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Submitted to the Appropriations Sub-Committee on Labor, Health and Human Services, Education and Related Agencies
United States House of Representatives
for the hearing titled
The Role of Facilities and Administrative Costs in Supporting NIH-Funded Research
Tuesday, October 24, 2017, 10:00 am EDT
Rayburn House Office Building, Room 2358-B

I thank Chairman Cole, Ranking Member DeLauro, and Members of the Subcommittee for the privilege of testifying on the important topic of facilities and administrative costs in research, particularly at the National Institutes for Health. My name is Kelvin K. Droegemeier, and I am Vice President for Research, Regents' Professor of Meteorology, and Weathernews Chair Emeritus at the University of Oklahoma. I also am a former member of the National Science Board (2004-2016), the last four years as Vice Chairman, and presently serve in the Cabinet of Oklahoma Governor Mary Fallin as Secretary of Science and Technology. I am testifying today in my roles as an academic researcher, administrator, teacher, and advisor on matters of science and technology policy.

I also thank the Members of this Subcommittee for their longstanding commitment to fostering national prosperity, economic security, quality education, and international competitiveness through support for basic and translational research at the National Institutes of Health. The topic of this hearing is important to that commitment and traces its roots to the pre-World War II era. Not unlike the U.S. Constitution, the framework of facilities and administrative (F&A) costs, previously known as overhead or indirect costs, has been debated continually since its inception, has multiple interpretations depending upon one's position in the research enterprise, and is vitally important to the nation. Consequently, this hearing is especially critical at a time when our nation's research budgets are stressed to an unprecedented degree, and the health, national security, and other challenges facing us are daunting and depend in no small part upon a robust and stable research enterprise.

1. Direct and Indirect Costs: Definition, Application and Viewpoints

For some 80 years, funding directed toward research and development (R&D) at U.S. institutions of higher education has been bifurcated into direct and indirect costs, also known as overhead and, most recently, as facilities and administrative (F&A) costs.[1] Although the categories of funding composing these costs have changed over the years, the general concept remains

[1] The term facilities and administrative (F&A) costs came into existence in the May, 1996 revision of "Cost Principles for Higher Education Institutions" (OMB Circular A-21) to more accurately describe the components of what had previously and synonymously been known as indirect costs or overhead. Although F&A is the appropriate term for contemporary use, I continue to use the terms overhead and indirect costs as referenced in historical events and documents.

essentially the same. Quoting from a 2013 primer [1] developed by the Association of American Universities (AAU) and Association of Public and Land-grant Universities (APLU) (bold emphasis added):

> "Research sponsors, including the Federal government, private industry, state and local governments, and nonprofit foundations provide funding to universities in the form of grants, cooperative agreements, or contracts. **Awards generally include funds for the direct costs of research as well as F&A, both of which are real costs incurred by the institution to conduct research.**
>
> **Direct research costs** are what people generally think of when it comes to federal support of research projects. These costs solely support research that is about to take place and often include laboratory supplies, specific research equipment, salary support for researchers and lab personnel, and travel for conducting research or disseminating research results. This is the core of university research, and it is also where the bulk of the federal investment is spent.
>
> In order to perform research on behalf of federal agencies, universities incur a variety of other significant costs both leading up to and during a specific research project that they would otherwise not incur. **F&A costs** cover the portion of these infrastructure and operational costs related to federally-funded research. Such shared costs include the maintenance of sophisticated, high-tech labs specifically designed for cutting-edge, federally-sponsored research; utilities such as light and heat; telecommunications; hazardous waste disposal;[2] and the infrastructure necessary to comply with various federal, state, and local rules and regulations."

It is important to add that, by their very nature, F&A costs cannot readily be assigned to a given project. Thus, averages are used to compute the elements within the F and A categories across a given institution and are applied to all relevant projects.

The F&A *rate*, which is used in proposal budgets, is composed of costs associated with facilities (F) and administrative services (A). The two components are evaluated and negotiated separately, as noted below, with the overall rate computed today as follows:

$$F\ \&\ A\,Rate = \frac{Indirect\ costs\ allocated\ to\ organized\ research}{Modified\ total\ direct\ research\ costs}.$$

The numerator includes items such as depreciation on buildings and equipment, interest on building debt service, operations and maintenance costs, the library, and administrative costs including general administration (e.g., executive administration, auditing, personnel and human resources), sponsored project administration (e.g., proposal services), and departmental administration (e.g., deans' offices and departmental personnel). For all of these items, only the proportion of the total, including space and debt service, that is directly attributable to organized research, is included in the calculation.

[2] Other items not included in the excerpted text but also relevant include high-speed data processing and storage, and human subject and animal safety.

The denominator represents all of the direct costs described above, though exemptions exist for graduate student tuition, capitalized equipment, project participants who are not formally part of the project team, and selected other items determined to be exclusions to the modified total direct costs and to which F&A is not applied.

It is important to recognize that the ratio above is the F&A *rate*, not the fraction of the project cost associated with F&A. For example, if the modified total direct cost portion of a budget is $100,000 and the F&A rate is 50%, then the total project budget is direct cost + (direct cost x F&A rate) = $100,000 + $50,000 = $150,000. Thus, F&A in this example is 1/3rd of the total project budget, not one-half, as some mistakenly assume.

F&A rates are set every few years through a negotiating process involving university administrators and one of two cognizant Federal agencies: The Department of Health and Human Services (DHHS) or the Office of Naval Research (ONR). **Although the process is long and tedious, as noted in multiple reports (e.g., [2]; see also Section 11), the framework does involve extensive space inventories and other assessments by universities to separate sponsored research from other activities.** Always a difficult process (Where does research end and teaching begin?), it is becoming increasingly so, particularly with the rise of undergraduate research as an integral component of learning, and the increasing use of "maker spaces" and other creative environments that promote simultaneous education/learning and research exploration.

Variation of F&A rates among research institutions is substantial, evoking in some the belief that the system is being gamed. However, **considerable and understandable variation exists among universities, public and private** [3], regarding how they address building maintenance, building construction (e.g., some only build buildings when all funding is in hand while others debt service buildings), administrative services, etc [4]. Additionally, geographical cost differences and the types of research performed (e.g., medical research in high-tech laboratories versus weather studies using computer models) must be taken into account as related to utility and other support costs. As noted subsequently, rigorous cost accounting principles and audits ensure that F&A rates, once established, are being applied appropriately.

F&A rates are, in general, not growing in surprising or inappropriate ways (see Section 6; the A component of the rate has been capped at 26% since 1991[3]). In fact, although the ten-year trend summary below focuses on negotiated F&A rates, Section 5 introduces the even more important concept of *actual* F&A recovery, which is significantly less than the *negotiated* amount. Table 1.1, from the Council on Governmental Relations (COGR) [5], shows F&A trends over the past 10 years for 107 institutions. At my own institution, the University of Oklahoma Norman campus, the F&A rate has increased only 17% in the last 20 years [6], with the current negotiated rate of 55% being notably less than the actual rate of 61.6% which should be utilized (59% if one takes into account the A cap of 26%). (Again, keep in mind that a rate of 55% means that just over a third of the total award is for F&A cost reimbursement.)

[3] According to a 1995 GAO report [37], this cap made overall F&A rates more uniform.

Table 1.1. Ten-year trend of annualized percent change in F&A rates for 107 U.S. research institutions. From [5].

Reporting Cohort & Survey Year	FY 2007	FY 2017	Annualized Percent Change
Research Universities (average)	*51.2*	*55.0*	*+ 0.8%*
Research Universities (median)	*50.3*	*54.5*	*+ 0.7%*

As might be expected, **views toward F&A depend to a significant extent upon the role one plays in the research enterprise** [3]**,** though generalizations can be dangerous. Faculty tend to view direct costs as the only real costs of research, with F&A, which for the most part is hidden to them, as an unnecessary subsidy to the university or not rigorously determined. This leads to the belief that less F&A would mean more funding to support direct costs for research. But of course, such is not the case because less F&A would actually mean that the university could not afford to conduct even as much research as it currently does, and certainly not more (see Section 8).

Administrators understand that F&A represents real costs to the institution, associated with which is a significant burden in negotiations every few years. Frowned upon by administrators are efforts, more frequently than is realized, by Federal agency officials, and other funders, to get the university to reduce or entirely waive F&A in certain grant proposals.

Views by funding agency personnel are mixed, but for the most part involve efforts, understandably, to stretch Federal dollars, especially in light of challenging research budgets. Private industry generally supports the F&A concept (though it is often confused with profit), while states that fund research at state universities often view F&A is unnecessary, reasoning that state appropriations already cover such costs.

As noted subsequently, private foundations, to which Federal agencies are frequently but inappropriately compared in the context of F&A, have an entirely different mission than the Federal government in the research enterprise (see Section 7). Not being subject to Federal cost accounting rules, foundations often prohibit or greatly limit F&A reimbursement, though they do allow for the recovery of many costs typically found in government F&A. I return to this point later.

Key Summary Points

- Direct and indirect costs are both real costs associated with the performance of research at academic institutions.
- The structure of direct and indirect costs has been around for some 80 years.
- F&A rates vary among universities, public and private, for understandable reasons.
- Rigorous cost account principles and audits ensure that F&A rates are being applied appropriately.
- F&A rates at universities are not increasing without reason, even though the administrative burden to conduct research has increased dramatically.
- Multiple views exist regarding F&A, depending upon the role one plays in the research enterprise.

