TO WHAT EXTENT ARE THE FINAL COST OBJECTIVES OF UNIVERSITIES SUBSIDIZED?

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ABSTRACT

Higher education in the United States appears to be at a crossroads at which costs and tuition are reaching unsustainable levels, potential disruptive technologies, such as distance education models, are threatening traditional delivery systems, and state financial support continues to wane. In order to strategically respond to these challenges, it is essential that senior leadership have a clear understanding of the financial structure at their institutions. Only when decision makers understand where the money is coming from and where it is going can they effectively manage costs.

It is well established in the literature that subsidies are a fundamental characteristic of higher-education economics. Despite the increasingly high cost of pursuing a higher education, tuition revenue is not sufficient to cover the full cost of providing that education and, therefore, must be subsidized. Understanding the nature and impact of these subsidies is important for effective cost management. Financial management of colleges and universities must go beyond the traditional control method of monitoring spending relative to static budgets, to include continuous monitoring of the various cross subsidies present at an institution.

This exploratory study analyzes cross subsidies across final cost objectives of research universities. The purpose of the study is to gain a broader understanding of the level of subsidization and to provide decision makers with a model for analyzing fully-loaded costs against revenue sources.

INTRODUCTION

Higher education in the United States appears to be at a crossroads at which costs and tuition are reaching unsustainable levels, potential disruptive technologies, such as distance-education models, are threatening traditional delivery systems, and state financial support continues to wane. In order to strategically respond to these challenges, it is essential that decision makers have a clear understanding of the financial structure at their institutions. Without a clear sense of what each activity on a campus costs and how much it contributes to the mission of the college or university, the educational process seems like a black box into which resources are put and out of which come graduates (Gordon & Charles, 1997-98, p. 24).

Institutional leaders and governmental policy makers are faced with continual challenges relative to the financing of higher education. Decisions on the allocation of scarce resources among competing priorities are made regularly at the institution, federal, state, and local levels. Institutional leaders must decide how to allocate funds across activities such as: academic

programs, faculty research and public service activities, academic and administrative support, libraries, maintenance of buildings and grounds, athletics, and residence and dining halls. These spending and policy decisions are linked to tuition pricing, and the burden of increased costs is often passed on to students and their families.

This study attempts to match the revenues and expenses associated with five major research-university outputs, instruction, research, hospitals, independent operations, and auxiliary enterprises and examine the resulting cross subsidies. The purpose of this research is to provide additional insights into the complex cost structures of private-research universities. It represents an effort to disentangle the financial data to better understand how university activities are being funded. The research aims to raise awareness of cross subsidization of university outputs in an effort to inform financial decision making. A cost-allocation model is presented to offer decision makers an approach to measuring the level of cross subsidization among various university outputs.

POLICY ISSUES

Affordability of and access to a higher education are important public policy issues. Managing costs and tuition levels is fundamental to making higher education affordable. According to research conducted by Immerwahr & Johnson (2010), there is a strong public perception that a college education is unaffordable and Americans are increasingly "skeptical about whether colleges and universities are doing all that they can to control costs and keep tuition affordable" (p. 2). These concerns have resulted in increased expectations for institutional accountability and transparency. Proactive efforts to identify creative cost-control strategies, and the ability to carefully monitor spending in relation to outcomes, are needed to respond confidently to these concerns.

Concern also exists among many who finance higher education that the revenue intended to fund instruction, such as tuition and fees, may be subsidizing the cost of conducting government-sponsored research. Conversely, government and private funding agencies have suggested that reimbursement for the indirect costs of sponsored research is subsidizing instruction and other university activities, resulting in the implementation of caps on indirect-cost reimbursements. These caps shift more of the financial burden of conducting national research onto universities, which increases the strain on other institutional funding sources. Failure to adequately reimburse for legitimate costs associated with sponsored research may result in institutions declining research awards that require significant institutional subsidy or in tuition increases to cover costs that have been shifted to the institution (Association of American Universities, 2007, para. 1).

FINANCING UNIVERSITIES

The financing of universities is complex. Research universities pursue a three-fold mission and produce multiple outputs through a joint-production process of teaching, research, and public service activities of faculty, making it difficult to separate the costs associated with each output. Revenue generated for final objectives flows to the university from multiple sources, including tuition and fees, appropriations, grants and contracts, private gifts, endowment earnings, and auxiliary enterprises. These complexities affect pricing and resource allocation decisions but also render it difficult to know if spending is aligned with institutional priorities. Inadequate understanding of the relationship between costs and outcomes can lead to inefficiencies in management decisions, particularly resource allocation decisions. Bowen (1980) said that little is known about the relationship between resources and educational outcomes, and this problem still holds true today. Existing research provides inadequate information about these relationships.

