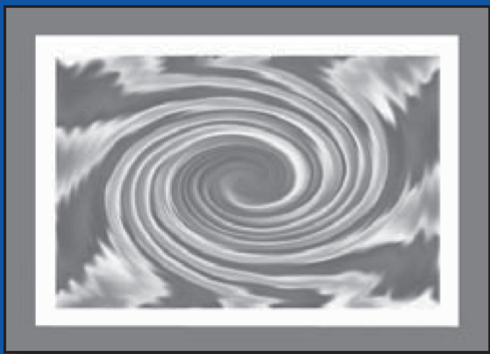

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Using Advanced Tools, Techniques, and Methodologies

Using Regression Analysis in Departmental Budget Allocations

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Abstract

This study uses a regression model to determine if a significant difference exists between the actual budget allocation that an academic department received and the model's predicted budget allocation for that same department. Budget data from a Southeastern Master's/Comprehensive state university were used as the dependent variable, and the budget for each department consists of money used for salaries (personnel) and money used for equipment, travel, and other expenditures (nonpersonnel). Independent variables included in the model were the number of professors, credit-hour production, number of degrees conferred, and a market ratio variable.

Introduction

Public institutions of higher education are not immune to the growing pressures, which hold them increasingly accountable for both their funding and the level of services they provide. These pressures include diminished federal and state funding levels for education as governments reallocate budgets away from higher education towards other state and national priorities. This poor funding situation forces colleges and universities to seek out relevant and reliable budgetary processes, which enable institutions to continue to successfully meet their objectives. At the same time, universities are also under pressure to answer external stakeholders' calls for accountability. Within this setting, utilizing effective budgeting models enables institutions to evaluate the changing institutional environment. Informed leadership may foresee ways in which to adapt to those changes while, at the same time, planning financially for future shifts in response to the altering environment (Hearn, Lewis, Kallsen, Holdsworth, & Jones, 2006). Using the context of a Southeastern Master's/Comprehensive university, this study presents an explanatory model useful in analyzing academic departmental budget allocations related to various predictor variables such as faculty FTE, credit-hour production, and number of degrees.

As universities fight to maintain level funding, decision-makers at all levels (department heads, deans, and provosts) need viable strategies with which to analyze data relevant to the budget process and which offer information useful in meeting universities' strategic goals. More specifically, effective academic departmental budgeting supports the core mission of the institution: teaching (Zemsky, Wegner, & Massy, 2005). This research adds to the growing body of knowledge about how higher education organizations allocate scarce resources to meet departmental needs, while at the same time looking out for the greater mission of the university. While there are many different methods for developing departmental budgets, most budgets rely on a combination of examining historical performance plus evaluating the costs for future business adjustments.While this is simple, it compounds inconsistencies by never looking at the base allocation. The budget model featured in this study seeks to assist institutions, at least on a micro-level, to account for their resources in terms of departmental instructional productivity and serves as a means for looking at the internal consistency of the recent budget allocation outcomes. By incorporating traditional key indicators (credit hours, number of majors, degrees conferred, faculty FTE, market value of faculty salary), a better understanding of what is taking place within the institution becomes available to assist decision-makers in optimizing their financial resources.

Literature Review

The funding issues facing higher education are varied and complex; among them, diminishing federal and state educational funding levels (Tierney, 1999). Universities increase tuition to compensate for decreasing external funding.With each new statewide budget crisis, university leadership, along with various stakeholder groups, grapple with how institutions should ration scarce resources. In the 1990s, the important budgetary concern focused on measuring productivity since the rise in technology allowed institutions to systematically gather, track, and report university-wide data efficiently. With the most recent decrease in support from state funds, the focus has shifted to applying data towards internal resource allocation decisions (Casper & Henry, 2001; Santos, 2007). These debates weigh heavy on the minds of the tuition-paying public. In answer, governmental agencies react by creating score cards and passing laws, which require increased consumer reporting. These trends are most notable in the recent Higher Education Reauthorization Act, which includes additional tuition-monitoring. Institutions with the highest tuition increases must explain those increases to the Secretary of Education and include a plan for cost containment (Sawchul & Klein, 2008). At the same time, university leadership contend with an unstable future of the American financial aid system and how the future financial aid availability will affect prospective students' college choice (Chen & DesJardin, 2008). Less federal and state financial aid translates into fewer students attending college and less discretionary funding to offset operational costs. All this means that university leadership must make sound resource allocation decisions and, to do so, they need reliable toolsets to translate data into information.

