The AIR Professional File — Fall 1979
The Association for Institutional Research — No. 3

FORMULA BUDGETING AND THE FINANCING OF PUBLIC HIGHER EDUCATION: PANACEA OR NEMESIS FOR THE 1980s?

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The financing of higher education has continued to remain a sensitive issue since the first state dollar was appropriated. Consequently, college officials and legislators have explored various ways of providing for the objective and equitable distribution of state funds to higher education. In recent years, concern has centered around the viability of formula funding—a practice which has gained widespread acceptance (or, at least, utilization) during the last twenty-five years.

The Budget Formula

Technically, budget formulas are lengthy sets of statements that detail a procedure for manipulating variable data applicable to an institution of higher education, by predetermined fixed factors, to produce the future funding requirements of that particular college or university (Gross, 1973). In simple language, this means applying some predetermined average cost rates or staffing ratios to quantifiable institutional program measures (such as enrollment or square feet of building space) in order to calculate the dollar resource requirements for a future year. The use of formulas to develop institutional appropriation requests (formula budgeting) may or may not result in actual appropriations equal or related to the amounts requested (formula funding).

Budget formulas may be considered the offspring of necessity. The history of the development of public higher education spans the four great eras in which major emphasis was directed toward the development of (1) the liberal arts colleges, (2) the agriculture and mechanical institutes, or land-grant colleges, (3) the teacher training colleges, and (4) the technical and/or community colleges. Consequently, by 1970, almost every state reflected full participation in each era through the existence of institutions of each type and, in many states, multiple structures for the administration of the public higher education. Moreover, the great increase in enrollments, which began in the 1950s and did not peak until the early 1970s, encouraged most four-year and many two-year state institutions to broaden the scope of their activities: state universities and land-grant colleges became major research universities, regional teacher colleges became universities, and technical schools became community colleges. By the mid-seventies, multi-campus university systems existed which were singular in some states and dual in others. Some states chose to place four- and two-year institutions under different governing boards, others decided to put them under one single board, and still others chose to use combinations of both schemes.

Faced with a variety of state-created higher educational institutions, the failure of available state resources to keep up with growth patterns and the public demand for services, the advent of accountability and cost-effectiveness, and the ground swell of public opinion for greater equity in the appropriation of state funds among colleges and universities, it is easy to understand why many states decided to develop budget formulas to "feed the tigers." After all, as Millett (1974, pp. 11–12) pointed out, the advantages identified by formula advocates included:

1. The lessening of the political warfare among, and open lobbying by, state-supported institutions for scarce funds
2. The assurance of annual operating appropriations for institutions based on quantifiable objective measures
3. The provision to state officials of a reasonably simple and understandable basis for deciding upon the appropriation requests of individual institutions
4. The representation of a reasonable compromise between state control over line-item budgeting and institutional fiscal autonomy.

Characteristics of Budget Formulas

Although state budget formulas have evolved to reflect the collective needs of the institutions to which they apply, current formulas display certain characteristics and attributes that may be summarized as follows:

1. **Budget formulas are complex.** Formulas calculate separately the resource requirements of each generally recognized functional area of institutional activity within the education and general (E & G) budget. These areas consist of the following:

Instruction
Academic support (including libraries)
Organized research
Public service
Student services
Physical plant operation and maintenance
Institutional support

However, most states limit formula calculation to determining the resource requirements of (a) instruction, (b) libraries, (c) student services, (d) physical plant operation and maintenance, and (e) institutional support.

2. **Budget formulas recognize few base factors.** Most formulas restrict base factors (institutional need predictors) to enrollment attributes such as student credit hours, student FTEs, student headcount, and continuing education units, or to physical plant characteristics such as square feet of building space and acres of ground. Base factors recognized tend to represent *input* measures of effort or indicators of magnitude rather than actual *outputs*, and no provision for quality measures exists.

