# Preface

## Background

Each year in the United States statistical formulas are used to allocate large amounts of federal funds to state and local governments in programs designed to meet a wide spectrum of economic and social objectives such as improving educational outcomes and accessibility to medical care. Many of the programs are designed to equalize the fiscal capacities of the recipient units of government to address identified needs. Furthermore, many states use formulas to distribute aid to local governments.

Allocation of funds by formula is by no means the unique province of the United States. Australia, for example, has a program of general revenue grants, overseen by its Commonwealth Grants Commission, which is designed to equalize the fiscal capacities of its states. In 2001–2002 Canada distributed 10.4 billion Canadian dollars to seven provinces through its equalization program. Formulas are also used in the collection of funds by national governments and international organizations. The United Nations' dues-owed formula shows that many of the issues that apply to allocation formulas, such as transparency, political compromise, nonlinearities, and data quality, apply with equal relevance to formulas for collection of funds.

Many formula allocation programs use official statistics as inputs to the estimates of formula components. The kinds of data used vary widely: total population, population by age group, per capita income, and proportion of families below the poverty line are a few examples. There have been several instances in the United States where data collection programs were initiated or expanded specifically to provide data needed for funds allocation.

In the U.S., use of formulas to allocate federal and state funds to subordinate jurisdictions is part of a broader process of government-to-government transfer of funds. Uses of such funds by the recipients may be unrestricted or they may be limited to specific purposes. At the federal level, the U.S. Congress determines how much money will be distributed and for what purposes. For some programs, the Congress appropriates a fixed total amount each year to be allocated among states or other recipients; for others, amounts may be specified as a certain proportion of all qualified expenditures by a state or other jurisdiction. In the former case, a formula dictates how much of the total goes to each recipient; in the latter case, a formula determines what proportion of each jurisdiction's amount will be matched by the federal government.

Allocation formulas are designed with one or more objectives and are developed in the context of a complex political process. Use of a formula (rather than a possibly arbitrary specification of the amount to be given to each recipient jurisdiction) facilitates informed debate and a degree of transparency about the allocation process by providing documentation of assumptions and computations. Furthermore, a formula offers legislators an effective way of explaining the allocation process to their constituents. However, when

funds are allocated according to a formula, there is no guarantee that objectives will be fully met. In particular, properties of data sources and statistical procedures used to produce formula inputs can interact in complex ways with formula features to produce consequences that may not have been anticipated or intended.

The statistical issues associated with fund allocation formulas have received relatively little attention from statisticians. One exception was the 1978 *Report on Statistics for Allocation of Funds* (U.S. Office of Statistical Policy and Standards), which described several major fund allocation programs existing at that time and put forth recommendations designed to assist program designers and drafters of legislation in meeting their goals more effectively. Since the publication of that report, the number and size of the U.S. Government's fund allocation programs has increased substantially, and the difficulties in designing formulas and allocation processes that effectively meet their objectives have not diminished.

### The U.S. National Academies Panel

To refocus attention to these matters, the Committee on National Statistics (CNSTAT) convened a two-day Workshop on Formulas for Allocating Program Funds on April 26–27, 2000. Drawing examples from four major U.S. programs, workshop participants discussed statistical issues that arise in the development and use of formulas for allocating federal funds to state and local governments. Subsequent to the workshop, CNSTAT initiated a comprehensive panel study. The Panel on Formula Allocations was formed in January 2001 with sponsorship by the National Center for Educational Statistics and also, in part, by the many U.S. federal agencies that support CNSTAT through the National Science Foundation. The panel's tasks were to refine and follow up on the important issues identified in the workshop, conduct case studies and methodological investigations, obtain input from individuals who design and implement programs using formula allocation, and develop findings, recommendations, and conclusions relating to these issues.

In July of 2001 the panel issued its initial report, ''*Choosing the Right Formula: Initial Report*'' (National Research Council, 2001), which featured the report of the April 2000 Workshop, highlighted key issues identified by the panel, and communicated its work plan. The panel's final report, ''*Choosing the Right Formula: Final Report*'' (National Research Council 2002), presents the panel's findings, recommendations, and conclusions. These reports are available by contacting the Committee on National Statistics (2101 Constitution Avenue, N.W., Washington, DC 20418, USA, phone 202-334-3023, fax 202-334-3751) or on the internet at www.nap.edu.

### This JOS Special Issue

This special issue is a joint activity of CNSTAT's Panel on Formula Allocations and the *Journal of Official Statistics*. To provide background for its deliberations, the panel commissioned a series of papers, which constitute the articles in this special issue of the *Journal of Official Statistics*. Each article benefited from reviews by the guest editors, a subset of panel members, and at least one outside referee.

The first three articles lay out how the formula allocation process works; examine

the underlying goals, roles, and structure of fund allocation formulas; and describe the legislative development process, and how formula features, underlying data, and estimation procedures interact in producing formula outputs. These articles are followed by U.S.-based and international case studies which serve to illustrate many of the issues raised in the first three articles. The case studies are drawn from U.S. programs that address children's health, women's and children's nutrition, and education; from a Canadian program designed to reduce discrepancies in the fiscal capacity of the provinces; and from the United Nations' dues assessment procedures.

In the opening article Thomas Downes (Tufts University) and Thomas Pogue (University of Iowa) examine the design and structure of intergovernmental aid formulas. The authors discuss a wide range of issues that relate to alternative, often contradictory, aid objectives. In addressing ''how best to hand out money,'' they show how program goals can be optimally translated into aid formulas. Optimality relates to goals such as reducing fiscal disparities and making tax and expenditure activities of recipient governments geographically neutral; generating a more equitable distribution of tax burdens; or reducing inefficient provisions of a public service attributable to interjurisdictional spillovers. The authors assess the extent to which, in practice, formulas deviate from the ideal and examine the economic and social effects of these deviations.

