Notes

The principles embodied in this article reflect the judgment of one among several of the scientific groups advisory to the Space Science Board of the U.S. National Academy of Sciences. However, they do not necessarily represent any official policy of the committed views of each consultant. The continued interest and advice of M. Calvin, R. Davies, N. Horowitz, S. E. Luria, A. G. Marr, D. Mazia, A. Novick, C. Sagan, G. Stent, H. C. Urey, C. B. van Niel, and H. Weaver, among many others, have been indispensable.

To document this article in detail with references to original sources would require a bibliography of inordinate length. Many of the issues are reviewed in the following works.

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Research Overhead and the Universities

Should government support of basic research in private universities cover overhead as well as direct costs?

Norman Kaplan

Should overhead, or the "indirect" costs of conducting basic research in the private universities, be fully reimbursed (*1*)? Contrary to the apparently increasing trend toward an affirmative answer among those in universities as well as in the federal government, this article examines the case for the other side (*2*). I would go even further and suggest stopping all overhead payments for basic research in private universities as soon as practicable.

The case for full reimbursement seems reasonably compelling. Its proponents cite the financial plight of our universities, their importance for the maintenance and extension of the nation's basic research effort, and the erosion of general funds from endowment and other such traditional sources. The universities, it is said, are too poor to be asked to continue sharing in the costs of conducting research, and the federal government should, in all fairness, assume the true burden for the research it seeks to support. Furthermore, research funds help the university to perform a task vital to our national interest by training our future scientists, so it follows that anything contributing to the financial stability of the universities contributes to our national welfare.

Although there is probably little disagreement with these propositions, it is the thesis of this article that concentration on them obscures some more basic problems and postpones the search for more general solutions. The plea for payment of full costs prematurely defines the problem, and so restricts our focus. It is a piecemeal approach to the larger problems of formulating a national science policy and of defining the role of the universities in that policy and in their own sphere as educational institutions. At best, the payment of full costs for basic research may partially alleviate the financial plight of the universities. But such action will not solve their financial problems. Nor will it solve the problems of research policies of the universities or the federal government.

A sharp reversal of the present trend toward full reimbursement (*3*) may force reconsideration of how basic research should be supported, where it can be done best, and how we can get the optimum return on the money invested in it. As a prelude to the consideration of such problems, this article focuses on the university's role as a producer of basic research in relation to its other goals. The claim for full costs is examined in the light of the university's fiscal policies on all its major activities, including research. Finally, some possible consequences of full reimbursement are discussed in the context of problems of university autonomy and control.

The University's Goals

There is probably general agreement that universities in the United States have as their primary goals the storing, transmission, and extension of knowledge (*4*). The means for reaching these goals are libraries, teaching, and research, and the "product" involved has something to do with knowledge. The university has not made a profit or typically realized full costs on its storage facilities, its teaching, or its research. The major client or customer, in the sense of both number and visibility, has typically been the student, and even he is not expected to pay the "full costs"

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of his education. Even the highest estimates rarely show the student contributing more than about half of the total costs incurred by the university in educating him. This deficit financing is typically accomplished through endowment income; from involuntary subsidies realized through the inadequacy of faculty salaries, which reduce the "true" costs; and through a variety of other means. The acknowledged fact is that the universities have not exacted "full costs" from their most visible and numerous clients in return for one of their most important products or services—the education of students (*5*).

True, some have argued that the student, or more precisely his parents, should contribute the full share of the costs of educating him. But it is probable that the vast majority of Americans are strongly opposed to the idea of an educational elite based on the individual's ability to pay full costs. And while the universities have straddled the issue by raising the tuition (but not nearly to the level where it would cover costs), they continue to favor the admission of students on the basis of criteria other than the ability to pay all costs. The universities have not threatened to "cut back" their teaching activities if they do not receive full payment from their customers; rather, they have sought to augment, from other sources, the funds available to make up the deficit. Teaching students has always been a "normal" activity of the universities; and within the context of our traditional American values and experiences, the universities seek supplementary income without "strings." Thus, the private universities generally tend to oppose government subsidies because of the traditional fear of government control.