Resources are defined as assets an organization depends upon to achieve its objectives. They can be tangible like equipment or intangible like faculty time and effort. Resource allocation and resource management represent strategic decisions, not simply operational activities (Constantin & Lusch, 1994). In creating and analyzing various departmental budgeting processes, many researchers and administrators have relied on Activity-Based Costing to allocate resources to support the variety of responsibilities carried out in academic departments. In identifying historic departmental activities and associating a cost to each activity, institutions have gained an understanding of how costs relate to various institutional goals and objectives. Sinceacademic departments are at the core of the university mission, they have become the core measure in resource allocation and performance decisions. The personnel-intensive activities associated with academic departments and their instructional costs draw attention to the need for budget models at this level; instructional costs comprise over 40% of educational expenditures, which is typically the largest percentage of university general expenditures (Middaugh, 2005). However, in making resource allocation decisions, faculty and department heads may not have a clear picture of the relationship between their budget and related instructional costs. Identifying models that increase the understanding of the budgetary needs of each department allows for flexibility in meeting goals, provides accountability for resources spent in relation to productivity of the department, and offers transparency to a process that is often perceived as convoluted.

Another related budgetary model popular with institutions, Responsibility Center Management (RCM), requires the allocation of all campus revenues and expenses to appropriate cost centers. Leaders within each cost center must balance their budgets based on generated revenue and departmental expenditures even if their costs cross traditional departmental or divisional boundaries (Milam, 2007). Since RCM accounts for faculty workload in both teaching and research, RCM studies tend to take place at four-year doctoral-granting institutions (Rodas, 2001; Rooney, Borden, & Thomas, 1999; Santos, 2007) in an effort to match departmental performance with the teaching and research component of academic departments. Utilizing RCM to measure productivity by tracking activity-based costs encourages institutions to compare unlike departments and disciplines, without considering the inherent differences among departments (Middaugh, 1999; Rhoades, 2001). Therefore, resource allocation decisions made through this system offer little insight into the needs and operation of specific departments. In a related vein, other limitations cited by studies address the inhibition of creative interdepartmental initiatives and the blocking of participation in and attainment of broader university goals due to the intense departmental budgetary focus of RCM (Rodas, 2001; Stocum & Rooney, 1997).

Like RCM, Incentive Based Budget systems (IBBS) place greater responsibility and accountability on departments than activity-based budget models. Under IBBS, departments account for revenue production, but are allowed to account for their own increased revenue as well as plan for and retain any cost savings seen through their budget planning (Hearn et al., 2006). In the majority of budget research, other performance-based models utilize similar variables in attempts to define and codify the budgetary process (Casper & Henry, 2001; Cox, Downey, & Smith, 1999). As with many of the current budget models, some subjective measures are added into the formula during analysis. In Casper & Henry's (2001) equipment allocation model, deans were required to assign a value to rate the equipment intensity of each program. Incorporating judgment factors into budget models complicates the replicability of the model. Replicability becomes a factor in choosing budgeting models as institutions compare departmental allocations both across the institution as well as against peer institutions. The model used in this study analyzes existing data to predict departmental budgets and places the judgment into the hands of decision-makers who will use the resulting information after it has been processed through the model. Unlike other budgetary models, this study furthers our understanding of micro-level budgeting by creating a tool that enables department heads and deans to make more informed decisions about institutional resource allocation.

