlays for nonstaff resources would continue to be financed with cost-sharing funds (fees plus financial assistance), as is done today.

Option B. Introduce a new formula for allocating funds for personnel, as in Option A, and retain the separate cost-sharing scheme for financing nonstaff resources, but reform the latter by introducing equalizing features—i.e., mechanisms that compensate for the unequal abilities of different schools to collect tuition-fee income from families. (Some possible equalization mechanisms are discussed below.)

Option C. Continue to charge tuition fees and to allow fee reductions for families with limited ability to pay, but eliminate the earmarking of tuition-fee income for nonstaff resources. Instead, introduce a new funding formula that (a) distributes funds for *all* educational resources (not just for personnel) and (b) takes into account, and equalizes for, interschool differences in ability to generate tuition-fee income. (The equalizing feature would supersede the present provisions for financial assistance payments to schools.)

Option D. Either eliminate the cost-sharing scheme entirely or "nationalize" it (see below), and distribute funds for all educational resources, staff and nonstaff, by formula—i.e., switch to a regime of formula-based full government funding of high schools.

Although option A, leaving cost sharing unchanged, and option D, eliminating or nationalizing cost sharing, appear diametrically opposed, they have in common that neither requires a funding formula that takes a school's ability to raise cost-sharing income into account. The difference is that the formula to be developed under option A would not cover funds for nonstaff resources, while the formula to be developed under option D would cover funds for all educational resources. Option B adds to option A the reform of cost sharing, but leaves the cost-sharing component divorced from the rest of the school finance system. Option C combines a formula covering all high school expenditures with retention of tuition fee payments to the individual schools.

How would these different strategies be reflected in fund allocation formulas? The answers are clear in principle, though the feasibility of constructing the required types of formulas in practice is questionable in some cases. Options A and D call for formulas with the features al-

ready discussed in detail above. That is, these formulas would distribute funds according to the number of pupils in each school, adjusted to reflect variations in educational needs and unit costs. The difference between the two options is that the formula for Option A would cover only funds for personnel, while the formula for Option D also would cover funds for nonstaff resources. It might be appropriate to choose somewhat different need and cost adjustment factors in these two cases to reflect this difference in coverage.

Options B and C would take the existence of income from tuition fees into account. Option B would do this by establishing, as a new element of the cost-sharing scheme, an equalizing formula to distribute supplemental funds for nonstaff resources. The funds so allocated would replace MOEYC's present financial assistance payments to schools. This equalizing formula would reflect each schools' relative needs for, and costs of, nonstaff resources as well as each school's capacity to generate tuition-fee income. Option C would establish a single, comprehensive formula for distributing funds for both staff and nonstaff resources, and which includes the same kinds of equalizing features as in Option B. Thus, it would take into account each school's relative needs and relative costs for both staff and nonstaff resources and each school's capacity to raise income from tuition fees. Some specific approaches to constructing equalizing formulas are set forth below.

Equalizing Formulas

The term "equalization," as used here, refers specifically to financial compensation for the unequal capacities of different schools to raise funds from their own sources, which, in Jamaica, means primarily from tuition fees paid by parents.[15] An equalizing formula is one designed to offset these capacity differences by giving lower-capacity schools more government funds per pupil. The present financial assistance provision can be thought of as a weak and erratic equalization device. Other things being equal, it would provide more supplemental government funding per pupil to schools whose pupils are less able to pay tuition. But other things are not equal. In practice, the potential equalizing effect is diluted, if not reversed, first by compliance problems and, second, by a pattern of variation in authorized tuition fees that provides larger cost-sharing payments to the higher-income schools.

Generally speaking, the need for an equalizing formula arises in situations where (1) a country finances educational services partly with grants from an agency of central or regional government and partly with funds raised by the entities that operate schools, and (2) the latter entities have significantly unequal capacities to generate funds from their own sources. The usual situation in countries that use equalizing formulas is that the operating entities are local education agencies—school districts, school boards, etc.—and the own-source funds they generate are proceeds from local taxes. In Jamaica, however, the entities in question are the individual

[15] In principle, one might want to take into account differences in the capacity to raise not only tuition fees but also other nongovernment funds—donations, endowment fund income, and the like. But in practice, these funds are unlikely to be fully or consistently reported or captured in school accounts. Moreover, some donations probably are in kind rather than in cash. For these practical reasons, no proposals are offered here for equalizing for nongovernment payments other than tuition fees.

schools, and the own-source funds they generate are tuition fees. There is no other case known to the author in which the individual school is both a grant-receiving and a fund-generating unit. (Britain's fiscally autonomous schools do receive grants, or subventions, from the national government or the LEA, but the power to generate local revenue, from taxes, resides at the LEA level, not at the level of the individual school.) It appears, therefore, that there may not be any established model of a school-level fiscal equalization formula that could be replicated or adapted for use in Jamaica.

But although there is no directly applicable model, there are analogues. The fiscal relationship between an individual Jamaican high school and MOEYC is analogous to the relationship between an American local school district and its state education agency (or between a Canadian local board and its provincial education agency). The U.S. district is financed with a combination of state grants and local property taxes; the Jamaican school is financed with a combination of MOEYC grants and tuition fees. Just as the state distributes funds according to a formula that takes into account the varying capacities of districts to raise property-tax revenue, so MOEYC could distribute funds according to a formula that adjusts for the varying capacities of high schools to generate tuition-fee revenue. Thus, it seems relevant to consider analogs of two types of equalizing formulas used by U.S. states and Canadian provinces to fund local education agencies—those known as the *foundation formula* and the *guaranteed yield*, or *equalized yield*, formula, respectively.

Foundation-type formulas. The essence of the foundation formula is that it guarantees a certain minimum level of funding per pupil (the "foundation") to any local agency that exerts at least a specified minimum level of effort to raise local funds. Most often, "effort" is measured by the rate at which the local agency taxes property. The per-pupil value of taxable property is taken as the measure of local revenue-raising capacity. But effort also can be measured by the percentage of local resident income collected as school taxes, in which case income per pupil becomes the capacity measure. A Jamaican analog would guarantee a minimum level of funding per pupil to any high school that imposes tuition fees amounting to at least a specified minimum percentage of tuition-paying capacity. The latter could be defined, at least in theory, in terms of parents' income or some other measure of family ability to pay. But a major practical obstacle to such an approach—and one that may well be insurmountable—would be the difficulty, if not the impossibility, of finding a suitable, consistently quantifiable capacity indicator.

Assuming for purposes of discussion that the problem of measuring ability to pay could be solved, a foundation-type equalizing formula could be used either as part of a reformed cost sharing system (Option B, above) or as the basis for an equalized, comprehensive formula for funding schools (Option C). A simplified formula for the cost sharing supplement (which would replace the present financial assistance scheme), with no pupil weights or need or cost adjustments, can be written,

$$G_C = E(k - r_m A),$$

where G_C is the supplemental grant to the school, E is enrollment, k is the specified foundation level of supplemental funding per pupil, A is an as-yet unspecified measure of the average per-pupil tuition-paying capacity of the pupils' families, and r_m is the aforementioned specified minimum percentage of capacity.

Each school, in other words, would set a tuition rate, t_m, at least equal to r_mA, yielding total tuition-fee income of at least $T_m = t_mE = r_mAE$. All schools setting their tuition fees at the required minimum level, which would differ among schools depending on the value of A, would receive total cost-sharing income of k per pupil, consisting of tuition income r_mA per pupil and supplemental equalizing grant income of $k - r_mA$ per pupil. However, any school setting its tuition fee above the required minimum, i.e., $t > t_m$, would be able to retain the resulting extra tuition-fee income, and hence to spend that much more per pupil. In general, a school's total cost-sharing income under this formula would be given by

$$I = T + G_C = tE + E(k - r_mA) = E[k + (t - r_mA)] \text{ (with } t \geq r_mA).$$

Similarly, a comprehensive funding formula based on the same foundation mechanism—that is, a formula covering all types of school expenditures—with pupil weights and need and cost adjustments included, could take the form,

$$G = E^*[kCN - r_mA],$$

where all variables are as defined earlier, except that A is now capacity per need-weighted pupil. In this case, of course, the grants would be on a much larger scale than those discussed just above, as they would cover all expenditures for both staff and nonstaff resources. In essence, each school would receive from MOEYC a grant proportional to its weighted pupil count (hence the substitution of E* for E), adjusted by need and cost factors, *less* an allowance for tuition fees commensurate with the average ability to pay of families of the school's pupils. Schools that set their tuition fees above the specified base level would be able to retain the resulting extra funds. The schools would be able, as at present, to charge different pupils different net fees, based on variations in family ability to pay. Or, putting it differently, pupils with limited ability to pay could be offered need-based "scholarships."

Equalized yield formulas. The guaranteed yield, or equalized yield, formula goes a step beyond the foundation formula in equalizing spending per pupil among schools. In addition to ensuring that each school receives a certain base level of spending per pupil, it would further guarantee each school the ability to supplement that base level of spending, within limits, on a fully equalized basis. It would do this by allowing each school to generate supplemental tuition-fee income *as if* it had at least a certain standard level of capacity, A_0, even if the school's actual capacity, A, is lower. A supplemental government grant, allocated on a matching basis to schools that set their tuition rate above the specified minimum, would make up for any capacity shortfall. This supplemental matching grant would be calculated as

$$G_S = CN(t - t_m)[(A_0 - A)/A], \text{ with } A_0 - A \geq 0.$$

In words, the supplemental amount would be calculated by multiplying the incremental tuition rate (tuition in excess of the required minimum) by the fraction by which a school's capacity falls short of the guaranteed standard level, A_0, and then adjusting for need and cost.

It bears repeating, however, that none of the formulas just described can be implemented without a valid, consistently measured indicator of each school's relative ability to generate tuition-fee income. That MOEYC is able to distribute means-tested financial assistance payments is encouraging in this regard. It shows that at least rough measurement of families' ability to pay is possible. But a considerably more systematic and sophisticated measurement approach would be needed to produce a factor adequate for use in a funding formula.

The Option of Nationalizing Cost Sharing

What the Jamaican authorities could hope to accomplish by introducing an equalizing formula of the type just discussed (setting aside the possibly insuperable measurement problems) would be to preserve the existing school-administered cost-sharing scheme while reducing the resulting inequality in the distribution of funds for nonstaff resources. There is, however, an alternative, more radical approach that also merits consideration—one that would allow Jamaica simultaneously (1) to eliminate—not just reduce—the equity problems associated with tuition fees and financial assistance, (2) to retain—for better or worse—the basic principle that families should bear a portion of the cost of high school education, and (3) to simplify the task of allocating education funds equitably. That alternative is to relieve the individual high schools of any responsibility for cost sharing and, instead, to have MOEYC administer a nationally standardized system of tuition fees and means-tested subsidies for pupils.

Without going into detail, this nationalized version of the cost-sharing system could be organized as follows: First, MOEYC would set nationally uniform high school tuition fees, perhaps with some differentiation by type of school and/or by grade level (e.g., a higher fee for grades 12 and 13). Second, MOEYC would replace the existing financial assistance component of cost sharing with a nationally uniform system of pupil subsidies, or tuition-fee discounts, based on a standardized approach to assessing family ability to pay. Families would apply to MOEYC for these subsidies and would pay to MOEYC (perhaps through the regional offices) the appropriate net tuition amount—that is, the tuition fee minus the approved subsidy. Third, the resulting net tuition-fee revenue could either become part of the general pot of money available for formula-based distribution to high schools or could be distributed separately, though it is hard to think of a good reason for doing the latter. Likewise, the net proceeds could be earmarked for financing of nonstaff expenditures, as they are under the current system—but again, there would seem to be no logical reason for maintaining such a linkage. Indeed, the opportunity that this approach would create to break the connection between cost-sharing income and nonstaff expenditure is one of its attractions. Thus, Jamaica could enhance the equity and rationality of its school finance system in several respects, while preserving, if it chose, the basic cost-sharing principle.

Variations in Makeup of the Teaching Staff

A major question raised by the proposal to allocate funds to Jamaica's high schools according to a pupil-based formula is how such a strategy would be reconciled with realities of the current teacher personnel system. The key elements of this reality—those that impinge most directly upon the distribution of funds to the schools—include the following:

1. The makeup of the existing teaching force varies sharply among schools. As was shown in Section II, some schools have much higher percentages than others of the more highly qualified types of teachers.
2. In Jamaica, as elsewhere, more highly qualified teachers (those who are trained and/or university graduates) and more experienced teachers are paid substantially more than teachers lacking those attributes.
3. Largely as a consequence of points (1) and (2), spending per pupil for teacher compensation, and hence total spending per pupil, is now sharply higher in some high schools than in others.
4. Although teachers are paid by MOEYC, each teacher is hired by, and considered an employee of, a particular school. MOEYC has no mechanisms for assigning particular teachers, or even teachers with specified qualifications, to particular schools, nor for redeploying already-employed teachers among schools.

The interschool distribution of funds produced by any of the pupil-based formulas described earlier would differ considerably from the distribution that exists today. Under these formulas, schools with similar pupil populations would receive similar levels of funding per pupil, regardless of what kinds of teachers they currently employ. If anything, schools facing the more difficult educational tasks, those serving larger percentages of poor or disadvantaged pupils, would receive larger per-pupil allocations than other schools because of the formulas' need-adjustment factors. Yet these are the schools now likely to be found at the low-spending end of the scale, mainly because they tend to employ the less-qualified, less-experienced teachers. At the other end of the spectrum, the schools that now spend the most per pupil, mainly because they have above-average percentages of graduate and trained graduate teachers, would no longer receive, under a pupil-based formula, the extra funds needed to cover these teachers' salaries. The question, then, is how the contradiction can be resolved between a mainly pupil-based distribution of funds, on one hand, and the very different distribution of funds that would be required to keep all the schools' existing teaching staffs employed.

There are basically three conflict resolution strategies that could be pursued, either singly or in combination:

1. Alter the fund distribution formula to accommodate the existing variability among high schools in the makeup of the teaching staff.

2. Alter the rules governing teacher assignment and redeployment of teachers among schools to accommodate the formula-based distribution of funds
3. Provide a sufficiently large aggregate increase in funding to allow schools that would otherwise lose money under a formula-based redistribution to retain their existing teachers.

Consider first the implications of trying to accommodate the existing interschool differences in makeup of the teaching force. One needs to distinguish between transitional accommodation and long-term accommodation. Transitional accommodation is relatively uncontroversial. It could be done by setting up a cushioning device, or "shock absorber," to ease the adjustment from the present distribution of funds to the distribution produced by a pupil-based formula. For instance, temporary extra funding could be provided to schools that now spend significantly more per pupil for teacher compensation than they would be able to spend under the new formula. This extra funding would cover only salaries of already-employed teachers. It could either be phased out over several years or allowed to diminish over time as a result of staff attrition, gradually converging to what the new base formula would provide. Schools would have to adjust their staffs accordingly during the transition period.

Long-term accommodation is quite a different matter. From a technical standpoint, it would not be difficult to do. One could construct a formula that adjusts explicitly for teacher qualifications and/or teacher experience, thereby allocating more money per pupil to schools with more highly qualified and/or highly experienced, hence highly paid teaching staffs. A few U.S. states do, in fact, do something of the kind in their formulas for distributing funds to school districts. They use the number of pupils in a district to calculate the number of "teacher units" to which the district is entitled and then assign differential weights to these units, depending on how many of the district's teachers have bachelor's degrees, master's degrees, and so forth.[16] The result is that districts with more highly qualified teachers receive larger state grants per pupil than districts with less qualified teachers.

The rationale usually offered for such adjustments is that they are needed to cover the "higher costs" a district is forced to incur because it has teachers whose characteristics place them high on the salary scale. It is argued, further, that that the employer of teachers (the school district, in the U.S. case) has only limited control over the makeup of its own teaching force. A school district can decide whom to hire but cannot stop existing teachers from accruing seniority or earning a higher degree. Moreover, a district generally cannot easily replace expensive, highly experienced or highly qualified teachers with cheaper, less-experienced or less-qualified teachers, even if it wants to do so. Tenure and seniority rules and other provisions of collective bargaining agreements, if not state laws, often preclude or severely impede such adjustments. Thus, some assert that variations in teacher experience and training should be treated as cost factors not

[16] Among the states using versions of the teacher-unit approach—without necessarily calling it that—are Alabama, North Carolina, West Virginia, and Washington. Descriptions of these states' formulas are included in the previously cited CD-ROM, *Public School Finance Programs of the United States and Canada: 1998-99*.

under a district's control, for which the fund allocation formula should compensate. Parallel claims could be made regarding the teaching staffs of Jamaica's high schools.

But the equity implications of this whole approach are very troubling. To give a school extra money, year after year, because its teachers are highly qualified would be to prolong, if not perpetuate, the present interschool disparities in the composition of the teaching force. The unspoken premise underlying the foregoing arguments is that having an experienced, well-educated teaching force is a burden rather than a benefit—an unintended extra cost for which the employer should be recompensed. But the actual behavior of employers suggests that the premise is false: Districts and schools generally desire highly qualified teachers and compete vigorously to obtain them. They do not treat as interchangeable teachers who have completed lesser and greater amounts of postsecondary education. If anything, attracting the better-trained teachers is likely to be even more important in a country at Jamaica's level of development than in a more highly developed country, simply because the range of variations in qualifications is greater. In the U.S., a prospective teacher will have either a bachelor's degree or a postgraduate degree. In Jamaica, teachers at the low end of the qualifications scale will neither have earned a university degree nor completed a teacher training program. It would not be correct to treat the salary difference between more-qualified and less-qualified teachers as if it were a difference in the price of the same commodity. Instead, the difference constitutes, at least in part, a premium paid for higher quality. Clearly, it would not be equitable to give one school enough money to employ, say, 50 teachers with average qualifications, while another school with the same enrollment receives enough to pay 50 teachers with superior qualifications and an average salary, say, 25 percent higher. Yet precisely that sort of inequity would result from making a school's fund allocation a function of the salary-related attributes of its teachers.

