



## State Funding of Higher Education: A New Formula

Gunapala Edirisooriya

Beeghly College of Education, Youngstown State University, Youngstown,  
OH 44555-0001,  
USA.

E-mail: gedirisooriya@ysu.edu

Over the last century, functions and activities of the higher education sector in the USA have changed dramatically. As the premise of institutional funding remains unchanged, states' burden on higher education funding continues to grow. With increasing pressure for more funding from state agencies coupled with the growing demand for 'less government,' states find it difficult to support higher education institutions at an ever-increasing level. Higher education administrators are quick to blame state legislators for lack of sufficient funds for institutional growth and quality improvement. Heavy dependence on state support is quite detrimental to operational viability of higher education institutions. Therefore, securing financial stability of higher education institutions should be a major priority among higher education policymakers. In this context, this paper presents a new funding formula that can be adopted by any state.

*Higher Education Policy* (2003) 16, 121–133. doi:10.1057/palgrave.hep.8300006

**Keywords:** financial stability; state support; institutional autonomy; educational policy

---

State-related institutions of higher education continue to grapple with the age-old issue of funding.<sup>1</sup> The problems with funding are only getting worse, as the current system is failing. It is time to take a visionary step and formulate a realistic solution. Currently, state institutions of higher education are heavily dependent on the state for funding (Southern Regional Education Board (SREB), 2001). According to 1996–1997 figures, 40% of general revenue of public 4-year colleges comes from state allocations in the US. This rate is 3% higher for the SREB states, and for Tennessee this rate is 48.3% with a wide variation among institutions. During the last three decades as a percentage of state taxes, state allocations to higher education have declined in the USA, SREB, and Tennessee — an indication of greater demand for state tax dollars by other state agencies. This dependency is a major source of financial instability of higher education institutions. A viable solution is needed to ensure long-term benefits for both the state and the state-related institutions of



higher education. This paper probes into the history of higher education funding, highlights current problems, presents a new higher education funding formula, and discusses the rationale and implications of its use. The proposed solution has the potential to transform higher education institutions from a survival mode to self-sufficient operating units.

To understand the need for such a solution, one must look at the historical data. From colonial times, many colleges followed in the footsteps of Harvard College (Morison, 1968) and solicited funds from respective local administrations, and this tradition continued in the new nation. Dartmouth College provides a compelling example (Novak, 1971; Whitehead, 1973). Even after Dartmouth College won its case in 1818 (Dartmouth College challenged New Hampshire State Assembly to establish college's private ownership), it went right back to the New Hampshire State Assembly seeking financial assistance. With the Morrill Act of 1862, a new category of higher education institutions emerged with statutory provisions for state funding (The Morrill Act, 1862). From the colonial era, some colleges and universities recognized the importance of financial security for institutional stability and growth (Veysey, 1970). These institutions also realized that financial solvency is a prerequisite for institutional autonomy and embarked upon establishing endowment funds for their operations. Some of them succeeded. It would be quite inspirational to learn from those institutions, especially the state-related institutions that gradually gained financial independence. The University of Delaware (UD) is a case in point (Munroe, 1984; Edirisooriya, 1990). In the first two decades of the 20th century, UD was struggling for its survival, and in 1906 it was even eager to hand over the full ownership of its assets to the State Government in return for state financial support for UD's operational expenses (Edirisooriya, 1991). In contrast, UD's reliance on state allocation of funds is now limited to one-fifth of its operational budget (University of Delaware, 2001). For UD, this financial success secured a great degree of institutional autonomy. An overwhelming majority of state-related institutions of higher education has not found this magic formula for financial stability, and their struggle for survival continues.

Generally, the ability to finance state-related institutions of higher education depends on the health of state coffers, which in turn depends on economic conditions of states (Sunquist, 2001). Consequently, economic fluctuations at the state level can impose serious threats to financial viability of state-related institutions of higher education (Zandi, 2001). Recent history bears ample evidence. A cursory look at the 1970–1980 period would indicate the vulnerability of heavy reliance on state financing of higher education in states such as Alabama, Georgia, Illinois, Maryland, Michigan, Mississippi, New York, Pennsylvania, Tennessee, and Washington (Slaughter, 1987). Many states gained some financial relief from the overall economic progress of the



1990s, but states like Tennessee continue to struggle (Southern Regional Education Board, 2001; Tennessee Higher Education Commission, 2001).