Regardless of the limitations inherent in many activity-based costing approaches, benefits do arise from collecting and understanding actual instructional data (Jones, 2000; Milam, 2007) related to university budgeting. Of the existing models that look specifically at departmental resource allocation, several variables are shared across multiple studies: student credit hour, faculty

FTE, and graduation rates. The most notable of budgetary studies concerned with instructional data is the Delaware Study of Instructional Costs and Productivity. The Delaware Study has been recording instructional and educational expenditures at an academic discipline level of analysis since 1992 (Middaugh, 2001, 2002) providing many institutions with the ability to benchmark their resource allocations at the department level. It documents the productivity of faculty based on the cost per credit-hour within a unit. Doing so offers insights into how higher education, on a macro-level, is managing and allocating instructional resources. This model, however, does not assist an individual institution in the strategic budgeting process it is often required to perform. The model used in this study inverts the analysis by relating and accounting for costs by productivity, taking into account many of the same variables (credit-hour production, number of faculty, number of majors, number of degrees awarded).

In addition, the model used in this study furthers the understanding of budget models by incorporating the influence of the market on faculty salaries and integrates these data into a broader understanding of external variables that affect instructional costs. At colleges and universities, salary comprises the largest portion of academic budgets as the nature of knowledge generation hinges on labor-intensive activities. Although senior administrators expect faculty across their institution to fulfill the same responsibilities of teaching and service (with research included at doctoral-level institutions), due to external market forces, those salaries within differing disciplines inevitably vary just as instructional costs across disciplines vary (Jones, 2000; Wenger & Girard, 2000). Although the debates rage on as to if or how faculty salaries across disciplines should be differentiated (Luna, 2007; Moore, 1993, 2004) and whether teaching or research activities should accrue different monetary rewards (Fairweather, 1994; Marsh & Hattie, 2002; Melguizo & Strober, 2007), the fact remains that faculty salaries will continue to rise and that the national averages of salaries are influenced by external market forces determined within discipline-based salary ranges (Zemsky, Wegner, & Massy, 2005). Thus, to create a more explanatory budget model, the cost associated with the market value of faculty salary must be evaluated both to account for the largest portion of the department's budget (salary) as well as to allow for departmental growth. The goal of this model focuses on developing a greater understanding of both existing and future faculty salaries by including a market variable and then analyzing those variables in relation to credit-hour production and degrees conferred. In doing so, this regression analysis takes into account departmental resources, including market influence on faculty salary, and uses the relationship between credit hours and degrees along with the relationship of credit-hour production andfaculty costs in an effort to predict the overall departmental budget and to assist decision-makers in reaching the institution goals.

Methodology

This study used multiple regression analysis to develop an explanatory model to determine budget allocations between academic departments within a Southeastern Master's/Comprehensive university. The central purpose of this study was to determine if budget allocations were based upon well-known key indicators and how strong those indicators were in determining the amount of money an academic department would receive.

A total of 28 academic departments were used in this study. The departments ranged from business and education to natural and social sciences, arts, and humanities. The total budget, including personnel and nonpersonnel, allocated to each department during the 2005 fiscal year (FY) was used as the dependent measure.

Predictor variables used represent a conceptual framework of how the number of faculty, the number of degrees conferred, credit-hour production, market, and the total number of majors within the field of the previous fiscal year influence budget allocation on the current year. The conceptual framework for the factors influencing