But what would be the consequences of not distributing funds in a manner that takes the qualifications of existing teachers into account? Even with the previously mentioned kinds of temporary shock absorbers in place, the effects over a period of years could be drastic. Fund allocations based mainly on each school's enrollment, with or without the kinds of need and cost adjustments discussed earlier, would differ sharply, in many instances, from what the schools had been accustomed to receiving. (The extent of these differences is illustrated in Section IV.) In the absence of a major increase in MOEYC's overall budget for secondary education, some high schools would receive large increases in funding while others would experience substantial funding declines. The former would have the opportunity to choose among hiring more teachers, hiring better teachers, or buying larger amounts of other instructional resources. But schools that had previously been funded at a level well above what the new formula provides would face alternatives of a less pleasant kind. With too little funding to sustain their relatively low pupil/teacher ratios or to continue paying salary premiums to their well-educated teachers, they would have to strike a balance between reducing teacher numbers and reducing average teacher qualifications. This, of course, is precisely what one would expect from an equity-enhancing redistribution of a fixed pot of money among the schools.

All the schools' choices and tradeoffs would be strongly influenced by the rules put in place, coincident with adoption of the pupil-based formula, to govern teacher personnel actions. The rules currently in effect in Jamaica, embodied in law and in union contracts, apparently se-

verely restrict the ability of a school to reduce its teaching staff, to replace teachers, or to eliminate teacher positions. Further, because each teacher is an employee of a particular school, not of MOEYC, there are no routine mechanisms for reassigning teachers, or even for arranging voluntary transfers of teachers among schools. Clearly, Jamaica would not be able to implement a new funding system that significantly redistributes resources among schools if the current personnel rules remained in place. Essential concomitants of the shift to a pupil-based formula, therefore, would be the rule changes needed to facilitate redeployment of teaching staff. Whether or how such changes might be made are matters beyond this author's competence to discuss.

Obviously, much of the dislocation and unpleasantness associated with redistribution could be avoided if the introduction of a new formula were accompanied by sufficient new funding to protect the currently better-off schools. All the formulas discussed above are essentially neutral with respect to the aggregate level of funding. They could be used to redistribute the same total amount of money for high schools as would have been spent otherwise, or an amount larger by, say, 10 or 20 percent. With a sufficiently large increase in aggregate spending, especially if combined with temporary shock-absorber provisions of the kind mentioned earlier, few schools, if any, would have to face absolute losses of funds. Few, therefore, would have to reduce or downgrade their teaching staffs. Of course, the relative funding levels of different schools, and hence their relative endowments of teaching personnel and other real resources, might change markedly. The interschool variations in these attributes would become much smaller than they are now. What an increase in total funding would buy, in other words, is low-conflict relative redistribution—equity enhanced not by forcing the better-off schools down but by leveling the worse-off schools up.

IV. Selected Formulas and Their Effects

Of the various formulas and formula components discussed in Section III, only a limited number can be demonstrated empirically with currently available data; others will have to remain at the conceptual stage—not ready for implementation—unless or until additional data are developed. This section shows how the distribution of funds would be altered and how the pattern of spending disparities would be changed if selected formulas for which data already are in hand were used to allocate money among Jamaica's high schools.

The specific formula alternatives for which data are available, and which are considered below, include the following:

- A simple flat grant per pupil enrolled
- Variants of the simple flat grant in which differential weights are assigned to pupils at different grade levels and in which school attendance as well as enrollment is taken into account
- Formulas that allow for differential funding by region and type of school

- A formula that includes an educational need adjustment based on the average test scores of pupils entering each school
- A composite formula that takes most of the aforementioned factors into account
- Variants of some of the foregoing options that limit the degree to which a school's allocation can fall below its past level of funding

Among significant options that cannot be demonstrated now because the key data items are not available are these:

- Formulas that take into account the number of poor, low-income, or disadvantaged pupils in a school
- Formulas that adjust for measured differences in unit costs among schools
- Equalizing formulas that reflect measured differences in family income or capacity to pay tuition fees

For the purpose of this exercise, the distribution of funds among Jamaica's high schools in the 2000-01 financial year—estimated in the manner described in Section II—is taken as the standard of comparison. The set of schools examined consists of 148 individual high schools—the full set of 152 high schools operating in that year, with the exceptions of (a) the three small agricultural high schools and (b) one newly established school, Cumberland High, which commenced operation only in September 2000.

Most of the funding formulas considered below are calibrated so as to distribute the same total amount of money among the 148 schools as was distributed to the same set of schools in 2000-01—an estimated J$5.260 billion exclusive of cost-sharing income, or J$6.121 billion with cost-sharing income included.[17] Setting up the analysis in this manner makes it possible to identify clearly the relative gains and losses to individual schools that would result from various formula-based redistributions of a fixed sum of funds. In some instances, however, holding aggregate spending constant is not appropriate. It is of interest, for example, to consider options that would "equalize up" the outlays of low-spending schools without forcing the outlays of the higher-spending schools to decline. Such options obviously would require higher total spending, and determining the magnitude of the required expenditure increase is itself an important objective of the analysis.

[17] There are several reasons why the total given here (exclusive of cost sharing) does not correspond to the figure for 2000-01 high school spending shown in the official 2000-01 Jamaica Budget. One is that the figure cited here excludes certain outlays for administrative and support services not associated with particular schools. Another is that it takes into account certain supplemental outlays approved after the 2000-01 budget was published. (For some reason, these supplemental outlays are not reflected even in the revised figures for 2000-01 presented in the Jamaica Budget for 2001-02.) A third is that it does not include expenditures for the four excluded high schools mentioned above.

Of course, the 2000-01 level of funding no longer prevails. Jamaica's education budget for financial year 2001-02 is sharply higher than the budget of the previous financial year, in large part because of the major increases in teacher salary that took effect in April 2001. The projected increase in funding for high schools between the two years appears to be on the order of 20 percent.[18] The calculations based on 2000-01 aggregate funding need to be interpreted, therefore, as indicators of how the relative levels of spending of different schools, or classes of schools, would be affected if the various formulas were adopted. To ensure that the focus is on relative changes, not absolute dollar amounts, the statistics used in this section to describe changes in allocations are expressed, wherever possible, mainly in terms of ratios, percentage differences, and other measures of relative spending. The allocation formulas themselves generally are scale-independent. They could equally easily be used to apportion the same amount of money as was spent in 2000-01 or an amount 20, 50, or 100 percent greater.

As explained earlier, a new funding formula could be designed either to cover or not to cover funds now generated under the cost-sharing scheme. The possible implications of choosing not to include cost-sharing funds would be either that the cost-sharing scheme is to be left unchanged or that it is to be reformed separately. (Leaving it unchanged would be unfortunate from the standpoint of fiscal equity, given the very large current disparities in cost-sharing income per pupil.) Choosing to include cost-sharing funds would imply either that (1) the cost-sharing scheme is to be abandoned or (2) that it is to be "nationalized" in the manner discussed in Section III—meaning that the government (MOEYC) would collect all tuition fees and add them to the pot of money to be distributed to the schools. In general, the redistributive effect of shifting to a formula-based fund allocation system would be somewhat greater with cost-sharing funds included than with them excluded, simply because cost-sharing income is more unevenly distributed under the existing system than is high school spending in general. To avoid an unduly repetitive presentation, most of the statistical comparisons offered below pertain to allocations of funds exclusive of cost sharing, but the effects of applying the formulas to cost-sharing funds as well are brought out at several points.

Simple and Modified Flat-Grant Formulas

To begin, let us consider what would have happened in 2000-01 if the funds available for Jamaica's high school sector had been apportioned strictly in proportion to the number of pupils in each school, without taking any other factors into account. As noted earlier, this is not intended as, and should not be construed as, a recommended policy option. The reason for examining it at the outset is that it provides a foundation for constructing and analyzing more complex, multifactor formulas.

[18] This is based on a comparison of figures for 2000-01 and 2001-02 presented in the Jamaica Budget for the latter year.

Simple Flat Grants: Allocation Proportionate to Enrollment

The simplest flat grant formula is one that distributes a uniform fixed amount per pupil enrolled. If such a formula had been in effect in 2000-01, how different would the resulting allocations to schools have been from the actual allocations for that year? To calculate the flat grant amount that could have been supported with existing funds, we divide the aggregate 2000-01 outlays of the 148 high schools by their aggregate enrollment of 189,026 pupils. The resulting per-pupil allotments are:

Excluding cost sharing: $J5.260 billion/189,026 = J$27,826.

Including cost sharing: $J6.121 billion/189,026 = J$32,383.

The question, then, is how allocations of these per-pupil amounts to each school would compare with the estimated amounts the schools actually received.

Table 9 deals with allocations exclusive of cost sharing. It shows for each school the estimated amount actually received in 2000-01, both in the aggregate and per pupil (columns 1 and 2); then how much the school would have received under the hypothetical flat grant, again both aggregate and per pupil (columns 3 and 4); and, finally, the difference between the flat grant and actual amounts, expressed both as an absolute dollar difference and as a percentage gain or loss (columns 5 and 6). In this table, schools are arrayed in order of increasing gain (or decreasing loss), starting with the school that would sustain the largest percentage loss of funds and ending with the school that would enjoy the largest percentage increase.

Table 10 provides two sets of statistics summarizing the effects of a shift from the actual 2000-01 allocations to a uniform flat grant per pupil. The statistics in the first column, which correspond directly to the individual-school figures shown in Table 9, pertain to allocations of funds exclusive of cost sharing. The statistics in the second column show what would happen with the cost-sharing funds included. (The school-by-school allocations inclusive of cost-sharing funds are not shown here.) The statistics presented in this table, and in similar tables to follow, include measures of the magnitude of the redistributive effect (the percentage of total funds redistributed and the numbers of gaining and losing schools), indicators of the net gains and losses of particular categories of schools, and counts of the numbers of schools whose percentage gains or losses fall into various ranges.

Table 9: Comparison: Flat Grant Per Pupil Enrolled vs. Current Allocations

School Code and Name		Current Allocations Aggregate (J$ millions)	Current Allocations Per Pupil (J$)	Flat Grant Per Pupil Enrolled Aggregate (J$ millions)	Flat Grant Per Pupil Enrolled Per Pupil (J$)	Change (J$ millions)	% Change
02247	St. Andrew Technical High	55.733	57,814	26.824	27,826	-28.908	-51.9
01133	St. Anne's High	21.925	49,380	12.355	27,826	-9.570	-43.6
01041	Kingston Technical High	43.644	48,710	24.932	27,826	-18.712	-42.9
02373	Haile Selassie High	23.499	44,930	14.553	27,826	-8.946	-38.1
14074	Dinthill Technical High	48.605	43,947	30.775	27,826	-17.829	-36.7
02246	Trench Town High	26.447	43,570	16.890	27,826	-9.557	-36.1
02330	Mavis Bank High	13.311	43,501	8.515	27,826	-4.797	-36.0
11075	Munro College	29.877	42,560	19.534	27,826	-10.343	-34.6
13083	Vere Technical High	51.897	42,330	34.114	27,826	-17.783	-34.3
02332	Priory High	14.484	40,234	10.017	27,826	-4.467	-30.8
11074	Hampton School	31.536	39,030	22.483	27,826	-9.053	-28.7
14128	Jose Marti Technical High	38.796	37,593	28.716	27,826	-10.079	-26.0
02190	Charlie Smith High	19.093	37,364	14.219	27,826	-4.874	-25.5
02061	The Queens School	47.943	36,794	36.257	27,826	-11.686	-24.4
01028	Dunoon Park Technical High	42.411	36,125	32.668	27,826	-9.744	-23.0
01043	Wolmer's Girls School	45.496	35,571	35.589	27,826	-9.906	-21.8
02056	Holy Childhood High	56.701	35,527	44.410	27,826	-12.291	-21.7
01125	Tivoli Gardens High	66.559	35,273	52.507	27,826	-14.052	-21.1
01037	Kingston College	61.949	35,019	49.224	27,826	-12.726	-20.5
02059	Merl Grove High	48.245	34,338	39.095	27,826	-9.150	-19.0
01013	Denham Town High	41.481	34,029	33.920	27,826	-7.561	-18.2
02324	Edith Dalton James High	36.200	33,991	29.635	27,826	-6.566	-18.1
02058	Jamaica College	43.569	33,774	35.895	27,826	-7.673	-17.6
02275	Pembroke Hall High	41.009	33,669	33.892	27,826	-7.117	-17.4
02320	Gaynstead High	10.341	33,360	8.626	27,826	-1.715	-16.6
08035	Cornwall College	40.950	33,320	34.198	27,826	-6.752	-16.5
02066	Meadowbrook High	44.468	33,111	37.370	27,826	-7.098	-16.0
02057	Immaculate Conception High	50.396	33,090	42.379	27,826	-8.018	-15.9
12100	Winston Jones High	14.158	33,003	11.937	27,826	-2.221	-15.7
01018	Kingston High	25.402	32,990	21.426	27,826	-3.976	-15.7
07032	Westwood High	21.675	32,891	18.337	27,826	-3.338	-15.4
01036	Convent of Mercy "Alpha"	40.869	32,879	34.588	27,826	-6.281	-15.4
02328	Campion College	46.840	32,847	39.680	27,826	-7.160	-15.3
11087	St. Elizabeth Technical High	51.145	32,473	43.826	27,826	-7.320	-14.3
02063	St. Hugh's High	49.316	32,296	42.490	27,826	-6.826	-13.8
01042	Wolmer's Boys School	41.267	32,115	35.756	27,826	-5.511	-13.4
02062	St. Andrew High	42.926	31,939	37.398	27,826	-5.528	-12.9
03039	Morant Bay High	36.826	31,884	32.139	27,826	-4.687	-12.7
14088	Charlemont High	29.635	31,729	25.989	27,826	-3.645	-12.3
10020	Frome Technical High	41.755	31,728	36.619	27,826	-5.136	-12.3
12061	Bishop Gibson High	18.224	31,584	16.056	27,826	-2.169	-11.9
12060	Holmwood Technical High	39.491	31,542	34.838	27,826	-4.653	-11.8
14071	St. Jago High	50.828	31,356	45.106	27,826	-5.722	-11.3
02053	Ardenne High	54.395	31,279	48.389	27,826	-6.006	-11.0
10055	Manning's High	54.403	30,911	48.973	27,826	-5.429	-10.0
13071	Glenmuir High	40.908	30,781	36.981	27,826	-3.928	-9.6
05066	St. Mary High	41.974	30,660	38.094	27,826	-3.880	-9.2
02054	Calabar High	52.112	30,439	47.638	27,826	-4.474	-8.6

Table 9: Comparison: Flat Grant Per Pupil Enrolled vs. Current Allocations

School Code and Name		Current Allocations Aggregate (J$ millions)	Current Allocations Per Pupil (J$)	Flat Grant Per Pupil Enrolled Aggregate (J$ millions)	Flat Grant Per Pupil Enrolled Per Pupil (J$)	Change (J$ millions)	% Change
14073	St. Catherine High	71.331	30,315	65.474	27,826	-5.857	-8.2
01039	Camperdown High	41.216	30,041	38.177	27,826	-3.039	-7.4
10072	Maud McLeod High	31.590	30,029	29.273	27,826	-2.318	-7.3
12059	Manchester High	49.831	29,893	46.386	27,826	-3.446	-6.9
13069	Clarendon College	48.801	29,866	45.467	27,826	-3.334	-6.8
11112	Lewisville High	16.438	29,832	15.332	27,826	-1.105	-6.7
01038	St. George's College	39.940	29,739	37.370	27,826	-2.570	-6.4
02155	Tarrant High	29.011	29,694	27.186	27,826	-1.825	-6.3
06063	St. Hilda's Diocesan High	28.873	29,613	27.130	27,826	-1.742	-6.0
04058	Buff Bay High	21.347	29,607	20.062	27,826	-1.285	-6.0
13070	Knox College	35.392	29,274	33.641	27,826	-1.751	-4.9
09102	Merlene Ottey High	17.384	29,266	16.529	27,826	-0.856	-4.9
01017	Holy Trinity High	51.988	29,256	49.447	27,826	-2.541	-4.9
04046	Happy Grove High	31.791	29,193	30.302	27,826	-1.489	-4.7
02055	Excelsior High	56.029	29,061	53.648	27,826	-2.381	-4.2
03053	Robert Lightbourne High	19.275	28,941	18.532	27,826	-0.743	-3.9
03050	Yallahs High	30.791	28,884	29.662	27,826	-1.128	-3.7
05072	Marymount High	19.541	28,822	18.866	27,826	-0.675	-3.5
08036	Montego Bay High	21.996	28,791	21.259	27,826	-0.737	-3.4
12101	Cross Keys High	17.394	28,750	16.835	27,826	-0.559	-3.2
01033	Vauxhall High	45.169	28,588	43.965	27,826	-1.204	-2.7
11105	Newell High	24.656	28,570	24.014	27,826	-0.642	-2.6
08078	Herbert Morrison Tech. High	41.806	28,152	41.321	27,826	-0.484	-1.2
12033	Mile Gully High	14.015	28,086	13.885	27,826	-0.130	-0.9
12102	DeCarteret College	22.137	27,950	22.038	27,826	-0.099	-0.4
04061	Fair Prospect High	17.914	27,688	18.003	27,826	0.089	0.5
02245	Penwood High	22.668	27,443	22.984	27,826	0.317	1.4
03052	St. Thomas Technical High	32.968	27,337	33.558	27,826	0.590	1.8
02302	Clan Carthy High	34.904	27,312	35.561	27,826	0.657	1.9
09044	Rusea's High	49.590	27,039	51.033	27,826	1.442	2.9
08041	Mount Alvernia High	34.270	26,984	35.339	27,826	1.069	3.1
05083	St. Mary Technical High	22.202	26,911	22.956	27,826	0.754	3.4
02052	Papine High	39.649	26,790	41.182	27,826	1.533	3.9
04047	Titchfield High	45.575	26,730	47.443	27,826	1.868	4.1
13111	Thompson Town High	18.211	26,624	19.033	27,826	0.822	4.5
02301	Mona High	32.166	26,561	33.697	27,826	1.531	4.8
09042	Knockalva Technical High	28.369	26,464	29.829	27,826	1.460	5.1
11110	Balaclava High	22.409	26,456	23.568	27,826	1.160	5.2
06064	York Castle High	27.551	26,389	29.050	27,826	1.500	5.4
06098	Iona High	10.351	26,339	10.936	27,826	0.585	5.6
13110	Lennon High	30.895	26,271	32.723	27,826	1.828	5.9
07042	Cedric Titus High	30.451	26,116	32.445	27,826	1.994	6.5
13109	Bustamante High	22.048	25,667	23.902	27,826	1.855	8.4
13097	Edwin Allen High	59.086	25,645	64.111	27,826	5.025	8.5
12031	May Day High	20.995	25,635	22.789	27,826	1.794	8.5
13107	Alston High	18.807	25,553	20.480	27,826	1.673	8.9
13124	Kemps Hill High	27.846	25,500	30.386	27,826	2.540	9.1
05082	Brimmer Vale High	26.069	25,434	28.521	27,826	2.452	9.4
14117	McGrath High	26.791	25,419	29.328	27,826	2.537	9.5
14084	Waterford High	36.535	25,407	40.014	27,826	3.478	9.5
14072	St. Mary's College	21.303	25,360	23.374	27,826	2.071	9.7
07041	William Knibb Memorial High	28.632	25,316	31.471	27,826	2.839	9.9
14106	Spanish Town High	56.277	25,068	62.469	27,826	6.192	11.0