2. Identifying the Questions

The U.S. science and engineering research and education enterprise is the envy of the world. It has produced innumerable breakthroughs that have translated to benefits for society, including the Internet, cures for insidious diseases, and technologies that help ensure national security as well as personal safety. From the iPhone to automobiles, to commercial airplanes, automated grocery checkout stands, unconventional recovery of crude oil and gas, and online shopping, **the benefits of research – and their translation into products and services via the process of private sector innovation – are undeniable and pervasive.**

A principal contributor in bringing about these benefits is higher education and, in particular, public and private research universities. According to National Science Foundation (NSF) data [7], in Federal fiscal year (FY) 2015, *institutions of higher education* expended approximately $37.9 billion in Federal funding on research and development (R&D), with $20 billion funded by the Department of Health and Human Services (HHS) and $17.1 billion [8] associated with National Institutes of Health (NIH) research grants and cooperative agreements.[4] In FY15, according to the Government Accounting Office (GAO) [8], $4.8 billion of this $17.1 billion – or 21% – went toward funding F&A costs at universities. [5]

Considerable debate has occurred during the past several decades regarding F&A, particularly when Federal budgets are challenged and thus agency budgets for R&D are highly constrained. **More than 30 GAO reports have been issued since 1980 on topics relating to indirect costs and research funding, with more than 100 formal testimonies given** (see Section 11 for a list of GAO reports and testimonies particularly relevant to the present hearing). Numerous other reports by the Congressional Research Service (CRS) have been prepared, and dozens of other studies and thought pieces have been offered on the topic. This body of material is exceptionally valuable, though in reading it, one comes to the unmistakable conclusion that is best summarized by the words, in 1994 [10], of Gary Talesnik, who formerly led indirect cost negotiations and the development of cost reimbursement policy for the Department of Health and Human Services:

> "To no one's surprise, the controversy over universities' indirect research costs is heating up again. In times past, you could count on this issue to turn up every few years; now it returns so often it never really seems to go away." "In my experience, the periodic debates about indirect costs have usually been, as Yogi Berra put it, "*Deja vu* all over again." Given the nature and importance of this subject, periodic reviews that honestly deal with the facts can be constructive. **All too frequently, however, the debates about indirect costs have been based on faulty assumptions and perceptions."**

In 1998, Robert M. Rosenzweig, former President of the Association of American Universities (AAU), made a similar point [11]:

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[4] Approximately 80% of the NIH budget is directed toward funding extramural research [5].

[5] When considering *all organizations* funded in FY15 by NIH research grants and cooperative agreements, the totals are $22.5 billion overall, of which $6.3 billion, or 28%, was for F&A [8]. For the National Science Foundation, in FY16, $5.8 billion in R&D funding was awarded, $1.3 billion of which (22%) was budgeted for F&A [9].

> "Benjamin Franklin once wrote that the Constitution might not last forever, but that death and taxes would forever be with us. To those who have been attentive to the relationship between the federal government and the nation's universities since the end of World War II, indirect cost recovery deserves a place on that short list. Like the first two, **the problem of indirect costs is inherently insoluble, and also like them, it excites extraordinary passions among people who are normally quite peaceable and reasonable**."

The principal and age old question for consideration at the present time is not whether F&A is a valid concept, but whether the proportion of money directed toward it, in comparison to funds that support direct costs of research, is appropriate. Related to this is a second question of how prescribed reductions to F&A, which could either save the government money overall or shift more funding to direct costs, would impact the national's research enterprise. And finally, a question exists as to whether the present F&A framework is being applied equitably across all sources and recipients of funding. In other words, **it all boils down to the cost of research: are the costs reasonable and accountable, who should pay, why, and in what proportion?**

Previous questions regarding accountability and transparency in applying F&A at universities have largely been addressed owing to rigorous Federal guidelines and audit and oversight procedures, though as noted in Section 7, confusion does still remain regarding how reimbursed F&A funds may be used. Undeniably, although the cost of performing research continues to rise, especially in the medical arena as a result of increasingly sophisticated and costly equipment, laboratories, and regulations, **the value to the public of Federally-funded research, and trust placed by the public in science and scientific institution leadership [12], are not in question.**

It is tempting to address the aforementioned F&A questions via a focus on dollars alone. Doing so, unfortunately, bypasses important elements of philosophy and principle that underpin the entire academic-government partnership, which came into being shortly after World War II. *Context is important if shared understanding and thoughtful policy – not simply numbers on a balance sheet somewhat arbitrarily determined – are the end goals.* That context is provided in the following sections.

Key Summary Points

- The public value of government-funded research at institutions of higher education is without dispute.
- In FY15, 21% of NIH funding for research at universities went toward F&A costs.
- The issue of indirect costs has been studied extensively, with more than 30 GAO reports issued since 1980 and more than 100 testimonies given.
- The indirect cost debate intensifies during times of especially constrained Federal budgets and boils down to the cost of research: are the reasonable, who should pay, why, and in what proportion?
- It is important to not overlook issues of policy in the quest to address budgetary concerns.

3. How We Got Here: Establishment of the Mutually Beneficial Academic-Government Research Partnership and Early Application of Indirect Costs

To understand how and why the current framework for Federally-funded academic research in the U.S. came to be, and thus the role played in it by F&A and its close cousin, cost sharing, it is instructive to begin with the 1930s (material in this section is drawn largely from [1], [3], [11], [13], [14], and [15]). **At this time, virtually all research in higher education was funded either by philanthropy or private foundations**. Faculty and administrative positions in *private academic institutions* were funded principally by endowment income and tuition, whereas *state institutions* relied more heavily upon state appropriations and tuition. In the mid-1930s, Land Grant institutions received some government funding for agriculture research, and the Works Progress Administration (WPA) helped fund the construction of new academic buildings. The Great Depression caused private foundations to limit funding and narrow their focus to medical and biological science, while some corporations continued to provide funding for equipment, especially for physics research.

Interestingly, and importantly, most institutions of higher education had no interest at this time in receiving Federal funds for research owing to fears about government intrusion in curricula, research topics, and governance. This was particularly true of private institutions, which felt that Federal patronage threated their foundational principles of academic freedom and self-governance (though such institutions did in fact have patrons in the form of donors). President Roosevelt's New Deal, which emphasized Federal assistance, was frowned upon by academics as pushing universities toward Federal funding and a statist approach to higher education. This fear was underscored by new data collection efforts initiated in the Department of Education, for which many institutions of higher education chose to not participate.

In 1933, the Federal Emergency Relief Administration (FERA) was allocated $500 million, which could be given to states to subsidize needy college students in part-time work. Many private institutions rejected this money for the reasons just noted, but others accepted it owing to their challenging budget circumstances. By the late 1930s, Congress wanted more money for university research, and in 1937, the National Cancer Institute (NCI) was created within the NIH. This was an important development because NCI could issue grants for extramural research, whereas all other NIH research was performed in house. Also at this time, Congress considered providing funding to the National Bureau of Standards (NBS) for grants to public and private universities. Although the bill did not pass, the National Research Council (NRC) of the National Academy of Sciences (NAS) was involved in creating the concept, which **calmed fears among academics that funding decisions would be made by experts and peers, not bureaucrats.**

By 1939, President Roosevelt began mobilizing the nation for war in light of Germany's invasion of Poland. Vannevar Bush, then President of the Carnegie Institute of Washington and head of the National Advisory Committee for Aeronautics (NACA), supported such mobilization, even though he disliked the New Deal, seeing it as the government making choices and interfering with free enterprise. NACA provided grants to individual researchers at academic institutions using contracts. This funding vehicle brought comfort because its structure and use were well known in the marketplace, and because contract funding clearly was not

viewed as a government handout. Additionally, NACA had received NRC endorsement, bringing additional comfort that decisions would be rendered by experts. **In providing this funding, Bush took into account the financial interests and ideological values of universities, establishing a funding model in which indirect costs would be fully reimbursed. Bush recognized not only the importance of a healthy higher education enterprise, but also the extraordinary assets within that enterprise being leveraged, at incremental cost, by the Federal government in providing funding for academic R&D.**

In June, 1940, President Roosevelt authorized Vannevar Bush to organize and sponsor academic and industrial research for national defense. Although higher education remained skeptical of Federal patronage for research, institutions' own financial need, coupled with a sense of national duty, led them to accept Federal support. This decision on the part of the academy was buttressed by decreases in private and philanthropic funding, loss of tuition revenue owing to faculty and students joining the war effort (the draft age was reduced from 21 to 18 in 1942), and the fact that German universities were making great strides in aeronautics with government funding. ***This was a watershed moment that, unknowingly, planted the seeds of a decades-long partnership between the U.S. government and U.S. higher education institutions in conducting research and development for public good.***

Key U.S. government sponsors of academic research as the war began were the Office of Scientific Research and Development (OSRD), established in 1941, and the National Defense Research Council (NDRC), both headed by Vannevar Bush. This funded research was performed on university campuses, and universities also administered most of the major wartime laboratories. In addition to being headed by civilian scientists and administrators who worked to ensure that the best research would be funded, NDRC followed NACA's model of indirect cost reimbursement, but broadened the definition and eliminated the process of itemization. **Bush thereby imposed a flat indirect cost rate of 50%, somewhat arbitrarily though justifiably in his mind, computing it as one-half of the 100% being charged at that time by industrial contractors.** The 50% rate applied to all salaries and wages except for those in large laboratories, such as the MIT Radiation Laboratory, owing to obvious special circumstances, where actual costs were used instead. Bush reasoned that universities, as non-profit organizations, had fewer and different types of expenses compared to private companies. He also believed, and argued persuasively, that although the indirect cost rate may have been overly generous, the most important issue was maintaining the health and wellbeing of the nation's higher education enterprise, and thus the research it brought forth for the war effort.