3. **Budget formulas utilize one or more of three computational methods.** A study conducted by the author in 1973—and summarized (Gross, 1973)—found three basic computational methodologies present in each of twenty-five formulas in use at that time. An analysis of the formulas used by states in 1977 indicated no substantive deviation from those methods, which were:

a) *Rate per base factor unit (RBFU)*—where given rates (formula factors) are multiplied by institutional descriptors (base factors) to calculate resource requirements. An example would be to multiply student credit hours by fixed dollar rates.

b) *Base factor position ratio with salary rates (BFPR/SR)*—where given position ratios (faculty/student, faculty/

supporting staff, etc.) are used to determine justified FTE positions which, in turn, are multiplied by given average salary rates to calculate resource requirements. An example of the BFPR/SR method would be to divide FTE enrollment by 20 (faculty/student ratio) to obtain the number of FTE faculty positions justified and then to multiply the number of faculty positions by a given salary rate to obtain the total instructional salary budget request.

c) *Percentage of base factor (PBF)*—which represents the most simple formula application in that the resource requirement of a given functional area is expressed as a percent of the total amount calculated for another functional area. For example, institutional support might be limited to twelve percent of the total instructional budget request.

4. **Budget formulas are zero based.** Most budget formulas follow a zero-base approach whereby the total appropriation request is developed anew each year using quantitative institutional base factors. Thus, fewer students in a given year could result in fewer dollars for the appropriation base budget—as opposed to fewer new dollars over last year's appropriation if incremental budgeting were followed.

5. **Budget formulas lack differentiation among institutions.** Because budget formulas were designed to ensure the distribution of state funds to institutions on an equitable and objective basis, little leeway is possible for the recognition of differences in institutional roles or missions. At best, some formulas differentiate between types of institutions (community colleges, regional universities, and comprehensive universities) by using different formula factors (rates, ratios, percentages) for each type. Most formula states are content to fund alike similar programs at similar levels of instruction. (Of course, different credit hour mixes among levels and disciplines result in *de-facto* funding distinctions among institutions, but such distinctions may be detrimental to, rather than supportative of, individual institutional missions.)

6. **Budget formulas assume linear relationships between base factors and resource requirements.** Most formula factors such as rates per credit hour are derived from institutional cost studies and reflect statewide average costs per unit. When applied to base factors, these averages (which represent only what was, at some earlier time, under certain conditions) predict resource requirements in a linear fashion.

7. **Formula budgeting is more prevalent than formula funding.** Formulas are used more to *develop* appropriation requests of colleges and universities than to *allocate* state funds to individual institutions. In good tax receipt years, some states fund fully the formula-derived requests for higher education. Others are selective as to which institutions receive full formula funding. However, in many formula states, the formula-derived request represents only the starting point in the appropriation process. (In Tennessee, for example, a formula is used to calculate a base appropriation request to which the Tennessee Higher Education Commission adds an amount for salary increases and to compensate for inflation. This higher figure becomes the recommended request for each institution. Because state revenues generally do not keep up with inflation, and/or funding requests for other state services are given higher priority, the request for each institution is proportionally scaled back to make the total for higher education "fit" the state resources deemed available. Thus, each institution actually receives a pro rata share of its original formula-derived request. This practice has been followed for the past eight years.)

Formula Budgeting is Alive and Well in Twenty-Two States

From a meager beginning in 1951 in four states (California, Indiana, Oklahoma, and Texas), budget formulas have proliferated and spread to states in all regions of the country. In 1973 (Gross), a total of twenty-five states were identified as using formulas. A study performed in 1977 by the Kentucky Council on Higher Education found the number to be twenty-two. Whereas no single source gives a chronological account of budget formula development on a state-by-state basis, trends in formula adoption or rejection may be gleaned from the few nationwide studies performed during this period. Table 1 presents the extent to which budget formulas were in use by states during five of the past twenty-eight years.

Table 1
Budget Formula Utilization by States

State	1951[a]	1963[a]	1967[a]	1973[a]	1977[b]
Alabama			X	X	X
Alaska					X
Arkansas				X	X
California	X	X	X		
Colorado				X	
Connecticut			X		
Florida		X	X	X	X
Georgia				X	X
Illinois			X		
Indiana	X		X		
Kentucky		X	X		
Louisiana			X	X	X
Maryland				X	
Minnesota			X	X	
Mississippi			X	X	X
Missouri				X	X
Nevada				X	X
New Jersey				X	X
New Mexico			X		X
New York				X	X
North Dakota			X	X	X
Ohio				X	X
Oklahoma	X	X	X	X	
Oregon			X		
Pennsylvania				X	
South Carolina				X	X
South Dakota				X	X
Tennessee		X	X	X	X
Texas	X	X	X	X	X
Virginia				X	X
Washington				X	X
West Virginia				X	X
Wisconsin				X	X
Totals	4	6	16	25	22

[a]Francis M. Gross, "A Comparative Analysis of the Existing Budget Formulas Used for Justifying Budget Requests or Allocating Funds for the Operating Expenses of State-Supported Colleges and Universities." The University of Tennessee, 1973.