The second of the three major activities of a university can be discussed briefly here. The storage of knowledge represents a relatively fixed cost, and a university has no choice but to try to maintain the best possible library as well as other facilities which enhance its standing as a repository of knowledge. Technical advances may bring about more efficient methods of storing information, in terms both of costs and of effective use by scholars. It is even conceivable, in these days of enthusiasm for strict financial accounting, that a system of charges will be worked out, for the use of these information-storage facilities, in which individual professor, student, departmental, research-project, and administration accounts will be charged in order to allocate the full and true costs.

The major point of the last of the three activities of a university—namely, the research activity—seems fairly obvious. If research has been, and continues to be, a normal activity of the university, why should there be any expectation of realizing "full costs" in this sector? Unlike the teaching sector, where it might be argued that the student expects a "return" regardless of how much money he has invested, the donor who provides money for basic research expects no return at all in the normal course of events except the usual acknowledgment in a footnote. However small the proportion of the total costs of a research project contributed by a research donor may be, his contribution might well be viewed as "manna from heaven." For every such contribution, large or small, reduces the total amount of money that the university has to spend from its own funds to support its normal research activities. Instead of accusing the foundations and government agencies of not shouldering their fair share and not contributing the "full costs," one could argue that the universities have not appreciated the actual financial contribution received and the related saving in time and effort otherwise spent in trying to raise these monies from other sources (*6*).

To ignore overhead and full costs for a moment, suppose that from the beginning of next year the government agencies, private foundations, and other research donors were to cease all payments to the universities in support of research. Since most of these research donors have not been paying the full costs, it might be expected that the universities would be forced to raise anew only a portion of the total research budget. How many universities would try to raise money for their general fund to maintain the present level of basic research activity on their campuses? Would university administrations be willing to support even a considerably contracted research program should the present research donors cease to make their present "partial" contributions?

If, as the universities have maintained, research is normally a central activity vital to a university's goals and functions in a society, then it is to be expected that each university will seek to maintain a certain level of research activity regardless of the financial details and arrangements. In fact, a reasonable operational test of what that level of research activity should be in a given university might well be the volume of research money which the university accepts willingly and gratefully when there is no contribution whatsoever to meet indirect costs. If the university argues that it has had to increase its administrative and financial staff or provide more heat and light as a result of the volume of research activity, then we have presumptive evidence that the university would not otherwise support that level of research activity and that it should consequently seek less financial assistance for research—to maintain a level of research activity closer to what it is prepared to support normally, much as it supports certain levels of teaching and student activity.

No one can answer the question with any degree of certainty, though it may be suspected on the basis of past performance alone that the university researchers might be forced to return to the days when there was considerably less enthusiasm for research on university campuses and even less support in the form of equipment, assistance, space, secretarial help, and even time (*7*), whereas in an analogous hypothetical situation involving teaching and the student, the university would spare no effort in trying to maintain current activity.

I wish to draw no conclusions from this exercise with hypothetical situations. The point is simply that many American universities have, by and large, paid only lip service to the importance of research. Not until the period of early small-scale stimulation by the private foundations and the more generous support by the government in the postwar period, did they provide much internal support for research.

Consequences and Questions for the Universities

Let us now assume that the research donors were to adopt a policy of full reimbursement for the indirect costs of conducting basic research in the universities. What consequences might we expect? What kinds of questions might then be raised by the universities, as well as by the federal government as the most important supporter of research?

In this article I allude only to some of

the more obvious questions and consequences. The first point is that full reimbursement of overhead costs will not solve the financial problems of American universities. But the specific desire to cover overhead costs of research could be satisfied if the present trend toward increasing support from the federal government is extended, since federal agencies now contribute a substantially greater proportion of full costs than other research donors.