Table 9: Comparison: Flat Grant Per Pupil Enrolled vs. Current Allocations

School Code and Name		Current Allocations Aggregate (J$ millions)	Current Allocations Per Pupil (J$)	Flat Grant Per Pupil Enrolled Aggregate (J$ millions)	Flat Grant Per Pupil Enrolled Per Pupil (J$)	Change (J$ millions)	% Change
14114	Old Harbour High	61.610	25,065	68.396	27,826	6.786	11.0
04033	Port Antonio High	35.609	24,954	39.707	27,826	4.099	11.5
06071	Ferncourt High	30.162	24,825	33.808	27,826	3.646	12.1
11106	Lacovia High	35.835	24,612	40.514	27,826	4.680	13.1
06102	Aabuthnott Gallimore High	23.261	24,537	26.379	27,826	3.118	13.4
13120	Spaldings High	39.858	24,453	45.356	27,826	5.498	13.8
13108	Denbigh High	33.467	24,393	38.177	27,826	4.710	14.1
05087	Oracabessa High	31.847	24,366	36.368	27,826	4.522	14.2
12087	Bellefield High	36.924	24,356	42.184	27,826	5.260	14.2
05084	Tacky High	24.330	24,306	27.854	27,826	3.524	14.5
14119	Guys Hill High	29.466	24,212	33.864	27,826	4.398	14.9
11104	Black River High	44.433	24,083	51.339	27,826	6.905	15.5
13092	Central High	49.392	24,082	57.071	27,826	7.679	15.5
12078	Christiana High	53.486	23,963	62.107	27,826	8.621	16.1
02060	Oberlin High	42.196	23,907	49.113	27,826	6.917	16.4
02274	Norman Manley High	48.944	23,644	57.599	27,826	8.656	17.7
10062	Godfrey Stewart High	29.680	23,537	35.088	27,826	5.409	18.2
10071	Petersfield High	43.753	23,536	51.728	27,826	7.975	18.2
10070	Little London High	23.194	23,499	27.464	27,826	4.270	18.4
13115	Garvey Maceo High	31.355	23,469	37.175	27,826	5.821	18.6
11108	B. B. Coke High	34.450	23,403	40.960	27,826	6.510	18.9
02326	Donald Quarrie High	37.000	23,140	44.494	27,826	7.493	20.3
14113	Glengoffe High	21.788	23,130	26.212	27,826	4.424	20.3
06095	Ocho Rios High	53.622	23,063	64.695	27,826	11.073	20.7
03054	Seaforth High	45.047	22,925	54.678	27,826	9.630	21.4
14112	Ewarton High	26.099	22,774	31.888	27,826	5.790	22.2
13127	Claude McKay High	20.959	22,732	25.655	27,826	4.696	22.4
12075	Porus High	21.863	22,633	26.880	27,826	5.017	22.9
14083	Jonathan Grant High	56.752	22,592	69.899	27,826	13.146	23.2
11109	Maggotty High	41.776	22,521	51.617	27,826	9.841	23.6
14089	Tacius Golding High	29.187	22,315	36.396	27,826	7.209	24.7
06097	Marcus Garvey Technical	47.705	22,282	59.575	27,826	11.870	24.9
08074	Anchovy High	49.191	22,248	61.523	27,826	12.332	25.1
07035	Muschett High	36.241	22,085	45.662	27,826	9.421	26.0
05061	Islington High	21.757	21,866	27.687	27,826	5.930	27.3
14143	Ascot High	20.736	21,805	26.462	27,826	5.726	27.6
07034	Albert Town High	31.503	21,592	40.598	27,826	9.095	28.9
08050	St. James High	51.987	21,159	68.368	27,826	16.381	31.5
14118	Bog Walk High	31.062	21,073	41.015	27,826	9.953	32.0
06096	Browns Town High	46.611	21,024	61.690	27,826	15.079	32.3
09046	Green Island High	34.388	20,816	45.968	27,826	11.581	33.7
08077	Cambridge High	30.150	20,636	40.654	27,826	10.504	34.8
08063	Maldon High	33.451	20,509	45.384	27,826	11.933	35.7
13114	Kellits High	23.069	19,836	32.361	27,826	9.292	40.3
10069	Grange Hill High	30.657	19,342	44.104	27,826	13.447	43.9
14982	Bridgeport High	18.249	17,087	29.718	27,826	11.469	62.9
14142	Greater Portmore High	17.717	14,776	33.363	27,826	15.646	88.3
	Sum/Average	5259.808	27,826	5259.808	27,826	0.000	0.0

Naturally, the introduction of a flat grant formula would sharply redistribute funds from higher-spending to lower-spending schools. The highest-spending schools would lose 30 to over

40 percent of their funding (in one case, St. Andrew Technical High, over 50 percent); the lowest-spending schools would gain by similar percentages (two schools, Bridgeport and Greater Portmore, would gain much larger percentages—63 percent and 88 percent, respectively—but these results may reflect data anomalies). As shown in Table 10, 13 currently high-spending schools (14 with cost sharing included) would sustain funding decreases of 25 percent or more, while 15 currently low-spending schools (16 with cost sharing included) would receive increases of 25 percent or more. Another 31 schools (34 with cost sharing included) would lose between 10 and 25 percent of their funds, while 33 schools (36 with cost sharing included) would gain between 10 and 25 percent. Fifty-six schools (48 with cost sharing included) would be relatively unaffected: each of their allocations would increase or decrease by less than 10 percent.

The extent of the redistribution is underscored by the statistics showing gains and losses of schools that fall into different outlay-per-pupil quintiles under the existing system. The shift to a flat grant would cause schools in the highest-spending and second-highest-spending quintiles to lose 26 percent and 10 percent of their funding, respectively, and schools in the lowest-spending and next-to-lowest-spending quintiles to gain 29 percent and 13 percent, respectively (exclusive of cost sharing). As can be seen from the figures in the right-hand column, extending the flat grant formula to cover cost-sharing funds would slightly amplify these effects.

Table 10 also shows that there would be a net shift of funds from the former secondary high schools and, especially, from the technical high schools towards the former comprehensive high schools. The total funding of the first two groups (cost sharing excluded) would decline by 5.0 and 18.1 percent, respectively, while that of the latter group would rise by 9.3 percent. With cost sharing included, the aggregate loss to the former secondary high schools would climb to 7.4 percent and the gain to the former comprehensive schools would rise to 11.9 percent. These are exactly the effects one would anticipate, considering that the former comprehensive high schools now receive less funding per pupil—and sharply less cost-sharing income per pupil—than the other two groups of schools. There would also be a shift of funds between regions: the net decrease of 14.1 percent in the funding of Kingston-area schools would translate into a net gain of 7.3 percent for schools in the rest of the country.

Of particular significance in Table 10 is the item labeled "losses as percentage of total funds." This refers to the total dollar losses of all schools whose funding would be reduced by the shift to a flat grant formula, expressed as a percentage of total spending for the whole high school sector.[19] The 8.1 percent figure signifies that an increment in aggregate funding equal to 8.1 percent of J$5.260 billion, or J$426 million, would be sufficient to offset all the reductions in allocations to individual schools. (The corresponding figure with cost sharing included is 8.4 percent of J$6.121 billion, or J$514 million.) In other words, if the Jamaican government could make these additional amounts available, all schools with above-average spending could be "held harmless" at their actual 2000-01 funding levels even as all the low-spending schools were "equalized up."

[19] The loss and gain percentages are the same in Table 2, both 8.6 percent, because the alternative in question is a zero-sum redistribution of a fixed pot of money among schools.

Table 10: Summary of Effects: Change from Actual 2000-01 Allocations to a Uniform Flat Grant Per Pupil

Indicator	Cost-sharing funds Excluded	Cost-sharing funds Included
Number of schools that would gain funds	75	80
Number of schools that would lose funds	73	68
Gains as percentage of total funds	8.1	8.4
Losses as percentage of total funds	8.1	8.4
Percentage change in allocations to:		
Former secondary high schools	-5.0	-7.4
Former comprehensive high schools	9.3	11.9
Technical-vocational high schools	-18.1	-17.2
Kingston-area schools (Region 1)	-14.1	-14.4
60 Schools outside Kingston area (Regions 2-6)	7.3	7.5
Percentage change in allocations to:		
Schools initially in 1st (highest-spending) quintile	-25.8	-26.2
Schools initially in 2nd spending quintile	-10.2	-10.5
Schools initially in 3rd (middle) spending quintile	0.7	1.6
Schools initially in 4th spending quintile	13.1	14.3
Schools initially in 5th (lowest-spending) quintile	28.6	28.7
Number of schools by percentage change in funding		
Loss more than 25 percent	13	14
Loss between 10 and 25 percent	31	34
Gain or loss of less than 10 percent	56	48
Gain between 10 and 25 percent	33	36
Gain more than 25 percent	15	16

Modified Flat Grants

The next formulas considered represent two variants on the flat grant theme. One is a weighted-pupil formula that assigns different weights to pupils enrolled in grades 7-9, grades 10-11, and grades 12-13. The other is a formula that distributes funds according to each school's attendance as well as its enrollment.

In principle, there are two defensible, but quite different, methods for developing differential weights for pupils at different grade levels. One would be to base the weights on past or current resource allocation patterns. This would require a cost analysis exercise, aimed at determining the types and amounts of school resources (say, within a sample of high schools) allocated to the different grade strata, and then estimating the outlay per pupil for each stratum. The second

approach would be to base the weights not on actual costs but rather on the estimated costs of providing a prescribed array of services and resources (presumably reflecting educators' conceptions of good pedagogical practice) to the pupils at each grade level. Thus, one could address the problem from either an historical-empirical or a normative perspective. It does not appear that either approach has yet been pursued in Jamaica, however. For the moment, one can do little more than to stipulate a more or less arbitrary—but, one hopes, reasonable—set of weights suitable for demonstrating the weighted-pupil approach.

The next simulation exercise shows how the interschool distribution of funds would be altered by providing the following differentiated levels of funding for high school pupils at different grade levels:

- A level of funding per pupil in grades 10 and 11 equal to 1.4 times the outlay per pupil in grades 7 to 9.
- A level of outlay per pupil in grades 12 and 13 equal to 1.25 times the outlay per-pupil for grades 10 and 11 (which, then, would equal 1.4 × 1.25, or 1.75 times the outlay per pupil for grades 7 to 9).

Given these relative weights, the expression for calculating each school's weighted enrollment count, E*, is

$$E^* = 1.0(E_{7\text{-}9}) + 1.4(E_{10\text{-}11}) + 1.75(E_{12\text{-}13}),$$

where the subscripted E's are numbers of pupils at the indicated grade levels. The resulting weighted pupil count for the 148 high schools is 223,494, as compared with the unweighted pupil count of 189,026. With total funding held constant at the actual 2000-01 levels, the amounts available for allocation per weighted pupil are:

Excluding cost sharing: J$5.260 billion/223,494 = J$23,534

Including cost sharing: J$6.121 billion/223,494 = J$27,389.

The summary statistics presented in Table 11 show how the interschool distribution of funds (exclusive of cost sharing) would be affected if each school were given the first of these amounts, J$23,534, per weighted pupil (the school-by-school allocations are not shown). From the table's first column, one can see how the distribution in proportion to weighted enrollment differs from the already-discussed distribution according to unweighted enrollment. From the second column, one can see how a flat grant per weighted pupil would diverge from the actual 2000-01 distribution of funds.

Allocating according to weighted rather than unweighted enrollment shifts funds towards schools with above-average percentages of grade 12 and 13 pupils and away from schools with above-average percentages of grade 7-9 pupils. This means that the former secondary high

schools, particularly those offering sixth-form university-preparatory programs, tend to gain from the change, as do the technical-vocational high schools, while the former comprehensive high schools tend to lose. The gainers, which number only 54 schools out of 148, generally would be schools that receive above-average funding under the existing system. Thus, schools in the highest-spending two quintiles in 2000-01 would gain about 2 percent more funding from the change, while schools in the bottom quintile lose about 1 percent. The overall effect is rather minor, a displacement of only 1.2 percent of total high school funds.

Consistent with the above, it can be seen from the second column of Table 11 that switching from the current system to a flat grant per weighted pupil would be slightly less redistributive than switching to a flat grant per unweighted pupil. (The relevant comparison is between the second column of Table 11 and the first column of Table 10.) For instance, the highest-spending quintile of schools would lose 24 percent of total funding under the weighted formula, as compared with 26 percent under the unweighted version; the former secondary high schools would lose 3.7 percent of their funding, as opposed to 5.0 percent without pupil-weighting. Pupil-weighting, in other words, would fractionally offset the redistributive effect of introducing a flat grant formula.

The use of attendance as a formula factor, either instead of or in addition to enrollment, is attractive in principle but problematic in light of the available data. What one would want to use for such a factor is average daily attendance, but the only indicator readily available at MOEYC seems to be an attendance rate. One can generate a proxy for average attendance by multiplying enrollment by this rate, but doing so is less than satisfactory because the available enrollment data are October census counts rather than average enrollment figures. Further, some reported attendance rates unfortunately are too good to be true—rates in the 95-percent-and-up range for no fewer than 24 schools (one of which, St. Mary's College, has a reported rate of 100 percent). Nevertheless, an experiment has been carried out with a formula based partly on attendance—specifically one that allocates half the available funds in proportion to the product of the attendance rate and enrollment and the other half in proportion to enrollment alone.

As can be seen from Table 12, the distribution produced by taking attendance into account in this manner differs only slightly from the distribution based on enrollment alone. Only 1.8 percent of total funds would be reallocated among schools. Some individual schools would be strongly affected, however. In particular, three high schools whose reported attendance rates are in the 60 to 65 percent range—Haile Selassie, Lewisville, and Little London—would lose 12 percent or more of their total funds; several others, with attendance rates in the 70 percent range, also would lose significant amounts. The former secondary high schools as a group would be the main gainers, with an average increase in funding of 2.3 percent. (Nearly all the implausibly high attendance rates mentioned above are attributed to former secondary highs.) The former comprehensive high schools as a group would lose about 1.8 percent. The breakdown by expenditure quintile in Table 12 indicates that insertion of the attendance variable would have little effect, either positive or negative, on interschool disparities in per-pupil spending

Table 11: Summary of Effects: Allocation of a Uniform Flat Grant Per Weighted Pupil (Cost Sharing Excluded)

Indicator	Comparison with a Flat Grant Per Unweighted Pupil	Comparison with Actual 2000-01 Allocations
Number of schools that would gain funds	54	72
Number of schools that would lose funds	94	76
Gains as percentage of total funds	1.2	7.4
Losses as percentage of total funds	1.2	7.4
Percentage change in allocations to:		
Former secondary high schools	1.4	-3.7
Former comprehensive high schools	-1.4	7.8
Technical-vocational high schools	1.3	-17.0
Kingston-area schools (Region 1)	1.3	-13.0
Schools outside Kingston area (Regions 2-6)	-0.5	6.7
Percentage change in allocations to:		
Schools initially in 1st (highest-spending) quintile	2.3	-24.3
Schools initially in 2nd spending quintile	2.1	-8.5
Schools initially in 3rd (middle) spending quintile	-0.9	-0.5
Schools initially in 4th spending quintile	-1.6	11.0
Schools initially in 5th (lowest-spending) quintile	-1.1	25.9
Number of schools by percentage change in funding		
Loss more than 25 percent	0	12
Loss between 10 and 25 percent	0	26
Gain or loss of less than 10 percent	147	63
Gain between 10 and 25 percent	1	36
Gain more than 25 percent	0	11

Adjustments for Educational Needs and Costs

Of the various previously discussed methods of adjusting for interschool differences in needs and costs, only a few can be implemented empirically at this time. The need-adjustment method most often encountered in other countries, basing the adjustments on each school's percentage of poor, low-income, or disadvantaged pupils, appears to be precluded in Jamaica by lack of data. No poverty indicator, or even a reasonable proxy, seems to be available at the level of the individual school. Also ruled out, not so much by lack of data as by Jamaica's open enrollment system, is the option of basing need adjustments on socioeconomic characteristics of the

community in which a high school is situated. Because substantial numbers of pupils attend high school outside their area of residence, this method would make little sense in the Jamaican context, even if good data on community characteristics were available. On the cost side, there seem to be no readily available proxies, such as local-area wage or cost-of-living indexes, for geographical variations in the cost of educational resources. Under these circumstances, the adjustment methods that can be demonstrated here are limited to the following two: (1) differential funding by region and type of school and (2) incorporation of a need adjustment based on pupils' test scores.