For the last 6 years, Tennessee Board of Regent's higher education institutions have been financed at about 86% of the eligible level (Tennessee Board of Regents, 2001). Furthermore, funding for higher education in Tennessee as a percentage of the state's budget has been declining. During the period from 1991–1992 to 1999–2000, the percentage of state allocation for higher education declined from 15.1 to 14.7% (Southern Regional Education Board, 2001). The adverse impact of such a decline becomes clear when one considers the rapid advances in information technology during this period, which in fact created more funding needs for higher education institutions. Latest data show that Tennessee places at the bottom among the southern states in terms of per student allocation of state funds (Southern Regional Education Board, 2001). Clearly, higher education institutions are faced with increasing costs while options for increasing revenue are very limited (Curry, 2001). Given this scenario, higher education administrators are in a quandary on how to improve the quality of programs in the light of accreditation requirements and competitive market conditions while they are forced to cut down operating expenses.

In this context, most people would ask the common sense question: does anyone run a business enterprise like the way we run state-related higher education institutions? While the idea that higher education institutions should be run like a business enterprise is not being endorsed here, there is an underlying rationale in such an argument (Manne, 1975). Stability is a prerequisite for long-term viability of any operation. Higher education institutions seem to operate on a crisis mode from year to year. While legislative bottlenecks and political tug-of-war continue to hamper any attempt to bring about a framework for fiscal stability, administrative policies in higher education also seem to impose major barriers against establishing a financially viable higher education system in many states. Such barriers include, among others: enrollment-driven state allocation of funds, lack of incentives for securing financial solvency, and unhealthy financial management policies.

Major sources of operating funds of state-related higher education institutions are: state allocations, tuition fees, grants and awards, and fund raising. Allocation of funds to state-related institutions of higher education (the major source of revenue of many state-related institutions of higher education) depends on a number of criteria. Critical variables include: student enrollment, student performance on mandated tests, institution-based performance funding (program accreditation), projected state revenue collections, budget requests by sister institutions for capital expenditure, and so on. As state allocations are made on projected revenues of state coppers, any downfall in state revenue calls for retrenchment of allocated funds from higher



education institutions by the state. Similarly, any decline in enrollment from the projected figures of higher education institutions calls for return of allocated funds back to the state. This practice breeds far-reaching consequences.

Generally, in March of every year, departmental units prepare budget requests for the following fiscal year. It is also customary to receive various directives from university hierarchy on various constraints and parameters to keep in mind in budget preparation. Inevitably, as enrollment count is a major criterion of state allocation of funds, planned activities revolve around ways to boost student enrollment.

Notwithstanding all the fancy statements of mission, vision, belief, values, and the like, 'Show me the numbers' seems to be the only driving force behind every 'rational' decision of these institutions. Routinely, in the middle of the fiscal year, a panic button is pushed and a distress call is in effect by university hierarchy, 'State revenue collections are falling behind the projected revenue; therefore, we have to cut back  $X\%$  of budgeted funds.' Another familiar distress call reads as follows: 'We failed to produce the estimated enrollment counts, based on which we prepared our budget for this fiscal year; therefore, we have to cut back  $Y\%$  of budgeted funds.' In a fiscal year, either one of these distress calls (a routine exercise among some states) can be quite damaging on operational activities of higher education institutions. (Both distress calls in one fiscal year is not a rarity in some states and the consequences of such an event is hard to swallow.) So, in every unit in every college, any effort to improve quality has to be shelved and only the quantity improvement measures survive. Hiring-freeze of new faculty and/or stalling the replacement of current salary lines comes into effect. Faculty travels are to be curtailed. Supplies are to be restricted. Maintenance works are to be postponed. This happens year after year.

This method of funding ignores a basic rule of system operation — there is virtually no single variable cost that can be adjusted as enrollment goes down a few percentage points or a few percentage drop in state-projected revenue. When there is a slight decline either in enrollment or state revenue, adjustment of fixed cost is out of the question. So, inevitably, the effect of lack of funding manifests negatively on quality improvement in higher education. All 'rational' decisions are geared toward one major objective: to increase full-time enrollment (FTE) counts. Do our policymakers in higher education care to think about the effects of this mode of operation? When will our higher education policymakers understand the damaging impact of enrollment-driven allocation of state funds to institutions of higher education? Why does such a damaging system survive?

