

Higher Education Finance Variables: An Analysis

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How should America provide postsecondary education for growing numbers of students? States, notes one observer, face a fundamental choice: Limit the number of college students served or serve more students more effectively.¹ The declining proportion of state budgets earmarked for higher education led public higher education finance researchers to focus on the second alternative. Key strategies include: allocating constrained state resources equitably and efficiently, pricing tuition fairly and reducing inequitable financial assistance, and planning for increased student diversity.

The dual focus on equity and efficiency resulted in several creative proposals. Two scholars, for example, developed a tuition-pricing model, based on student willingness to pay, that helped colleges establish equitable tuition rates.² Other scholars proposed changes in the distribution of state funds among colleges.³

Another researcher, who proposed a major role for faculty and staff in determining college budgets, posed a key question for scholars and practitioners: "How, precisely, can we determine the financial health of an institution?"⁴ More precise assessments, this researcher added, would permit association leaders and faculty members to compare the financial standing of their college to similar institutions. Scholars usually assess financial health by comparing income sources to expenditures. Income streams include state and local revenue; tuition and fees; endowment income; and federal, state, local, and private grants and contracts. Expenditures include the costs of instruction; research; academic support; student services; institutional support; plant operation and maintenance; scholarships and fellowships; and educational, general, and current fund expenditures and transfers.

Applying inconsistent definitions to key items often leads to inconclusive, even misleading, inter-institutional comparisons. Is there a better way of comparing the financial condition of institutions?

DATA AND METHODOLOGY

The National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) annually surveys the finances of postsecondary education institutions. The survey aims

... to collect basic data to describe the financial condition of postsecondary education in the nation; to monitor changes in postsecondary education finance; and to promote research involving institutional financial resources and expenditures.

We developed a methodology to compare the financial condition of the 1,493 colleges in the IPEDS 1995-96 survey that offered *at least two years but less than four years* of instruction. The IPEDS data include 126 revenue and expenditure variables, and financial ratios⁵ derived from these variables—costs per student, for example.

We used “factor analysis” to provide a few indicators or “factor scores” of financial health to compare institutions, while preserving the relative contribution of each finance variable to these factors. One scholar illustrated the utility of factor analysis for comparing countries. Noting the existence of a large number of variables by which to measure the attributes of a nation, including size, population, and degree of technological development, this scholar asked, “To what extent can this large number of variables be considered manifestations of more basic constructs or factors?” “To the degree that the variables are interrelated and represent a few factors,” he answered, “it will be possible to develop a theory for each factor but still explain a large number of variables.”⁶

We based our study of the financial health of colleges on the same principle.⁷ Factor analysis reduced the 126 IPEDS revenue and expenditure variables into a few categories. We may express the basic factor analysis model as an equation:

$$z_j = a_{j1}F_1 + a_{j2}F_2 + \dots + a_{jm}F_m + d_jU_j \quad (j = 1, \dots, n)$$

where n is the number of observed variables, and where each observed variable z_j is described linearly in terms of m (usually much smaller than n) *common factors* and a *unique factor* U .⁸

THE EIGHT FACTORS

“Varimax” rotation on the 126 finance variables and ratios produced eight factors that accounted for 68 percent of the total variance. In this study, the factor analysis model represents the regression of each variable (z_j) on the eight factors for the 402 (of 1493) institutions with factor scores.⁹

The output is a table titled “Rotated Factor Pattern”; the column headings are Factor 1 to Factor 8 and the row names are the names of the 126 IPEDS variables. Table 1 shows sample lines of this output. We used a 0.50 cut-off point to identify the factors with high loadings or correlations—the a -coefficients in the regression equation above—on the variables. A star indicates a high factor loading on the associated variable.

About 40 percent of the 126 variables entering into the factor analysis had low loading—less than 0.50—from all factors; we excluded these 51 variables from the factor interpretation.¹⁰

Table 2 shows the variables with high factor loadings on the eight factors. The factor names evolved from the variable with the largest correlation with the given factor.¹¹ Factors 1 and 2 show high loading on more variables than Factors 3 through 8. The scores for Factor 1, “overall financial picture,” ranged from 3306.39 to -1393.40 for the 402 colleges in the IPEDS database.