Differential Funding by Region and Type of School

In the absence of direct measures of unit costs and need-related characteristics of pupils, one must decide how to interpret the observed disparities in spending among certain broad categories of high schools. In particular, is the 17 percent difference in per-pupil spending between the Kingston region and the rest of the country due wholly to political and historical factors or does it reflect real differences in unit costs? Is the 25 percent difference in per-pupil spending between technical-vocational and general/academic high schools mainly a matter of tradition, or perhaps the result of the technical schools' superior negotiating skills, or does it have to do with the real resource requirements of preparing pupils for technical occupations? The next funding formula considered rests on the premise that these spending differences do correspond at least in part to real need and cost differentials.

To illustrate the implications of that premise, a formula is presented below that begins with a flat grant per weighted pupil (the same formula as represented in Table 11) but then adds two significant modifications. The first is a funding increment of 15 percent for technical-vocational schools, intended to represent the extra resources needed for vocational training. The second is a 10 percent increment for schools in the Kingston area (Region 1), intended to represent a regional cost differential. No claim is made for the validity of these particular numbers. They are arbitrarily selected figures, each set at a fraction of the percentage by which the observed per-pupil spending of the set of schools in question exceeds that of other Jamaican high schools. The purpose of the exercise is solely to illustrate what would happen if the existence of need and cost differentials were confirmed, and if a decision were made to adjust fund allocations accordingly. Table 13 shows the resulting allocations to individual high schools and the degree to which they would differ from actual (estimated) allocations in 2000-01. Table 14 presents two sets of summary statistics: one comparing the modified formula against the original flat grant per weighted pupil, the other comparing it against the actual 2000-01 allocations.

Table 12: Summary of Effects: Change from a Simple Flat Grant to a Formula Based Half on Enrollment and Half on Attendance (Cost Sharing Excluded)

Indicator	Value
Number of schools that would gain funds	73
Number of schools that would lose funds	75
Gains as percentage of total funds	1.8
Losses as percentage of total funds	1.8
Percentage change in allocations to:	
Former secondary high schools	2.3
Former comprehensive high schools	-1.8
Technical-vocational high schools	-0.6
Kingston-area schools (Region 1)	0.0
Schools outside Kingston area (Regions 2-6)	0.0
Percentage change in allocations to:	
Schools initially in 1st (highest-spending) quintile	-0.1
Schools initially in 2nd spending quintile	1.7
Schools initially in 3rd (middle) spending quintile	0.2
Schools initially in 4th spending quintile	-0.4
Schools initially in 5th (lowest-spending) quintile	-1.1
Number of schools by percentage change in funding	
Loss more than 25 percent	0
Loss between 10 and 25 percent	3
Gain or loss of less than 10 percent	145
Gain between 10 and 25 percent	0
Gain more than 25 percent	0

The first column of Table 14 indicates the degree to which adding the special extra weights for technical-vocational and Kingston-area schools would increase the funding of those institutions while decreasing the funding for all the others. With the total pot of money fixed, the technical-vocational schools gain about 12 percent and Kingston-area schools gain about 6 percent, while the former comprehensive schools and schools in other regions are the losers. Schools initially in the highest-spending quintile would recover some of the funds lost from the shift to a flat grant per weighted pupil, while schools initially in the lowest-spending two quintiles would give back some of the gains. The allocations of most schools would change by less than plus or minus 10 percent. To be precise, all schools that are neither technical-vocational nor in the Kingston region would lose 4.2 percent; and Kingston-area schools that are not technical-vocational would gain 5.4 percent. The technical-vocational schools would gain more: 21.2 percent if they are within the Kingston region, 10.2 percent if they are not.

From Table 13 and from the second column of Table 14, one can see that the overall redistributive effect of the formula in question would be significantly milder than that of either the unweighted or the weighted-pupil version of a flat grant. For instance, schools in the highest-spending quintile would lose 19 percent of their funding and schools in the lowest-spending quintile would gain 23 percent with the technical-vocational and Kingston-area factors in place, as compared with corresponding changes of minus 24 percent and plus 26 percent, respectively, without them. The technical-vocational schools as a group would still end up with less funds than under the existing system, but only 7 percent less, as compared with 17 percent less in the absence of these factors. In essence, three features of the formula, working in combination, would soften the reallocative effects: first, differential weighting by grade level; second, the Kingston-area regional factor; and third, the special allowance for the technical-vocational schools. Each feature tends to favor the schools that are better-funded under the existing system and thus offsets some of the impact of the flat grant approach.

Table 13: Comparison: Fixed Allotment Per Weighted Pupil with Extra Weights for Technical Schools and Kingston Region vs. Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Weighted Pupil, Plus Adjustments			
		Aggregate (J$ millions)	Per Pupil (J$)	Aggregate (J$ millions)	Per Pupil (J$)	Change (J$ millions)	Percent Change
01133	St. Anne's High	41.481	49,380	35.787	28,934	-5.694	-41.4
02247	St. Andrew Technical High	51.988	57,814	51.758	35,751	-0.230	-38.2
02246	Trench Town High	25.402	43,570	22.717	27,301	-2.685	-37.3
11075	Munro College	42.411	42,560	42.815	27,752	0.404	-34.8
02330	Mavis Bank High	45.169	43,501	46.386	29,209	1.218	-32.9
02373	Haile Selassie High	40.869	44,930	36.923	31,022	-3.946	-31.0
11074	Hampton School	61.949	39,030	52.177	27,335	-9.772	-30.0
02332	Priory High	39.940	40,234	40.328	28,410	0.388	-29.4
01041	Kingston Technical High	41.216	48,710	42.041	34,772	0.825	-28.6
14074	Dinthill Technical High	43.644	43,947	31.156	31,948	-12.489	-27.3
13083	Vere Technical High	41.267	42,330	39.653	31,629	-1.614	-25.3
02190	Charlie Smith High	45.496	37,364	40.341	29,149	-5.154	-22.0
12100	Winston Jones High	66.559	33,003	55.786	25,867	-10.774	-21.6
07032	Westwood High	21.925	32,891	12.847	25,953	-9.078	-21.1
02320	Gaynstead High	39.649	33,360	42.766	27,040	3.116	-18.9
08035	Cornwall College	54.395	33,320	52.384	27,336	-2.010	-18.0
12061	Bishop Gibson High	52.112	31,584	50.561	26,094	-1.551	-17.4
02056	Holy Childhood High	56.029	35,527	54.809	29,426	-1.220	-17.2
14128	Jose Marti Technical High	56.701	37,593	46.964	31,173	-9.737	-17.1
01125	Tivoli Gardens High	50.396	35,273	46.668	29,563	-3.728	-16.2
01037	Kingston College	43.569	35,019	37.774	29,495	-5.794	-15.8
02275	Pembroke Hall High	48.245	33,669	42.246	28,563	-5.999	-15.2
14088	Charlemont High	42.196	31,729	51.535	26,958	9.339	-15.0
01013	Denham Town High	47.943	34,029	42.267	29,357	-5.676	-13.7
10072	Maud McLeod High	42.926	30,029	41.817	25,983	-1.109	-13.5
02058	Jamaica College	49.316	33,774	45.888	29,283	-3.428	-13.3
02324	Edith Dalton James High	44.468	33,991	40.680	29,541	-3.788	-13.1

Table 13: Comparison: Fixed Allotment Per Weighted Pupil with Extra Weights for Technical Schools and Kingston Region vs. Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Weighted Pupil, Plus Adjustments			
		Aggregate (J$ millions)	Per Pupil (J$)	Aggregate (J$ millions)	Per Pupil (J$)	Change (J$ millions)	Percent Change
02059	Merl Grove High	29.011	34,338	28.882	30,068	-0.129	-12.4
13070	Knox College	19.093	29,274	14.895	25,693	-4.198	-12.2
05066	St. Mary High	22.668	30,660	23.699	27,019	1.032	-11.9
02061	The Queens School	26.447	36,794	16.572	32,438	-9.875	-11.8
11105	Newell High	55.733	28,570	34.464	25,221	-21.269	-11.7
06063	St. Hilda's Diocesan High	48.944	29,613	58.846	26,255	9.902	-11.3
01043	Wolmer's Girls School	41.009	35,571	34.790	31,541	-6.219	-11.3
12101	Cross Keys High	32.166	28,750	34.398	25,601	2.232	-11.0
10055	Manning's High	34.904	30,911	36.744	27,550	1.840	-10.9
14071	St. Jago High	10.341	31,356	8.382	28,039	-1.959	-10.6
01018	Kingston High	36.200	32,990	31.462	29,503	-4.739	-10.6
14073	St. Catherine High	37.000	30,315	46.322	27,164	9.322	-10.4
04058	Buff Bay High	46.840	29,607	45.300	26,573	-1.540	-10.2
01036	Convent of Mercy "Alpha"	13.311	32,879	8.938	29,704	-4.373	-9.7
03053	Robert Lightbourne High	14.484	28,941	10.228	26,148	-4.257	-9.7
13069	Clarendon College	23.499	29,866	16.224	26,988	-7.274	-9.6
04046	Happy Grove High	36.826	29,193	33.588	26,579	-3.238	-9.0
08036	Montego Bay High	30.791	28,791	30.921	26,229	0.130	-8.9
03039	Morant Bay High	32.968	31,884	36.724	29,081	3.755	-8.8
02066	Meadowbrook High	19.275	33,111	17.414	30,290	-1.861	-8.5
13071	Glenmuir High	45.047	30,781	51.192	28,254	6.145	-8.2
02057	Immaculate Conception High	35.609	33,090	38.125	30,642	2.516	-7.4
02063	St. Hugh's High	31.791	32,296	28.944	30,051	-2.847	-7.0
05072	Marymount High	45.575	28,822	46.490	26,923	0.915	-6.6
12059	Manchester High	21.347	29,893	19.159	27,932	-2.188	-6.6
12102	DeCarteret College	17.914	27,950	17.076	26,178	-0.838	-6.3
09102	Merlene Ottey High	21.757	29,266	26.031	27,480	4.274	-6.1
11112	Lewisville High	41.974	29,832	36.988	28,094	-4.985	-5.8
12033	Mile Gully High	19.541	28,086	18.254	26,594	-1.287	-5.3
04061	Fair Prospect High	26.069	27,688	26.699	26,393	0.629	-4.7
10020	Frome Technical High	22.202	31,728	25.113	30,325	2.912	-4.4
11087	St. Elizabeth Technical High	24.330	32,473	25.941	31,066	1.611	-4.3
01042	Wolmer's Boys School	31.847	32,115	33.634	30,858	1.787	-3.9
02053	Ardenne High	28.873	31,279	25.598	30,123	-3.274	-3.7
13111	Thompson Town High	27.551	26,624	28.638	25,670	1.087	-3.6
02328	Campion College	30.162	32,847	31.794	31,767	1.632	-3.3
02054	Calabar High	53.622	30,439	61.230	29,534	7.608	-3.0
06098	Iona High	46.611	26,339	60.481	25,644	13.870	-2.6
02062	St. Andrew High	47.705	31,939	64.254	31,114	16.548	-2.6
09044	Rusea's High	10.351	27,039	10.078	26,357	-0.273	-2.5
02055	Excelsior High	23.261	29061	25.206	28,428	1.945	-2.2
12060	Holmwood Technical High	21.675	31,542	17.103	31,353	-4.572	-0.6
02155	Tarrant High	31.503	29,694	38.855	29,562	7.352	-0.4
01017	Holy Trinity High	36.241	29,256	41.831	29,127	5.590	-0.4
07042	Cedric Titus High	28.632	26,116	29.404	26,018	0.772	-0.4

Table 13: Comparison: Fixed Allotment Per Weighted Pupil with Extra Weights for Technical Schools and Kingston Region vs. Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Weighted Pupil, Plus Adjustments			
		Aggregate (J$ millions)	Per Pupil (J$)	Aggregate (J$ millions)	Per Pupil (J$)	Change (J$ millions)	Percent Change
11110	Balaclava High	30.451	26,456	30.337	26,453	-0.113	0.0
03050	Yallahs High	40.950	28,884	33.596	29,007	-7.353	0.4
01028	Dunoon Park Technical High	21.996	36,125	20.039	36,469	-1.958	1.0
01038	St. George's College	34.270	29,739	35.060	30,028	0.790	1.0
13110	Lennon High	51.987	26,271	67.182	26,572	15.195	1.1
12031	May Day High	33.451	25,635	42.877	26,003	9.427	1.4
13107	Alston High	49.191	25,553	57.262	25,977	8.071	1.7
13109	Bustamante High	30.150	25,667	37.629	26,147	7.479	1.9
01039	Camperdown High	41.806	30,041	44.704	30,642	2.899	2.0
04047	Titchfield High	28.369	26,730	32.347	27,267	3.978	2.0
13097	Edwin Allen High	49.590	25,645	48.338	26,167	-1.252	2.0
08041	Mount Alvernia High	34.388	26,984	42.765	27,606	8.377	2.3
05082	Brimmer Vale High	17.384	25,434	16.323	26,047	-1.061	2.4
07041	William Knibb Memorial High	41.755	25,316	39.908	25,998	-1.847	2.7
01033	Vauxhall High	54.403	28,588	48.488	29,358	-5.915	2.7
14117	McGrath High	29.680	25,419	32.966	26,114	3.287	2.7
14072	St. Mary's College	30.657	25,360	41.624	26,121	10.967	3.0
14106	Spanish Town High	23.194	25,068	25.517	25,880	2.323	3.2
14084	Waterford High	43.753	25,407	48.856	26,277	5.104	3.4
13124	Kemps Hill High	31.590	25,500	27.334	26,493	-4.256	3.9
06064	York Castle High	31.536	26,389	22.087	27,431	-9.449	3.9
02245	Penwood High	29.877	27,443	19.482	28,691	-10.395	4.6
02302	Clan Carthy High	51.145	27,312	48.929	28,751	-2.216	5.3
06071	Ferncourt High	44.433	24,825	48.911	26,168	4.477	5.4
05087	Oracabessa High	24.656	24,366	21.766	25,733	-2.890	5.6
13108	Denbigh High	35.835	24,393	38.670	25,773	2.835	5.7
05084	Tacky High	34.450	24,306	39.238	25,915	4.789	6.6
08078	Herbert Morrison Technical High	41.776	28,152	53.050	30,104	11.274	6.9
02301	Mona High	22.409	26,561	22.406	28,405	-0.003	6.9
04033	Port Antonio High	16.438	24,954	15.480	26,717	-0.958	7.1
14114	Old Harbour High	20.995	25,065	21.297	26,853	0.302	7.1
02052	Papine High	14.015	26,790	13.270	28,896	-0.744	7.9
11106	Lacovia High	49.831	24,612	46.562	26,559	-3.269	7.9
14119	Guys Hill High	39.491	24,212	39.254	26,154	-0.236	8.0
12087	Bellefield High	18.224	24,356	15.056	26,365	-3.168	8.2
13120	Spaldings High	21.863	24,453	25.386	26,474	3.523	8.3
12078	Christiana High	53.486	23,963	57.924	25,952	4.438	8.3
06102	Aabuthnott Gallimore High	36.924	24,537	39.969	26,589	3.045	8.4
13092	Central High	14.158	24,082	11.097	26,415	-3.061	9.7
10070	Little London High	17.394	23,499	15.489	25,853	-1.905	10.0
11104	Black River High	22.137	24,083	20.733	26,510	-1.404	10.1
10062	Godfrey Stewart High	48.801	23,537	44.098	26,143	-4.703	11.1
03052	St. Thomas Technical High	35.392	27,337	31.063	30,451	-4.329	11.4
10071	Petersfield High	40.908	23,536	37.550	26,281	-3.358	11.7
13115	Garvey Maceo High	51.897	23,469	38.777	26,216	-13.120	11.7