Awareness of cross-subsidies is essential to understanding the relationship between university inputs and outputs and to ensuring that resource allocation is aligned with mission. Cross subsidies are common in nonprofit organizations as leaders attempt to balance revenue generation and mission attainment. To accomplish this, surpluses from certain activities are reinvested to subsidize the cost of other mission-driven activities. For example, universities often subsidize graduate education with revenue generated from undergraduate students (de Groot, McMahon, & Volkwein, 1991; James, 1978). Olson (1990) suggests that these cross subsidies represent an institution's implicit intrinsic values. Careful management of cross subsidies can help an institution to strategically maximize select revenue sources to best support their mission.

Prior researchers have shown the importance of cross subsidies in understanding the financing of universities, for example, Bowen (1980); de Groot et al. (1991); James (1978); Massy & Olson (1994); Olson (1996); and Winston (1998). There is also a significant body of empirical research that addresses higher education economics, establishing a context for cross-subsidies (for example, Leslie & Johnson, 1974; Massy, 2004; Winston, 1998; Zemsky, Wegner, & Massy, 2005); indirect cost rates (for example, Arthur Andersen, 1996; Goldman & Williams, 2000; Massy & Olson, 1994; McPherson, Schapiro, & Smith, 1996; Sale & Sale, 2010; Zuiches & Vallely, 1987); and endowments (for example, McPherson, Schapiro, & Winston, 1989; Winston, 2004).

HIGHER EDUCATION ECONOMICS

In order to make effective policy and management decisions that support mission and strategic priorities, policymakers and institutional leaders must understand the economic context within which universities operate, as it differs in significant ways from the for-profit marketplace. According to Winston (1998), "economic research published over the past several years makes it increasingly clear that there are basic economic differences that make it highly misleading to see a college or university as just another business" (Chronicle, para 2). Leslie & Johnson (1974) support the argument against using the market model as a basis for higher education financing decisions because it ignores certain characteristics indigenous to higher education that severely limit its applicability. "The implication of this contention is that if policy bases are invalid, then the policy itself is subject to serious questions" (Leslie & Johnson, 1974, p. 2).

One of the most important distinguishing characteristics of higher education economics is the presence of cross subsidies. Subsidies are a fundamental characteristic of nonprofit colleges and universities (Massy, 2004; Winston, 1998; Zemsky et al., 2005). Whereas for-profit organizations sell their products at a price greater than the cost of production, colleges and universities (both public and private) sell their primary product of education at a price that is substantially less than the cost of production (i.e., tuition and fees were less than the total cost of instruction) (Winston, 1998). The remainder of the costs must be subsidized. In private universities, these subsidies generally come from private gifts and endowment earnings (Winston, 1998, Chronicle, para. 7).

Researchers have found that although schools charge students a tuition price that is less than the full cost of producing an education, the amount of subsidy varies considerably across schools. The level of student subsidy has been linked to endowment levels (McPherson et al., 1989). In 1995, total student subsidies exceeded $82 billion when "the average American college produced an $11,967 education that it sold to students for $3,770, resulting in a subsidy of $8,197 a year" These subsidies represent a large part of total costs and are slightly smaller in private than in public institutions. (Winston, 1998, Connection, p. 13).

Similar findings were reported in a recent study conducted by Wellman, Desrochers, & Lenihan (2009), for the Delta Cost Project on Postsecondary Education Costs, Productivity, and

Accountability (Delta Cost Project). The researchers examined IPEDS revenue and expenditure data from 1998-2005 for approximately 2,000 public and private nonprofit colleges and universities and found that, on average, students pay less than the full cost of their education. Data from 2005 show that these subsidies were slightly smaller in private-research universities, where students paid about 56% of the full cost of instruction, than in public-research universities, where students paid about 50% of the full cost of instruction.

A project undertaken by NACUBO (2002) attempted to develop a uniform methodology to identify the costs of providing one year of undergraduate education and related services and found that "the cost of providing an undergraduate education exceeds the full 'sticker' price charged to students and their families in the form of tuition and related fees" (p. 10), at almost every institution studied, by anywhere from a few hundred dollars to more than $20,000. Even students who pay full tuition were subsidized by other sources of funds. The difference between cost and price lies in the amount of additional resources available to an institution and the source of the additional revenues that allow the institutions to provide it.

Another distinguishing characteristic of higher-education economics is that nonprofit organizations try to maximize a mission-driven value function subject to a revenue-driven budget constraint, whereas for-profits try to maximize profit, which is ultimately distributed to shareholders. Nonprofits want to produce "as much high-quality education, research, and public service as possible given their circumstances" (Zemsky et al., 2005, para. 9).