The problem of overhead costs is undoubtedly of greatest importance to the relatively few universities and colleges now receiving the bulk of federal research support. Presumably, the present failure to reimburse full costs accounts in part for the absence of any extensive research effort at the vast majority of the nation's institutions of higher education. Full reimbursement may very well encourage many colleges and universities to expand their research activities beyond the level that their desires and capabilities warrant. Federal research support is already viewed as a "hidden" (and necessary) subsidy to higher education.

Concern over the real or apparent dangers of federal control over education has always been strong in American thought. With payment of full research costs, government concern over precise determination of full costs might very well become concern over the extent and nature of overhead expenses in universities. Further, academic freedom and, more precisely, the university's independence with respect to its own research program might be threatened by the centering of attention on the short-run problems of overhead costs.

I turn now to a somewhat more detailed discussion of these points.

While full reimbursement would undoubtedly ease one sector of the university budget, it would clearly not solve the over-all financial crisis in the universities. A recent National Science Foundation report shows that the universities had to provide about $30.2 million toward an estimated $72.7 million of indirect costs on a $327.5 million budget for research in 1957–1958 (*8*). There is no separate tabulation for the private universities, so the $30.2 million figure includes some unknown proportion provided by state and local governments—a fact disregarded in these figures. Thus, the maximum that might have been recovered from research donors in 1957–1958 to cover what the universities themselves estimated as their unreimbursed indirect costs on their research was $30.2 million. This figure would appear to be a very small portion of a university financial problem usually estimated in the $20- to $40-*billion* range (*9*).

Parenthetically, it may be noted that universities could alleviate their indirect-cost problem considerably by increasing the proportion of support received from the federal government. While federal support contributed just over 70 percent to the universities' total indirect-cost bill in 1957–1958, it also paid just over 80 percent of the total indirect costs reimbursed by any sponsor. The federal government reimbursed the universities for two-thirds of the indirect costs resulting from outside support, while all other sponsors only contributed one-third of the total indirect costs resulting from their grants to the universities (*8*, p. 7).

The concentration of funds in a relatively few universities (*8*, p. 6; *10*) has raised pointed questions about the role of such federal support to the universities. If these federal funds are a kind of *de facto* subsidy to education, then how can the concentration of support be justified (*11*)? Not only is it likely that there will be increasing demands for greater dispersal of federal support for research among institutions not now among the large beneficiaries but the criterion for federal support may continue to shift from research capability to the over-all well-being of the institution.

Administrative Control

Questions of "control" enter at a number of points. If the federal government were to pay the full costs of the research it sponsors, it might well be justified in raising questions about the universities' mode of operation and fiscal accounting policies. The government already does this through its auditing procedures, which are felt by many to be inappropriately complex and restrictive for the university setting. But it could go further and question both the extent of administrative costs and the particular methods that are used to allocate such costs to the research activity.

In the staff report of the Commission on Financing Higher Education, Millett points not only to the variability of such costs among institutions but also to the fact that the general average of such expenditures is relatively high. He notes that about "40 percent of total current operating expenditures of institutions of higher education as a whole falls within the three major reporting categories 'administration and general,' 'plant operation and maintenance,' and 'auxiliary enterprises' . . ." (*12*).

Millett continues: "the allocation of overhead costs has become so important . . . [because of] the very magnitude of the expenditures which are labeled 'administrative' . . ." (*12*). But such allocations are extremely complex in the framework of the universities' many functions and not merely in terms of any technical accounting problems. As President Lee A. DuBridge of the California Institute of Technology noted recently: "I do not know how to determine at Caltech how many pennies of each dollar go to teaching and how many to research. This is not because our bookkeeping department is inefficient, but only because we purposely mix the two activities so thoroughly that separate budgeting is impossible even in principle" (*13*, p. 111).

But such considerations may only be considered of minor importance in relation to the more serious implied threats to academic freedom noted by the Academic Freedom Committee of the American Civil Liberties Union in its statement of 24 November 1959. Here the Committee noted: "It must be clearly recognized that if outside financing of university research and graduate education, particularly in the natural sciences, continues to follow present patterns, it will inevitably lead to a very serious erosion of university control of university activities" (*14*).