We focused on the 23 colleges with the highest and the lowest scores on Factor 1. Factor 2, “determinate income and expenditure” was, like Factor 1, arranged in near-perfect descending order.

Table 3 shows the eight factor scores for the 23 institutions *highest* in Factor 1 score—observation numbers 1 through 23. Table 4 shows all eight factor scores for the 23 institutions *lowest* in Factor 1 score—observation numbers 380 to 402. Factors 1 and 2 showed the same rank order from highest to lowest, reflecting the different categories of revenues and expenditures. The remaining six factor scores were generally arranged in ascending rank order; moving from low negatives to high positives in inverse relationship with Factor 1 and Factor 2 scores.

Factor 3, “revenues and expenditures ratios per full-time equivalent student (FTE),” started with a negative score of -2224.09 (Table

TABLE 1

SELECTED PARTIAL OUTPUT OF FACTOR ANALYSIS: ROTATED FACTOR PATTERN

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
TLENDOW	0.89608*	-0.20761	0.02194	0.01625	0.51688	0.02183	0.07630	0.01901
TLCFREV	0.61844*	0.75604*	-0.03133	0.02069	0.01306	0.00496	0.00995	-0.05637
REV2	0.00195	-0.00982	0.70991*	0.32346	-0.00768	0.42133	-0.02639	0.06567
REV6	0.03719	-0.01241	-0.13360	0.86744*	0.04880	-0.19954	-0.00017	-0.01551
END4	0.14643	0.11358	0.08887	0.00456	0.92132*	-0.02326	-0.05167	0.02034
ASST4	-0.05408	-0.02598	-0.15275	0.13153	0.27447	0.64461*	0.05568	0.02372
EXP13	0.01064	0.07915	-0.14602	-0.01238	0.01128	-0.04580	0.63597*	-0.12085
EXP19	-0.03382	-0.07066	-0.13140	0.03802	-0.00087	0.07722	-0.04713	0.87682*

*High factor loading

TLENDOW: total endowment income.

TLCFREV: total current fund revenue.

REV2: tuition and fees per FTE.

REV6: other revenue per FTE.

END4: endowment yield a.

ASST4: equipment assets per FTE.

EXP13: public service expenditure per E&G expenditures.

EXP19: library expenditures per E&G expenditures.

TABLE 2

EIGHT FINANCIAL FACTORS, RELATED VARIABLES, AND EXPLANATION OF FACTORS

Factor Name	Variables with High Factor Loadings	Explanation of Factors
Factor 1: Overall Financial Picture	<p>Revenues: Unrestricted and total tuition and fees, unrestricted and total endowment income, unrestricted and total other income, unrestricted and total current fund revenue.</p> <p>Expenditures: Unrestricted and total instructional expenditure, unrestricted and total academic support expenditure, unrestricted and total institutional support expenditure, unrestricted and total operation and maintenance of plant expenditure, unrestricted and total educational and general expenditures and transfers, unrestricted and total current fund expenditures and transfers.</p> <p>Faculty and students: Faculty on 9/10 month contracts, full time equivalent students, total faculty on 9/10 and 11/12 month contracts.</p>	<p>Factor 1 represents the basic financial condition of the institution, encompassing revenues and expenditures, faculty, and students. This factor accounts for current fund revenue and specific revenues such as tuition and fees, endowment income, and other income sources. Current fund revenue is the sum of tuition and fees, state appropriations, grants and contracts, private gifts, endowment income, sales and services and other income.¹ This factor accounts for the major components of expenditures, including instruction, academic support, institutional support, plant operation and maintenance, and total educational expenditures and transfers. Total education expenditures and transfers are the sum of expenditures for instruction, research, public service, instructional support, student services, instructional support, operation and maintenance of plants, scholarships and fellowships and mandatory transfers.² Factor 1 also includes the number of faculty on 9/10 and 11/12 month contracts, and the number of full time equivalent students. This factor does not include <i>restricted</i> income and expenditures.</p>

TABLE 2

EIGHT FINANCIAL FACTORS, RELATED VARIABLES, AND EXPLANATION OF FACTORS (CONTINUED)