Table 13: Comparison: Fixed Allotment Per Weighted Pupil with Extra Weights for Technical Schools and Kingston Region vs. Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Weighted Pupil, Plus Adjustments			
		Aggregate (J$ millions)	Per Pupil (J$)	Aggregate (J$ millions)	Per Pupil (J$)	Change (J$ millions)	Percent Change
05083	St. Mary Technical High	49.392	26,911	54.177	30,440	4.785	13.1
03054	Seaforth High	59.086	22,925	60.289	26,052	1.204	13.6
11108	B. B. Coke High	18.807	23,403	19.119	26,657	0.312	13.9
14083	Jonathan Grant High	33.467	22,592	35.361	25,748	1.894	14.0
09042	Knockalva Technical High	22.048	26,464	22.460	30,175	0.412	14.0
06095	Ocho Rios High	30.895	23,063	31.248	26,335	0.353	14.2
14112	Ewarton High	18.211	22,774	17.559	26,095	-0.652	14.6
13127	Claude McKay High	23.069	22,732	30.847	26,047	7.778	14.6
07035	Muschett High	31.355	22,085	35.025	25,491	3.670	15.4
14113	Glengoffe High	39.858	23,130	43.152	26,844	3.295	16.1
12075	Porus High	27.846	22,633	28.931	26,280	1.085	16.1
08074	Anchovy High	20.959	22,248	24.016	25,898	3.056	16.4
14143	Ascot High	50.828	21,805	45.451	25,789	-5.377	18.3
14089	Tacius Golding High	21.303	22,315	21.941	26,655	0.639	19.5
05061	Islington High	71.331	21,866	63.917	26,162	-7.414	19.6
02274	Norman Manley High	48.605	23,644	35.334	28,428	-13.271	20.2
02060	Oberlin High	56.752	23,907	64.679	29,198	7.927	22.1
07034	Albert Town High	36.535	21,592	37.787	26,631	1.251	23.3
09046	Green Island High	29.635	20,816	25.179	25,887	-4.456	24.4
08077	Cambridge High	29.187	20,636	34.865	25,755	5.677	24.8
14118	Bog Walk High	56.277	21,073	58.100	26,333	1.823	25.0
02326	Donald Quarrie High	26.099	23,140	29.905	28,969	3.806	25.2
11109	Maggotty High	21.788	22,521	25.287	28,598	3.499	27.0
08063	Maldon High	61.610	20,509	66.005	26,289	4.395	28.2
08050	St. James High	26.791	21,159	27.524	27,343	0.732	29.2
06096	Browns Town High	31.062	21,024	38.815	27,281	7.753	29.8
13114	Kellits High	29.466	19,836	31.830	26,524	2.364	33.7
06097	Marcus Garvey Technical	38.796	22,282	32.171	30,011	-6.625	34.7
10069	Grange Hill High	17.717	19,342	30.468	26,261	12.752	35.8
14982	Bridgeport High	20.736	17,087	24.525	24,741	3.789	44.8
14142	Greater Portmore High	53.255	14,776	59.160	25,411	5.905	72.0
	Sum/Average	**5259.808**	**27,826**	**5259.808**	**27,826**	**0.000**	**0.0**

But again, the arbitrariness of the aforesaid formula features needs to be emphasized. That arbitrariness consists not just of selecting particular numerical adjustment factors, such as the 10 percent and 15 percent factors used in the illustration. It also extends to the identification of the school categories to which the adjustments apply, and even to the idea of applying a uniform percentage adjustment to all schools in a category. One can argue, for example, that even if extra funding for vocational education generally is justified by higher costs, it does not follow that the adjustment percentage should be the same for every technical-vocational school. While some

vocational programs, those involving industrial-type facilities and equipment, undoubtedly do incur extra expenses, other vocational programs, such as those preparing pupils for careers in business administration, probably do not. Moreover, an adjustment for vocational programs should not necessarily be limited to schools officially designated technical-vocational. Other Jamaican high schools (many schools formerly called comprehensive) offer vocational programs as well. Ideally, if such adjustments are to be made, they should be based on the specific program offerings and program mixes of each school. A broad-brush adjustment, such as that illustrated above, can be no more than a crude proxy for a more appropriate approach.

Table 14: Summary of Effects: Change to an Allocation Per Weighted Pupil, with Extra Weights for Technical-Vocational Schools and the Kingston Region (Excluding Cost Sharing)

Indicator	Comparison with a Flat Grant Per Weighted Pupil	Comparison with Actual 2000-01 Allocations
Number of schools that would gain funds	56	75
Number of schools that would lose funds	92	73
Gains as percentage of total funds	2.6	6.2
Losses as percentage of total funds	2.6	6.2
Percentage change in allocations to:		
Former secondary high schools	-0.4	-4.0
Former comprehensive high schools	-2.0	5.6
Technical-vocational high schools	12.2	-6.9
Kingston-area schools (Region 1)	6.3	-7.5
Schools outside Kingston area (Regions 2-6)	-2.7	3.9
Percentage change in allocations to:		
Schools initially in 1st (highest-spending) quintile	6.6	-19.3
Schools initially in 2nd spending quintile	1.3	-7.3
Schools initially in 3rd (middle) spending quintile	1.2	0.7
Schools initially in 4th spending quintile	-3.4	7.3
Schools initially in 5th (lowest-spending) quintile	-3.2	22.7
Number of schools by percentage change in funding		
Loss more than 25 percent	0	11
Loss between 10 and 25 percent	0	29
Gain or loss of less than 10 percent	134	71
Gain between 10 and 25 percent	14	27
Gain more than 25 percent	0	10

Test Scores as an Indicator of Educational Needs

Although Jamaica does not have school-by-school data on such need-related factors as pupils' family income, it does have the data needed to construct a more direct indicator of relative educational needs, namely, test scores of entering pupils. Specifically, data are now available for most—though not all—high schools on the average scores received by entering 7th graders on their grade 6 primary school-leaving examinations. These scores can be used to create an adjustment factor that increases in value as the average test score decreases. The effect of incorporating such a factor into the fund allocation formula would be to channel extra funds to high schools whose entering pupils have relatively low scores. The rationale for doing so would be that high schools with low-performing entrants face more difficult educational tasks, and hence require additional resources to produce a given level of educational results.

The following are the details of how a particular type of test-score factor has been constructed for the purpose of this exercise, how the factor has been inserted into an allocation formula, and how its presence affects the interschool distribution of funds:

- The pertinent data consist of the average scores of entering 7th graders on two 6th grade school-leaving examinations, a mathematics test and a language test. Scores on the mathematics test vary among high schools from about 28 to 97, around an average of 59; scores on the language test very from about 30 to 97, around an average of 66. (These scores are available only for schools with entering 7th graders. This excludes seven technical-vocational schools that serve only pupils in grade 8 or 9 and above.)
- The formula factor examined here is based on the normalized average of the mathematics and language scores. This average has been constructed by expressing each school's average score on each test relative to the all-school average score on the same test and then averaging the resulting two relative scores to produce a composite relative score. The values of this composite score range from 0.47 to 1.56, around an average set, by definition, at 1.00.
- The adjustment factor to be used in the formula takes the form $F = a + bT$, where T is the aforesaid composite score, and the coefficients a and b are set so that (1) the factor equals 1.0 for a school whose composite relative test score is 1.0, and (2) the value of the factor exceeds 1.0 by a specified fraction for the school with the lowest test score. That fraction, a policy parameter, represents the maximum increment in funding a school can receive by virtue of having low test scores. For this exercise, the parameter has been assigned a value around 0.3, meaning that the worst-performing school will receive, other things being equal, about 30 percent more funding per pupil than a school with an average test score. The values of a and b that satisfy these conditions are $a = 1.6$, $b = 0.6$, which yields the equation, $F = 1.6 – 0.6T$, for calculating the value of the factor for each school. (The value of F has been set at 1.0 for each of the aforementioned seven vocational schools for which test scores are unavailable.)
- An optional additional feature incorporated into this illustration is that the adjustment factor is subject to the constraint $F = 1$ for $T \geq 1$. This means that the test-score factor takes on values greater than 1.0 for schools with below-average scores but is held equal exactly to 1.0 for

all schools whose scores are at or above the all-school average. Thus, a school is not "penalized" for having an above-average test score; it receives exactly the same funding per pupil, other things being equal, as a school whose pupils score just at the national average level.

Table 15 provides a school-by-school comparison of actual 200-01 allocations against the allocations that result when the test-score adjustment factor is incorporated multiplicatively into a simple flat grant formula. It also shows, in its two right-hand columns, each school's calculated test-score factor and the normalized average test score from which that factor is calculated. Table 16 presents two sets of summary statistics: the first compares the formula with the test-score factor against a simple flat grant; the second compares it against the actual 2000-01 allocations.

Consider the distribution of test scores and the test-score adjustment factor shown in the last two columns of Table 15. The normalized composite average test scores range from 0.464 to 1.554. A total of 78 high schools have test scores less than 1.0 and, correspondingly, adjustment factors greater than 1.0. Among these schools, the maximum value of the adjustment factor, corresponding to the lowest test score, is 1.32 (St. Anne's High). For the remaining 70 high schools (including the seven technical-vocational schools for which no test scores are available), the adjustment factor is constrained to be exactly 1.0. Thus, the schools with the highest average test scores—Immaculate Conception, Campion College, Ardenne, and Montego Bay, all with normalized scores greater than 1.5—receive the same funding under this formula as they would have received if they had test scores of only 1.0.

There is a very large difference in test scores between the former secondary and former comprehensive high schools. The average normalized scores are 1.27 and 0.78, respectively. Only 8 out of 59 former secondary highs, as compared with 67 out of 75 former comprehensive highs, have average scores of less than 1.0. But this difference, though dramatic, cannot be considered surprising, considering that the former secondary high schools are able to set academic performance standards for the pupils they admit.

On the other hand, the relationship between test scores and per-pupil spending is weaker than might have been expected. The coefficient of correlation between the average normalized test score and actual 2000-01 spending per pupil, exclusive of cost sharing, is only 0.33. With cost sharing included, the coefficient rises to 0.48. (The reason for this difference is that the correlation between test scores and cost-sharing income per pupil is quite strong—a coefficient of 0.72.)[20] High schools in the two highest-spending-per-pupil quintiles have average test scores of 1.12 and 1.23, respectively, as compared with average scores of .94, .90, and .82, respectively, for schools in the third, fourth, and fifth quintiles. One thing that prevents the relationship from being stronger is that the highest-spending quintile includes several former comprehensive high schools with notably low test scores—e.g., St. Anne's, Trench Town, and Charlie Smith Highs. It would be

[20] These correlation coefficients are calculated for the 141 high schools for which 7th graders' scores on the 6th grade school-leaving examination are available. The seven technical-vocational schools for which such data are lacking are excluded.

interesting to know what explains the conjunction, in these instances, of low-scoring incoming pupils and high per-pupil outlay.

Table 15: Comparison: Allocation in Proportion to Enrollment, Adjusted by Test Score Factor, versus Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Pupil + Test Score Adjustment				Normalized Avg. Test Score	Test Score Factor
		Aggregate	Per Pupil	Aggregate	Per Pupil	Change	%Change		
02247	St. Andrew Technical High	55.733	57,814	25.273	26,217	-30.460	-54.7	a	1.00
01041	Kingston Technical High	43.644	48,710	23.490	26,217	-20.154	-46.2	a	1.00
14074	Dinthill Technical High	48.605	43,947	28.996	26,217	-19.609	-40.3	a	1.00
11075	Munro College	29.877	42,560	18.404	26,217	-11.473	-38.4	1.440	1.00
13083	Vere Technical High	51.897	42,330	32.142	26,217	-19.755	-38.1	a	1.00
02332	Priory High	14.484	40,234	9.438	26,217	-5.046	-34.8	1.284	1.00
11074	Hampton School	31.536	39,030	21.183	26,217	-10.353	-32.8	1.452	1.00
02330	Mavis Bank High	13.311	43,501	9.051	29,577	-4.261	-32.0	0.786	1.13
02373	Haile Selassie High	23.499	44,930	16.164	30,906	-7.335	-31.2	0.702	1.18
14128	Jose Marti Technical High	38.796	37,593	27.056	26,217	-11.740	-30.3	a	1.00
01133	St. Anne's High	21.925	49,380	15.384	34,648	-6.541	-29.8	0.464	1.32
02061	The Queens School	47.943	36,794	34.161	26,217	-13.782	-28.7	1.363	1.00
01028	Dunoon Park Technical High	42.411	36,125	30.779	26,217	-11.633	-27.4	a	1.00
02246	Trench Town High	26.447	43,570	19.303	31,801	-7.144	-27.0	0.645	1.21
01043	Wolmer's Girls School	45.496	35,571	33.531	26,217	-11.964	-26.3	1.468	1.00
02056	Holy Childhood High	56.701	35,527	41.842	26,217	-14.859	-26.2	1.378	1.00
01037	Kingston College	61.949	35,019	46.378	26,217	-15.572	-25.1	1.333	1.00
02059	Merl Grove High	48.245	34,338	36.835	26,217	-11.411	-23.7	1.310	1.00
02058	Jamaica College	43.569	33,774	33.820	26,217	-9.749	-22.4	1.298	1.00
02320	Gaynstead High	10.341	33,360	8.127	26,217	-2.214	-21.4	1.197	1.00
08035	Cornwall College	40.950	33,320	32.220	26,217	-8.729	-21.3	1.428	1.00
02066	Meadowbrook High	44.468	33,111	35.209	26,217	-9.259	-20.8	1.404	1.00
02057	Immaculate Conception High	50.396	33,090	39.928	26,217	-10.468	-20.8	1.535	1.00
07032	Westwood High	21.675	32,891	17.277	26,217	-4.398	-20.3	1.378	1.00
01036	Convent of Mercy "Alpha"	40.869	32,879	32.587	26,217	-8.281	-20.3	1.322	1.00
02328	Campion College	46.840	32,847	37.385	26,217	-9.454	-20.2	1.554	1.00
02275	Pembroke Hall High	41.009	33,669	33.029	27,117	-7.980	-19.5	0.943	1.03
11087	St. Elizabeth Technical High	51.145	3,473	41.291	26,217	-9.854	-19.3	1.324	1.00
02063	St. Hugh's High	49.316	32,296	40.033	26,217	-9.283	-18.8	1.360	1.00
01042	Wolmer's Boys School	41.267	32,115	33.689	26,217	-7.579	-18.4	1.453	1.00
02062	St. Andrew High	42.926	31,939	35.235	26,217	-7.691	-17.9	1.480	1.00
03039	Morant Bay High	36.826	31,884	30.280	26,217	-6.545	-17.8	1.274	1.00
14088	Charlemont High	29.635	31,729	24.487	26,217	-5.148	-17.4	1.264	1.00
10020	Frome Technical High	41.755	31,728	34.501	26,217	-7.253	-17.4	1.172	1.00
12061	Bishop Gibson High	18.224	31,584	15.127	26,217	-3.097	-17.0	1.400	1.00
12060	Holmwood Technical High	39.491	31,542	32.823	26,217	-6.667	-16.9	a	1.00
14071	St. Jago High	50.828	31,356	42.497	26,217	-8.330	-16.4	1.448	1.00
02053	Ardenne High	54.395	31,279	45.591	26,217	-8.804	-16.2	1.513	1.00
01125	Tivoli Gardens High	66.559	35,273	56.013	29,683	-10.547	-15.8	0.780	1.13
02324	Edith Dalton James High	36.200	33,991	30.647	28,776	-5.554	-15.3	0.837	1.10
10055	Manning's High	54.403	30,911	46.142	26,217	-8.261	-15.2	1.408	1.00
13071	Glenmuir High	40.908	30,781	34.842	26,217	-6.066	-14.8	1.458	1.00
05066	St. Mary High	41.974	30,660	35.891	26,217	-6.083	-14.5	1.351	1.00
02054	Calabar High	52.112	30,439	44.883	26,217	-7.229	-13.9	1.292	1.00

Table 15: Comparison: Allocation in Proportion to Enrollment, Adjusted by Test Score Factor, versus Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Pupil + Test Score Adjustment				Normalized Avg. Test Score	Test Score Factor
		Aggregate	Per Pupil	Aggregate	Per Pupil	Change	%Change		
01018	Kingston High	25.402	32,990	21.942	28,496	-3.460	-13.6	0.855	1.09
14073	St. Catherine High	71.331	30,315	61.688	26,217	-9.643	-13.5	1.277	1.00
01039	Camperdown High	41.216	30,041	35.969	26,217	-5.247	-12.7	1.243	1.00
12059	Manchester High	49.831	29,893	43.703	26,217	-6.128	-12.3	1.435	1.00
13069	Clarendon College	48.801	29,866	42.838	26,217	-5.963	-12.2	1.298	1.00
01038	St. George's College	39.940	29,739	35.209	26,217	-4.731	-11.8	1.379	1.00
06063	St. Hilda's Diocesan High	28.873	29,613	25.561	26,217	-3.311	-11.5	1.353	1.00
02155	Tarrant High	29.011	29,694	25.762	26,368	-3.249	-11.2	0.990	1.01
13070	Knox College	35.392	29,274	31.696	26,217	-3.696	-10.4	1.289	1.00
02190	Charlie Smith High	19.093	37,364	17.120	33,502	-1.973	-10.3	0.537	1.28
04046	Happy Grove High	31.791	29,193	28.578	26,242	-3.214	-10.1	0.998	1.00
02055	Excelsior High	56.029	29,061	50.546	26,217	-5.483	-9.8	1.269	1.00
05072	Marymount High	19.541	28,822	17.775	26,217	-1.766	-9.0	1.216	1.00
08036	Montego Bay High	21.996	28,791	20.030	26,217	-1.967	-8.9	1.526	1.00
12100	Winston Jones High	14.158	33,003	12.918	30,113	-1.240	-8.8	0.752	1.15
01013	Denham Town High	41.481	34,029	38.351	31,461	-3.130	-7.5	0.667	1.20
08078	Herbert Morrison Tech. High	41.806	28,152	38.932	26,217	-2.874	-6.9	1.386	1.00
09102	Merlene Ottey High	17.384	29,266	16.285	27,415	-1.100	-6.3	0.924	1.05
12102	DeCarteret College	22.137	27,950	20.764	26,217	-1.373	-6.2	1.302	1.00
09044	Rusea's High	49.590	27,039	48.082	26,217	-1.509	-3.0	1.169	1.00
08041	Mount Alvernia High	34.270	26,984	33.295	26,217	-0.974	-2.8	1.390	1.00
05083	St. Mary Technical High	22.202	26,911	21.629	26,217	-0.573	-2.6	1.096	1.00
10072	Maud McLeod High	31.590	30,029	30.945	29,415	-0.646	-2.0	0.797	1.12
04047	Titchfield High	45.575	26,730	44.700	26,217	-0.875	-1.9	1.262	1.00
04058	Buff Bay High	21.347	29,607	21.026	29,162	-0.321	-1.5	0.813	1.11
02301	Mona High	32.166	26,561	31.749	26,217	-0.417	-1.3	1.179	1.00
03052	St. Thomas Technical High	32.968	27,337	32.613	27,042	-0.355	-1.1	0.948	1.03
01033	Vauxhall High	45.169	28,588	44.825	28,371	-0.343	-0.8	0.863	1.08
06064	York Castle High	27.551	26,389	27.370	26,217	-0.180	-0.7	1.285	1.00
06098	Iona High	10.351	26,339	10.303	26,217	-0.048	-0.5	1.044	1.00
01017	Holy Trinity High	51.988	29,256	51.765	29,131	-0.223	-0.4	0.815	1.11
02052	Papine High	39.649	26,790	40.247	27,194	0.597	1.5	0.938	1.04
13097	Edwin Allen High	59.086	25,645	60.404	26,217	1.318	2.2	1.046	1.00
12031	May Day High	20.995	25,635	21.472	26,217	0.477	2.3	1.034	1.00
14072	St. Mary's College	21.303	25,360	22.022	26,217	0.720	3.4	1.053	1.00
07041	William Knibb Memorial High	28.632	25,316	29.651	26,217	1.019	3.6	1.176	1.00
02245	Penwood High	22.668	27,443	23.649	28,631	0.982	4.3	0.847	1.09
14117	McGrath High	26.791	25,419	28.013	26,578	1.222	4.6	0.977	1.01
14106	Spanish Town High	56.277	25,068	58.886	26,230	2.608	4.6	0.999	1.00
02302	Clan Carthy High	34.904	27,312	36.642	28,672	1.738	5.0	0.844	1.09
12033	Mile Gully High	14.015	28,086	14.730	29,519	0.715	5.1	0.790	1.13
14114	Old Harbour High	61.610	25,065	64.797	26,362	3.187	5.2	0.991	1.01
11112	Lewisville High	16.438	29,832	17.340	31,471	0.903	5.5	0.666	1.20
06071	Ferncourt High	30.162	24,825	31.853	26,217	1.691	5.6	1.187	1.00
09042	Knockalva Technical High	28.369	26,464	30.299	28,264	1.929	6.8	0.870	1.08
12101	Cross Keys High	17.394	28,750	18.654	30,834	1.261	7.2	0.706	1.18
13108	Denbigh High	33.467	24,393	35.969	26,217	2.503	7.5	1.005	1.00
13110	Lennon High	30.895	26,271	33.255	28,278	2.360	7.6	0.869	1.08