The reaction to this report is described in a recent article in The New York *Times* by Fred M. Hechinger: "In The New York *Times* sampling of views of university leaders, most of the thirty-eight presidents who replied pointed to dangers on other campuses and a high safety record on their own. While they admit that outside patrons are paying much of the piper's wage, they insist that the academic tune, whoever is calling it, remains strong and sound" (*15*).

Moreover, many university leaders, like Lloyd V. Berkner, have long maintained that: "The dangers of Federal support are greatly lessened when the funds are administered by a variety of government agencies. The most dangerous thing that could happen would be a concentration of all Federal support in any one agency, be it the Department of Defense, the National

Science Foundation, or the Department of Health, Education and Welfare" (*16*).

But it must be noted that while we are still far from concentration of federal support, the latest available figures show that the three agencies mentioned by Berkner, plus the Atomic Energy Commission, accounted for 97 percent of the total federal expenditures for separately budgeted research and development in colleges and universities in fiscal 1958 (*8*, p. 5).

Concentration of all federal research support in a single agency would undoubtedly result in a more unified policy, which could lead to favoring particular institutions, scientists, or research approaches. And it would certainly decrease alternative support possibilities for projects turned down by that agency. But some observers already see the seeds of these dangers in the powers which could be exercised by the review panels, which now carry a major responsibility in advising the government agencies on the projects they should support. Thus, Lee A. DuBridge recently commented: "The chief threat of control has come not from the government agencies who administer the funds, but from the panels and advisory committees (composed largely of professors!) who pass upon projects and budgets before they are accepted. Many of these groups have steadfastly opposed proper overhead payments on research contracts, have opposed including allowances for the salaries of professors working on the projects, have opposed block or departmental grants, and have required of the prospective research worker such elaborate and detailed proposals and reports that a type of bureaucratic committee control has grown up which suppresses daring ideas and takes administrative control out of the hands of the universities themselves" (*13*, p. 113).

But keeping administrative control in the universities appears to be threatened from many other directions as well. In a recent statement by the President's Advisory Committee, a policy for educational and research growth in the universities was advocated which few, if any, universities accept, or are likely to accept, for the majority of their graduate faculties. The committee noted: ". . . graduate education cannot be effective in institutions which impose heavy burdens of routine instruction and administration on the research scholar who should have plenty of time free to work with his graduate students. *A single graduate course plus the supervision of research may be more than a full-time load for many a professor*" (italics mine) (*17*).

Above all, there is the danger that administrative control may slip away imperceptibly as a result of numerous small and seemingly insignificant decisions and developments. And it is this danger which is the very crux of my opposition to full reimbursement for the overhead costs of basic research in the universities. Seemingly, this is a relatively small problem, and full reimbursement might help some aspects of the universities' financial plight. This might very well be the immediate result, but in the long run it might be detrimental to the interests of both the universities and the federal government. As was noted in a recent New York *Times* article: "One danger [of outside research grants] is clear and present. It is as President A. Whitney Griswold of Yale University warns, that an institution's independence is 'given away or traded away a little bit at a time in individual bargains that seem necessary or profitable at the moment.' This is not necessarily a warning against outside grants; it is rather a warning against an aimless patchwork of sponsored activities" (*15*).

Summary

The question of overhead costs must be viewed in the broader perspective of a national science policy as well as long-range university goals. The probability is that the federal government will maintain and even extend its present level of research support. Whether the government will, or should, maintain a large number of disbursing agencies supporting research is certainly one crucial issue to be decided. Related to it, but at the same time important in its own right, is the question of how the money will be spent and, specifically, how that money will be used to influence the over-all structure of the national research establishment. Will the government seek to modify the present diverse structure of research producers in order to achieve greater possibilities of coordination, or will it seek to maintain the present diversity? If we are not to abdicate our responsibilities, both to the universities and to the national research structure, questions such as these must be faced in the context of an emerging national science policy (*18*).