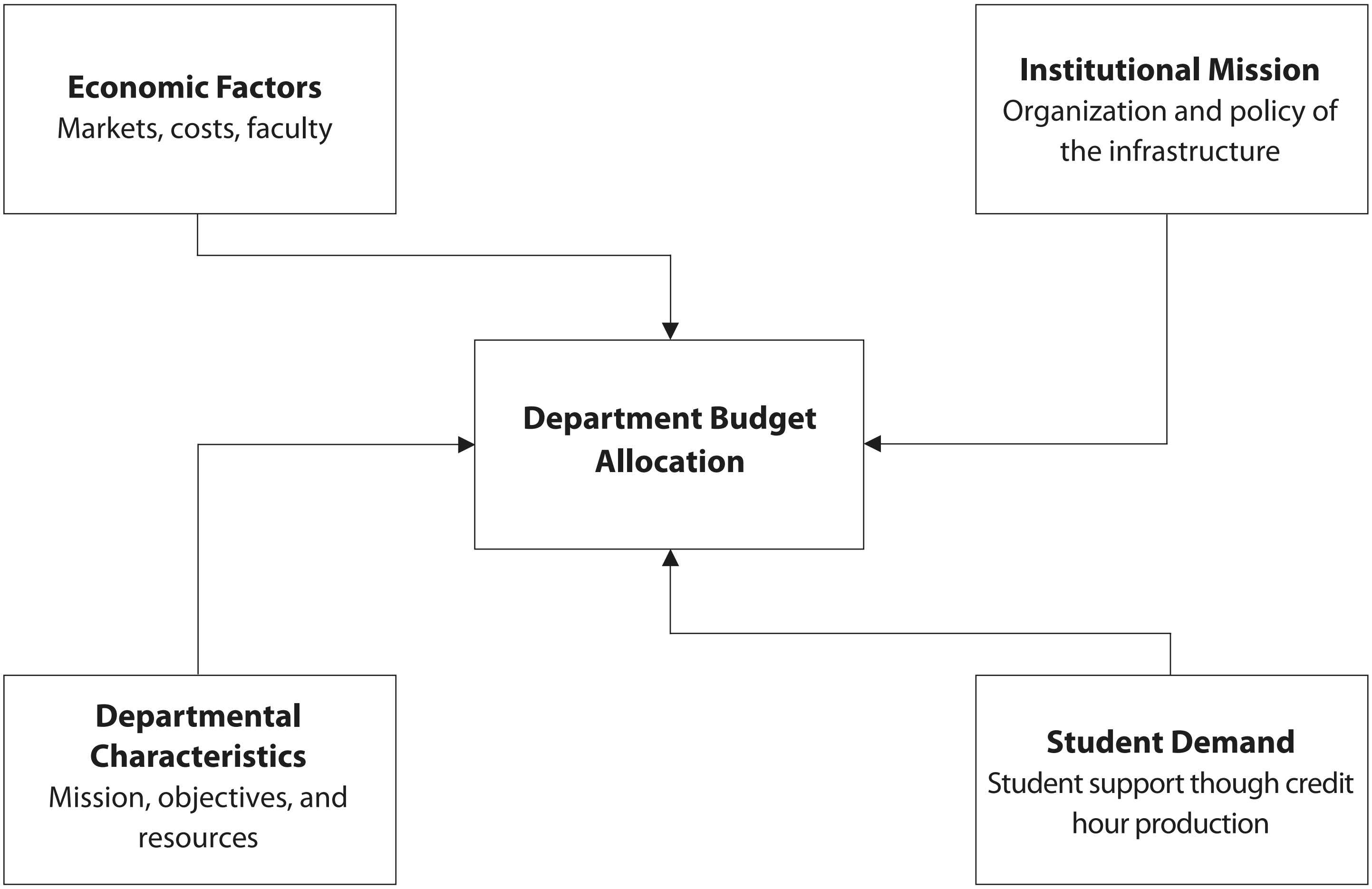

Figure 1. Conceptual framework of factors influencing departmental budget allocations.

budget allocation decisions made by the administration is illustrated in **Figure 1**, indicating that the allocation of any given department is a function of economic factors, institutional mission, departmental characteristics, and student demand. For example, a department that has fewer majors but strongly supports the institution's core curriculum may be sustaining institutional mission and will probably have high demand for lower-level courses due to the required classes offered. Another department may offer a highly sought-after professional degree and may have an increasing demand for upper-level and graduate-level classes. Furthermore, because of external market factors and increased competition for qualified instructors, faculty salaries within this department are higher.

While it is clear that the influence of one of these factors to budget allocation is variable from department to department, all of these factors influence budget allocation to some extent.

Predictor variables defined below represent this conceptual framework and investigate how the number of faculty, degrees conferred, credit-hour production, market, research dollars, and the total number of majors within the field explain departmental budget allocations.

Budget (BUDGET): This study used the entire budget allocation for FY 2005 given to each of the 28 academic departments as the dependent measure. This allocation included personnel (administration, faculty, and support staff) as well as nonpersonnel allocations (equipment, operations, travel, and supplies).