Some politicians may adore this system of financing higher education, because they can maintain a firm grip on higher education. Every higher



education institution operates at the mercy of local politicians, state assembly, and other powerful political lobbyists and organizations. They can give various commands to the higher echelon of institutional administration in return for ‘taking care of institutional funding needs.’ Such commands range from trivial personal issues of a voter to a major ‘political’ concern with academic programs. At an institutional level, the higher echelon of administration at some institutions may find this operational system rather irresistible because of the enormous power bestowed upon them by uncertainty and financial instability — a system of crisis-driven management seem to attract some devotees! The higher echelon of administration at these institutions may resort to numerous arm-twisting tactics — ‘Requests for additional funds have to be directly tied to improvements in enrollments.’ Eventually, increasing full-time equivalent (FTE) enrollment becomes the sole responsibility of department chairs and individual faculty. Faculty are forced to believe that increasing FTE enrollment means ensuring full-time employment (FTE) for faculty. History repeats itself in wonderful ways! In 1858, in the midst of a financial calamity, Delaware College president promised his faculty, ‘For every student you recruit, I will pay you 50% of his tuition’ (Minutes of the Delaware College Board of Trustees, 1858). Unfortunately, the 21st century is no different! The current system of funding is structured in such a way the dependency of state-related institutions of higher education on state funding is perpetually sealed — a system of funding that guarantees to increase the burden on state taxpayers. There is no end in sight for this tragic system of operation.

Every year the only solution the bureaucrats in higher education put forward is ‘Give us more money,’ or ‘We need more money.’ Their justification is, ‘We have been funded at the  $(100 - X)\%$  of the eligible level. Therefore, we have to fight for 100% of eligible level of funding.’ This is an ostrich-type argument. This is a perennial complaint that never seems to disappear from the vocabulary of the higher education administrators. The mere fact is that this argument’s perennial nature speaks volume for the futility of this crusade. At a time when every state agency is hit by budget cuts and quite legitimately each institution is clamoring for more money, what is the rationale for seeking more money by the higher education sector? Lawmakers are reluctant, quite rightly so, to raise tax rates to meet budget shortfalls. Under these conditions, it would be wise to get the lawmakers’ attention to a new higher education funding formula that will guarantee a specific amount of state funding to each institution of higher education while guaranteeing to reduce the state’s burden on higher education funding. Therefore for the sake of creating an environment conducive for the long-term survival of state-related institutions of higher education, it is essential to establish solid financial foundations for those institutions. We must replace policies geared toward quantity improvement with policies geared toward quality improvement. In this vein, the



following method of funding is proposed for state-related institutions of higher education.

As an alternative to the FTE enrollment-based funding method, I propose a simple formula. Assume that under the prevailing conditions, the state's current method of allocation of funds provides the optimum dollar amount the state can provide to each institution of higher education. This includes funds from all sources: FTE enrollment count, categorical, performance-based, allocation on fixed assets and so on — the grand total of funds an institution receives from the state. This is the basis of the new formula, a very simple one. The state must guarantee each of its institutions the average of the last  $X$  number of years (e.g., 3 years) of state total allocation of funds to each institution for the inaugural year. In the second and the third year of its operation, the dollar amount each institution receives remains constant. This will guarantee each institution to receive a constant dollar figure for three consecutive years and provide an ample time frame for each institution to prepare and embark upon a strategic development plan based on institutional mission.

Emphasis of funding has to be changed from sustenance or survival to self-sufficiency (= financial autonomy). One strategy would be to reduce state's disposable funds for higher education on a set formula after the initial period of 3 years. Starting from the fourth year, the state will reduce the size of this disposable dollar amount by a constant percentage. Consequently, in year 4, the amount of funding each institution of higher education receives will be adjusted by a given percentage downward ( $-x\%$ ). This discount rate has to be established at the time of implementing this funding formula, and it is to be remained fixed. In the future, this discount rate can be changed (downward or upward) only if the economic conditions warrant. A mathematical formulation of the proposed funding formula is presented in Appendix A and a simulated funding needs for 20 years assuming discounts rates of 0.1 and 0.2% is given in Appendix B.