As an additional argument, knowing that universities were still somewhat reluctant to accept the Federal government as a patron, generous indirect costs would soften that position. And to forestall faculty from leaving universities when the draft age was reduced, OSRD agreed to allow universities to direct-charge portions of faculty salaries to Federal awards, thereby further increasing indirect cost recovery. Indeed, by the mid-1940's, **some universities collected indirect cost payments in excess of actual charges and began utilizing them as unrestricted funds – the type most attractive to institutional administrators, unbeknownst to the funding organization. This practice violated the no-loss/no-gain (in financial terms)**

proposition that underpinned Federal funding for research at academic institutions.[6] Eventually, however, universities were asked, though not required, to return surplus indirect cost payments, and some 28% did so.

The first controversy concerning indirect costs developed during the war, when OSRD objected to the fact that *reimbursements* were used to cover administrative support. This marked the beginning of a debate – which continues to this day – about the concept of indirect cost reimbursement and how the funds can be expended (see Section 7). Note that this issue is separate and distinct from that of indirect cost over-recovery, described in the paragraph above, and indeed, it is shown in Section 5 that U.S. institutions of higher education, in aggregate, grossly under-recover indirect costs on Federally-funded research.

In partial response to this controversy, Bush appointed a review committee, in 1942, which noted that, indeed, indirect costs were overly generous; however, it rejected an earlier call for itemization in determining actual indirect costs. Yet, setting indirect costs simply as a percentage of other costs was seen as improper, because such practice was essentially the same as the then illegal cost-plus-percent-of-cost contract vehicle. However, because the flat percentage model had been in place and was generally accepted, it was allowed to continue.

By the end of WWII, U.S. higher education institutions generally were comfortable with the receipt of Federal funding for R&D, thus marking the end – though via a gradual rather than abrupt transition – of the old academic research economy based principally on private foundations and philanthropy. Universities were increasingly seen as key players in providing a clear service to the nation beyond what had been the case previously, with their own capabilities and prestige notably enhanced in the process. ***Thus was born the academic-government partnership, or social contract, based upon the principle of mutuality of interest, that arguably remains intact.***

In this "contract," Federal funding is provided to universities to generate benefits to the public by way of research outcomes that lead to new technologies and understanding, cure diseases, and improve economic and national security; produce a research-capable workforce that is foundational to a thriving economy; and provide educated and informed citizens who are the cornerstone of democracy. Benefits to universities include but are not limited to funding to pursue ideas that either could not otherwise be pursued or would be pursued much more slowly; support for buildings, facilities and equipment; attraction of the best students globally; and prestige that helps garner additional funding from other sources.

One of Vannevar Bush's enduring legacies, which flowed from his strong influence and academically attentive philosophies during WWII, was the manifesto "Science, the Endless Frontier."[7] **It set forth the framework for what would become the National Science Foundation (NSF), founded in 1950.** NSF today funds the majority of U.S. non-clinical basic research in science, technology, engineering and mathematics. But in writing his manifesto, Bush felt the Federal research portfolio should consist principally of physical science and

[6] As documented in Section 5, this principle is no longer operating today, with U.S. universities unable to recover some $4.8 billion of allowable F&A costs from external grants, contracts and cooperative agreements across all funding providers.

[7] Available from the National Science Foundation at https://nsf.gov/about/history/nsf50/vbush1945.jsp.

engineering, not the social sciences, which he believed lacked scientific rigor. Today, social, behavioral, and economic sciences not only are a key part of the NSF portfolio, but are essential for integrative approaches to understanding some of the world's greatest challenges – virtually all of which can, in one way or another, be traced to the behavior of people, from individuals to families to communities to nations to the world.

Key Summary Points

- Prior to World War II, U.S. universities received the bulk of their research funding from philanthropy or private foundations and were opposed to Federal patronage.
- In preparing for war, the Federal government began funding research at institutions of higher education, fully reimbursing indirect costs at a fixed rate of 50%.
- Federal funding for research at universities was governed by the principle of no-gain/no-loss (financially) to them.
- This marked the beginning of the academic-government partnership, or social contract, in which the government funded research at universities for the public good and simultaneously created benefits for the universities – the principle of mutuality of interest and, ultimately, shared cost.

4. The Introduction of Rigor and Cost Sharing following World War II: Building the Academic-Government Research Partnership

Most of the Federal research funds allocated immediately following WWII were appropriated to military agencies, especially the U.S. Navy. Consequently, **it was natural for the Office of Naval Research (ONR), in 1947, to establish the first set of cost principles governing indirect costs** ([1], [3])**.** Although arguably not rigorous, these principles provided a framework, utilizing actual costs to produce average campus-wide rates, that was absent during the war.

In 1958, a pivotal development occurred with creation, by the Bureau of the Budget (later the Office of Management and Budget), of Circular A-21 ([3], [16]), which set forth sound, government-wide principles and consistent cost accounting methods for indirect costs. This document made clear which costs were allowable for charging as indirect, and also required universities to provide justification and documentation regarding them. Additionally, it allowed for varying institutional characteristics.

From 1950 to 1966, various caps were instituted on indirect cost rates for grants by the Department of Health, Education and Welfare (DHEW), **thereby stopping previous practice of full indirect cost reimbursement for grants** – though full reimbursement was still provided for contracts [3].[8] The caps were intended to control what some saw as the overly generous indirect cost reimbursements provided during the war, particularly as R&D funding to universities was beginning to grow significantly. The grant indirect cost limit was set a 8% in 1950, then revised

[8] The difference between a research assistance grant and a contract is that, in the former, the mutuality of interest principle applies. Namely, in the case of a grant, a benefit accrues to both the funder (e.g., Federal government) and performer (university). Conversely, contracts are procurement vehicles with the benefit accruing principally to the funder. Universities of course accept research contracts as well as grants, and it is not realistic to assume contracts yield no benefit to the performing institution given that they, like grants, fund faculty, students, equipment, etc.

to 15% in 1958, and then raised to 20% in 1963 and extended to grants awarded by all other agencies [3].

In 1966, the aforementioned indirect cost caps were removed, thereby reinstating the concept of full cost reimbursement [8]. At the same time, the negotiated indirect cost rate was modified to be based upon actual costs. However, **a new requirement was added: mandatory cost sharing**. The rationale behind this addition was that institutions of higher education should formally assume some of the financial risk associated with research projects funded by the Federal government. Additionally, mandated cost sharing underscored the principle that both the general public and universities benefitted from Federally-funded research (the mutuality of interest and shared benefit principles described previously). And, without question, mandated cost sharing allowed agencies to stretch Federal dollars and thus fund more work.

From 1961 through 1983, Circular A-21 was revised eight times [14], reflecting efforts to continue understanding and improving the process of indirect cost calculation and reimbursement. A 1979 GAO study[9] noted that rapid increases were occurring in health-related research costs, thereby leading to a call for a ceiling on Federal reimbursement, though not on indirect costs themselves [3]. A subsequent study in 1981[10] by the Advisory Committee to the Director of NIH suggested responding to the rapid growth of indirect costs by eliminating the practice of retrospective adjustments and re-defining eligible costs. **The FY83 DHHS budget proposed to limit indirect costs to 90% of the negotiated rate temporarily for two of the NIH institutes. Universities objected and the plan was dropped.** Congress requested a report, believing that indirect cost reimbursements were too large [3].

Although other changes occurred in indirect costs between the mid-1980s and today, the most important was the **capping in July, 1991 (U.S. House Resolution 2507), of the administrative component of the F&A rate at 26% [14].** Although facility cost increases traditionally outpaced those of an administrative nature, **the rapid increase in the number and complexity of research compliance mandates since 1991, with no concomitant change in the A cap, has proved extremely problematic for universities, as described later**. This point is underscored in Figure 4.1 [17], which shows the cumulative number of new Federal regulations governing research at universities from 1991 through 2014. Topics in the regulations include but are not limited to time and effort reporting, sub-recipient monitoring, export controls, human and animal subjects protocols, grant proposal preparation, and grant reporting.

[9] Comptroller General of the United States: *Indirect Costs of Health Research: How They are Computed, What Actions are Needed* (Washington, DC: General Accounting Office, July 27. 1979).
[10] Advisory Committee to the Director, NIH, *Costs of Biomedical Research* (Washington, DC): U.S.: Department of Health and Human Services, 1981).