Factor Name	Variables with High Factor Loadings	Explanation of Factors
Factor 2: Determinate revenue and expenditure	<p><i>Revenues:</i> Unrestricted and total state and local appropriations, restricted and total government grants and contracts revenues, restricted, unrestricted and total current fund revenue.</p> <p><i>Expenditures:</i> Restricted and total instructional expenditure, restricted, unrestricted and total student services expenditure, restricted and total scholarship and fellowship expenditure, restricted educational and general expenditures and transfers, restricted current fund expenditures and transfers, faculty on 9/10 month contracts, full-time equivalent students, total faculty on 9/10 and 11/12 month contracts.</p>	Factor 2 consists of revenues and expenditures that are predetermined or earmarked for specific purposes, such as state and local appropriations, and <i>restricted</i> revenues and expenditures. Factor 2, unlike Factor 1, does not give an overall picture of the financial condition of the institution.
Factor 3: Revenues and expenditures ratios	<p><i>Revenues Ratios*:</i> State and local appropriations /FTE, tuition and fees/FTE, state and local appropriations/E&G revenue, tuition and fees/E&G revenue, net tuition and fees revenue/FTE.</p> <p><i>Expenditures Ratios:</i> Student services expenditure/FTE, unrestricted scholarships and fellowship expenditures/FTE, instruction expenditures/E&G expenditures(-), expenditures for instruction, research and academic support/E&G expenditures(-), net tuition and fees revenue/instructional expenditures, net tuition and fees revenue/E&G expenditures.</p>	Factor 3 includes revenues and expenditures expressed as ratios to FTE, E&G revenues, and E&G expenditures. It reflects the institution's balancing approach to budgeting, the way it allocates specific expenditures relative to overall expenditures. It also reflects revenues as they relate to full-time equivalent students.
Factor 4: Expenditures Per FTE Student	<p>Other revenue/FTE, current fund revenue/FTE, other revenue/E&G revenue.</p> <p><i>Mostly Expenditures Ratios:</i> Instruction expenditure/FTE, academic support expenditure/FTE, institutional support expenditure/FTE, plant operation and maintenance expenditure/FTE, E&G expenditures/FTE, land assets/FTE.</p>	Factor 4 includes two revenue variables, but the "other revenue" variable is relatively insignificant. ³ Current fund revenue/FTE is the only revenue ratio that is logically linked to the expenditures ratios. This ratio, together with the expenditures ratios, relate to FTE. Factor 4 then makes clear indication of looking at expenditures per full-time equivalent student, with the backdrop of current revenue per FTE.
Factor 5: Endowment	Unrestricted and total endowment income, endowment income/FTE, endowment income/E&G revenue, building assets/FTE, debt/FTE, endowment fund balance/current fund expenditures, endowment market value, beginning of year, endowment market value, end of year, endowment yield a.	Factor 5 is an endowment factor.
Factor 6: Building and equipment assets per FTE student	Building assets/FTE, equipment assets/FTE.	Factor 6 is self-explanatory.
Factor 7: Government grants and contracts spent on public service and institutional support	Restricted public service expenditure, total public service expenditure, government grants and contracts revenue/FTE, government grants and contracts revenue/E&G revenue, Public service expenditure/FTE, public service expenditure/E&G expenditures, institutional support expenditures/instructional expenditures.	Factor 7 reflects the relationship between government grants and contracts and community service—public service expenditures—and institutional support. Some institutions, for example, receive funded contracts for public service such as outreach tutorial contracts. ⁴

TABLE 2

EIGHT FINANCIAL FACTORS, RELATED VARIABLES, AND EXPLANATION OF FACTORS (CONTINUED)

Factor Name	Variables with High Factor Loadings	Explanation of Factors
Factor 8: Other expenditures as ratios to E&G expenditures.	Plant operation and maintenance expenditures/E&G expenditures, restricted scholarships and fellowship expenditure/E&G expenditures, library expenditures /E&G expenditures, expenditures for instruction, research and academic support/E&G expenditures.	Factor 8 is other expenditures relative to E&G expenditures; this is an important component budget wise as these expenditures could be close to 40 percent of the total E&G expenditures.