This funding formula provides long-term stability for state funding of higher education for both the state and the state-related institutions of higher education. Share of the higher education funding of total state expenditure is contained within a certain limit and is most likely to go down as the total state spending goes up. Over the years, as the total disposable dollar figure for state funding of higher education goes down, the state can accumulate a reserve fund (using an annual discount rate of  $x\%$ ). This reserve fund can be used for purposes of funding higher education only. For example, it can be used to supplement any shortfall in total disposable amount for higher education in years of economic downturns as well as to provide supplemental allocations to institutions as incentives for raising external funds (grants, endowments, gifts, etc.). In the long run, accumulation of a sizable reserve fund will provide many



options for the state government. A scholarship fund can be established or strengthened an existing one to offer state scholarships for prospective college students. Eventually, states fund students rather than institutions. If legislators and policymakers are interested in increasing the number of college-educated population in a state (Tennessee Higher Education Commission, 2000), they should consider supporting college-aspiring students rather than to maintain colossal structures of bureaucracy by supporting higher education institutions, most likely through excessive taxation. This approach is quite appealing for legislators as student-based incentives can strike a code between voters and lawmakers quite easily as compared to the current situation in many states where legislators find it very difficult to convince taxpayers the need for more funding of higher education institutions.

In effect, this system of funding dictates that each institution should be allowed to decide its enrollment size. Consequently, each institution can design its size of operation and expansion path in the light of more realistic resource projections. Higher education institutions should welcome the opportunity to devote its resources toward quality improvement rather than to increase enrollment by hook or by crook — higher education administrators are all too familiar with the nitty-gritty of such efforts. The positive impact of this scenario is quite compelling. Academic programs can be selective in admission decisions. Quality candidates are a prerequisite for producing quality graduates. This funding method is bound to create opportunities for addressing some of the widespread criticisms of higher education such as watered-down curricula, relaxed-assessment standards, low-quality graduates, grade inflation, and so on (Stone, 1995).

This funding method also paves the way for each institution to set its tuition fees. Higher education market should be driven by the quality of its service. As each institution can take measures to improve its quality and to decide the size of its operation, it will enjoy the power to set the price for its services. The forces of free market economy decide the destiny of each institution. This will create possibilities for state-related institutions of higher education to be more efficient. Waving TQM banners is a futile exercise while keeping both hands and feet of these institutions tied together. Rather, conditions must be provided for quality improvement. Periodic accreditation procedures at various levels (institutional, college, departmental, and program) are sufficient to safeguard academic, social, and ethical issues.

As long as higher education institutions follow state's financial rules and procedures in spending state-allocated funds, the state has no reason for alarm. Nevertheless, it is important to point out that some current budgeting practices encourage wasteful spending. For example, zero-sum financial management practice encourages every unit to spend every dollar of the allocated funds, irrespective of utility. In the private sector or among households, a prudent



practice in financial management is to save money and build investment portfolios. In the public sector, saving is a taboo and spending all available funds is the rule. Toward the end of fiscal year, each unit operates in a panic mode to spend account balances (buying various ‘stuff’) because any remaining positive balances at the end of fiscal year cannot be carried forward for the next year. Under this system, there is no incentive to save and to carry forward any balance to accumulate funds for the future — saving is penalized. Each unit should be encouraged to save budgeted funds and a mechanism should be in place to encourage and reward such efforts. In this proposed system, saving of budgeted funds will be an integral part. There is no point in trying to defend a bureaucratic quagmire (bureaucratic trivia, rules and procedures, administrative divisions, cadres, committees, meeting, surveys, compliance reports, audit reports, and a gamut of paperwork) created by the existing set of funding criteria. The proposed funding formula will drastically reduce fund-administration cost and related bureaucratic bottlenecks. A comparison of the current funding method and the proposed formula is synthesized in Table 1.

This funding formula provides an ideal framework for policymakers and legislators, as it guarantees to contain higher education funding within a certain limit in the short run and to minimize its growth in the long run. Furthermore, this funding formula deserves policymakers’ attention as this system of funding creates incentives for quality improvements in higher education. As institutions of higher education know the amount of funding to receive from state coffers each year they can establish and follow a long-term plan of development. State-related institutions of higher education must embark upon a vigorous development-funding program to strengthen institutional resources needed to materialize its development plan. In effect, this funding formula offers an opportunity for state-related higher education institutions to take charge of their own destiny. Eventually, with the proposed formula, state-related institutions of higher education gain financial autonomy while the state will no longer be required to carry on a limitless burden on financing higher education institutions.