Subsidies play a fundamental role in maximizing an institution's value function. For-profit organizations do not subsidize products over the long run. If a product cannot generate sufficient profit after a brief introductory period, it is generally eliminated from a company's product line. Nonprofits, on the other hand, reinvest surpluses earned from certain activities to subsidize other activities that help them attain their mission. Essentially, they are using proceeds derived from the market to invest in activities that contribute to mission (Zemsky et al., 2005). Without the extra profits from one revenue-generating program, an important program that does not generate revenue but contributes to mission might have to contract. "Today's Colleges must be market smart and mission centered" (Zemsky et al., 2005, Title).

CROSS SUBSIDIES

Relative to our study, the most relevant empirical work is an unpublished study conducted by Olson (1996) for the Spencer Foundation, in which cross subsidies among final objectives of public and private universities were examined. No cross subsidization was observed among the instruction, auxiliary, hospital, and independent operations functions of the institutions. Rather, tuition and fees paid less than 60 percent of the total cost of instruction; and auxiliary enterprises, hospitals, and institutionally-operated federally-funded research and development centers (FFRDCs) did not generate sufficient revenue to cover their full costs. Research revenue, however, was found to subsidize up to 3% of other services.

With respect to service mix, Olson (1996) found that, on average, instruction accounted for less than 43 percent of the total cost of final objectives, research accounted for 20 percent, and the other final objectives combined accounted for the remaining 37 percent. Indirect cost rates were found to be 66 percent for instruction, 42 percent for research, 24 percent for other final services, and 48 percent overall. Our study builds on Olson's work.

Other studies address subsidies across education level (graduate and undergraduate) and academic discipline. In an earlier study, using data for selected years between 1953 and 1966, James (1978) found that students in both the public and private sectors were subsidized.

Undergraduate education was found to subsidize graduate education, with graduate costs at least three times as great as undergraduate costs. Despite the substantial difference in cost, tuition was almost identical at both levels. The study also revealed subsidization across academic disciplines, such that revenue from students enrolled in low-cost disciplines was used to support students enrolled in high-cost disciplines. James described this as "the smorgasbord approach to pricing: a single entry fee entitles the student to sample according to his taste rather than facing a differential charge for each item on the menu" (p. 182). The smorgasbord approach results in some students receiving a higher subsidy depending on the bundle of courses they select. James concluded that "the university must be viewed as a multi-product, nonprofit institution whose input-output relationships are subject to severe distortions if product mix is not explicitly taken into account" (p. 183).

A study conducted by deGroot et al. (1991) using HEGIS (currently known as IPEDS) data from 147 public and private doctoral-granting universities produced interesting observations related to cross subsidies. Consistent with James (1978), deGroot et al. found that graduate instruction was subsidized by undergraduate instruction. In contrast to Olson (1996), deGroot et al. suggest that research expenses might be cross-subsidized by non-research revenue. DeGroot et al. also observed that the presence of a medical school resulted in a more expensive cost structure. Finally, no differences were observed in the cost structures of private and public institutions.

A recent study conducted as part of the Delta Cost Project (2008), using IPEDS data from 1998 to 2006, supports findings of cross subsidies across educational level (James, 1978; deGroot, 1991) and across high-cost (i.e., fine arts, agriculture, business, and engineering) and low-cost (such as humanities and social sciences) academic disciplines (James, 1978). The Delta Cost Project researchers also found that tuition paid by lower-division students subsidized the costs of upper-division students.

POPULATION AND DATA

This exploratory-research study was designed to gain insight into the cost structures of private-research universities, with a particular focus on cross subsidies among final objectives. To begin to unbundle and sort the data, several analyses were conducted: (1) fully-loaded costs were matched with revenue for each final objective, and differences were analyzed across outputs; (2) important ratios were computed to examine the relationship between revenues and total costs and between direct and indirect costs (indirect-cost rate); and (3) proportions were computed to examine the product/service mix, which was determined by James (1978) to be critically relevant to understanding input-output relationships in universities.

The population examined in this study is comprised of U.S. private, not-for-profit, research-doctoral universities (as defined by the 2005 Basic Carnegie Classification system). Of the 108 universities that met the selection criteria, six institutions were excluded from the study for various reasons (see Phillips, 2011, p. 51 for the details). The 102 remaining institutions form the basis for this research.