* FTE: Full-time equivalent students.

E & G: Education and General.

Notes:

¹ Dubeck, 1998, Table 1A.

² Ibid.

³ Ibid., 11

⁴ John Lee of JBL Associates helped to explain Factor 7.

3), approached zero at observation number 222 (not shown), about midway through the 402 institutions, and then increased to 937.63 (Table 4-observation 402). Why did institutions with high scores on Factors 1 and 2 report low Factor 3 scores? Perhaps the 23 institutions with the highest healthy *overall financial picture* and with high *determinate revenue and expendi-*

ture levels carefully controlled revenues and expenses per student. Students neither benefited from high levels of service, scholarship, and instructional spending, nor paid high tuition. These institutions budgeted well and did not overspend; the factor scores indicate the financial health of colleges, not the benefits to students.

TABLE 3

TWENTY THREE INSTITUTIONS HIGHEST IN FACTOR 1 SCORES

Obs	Unit Id	Institution Name	City
1	170693	Lewis College of Business	Detroit
2	206817	Bacone College	Muskogee
3	170055	Grand Rapids Community College	Grand Rapids
4	238722	Fox Valley Technical College	Appleton
5	240170	Western Wisconsin Technical College	La Crosse
6	135717	Miami-Dade Community College	Miami
7	193326	Monroe Community College	Rochester
8	222992	Austin Community College	Austin
9	171304	Muskegon Community College	Muskegon
10	169521	Delta College	University Center
11	236513	Seattle Community College-Central Campus	Seattle
12	111887	Cerritos College	Norwalk
13	146472	College of Lake County	Grayslake
14	209074	Linn-Benton Community College	Albany
15	239248	Milwaukee Area Technical College	Milwaukee

TABLE 3

TWENTY THREE INSTITUTIONS HIGHEST IN FACTOR 1 SCORES (CONTINUED)									
Obs	Unit Id	Institution Name							City
16	144944	Elgin Community College							Elgin
17	149842	William Rainey Harper College							Palatine
18	213233	Johnson Technical Institute							Scranton
19	239910	Southwest Wisconsin Technical College							Fennimore
20	203748	Lorain County Community College							Elyria
21	239008	Lakeshore Technical College							Cleveland
22	209250	Mt. Hood Community College							Gresham
23	182005	Community College of Southern Nevada							Las Vegas

Obs	State	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
1	MI	3306.39	2418.81	-2224.09	-1597.82	-17487.81	-460.26	-3945.95	-518.694
2	OK	2548.27	1860.37	-1727.31	-1241.23	-13483.60	-373.03	-3040.99	-405.125
3	MI	2175.36	1581.89	-1490.88	-1066.72	-11517.72	-340.77	-2595.25	-353.334
4	WI	1088.29	791.11	-748.38	-538.43	-5764.70	-166.42	-1298.33	-176.326
5	WI	1027.25	746.59	-706.98	-506.79	-5440.92	-160.76	-1226.04	-166.831
6	FL	919.32	676.48	-628.18	-448.59	-4860.33	-147.90	-1094.17	-148.184
7	NY	850.69	623.51	-572.80	-412.96	-4500.08	-121.36	-1014.75	-135.071
8	TX	728.49	529.75	-503.47	-365.01	-3856.18	-118.59	-868.10	-119.910
9	MI	704.96	512.82	-482.44	-345.88	-3733.61	-107.83	-841.71	-114.293
10	MI	703.67	510.07	-493.26	-354.16	-3725.69	-125.67	-836.38	-118.839
11	WA	697.91	509.65	-477.65	-340.91	-3694.03	-108.17	-833.58	-112.738
12	CA	662.70	486.19	-449.15	-320.53	-3507.71	-94.65	-791.07	-105.195
13	IL	637.94	465.40	-441.67	-315.21	-3377.51	-107.29	-760.05	-104.530
14	OR	583.33	425.63	-398.45	-285.88	-3087.82	-88.44	-696.03	-93.658
15	WI	578.00	421.04	-403.23	-284.79	-3058.59	-96.58	-689.66	-95.738
16	IL	561.21	410.70	-383.37	-273.17	-2967.76	-87.00	-668.37	-89.278
17	IL	522.21	382.07	-356.04	-254.54	-2757.56	-80.81	-621.30	-83.757
18	PA	487.13	354.95	-329.84	-237.17	-2578.52	-73.18	-581.64	-77.482
19	WI	470.77	342.29	-323.38	-231.93	-2493.43	-72.17	-562.57	-76.198
20	OH	462.72	337.75	-316.69	-226.88	-2448.50	-72.31	-550.01	-75.266
21	WI	444.88	324.31	-303.79	-217.74	-2355.60	-64.59	-531.60	-70.930
22	OR	430.21	315.10	-297.00	-211.62	-2276.55	-69.90	-512.47	-69.822
23	NV	414.71	301.00	-285.97	-205.81	-2195.04	-67.09	-494.33	-67.887