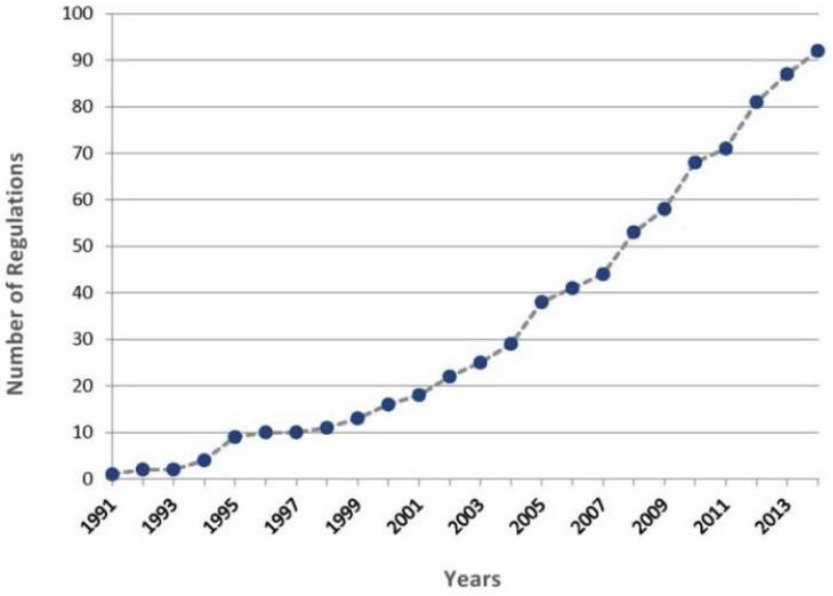

Figure 4.1. Cumulative number of new Federal regulations governing research at U.S. universities between 1991 and 2014. From [17].

Key Summary Points

- The first set of cost accounting principles for indirect costs were established in 1947 and formally codified in Circular A-21 in 1958.
- Indirect cost rates were capped from 1950 to 1963
- In 1966, indirect cost rate caps were removed, but mandatory cost sharing was introduced.
- The administrative component of the F&A rate was capped at 26% in 1991. Since then, the number of Federal regulations governing research at universities has increased continuously, with no change in the cap to cover the associated costs.

5. Cost Sharing and F&A

Although mandatory cost sharing was not formally introduced until 1966, cost sharing had in fact been occurring for many years previously owing to the aforementioned caps on indirect costs to universities. That is, although full cost reimbursement was the concept upon with Vannevar Bush established the academic-government research enterprise prior to and during WWII, it quickly became clear, for reasons mentioned previously, that he was being overly generous, and that caps were needed to control indirect costs, which at that time were not governed by sound accounting principles and full disclosure.

Because of the inextricable links between F&A and cost sharing, the latter has been studied almost as extensively as the former (a series of excellent articles are available in [18] to [25]). Although seemingly a reasonable proposition, **mandatory cost sharing[11] contains a number of**

[11] Note that cost sharing can take the form of cash, or in-kind contributions, such as faculty time, funded by the institution, that is devoted to the project. Both have to be fully documented and are auditable.

undesirable features, as noted in the 2007 National Science Board (NSB) report [16] on the topic. First, if cost sharing is used as a condition of eligibility in funding solicitations, the number and type of institutions able to compete is limited to those having the financial resources to do so. Second, mandated cost sharing constrains the ability of academic officials to strategically direct limited resources in ways they see most appropriate for advancing institutional goals. Ironically, cost sharing often is funded, especially at larger universities, via indirect cost reimbursements.

Third, *voluntary* cost sharing, i.e., auditable cost sharing made at the discretion of the recipient but disclosed as part of a grant proposal and typically included in the review process, can allow especially well-endowed institutions to "buy their way" into grants by putting substantial resources on the table. Fourth, the tracking of cost sharing, either mandatory of voluntary, is a substantial administrative undertaking. Fifth, cost sharing, particularly that voluntarily committed, actually serves as a disincentive for universities to take part in sponsored research because it increases the denominator of the F&A rate equation (see Section 1), thus lowering the F&A rate.

And finally, faculty who commit more time on a project than is supported by an award, which is a desirable act in the spirit of the academic-government partnership, actually works against the faculty member's institution because it must be tracked and accounted as cost sharing. Thus, it too enters the denominator of the F&A rate equation, decreasing the rate and serving as a disincentive for such altruistic behavior. **Consequently, explicit cost sharing, either mandatory or voluntary in nature, is one of the ways F&A and cost sharing are linked.**

It is for these reasons, among others, that the NSB in 2007 prohibited NSF from mandating cost sharing, except in a very limited number of cases where its application could be justified based upon solid principles (e.g., strategic transformation of an institution or state, significant permanent equipment, partnerships with industry). This action leveled the playing field for all institutions seeking to participate in NSF-funded research, and also in 2007, Congress eliminated the 1% mandatory cost sharing on NSF awards. Additionally, the prohibition by NSF of voluntary committed cost sharing removed pressure from NSF program officers to "make deals" that stretch Federal dollars in ways that shift the cost burden to the institution being funded. Unfortunately, other Federal agencies did not follow suite,[12] and consequently, mandatory cost sharing still exists, and voluntary cost sharing is still allowed (in some cases, it is not required but encouraged). **In FY15, U.S. universities spent $1.3 billion in cost sharing [26].**

Three other forms of cost sharing exist in the academic-government research partnership (more likely exist, but I focus on these as they are most relevant to the subject of the testimony).

The <u>first form of cost sharing</u> concerns the un-recovery of F&A by institutions of higher education despite them having Federally-negotiated F&A rates. In FY15, the latest year for which data are available [27], **U.S. colleges and universities did not recover $4.86 billion in F&A[13] of the $68.7 billion in total funding expended[14] (a ratio of 7%),[15] compared to $11.1**

[12] In assisting the creation of 2 CFR 200, which consolidated a number of the OMB circulars governing university research, an effort was made by the community, unsuccessfully, to require formal agency head approval for mandatory cost sharing.

[13] An increase of 246 million from FY11.

billion of F&A recovered. In other words, these institutions did not recover 30% of the F&A they were allowed to receive owing to their negotiated rates. For public institutions, the un-recovery was 34.7% while it was 23.9% for private institutions [27]. At my own university's Norman campus, un-recovered F&A averaged $17.5 million per year from FY11 through FY15, with the ratio of unrecovered to total F&A recovery averaging 48% [6], or well above the national average. Viewed another way, the current Norman campus approved F&A rate is 55%, while the actual recovery rate on funded research awards is 33%. **As a result, the university spends 22 cents of its own money to obtain $1 in grant or contract funds. Although actual recovery rates are not systematically compared to approved rates, the general belief in the community is that a 20 percentage point differential is not uncommon [28].**

For FY15 [7], total R&D expenditures by U.S. institutions of higher education were attributed to the following: Federal government (55%), state and local government (6%), institutional funds (24%), businesses (6%), non-profit organizations (6%), and all other sources (3%). Consequently, the great majority of funding for research is provided by the Federal government.

So what explains the significant un-recovery of F&A and thus the associated significant sharing in the costs of research?

For one thing, certain programs within some Federal agencies limited the amount of F&A that can be charged to an award. Examples include the U.S. Department of Education TRIO and training programs, which cap F&A at 8%. The U.S. Department of Agriculture National Institute for Food and Agriculture (NIFA) program sometimes limits F&A to slightly less than 43% of total direct costs. NIH K and educational awards cap F&A at 8% of modified total direct costs.

Second, private foundations and most states either limit F&A recovery or do not allow it at all. As noted previously, research budgets to foundations include items in the direct cost category that typically are included as indirect costs in Federal proposal budgets [29], and states reason that their appropriations to state institutions already cover F&A. These sorts of awards are accepted by universities because the work to be done is important but is a small fraction of the total portfolio [7]. In other words, "eating the F&A" on such awards is simply a business decision but would not be possible if the majority of funding were from such sources.

Finally, academic institutions sometimes choose, of their own accord, to reduce or "contribute" F&A for various reasons, e.g., to initiate a partnership with a private company or undertake work that has a particularly important benefit to the community or region. It is not clear the extent to which such decisions contribute to un-recovery of F&A, though as noted above, overall, the proportion of funding from such sources is relatively small compared to that from the Federal government and institutions' own funds (see below) [7].

One important consequence of F&A un-recovery is the contribution, by universities, toward the cost of increasingly numerous, unfunded Federal compliance mandates. As noted in Section 4,

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[14] Down 13% since FY11 when adjusted for inflation. Note that the top 30 institutions received 41.3% of total R&D funding for higher education in FY15.

[15] For FY15, the ratio of un-recovered F&A to total research expenditures for 64 Carnegie R1 universities was: mean of 8.1%, median of 6.8%, and maximum of 20.8%.

such additional costs cannot be charged to F&A owing to the 26% cap, since 1991, on the A component. Consequently, **institutions themselves are funding important compliance elements of the research enterprise which rightly belong in the F&A category (see below), and thus explicitly represent institutional sharing of these costs.**

The <u>second form of cost sharing</u> provided to support R&D by institutions of higher education, alluded to above, involves the use of institutional funds. As noted previously, for FY15 [7], this investment represented 24% of all funds expended, or $16.8 billion out of $68.8 billion, and has been increasing steadily during the past 20 years (Figure 5.1). In fact, the increase between FY11 and FY15 was particularly dramatic -- 32.5%! Activities funded include a wide array of unfunded compliance mandates, new buildings and laboratories, faculty start-up costs, equipment, and renovation. At my university [6], a total of $42.7 million in institutional funds were invested in research from FY11-FY15, with the cost sharing component totaling $19.8 million. **This trend is unsustainable, and universities are loath to shift the cost burden to sources such as tuition and fees.** Other funding sources, such as private gifts, typically contain very specific constraints on usage, and trends in state appropriations for state institutions have decreased dramatically during the past several years [30], though now are leveling off.