Some may have a vested interest in the current system of fund allocation to state-related institutions of higher education. It would be wise for them to understand that the current form of state funding of higher education is on a collision course. ‘If it ain’t broke, don’t fix it’ can no longer be used as a shield to hide behind and to oppose reforming the current system of higher education funding. It is much easy to cling onto methods and systems, which we are all too familiar with. To change the status quo of higher education institutions, visionary approaches and innovative ideas are needed. It is high time for our policymakers to consider alternatives to the current system of funding. It must be emphasized that this formula

**Table 1** A comparison of the current funding method with the proposed funding method

<i>Current funding method</i>	<i>Proposed funding method</i>
1 Uncertainty is the norm, for the present and the future	Certainty is the norm, for the present and the future
2 Allocation figures are unpredictable.	Allocation figures can be precisely predicted
3 Bureaucracy is rampant both at the state and the institutional levels	Bureaucracy is minimal both at the state and the institutional levels
4 Rules, regulations, monitoring, reports are abundant both at the state and the institutional levels	Rules, regulations, monitoring, reports are minimal both at the state and the institutional levels
5 Institutions operate on a crisis-driven mode	Institutions can plan and operate on long-term development plans
6 Perpetual dependency of the state–institutional relation	Opportunities for minimizing institutional dependency on state
7 Incentives are minimal for quality improvements in higher education	A myriad of opportunities for quality improvements in higher education
8 Sustainability of higher education is in the hands of taxpayers	Sustainability of higher education is in the hands of higher education administrators
9 Saving is penalized	Incentive to save and accumulate funds for future
10 Status quo maintained	Visionary approach
11 Legislators and taxpayers are in a dilemma	Appealing for legislators and taxpayers
12 Higher education administrators are frustrated	Appealing for higher education administrators

alone will not be sufficient to bring financial stability to state-related institutions of higher education. Coupled with this formula, statewide streamlining of programs and fields of studies is necessary at the state level. Each institution must be able to make all administrative decisions with no state interference—each institution is in charge of its own destiny. This includes all spheres of internal administration: size and the composition of enrollment, the setting of tuition fee and other charges, decisions on fund raising, investments, disbursements, and so on. By probing into the history of higher education funding, highlighting the financial woes of state-related institutions of higher education, presenting a new and simple formula for funding these institutions, and discussing the rationale and the implications of implementing the proposed funding formula, this paper aims to ignite some interest among higher education policymakers on reforming the existing state funding formula in the interest of growth and stability in the higher education sector.



## Notes

1 This paper was prepared while I was at the College of Education, East Tennessee State University, USA. The views expressed do in no way represent the official position of East Tennessee State University, Tennessee Board of Regents, Tennessee Higher Education Commission, or any other state institution in any of the states in the USA. The ideas presented in this paper solely represent the author's viewpoint. I greatly appreciate Lou Ann Sevier's help in preparing this paper.

