INDIRECT COST RECOVERY RATES: WHY DO THEY DIFFER?

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The recent controversies at Stanford and other well-known research universities regarding alleged abuses of the federal government's research funding system have thrust the indirect cost recovery (ICR) mechanism into the spotlight. This system governs the compensation of universities for the overhead expenditures created by federal research projects. Given estimates that universities conduct 60 percent of all basic research in the United States, the government's role in funding this work is crucial [Office of Science and Technology, 1986]. This paper reviews the history of the indirect cost recovery system and empirically examines the determinants of IRC rates.

THE INDIRECT COST RECOVERY SYSTEM

The ICR rate, popularly referred to as the *overhead rate*, is the proportion of the direct costs of research (for salaries, specific equipment, etc.) that universities charge the government sponsor. Motivations differ concerning the level of these rates. Faculty researchers have an interest in keeping the ICR rate as low as possible relative to other universities. Obviously, for any fixed level of funding of a grant award, the more money that is required by the university for overhead reimbursements, the less is available for the direct costs of research projects. Raising the total funding request to compensate for higher ICR rates may place the investigator at a competitive disadvantage. University administrators, on the other hand, have an interest in pressing for larger amounts of reimbursement from the government, while government administrators have an incentive to keep the ICR rate as low as possible.

Government officials have long recognized that the government should pay most of the additional costs of funded research. However, in this era of scarce research funds, some officials are questioning whether the government should be responsible for even those additional costs that are clearly appropriate, much less the questionable items that have received so much media attention the past few years.[1]

Government administrators have no doubt been concerned about the rise in ICR rates over the last fifteen or so years at both public and private institutions, as well as the wide variation in rates at seemingly similar institutions.[2]

The problem is that deciding upon the pool of funds to include in an ICR rate is, by definition, an arbitrary process. They are costs that are difficult, if not impossible, to account for directly. This does not mean that these are not legitimate research costs. They are simply estimates of the costs the university would not otherwise face if it did not conduct federally sponsored research. The guidelines used in the determination of these costs are contained in Office of Management and Budget (OMB) Circular A-21.

It may be useful to trace the history of this important document. Prior to 1966, the U.S. Government used a fixed national rate to determine the proportion of direct costs allocable to overhead costs.[3] Before 1955 the rate was fixed at 8 percent for all educational research institutions. Responding to pressures from university representatives, the rate was increased to 15 percent by 1963 and to 20 percent by 1966. In 1966, however, the Bureau of the Budget (now called OMB) instituted a major policy change, allowing each university to negotiate its ICR rate through one of two federal funding agencies — the Department of Health and Human Services (DHHS) and the Department of Defense. While universities initially were more evenly split between the two, the DHHS currently sets virtually all of the ICR rates for universities receiving federal research grants.

By the mid-1970s, rising ICR rates had attracted the attention of Congress. Eventually a revision was agreed upon that focused on tightening the reimbursement rules, seeking to slow the increase. The new ground rules were codified in a crucial document, "Circular A-21 — Cost Principles for Educational Institutions."[4]

Circular A-21 is designed to allocate costs of research more equitably between educational institutions and the government. It employs generally-accepted accounting principles in an attempt to determine the extent to which the government is responsible for costs applicable to grants, contracts, and other agreements with these universities.

The document defines direct costs as expenditures that can be specifically linked to a particular sponsored project with a high degree of accuracy. Indirect costs, on the other hand, are defined as expenditures that cannot be readily and specifically attached to a particular sponsored project. Much of the government-sponsored research at a university indirectly utilizes university infrastructure and administrative functions. Circular A-21 prescribes a set of rules, many of them more or less arbitrary from the standpoint of economic logic, to determine the proportion of these services that the government uses for research and that the university uses for instruction.

Circular A-21 creates seven major cost pools for the university with a high likelihood of indirect costs:

1. Depreciation and Use Allowance;
2. Operation and Maintenance Expenses;
3. General Administration and General Expenses;

4. Departmental Administration;
5. Sponsored Projects Administration;
6. Library; and
7. Student Administration and Services.