Conversely, colleges with low scores on Factors 1 and 2 may “overspend” on student services, scholarships, and fellowships (Factor 3). State and local appropriations ratios may also be relatively high—another implication of a high Factor 3 score—but so are tuition and fees per FTE (Table 4). Perhaps the “happy medium” is a college within, say, one standard deviation on either side of the mean of the fac-

tor scores. This college attains financial stability without sacrificing the education and well-being of its students.

Factors 1 and 4 also showed a reciprocal relationship: Institutions scoring high on their overall financial picture tended to have low scores on the expenditures ratios in Factor 4—expenditures per FTE on instruction, academic support, institutional support, and plant oper-

TABLE 4

TWENTY THREE INSTITUTIONS *LOWEST* IN FACTOR 1 SCORES

Obs	Unit Id	Institution Name	City
380	204422	North Central Technical College	Mansfield
381	208318	Central Oregon Community College	Bend
382	247834	Collin County Community College-Central Park	Mckinney
383	137078	Saint Petersburg Junior College	Pinellas Park
384	230171	Dixie College	St. George
385	209038	Lane Community College	Eugene
386	107743	Rich Mountain Community College	Mena
387	193478	Nassau Community College	Garden City
388	226408	College of The Mainland	Texas City
389	223427	Blinn College	Brenham
390	169275	Mott Community College	Flint
391	210605	Community College of Allegheny County	Pittsburgh
392	147378	Moraine Valley Community College	Palos Hills
393	172635	Wayne County Community College	Detroit
394	209746	Portland Community College	Portland
395	158431	Bossier Parish Community College	Bossier City
396	147800	Oakton Community College	Des Plaines
397	165802	Fisher College	Boston
398	122205	Saddleback College	Mission Viejo
399	187912	New Mexico Military Institute	Roswell
400	170790	Macomb Community College	Warren
401	225423	Houston Community College System	Houston
402	171535	Oakland Community College	Bloomfield Hills

Obs	State	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
380	OH	-351.87	-254.26	252.56	177.902	1863.17	73.136	422.29	60.109
381	OR	-361.45	-262.11	253.53	180.03	1914.20	66.89	433.77	59.58
382	TX	-366.38	-267.32	243.92	176.77	1942.09	46.81	436.41	56.32
383	FL	-377.03	-273.68	257.83	182.63	1998.32	57.93	449.96	60.44
384	UT	-379.78	-275.92	259.85	187.58	2012.27	59.07	453.20	61.02
385	OR	-379.99	-277.26	249.63	183.92	2010.50	44.47	455.83	57.90
386	AR	-405.61	-293.74	288.05	204.63	2146.87	80.29	485.88	68.65
387	NY	-434.96	-316.71	294.39	205.61	2311.74	59.77	519.62	68.81
388	TX	-437.59	-317.64	302.16	216.81	2318.57	72.63	522.67	71.45
389	TX	-456.79	-332.41	310.45	225.84	2419.83	67.79	544.23	72.56
390	MI	-460.39	-335.87	309.79	220.21	2437.48	65.24	549.62	71.76
391	PA	-483.30	-349.22	337.61	240.52	2564.85	82.54	576.07	79.16
392	IL	-682.66	-495.61	467.05	340.50	3617.19	102.95	815.79	110.28
393	MI	-720.41	-526.48	489.46	346.53	3811.79	111.93	861.85	114.90
394	OR	-731.32	-524.50	512.79	370.03	3876.88	127.69	873.45	122.35
395	LA	-738.83	-538.42	503.94	362.82	3912.93	111.31	881.12	119.26
396	IL	-760.88	-550.54	525.97	384.28	4033.19	123.09	907.66	124.42
397	MA	-884.08	-646.61	598.99	427.89	4677.54	127.33	1055.72	139.94