Professors (PROF): This study included both full-time and part-time faculty for FY 2004 through an FTE variable and supports the economic factors of the conceptual framework. FTE faculty was determined by the following formula: Full-Time + (Part-Time/3). It was hypothesized that the total number of FTE professors hired within a department affects budget variance because the majority of revenue within the department's total budget is allocated toward faculty salaries.

Majors (MAJORS): Included within this study were all students who declared a major or field of study within the department during FY 2004. This total included students in graduate programs, where available, and supported the student demand factors of the conceptual framework. It was hypothesized that the number of majors within a department will affect its budget because the more majors it has, the more resources it will need.

Degrees Conferred (DEGREES): Degrees conferred also supported the student demand factors of the conceptual framework and indicated the total number of degrees awarded during FY 2004. This total included graduate degrees, where available. It was hypothesized that a relationship existed between the total number of degrees conferred and a department's budget due to increased demands on departmental resources by an overall increase in either more new students choosing the discipline or by an increase in students staying within the program to finish their degree.

Credit Hours (CHRS): Included within this study were total credit hours generated by students within each department during FY 2004. This variable supported the student demand factors, but it may also support the departmental characteristics and institutional mission areas of the conceptual framework. For example, the role, scope, and mission of a liberal arts college may place great emphasis on students taking humanities courses. Departments teaching those courses will see larger student demand based, in part, on this institutional mission. It was hypothesized that as student credit-hour demand increased within the department, more departmental resources will be needed.

Market (MARKET): The market factor was calculated by taking the ratio of the average national salary for a given discipline to the average national salary for all selected disciplines combined. For a College and University Professional Association for Human Resources (CUPA-HR) discipline to be used in this study, the discipline had to be offered within the subject institution. The average national salaries were taken from the 2004 CUPA-HR National Faculty Salary Survey (available at http://www.cupahr.org/surveys/files/DOD_Users_Manual.pdf). The ratio indicates how the discipline compares to the national average, in which case, the ratio will be one. For example, a market factor of .94 for biology indicates that national average salaries for this discipline are 94% of the national average for all disciplines combined. A market factor of 1.10 for chemistry indicates that the national average salaries for this discipline are 10% higher than the combined national average for all disciplines. It was hypothesized that, because salaries are a significant portion of a department's budget allocation, as the market ratio increases, the department will have to find more resources in order to hire and maintain qualified faculty. In this study, market was used over a rank variable because, in a previous study by Luna (2007), the market value of a discipline was significantly more influential than the differential of salary within a discipline due to rank. The market ratio factor supported the economic factors of the conceptual framework.

Research Dollars (RESEARCH):Included within this study were total research/grant dollars generated by each department duringFY 2004. While the institution under study was Master's/Comprehensive rather than a Research institution,it was hypothesized that as more research dollars are secured, departmental budget should increase in order to handle the scientific and administrative interests of the research/grant, and to potentially hire more new faculty. Research dollars supporting the institutional mission and departmental characteristics components of the conceptual framework in that the role, scope, and mission of the institution as well as the department determine the amount of emphasis the facultyplaces on research.

Results

Multiple regression is used to account for the variance in a dependent variable (budget allocation), based on linear combination of intervalor categorical independent variables. A typical Ordinary Least Squares (OLS) regression model was used to test how all of the predictor variables described above related to the budget allocation a department actually received.

Results from the first iteration (full model) indicated a statistically significant relation between the overall model based on the predictor variables and budget allocation ($F = 39.53$, df $= 6, 21$, $p < .001$). The R-Squared statistic indicates that 92% of the change in departmental budget allocation can be attributed to change in one or more of the predictor variables. The Adjusted R-Square of .8954 takes into account the number of X variables as well as the number of data points. The standard deviation (Root MSE) of unexplained budget allocation is $123,240.

The *t* statisticswithin the parameter estimates in **Table 1**indicate that FTE and Market make a

Table 1

Parameter Estimates—Full Model

		Parameter	Standard		
Variable	DF	Estimate	Error	*t* Value	Pr > |*t*|
INTERCEPT	1	-475,088	204,771	-2.32	0.0305
FTE	1	26,691	4,167.35	6.40	<.0001
MARKET	1	746,285	786,550.00	4.00	0.0006
RES	1	0.3234	0.5999	0.54	0.5955
MAJORS	1	165.23	257.43	0.64	0.5279
DEGREES	1	729.80	1043.59	0.70	0.4920
CHRS	1	12.55	7.59	1.65	0.1130

[1] This decrease in the R-Square value is a natural occurrence because all independent variables used in the full model increased this statistic to some degree, even if they did not significantly add to the predictive power of the model.