[b]Kentucky Council on Higher Education, "Program Funding by Formula of the Unrestricted Current Fund Operations of Kentucky's Public Higher Education Institutions," Frankfort, July, 1977.

A comparison between the states using formulas in 1973 and those using formulas in 1977 reveals that two states (Alaska and New Mexico) are newcomers to the formula ranks while five states (Colorado, Maryland, Minnesota, Oklahoma, and Pennsylvania) have, for various reasons, abandoned formulas and adopted other methodologies for determining state appropriations for higher education. However, the most recent study (Kentucky Council on Higher Education, 1977) reported that, in addition to the twenty-two states found to be using formulas in 1977, others were in various stages of formula development or abandonment:

> Florida and Wisconsin are resuming formula funding after a two-year hiatus respectively. Nevada and Alaska are presently expanding their formulas to include additional

institutional activities. In addition, Kentucky, Kansas, and Utah are actively pursuing formula development while Connecticut and Colorado are proceeding at a more measured pace. Michigan's state legislature rejected a formula-funding mechanism for that state. Oregon, Illinois, and California are using limited techniques for their community college systems, and numerous other states are interested and have made requests for copies of anything produced by Kentucky. p. 32

An examination of the differences between the formulas used by the twenty-two states in 1977 and the twenty-five states in 1973 indicates no definite trends in computational method changes for calculating resource requirements of various functional areas during the four-year interval. (See Table 2.)

Table 3 presents the institutional base factors that were used by states in 1977 as resource predictors for each functional area. Enrollment (credit hours, FTE students, and headcount) remains the most used predictor for estimating the resource requirements of instruction, libraries, students' services, and organized research. Seven states used enrollment for calculating institutional support, while seven others used a percentage of the total instructional or total educational and general budget. Square feet of building space was clearly the most favored choice for predicting physical plant operation and maintenance cost requirements.

From a geographical standpoint, formula budgeting remains the most prevalent approach in the South where ten of the twenty-two states were located. The other formula states were divided among the Midwest (four), the Southwest (two), the Farwest (two, counting Alaska), the Mideast (two), and the Northeast (two). These groupings suggest that budget formulas are most likely to be adopted by states having either limited resources to commit to higher education or a large number of similar institutions vying for state dollars.

Another interesting observation is that, among the forty-three institutions identified in the Ladd/Lipsett survey (1979) as having the top-ranked faculties (departments) in nineteen fields of study, only six were state institutions subject to formula budgeting. Located in five formula states, the six state institutions accounted for nineteen (9.3 %) of the top-ranked departments. (However, the University of Wisconsin, Madison, accounted for twelve departments.) In sharp contrast, eighteen state institutions located in non-formula states had seventy-two (35.1%) of the top-ranked departments. (Nineteen private institutions accounted for the remaining 55.6% of the top-rated departments.)

Formula Pitfalls in the Eighties

The problems facing higher education in the 1980s have, for the most part, been revealed in numerous publications and remain the focal point of many professional conferences. In a recent publication, the Southern Regional Education Board (1978) identified several trends which will impact on colleges and universities in the future:

1. *Changing student body composition* with a reduction in the traditional college-age, full-time student and an increase in the number of older part-time students. Although student headcounts may stabilize, reductions in full-time equivalent student enrollments will be experienced by many institutions.

2. *Selective growth and retrenchment* within and among

Table 2
Formula Calculation Methods Used by States in 1973 and 1977

Functional Budget Areas	Calculation Methods: RBFU[1] 1973	RBFU[1] 1977	PBF[2] 1973	PBF[2] 1977	BFPR/SR[3] 1973	BFPR/SR[3] 1977
Instruction	13	7	10	3	17	9
Libraries	12	11	16	8	8	5
Student services	6	7	2	5	1	1
Organized research	0	3	3	2	0	5
Public service[4]		1		3		1
Physical plant	11	7	11	3	4	3
Institutional support	8	5	11	8	1	1

1. RBFU is the rate per base factor unit method.
2. PBF is the percentage of base factor method.
3. BFPR/SR is the base factor position ratio with salary rates method.
4. Public service was not a separate functional area in 1973.