Obs	State	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
398	CA	-890.07	-646.51	612.83	441.50	4720.03	141.527	1062.89	143.93
399	NM	-891.08	-646.83	606.63	438.37	4730.97	136.437	1058.33	143.39
400	MI	-969.46	-706.80	656.49	472.51	5138.69	138.260	1155.94	152.81
401	TX	-1227.34	-897.54	832.59	596.81	6490.03	174.490	1474.49	194.36
402	MI	-1393.40	-1016.49	937.63	671.93	7385.88	188.110	1661.21	217.50

ation and maintenance. These colleges attained a strong financial profile by limiting expenditures on categories less directly associated with student needs. Conversely, institutions showing poorer financial health tended to spend more on instructional support and plant. The middle institutions again exhibited a healthy financial picture with moderate spending and revenues.

Factor 5—endowment income and the ratios of endowment income to E&G revenue and to FTE—had a small effect on institutional spending policies. Moderate use of endowment funds was a key component of a healthy financial picture. Moderate outlays on plant assets, Factor 6 suggests, also helped to maintain financial health.

Factor 7 was inversely related to Factors 1 and 2. High scores on financial picture and determinate revenue and expenditure were associated with low scores in government grants and contracts for public service and institutional support. These colleges may not be moved to obtain grants and contracts, since they have sufficient funds from other sources.

Factor 8—other expenditures as ratios to E&G expenditures—was also inversely related to Factors 1 and 2. Colleges with high scores on Factor 1 and 2 scores, showed low expenditure ratios for Factor 8 expenses, including scholarships and fellowships, and library and research expenditures. Careful choice of spending priorities, this factor combination suggests, can result in a healthy overall financial picture. Conversely, if Factor 1 is low, Factor 8 ratios must be high; in that case, a college gives priority to some expenditures by cutting back on expenditures that produce a healthy financial picture.

EXTERNAL CRITERIA

We next ran a “peer group analysis” to compare institutions ranked highest and lowest in Factor 1 and Factor 2 scores.¹² The analysis used 1997-98 IPEDS financial data; we assumed that factor scores remained constant indicators of the financial health of the institutions between 1995-96 and 1997-98. Table 5 shows key differences between the two groups of 23 colleges.

TABLE 5

COMPARISON OF TWO GROUPS OF INSTITUTIONS ON EXTERNAL CRITERIA			
Peer Group Item	Highest 23 on Factor 1 Score	Lowest 23 on Factor 1 Score	Remarks
Average FTE 1996	6,074	6,674	L23 = higher FTE
Average E&G Exp./FTE	\$8,620	\$7,983	L23 = lower E&G/FTE
Range FTE 1996	297-26,654	404-19,539	L23 = closer range of FTE
Range E&G Exp./FTE	4,267-16,146	3,834-14,816	
Average No. of Faculty	180	158	
Average Salary	\$51,173	\$51,802	
% Tenured	79%	74%	
Average Benefits	\$12,838	\$14,266	

The 23 colleges with the highest Factor 1 and 2 scores in 1997-98 had fewer FTE students than the 23 colleges with the lowest scores on these factors; higher E&G expenditures per FTE student, more faculty (180 vs. 158); and a higher proportion of tenured faculty—79 percent vs. 74 percent. But the high scoring colleges showed lower average faculty salaries—\$51,173 vs. \$51,802.

These scores showed the different financial strategies used by the two groups of colleges. High scorers spent more money on fewer students and on more faculty, though instructors received neither the highest salaries nor benefits. Low scorers, in contrast, enrolled more students and spent less per student. These colleges paid higher salaries to smaller numbers of faculty members, and they tenured a smaller proportion of faculty.