Table 15: Comparison: Allocation in Proportion to Enrollment, Adjusted by Test Score Factor, versus Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Pupil + Test Score Adjustment				Normalized Avg. Test Score	Test Score Factor
		Aggregate	Per Pupil	Aggregate	Per Pupil	Change	%Change		
12087	Bellefield High	36.924	24,356	39.745	26,217	2.821	7.6	1.027	1.00
11104	Black River High	44.433	24,083	48.370	26,217	3.937	8.9	1.176	1.00
02060	Oberlin High	42.196	23,907	46.273	26,217	4.077	9.7	1.069	1.00
04033	Port Antonio High	35.609	24,954	39.464	27,655	3.855	10.8	0.909	1.05
14982	Bridgeport High	53.255	23,564	59.250	26,217	5.995	11.3	1.014	1.00
06102	Aabuthnott Gallimore High	23.261	24,537	25.907	27,328	2.646	11.4	0.929	1.04
13115	Garvey Maceo High	31.355	23,469	35.026	26,217	3.671	11.7	1.184	1.00
06095	Ocho Rios High	53.622	23,063	60.954	26,217	7.332	13.7	1.015	1.00
03053	Robert Lightbourne High	19.275	28,941	22.059	33,121	2.784	14.4	0.561	1.26
11105	Newell High	24.656	28,570	28.301	32,794	3.645	14.8	0.582	1.25
11106	Lacovia High	35.835	24,612	41.264	28,341	5.429	15.2	0.865	1.08
03050	Yallahs High	30.791	28,884	35.552	33,351	4.761	15.5	0.546	1.27
14083	Jonathan Grant High	56.752	22,592	65.857	26,217	9.104	16.0	1.073	1.00
13124	Kemps Hill High	27.846	25,500	32.361	29,635	4.516	16.2	0.783	1.13
13092	Central High	49.392	24,082	57.650	28,108	8.258	16.7	0.880	1.07
04061	Fair Prospect High	17.914	27,688	20.985	32,434	3.071	17.1	0.605	1.24
14119	Guys Hill High	29.466	24,212	34.542	28,383	5.076	17.2	0.862	1.08
07042	Cedric Titus High	30.451	26,116	35.838	30,736	5.387	17.7	0.713	1.17
08074	Anchovy High	49.191	22,248	57.965	26,217	8.775	17.8	1.091	1.00
02274	Norman Manley High	48.944	23,644	57.750	27,898	8.806	18.0	0.893	1.06
03054	Seaforth High	45.047	22,925	53.726	27,341	8.678	19.3	0.929	1.04
13120	Spaldings High	39.858	24,453	48.245	29,598	8.388	21.0	0.785	1.13
11110	Balaclava High	22.409	26,456	27.292	32,222	4.884	21.8	0.618	1.23
11109	Maggotty High	41.776	22,521	50.921	27,451	9.145	21.9	0.922	1.05
12078	Christiana High	53.486	23,963	65.370	29,287	11.884	22.2	0.805	1.12
10071	Petersfield High	43.753	23,536	53.885	28,986	10.132	23.2	0.824	1.11
11108	B. B. Coke High	34.450	23,403	42.615	28,950	8.165	23.7	0.826	1.10
02326	Donald Quarrie High	37.000	23,140	46.006	28,771	9.006	24.3	0.838	1.10
13109	Bustamante High	22.048	25,667	27.495	32,008	5.447	24.7	0.632	1.22
13111	Thompson Town High	18.211	26,624	22.910	33,494	4.699	25.8	0.537	1.28
07035	Muschett High	36.241	22,085	45.663	27,826	9.422	26.0	0.898	1.06
06097	Marcus Garvey Technical	47.705	22,282	60.190	28,113	12.484	26.2	0.879	1.07
08063	Maldon High	33.451	20,509	43.206	26,490	9.755	29.2	0.983	1.01
05084	Tacky High	24.330	24,306	31.498	31,466	7.168	29.5	0.666	1.20
10062	Godfrey Stewart High	29.680	23,537	38.452	30,494	8.773	29.6	0.728	1.16
05087	Oracabessa High	31.847	24,366	41.308	31,605	9.462	29.7	0.657	1.21
14084	Waterford High	36.535	25,407	47.443	32,993	10.908	29.9	0.569	1.26
08050	St. James High	51.987	21,159	67.960	27,660	15.973	30.7	0.908	1.06
05082	Brimmer Vale High	26.069	25,434	34.133	33,300	8.063	30.9	0.550	1.27
13107	Alston High	18.807	25,553	24.785	33,675	5.978	31.8	0.526	1.28
13127	Claude McKay High	20.959	22,732	28.002	30,371	7.043	33.6	0.736	1.16
14113	Glengoffe High	21.788	23,130	29.367	31,175	7.579	34.8	0.685	1.19
07034	Albert Town High	31.503	21,592	42.866	29,380	11.363	36.1	0.799	1.12
14112	Ewarton High	26.099	22,774	35.662	31,118	9.563	36.6	0.688	1.19
10070	Little London High	23.194	23,499	31.772	32,190	8.578	37.0	0.620	1.23
14143	Ascot High	20.736	21,805	28.609	30,083	7.873	38.0	0.754	1.15
08077	Cambridge High	30.150	20,636	42.126	28,834	11.976	39.7	0.834	1.10
06096	Browns Town High	46.611	21,024	65.169	29,395	18.558	39.8	0.798	1.12

Table 15: Comparison: Allocation in Proportion to Enrollment, Adjusted by Test Score Factor, versus Existing Allocation

School Code and Name		Current Allocations		Flat Grant Per Pupil + Test Score Adjustment				Normalized Avg. Test Score	Test Score Factor
		Aggregate	Per Pupil	Aggregate	Per Pupil	Change	%Change		
14118	Bog Walk High	31.062	21,073	43.508	29,517	12.446	40.1	0.790	1.13
09046	Green Island High	34.388	20,816	48.608	29,424	14.221	41.4	0.796	1.12
05061	Islington High	21.757	21,866	30.799	30,954	9.042	41.6	0.699	1.18
14089	Tacius Golding High	29.187	22,315	41.588	31,795	12.400	42.5	0.645	1.21
12075	Porus High	21.863	22,633	31.513	32,623	9.650	44.1	0.593	1.24
13114	Kellits High	23.069	19,836	36.968	31,787	13.899	60.2	0.646	1.21
10069	Grange Hill High	30.657	19,342	50.761	32,026	20.103	65.6	0.631	1.22
14142	Greater Portmore High	17.717	14,776	39.461	32,912	21.744	122.7	0.574	1.26
	Sum/Average	5259.808	27,826	5259.808	27,826	0.000	0	1.000	

Table 16: Summary of Effects: Allocation in Proportion to Enrollment, Adjusted by a Test Score Factor (Excluding Cost Sharing)

Indicator	Comparison with a Flat Grant Per Pupil	Comparison with Actual 2000-01 Allocations
Number of schools that would gain funds	63	73
Number of schools that would lose funds	85	75
Gains as percentage of total funds	3.2	9.6
Losses as percentage of total funds	3.2	9.6
Percentage change in allocations to:		
Former secondary high schools	-5.1	-9.8
Former comprehensive high schools	5.1	14.9
Technical-vocational high schools	-4.3	-21.6
Kingston-area schools (Region 1)	-1.7	-15.5
Schools outside Kingston area (Regions 2-6)	0.7	8.1
Percentage change in allocations to:		
Schools initially in 1st (highest-spending) quintile	-1.8	-27.4
Schools initially in 2nd spending quintile	-4.8	-14.7
Schools initially in 3rd (middle) spending quintile	0.7	1.1
Schools initially in 4th spending quintile	1.1	14.1
Schools initially in 5th (lowest-spending) quintile	3.7	32.0
Number of schools by percentage change in funding		
Loss more than 25 percent	0	17
Loss between 10 and 25 percent	0	38
Gain or loss of less than 10 percent	119	40
Gain between 10 and 25 percent	29	26
Gain more than 25 percent	0	27

The first column of Table 16 shows that the introduction of the test score factor, holding the total pot of money constant, results in a net increase in funding for 63 of the 148 high schools and a net reduction for the remaining 85 schools. (These gains and losses are expressed relative to what each school would receive under a simple flat grant formula.) Twenty-nine of the gainers would benefit by 10 percent or more, while the remainder would receive increases between zero and 10 percent. All 70 schools with a normalized test score of 1.0 or more would lose exactly the same percentage of total funding, 5.8 percent, because of the presence of the test score factor. The overall effect of the adjustment would be to shift 3.2 percent of the total high school sector budget from high-scoring to low-scoring schools. The former comprehensive high schools as a group would gain about 5 percent from the adjustment, while the former secondary high schools and the technical-vocational high schools would lose about 5 percent and 4 percent, respectively. There would also be a slight shift of funds from the Kingston area to other regions.

In general, introducing a test-score factor would reinforce the equalizing effect of the shift to a flat grant formula. Comparing the statistics in the right-hand column of Table 16 with the corresponding statistics in the left-hand column of Table 10, we see that the numbers of schools gaining or losing more than 25 percent of their actual 2000-01 funds become larger when the test-score adjustment is added. Similarly, adding the test-score factor results in a somewhat larger loss of funding to the highest-spending quintile of schools—27.4 percent, as compared with 25.8 percent under the simple flat grant—and a somewhat larger gain for the lowest-spending quintile—32.0 percent, as compared with 28.6 percent. This accentuation of the redistributive effect occurs because of the aforementioned positive, though moderate, correlation between test scores and actual per-pupil spending. Even so, only 9.6 percent of the total funds available to the high school sector would be redistributed among schools if the test-score-adjusted flat grant formula were adopted.

A Composite, Multifactor Formula

The next simulation examines the combined effects of a number of the formula features already discussed. For this purpose, a composite formula has been constructed that allocates funds in proportion to a school's weighted enrollment, adjusted by (1) the same test-score factor as presented above and (2) the previously discussed extra weights for technical-vocational schools and schools in the Kingston region. To be precise, the formula is $G = kFA_TA_KE^*$, where G is a school's grant amount, F is the test score factor, A_T has the value 1.15 if the school is a technical-vocational school but 1.0 otherwise, A_K has the value 1.1 if the school is in the Kingston region but 1.0 otherwise, E* is the number of weighted pupils (calculated as shown earlier), and k is a multiplier chosen to maintain total spending for all 148 schools at the actual 2000-01 level. Given the data limitations, this is probably as close as one can come to demonstrating the effects of taking multiple need- and cost-related variables into account.

Table 17 shows the school-by-school effects of using the composite formula to distribute all high school funds exclusive of cost sharing; Table 18 shows the effects with cost sharing included. Each table compares the resulting distribution with the corresponding actual allocations in 2000-01. As before, the schools are arranged in order of decreasing losses or increasing per-

centage gains, making it easy to see which schools would be better off and which worse off if the formula in question were adopted. Table 19 presents two sets of summary statistics, corresponding, respectively, to the allocations shown in Tables 17 and 18.

Based on results already reported, it is apparent that the different elements incorporated into this multifactor formula will have partially offsetting effects. Both the pupil-weighting feature and the adjustments for technical-vocational schools and Kingston-area schools tend to favor higher-spending schools and thus to moderate the redistributive effects of basing fund allocations mainly on enrollment. But at the same time, the test-score factor tends to favor lower-spending schools and, more particularly, former comprehensive high schools, and thereby to amplify the redistributive effects.

Table 17: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Excluded

School Code and Name		Actual Allocatioins Aggregate (J$ millions)	Actual Allocatioins Per Pupil (J$)	Composite Formula, Cost Sharing Excluded Aggregate (J$ millioins)	Composite Formula, Cost Sharing Excluded Per Pupil (J$)	Change	% Change
02247	St. Andrew Technical High	41.481	57,814	40.537	33,746	-0.944	-41.63
11075	Munro College	51.988	42,560	54.286	26,196	2.298	-38.45
11074	Hampton School	25.402	39,030	23.307	25,803	-2.095	-33.89
02332	Priory High	42.411	40,234	40.414	26,817	-1.997	-33.35
01041	Kingston Technical High	45.169	48,710	47.382	32,822	2.214	-32.62
14074	Dinthill Technical High	40.869	43,947	34.852	30,156	-6.016	-31.38
13083	Vere Technical High	61.949	42,330	49.252	29,856	-12.698	-29.47
02330	Mavis Bank High	39.940	43,501	38.067	31,106	-1.874	-28.49
02246	Trench Town High	41.216	43,570	39.684	31,259	-1.532	-28.26
01133	St. Anne's High	43.644	49,380	29.409	36,094	-14.236	-26.90
07032	Westwood High	41.267	32,891	37.430	24,498	-3.838	-25.52
02320	Gaynstead High	45.496	33,360	38.079	25,524	-7.416	-23.49
02373	Haile Selassie High	66.559	44,930	59.621	34,520	-6.939	-23.17
08035	Cornwall College	21.925	33,320	16.026	25,804	-5.899	-22.56
12061	Bishop Gibson High	39.649	31,584	41.872	24,631	2.223	-22.02
02056	Holy Childhood High	54.395	35,527	49.447	27,776	-4.948	-21.82
14128	Jose Marti Technical High	52.112	37,593	47.727	29,425	-4.386	-21.73
01037	Kingston College	56.029	35,019	51.735	27,842	-4.293	-20.50
14088	Charlemont High	56.701	31,729	44.331	25,447	-12.370	-19.80
02058	Jamaica College	50.396	33,774	44.051	27,641	-6.345	-18.16
02059	Merl Grove High	43.569	34,338	35.656	28,382	-7.912	-17.34
02275	Pembroke Hall High	48.245	33,669	39.877	27,887	-8.368	-17.17
13070	Knox College	42.196	29,274	48.645	24,253	6.449	-17.15
05066	St. Mary High	47.943	30,660	39.897	25,504	-8.045	-16.82
02061	The Queens School	42.926	36,794	39.472	30,619	-3.454	-16.78
06063	St. Hilda's Diocesan High	49.316	29,613	43.315	24,783	-6.001	-16.31
01043	Wolmer's Girls School	44.468	35,571	38.399	29,773	-6.069	-16.30
10055	Manning's High	29.011	30,911	27.420	26,005	-1.591	-15.87
14071	St. Jago High	19.093	31,356	17.967	26,467	-1.126	-15.59
14073	St. Catherine High	22.668	30,315	24.430	25,641	1.763	-15.42
12100	Winston Jones High	26.447	33,003	18.974	28,045	-7.473	-15.02
01036	Convent of Mercy "Alpha"	55.733	32,879	32.532	28,039	-23.201	-14.72