Table 2

Analysis of Variance—Final Model

Source	DF	Sum of Squares		Mean Square	*F* Value	Pr >*F*
Model	4	3.594064E+12		8.985160E+11	63.2	<.0001
Error	23	3.269978E+11		14217294634		
Total	27	9.921062E+12				
		Root MSE	119236	R-Square	0.9166	
		Dependent Mean	952786	Adj. R-Square	0.9021	
		Coeff Var	12.51449			

significant contribution to the model (*p*< .001).

The estimated coefficients shown in Table 1, indicate the average amount the budget allocation will change $26,691 for an increase of one faculty and $746,285 for a unit increase in the Market Ratio, when holding the other variables constant.

When some variables in the full model within a regression analysis appear to contribute insignificantly to the predictive power of the model, it is often useful to find an optimum subset model that, for a given number of variables, produces the minimum error sum of squares or, equivalently, the maximum R-Square. Within the SAS system, the Maximum R-Square selection was chosen, which produced a more parsimonious model with a higher significance level. Results from this second iteration also indicated a statistically significant relation between the linear forms of the predictor variables and budget allocation. The results of the maximum R-Square selection indicated that FTE, MARKET, MAJORS were significant contributors to the model. Even though CHRS was not a significant contributor at the .05 level, it was close to a significant level and was still used in the final model due to the robustness of regression analysis. One concern with using a model that has a small amount of observations is that there will be too many variables to support the number of observations in the dataset. As a general rule of thumb, there should be at least six to ten observations for each independent variable in the model (Neter, Wasserman, & Kuther, 1989). The final model, with four variables, clearly falls within this range.

As shown in **Table 2**, the value of the *F* statistic is 63.20, which is substantially larger than the full model. The *p* valueof <.0001 indicates that there is less than a .0001 chance of obtaining an *F* valuethis large or larger if Therefore, there is reasonable evidence to assume that and at least some of the independent variables contribute to the variation of departmental budget. The R-Squared statistic decreased slightly indicating that almost 92% of the differences in departmental budget allocation can be attributed to change in one or more of the predictor variables. The Adjusted R-Square increased slightly to .9021, and the standard deviation (Root MSE) of unexplained budget allocation decreased slightly to $119,236.

The *t* statistics within the parameter estimates on **Table 3** indicate the stronger predictive value of the individual parameters. In the reduced model, the *t* value for FTE is 6.66 and indicates a significant predictor to the model. In this case, an increase of one professor will produce an average budget allocation increase of $26,471. MARKETis a significant predictor with a *t* value of 4.11, indicating that for every .10-point increase in the Market Ratio, the average budget allocation will increase $72,500. MAJORS is also a significant predictor with a *t* value of 4.07, indicating that for every major, the average budget allocation will increase $341.31. CHRS did

Table 3

Parameter Estimates—Final Model

Variable	DF	Parameter Estimate	Standard Error	*t* Value	Pr > |*t*|
INTERCEPT	1	-448281	193154	-2.32	0.0295
FTE	1	26471	3977.18094	6.66	<.0001
MARKET	1	724997	176512	4.11	0.0004
MAJORS	1	341.30833	83.92814	4.07	0.0005
CHRS	1	12.80164	7.24352	1.77	0.0904

not have a significant effect on the model at the .05 level. However, its *t* value is 1.77, indicating that for every credit-hour increase, there is an increase of $12.80 to the budget allocation.

After the final model was selected, a test for multicollinearity was run to determine if there was a high correlation by any of the predictor variables to each other, causing a possibility that the coefficient estimates will change erratically in response to small changes in the model or the data. Variance Inflation Factors (VIFs) were computed to confirm the appropriateness of each predictor variable to the model. The VIFs for all predictor variables were less than 10, indicating minimal multicollinearity problems for each predictor. Therefore, no significant correlation existed between the predictor variables in the final model.