CONCLUSION

This study attempted to understand the relationships among revenue and expenditure categories. We derived a few factors to compare institutions and to summarize the financial condition of a given college. Future studies might replicate this approach for four-year colleges, or analyze the data by type of control— independent and public institutions.

NOTES

¹ Finney, 1994, 24.

² Bryan and Whipple, 1995, 560 (15).

³ Martinez, 1997. Martinez compared California with Florida, Michigan, Minnesota, and New York between 1990 and 1995.

⁴ Dubeck, 1998.

⁵ Thanks to John B. Lee of JBL Associates, who developed the ratio variables.

⁶ Gorsuch, 1983, 3.

⁷ In 1994, we conducted a factor analysis of finance data from 84 community colleges, taken from 1991 IPEDS data. The analysis produced 10 factors from 82 finance variables. A stepwise regression analysis of faculty salaries on these factors as independent variables retained seven of the ten factors as predictors of salaries, the retained factors accounting for 75 percent of the common variance (Peña, 1994).

⁸ Harman, 1976, 15.

⁹ Many datapoints are missing, so the use of the variables in factor analysis results in having more

variables than the number of observations. Hence, the matrix correlation coefficients (inter-correlation of variables) were the input for factor analysis.

¹⁰ Variables with low factor loading from all eight factors are: RSTLOC: Restricted state and local revenue; RTUIT: Restricted tuition and fees; RENDOW: Restricted endowment income; URGGRNT: Unrestricted federal, state and local government grants and contracts revenue; RPGRNT: Restricted private grants and contracts revenue; URPGRNT: Unrestricted private grants and contracts revenue; TTLPGRNT: Total private grants and contracts revenue; ROTRR: Restricted other revenue; RRESRCH: Restricted research expenditure; URRESRCH: Unrestricted research expenditure; TTLRESRCH: Total research expenditure; URPUBSRV: Unrestricted public service expenditure; RACAD: Restricted academic support expenditure; RINSSUP: Restricted institutional support expenditure; RPLANT: Restricted operation and maintenance of plant expenditure; URSCHL: Unrestricted scholarship and fellowship expenditure; FAC1112: Faculty on 11/12 month contracts; REV5: Private gifts, grants and contracts/FTE; REV12: Private gifts grants and contracts/E&G revenue; REV14: Net current fund revenue/total current fund revenue; REV 15: Net E&G revenue/total E&G revenue; REV16: Net auxiliary enterprise revenue/total auxiliary enterprise; REV17: Auxiliary enterprise revenue/FTE; REV18: Net auxiliary revenue/current fund revenue; EXP2: Research expenditure/FTE; EXP3: Public service expenditure/FTE; EXP9: Restricted scholarships and fellowship; EXP12: Research expenditure/E&G expenditures; EXP14: Student services expenditure/E&G expenditures; EXP15: Institutional support expenditure/E&G expenditures; EXP17: Unrestricted scholarships and fellowship expenditures; EXP20: Library expenditures/instructional expenditures; EXP22: Student services expenditures/instructional expenditures; EXP24: Auxiliary enterprise expenditures per FTE; ASST1: Net investment in plant/plant debt; ASST2: Land assets per FTE; END5: Endowment yield b; END7: Net transfers, endowment fund; WC1: Sum (current fund and plant fund balance)/plant debt; WC3: Current fund balance /current fund expenditures; FF1: Restricted current fund revenue/total current fund revenue; FF2: Revenue dispersion measure (percent revenue from largest single source of income); FF3: FTE/total FT faculty; FF5: Net plant assets/plant debt; FF6: Interest on plant debt/total current fund expenditures; SAL2: Average faculty salary for faculty members on 9/10 month contracts; SAL3: Average faculty salary for faculty members on 11/12 month contracts; SAL4: Average benefits for faculty members on 9/10-month contracts; SAL5: Average benefits for faculty members on 11/12-month contracts; SAL6: Average benefits as a percent of aver-

age salary, faculty members on 9/10 month contracts; SAL7: Average benefits as a percent of average salary, faculty members on 11/12 month contracts

¹¹ Harman, 131.

¹² Suzanne B. Clery of JBL Associates furnished the peer group analysis for the two groups of 23 institutions.

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