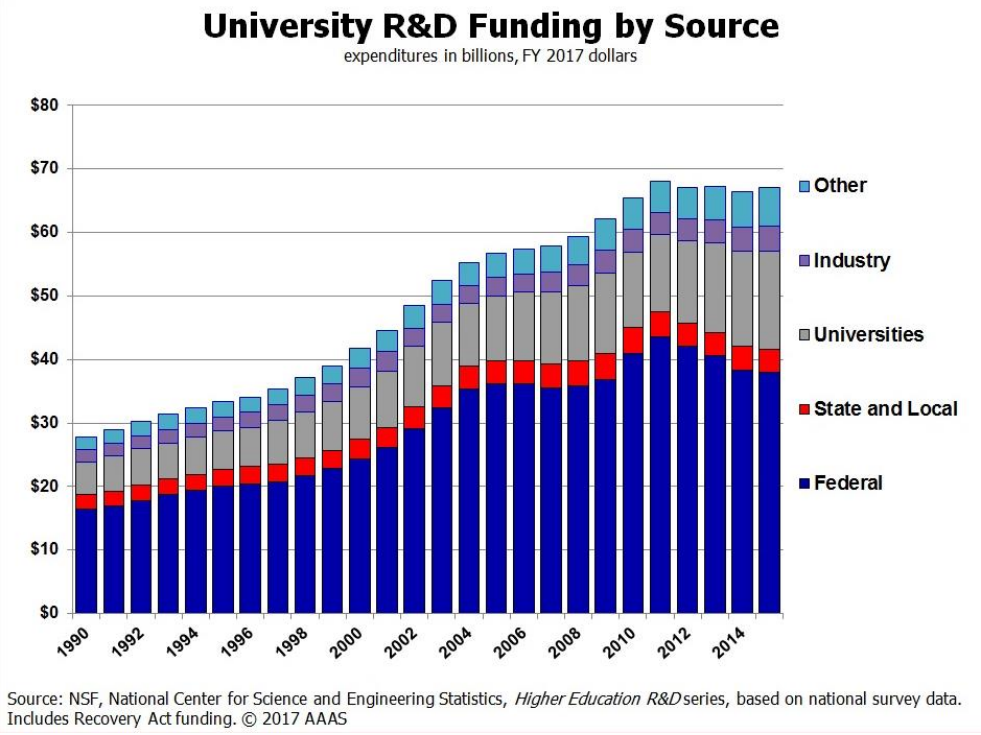

Figure 5.1. Sources of research and development funding at U.S. universities (expenditures in billions of constant FY17 dollars) from 1990 through 2015. Courtesy American Association for the Advancement of Science (available online at https://www.aaas.org/page/historical-rd-data).

The <u>third form of cost sharing</u> lies in the fact that, for virtually all academic institutions, the F&A rate negotiated with the Federal government is in fact lower than it should be based upon institutional analyses, owing in part to the cap, since 1991, on the administrative (A) component of F&A, and in part to the government wishing to contain

actual costs by artificially deflating real costs. As noted previously, at my own institution's Norman campus [6], the current negotiated F&A rate of 55% is notably less than the actual rate of 61.6% determined by institutional analyses. Considering the 26% cap on the A component of F&A, the actual rate is 59%, again well above the 55% negotiated rate. Although national data are not available on these comparisons, anecdotal evidence [28] suggests that, for most if not all institutions, the negotiated rate is less than the actual rate computed from institutional data.

Key Summary Points

- Although formal mandatory cost sharing for Federally-funded research was not instituted until 1966, cost sharing had been occurring prior to that time owing to caps on indirect cost recovery.
- Although mandatory cost sharing purports to deepen the partnership between the government and academic institutions via sharing of cost risk and other factors, it contains undesirable features, such as creating an un-level playing field for universities.
- In FY15, universities spent $1.3 billion in direct cost sharing on research awards.
- Universities contribute cost sharing to research in three other ways:
    - by not recovering full F&A that is allowable according to Federal guidelines. In FY15, this un-recovery totaled $4.86 billion and ranges between 24% and 35% of total indirect costs in the nation's public and private universities, respectively;
    - by paying for nearly one-quarter of all R&D funded at their institutions ($16.8 billion in FY15). This percentage has been growing steadily for 20 years; and
    - by using negotiated F&A rates that are notably lower than they should be based upon institutional data.

6. Trends in F&A and Research Funding

As noted previously, concerns have long existed in Congress and other quarters about increases to F&A rates relative to the trajectory of Federal appropriations for research, e.g., [31], [32]. Quoting the important 1983 National Research Council report [3],

> "Some believe that indirect costs are out of control and that universities have no incentive to control them. Indirect costs as a percentage of the total cost of a research project grant at NIH rose from a mean of 15% in 1966 to 25.5% in 1976 and to 29.5% in 1981. This fact is a source of concern in all quarters. Its interpretation, however, must take account of several factors."

The report goes on to mention those factors, including differences in how rates were computed throughout the period referenced and changes in the actual costs of performing research, which grew over time. **The report notes that the actual rise in indirect costs was much slower than often cited, and that strong incentives exist for institutions to control those costs.** Among them are the fact that indirect costs are shared proportionally among all institution activities, and consequently, because Federal research is typically less than one-third of total institution budget (a smaller fraction today), universities share the bulk of the indirect cost burden. Additionally today, universities take considerable steps to reduce costs in energy, enhance efficiency through consolidation, and defer maintenance as appropriate [3].

Of course, the real issue of concern should be the ratio of F&A to total project costs. Given that the two are linked (see Section 1), increasing costs of performing research should generally be taken into consideration in both values, leading to a ratio that is roughly constant with time. Such indeed is the case, as can be seen in Figure 6.1 from the May, 2017 AAU report [4]. It illustrates the F&A-to-total-project-cost ratio for NIH *Research Project Grants* from 1998 through 2014. **The near constant value of the ratio demonstrates that F&A costs are keeping pace with total research project costs, not outrunning them, even though Federal funding to universities for R&D has declined from 2011 to the present (Figure 5.1).**

Data for *total NIH awards* (different from Research Project Grants shown in Figure 6.1), from a 2017 Council on Governmental Relations (COGR) report [5], shown in Table 6.1, exhibits a similar trend. **Thus, since 1998, the F&A-to-total-grant-cost ratio at NIH has been steady at between 28% and 31%.** Given that the NIH budget is approximately 0.8% of the total Federal budget, and in light of other budget increases, this trend is remarkable.

The GAO completed a study in 2013 [33], at the request of Congress, regarding NIH assessment of mission impacts related to the growth of F&A (see also Table 6.1). The report notes that, in FY12, $4.6 billion in NIH funding went toward F&A costs. Some 70% of the F&A to universities went to10% of the institutions supported (50 out of 500), with eight of 10 schools located in areas of notably high cost of living. The report also notes that F&A costs grew from $3.6 billion in FY02 to $4.6 billion in FY12, which is an increase of 28%. Likewise, direct costs grew from $9 billion to $11.5 billion, or 27%, during the same period, consistent with the trends shown above. However, the report makes particular mention of the fact that, during certain periods of time, F&A grew at a rate faster than direct costs (Figure 6.2). As shown below, **such changes are to be expected and do not necessarily, as indicated above and suggested by the GAO report, indicate a problematic trend in F&A.**

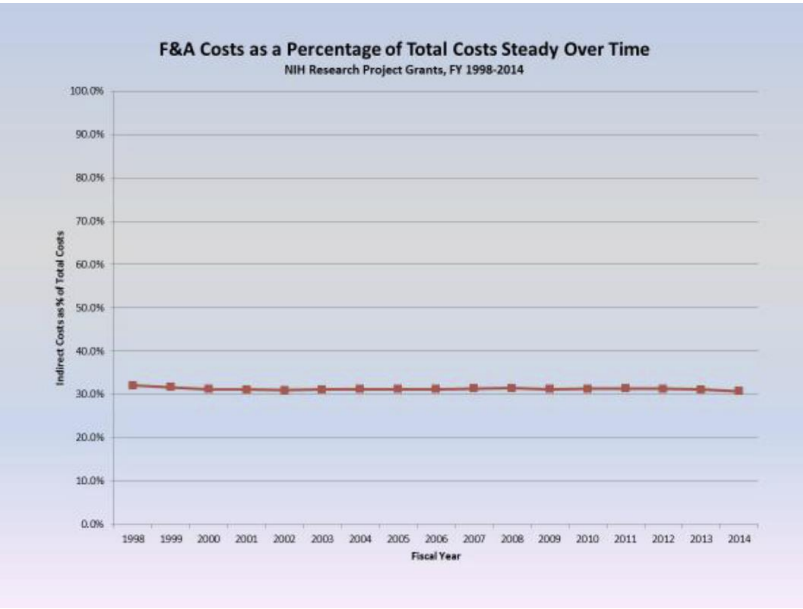

Figure 6.1. The ratio of F&A to total project costs for NIH Research Project Grants from 1998 through 2014. From [4].