The decision to subdivide universities by Carnegie Classification and by institutional control (private or public) is based on prior research, which shows that revenue and expenditure patterns vary considerably across colleges and universities (Bowen, 1980; Brinkman, 1981; McPherson et al., 1989; Wellman et al., 2009) and also across the public and private sectors (Bowen, 1980; Toutkoushian, 1999; Wellman et al., 2009). Because of these differences, public and private institutions should be studied separately (Bowen, 1980) and results of this study should not be generalized to all higher-education institutions.

Institutional survey data from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) were used. Financial data related to institutional revenues and expenses for fiscal year 2005-2006 were gleaned primarily from the Finance survey. Other relevant information, including parent/child reporting relationships, audit opinion, fiscal year, survey completion status, and national disaster indicators, was gathered from the Institutional Characteristics survey.

Completion of IPEDS surveys is mandatory for postsecondary institutions that receive federal Title IV funding, such as Pell grants and federal student loans. Institutions that do not respond to this mandate are subject to extensive follow-up and/or fines. IPEDS data are used frequently in research studies on the costs of higher education, as the surveys provide a substantial amount of information that is otherwise unavailable from other sources.

Although IPEDS data are self-reported, Finance survey responses are expected to align with institutional General Purpose Financial Statements (GPFS). Institutional GPFS must conform to Generally Accepted Accounting Principles (GAAP) set by the Financial Accounting Standards Board (FASB), and are audited annually by an independent auditor. For the 2006 fiscal year, 100 of the 102 (98%) institutions reported receiving a clean audit opinion on their GPFS.

Five major outputs of research universities are considered: Instruction, Research, Auxiliary Enterprises, Hospitals, and Independent Operations. These functional classifications are widely used in accounting and reporting of higher education expenses. The FASB, which establishes accounting and financial reporting standards for all private sector commercial and not-for-profit entities, requires independent institutions to report expense information by function in their financial statements. According to Section 703.1 of the National Association of College and University Business Officers (NACUBO) Financial Accounting and Reporting Manual (FARM), a functional expense classification is a method of grouping expenses according to the purpose for which the costs are incurred. The classifications tell why an expense was incurred rather than what was purchased. Reporting expenses by functional classification helps donors, granting agencies, creditors, and other readers of the financial statements to understand the various mission-related activities of the institution and their relative importance (NACUBO FARM 703.1).

Although the FASB does not dictate specific functional classifications to be used (FASB ASC 958-720-45), institutions are required to report expenses using specific functional classifications when completing the IPEDS Finance Survey. Therefore, accounting information systems must be capable of producing expense information by functional classification (NACUBO FARM 703.1). The functional-expense classifications used in this study are consistent with IPEDS Finance survey requirements.

Based on FASB requirements, operations and maintenance (O&M) of plant should not be reported as a separate functional classification in financial statements (FASB ASC 958-720-45). Most independent institutions use that classification internally, and then allocate the accumulated costs to the other functional classifications when preparing financial statements. Interest and depreciation also are not functional classifications, and those costs should be allocated to the other functional classifications using reasonable bases (NACUBO FARM 703.2). Reporting requirements for the IPEDS Finance survey are consistent with this reporting approach.

Other functional expense categories include: Public Service (PS), Institutional Support (IS), Academic Support (AS), and Student Services (SS). Although Public Service is an important university output, it was excluded because sufficient data were not available to inform meaningful

analysis. The remaining functional categories, IS, AS, and SS, are treated as indirect costs and allocated to the final objectives using a step-down allocation methodology.

A supplemental data source was needed because research revenue is not reported separately in IPEDS. Data from the National Science Foundation's (NSF) web-based Computer-Aided Science Policy Analysis and Research database system (WebCASPAR) were used for this purpose. Specifically, data from the *Survey of Research and Development Expenditures at Universities and Colleges, FY2006* (R&D survey) was used to represent research revenue and expenditures. According to NSF, the R&D survey is the primary source of information on separately budgeted R&D expenditures within academic institutions in the United States and outlying areas.

Research revenue for the purposes of this study is defined as revenue received from external agencies and organizations to support direct and indirect costs of separately-budgeted activities specifically organized to produce research outcomes. This definition is based on the definition of "organized research" in Office of Management and Budget (OMB) Circular A-21 (A-21) and the definition of research and development in the R&D Survey.

Total academic R&D expenditures, adjusted to exclude institutionally-funded separately-budgeted Science and Engineering (S&E) R&D expenditures and expenditures passed through to sub-recipients, were used as a proxy for research revenue. Data for institutionally-funded non-S&E R&D and non-S&E R&D expenditures passed through to sub-recipients were not available and therefore could not be excluded. This may result in an overstatement of research revenue.