## References

- Curry, D. (2001) 'How a university system won a spurt of spending in a state known for frugality', *The Chronicle of Higher Education*, 47(46): A20.
- Edirisooriya, G. (1990) 'A market analysis of the American higher education sector in the latter half of the nineteenth century', Paper presented at the American Educational Research Association Annual Meeting; Boston, MA.
- Edirisooriya, G. (1991) 'State–University relationship: the case of the University of Delaware', Paper presented at the American Educational Research Association Annual Meeting, Chicago, IL.
- Manne, H.G. (1975) *The Economics of Legal Relationships: Readings in the Theory of Property Rights*, St Paul, MN: West Publishing Co.
- Minutes of the Delaware College Board of Trustees*, Vol. 1, July 06, 1858, University of Delaware Archives, Newark, DE.
- The Morrill Act* (1862) Available: <http://www.usinfo.state.gov/usa/infousa/facts/democrac/demo.htm>.
- Morison, S.E. (1968) *The Founding of Harvard College* 2nd edn, Cambridge, MA: Harvard University Press.
- Munroe, J.A. (1984) *History of Delaware* 2nd edn, Newark, DE: University of Delaware Press.
- Novak, S.J. (1971) 'The college in the Dartmouth College case: a reinterpretation', *The New England Quarterly* 47(4): 550–563.
- Slaughter, S. (1987) 'Continued efforts to cope with declining resources: selected post-secondary education systems in the United States and Canada, an introductory essay', *Higher Education* 16(2): 125–134.
- Southern Regional Education Board (2001) 'Higher education finance and budgets', Available: <http://www.sreb.org/main/EdData/DataLibrary/highered/finance/finance.asp>.
- Stone, J. (1995) 'Inflated grades, inflated enrollment, and inflated budgets: an analysis and call for review at the state level', *Education Policy Analysis Archives* 3(11). Available: <http://epaa.asu.edu/epaa/v3n11.html>.
- Sunquist, D. (2001) 'FY 2001–2002 budget document', Available: <http://www.state.tn.us/finance/bud/overview/buddoc.html>.
- Tennessee Board of Regents (2001) 'Basic facts', Available: [http://www.tbr.state.tn.us/basic\\_facts.htm](http://www.tbr.state.tn.us/basic_facts.htm).
- Tennessee Higher Education Commission (2000) 'Statewide master plan for Tennessee higher education, 2000–2005', Available: <http://www.state.tn.us/thec/mastplan.pdf>.
- Tennessee Higher Education Commission (2001) 'The status of higher education in Tennessee', Available: <http://www.state.tn.us/thec/c2001.2.pdf>.
- University of Delaware (2001) 'Facts and figures', Available: <http://www.irp.udel.edu/ir/fnf/98-99/stprof>.



- Veysey, L.R. (1970) *The Emergence of the American University*, Chicago: The University of Chicago Press.
- Whitehead, J.S. (1973) *The Separation of College and State: Columbia, Dartmouth, Harvard, and Yale 1776–1876*, New Haven, CO: Yale University Press.
- Zandi, M.M. (2001) ‘The outlook for state tax revenues’, Available: <http://www.nga.org/cda/files/TAXREVENUES.pdf>.

### About the author

Gunapala Edirisooriya is Associate Professor at the Beeghly College of Education, Youngstown State University, USA, prior to which he was Associate Dean, College of Education, East Tennessee State University, USA. Except for a stint of 4 years during which he worked as a research and evaluation specialist in a large urban school system in the USA, he has been associated with the higher education sector his entire adult life, as an educand, educator, or administrator. Altogether, he has attended or worked for nine universities in Sri Lanka, Great Britain, Nigeria, and the USA. He has published journal articles and book chapters on educational policy issues. Additionally, he has served the World Bank and the Government of Sri Lanka as a consultant on educational planning. His academic degrees include: B.Com. (University of Ceylon), M.Litt. (University of Glasgow, UK), and M.A., Ph.D. (University of Delaware, USA).

### Appendix A

Let  $X_t$  be the amount of funding a state allocates to its higher education institutions in year  $t$ . For any given institution, the annual state allocation of funds is given by  $X_{it}$ . So, the total allocation of state funds is equal to the sum of allocation to each individual institution, that is,

$$X_{it} + \dots + X_{jt} = X_t \quad (1)$$

In the new formula, in year  $t+1$ , the amount of state allocation for higher education institutions is based on the average of the three previous consecutive years’ allocations, which is,

$$(X_{t-2} + X_{t-1} + X_t)/3 = X_{t+1} \quad (2)$$

Similarly, a higher education institution’s state allocation for the year  $t+1$  will be

$$(X_{it-2} + X_{it-1} + X_{it})/3 = X_{it} + 1 \quad (2a)$$

The dollar amount of state allocation of funds to its higher education institutions in year  $t+1$  will continue to be applied for year  $t+2$  and year  $t+3$ .

In the year  $t+4$ , state will reduce its allocation of funds by  $-x\%$ . For example, the discount rate is set at 0.1%. So, in the year  $t+4$ , the amount of allocation will be equal to

$$(X_{t+3}) * 0.999 = X_{t+4} \quad (3)$$



Similarly, in year  $t + 5$ , the amount of state allocation will be

$$(X_{t+4}) \times 0.999 = X_{t+5} \quad (4)$$

$$(X_{t+3}) * (0.999)^2 = X_{t+5} \quad (5)$$

Equations (4) and (5) are equal.