The key consideration is the determination of the extent to which the costs included in each pool are attributable to research versus teaching. These costs are divided "in proportions reasonably consistent with the nature and extent of their use of the institution's resources." An indirect cost rate is negotiated and determined for each of these pools, and the rates are then combined to create an overall university ICR.

Many allocation methods apply to each pool, and the advice that A-21 gives for selecting the method to distribute the individual cost grouping is somewhat vague. A-21 states that "[t]he essential consideration in selecting a base is that it be the one best suited for assigning the pool of costs to cost objectives in accordance with benefits derived; a traceable cause and effect relationship; of logic and reason, where neither benefit nor cause and effect relationship is determinable."

For the depreciation and use allowance and for operations and maintenance expenses, the allocation of costs between instruction and research is fairly straightforward. If a building is used "exclusively [or predominantly] in the conduct of a single function [teaching or research]...[the costs] shall be assigned to that function." If the building is used for more than one function and the spaces are not used jointly, the costs "shall be allocated...on the basis of usable square feet of space, excluding common areas such as hallways, stairwells and restrooms." Finally, if the space is shared by people for instruction and for research, the costs "shall be allocated to benefiting functions in proportion to the total salaries and wages applicable to the joint functions."

For general administration and general expenses and for departmental administration expenses, the costs may be allocated in accordance with the Modified Total Direct Cost (MTDC) method. The costs for each pool are aggregated with regard to the common major functions of the university and are then divided based on MTDC, a base consisting of

1. Salaries and Wages;
2. Fringe Benefits;
3. Materials and Supplies;
4 Services;
5. Travel; and
6. Subgrants and Subcontracts up to $25,000 each.

Thus, the MTDC of the instruction function is compared to the MTDC of the research effort, and a proportion is taken to calculate the ICR rate for the specified pool. With this background in mind, we turn now to a description of our data set followed by an empirical analysis of the determinants of ICR rates.

THE MODEL

The data set used below contains information from 1983-84 to 1988-89 for most of the largest grant-receiving research universities in the country. For each year, we have assembled a set of institutional data by merging three separate data sets. One, the Financial Statistics report from the Higher Education General Information Survey (*HEGIS*) for the period up to 1985-86, and the Integrated Postsecondary Education Data System (*IPEDS*) for the more recent period, describes the basic financial accounts of almost all public and private non-profit post-secondary institutions in the United States. The second, the *HEGIS* and *IPEDS* Enrollment Survey, reports full- and part-time enrollment for all institutions. Finally, a file of ICR rates was made available to us by the National Institute of Health's (NIH) financial management branch.[5] These rates are the negotiated rates for most of the top research universities in the country. The data set has been constructed as a panel, so that only those schools with data for all six observation years are included.[6] We end up with a sample consisting of seventy-one of the most heavily funded research universities for each year from 1983-84 to 1988-89.

Table 1 presents descriptive statistics for the variables used in our regression analysis. We begin with *ICRRATE*, the indirect cost recovery rate for each institution in a particular year.[7] *PRIVATE* is a dummy variable that takes a value of 1 if the university is privately controlled and 0 if it is publicly controlled.[8] *ENROLL* is a measure of full-time-equivalent graduate and undergraduate students (in thousands) while *GRADMIX* is the percentage of graduate students at the university. *PHYSPLANT* is the amount (in millions of 1988-89 dollars) that the university spent on the operation and maintenance of the physical plant. *ADMINBURDEN* is a variable which measures "administrative burden" by computing the percentage of operating expenditures going to administrative expenses.[9] *ENDOWINC* measures income received from the endowment while ST&LOCAL$ measures state and local appropriations (both in millions of 1988-89 dollars). Regional dummies include *NORTHEAST*, *SOUTH*, and *MIDWEST* (with *WEST* as the omitted category).[10] Finally, there are a number of interactive variables. *PLANTPRIV*, *ENDOWPRIV*, *ST&LOC$PRIV*, and *NORTHPRIV* each measure the differential effects of the variables *PHYSPLANT*, *ENDOWINC*, *ST&LOCAL$*, and *NORTHEAST* on public and private institutions. Finally, *LAG(ICRRATE)* is the one-year lag of *ICRRATE*.