Research expenditures provide a reasonable proxy for research revenue because of the nature of the research-grant funding process. The NSF Proposal Award Policies and Procedures Guide (2009) prescribes that reimbursement for project-related disbursements must be timed with the actual, immediate cash requirements of the grantee in carrying out the purpose of the approved project.

To maintain consistency, total direct cost of research reported in IPEDS was adjusted to exclude S&E R&D expenditures passed through to sub-recipients. The adjustments were made prior to allocating indirect costs. Research expenditures reported in IPEDS include only separately-budgeted research. Expenses related to research that is not separately budgeted are reported in the Instruction category. This may result in an overstatement of instruction expense and an understatement of research expense.

Although completion of the NSF R&D survey is not mandated, the response rate is very high. Of the 660 surveys sent for FY2006, responses were received from 98.7% of all doctorate-granting institutions, to which 98.5% of the estimated national R&D expenditures in Science and Engineering disciplines had been disbursed (NSF, 2007).

METHODS

Methods were selected to support the exploratory nature of the study and include descriptive statistics and a sequential (step-down) cost-allocation model. Descriptive statistics were used to explore revenues, costs, cross subsidies, and relevant ratios. The step-down cost-allocation methodology was employed to assign support-department costs and compute fully-loaded costs of the final objectives.

Use of a step-down approach to assign costs recognizes that some support departments benefit from services of other support departments. Unlike the direct method, which does not recognize interactions among support departments, the step-down approach allocates support-department

costs to other benefitting support departments to form cost pools that are ultimately allocated to the final cost objectives.

To employ the step-down technique, support departments are rank ordered based on the level of services provided to other support departments. Costs are then allocated, in a sequential manner, based on the established order. Costs of the top-ranked department are allocated to all remaining support departments and to the final cost objectives based on a measure of service usage. Once a cost pool is allocated, it is closed out and no other cost pool can be allocated to it. This process is repeated until all cost pools have been allocated.

Use of the step-down approach for this study is based on the cost principles for educational institutions outlined in Office of Management and Budget (OMB) Circular A-21 (A-21) as they pertain to allocation of Facilities & Administrative (F&A) expenses. A-21 provides principles for determining costs applicable to grants, contracts, and other agreements between educational institutions and the Federal government and requires that cost accounting systems of grant-recipient institutions support the accumulation of costs as required by the principles outlined in the circular. Given the population of research universities, we make the assumption that the required cost accounting systems are in place at those institutions.

Consistent with good cost-accounting principles, A-21 calls for the allocation of F&A expenses in "proportions reasonably consistent with the nature and extent of their use of the institution's resources" (A-21 E.2.b, 51887). Following A-21 requirements, expenditures were grouped according to major function prior to allocating indirect costs. The Cost Model and Data-Collection Paradigm developed by Massy and Olson (1991) was used to perform the allocations and compute total cost for each final objective (see Figure 1).

The O&M functional category was first assigned its allocable share of fringe benefit costs, depreciation and use allowances, and interest costs and then total O&M costs were allocated to the other functions. This was done at the institution level and reported in the Finance survey. We used these data as reported under the assumption that the individual institutions, understanding their unique operations and circumstances, are best able to identify relevant allocation metrics (such as overall square footage of building usage) that will produce a relatively accurate cost assignment.

Expenses associated with the remaining administrative functions, IS, AS, and SS, were grouped into cost pools and allocated to benefiting functions using a Modified Total Direct Cost (MTDC) metric, as directed by A-21. MTDC consists of all salaries and wages, fringe benefits, other operating expenses, and up to the first $25,000 of each subgrant or subcontract and excludes equipment, capital expenditures, charges for patient care and tuition remission, rental costs, scholarships, and fellowships and the portion of each subgrant and subcontract in excess of $25,000 (A-21). Detail by major function was not available for the exclusion items; therefore total direct cost, which includes salaries and wages, fringe benefits, and other operating expenses, was used as a proxy for MTDC.

Although Public Service is not considered a final objective for the purposes of this study, it is assumed to draw indirect costs for institutional and academic support. Therefore, Public Service is included in the calculation of MTDC, and in the allocation of IS and AS expenses.