Table 3
Formula Base Factors Used by States in Determining Resource Requirements for Functional Budget Areas in 1977

Functional Budget Area	Head Count	FTE[1] Students	Credit Hours	Faculty Positions	E & G Budget[2]	Square Feet
Instruction		2	13			
Libraries		3	7		6	
Student services	5	3	2		5	
Organized research		1	6	1	1	
Public service		1		1	2	
Physical plant					2	9
Institutional support	2	3	2		7	

1. Full-time equivalent
2. Educational and General

institutions which reflects not only the change in student body compositions but also the changing curricular preferences of students.

3. *Rising costs* stemming from both inflation and the inability of colleges and universities to increase productivity sufficiently to offset increases in salaries and benefits. These, coupled with stabilized or reduced enrollments, mandatory social programs, the need for more remedial instruction, and more student support activities such as financial aid programs, cause the average instructional cost per full-time student to rise rapidly.

4. *Increasing governmental involvement* reflected in the increased monitoring of all operations of higher education by both the legislative and executive branches of state governments as well as increasing federal legislation affecting higher education.

5. *More "Proposition 13" type referenda* which impose limitations on personal property taxes and other tax sources and thus curtail state resources available for public services, including higher education.

6. *Increasing competition with other state agencies* for limited funds which, when combined with the perception of a declining economic value of a college education, may result in higher education becoming more of a discretionary item in state budgets and receiving a smaller proportion of new state dollars.

These trends, when viewed in a formula-budgeting context, pose serious problems for state-supported colleges and universities. Specifically, formula developers must start to give their utmost attention to such pitfalls as (a) the linear cost syndrome, (b) the self-fulfilling average cost prophecy, and (c) the formula numbers game.

The Linear Cost Syndrome

Most college presidents and budget officers in formula states are acutely aware that during steady-state or declining enrollment periods, enrollment-driven formulas have an adverse effect on state appropriations for higher education. While instructional and institutional costs do not rise proportionally to enrollment increases, linear relationships between costs and most formula factors (e.g., enrollments) have been accepted by the higher education officials in the development of budget formulas. This probably occurred for two reasons: (1) average costs per student, per credit hour, or per square foot of building space were relatively easy to obtain and (2) the linear approach represented a "margin of safety" for institutions when state appropriations failed to keep pace with enrollment increases. Since more states practice formula budgeting than formula funding, linear relationships have helped ease the burden of less-than-full-formula funding by providing new funds to help meet the marginal costs associated with the numbers of new students. Linear formula relationships have also helped offset the impact of modifications in formula factors such as increasing faculty/student ratios or holding down the rates per credit hour so as to keep formula-generated requests in line with anticipated state revenues.

During declining enrollment periods, however, linear formulas can be devastating—particularly when state legislatures do not fully fund formula requests. In declining enrollment periods, institutions can only achieve marginal reductions in expenditures, and the amount of such reductions is contingent upon many factors. Required courses and key electives must continue to be taught, albeit to fewer students. "Critical mass" staffing requirements and the maintenance of specializations within academic areas prevent a reduction in instructional staff parallel to the decline in enrollment. When staff reductions do occur, tenure policies require the termination of teaching assistants, part-time staff, and untenured faculty first. Since the untenured appointments are at the lower end of the salary scales, the resulting cost reductions do not correspond to funding reductions based on average costs. The result will likely be as Moss and Gaither (1976) have predicted:

> In a labor intensive effort such as higher education, which may be a constant productivity industry, where up to three-fourths of an institution's operating budget may go for salaries, it is not clear how much resource reduction can be absorbed before long-term institutional damage occurs. (It follows that) . . . quality will inevitably suffer once funding reductions pass the average cost curve for constant program quality since below this point the costs are higher than the resources allotted. p. 558