References and Notes

1. It should be emphasized that I refer here only to universities and not to other types of research producers, such as industrial or independent laboratories. The discussion is restricted to support for *basic* research and, further, to the grant rather than the contract type of support. (The use of the research contract rather than the grant as an administrative convenience by some agencies presents some difficulties which need not be explored in this article.) By "indirect costs" I mean that sum of money (usually some percentage of anticipated costs for salaries, equipment, travel, and the like, specifically justified by the nature of the research proposed) which is added to the total requested by the research investigator.
2. For a most thoughtful and thorough study of the larger problems alluded to in this article, see C. V. Kidd, *American Universities and Federal Research* [Harvard Univ. (Belknap) Press, Cambridge, Mass., 1959]. The discussion in chapter 5 on the complexities of research costs, direct and indirect, is particularly relevant in the present context, although I disagree with Kidd's conclusions. Some of the other proponents of full reimbursement of indirect costs are quoted in the text. As another example of this general position, see the recent statement in "The Advancement of Medical Research and Education," *Final Report of the Secretary's Consultants on Medical Research and Education* (27 June 1959), p. 71.
3. The recent action of the National Science Foundation allowing 20 percent of total reimbursable direct costs for recoverable indirect costs is a case in point.
4. The American Council on Education statement on university goals and research policies is probably still the most relevant. See *Sponsored Research Policy of Colleges and Universities: A Report of the Committee on Institutional Research Policy* (Washington, D.C., 1954), especially p. 4.
5. The principle of covering costs in a university is not recognized for the educational function but only for what are termed "auxiliary enterprises," which include the operation of dining halls and dormitories, student union facilities, and intercollegiate athletics. As Millett points out, "all these activities have in common one and only one attribute—that in most colleges and universities the costs of current operation . . . are borne by direct-service charges [and] because the general expectation is that all or most of these particular activities of higher education institutions shall be self-supporting, they have been segregated for special treatment in the expense and income accounts" [J. D. Millett, *Financing Higher Education in the United States* (Columbia Univ. Press, New York, 1952), p. 101].
6. C. V. Kidd, *American Universities and Federal Research* [Harvard Univ. (Belknap) Press, Cambridge, Mass., 1959], p. 84.
7. Despite the growing recognition of the importance of research in universities, the relative recency of this recognition in America tends to be forgotten. See, for example, C. A. Elvehjem, "Basic research and the state university," in "Symposium on Basic Research," *Publ. Am. Assoc. Advance. Sci. No. 56* (1959), especially p. 88; also, A. H. Dupree, "Influence of the past: An interpretation of recent development in the context of 200 years of history," *Annals* **327**, 19–26 (1960), especially pp. 24–25.
8. "Funds for Research and Development in Colleges and Universities, Fiscal Year 1958; A Preliminary Report," *Reviews of Data on Research and Development No. 19* (National Science Foundation, Washington, D.C., 1960).
9. These estimates of the total extent of the university financial crisis were reported in an article by F. M. Hechinger on the Arden House Conference in The New York *Times* (8 May, 1960).
10. The National Science Foundation survey collected data from 1900 independent and autonomous institutions of higher education in the United States. Only 363 institutions reported research and development operating expenditures, and 61 of these reported such small expenditures that they were excluded from this preliminary report. Of the 302 institutions included in the report, 71, or about 23 percent, accounted for almost 89 percent of

the total university research expenditures. The top 20 institutions accounted for 57 percent of the total budget.

11. For a recent expression of this concern, see F. M. Hechinger's report on the Arden House Conference, New York *Times* (8 May 1960).
12. J. D. Millett, *Financing Higher Education in the United States* (Columbia Univ. Press, New York, 1952), p. 177.
13. L. A. DuBridge, "Basic research and the private university," in "Symposium on Basic Research," *Publ. Am. Assoc. Advance. Sci. No. 56* (1959), p. 111.
14. "Statement Concerning the University and Contract Research by the Academic Freedom Committee of the American Civil Liberties Union," p. 2.
15. F. M. Hechinger, New York *Times* (24 Apr. 1960).
16. L. V. Berkner, *Phys. Today*, 7, 13 (1954).
17. "Education for the Age of Science" (statement by the President's Advisory Committee) (Washington, D.C., 1959), pp. 28–29.
18. The observations reported in this article grew out of a recent study of research organization in the U.S.S.R. and parts of Western Europe. This investigation was supported by a research grant (RG 5289) from the National Institutes of Health, U.S. Public Health Service.