Table 6.1. NIH direct and F&A awarded dollars and percentages. From [5].

Fiscal Year	Direct Awarded (000s)	F&A Awarded (000s)	Total Awarded (000s)	Direct as a Percent of Total	F&A as a Percent of Total
FY2002	12,822,068	4,835,456	17,657,524	72.6	27.4
FY2007	15,387,745	5,876,060	21,263,805	72.4	27.6
FY2012	15,978,032	6,182,900	22,160,932	72.1	27.9
FY2016	16,899,936	6,407,203	23,307,139	72.5	27.5

Source: Congressional Justification of the NIH fiscal year (FY) 2017 budget request; Overview of 2017 Presidents Budget.

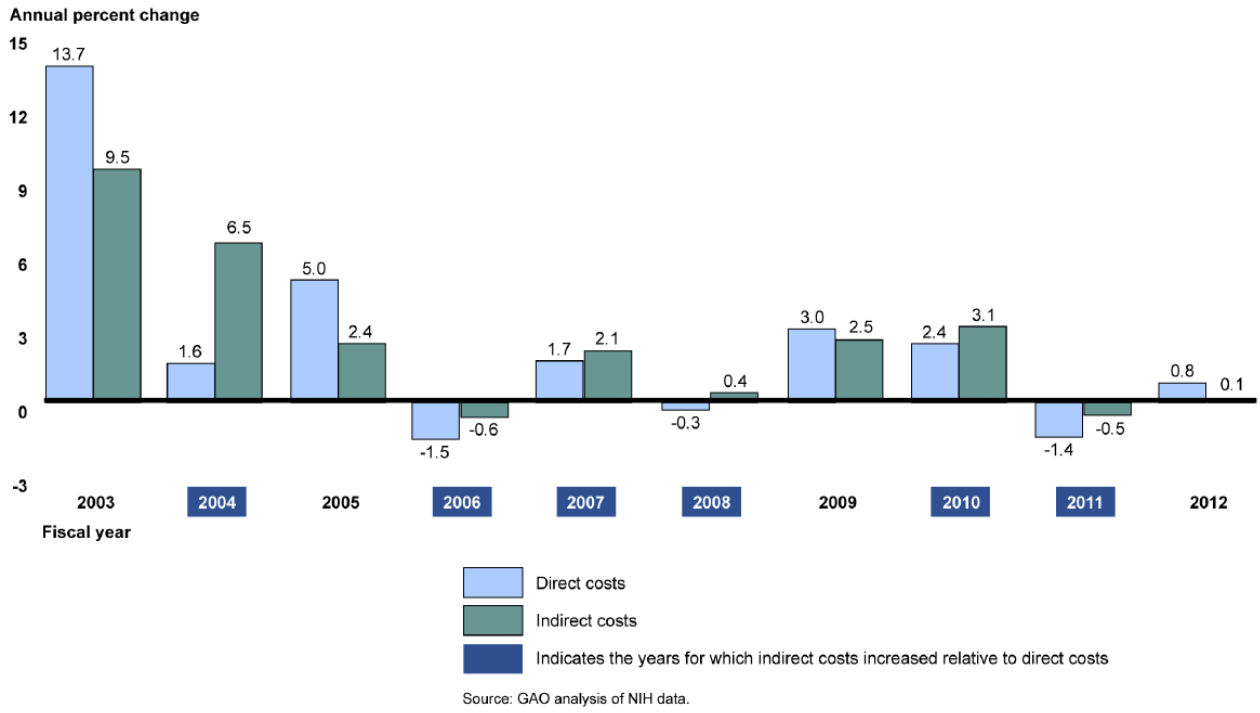

Figure 6.2. Percent change from the prior year in NIH reimbursement for direct costs and F&A for FY 2003 through FY 2012. From [33].

It is instructive to evaluate the equivalent percentages for the National Science Foundation, though a direct comparison of percentages with NIH should be avoided given the vastly different types of research funded by these two agencies, and also the different funding structures used. A 2017 GAO report of NSF practices [34], based on a preliminary analysis of NSF data for FY00 – FY16, indicates that the F&A-to-total-project-cost ratio at NSF held steady through 2009 (see Figure 6.3) but then dropped in 2010, recovering to pre-2009 values by 2013 and, on average,

trending upward slightly thereafter. The current ratio (FY16) at NSF *for all awardees* is approximately 22% and, *for universities only*, is 27% [35]. Although no conclusions have yet been drawn from the preliminary analysis, NSF did offer that the **variations in F&A from year to year are a result of factors that include differences in the types of organizations receiving awards, differences in the types of activities funded (e.g., research, training, infrastructure), the type of research funded, and the discipline of the award**. Some of these or similar factors likely explain the year to year changes for NIH shown in Figure 6.2.

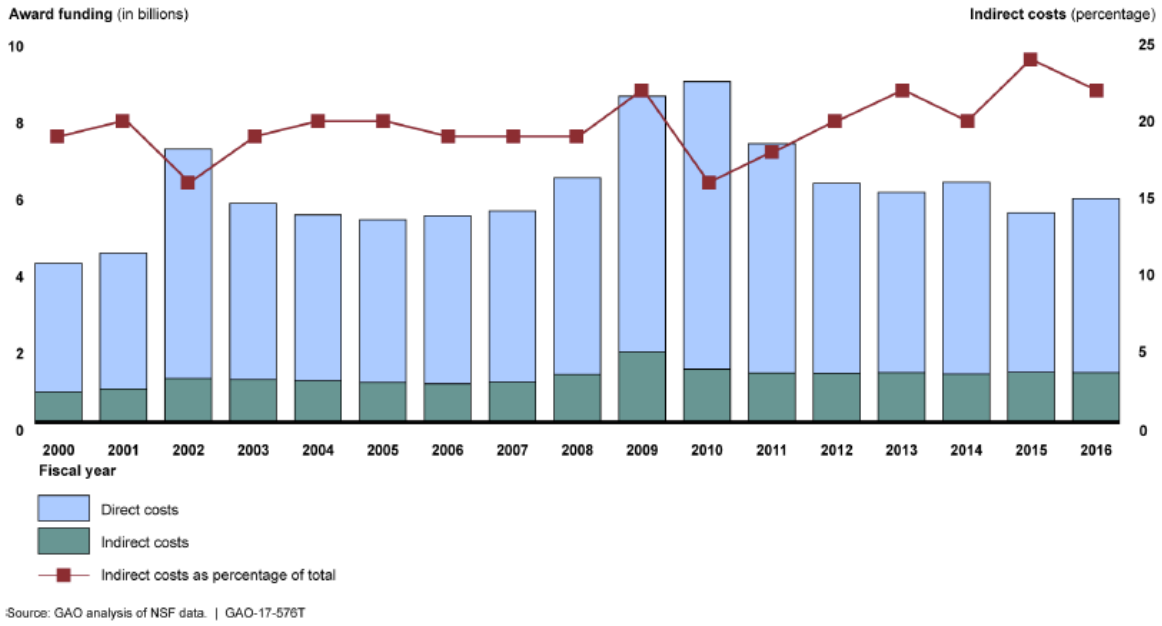

Figure 6.3. National Science Foundation award funding as direct costs, indirect costs (F&A), and the ratio of the two. Note that award funding has not been adjusted for inflation. From [34].

Key Summary Points

- Despite decreases in Federal funding for research, increases in research costs, especially for equipment and facilities, and a capped administrative component of the F&A rate, the ratio of F&A to total project costs at NIH has held nearly steady for approximately two decades.
- A similar trend was present for NSF until 2009, after which variations are notable, owing part to funding from the American Recovery and Reinvestment Act (ARRA). However, this finding is based upon preliminary data.
- Although year to year variations exist in F&A costs at both NSF and NIH, they are readily explained.

7. Lingering Misperceptions Regarding F&A

The complexities of today's F&A framework, the circuitous path over which it evolved during the past 80 years, and the disparate views held by those within the nation's research enterprise

naturally and understandably lead to confusion and misperception about F&A. Although some aspects of F&A arguably remain open to interpretation, it is useful to identify those issues which, for the most part, can be put to rest based upon hard facts (see also [1] and [4]).

- **Presumption: F&A reimbursements must be spent on items contained in the definition of F&A.** Fact: Because universities pay F&A costs up front and are then reimbursed for them by the funding organization, that reimbursement may be used for any purpose, though of course subject to applicable laws. A good analogy is the insurance industry. Suppose the roof of your home is destroyed by a hail storm. An insurance adjuster provides a cost estimate, and then you hire a roofer to replace the roof and pay the costs from your savings account. A month later, the insurance company writes you a check in an amount identical to your payment, but instead of placing the check back into your savings account, you purchase a boat. Have you defrauded the insurance company? Not at all! You were simply reimbursed for money already spent, and thus you are free to use that reimbursement for any purpose. Unfortunately, universities confuse the issue by using phrases such as "returning a portion of the F&A to the faculty for strategic investment," which of course is not what actually happens. The university provides appropriated or other monies to faculty in some proportion to the F&A that is expended by them or their research groups. Some state institutions are required to provide the F&A reimbursement to state agencies, which further muddies the waters. Yet all of these uses for F&A reimbursement are legal.