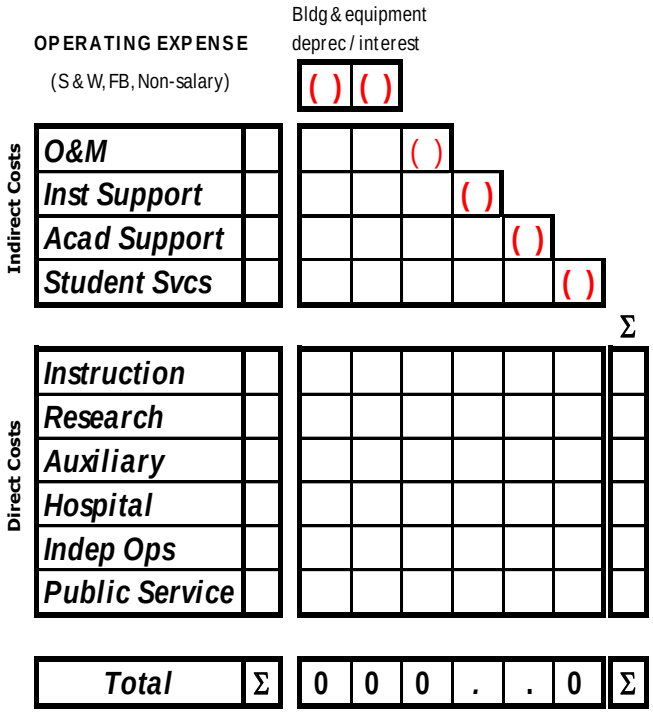

Figure 1. Cost Model & Data Collection Paradigm. Adapted from Massy & Olson (1991).

Following A-21 guidelines, administrative expenses were allocated according to the following sequence:

- IS cost pool was allocated to all the remaining functions using MTDC.
- AS cost pool was allocated to Instruction, Research & Public Service using MTDC.
- SS cost pool was allocated 100% to Instruction.

Once the allocations were completed, direct, indirect, and total costs were computed for each of the five final objectives. Indirect costs for **all** functional areas include operations and maintenance, depreciation, and interest. Indirect costs for the final cost objectives also include the appropriate share of IS, AS, and SS expenses.

Revenue categories were assigned to final objectives, where possible, and matched to total costs, as follows: gross tuition and fees, adjusted to exclude funded and unfunded institutional aid, were allocated 100% to instruction revenue and matched to instruction expense. Research revenue was matched to research expense. Gross sales and services of auxiliary enterprises, hospital revenue, and independent operations revenue were each matched to their respective expense functions to reveal interesting results.

All expenses that are not captured in the major functions, including student aid, Public Service, and costs reported as *Other* in the Finance survey, were combined into a category named Other Expenses. Review of financial statements for several institutions with high expenses in the *Other* category on the Finance survey reveals that these expenses are primarily for accounting adjustments to items such as annuities payable, additional minimum pension liability, and actuarial change on annuity liability. Given the nature of these expenses, we conclude that they

do not represent a valid proxy for alternate levels of institutional activity and, therefore, do **not** draw indirect costs.

Revenue categories that could not be reasonably assigned to a final objective were combined to form a Subsidy Revenue category and matched to the Other Expense category. Subsidy Revenue includes revenue from appropriations, grants and contracts for non-R&D activities, private gifts, contributions from affiliated entities, investment return, sales and services of educational activities (other than tuition), and other revenue. Funds remaining after all expenses have been covered are assumed to be available to subsidize institutional activities that did not generate sufficient revenue to cover their full costs.

Ratios of indirect cost/direct cost and revenue/total cost were computed for each of the final objectives to provide additional insight into the relationship between revenues and costs. Service mix was also computed.

RESULTS AND ANALYSIS

Results for the average direct cost, indirect cost, and total cost for each final objective are displayed in Table 1.

The data show that hospitals are associated with a substantially different cost structure, with an average total cost greater than three times the average cost of instruction. These findings are consistent with those of deGroot et al (1991). Universities with a hospital have common characteristics - all are research-intensive institutions and all grant a medical degree.

Average service mix (excluding the hospital function) shows instruction at 41 percent, research at 22 percent, and auxiliary and independent operations combined at 37 percent. These results are very similar to Olson's (1996) findings, which show the service mix as 43 percent instruction, 20 percent research, and 37 percent for the other final objectives combined. It is surprising that the percent of expenses accounted for by instruction had not increased given the significantly increased investment in student services (which is included in instruction) since Olson's study.

Table 1. Direct, Indirect, and Total Costs and Indirect Cost Rates

Major Functions	*N*[a]	*Direct Cost*	*Indirect Cost*	*Total Cost*	*IDC/DC Weighted*[b]	*IDC/DC Unweighted*[c]
Instruction	102	183,557	130,786	314,343	71.3%	99.6%
Research	79	112,412	57,106	169,518	50.8%	65.2%
Auxiliary	100	41,410	21,784	63,194	52.6%	75.0%
Hospital	8	918,782	110,969	1,029,751	12.1%	13.7%
Independent Ops	18	207,232	18,073	225,305	8.7%	21.9%
Final Objectives	102	419,973	208,304	628,277	49.6%	87.7%

Note: Amounts are reported in thousands of dollars.
[a] Includes only cases with both revenue and cost for a particular final objective
[b] Average indirect cost of the population divided by the average direct cost.
[c] Individual ratios were computed for each institution first and then an average was computed for the population.