Table 17: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Excluded

School Code and Name		Actual Allocatioins Aggregate (J$ millions)	Actual Allocatioins Per Pupil (J$)	Composite Formula, Cost Sharing Excluded Aggregate (J$ millioins)	Composite Formula, Cost Sharing Excluded Per Pupil (J$)	Change	% Change
13069	Clarendon College	48.944	29,866	59.109	25,475	10.165	-14.70
08036	Montego Bay High	41.009	28,791	33.967	24,758	-7.042	-14.01
04046	Happy Grove High	32.166	29,193	32.469	25,113	0.303	-13.98
03039	Morant Bay High	34.904	31,884	37.932	27,450	3.027	-13.91
02066	Meadowbrook High	10.341	33,111	7.912	28,592	-2.429	-13.65
13071	Glenmuir High	36.200	30,781	32.597	26,670	-3.604	-13.36
02057	Immaculate Conception High	37.000	33,090	47.985	28,924	10.985	-12.59
02063	St. Hugh's High	46.840	32,296	42.760	28,366	-4.079	-12.17
05072	Marymount High	13.311	28,822	9.518	25,414	-3.793	-11.82
12059	Manchester High	14.484	29,893	9.654	26,366	-4.830	-11.80
12102	DeCarteret College	23.499	27,950	18.054	24,710	-5.445	-11.59
01125	Tivoli Gardens High	36.826	35,273	31.705	31,595	-5.121	-10.42
02324	Edith Dalton James High	30.791	33,991	37.129	30,607	6.339	-9.95
10020	Frome Technical High	32.968	31,728	35.756	28,625	2.788	-9.78
11087	St. Elizabeth Technical High	19.275	32,473	20.767	29,324	1.492	-9.70
01042	Wolmer's Boys School	45.047	32,115	50.394	29,128	5.347	-9.30
02053	Ardenne High	35.609	31,279	37.961	28,434	2.352	-9.10
02328	Campion College	31.791	32,847	27.348	29,986	-4.444	-8.71
02054	Calabar High	45.575	30,439	43.884	27,878	-1.691	-8.42
10072	Maud McLeod High	21.347	30,029	20.117	27,518	-1.230	-8.36
01018	Kingston High	17.914	32,990	19.941	30,269	2.027	-8.25
06098	Iona High	21.757	26,339	29.011	24,206	7.254	-8.10
02062	St. Andrew High	41.974	31,939	34.915	29,369	-7.059	-8.05
09044	Rusea's High	19.541	27,039	17.231	24,879	-2.310	-7.99
02055	Excelsior High	26.069	29,061	32.011	26,834	5.941	-7.66
09102	Merlene Ottey High	22.202	29,266	23.705	27,125	1.503	-7.32
12060	Holmwood Technical High	24.330	31,542	29.389	29,595	5.059	-6.17
02190	Charlie Smith High	31.847	37,364	38.273	35,160	6.426	-5.90
04058	Buff Bay High	28.873	29,607	24.163	27,901	-4.710	-5.76
02155	Tarrant High	27.551	29,694	27.032	28,066	-0.519	-5.48
01028	Dunoon Park Technical High	30.162	36,125	30.011	34,424	-0.151	-4.71
01038	St. George's College	53.622	29,739	57.796	28,344	4.175	-4.69
12031	May Day High	46.611	25,635	64.011	24,545	17.400	-4.25
01039	Camperdown High	47.705	30,041	65.037	28,924	17.332	-3.72
04047	Titchfield High	10.351	26,730	9.513	25,738	-0.838	-3.71
13097	Edwin Allen High	23.261	25,645	24.802	24,700	1.541	-3.68
08041	Mount Alvernia High	21.675	26,984	16.144	26,058	-5.531	-3.43
07041	William Knibb Memorial High	31.503	25,316	41.102	24,541	9.599	-3.06
14072	St. Mary's College	36.241	25,360	41.910	24,656	5.668	-2.78
14106	Spanish Town High	28.632	25,068	27.755	24,441	-0.877	-2.50
01013	Denham Town High	30.451	34,029	33.572	33,255	3.121	-2.27
06064	York Castle High	40.950	26,389	31.713	25,893	-9.237	-1.88
14117	McGrath High	21.996	25,419	18.915	24,989	-3.081	-1.69
12101	Cross Keys High	34.270	28,750	33.094	28,422	-1.176	-1.14
06071	Ferncourt High	51.987	24,825	66.905	24,701	14.918	-0.50
13108	Denbigh High	33.451	24,393	40.895	24,328	7.445	-0.27
12033	Mile Gully High	49.191	28,086	54.051	28,265	4.860	0.64

Table 17: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Excluded

School Code and Name		Actual Allocatioins Aggregate (J$ millions)	Actual Allocatioins Per Pupil (J$)	Composite Formula, Cost Sharing Excluded Aggregate (J$ millioins)	Composite Formula, Cost Sharing Excluded Per Pupil (J$)	Change	% Change
08078	Herbert Morrison Tech. High	30.150	28,152	39.064	28,416	8.915	0.94
02301	Mona High	41.806	26,561	42.198	26,812	0.392	0.94
14114	Old Harbour High	28.369	25,065	32.918	25,487	4.548	1.68
12087	Bellefield High	49.590	24,356	45.628	24,886	-3.963	2.18
13110	Lennon High	34.388	26,271	45.305	27,054	10.917	2.98
11104	Black River High	17.384	24,083	16.112	25,023	-1.272	3.90
11105	Newell High	41.755	28,570	37.670	29,779	-4.085	4.23
01017	Holy Trinity High	54.403	29,256	45.769	30,549	-8.633	4.42
14982	Bridgeport High	29.680	23,564	36.194	24,709	6.514	4.86
01033	Vauxhall High	30.657	28,588	47.995	29,989	17.338	4.90
13115	Garvey Maceo High	23.194	23,469	29.575	24,746	6.381	5.44
02052	Papine High	43.753	26,790	50.988	28,292	7.235	5.61
04033	Port Antonio High	31.590	24,954	28.949	26,602	-2.641	6.61
06102	Aabuthnott Gallimore High	31.536	24,537	20.848	26,162	-10.688	6.62
11112	Lewisville High	29.877	29,832	18.389	31,833	-11.488	6.71
05083	St. Mary Technical High	51.145	26,911	46.186	28,734	-4.960	6.77
14083	Jonathan Grant High	44.433	22,592	46.168	24,304	1.735	7.58
03053	Robert Lightbourne High	24.656	28,941	25.699	31,182	1.043	7.74
02245	Penwood High	35.835	27,443	39.459	29,577	3.625	7.78
06095	Ocho Rios High	34.450	23,063	40.900	24,859	6.451	7.79
03052	St. Thomas Technical High	41.776	27,337	52.432	29,649	10.656	8.46
02302	Clan Carthy High	22.409	27,312	25.994	29,680	3.586	8.67
08074	Anchovy High	16.438	22,248	17.540	24,446	1.103	9.88
11106	Lacovia High	20.995	24,612	20.103	27,101	-0.892	10.11
07042	Cedric Titus High	14.015	26,116	14.104	28,793	0.089	10.25
14119	Guys Hill High	49.831	24,212	43.952	26,728	-5.879	10.39
13124	Kemps Hill High	39.491	25,500	37.053	28,268	-2.437	10.86
13092	Central High	18.224	24,082	14.212	26,733	-4.012	11.01
04061	Fair Prospect High	21.863	27,688	29.818	30,821	7.955	11.32
03054	Seaforth High	53.486	22,925	61.081	25,646	7.595	11.87
12078	Christiana High	36.924	23,963	37.728	27,366	0.804	14.20
02060	Oberlin High	14.158	23,907	12.031	27,561	-2.127	15.28
13120	Spaldings High	17.394	24,453	17.195	28,213	-0.199	15.38
07035	Muschett High	22.137	22,085	19.571	25,539	-2.566	15.64
11110	Balaclava High	48.801	26,456	41.626	30,690	-7.175	16.00
09042	Knockalva Technical High	35.392	26,464	29.322	30,707	-6.071	16.03
13111	Thompson Town High	40.908	26,624	35.444	30,957	-5.464	16.28
10071	Petersfield High	51.897	23,536	36.603	27,428	-15.294	16.54
13109	Bustamante High	49.392	25,667	54.829	30,132	5.437	17.40
11108	B. B. Coke High	59.086	23,403	56.909	27,786	-2.177	18.72
05087	Oracabessa High	18.807	24,366	23.181	29,283	4.374	20.18
03050	Yallahs High	33.467	28,884	33.378	34,831	-0.089	20.59
02274	Norman Manley High	22.048	23,644	25.884	28,555	3.836	20.77
05084	Tacky High	30.895	24,306	31.816	29,360	0.921	20.79
10062	Godfrey Stewart High	18.211	23,537	21.175	28,703	2.964	21.95
08063	Maldon High	23.069	20,509	35.304	25,074	12.235	22.26
05082	Brimmer Vale High	31.355	25,434	33.061	31,230	1.706	22.79
14084	Waterford High	39.858	25,407	45.987	31,214	6.129	22.86

Table 17: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Excluded

School Code and Name		Actual Allocatioins Aggregate (J$ millions)	Actual Allocatioins Per Pupil (J$)	Composite Formula, Cost Sharing Excluded Aggregate (J$ millioins)	Composite Formula, Cost Sharing Excluded Per Pupil (J$)	Change	% Change
13107	Alston High	27.846	25,553	30.869	31,496	3.023	23.26
13127	Claude McKay High	20.959	22,732	26.261	28,483	5.302	25.30
11109	Maggotty High	50.828	22,521	42.903	28,265	-7.925	25.51
10070	Little London High	21.303	23,499	20.711	29,964	-0.591	27.51
14143	Ascot High	71.331	21,805	60.333	27,933	-10.998	28.11
14112	Ewarton High	48.605	22,774	33.353	29,237	-15.252	28.38
08050	St. James High	56.752	21,159	61.053	27,230	4.300	28.70
08077	Cambridge High	36.535	20,636	44.886	26,738	8.351	29.57
02326	Donald Quarrie High	29.635	23,140	23.767	30,010	-5.868	29.69
14113	Glengoffe High	29.187	23,130	39.912	30,131	10.724	30.27
07034	Albert Town High	56.277	21,592	54.869	28,171	-1.408	30.47
09046	Green Island High	26.099	20,816	33.505	27,424	7.407	31.75
14118	Bog Walk High	21.788	21,073	28.384	27,985	6.596	32.80
05061	Islington High	61.610	21,866	62.648	29,157	1.038	33.34
06097	Marcus Garvey Technical	26.791	22,282	26.339	30,377	-0.453	36.33
12075	Porus High	31.062	22,633	41.250	30,868	10.188	36.39
14089	Tacius Golding High	29.466	22,315	32.528	30,514	3.062	36.74
06096	Browns Town High	38.796	21,024	30.367	28,873	-8.429	37.33
13114	Kellits High	17.717	19,836	36.104	30,356	18.387	53.03
10069	Grange Hill High	20.736	19,342	26.564	30,281	5.828	56.56
14142	Greater Portmore High	53.255	14,776	55.843	30,112	2.588	103.79
	Sum/Average	**5259.808**	**27,826**	**5259.808**	**27,826**	**0.000**	**0.00**

Table 18: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Included

		Actual Allocations		Composite Formula, Cost Sharing Included			
	School Code and Name	Aggregate (J$ milliions)	Per Pupil (J$)	Aggregate (J$ milliions)	Per Pupil (J$)	Change (J$ milliions)	% Change
11075	Munro College	44.664	50,812	47.176	30,486	2.512	-40.0
02247	St. Andrew Technical High	58.491	64,870	63.176	39,273	4.686	-39.5
11074	Hampton School	27.749	47,468	27.124	30,028	-0.625	-36.7
02332	Priory High	48.061	47,917	47.033	31,209	-1.028	-34.9
14074	Dinthill Technical High	49.431	50,547	55.142	35,095	5.711	-30.6
01041	Kingston Technical High	47.366	54,672	40.560	38,197	-6.806	-30.1
13083	Vere Technical High	73.988	49,582	57.318	34,745	-16.671	-29.9
02056	Holy Childhood High	49.254	45,565	44.301	32,325	-4.954	-29.1
07032	Westwood High	48.829	38,603	46.183	28,510	-2.646	-26.1
12061	Bishop Gibson High	48.986	38,732	34.225	28,664	-14.761	-26.0
13070	Knox College	52.875	37,266	43.560	28,225	-9.315	-24.3
02320	Gaynstead High	55.964	39,027	44.316	29,704	-11.649	-23.9
08035	Cornwall College	73.743	39,331	69.385	30,029	-4.358	-23.6
02246	Trench Town High	23.364	47,133	18.650	36,378	-4.713	-22.8
01037	Kingston College	44.839	41,825	48.729	32,401	3.890	-22.5
02330	Mavis Bank High	66.881	46,520	57.545	36,200	-9.336	-22.2
02059	Merl Grove High	62.403	42,064	55.543	33,031	-6.861	-21.5
01043	Wolmer's Girls School	67.283	43,756	60.208	34,649	-7.075	-20.8
02058	Jamaica College	72.722	40,397	51.591	32,167	-21.131	-20.4
01133	St. Anne's High	61.995	52,621	51.265	42,005	-10.730	-20.2
14128	Jose Marti Technical High	52.113	42,541	41.496	34,244	-10.617	-19.5
14088	Charlemont High	59.100	36,425	46.408	29,614	-12.692	-18.7
13069	Clarendon College	52.768	36,285	56.612	29,647	3.844	-18.3
06063	St. Hilda's Diocesan High	56.824	35,299	46.431	28,841	-10.393	-18.3
02061	The Queens School	52.748	43,610	45.937	35,634	-6.811	-18.3
14071	St. Jago High	52.796	37,671	50.409	30,801	-2.387	-18.2
01042	Wolmer's Boys School	53.398	41,148	44.687	33,898	-8.711	-17.6
02057	Immaculate Conception High	31.341	40,706	31.911	33,661	0.570	-17.3
02373	Haile Selassie High	20.702	48,478	20.909	40,173	0.207	-17.1
05066	St. Mary High	25.945	35,682	28.431	29,680	2.486	-16.8
14073	St. Catherine High	28.610	35,734	22.081	29,840	-6.529	-16.5
02066	Meadowbrook High	62.535	39,760	37.859	33,274	-24.676	-16.3
12059	Manchester High	57.340	36,586	68.789	30,684	11.449	-16.1
12102	DeCarteret College	45.740	34,085	39.530	28,757	-6.210	-15.6
03039	Morant Bay High	42.455	37,750	37.787	31,946	-4.669	-15.4
01036	Convent of Mercy "Alpha"	40.650	38,107	44.144	32,631	3.493	-14.4
13071	Glenmuir High	12.098	36,158	9.208	31,038	-2.890	-14.2
02053	Ardenne High	39.366	38,460	37.935	33,091	-1.431	-14.0
02275	Pembroke Hall High	41.507	37,553	55.844	32,455	14.337	-13.6
02328	Campion College	57.402	40,254	49.763	34,897	-7.639	-13.3
05072	Marymount High	14.235	34,017	11.077	29,576	-3.158	-13.1
02062	St. Andrew High	17.250	39,247	11.235	34,179	-6.015	-12.9
04046	Happy Grove High	25.354	33,096	21.011	29,225	-4.343	-11.7
08036	Montego Bay High	43.602	32,578	36.897	28,812	-6.704	-11.6
10055	Manning's High	33.921	34,051	43.210	30,264	9.289	-11.1
02301	Mona High	38.304	35,058	41.612	31,203	3.308	-11.0

Table 18: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Included

School Code and Name		Actual Allocations		Composite Formula, Cost Sharing Included			
		Aggregate (J$ milliions)	Per Pupil (J$)	Aggregate (J$ milliions)	Per Pupil (J$)	Change (J$ milliions)	% Change
02054	Calabar High	21.111	36,451	24.168	32,443	3.057	-11.0
06098	Iona High	51.995	31,632	58.647	28,170	6.652	-10.9
07041	William Knibb Memorial High	40.808	31,970	44.178	28,560	3.370	-10.7
02055	Excelsior High	36.041	34,898	31.826	31,228	-4.215	-10.5
12100	Winston Jones High	54.217	36,375	51.070	32,638	-3.147	-10.3
01038	St. George's College	23.223	36,675	23.411	32,986	0.188	-10.1
08041	Mount Alvernia High	19.816	33,038	23.207	30,326	3.391	-8.2
12060	Holmwood Technical High	25.029	37,443	33.763	34,442	8.734	-8.0
13097	Edwin Allen High	48.849	31,102	40.632	28,745	-8.217	-7.6
06064	York Castle High	23.063	32,569	20.052	30,133	-3.011	-7.5
11087	St. Elizabeth Technical High	28.975	36,753	37.253	34,127	8.278	-7.1
10020	Frome Technical High	25.814	35,640	27.587	33,312	1.773	-6.5
09044	Rusea's High	28.764	30,960	34.202	28,953	5.439	-6.5
01125	Tivoli Gardens High	35.369	39,079	44.541	36,770	9.172	-5.9
04047	Titchfield High	34.417	31,799	28.120	29,953	-6.296	-5.8
01039	Camperdown High	34.003	35,590	31.459	33,661	-2.544	-5.4
10072	Maud McLeod High	35.423	33,669	34.926	32,025	-0.497	-4.9
08078	Herbert Morrison Technical High	62.752	34,688	67.262	33,070	4.510	-4.7
02063	St. Hugh's High	55.279	34,575	74.494	33,012	19.215	-4.5
14072	St. Mary's College	55.619	29,919	75.688	28,694	20.069	-4.1
02324	Edith Dalton James High	12.432	36,963	11.071	35,620	-1.361	-3.6
01018	Kingston High	26.642	36,038	28.863	35,227	2.221	-2.3
01028	Dunoon Park Technical High	25.439	40,938	18.788	40,062	-6.651	-2.1
13108	Denbigh High	38.506	28,717	47.833	28,312	9.327	-1.4
06071	Ferncourt High	43.986	29,154	48.773	28,746	4.788	-1.4
09102	Merlene Ottey High	36.158	31,970	32.301	31,567	-3.857	-1.3
14106	Spanish Town High	36.415	28,364	39.070	28,443	2.655	0.3
12101	Cross Keys High	48.338	32,882	36.906	33,076	-11.432	0.6
04058	Buff Bay High	24.889	32,210	22.013	32,471	-2.877	0.8
12087	Bellefield High	41.958	28,729	38.514	28,962	-3.445	0.8
02190	Charlie Smith High	59.334	40,513	77.862	40,919	18.527	1.0
02155	Tarrant High	38.237	32,079	47.593	32,662	9.355	1.8
12031	May Day High	56.591	27,926	62.903	28,565	6.312	2.3
14114	Old Harbour High	34.633	28,949	45.462	29,661	10.829	2.5
12033	Mile Gully High	51.512	32,029	49.108	32,894	-2.403	2.7
14982	Bridgeport High	31.943	27,680	38.308	28,756	6.365	3.9
14117	McGrath High	56.780	27,929	53.100	29,082	-3.680	4.1
13115	Garvey Maceo High	39.760	27,537	52.724	28,799	12.964	4.6
13110	Lennon High	18.990	29,845	18.751	31,485	-0.239	5.5
01013	Denham Town High	46.903	36,640	43.839	38,701	-3.064	5.6
14083	Jonathan Grant High	59.930	26,641	53.265	28,285	-6.665	6.2
11104	Black River High	32.945	27,325	42.122	29,121	9.176	6.6
05083	St. Mary Technical High	33.246	31,290	55.855	33,439	22.609	6.9
06095	Ocho Rios High	25.976	26,990	34.418	28,930	8.441	7.2
11105	Newell High	48.423	32,305	59.338	34,656	10.916	7.3
02060	Oberlin High	35.420	29,897	33.690	32,075	-1.730	7.3
07042	Cedric Titus High	38.354	31,231	24.263	33,508	-14.091	7.3