- **Presumption: F&A is somewhat arbitrarily determined and represents a slush fund for universities, providing little benefit to research**. Fact: F&A rates are set via negotiation with one of two cognizant Federal agencies based upon university analyses of space utilization, administrative costs, and other services. Reports have identified variations in the rate setting process and have called for additional rigor and consistency (e.g., [8] and [35]). As noted throughout this document, however, F&A represent real costs associated with the performance of research, even though, owing to their nature, they cannot readily be allocated on a project by project basis. This is the reason why averages are used in setting the rates. To say F&A does not support research is completely inaccurate.

- **Presumption: The vastly different F&A rates across academia reflect different ways of gaming the system or ineffective practices.** Fact: Differences across institutions of F&A rates reflect dissimilarities in how institutions deal with facility management, building construction, utility costs, maintenance, and a host of administrative services. They also reflect geographic differences and differences in the type of research performed, which impact utility and other costs.

- **Presumption: Universities over-recover F&A**. Fact: The notion of full cost reimbursement for F&A has been absent from the research enterprise for decades, and in FY15 alone, universities failed to recover $4.85 billion in F&A. It is believed that most universities have actual F&A recover rates some 20 percentage points below the approved rate, meaning universities spend on the order of 20 cents of their own money to get $1 in research funding.

- **Presumption: University F&A rates for government-sponsored research are inappropriately high compared to those applied to research sponsored by private foundations**. Fact: The role of private foundations in the U.S. research enterprise is vastly different from that of the Federal government. The government has a unique responsibility of advancing national prosperity, defense, and the health and wellbeing of its citizens via investing in research, especially fundamental or discovery research that may or may not lead to practical outcomes and thus poses too great a financial risk for other funders. Private foundations play an extremely important role in supplementing government-funded research, though they tend to have very specific and narrow foci of interest, compared to that of the Federal government, and represent only 6% of all R&D funded at universities (see Section 5). Because private foundations are not subject to Federal cost accounting standards for research, they structure their budgets for funding to universities quite differently. Specifically, they allow certain costs to be charged as direct costs whereas in Federal budgets, they are included in indirect costs [29]. Additionally, some private foundation funding does not require traditional laboratories but instead is performed in the field, especially in other countries. In such cases, the F&A requirements are quite different.

- **Presumption: University F&A rates are much higher than those at other research institutions**. Fact: Academic F&A rates typically are lower than those of research hospitals, non-profit organizations, and for-profit private companies (which tend to have the highest rates and, unlike universities, are fully reimbursed for F&A charges) [32].

- **Presumption: A lower institutional F&A rate increases the competitiveness of a grant proposal**. Fact: Although the budget of a grant proposal is evaluated to determine appropriateness for the work proposed, both in the total amount proposed and in the components and associated justification for them, little evidence exists to support the notion that higher F&A rates work against competitiveness. Indeed, as noted in Section 6, the largest F&A payments made by NIH in FY12 went to 9 of the top 10 universities receiving funding. Consequently, quality and competitiveness of the research, as well as available facilities and track record of the investigators – not F&A – figure most prominently in funding decisions.

8. Addressing the Key Questions: Options and Consequences

At the beginning of this document, I posed three questions that are foundational to the subject of the present hearing:

Question 1: Is the <u>proportion</u> of money directed toward F&A, in comparison to funds that support direct costs of research, appropriate?

Question 2: How could prescribed reductions to F&A, which could either save the government money overall or shift more funding to direct costs, impact the national's research enterprise?

Question 3: Is the present F&A framework being applied equitably across all sources and recipients of funding?

As noted previously, numerous studies during the past several decades have analyzed data and offered suggestions as to how these and other related questions might be answered. I humbly offer my additions to this body of work in suggesting, in this section, various options and the possible consequences associated with them. Yet, given the clear value of research to our past and its ever increasing importance to our future, additional discussions beyond this hearing may be needed to arrive at the best solution possible for the moment, keeping in mind the wise point – made by former AAU President, Robert M. Rosenzweig – that ***the problem of [F&A] is inherently insoluble*.**

Question 1. Although concerns have existed for the past 30 or more years regarding apportionment of research dollars between direct and indirect or F&A costs, **no compelling evidence exists, in my opinion, to suggest that the current ratio is materially deficient**. Referencing numerous studies and data sets, this testimony has shown that F&A costs at NIH in particular[16] have increased in an amazingly close proportion to direct costs over at least the past 20 or so years, despite significant changes in how F&A is determined, significant increases in the costs of performing health-related research, and problematic Federal research funding following the doubling of the NIH budget from 1998 to 2003. **Given that universities already significantly under-recover F&A, and also share in the costs of research in other ways described herein, the fundamental principles of mutuality of interest and fairly shared costs that underpin the academic-government research partnership – though strained – appear intact.**

Question 2. Embedded in this question are two scenarios. In the first, a significant reduction in funding directed toward F&A would be implemented, for example, via a cap on the F&A rate, with this money removed from agency coffers. In this scenario, the amount of money available from the agency for direct research costs would remain unchanged. Consequently, the same amount, and likely less, research would be sponsored by the agency, say with a narrower focus on a smaller number of key societal challenges. Yet the most important impact would be a dramatic shift in the institutions able to perform research. That is, all other things being equal, with the overall costs to perform research remaining the same, only institutions having sufficient resources to make up the loss in F&A, or a substantial fraction of it, would be able to perform research. Recalling the 2013 GAO study of NIH [33], the top 10% (50 of 500) of institutions received 70% of the F&A. The scenario just described would mean some portion, likely sizeable, of the other 450 institutions would **no longer be able to afford the costs necessary to perform research sponsored by the agency, while others would have to scale back significantly**. The U.S. consequently would see **diminished leveraging of intellectual capacity and other assets** already invested in these other 400+ institutions, located across the entire nation, which would have additional consequences, such as reducing participation of traditionally underrepresented groups. Another important likely outcome would be a **reduction in the supply of graduates**, educated in those other 400+ institutions, who take faculty positions in the top 50 funded, as well as the **hiring of graduates from the top 50 funded institutions as faculty** by the other 400+ institutions.

The second scenario is identical to the first, with the exception that funds available from the cap placed on F&A remain with the agency and are used to increase the amount of funding for direct

[16] Approximately 80% of research funded by NIH is extramural, with the remainder conducted within NIH's own Federal facilities.

costs. In this case, again other things being equal, the amount of research sponsored by the agency no doubt would increase. However, as in the first scenario, **the F&A cap would preclude participation in research by some institutions which do not possess sufficient resources to make up for the loss in F&A, and greatly constrain the degree of participation by others. Consequently, a larger amount of research would be performed by the currently well-funded and well-resourced institutions (many of which are located in high cost of living areas and thus have higher F&A rates).**[17] This translates into a loss of jobs at other research institutions, laboratories being shuttered, a reduction in workforce capacity, and perhaps a reduction of the ability by the nation to pursue creative ideas because fewer individuals are performing research.

An extremely important point relevant for both scenarios is that a substantial reduction in F&A would dramatically alter the more than 70 year-old academic-government partnership that has made the U.S. research enterprise the envy of the world – not unlike how substantial reductions in state appropriations to state colleges and universities are changing the face of higher education. Given the amount of cost sharing already being performed by our nation's academic research institutions (see Section 5) – **and the clear fact that full cost reimbursement is no longer even a consideration**[18] – a further shift of the funding burden to these institutions not only would have **profound material consequences**, but also could lead to a **slow undoing of the academic-government research partnership model** and lead to a loss in U.S. global research competitiveness at a time when nations like China, India, and others in southeast Asia are investing and advancing at unprecedented rates.

In the case of NIH in particular, finding cures to insidious diseases such as Alzheimer's, all types of cancer, AIDS, mental disorders, and threats which can emerge rapidly such as Zika, **requires all hands on deck and participation of researchers in every corner of the nation.** As noted at the beginning of this testimony, **the risks associated with making profound changes to the highly successful academic-government research partnership for short-term financial expediency, must be carefully weighed.**

Question 3. I have shown in this testimony that universities fail to recover billions of F&A dollars each year which they are allowed by law to recover. This results, in part, from F&A rate limitations imposed by Federal agencies, by a 26-year cap on the administrative component of the F&A rate, and by research performed for non-governmental organizations (e.g., private foundations) which, for the understandable reasons described in Section 7, prohibit or limit F&A recovery and instead fund many of the F&A-related costs in other parts of a project budget. **The equitability of F&A application is clearly in question because universities are the only organizations not allowed to recover full F&A from Federal agencies**. This translates into cost sharing, which as noted herein has multiple implications for research and in the case of voluntary sharing, works against the institution by reducing the F&A rate. **Yet, universities assume enormous risk in the research enterprise** because they build and manage buildings, equip and operate laboratories, build and operate IT infrastructures, fund support personnel, operate complex physical plants, and maintain sophisticated human resources and reporting

[17] Over time, even the well-resourced institutions would be challenged in identifying funds to replace F&A lost to the cap.

[18] 2 CFR 200, which succeeded the A-21 and several other OMB Circulars, uses the term "fair share" to describe the notion of shared costs and shared benefits in today's academic-government research enterprise.

systems – all of which Federal agencies leverage[19] , at principally incremental cost, in direct funding in grants, contacts and cooperative agreements and related F&A.