A number of these variables were suggested by Massy who asserted that "It is difficult to believe that differences in scale and mix of operations, characteristics of physical plant, regional economic differences, and administrative efficiency could produce so much variation in overhead rates" [1990, 47].

Our expectations concerning effects are as follows:

PRIVATE: It is commonly thought that whether a school is publicly or privately controlled has a notable effect on its ICR rate. Zuiches and Vallely [1987] propose several reasons for why this may be true. One explanation is that publicly supported universities do not encourage their faculty members to request salary reimbursements, because their salaries are already paid for by the state. Another explanation is that state universities have little incentive to collect fully the indirect costs of research because excess funds are either returned to the state treasury or the state is already paying for overhead costs. This is in sharp contrast with many private universities. According to Jaroslovsky [1991], both the controller and the assistant controller at Stanford held yearly seminars for business officers at other schools on how to maximize indirect cost recovery, as Stanford "developed a reputation for being among the most aggressive universities when it came to charging the government" (no doubt a significant factor in the troubles Stanford encountered). A key question for us is whether the higher ICR rates observed at private universities are explained by differences between the sectors in other variables, or whether the public-private difference itself is an important source of difference in ICR rates, other things equal.

TABLE 1
Descriptive Statistics of the Regression Variables

Variable	Mean	Std. Dev.	Minimum	Maximum
ICRRATE	52.130	12.250	33.000	120.000
PRIVATE	0.393	0.489	0.000	1.000
ENROLL	11.842	8.537	0.170	34.426
GRADMIX	0.224	0.144	0.020	0.734
PHYSPLANT	25.802	16.227	3.349	81.596
ADMINBURDEN	0.141	0.043	0.049	0.305
ENDOWINC	13.430	22.733	0.000	189.168
ST&LOCAL$	93.600	100.770	0.000	462.711
NORTHEAST	0.333	0.472	0.000	1.000
SOUTH	0.302	0.459	0.000	1.000
MIDWEST	0.181	0.386	0.000	1.000
PLANTPRIV	10.663	17.525	0.000	73.936
ENDOWPRIV	11.427	23.354	0.000	189.168
ST&LOC$PRIV	1.626	5.104	0.000	37.695
NORTHPRIV	0.215	0.411	0.000	1.000
LAG(ICRRATE)	52.303	11.773	33.000	99.000

ENROLL: This variable is included to test whether economies of scale exist for large universities, allowing them to spend less money on overhead charges and thereby allowing them to maintain a lower ICR rate.

GRADMIX: In addition to the absolute scale of operations, the mix of operations may have an effect on the ICR rate. One reason why this may be true is that the capital and maintenance for the equipment required for graduate students tends to be much more expensive than that for undergraduates. This would indicate that graduate students require larger overhead expenditures and that as the number of graduate students rises relative to undergraduates, we would see a corresponding rise in the level of the ICR rate. In addition, the

percentage of graduate students may serve as a proxy for the research orientation of an institution, with the expectation that indirect costs increase along with research emphasis.

PHYSPLANT: Universities tend to justify high ICR rates by citing the age and condition of their physical plant. The argument is that older plants (which are more likely found at private universities) require more money than do the more modern plants. This variable measures how much universities actually spend on the maintenance of their physical plants with the expectation that higher spending leads to a higher ICR rate.

ADMINBURDEN: The ratio of administrative expenditures to the total educational and general expenditures for the university is a proxy for the relative efficiency of the administration of a university. More efficient schools (those with lower administrative burdens) could pass these savings along to the government in the form of lower ICR rates.

ENDOWINC: Universities with higher endowment earnings likely invest more in capital stock. If this means that richer schools purchase more expensive buildings with larger administrative support staffs, they will, all else equal, have higher ICR rates.