In the second article, Dan Melnick (CNSTAT) focuses on how, in the context of broadly stated program goals, the legislative process influences the design of formula-based funds allocation. He looks at how the formula-based approach itself influences both the legislative process and government programs. The statistical challenges associated with formula allocation needs are complicated by operational realities, which can affect the choices of statistical indicators ultimately used for formulas. The article provides new insights into the process whereby policy makers and statisticians must fashion formulas that pass the test for face validity, while generating the necessary political support.

Alan Zaslavsky (Harvard University) and Allen Schirm (Mathematica Policy Research, Inc.) provide a compliment to the Downes, Pogue article. They describe how formula characteristics, data input sources, and statistical estimation procedures interact to determine funding allocations. Emphasizing allocation of U.S. Federal funding to state and local entities, their central theme is that, while some consequences of these interactions are straightforward to predict, others are not. As a result, fund allocations are not always consistent with program goals. The authors simulate a series of multiyear scenarios to illustrate combinations of formula properties, data sources, and estimation procedures, which are likely to produce allocations that do not line up with original intentions. They give special attention to problems caused by the introduction of new surveys for producing formula inputs.

The fourth article leads off a series of program-specific case studies. Michelle Taylor, Sean Keenan (both of Finance Canada), and Jean-Francois Carbonneauis (Statistics Canada) provide an overview of the Canadian Equalization Program, a program designed to narrow fiscal disparities among the provinces through intergovernmental aid. The basis of the transfers is to enable the relatively less and more prosperous provinces to provide roughly comparable levels of services. The authors discuss the historical and administrative background of the program and emphasize the central role of formulas in meeting program goals.

John Czajka (Mathematica Policy Research, Inc.) and Thomas Jabine (Statistical Consultant), extend the volume's coverage of issues treated by Zaslavsky and Schirm by evaluating the use of survey data to estimate inputs for allocation formulas. The authors provide a comprehensive overview of the allocation process for the State Children's Health Insurance Program and recommend improvements. They discuss statistical problems created when allocations must be based on survey estimates that have large sampling errors.

Dawn Aldridge (U.S. Department of Agriculture) examines the history and formula features of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Aldridge traces how program goals have been manifested in a sequence of formulas, taking us from the initial phase after the program was introduced in the early 1970s (when the Congressional mandate emphasized expanding the number of eligibles reached by the program) to the 1990s, when the program had stabilized and program goals shifted toward an equitable distribution of resources across states. Aldridge shows how the rule-making process for the WIC program attempted to reflect these objectives.

Title I, Part A of the Elementary and Secondary Education Act establishes grants to states and local educational agencies (LEAs) or school districts with disproportionate numbers of poor school age children. Paul Brown (U.S. Department of Education) analyzes how the interaction of factors such as the introduction of new data sources, use of hold harmless guarantees, and political compromise has affected Title 1 allocations. For the 2000–2001 school year, he assesses how formula features interact to affect, sometimes in a contradictory manner, state level and per child allocations. The case study illustrates ''the tension that exists between the conflicting needs to target funds and to ensure funding stability for those LEAs that stand to lose as a result of new data.''

In a second article on education funding, James Kadamus (New York State Education Department) summarizes the development of school aid in his state. He communicates valuable lessons for those charged with using formulas to distribute aid at any level of government. He examines the historical context and the stated objectives of education aid in New York from the practitioner's perspective, describing the evolution of New York school aid formulas as incremental but ''punctuated by occasional reforms.'' Kadamus discusses the effects on this evolution created by the often competing goals of increasing educational opportunities and improving financial stability as well as by problems of targeting aid to student needs, ongoing funding formula design and data quality challenges, and the federal role in education.

In the final article, Felizardo Suzara (United Nations Statistics Division) provides an international perspective. Unlike the foregoing articles, he describes a formula that allocates a tax obligation rather than a benefit. He shows how the U.N. uses formulas to allocate among member states the contributions required to finance its operations. Suzara describes how the U.N.'s Committee on Contributions prepares the scale of assessments and advises the General Assembly on all aspects of its methodology ''with a view to making it simple and transparent, stable and, most importantly, fair and equitable.'' In this context where capacity to pay can be calculated in a variety of ways, the formula is manifestly the result of extended negotiations and compromises among the participating stakeholders.

First and foremost, the editors would like to thank the authors who prepared articles for

this volume and made earlier drafts available that served as valuable input to the deliberations and final report of the CNSTAT panel on formula allocations. Additionally, manuscripts were greatly improved by revisions made in response to comments from formal reviewers – David Betson, University of Notre Dame; Linda Bilheimer, Robert Wood Johnson Foundation; Hamilton Lankford, Stanford Universtiy; David McMillen, House Government Reform Committee; Wayne Riddle, Congressional Research Service; William Seltzer, Fordham University; Robert Tannenwald, Federal Reserve Bank of Boston; and Jim Wyckoff, SUNY Albany. The quality of the articles also benefited from careful readings by panel members – Gordon Brackstone, Statistics Canada; Linda Gage, California Department of Finance; Hermann Habermann, United Nations; Allen Schirm, Mathematica Policy Reserch, Inc.; and Bruce Spencer, Northwestern University – and by CNSTAT staff Virginia de Wolf and Marisa Gerstein.

The editors and the Panel on Formula Allocations have benefited from the contributions of the late Wray Smith, who chaired the interagency committee that prepared the 1978 *Report on Statistics for Allocation of Funds* and wrote and presented the keynote paper for CNSTAT's April 2000 Workshop on Formulas for Allocating Program Funds.

This special issue is intended to be of independent interest and to serve as a companion volume to the Panel's final report. We trust that you will find it interesting and informative.

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