This study then took the predicted budget allocation for each department and compared it to that department's actual budget allocation to determine if any significant differences were apparent. By taking a simple *z* score of the difference between the actual and the predicted budget allocation, those *z* scores of 2 and higher indicated a significant difference at the .05 level. The results of this comparison are shown on **Table 4**.

Table 4

Actual Versus Predicted Budget Allocations

Dept.	Actual FY 05 Budget	Percent Actual Budget	Predicted FY 05 Budget	Percent Predicted Budget	Difference	Percent Difference	Z-Score
1	$366,314	1.37%	$493,231	1.85%	-$126,917	-0.48%	-1.15
2	$785,957	2.95%	$808,090	3.03%	-$22,133	-0.08%	-0.20
3	$1,073,918	4.03%	$1,101,126	4.13%	-$27,208	-0.10%	-0.25
4	$749,781	2.81%	$800,436	3.00%	-$50,655	-0.19%	-0.46
5	$1,148,998	4.31%	$919,758	3.45%	$229,240	0.86%	2.08
6	$1,872,682	7.02%	$1,988,359	7.45%	-$115,677	-0.43%	-1.05
7	$839,349	3.15%	$667,974	2.50%	$171,375	0.64%	1.56
8	$1,031,396	3.87%	$884,382	3.32%	$147,014	0.55%	1.34
9	$1,138,153	4.27%	$1,092,963	4.10%	$45,190	0.17%	0.41
10	$783,089	2.94%	$873,445	3.27%	-$90,356	-0.34%	-0.82
11	$1,215,758	4.56%	$1,246,414	4.67%	-$30,656	-0.11%	-0.28
12	$658,470	2.47%	$495,463	1.86%	$163,007	0.61%	1.48
13	$986,737	3.70%	$983,008	3.68%	$3,729	0.01%	0.03
14	$310,468	1.16%	$364,272	1.37%	-$53,804	-0.20%	-0.49
15	$433,556	1.63%	$608,392	2.28%	-$174,836	-0.66%	-1.59
16	$901,275	3.38%	$867,749	3.25%	$33,526	0.13%	0.30
17	$1,031,026	3.86%	$1,004,549	3.77%	$26,477	0.10%	0.24
18	$843,233	3.16%	$940,110	3.52%	-$96,877	-0.36%	-0.88
19	$1,143,164	4.29%	$1,088,556	4.08%	$54,608	0.20%	0.50
20	$768,405	2.88%	$814,915	3.05%	-$46,510	-0.17%	-0.42
21	$1,475,239	5.53%	$1,341,134	5.03%	$134,105	0.50%	1.22
22	$734,155	2.75%	$969,307	3.63%	-$235,152	-0.88%	-2.14
23	$895,354	3.36%	$813,477	3.05%	$81,877	0.31%	0.74
24	$2,008,792	7.53%	$1,990,168	7.46%	$18,624	0.07%	0.17
25	$1,094,140	4.10%	$982,982	3.68%	$111,158	0.42%	1.01
26	$662,160	2.48%	$735,534	2.76%	-$73,374	-0.28%	-0.67
27	$727,807	2.73%	$794,745	2.98%	-$66,938	-0.25%	-0.61
28	$998,630	3.74%	$1,007,466	3.78%	-$8,836	-0.03%	-0.08

According to this table, the selected model accurately predicted budget allocation for all departments to less than 1% of the actual allocation. Even with this low error, some significant differences do exist. For example, according to the model, Department 5 was over-budgeted \$229,240, with a *z*score of 2.08. Likewise, the model also indicates that Department 7's over-budgeted amount of \$171,375 is close to the threshold *z*score of 2, but is currently not statistically significant.The model also shows some areas of under allocation. For example, Department 22 was significantly under-budgeted (\$235,152), with a *z* score of -2.14. Department 15, while not significant with a *z* score of -1.59, is close to being significantly under-budgeted by \$174,836.