ST&LOCAL$: The equivalent to higher endowment earnings for private universities is, for public universities, higher levels of state and local appropriations. Again, if richer schools build buildings that carry large operating expenses, ICR rates will rise.

NORTHEAST, SOUTH, MIDWEST: It seems natural to test for regional effects on the ICR rate. It may be true that schools in different regions face different prices for labor, materials, energy, etc., thereby leading to differences in ICR rates. It is expected that the highest prices are found in the northeast, and, therefore, all else equal, universities located there would have the highest ICR rates.

PLANTPRIV, ENDOWPRIV, ST&LOC$PRIV, NORTHPRIV: It is plausible that the effects of certain variables will vary depending on whether the university is privately or publicly controlled. If, for example, private universities are more aggressive than public universities in passing on to the government higher maintenance expenditures, the interaction term *PLANTPRIV* would be positive and significant. If, for example, the coefficient of *NORTHPRIV* were positive and significant, it would tell us that private universities in the northeast have, all else equal, higher ICR rates than public universities that are also located in the northeast.

REGRESSION RESULTS

Table 2 presents the ordinary least squares regression results from estimating the model described above.

First of all, the findings suggest that there is a substantial amount of inertia in the indirect cost recovery system. The coefficient of *LAG(ICRRATE)* is positive and significant with a value of 0.519. This suggests that about one half of the adjustment to an exogenous change takes place in one year, or alternatively, that it takes two years for the effects of an exogenous change to be fully realized.

Turning now to the independent variables affecting the ICR rate, private control has a positive effect although it is only marginally significant (at the .10 level). Other things equal, a privately-controlled school can be expected to have an ICR rate roughly 2 percentage-points higher than if it were publicly controlled. This indicates that the considerable differences in ICR rates between private and public universities can almost entirely be explained by differences in certain characteristics of these schools other than private/public control. While Massy [1990] appears to be correct in saying that these other explanatory variables can not completely account for the large differences in ICR rates among universities, our analysis indicates that private/public control explains only 2 points of the observed 15 point difference in average ICR rates between private and public universities. It therefore plays only a very modest role in the determination of ICR rates.

Four other variables turn out to play a statistically significant role in the overhead system. The economic significance of these estimates is discussed below.

As the number of graduate students rises relative to the number of undergraduates, we see a corresponding rise in the ICR rate — an increase of one standard deviation in *GRADMIX* produces a one and one half point increase in the ICR rate.[11] This supports the speculation that graduate students require larger overhead expenditures.

Expenditures on the operation and maintenance of the physical plant also has a significant effect on ICR rates. An increase in *PHYSPLANT* of one standard deviation raises the ICR rate almost two points.[12] Thus, there appears to be merit to the contention that high ICR rates are linked, at least in part, to the age and condition of the physical plant.

The coefficient of *ADMINBURDEN*, the measure of administrative efficiency, is also positive and significant. A one standard-deviation increase in the administrative burden leads to about a two-thirds of a point increase in the ICR rate.[13] This implies that schools that are administratively leaner have lower ICR rates, a finding that lends support for the recent attempts by the federal government to limit the administration component of the ICR rate.

Finally, as expected, region appears to affect the ICR rate, with schools located in the northeast having, all else equal, ICR rates five points above their western counterparts. This is consistent with the speculation that these schools face higher prices for important inputs.

TABLE 2
Regression Results

Dependent Variable: ICRRATE

Variable	Parameter Estimates: Parameter Estimate	Parameter Estimates: Standard Error
INTERCEPT	16.199	2.127[a]
PRIVATE	2.173	1.267[c]
ENROLL	0.002	0.065
GRADMIX	10.371	2.936[a]
PHYSPLANT	0.106	0.056[c]
ADMINBURDEN	14.791	7.594[c]
ENDOWINC	-0.044	0.084
ST&LOCAL$	-0.009	0.008
NORTHEAST	4.926	1.226[a]
SOUTH	0.389	0.911
MIDWEST	0.260	1.064
PLANTPRIV	-0.019	0.064
ENDOWPRIV	0.058	0.086
ST&LOC$PRIV	-0.094	0.070
NORTHPRIV	0.822	1.413
LAG(ICRRATE)	0.519	0.037[a]

Number of observations: 429
F Value: 83.7[a]
Dependent Mean: 52.339
Adjusted R^2: 0.744

a. Significant at the .01 level.
b. Significant at the .05 level.
c. Significant at the .10 level.