Similarly, Equations (3)–(5) can be equally applied to any institution within the state simply by adding institutional subscript, that is,

$$(X_{it+3}) * 0.999 = X_{it+4} \quad (3a)$$

$$(X_{it+4}) * 0.999 = X_{it+5} \quad (4a)$$

$$(X_{it+3}) * (0.999)^2 = X_{it+5} \quad (5a)$$

So, for any given year, the amount of state allocation of funds to higher education would be equal to

$$(X_{t+3}) * (0.999)^n = X_{t+n} \quad (6)$$

For the state, for any given institution of higher education, and for any given year, this funding formula can predict the amount of state fund allocation. For example, if we assume a 0.1% rate of discount and state allocation of funds to its higher education institutions in year  $t + 3$  as \$1,000,000,000, then in  $t + 4$  state allocation would be

$$(\$1,000,000,000) \times (0.999)^1 = \$999,000,000 \quad (7)$$

Likewise, in  $t + 23$  state allocation of funds to its higher education institutions will be

$$(\$1,000,000,000) \times (0.999)^{20} = \$980,188,865 \quad (8)$$

Similarly, if a higher education institution in year  $t + 3$  receives \$100,000,000 as state allocated funds, then in year  $t + 4$  this institution will receive,

$$(\$100,000,000) \times (0.999)^1 = \$99,900,000 \quad (7a)$$

In year  $t + 23$  this institution will receive,

$$(\$100,000,000) \times (0.999)^{20} = \$98,018,886 \quad (8a)$$

In this example, this institution will lose about \$2,000,000 in the year  $t + 23$ . To generate \$2,000,000 in year  $t + 23$ , this institution must plan to raise about 20 million dollars (assuming a 10% rate of return on invested funds) by year  $t + 22$ . In effect, in every consecutive year, this institution must plan to raise an additional one million dollars more than the amount of dollars raised in a previous year. One caveat is in order. This funding formula does not take into account the inflation factor. This is not an omission. Destiny of higher



**Table 2** A 20-year simulated data

$Y_{t+}$	$X$	$Z$ (\$)	$Y_{t+}$	$X$	$Z$ (\$)
4	0.999	999,000,000.00	4	0.998	998,000,000.00
5	0.999	998,001,000.00	5	0.998	996,004,000.00
6	0.999	997,002,999.00	6	0.998	994,011,992.00
7	0.999	996,005,996.00	7	0.998	992,023,968.02
8	0.999	995,009,990.00	8	0.998	990,039,920.08
9	0.999	994,014,980.01	9	0.998	988,059,840.24
10	0.999	993,020,965.03	10	0.998	986,083,720.56
11	0.999	992,027,944.07	11	0.998	984,111,553.12
12	0.999	991,035,916.13	12	0.998	982,143,330.01
13	0.999	990,044,880.21	13	0.998	980,179,043.35
14	0.999	989,054,835.33	14	0.998	978,218,685.27
15	0.999	988,065,780.49	15	0.998	976,262,247.89
16	0.999	987,077,714.71	16	0.998	974,309,723.40
17	0.999	986,090,637.00	17	0.998	972,361,103.95
18	0.999	985,104,546.36	18	0.998	970,416,381.74
19	0.999	984,119,441.82	19	0.998	968,475,548.98
20	0.999	983,135,322.37	20	0.998	966,538,597.88
21	0.999	982,152,187.05	21	0.998	964,605,520.69
22	0.999	981,170,034.86	22	0.998	962,676,309.65
23	0.999	980,188,864.83	23	0.998	960,750,957.03

education must be placed in the hands of higher education administrators and not on taxpayers. It is the responsibility of higher education administrators to plan operational activities by taking into account inflationary effects. This formula guarantees a steady stream of funds from state governments to higher education institutions and operational decisions are left for each institution.

## Appendix B

Table 2 provides 20-year simulated data for a state that provides a total of \$1,000,000,000 for its higher education institutions in year  $t+3$ , using two discount rates, 0.1 and 0.2% where  $X$  is the discount multiplier and  $Z$  is the state total allocation for Higher Education.