Conclusion

This study demonstrated how a regression model can be successfully used to help explain departmental budget allocation variations. By comparing the actual budget allocation for each department with the predicted allocation, significant over- or under-budgeted departments can be readily identified. Administrators then can decide if a significant discrepancy should be addressed outright during that fiscal year, should be incrementally addressed during multiple years, or should not be addressed until additional analysis is completed. An example of further analysis might be to determine if a department's budget included a service center or institute, or if the department was considered a Program of Excellence.

It is not the purpose of this study to imply that budget allocations should be determined solely on the results of a regression model. Rather, it is suggested that statistical tools may be used by administrators in the overall budget planning process. If departmental budget allocations are based upon some type of productivity/output measure or measures, it is reasonable to conclude that a statistical model can be effectively used to determine the level of funding based upon the department's level of productivity.

It should be reiterated that this study involved a Master's/Comprehensive university and methodologies may vary depending on type of institution. For instance, larger research universities may find research dollars to be a significant contributor to the model, or they may want to include the number of adjunct instructors or graduate teaching assistants. Larger institutions may also want to measure graduate programs separately (credit-hour production, degrees, majors, etc.); differentiate medical, law, and dental schools from other programs; and/or account for distinguished faculty. Furthermore, additional research may approach the variables differently. For example, the market ratio could be used as a multiplier for FTE since it is a function of the ratio of salaries. Moreover, larger institutions may want to use separate variables for full- and part-time faculty. There may also be the presence of nonlinear relationships and interactions between variables.

This model was used by this institution for two consecutive years with similar results. Due to the variability of influence factors occurring within departments at other institutions, results may differ by institution. While this may be seen as a limitation of this study, it could also been seen as a positive attribute of the model.

By utilizing new and different methodologies in higher education, institution administrators may be better prepared to address the increasing accountability demands apparent in state and federal government while, at the same time, maximizing resources by positioning the budget process to better meet the institution's role, scope, and mission.

Editor's Note:

Much of the recent discussion about higher education has concerned the cost of tuition. This discussion has ranged from editorials to web sites that seem to spontaneously become experts in managing institutions to the political platform, where the discussion has found its way into the Higher Education Opportunity Act. The evidence for this concern is based on the increases in tuition. As Luna and Brennan mention, this is an important discussion from the perspective of costs that unfortunately fails to consider the either the value added or the foundation of the costs. While the issue of value added is very important, it is the other aspect of consideration, the foundation of the costs, which is the topic of this IR Applications.

As identified by Luna and Brennan, the focal issue of the price is the cost and, as they identified, the key in the vast majority of situations is the resource allocation to the department.

One of the first valuable contributions of their discussion is the identification of several other methodologies. One often expects that the basic strategy of departmental funding is the traditional last-year-plus-increase. Other, and possibly more sensitive methodologies, include the use of Responsibility Center Management with Activity Based Costing (which most universities teach but fewer use) and Incentive Based Budgeting systems, which understands that performance pays but effective incentives require awareness of the payoffs and the personalities of the individuals involved.

At this point, Luna and Brennan bring forward the traditional and robust tool of linear modeling as an alternative. It is a point of discussion as to whether it is a tool whose purpose is to suggest allocating resources or a methodology to review previous allocations to raise questions. There is no argument, however, that it is a methodology to relate departmental characteristics to the departmental allocations. The conceptual model for categories of reasons for funding is a helpful means for discussing the variables that are elected as cost drivers. The twin horns of the dilemma will often be that there are too many measures but many are surrogates of what institutions value.

The issues that Luna and Brennan discuss, such as the relationship of the number of departments to the number of variables, the use of market and faculty characteristics, and the differentiation of student level are the tip of issues that will surface. Performing arts departments have a unique pedagogy. Departments with a commitment to the general education core are different from professional schools. Different colleges often have different allocation strategies within the same university. On-line education and the associated costs make standard metrics more complex. For many institutions, the simple question of "What is a Department?" is complicated as there are majors with no faculty and faculty with no departmental home. Certainly all of these challenges exist.

The BRHC (Bottom Right Hand Corner), however, is that this methodology makes discussions about what higher education is paying for more visible in an objective quantitative fashion. This makes it a valuable application for the IR function.

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