The Self-Fulfilling Average Cost Prophecy

Another formula pitfall whose impact will manifest itself fully during a period of steady-state or declining enrollments is the self-fulfilling average cost prophecy. This phenomenon will occur in those states which derive formula factors from statewide average costs updated periodically by institutional cost studies. The rationale for this practice is to satisfy the equity principle of formula funding by providing equal financial funding treatment for all similar programs in every institution. When combined with the practice of deducting fees and all other unrestricted revenues to arrive at the net state appropriation request, the formula becomes an expenditure-leveling device since the statewide average formula rates determine the maximum budget at which each institution is expected to operate. During periods of enrollment growth, this leveling tendency can be circumvented by the internal reallocation of new dollars over the base budget. But during stable or declining enrollment periods, when appropriation increases are few or nonexistent, internal reallocation becomes more difficult. Consequently, the demand for internal institutional budgeting to parallel actual state funding intensifies and the outcome frequently may be to let the formula dictate cost reductions within institutions. Thus, the self-fulfilling average cost prophecy will be realized.

The Formula Numbers Game

Last, but not least, among formula pitfalls is the "numbers game" which is spawned by enrollment-driven formulas. Whereas competition for students was an acceptable alternative to the political warfare and intensive lobbying which precluded the adoption of budget formulas in many states, the rapid increase in enrollments at state institutions during the 1950s, 1960s, and early 1970s all but eliminated the need for anything other than passive recruitment efforts. Aggressive recruitment was left to the small private colleges whose survival depended upon finding a clientele for the special services and educational programs which set them apart from the less expensive and more accessible state institutions.

However, changing enrollment patterns in the late 1970s, along with predictions for declining numbers of college-age students in the 1980s, have brought about the development of intensive recruitment programs by state institutions. Although not as experienced in the recruitment and retention of students as their counterparts in private colleges and universities, officials in state-supported institutions are rapidly gaining the expertise for marketing the services of higher education. Currently, state institutions are at various stages of preparation for the intensive recruitment efforts to improve, or at least retain, their share of the declining potential enrollment base during the next decade.

Faced with funding reductions proportional to enrollment declines, the temptation to take drastic measures to avoid the dreaded "financial exigency" process will intensify in the 1980s. Such pressure on faculty and administrators will likely promote practices which the Carnegie Council on Policy Studies in Higher Education (Scully, 1979) has termed "ethically dubious, if not illegal" and will compromise the integrity and lead to the deterioration of higher education. Specifically, the practices which the Carnegie Council fears are already present in post-secondary education are: *(next page, please)*

1. The proliferation of off-campus programs of dubious quality
2. The lowering of admission and retention standards
3. "Hucksterism" in the recruitment of nontraditional and foreign students
4. The deliberate recruitment and admission of students lacking in basic skills
5. Grade inflation and the lowering of academic standards.

In addition to the practices identified by the Carnegie Council, there are also periodic reports of the falsification of enrollment reports, the reclassification of courses, the permitting of course overloads during enrollment projections periods, and other actions which serve to improve formula-derived appropriation requests.

Unfortunately, there are no winners in the formula numbers game. Whether institutions experience severe underfunding or resort to unethical practices in order to play the numbers game, the quality of educational programs suffers. Deterioration of educational quality will only result in the lessening of the economic value of the college degree which, in turn, will erode public support and, ultimately, funding priority for the services of higher education. The end result could likely be economic disaster as well as the complete loss of institutional autonomy for state institutions.

Alternatives to Formula Pitfalls

The probability of reduced enrollments, rising costs, greater competition for fewer students, greater competition for fewer state resources, and more governmental involvement is high. For the same reasons, an increase is also likely in the number of states utilizing budget formulas. If the erosion in the quality of higher education is to be minimal, the challenge will be to recognize the pitfalls of current formula practices and seek alternative funding approaches.

Obviously, much study in developing new formula or non-formula approaches is needed. One of the more obvious solutions to the linear cost syndrome is to substitute marginal for average costs as formula factors. However, this is not easily accomplished. Marginal costs are difficult to calculate and tend to reflect the unique structure of each institution. Conversely, marginal costs among different size institutions will likely bear little resemblance to each other. Perhaps the best that can be expected is to calculate average marginal costs per base factor for formula application in two ways: (1) use marginal cost information to develop economies (and, if applicable, diseconomies) of scale factors for incorporation into every enrollment-driven formula, and (2) limit formula application to incremental budgeting based on marginal costs. If the use of marginal costs is not feasible or is impractical because of institutional differences or because costing methods have not been fully perfected, there are other stop-gap measures that should be considered.