Table 18: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Included

School Code and Name		Actual Allocations		Composite Formula, Cost Sharing Included			
		Aggregate (J$ milliions)	Per Pupil (J$)	Aggregate (J$ milliions)	Per Pupil (J$)	Change (J$ milliions)	% Change
01017	Holy Trinity High	35.670	32,915	21.401	35,552	-14.269	8.0
04033	Port Antonio High	57.886	28,597	53.749	30,959	-4.136	8.3
06102	Aabuthnott Gallimore High	50.414	28,103	53.729	30,447	3.315	8.3
02302	Clan Carthy High	27.879	31,808	29.908	34,541	2.028	8.6
03052	St. Thomas Technical High	40.338	31,761	45.922	34,504	5.584	8.6
02052	Papine High	41.092	30,297	47.599	32,925	6.507	8.7
02245	Penwood High	47.990	31,410	61.019	34,420	13.028	9.6
14119	Guys Hill High	25.044	28,307	30.251	31,105	5.208	9.9
13124	Kemps Hill High	18.366	29,838	20.413	32,898	2.047	10.3
07035	Muschett High	22.871	26,804	23.395	29,722	0.524	10.9
11112	Lewisville High	15.982	33,331	16.414	37,047	0.432	11.1
08074	Anchovy High	60.988	25,595	51.150	28,450	-9.839	11.2
01033	Vauxhall High	46.879	31,286	43.121	34,900	-3.758	11.6
03054	Seaforth High	22.348	26,461	16.539	29,846	-5.809	12.8
12078	Christiana High	24.994	28,137	34.701	31,847	9.708	13.2
11106	Lacovia High	62.801	27,705	71.084	31,540	8.282	13.8
03053	Robert Lightbourne High	43.553	31,698	43.907	36,288	0.354	14.5
13107	Alston High	15.605	31,837	14.002	36,654	-1.603	15.1
13111	Thompson Town High	19.894	31,187	20.011	36,027	0.118	15.5
13092	Central High	26.996	26,889	22.776	31,111	-4.220	15.7
11108	B. B. Coke High	59.290	27,916	48.443	32,336	-10.847	15.8
04061	Fair Prospect High	45.055	30,627	34.124	35,868	-10.931	17.1
05084	Tacky High	48.054	28,735	41.249	34,168	-6.805	18.9
09042	Knockalva Technical High	60.787	29,798	42.597	35,735	-18.190	19.9
02274	Norman Manley High	55.149	27,701	63.808	33,232	8.659	20.0
13120	Spaldings High	71.658	27,359	66.229	32,833	-5.429	20.0
11110	Balaclava High	23.432	29,567	26.977	35,716	3.545	20.8
10071	Petersfield High	39.399	26,048	38.844	31,919	-0.555	22.5
07034	Albert Town High	24.040	26,392	30.123	32,785	6.083	24.2
08063	Maldon High	35.097	23,444	37.026	29,180	1.929	24.5
13109	Bustamante High	21.332	27,986	24.642	35,067	3.310	25.3
05087	Oracabessa High	25.791	27,061	41.085	34,079	15.294	25.9
14143	Ascot High	36.790	25,812	38.475	32,507	1.685	25.9
14084	Waterford High	44.595	28,690	53.518	36,326	8.923	26.6
11109	Maggotty High	32.583	25,871	35.924	32,894	3.342	27.1
03050	Yallahs High	23.681	31,821	30.562	40,535	6.881	27.4
14118	Bog Walk High	61.065	25,483	49.929	32,568	-11.137	27.8
10062	Godfrey Stewart High	25.132	26,126	24.103	33,403	-1.029	27.9
05082	Brimmer Vale High	84.082	28,269	70.214	36,344	-13.868	28.6
13127	Claude McKay High	55.906	25,684	38.815	33,147	-17.091	29.1
08050	St. James High	66.923	24,149	71.051	31,690	4.128	31.2
08077	Cambridge High	41.257	23,705	52.237	31,117	10.981	31.3
10070	Little London High	34.021	26,319	27.660	34,871	-6.362	32.5
09046	Green Island High	34.021	24,068	46.448	31,915	12.427	32.6
14113	Glengoffe High	63.677	26,257	63.855	35,066	0.178	33.5
02326	Donald Quarrie High	28.695	25,958	38.992	34,924	10.298	34.5
06096	Browns Town High	24.734	24,934	33.032	33,601	8.298	34.8

Table 18: Comparison: Allocation According to Composite Formula vs. Existing Allocation, Cost Sharing Included

School Code and Name		Actual Allocations: Aggregate (J$ milliions)	Actual Allocations: Per Pupil (J$)	Composite Formula, Cost Sharing Included: Aggregate (J$ milliions)	Composite Formula, Cost Sharing Included: Per Pupil (J$)	Composite Formula, Cost Sharing Included: Change (J$ milliions)	Composite Formula, Cost Sharing Included: % Change
05061	Islington High	71.156	25,154	72.908	33,932	1.752	34.9
14112	Ewarton High	29.437	25,039	30.652	34,025	1.215	35.9
06097	Marcus Garvey Technical	37.562	25,978	48.006	35,352	10.444	36.1
14089	Tacius Golding High	34.450	26,010	37.855	35,511	3.404	36.5
12075	Porus High	43.902	25,873	35.340	35,923	-8.562	38.8
13114	Kellits High	22.444	22,176	42.017	35,327	19.573	59.3
10069	Grange Hill High	24.548	20,976	30.914	35,240	6.367	68.0
14142	Greater Portmore High	62.557	18,719	64.988	35,043	2.431	87.2
	Sum/Average	**6121.194**	**32,383**	**6121.194**	**32,383**	**0.000**	**0.0**

The net outcome, as shown in table 19, is a reallocation of funds similar in scale to, but different in pattern from, that resulting from a simple flat grant. Overall, the composite formula would redistribute about 8 percent of the high school sector's funds, which is about the same percentage as under the flat grant option. But the former secondary high schools would sustain larger losses under the composite formula—8.8 percent of their total funding (cost sharing excluded) or 11.1 percent (cost sharing included), as compared with 5.0 and 7.4 percent, respectively, under the simple flat grant (see Table 10). The technical-vocational schools would lose around 10 percent, which is just over half what they would lose with an unadorned flat grant. The former comprehensive high schools would gain 11.2 percent, cost sharing excluded, or 13.8 percent, cost sharing included, which is significantly more than they would receive from a flat grant formula.

Table 19: Summary of Effects: Change from Actual 2000-01 Allocations to the Composite Formula

Indicator	Cost Sharing, Funds Excluded	Cost Sharing, Funds Included
Number of schools that would gain funds	70	76
Number of schools that would lose funds	78	72
Gains as percentage of total funds	7.7	8.2
Losses as percentage of total funds	7.7	8.2
Percentage change in allocations to:		
Former secondary high schools	-8.8	-11.1
Former comprehensive high schools	11.2	13.8
Technical-vocational high schools	-10.8	-9.8
Kingston-area schools (Region 1)	-9.0	-9.3
Schools outside Kingston area (Regions 2-6)	4.7	4.9
Percentage change in allocations to:		

Schools initially in 1st (highest-spending) quintile	-20.8	-21.7
Schools initially in 2nd spending quintile	-11.6	-12.0
Schools initially in 3rd (middle) spending quintile	1.5	1.7
Schools initially in 4th spending quintile	8.6	10.2
Schools initially in 5th (lowest-spending) quintile	26.5	27.7
Number of schools by percentage change in funding		
Loss more than 25 percent	11	10
Loss between 10 and 25 percent	33	42
Gain or loss of less than 10 percent	58	49
Gain between 10 and 25 percent	26	22
Gain more than 25 percent	20	25

Under the composite formula, high schools in the highest-spending quintile would lose around one-fifth of their funds, as compared with one-fourth of their funds under a simple flat grant. Schools in the lowest-spending quintile would gain 26.5 percent (without cost sharing) or 27.7 percent (with cost sharing), which is only slightly less than what the simple flat grant would provide (see Table 10). Only 10 high schools would stand to lose 25 percent or more of their funding (cost sharing included) under the composite formula, as compared with 14 under a flat grant formula. But no fewer than 25 schools would enjoy increases of 25 percent or more (cost sharing included), as compared with only 16 if the flat grant were in effect. This last-mentioned difference obviously reflects the positive influence of the test-score factor on allocations to some of the lowest-spending schools.

Hold Harmless Provisions: The Price of "Equalizing Up"

The foregoing composite formula provides a convenient vehicle for demonstrating the effects of protecting individual high schools, wholly or in part, from the potential losses of funds associated with the shift to a formula-based finance system. This protection can be provided by incorporating what is commonly called a "hold harmless" provision into the fund allocation formula—namely, a guarantee that each school will continue to receive at least a certain minimum, or "floor," level of funding under the new formula, regardless of what the basic formula calculation provides. For instance, the provision might state that each high school shall receive the greater of (a) the amount calculated according to the new formula or (b) a specified percentage, such as 90 percent, of what the school would have received under the existing system. Setting the guaranteed percentage (the hold-harmless level) at 90 percent would limit each school's potential loss from redistribution to 10 percent of its previously established funding level, even where the basic formula calls for a substantially larger fund reduction.

What would it cost to establish such a guarantee? Logically, no additional outlay would necessarily be required. That is, one could incorporate a spending floor into the formula, say at the aforementioned 90 percent level, while still holding total spending for the high school sector constant at the actual 2000-01 figure. But doing so would diminish the formula's equalizing effects. Whatever funds were used to sustain high-spending schools at the 90 percent funding level

would not be available to raise the outlays of low-spending schools. The cost of the guarantee would take the form of reduced allocations to the latter schools, and the purpose of introducing a fund allocation formula would be correspondingly compromised.

Alternatively, the hold-harmless provision could be paid for with an increase in Jamaica's total spending for high schools. The initially low-spending schools would then be able to receive the full allocations called for by the basic formula, while the initially high-spending schools would be protected at the specified guarantee level. The expenditure increase required to make this possible can be viewed as the price of "equalization up." It is the additional spending needed to bring outlays of the low-spending schools up, while eliminating or reducing the need to bring outlays of the high-spending schools down.

Table 20 shows how much extra spending would be required, in conjunction with the just-discussed composite formula (the version with cost sharing included), to provide various degrees of protection to the high-spending schools. The table covers five different guarantee levels, ranging from 80 to 100 percent of actual 2000-01 funding. (A 100 percent guarantee level signifies that no school's spending would be reduced at all; an 80 percent level signifies that a school could lose up to 20 percent of its funding.) Two cases are considered: one in which cost-sharing funds are excluded and one in which they are folded into the formula-based allocations. The table shows both the absolute increment in funding required to support the specified degree of protection (in J$ millions) and the corresponding percentage increase.

Table 20: Additional Expenditure Required to Fund Hold-Harmless Provisions

Guarantee Level (Percentage of Actual 2000-01 Outlay)	Required Expenditure Increment			
	Cost Sharing Excluded		Cost Sharing Included	
	Amount (J$ millions)	Percentage of Total HS Outlay	Amount (J$ millions)	Percentage of Total HS Outlay
100	403	7.7	502	8.2
95	269	5.1	346	5.7
90	163	3.1	219	3.6
85	90	1.7	123	2.0
80	50	1.0	63	1.0

As can be seen, the additional expenditure required to prevent any funding loss to any school—a 100 percent guarantee—would be J$403 million, or 7.7 percent of total spending for high schools, with cost sharing excluded, or J$502 million, 8.2 percent of the total sector budget, with cost sharing included. If the guarantee level were reduced to 90 percent of actual spending, the required incremental expenditure would decline by more than half. It would take only J$163 million, a 3.1 percent expenditure increment (J$219 million, or 3.6 percent, with cost sharing included) to provide this lesser degree of protection. If the guarantee level were further reduced to

80 percent (i.e., some schools' allotments could fall by as much as 20 percent), only a 1.0 increment in the total high school budget would be required.

Of course, any hold-harmless provision would entail some sacrifice of fiscal equity. To the extent that the high-spending schools are protected against funding reductions, their privileged positions will be preserved. Some of these schools would still be able to spend substantially more per pupil than the rest of Jamaica's high schools, although not by the same margins as before. The import of this point depends, however, on whether the spending floors are set up to be permanent or temporary. If, for example, each school were offered a guarantee that its funding (inflation adjusted) would never drop below, say, 90 percent of 2000-01 spending per pupil, a significant degree of inequity would be permanently institutionalized. But if, on the other hand, each school were guaranteed only that its year-to-year decline in funding would not exceed 10 percent, the resulting residual inequity would be temporary: Each school's allotment would adjust, over a period of three or four years, to the level called for by the basic formula. This transient inequity might be a price well worth paying to avoid the sharp and sudden fiscal dislocations that would otherwise accompany the shift to a formula-based system.

Summary of Findings

Because of the more than two-to-one difference in per pupil spending that now exists among Jamaica's high schools, any formula that allocates funds primarily according to the number of pupils will have major redistributive effects. With total funding held constant, and absent any special provisions for protection against funding losses, the currently high-spending schools generally would receive less under such a formula than under the current system, and the currently low-spending schools would receive more. But both the magnitudes and the pattern of these gains and losses would depend strongly on which additional variables, other than enrollment, are taken into account in allocating funds.

The former secondary high schools currently have more money to spend per pupil, on average, than the former comprehensive high schools, which means that the former generally would lose and the latter generally would gain under any plan that spreads funds more evenly. Assigning greater weight to pupils at higher grade levels would moderate this aspect of redistribution to some extent. It should be noted, moreover, that certain former comprehensive schools, unlike most members of that group, currently receive relatively large allotments per pupil, and so would fare less well under a more equalized system.

Most, though not all, technical-vocational high schools receive relatively high per-pupil allotments under the existing system, and so would lose funds under a pupil-based formula unless an adjustment were made for their allegedly higher unit costs. The 15 percent adjustment factor illustrated earlier (an arbitrarily chosen percentage) offsets only part of the funding loss. But whether any such adjustment is justified, and if so, how large it should be, can only be established by carrying out a detailed cost study of vocational education.

Virtually any pupil-based formula would shift funds away from high schools in the Kingston area and towards schools in other regions, except insofar as the effect is offset by the inclusion of a regional or large-city cost factor. The arbitrary 10 percent Kingston-area factor illustrated earlier cancels out over half the geographical shift. Although it is reasonable to believe that unit costs are higher in large urban centers, a special study would be needed to estimate the appropriate size of a cost adjustment and, further, to determine whether such an adjustment should apply to urban centers other than Kingston.

Unfortunately, data are not available that would support an examination of the effects of using an indicator of poverty or socioeconomic disadvantage to represent differential educational needs. It has been possible, however, to demonstrate the effects of incorporating a different kind of need factor into a funding formula—one based on the 6th grade test scores of pupils entering each high school. The main result is that the test-score factor amplifies the effects of the shift to a pupil-based formula: It adds to the funding gains of former comprehensive high schools and to the losses of former secondary high schools, technical-vocational schools, and Kingston-area schools. It sharpens the redistribution of funds from currently low-spending to currently high-spending schools.

Two principal indicators have been used in this discussion to represent the magnitude of redistributive effects: first, the numbers of schools that would gain or lose specified percentages of funds; second, the percentage gains or losses for schools in different spending-per-pupil brackets. Under the various pupil-based formulas considered here, and assuming a fixed total budget for high schools, the number of schools that would experience large funding gains (25 percent or more) generally ranges from 10 to 15, and the number of schools that would sustain large losses ranges from 11 to 13. The exception is that under a formula that takes test scores but no offsetting factors into account, the numbers of large gainers and large losers would rise to 27 and 17, respectively. The highest-spending schools (those in the top quintile) would lose between 19 and 27 percent of their total funds, depending on the specific formula chosen, and the lowest-spending (bottom quintile) schools would gain between 22 and 32 percent. Even the least drastic of the formulas considered would shift the fund distribution significantly in favor of the currently low-spending schools.

With total funding held constant, the introduction of a pupil-based funding formula would result in aggregate gains for one set of high schools, and aggregate losses for another set of high schools, amounting to between 6 and 10 percent of Jamaica's total high school budget (the exact amount depending on the details of formula design). The losses could be offset, wholly or in part, by adding a similar percentage, or some fraction thereof, to total spending for the high school sector. This added investment would support a policy of "equalization up," avoiding the dislocations that a zero-sum scenario would require.