Of some concern is the low level of indirect costs for hospitals and independent operations, given the magnitude of these activities. Review of the raw data reveals that many institutions did not

report O&M, depreciation, or interest expense in the Finance survey for these functions. It is evident that expenses designated as indirect in this study are being captured as direct expenses in the Finance survey in some cases.

The indirect cost rate (indirect cost/direct cost) is an important metric in understanding an institution's fundamental structure, as indirect costs comprise a substantial portion of total costs. The weighted average indirect cost rate was 71% for instruction and approximately 50% each for research, auxiliary, and total final objectives. Careful monitoring of indirect costs is essential for effective resource management and for understanding the true costs associated with institutional activities.

Indirect cost rates are particularly relevant with respect to official federal policy for recovering overhead (F&A) costs incurred by universities while conducting government-sponsored research and are the topic of much debate between universities and research-sponsoring agencies. The indirect cost rate represents the amount a university can charge for indirect costs associated with sponsored-research projects and is based on the percentage of direct costs. A 50 percent indirect cost rate means that for every dollar reimbursed for the direct costs of a sponsored-research project, an institution can charge 50 cents for overhead costs associated with the project.

Researchers have consistently shown that the reimbursement rate (which is a negotiated rate) is less than a university's computed indirect cost rate, and in practice universities do not even recover costs at the negotiated rate (Goldman & Williams, 2000; Zuiches & Vallely, 1987; Olson, 1996). Goldman & Williams (2000) found that universities only recover an estimated 70 to 90 percent of the actual F&A expenses associated with federally-sponsored research projects.

Results of the cross-subsidy analysis are presented in Table 2. The data reveal that, on average, instruction, research, and auxiliary activities did not generate sufficient revenue to cover their fully-loaded costs. Tuition and fees paid for only 54% of total instructional costs and was not even sufficient to cover direct costs of instruction. This result is consistent with Wellman et al. (2009) who found that students at private-research universities paid about 56% of the full cost of instruction in 2005-06, the same timeframe as our study.

Table 2. *Cross Subsidies and Revenue/Cost Rates*

Major Functions	***N***[a]	***Revenue***	***Total Cost***	***Net Revenue (Cost)***	***Rev/Cost Weighted***[b]	***Rev/Cost Unweighted***[c]
Instruction	102	170.772	314,343	(143,571)	54.3%	72.9%
Research	79	129,129	169,518	(40,389)	76.2%	77.4%
Auxiliary	100	51,913	63,194	(11,281)	82.1%	96.0%
Hospital	8	1,169,738	1,029,751	139,988	113.6%	106.0%
Independent Ops	18	228,383	225,305	3,078	101.4%	108.2%
Final Objectives	102	457,362	628,277	(170,916)	72.8%	80.1%
Subsidy Revenue[d]	102	/ / / / / /	/ / / / / /	426,759	/ / / / / /	/ / / / / /

Note: Amounts are reported in thousands of dollars.

[a] Includes only cases with both revenue **and** cost for a particular final objective except for Subsidy Revenue, which includes cases with revenue **or** cost.

[b] Average revenue of the population divided by average total cost.

[c] Individual ratios were calculated for each institution first and then an average was computed for the population.

[d] Includes all revenues not captured in the final objectives net of the costs not captured in the final objectives.

Only 76% of separately-budgeted research costs were covered by grants and contracts. The contention that revenue intended for instruction is being used to support sponsored research and funding received for the purpose of research is being used to subsidize instruction is not supported by these results.

Auxiliary enterprises, which are intended to be self-sustaining operations, only generated enough revenue to cover 82% of total costs. Examples of auxiliary operations include campus bookstores, housing, dining services, and intercollegiate athletics. The most prominent auxiliary enterprise is intercollegiate athletics. In only a few institutions do revenues from intercollegiate athletics exceed their costs (NACUBO, 2002, p. 29).

Institutions have an option in the Finance survey (based on NACUBO guidelines) to report costs associated with intercollegiate athletics as auxiliary enterprises, if the program is operated as a self-supporting operation, or as student services, if the program is not operated as a self-supporting operation. Only twenty-seven percent of the institutions in this study accounted for athletics in auxiliary enterprises. Sixty-two percent accounted for athletics in student services, which means the costs were allocated to the instruction function. The remaining eleven percent do not participate in intercollegiate athletics.