It is also of interest to examine the variables that do not play a significant role in the determination of the ICR rate. A coefficient of *ENROLL* not significantly different from zero indicates the absence of economies of scale. In addition, neither endowment earnings nor state and local appropriations play a significant role in the determination of the ICR rate.

Perhaps more surprising is the statistical insignificance of the interaction terms. This means that, contrary to popular belief, private universities are no more likely than public universities to, for example, pass along to the federal government their higher maintenance expenditures or the higher prices faced by schools located in the northeast. This result, along with the small coefficient of the variable measuring private/public control, indicates that, all things equal, whether a university is publicly or privately controlled does not have a large effect on the ICR rate.

CONCLUDING REMARKS

The regression results discussed above provide a clearer indication of the validity of various speculations concerning ICR rates. Being located in the northeast increases ICR rates substantially, regardless of whether the university is privately or publicly controlled. Schools that are less efficient in terms of administrative expenditures and schools with a disproportionate number of graduate students also have higher ICR rates as do schools that spend greater amounts on maintaining their physical plants. Changes in the various independent variables, however, do not lead to immediate adjustments in ICR rates. To the contrary, evidence suggests considerable inertia in the ICR system.

While private research universities do in fact have higher ICR rates after controlling for other factors, these other factors are successful in explaining most of the private-public difference. Institutional characteristics relating to the mix of operations, financial characteristics, and location all play an important role in the determination of this rate, implying that there are good economic reasons for much of the observed variation in ICR rates both between and within sectors.

NOTES

1. See the discussion in Office of Science and Technology Policy [1986] regarding the government's obligation to reimburse indirect costs. De Witt [1991] is representative of press accounts.
2. In terms of the variation in rates, the average ICR rate at our sample of public research universities was 46 percent in 1988-89, as opposed to 61 percent at their private counterparts.
3. Brown [1981] contains a useful summary of the history of the indirect cost recovery system.
4. Office of Management and Budget Circular A-21 [1979]. See also the 9 June 1986 Circular A-21 Revision.
5. We are grateful to Wayne Berry for his help in arranging our use of this file.
6. These six years were the only ones for which we had data from all three data files.
7. There are several bases upon which these rates are applied to determine the amount of funds reimbursed for overhead costs. Modified Total Direct Costs (described above) is the most prevalent and all of the rates used here employ this base. The maximum value of 120 percent is for Harvard Medical School.
8. As can be seen from Table 1, 39 percent of our sample consists of private universities.
9. It is administrative costs less library costs divided by total educational and general expenses.
10. Note that the northeastern and southern regions each contain about one-third of our sample, with the remaining schools almost equally divided between the midwest and west. *NORTHEAST* contains schools from: CT, DC, DE, MD, ME, MA, NH, NJ, NY, PA, RI, and VT. *SOUTH* contains schools from: AL, AR, AZ, FL, GA, KY, LA, MS, NC, NM, OK, SC, TN, TX, VA, and WV. *MIDWEST* contains schools from: IA, IL, KS, IN, MI, MN, MO, NE, OH, ND, SD, and WI. *WEST* contains schools from: AK, CA, CO, HI, ID, MT, NV, OR, UT, WA, and WY.
11. 144 (the standard deviation of *GRADMIX* — see Table 1) times 10.371 (the coefficient of *GRADMIX* — see Table 2) equals 1.49.
12. 16.227 times .106 equals 1.72.
13. 0.043 times 14.791 equals 0.64.

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