First, modify budget formulas to limit revenue deductions to student tuition and fee receipts. This action will change the complexion of many formulas from educational expenditure-equalizing devices to mechanisms for providing equal state support to similar programs. Millett (1974), in addressing this problem, has stated:

> My sense of the need for equity is satisfied by a formula that results in an equality of appropriation support for instruction based on two and only two sources of income: the state government general appropriation for departmental instruction and institutional support plus the general institutional charge to all students. All other sources of outside income then become add-on for the benefit of the individual state institution of higher education which happens to generate this additional income. p. 60

Second, eliminate the use of historical average costs as formula factors to predict future resource requirements. For states which average the costs of all institutions regardless of size or type, consideration should be given to determining separate cost rates for community colleges, regional universities, and major research universities—or any other logical division which best represents the higher education divisions within a particular state. A more complex but intriguing approach is to use historical cost data to develop cost indices which reflect the relative costs of instruction among academic programs, levels of instruction, and types of institutions. These indices could be used to weight projected enrollments by discipline and level of instruction to arrive at total institutional base factors (e.g., weighted credit hours). This approach would more nearly reflect the complexity and uniqueness of each institution. Total institutional base factor units could then be multiplied by given formula rates (perhaps different for each type of institution) adjusted annually for inflation. Variations of this approach are evident in those states using indices to weight credit hours and those using benchmark salary rates which reflect regional averages. Adoption of these approaches should help prevent realization of the self-fulfilling average cost prophecy.

The use of formulas during periods of steady or declining enrollments will always promote the formula numbers game unless funding approaches can be found which remove enrollment attributes as institutional resource predictors. One approach would be for state governing or coordinating boards to conduct extensive enrollment projection studies by institutional service region and then set maximum and minimum enrollment ranges for each college or university within which state funding would be fixed. Ranges should be wide enough to encompass enrollment fluctuations expected during five-year intervals. This practice would limit enrollment change rewards to increases or decreases in actual fee collections, which within certain ranges may approximate the actual increases or decreases in marginal costs. Removing state funding rewards for intensive recruitment and cushioning institutions against drastic funding reductions should enable colleges and universities to reallocate funds internally to help combat the effects of inflation on academic operating budgets and stem the erosion of academic standards.

Finally, viable non-formula approaches should be given consideration by formula states. Illinois has adopted an objective form of incremental program budgeting which appears to incorporate the positive aspects of formula budgets while minimizing the formula pitfalls previously discussed. In that state, future appropriation requests for state institutions of higher education are derived by adjusting the projected expenditures for the current year for increases or decreases in marginal costs and tuition revenue based on enrollments and then adding increases for salaries, operating budgets, utilities, library material costs, new building maintenance costs, and program support (Illinois Board of Higher Education, 1979). The program support feature in the appropriation request enables institutions to (a) adjust for shifts in student curricular demands, (b) respond to social and economic needs, (c) improve the quality of instruction, (d) enhance faculty development, and (e) initiate new, or reorient current, program directions—all of which represent the programmatic flexibility that colleges and universities need in order to adjust effectively to the changes in higher education.

Summary

Formula budgeting in the financing of public higher education has yet to attain its potential as a predictor of resource requirements. While the use of formulas during the growth period of the last two decades may have been a temporary panacea for the funding problems of state-supported institutions, continued reliance upon budget formulas as they now exist may prove to be public higher education's nemesis during the no-growth or declining periods ahead. The real test for the medicinal utility of budget formulas will be in their application to accommodate the major trends of the 1980s and their ability to preserve the quality of public higher education and the existence of the state institutions under their purview.

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The *AIR Professional File* is published by the Association for Institutional Research, 314 Stone Building, Florida State University, Tallahassee, FL 32306. Distributed as an insert to the *AIR Newsletter*, the *Professional File* is intended as a presentation of papers which synthesize and interpret issues, operations, and research of interest in the field of institutional research. Paper authors are responsible for material presented. The editor is Richard R. Perry, Associate Vice President for Academic Affairs, The University of Toledo, 2801 W. Bancroft, Toledo, OH 43606.