Science in the News

Senate Space Committee Report Is Critical of NASA's Plans for Its New Office of Life Sciences

Last March the National Aeronautics and Space Administration organized its fifth major division, an Office of Life Sciences, whose function is to see that when the time comes to send a man into space the information necessary to keep him alive and healthy will be available. A major share of the necessary research is already being done in Defense Department laboratories, where the military services, for their own purposes, are doing a great deal of work with direct applications in the space program. The Army, for example, is doing work on minimum nutritional requirements, the Navy is investigating the effects on personnel of the restricted and isolated life in long-submerged submarines, and the Air Force is studying the physiological effects of extremely rapid accelerations. The NASA life sciences office is charged with keeping track of research in such space-related fields; it will sponsor research programs of its own where the required information is not already being sought in service and university laboratories whose projects overlap the interests of the space agency.

Space Committee Report

Last week Lyndon Johnson's Senate Space Committee issued a report, prepared by the committee staff, criticizing NASA for not doing enough to coordinate the activities of its life sciences office with the work being done in the service laboratories. The bulk of the 270-page report is given over to descriptions of 32 of the larger Defense research facilities doing work in space-related fields. The committee staff's comments occupy only a short introductory section. Here the report points out that the armed services will spend $38 million this year on space-related research, that 2800 civilian and military employees will have been involved in the work, and that the equipment and facilities at their disposal represent an investment of $61 million. The report contrasts the Defense programs with the $5 million first-year budget of NASA's life sciences office and its expectation of having 20 professional employees on its staff by June 1961, the end of the current fiscal year. The report states that NASA obviously should make full use of the service programs and that there isn't enough evidence that NASA is making satisfactory arrangements for doing so. Indeed, Senator Johnson, in a statement accompanying the report, went so far as to suggest that NASA might not even need a life sciences division if it made thorough enough use of the service programs.

Neither NASA nor the Republicans on the committee were very happy with the report. NASA is not anxious to get involved in a public quarrel with the congressional committee that supervises its activities, but the agency clearly felt that the criticism was at least premature. The life sciences office was barely four months old when the report was completed. It still has only nine professional staff members. At this stage NASA feels that the office has not had much time to demonstrate whether or not it is doing a good job of coordinating its research with the Defense laboratories.

Observers have interpreted the report as a case of seizing an opportunity to reflect the attitude of the majority of the committee, at least (perhaps encouraged by election-year fervor), that the Administration has not been doing a good enough job of coordinating the military and civilian space programs generally. For the minority members of the committee Senator Wiley (R-Wis.) reacted with a statement arguing that the place that needed better coordination was the Senate Space Committee. He said he hadn't heard anything about the report until he read about it in the newspapers.

Jury Decides Cigarettes Caused Lung Cancer But Company Is Not Liable

A jury in Miami, Florida, has decided that a man whose heirs were suing the American Tobacco Company had died of lung cancer, that the disease was caused by smoking Lucky Strike cigarettes, and that the American Tobacco Company could not be held financially liable for the man's death. (The man had smoked two to three packs of cigarettes a day for 30 years before the disease developed.)

A company spokesman interpreted the results as support for the position taken by its medical witnesses, who argued that there was no firm proof that cigarettes do cause cancer. A court official, though, interpreted the ruling as indicating that the jury felt that not enough had been known about the dangers of smoking prior to 1956, when the man's illness was diagnosed, to hold the company financially liable.

A lawyer for the tobacco company told the jury that a judgment for the plaintiffs would "sound the death knell of the industry." The terms of the jury's decision suggest that a future