Hospitals and independent operations generated revenue in excess of cost that may be available to subsidize other institutional activities. These results differ somewhat from Olson (1996), who found that hospitals and institutionally-operated FFRDCs had to be subsidized.

It was interesting to learn that amounts reported in the Independent Operations (IO) function were not limited to revenue and expense associated with FFRDCs, as implied in the IPEDS Finance survey instructions. Most of the institutions reporting independent operations did not have FFRDCs. Rather, amounts reported were associated with operations that are independent of the primary missions of an institution, also consistent with IPEDS survey instructions. This may explain the small amounts reported for indirect costs associated with these functions.

Overall revenue generated in exchange for services covered less than 73% of the total cost to deliver these services. All remaining costs must be subsidized by alternative revenue sources. These findings are consistent with the fundamental principle of higher-education economics – that all college students are subsidized (Massy, 2004; Winston, 1998; Zemsky et al., 2005).

Average subsidy revenue for the population is approximately $427 million. This amount represents net revenue from which subsidies can come. Some funds that are restricted for a particular purpose are included. They are still subsidies but are not generally available to fund all activities.

SUMMARY AND CONCLUSIONS

This research examined cross subsidies across five major outputs of research-doctoral universities. No cross subsidies among these outputs were identified except for the few institutions that have hospitals or independent operations. Rather, the results indicate that revenue in exchange for services was not sufficient to cover indirect costs of instruction, research, auxiliaries, and overall. For instruction, revenue did not even cover direct costs.

Awareness of cross subsidies is important in examining the relationships between university costs and outputs. For example, if the need to subsidize auxiliaries is accurate, adjustments should be considered to ensure full recovery of costs. The results of this study suggest that pricing decisions at universities may not be based on a full-costing approach.

Results support prior research findings that all college students are subsidized. This is particularly problematic when the economy is weak, costs are escalating faster than the rate of inflation, and tuition is reaching unaffordable levels. Raising funds to subsidize activities has become extremely challenging now that economic conditions have reduced giving and driven down endowment values. Adding to the problems is the increased competition from institutions offering low-cost, online delivery alternatives. There is a critical need to develop creative solutions for reducing expenses and generating subsidy revenue.

Although any link to policy implications is premature due to the exploratory nature of this study, the work may be able to alleviate concerns about instruction and research cross subsidizing each other.

Several limitations are acknowledged:

- Data were analyzed for only one year, results of which may be affected by externalities not considered in the analysis and, therefore, not representative. Multi-year analysis might yield different cross subsidies and provide important insights into cost behavior.
- Differing institutional accounting and reporting practices (for costs of technology, tuition remission, and sabbaticals, and other such institution-specific data handling) are used across institutions. This is appropriate as a reflection of institutional differences but it makes comparisons problematic.
- Departmental research is included in instruction, if not separately budgeted, which may result in an understatement of research expense and an overstatement of instruction expense.
- Sufficient details were not available to break library expenses out of the AS function. Accuracy would be improved if library expenses were broken out and allocated separately based on categories of users, as described in A-21.
- Sufficient information is not available to assign restricted funds to final objectives to get a truer picture of subsidies.
- The nature of student services has changed over time. They have become more involved with educating students outside the classroom than just supporting students for classroom instruction. This suggests re-characterizing them, or at least a substantial portion of them, as a final cost objective.
- The reliability of cost allocations in fully-costing services is only as good as the strength of their relationship with the cost allocation basis used to distribute costs. The allocation basis should be related to the activity that drives the incurrence of indirect costs. The amount of cost allocated to each cost objective can vary considerably depending on the allocation basis selected.

Despite these limitations, the conceptual model presented here provides a lens through which to analyze university finances. While providing some insights into the cost structures of private-research universities as a group, the model might prove more useful to inform decision making at the institutional level. Applying the model to an individual institution, within its unique set of circumstances, may provide leadership with a better understanding of cost behavior and greater ability and manage costs and allocate resources appropriately to support mission and strategic priorities. Analysis at the institution level would overcome one of the biggest weaknesses of the model by allowing for the assignment of restricted funds and other subsidy revenue to the appropriate final objectives. Such analysis would provide very valuable information to inform decision making.

Full-costing models provide decision makers with a clearer perspective of the true cost of delivering services than would be obtained by analyzing direct costs alone. According to Snyder & Davenport (1997), better managerial control of decision making and understanding of the total costs of a service result from allocating indirect costs. Financial management of colleges and universities must go beyond the traditional control method of monitoring spending relative to static budgets, to include continuous monitoring of cross subsidies at all relevant levels of the institution (i.e., final cost objectives, majors, programs, student level-graduate/undergraduate, etc.). to satisfy a greater need for accountability and the need to contain cost increases.

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