Many options have been proposed over the years to **simplify and/or reduce F&A** [37], including flat rates, caps, negotiations on a per-award basis, etc. Each has pros and cons which are briefly summarized below. Other options exist (see, e.g., [32], [37]), but all must take into account the complexities of and variations in finances of research universities [38].

- Flat F&A Rate: Advantages include a very simple model that requires no negotiation, thus eliminating time-consuming space and financial analyses by universities. This model was rejected decades ago because it does not account for the widely varying characteristics of institutions and thus implicitly would be inequitable and lead to a loss of participation of many institutions in funded research.

- Multiple F&A Rates: Keying the F&A rate to specific types of projects, rather than using an average across all projects, inherently has merit. In fact, multiple types of F&A rates already exist, e.g., full rate, a rate for research conducted off campus (the A-only rate of 26%), a rate for other sponsored activities (OSA), etc. However, determining these rates would be extremely laborious, fraught with uncertainty owing to the fact that modern research is not readily stove-piped into categories, and difficult to implement in pre- and post-award administrative proposal services.

- F&A Percentage Caps: As noted in this testimony, percentage caps have been used before and, more recently in the case of NIH, proposed and rejected. They are an attractive option, especially if applied for a finite time to deal with budget exigencies, because they do not fundamentally change the F&A structure, e.g., allowing 90% of an F&A rate rather than 100%. However, as un-recovery already is a concern, this option would enhance the magnitude of it.

- F&A Rate Caps: This option was discussed extensively earlier in this section and has been applied for more than 26 years to the administrative component of the F&A rate. It is an attractive option for controlling F&A costs (presuming those costs are increasing without good reason) and has been proposed previously for the facility component of F&A. Again, as un-recovery already is a concern, this option would enhance the magnitude of it.

- F&A Exceptions: Exceptions to the approved F&A rate could be granted on a programmatic or other basis, though as in cost sharing, this would have to be done

[19] The Federal government does in fact support some research space construction and renovation at U.S. universities. Based upon the latest NSF data [36], 22% of the nation's 570 research-performing colleges and universities initiated new construction of science and engineering research space (defined as a new building or a new addition to an existing building) in FY14-15 at an estimated completion cost of $5.7 billion. Of this total, 15.8% of costs were funded by the Federal government, 20.5% by state and local sources, 63.7% by institutional funds that include endowments, gifts, tax-exempt bonds and other debt financing, and F&A recovered from Federal and non-Federal sources. The Federal government also funds repair and renovation of research space. In FY14-15, $4.1 billion was invested, with 25% associated with health sciences space and 25% associated with biological and biomedical sciences. Interestingly, research space at academic institutions increased only 1.4% between FY13 and FY15, which was the smallest growth in 30 years.

carefully, so as to avoid creating an un-level playing field, as described previously, and only in cases where its use is justified based upon agency mission.

- Agency-Specific F&A Rates: This option involves eliminating government-wide rates and allowing granting agencies to negotiate separate F&A rates at the agency or programmatic level. Although this concept makes sense given that different types of research (even within agencies) have different costs, doing so in practice would be extraordinarily difficult – from setting the rate to tracking multiple rates within academic institutions.

- Principal Investigator Negotiation: In this scenario, investigators would have to negotiate F&A components with their institutional administrators. This is a completely unworkable concept simply from a process point of view.

Key Summary Points

- No compelling reason exists to suggest that the current F&A-to-direct cost ratio is materially deficient.
- The fundamental principles of mutuality of interest and fairly shared costs that underpin the academic-government research partnership – though strained – appear intact.
- A significant cap on F&A funding would preclude participation in research by some institutions which do not possess sufficient resources to make up for the loss in F&A, and greatly constrain the degree of participation by others.
- The risks associated with making profound changes to the highly successful academic-government research partnership for short-term financial expediency, must be carefully weighed.
- The equitability of F&A application is clearly in question because universities are the only organizations not allowed to recover full F&A from Federal agencies.

9. Application to Proposed NIH F&A Changes and Consequences to the University of Oklahoma and the Oklahoma Medical Research Foundation (OMRF)

A policy has been proposed [39] whereby a fixed F&A rate of 10%, consistent with that of some private foundations, would be applied to all NIH grants. This change apparently would shift approximately $4.6 billion dollars from F&A to direct costs, though originally was proposed as a means to reduce the NIH budget by 22%. Ironically, this reduction in F&A is only slightly less than the amount of F&A currently under-recovered by the nation's academic research institutions. Were this new rate to be imposed, the F&A distributed by NIH would decrease to approximately $1.9 billion [39], having the consequences described in the second scenario of the answer to Question 2 in Section 8 above.

At the University of Oklahoma Health Sciences Center campus [40], the proposed 10% F&A rate would have resulted in a loss of $11 million in F&A recovery for FY16. On the Norman campus, where all non-medical/clinical programs are located, the proposed 10% cap would have resulted in a loss of $7 million in F&A recovery for the period FY14-16. As

one of 24 NIH Institutional Development Award (IDeA) states, the University of Oklahoma has an IDeA Network for Biomedical Research Excellence (INBRE) and several Centers of Biomedical Research Excellence (CoBRE) grants. **An F&A cap would greatly diminish the ability of the University of Oklahoma to contribute to the nation's health research enterprise**, for reasons noted in Section 8, resulting in an expected loss of some $100 million per year to the State.[20]

The Oklahoma Medical Research Foundation (OMRF), founded in 1946, is a world recognized organization that conducts basic biomedical research with the goal of helping people live longer, healthier lives. With more than 400 employees, OMRF works closely with the University of Oklahoma and other organizations to study cancer, heart disease, autoimmune disorders and diseases of aging. **Analyses by OMRF [41] indicate that the proposed 10% cap on NIH F&A would cut $25 million – or 30% – of annual NIH funding to the State of Oklahoma**. Importantly, **OMRF contributes more than NIH does to its annual F&A costs, and with no mechanism to replace the proposed cuts, ORMF would have to scale back research dramatically, translating into much slower progress, reduced capabilities in labs and other facilities, and loss of jobs**. Quoting an OMRF analysis [41],

> "Some larger institutions on the coasts, in states such as Massachusetts, New York, and Maryland, have large endowments and other fungible resources that might allow them to absorb some of the costs that a 10 percent cap would shift to institutions. But in most states, particularly those in Middle America and the South that do not have similarly well-developed research ecosystems, the result would be massive job losses, downsizing of research operations at large institutions, and outright closure of many smaller ones."

Key Summary Points

- Oklahoma would lose $25 million, or 30% of its NIH funding, if the NIH F&A is capped at 10%.
- Consequences to the University of Oklahoma of a 10% F&A cap at NIH
  - The Health Science campus would have lost $11 million in F&A funding for FY16.
  - The Norman campus would have lost $7 million in F&A from FY14-16.
  - The $100 million now contributed to the State by the University's NIH research would be eliminated.
- The Oklahoma Medical Research Foundation (OMRF) contributes more than does NIH to its annual F&A costs.
- Middle America states would experience massive job losses, downsizing of research operations at large institutions, and outright closure of many smaller ones if NIH F&A is capped at 10%.

[20] The Battelle Technology Partnership Practice estimated an economic impact in Oklahoma of $2.24 for each $1 of NIH funding expended.

10. Bibliography

[1] Association of American Universities and Association of Public and Land Grant Universities (2013, October). *Understanding the Costs of Federally Sponsored Research at Universities*. Available from AAU or APLU.

[2] U.S. Government Accountability Office (2010, September). University research: Policies for the reimbursement of indirect costs need to be updated (Publication No. GAO-10-937). Retrieved from GAO Reports & Testimonies database: https://www.gao.gov/products/GAO-10-937

[3] National Research Council (1983). Chapter 6: *Cost sharing and indirect costs. Strengthening the Government-University Partnership in Science* (pp. 117-145) *and Appendix B* (pp. 220-223). Washington, DC: The National Academies Press. doi: https://doi.org/10.17226/19442. Retrieved from: www.nap.edu/catalog.php?record_id=19442.

[4] Association of American Universities (2017, May 16). *Frequently Asked Questions about Facilities and Administrative (F&A) Costs of Federally Sponsored University Research*. Available at https://www.aau.edu/key-issues/frequently-asked-questions-about-facilities-and-administrative-fa-costs-federally.

[5] Council on Governmental Relations (2017, February). *2017 Survey of Facilities and Administrative (F&A) Rates Executive Summary*. Washington, DC. Available from COGR for COGR members.

[6] Office of the Vice President for Research, University of Oklahoma Norman campus, based upon 2017 data from the Office of Financial Services.

[7] Britt, R. (2016, November). *Universities Report Fourth Straight Year of Declining Federal R&D Funding in FY2015* (InfoBrief NSF 17-303). Arlington, VA: National Science Foundation, Directorate for Social, Behavioral, and Economic Sciences.

[8] U.S. Government Accountability Office (2016, September). *NIH biomedical research: Agencies involved in the indirect cost rate-setting process need to improve controls* (Publication No. GAO-16-616). Retrieved from GAO Reports & Testimonies database: https://www.gao.gov/products/GAO-16-616

[9] U.S. Government Accountability Office (2017, September). *National Science Foundation: Actions needed to improve oversight of indirect costs for research* (Publication No. GAO-17-721). Retrieved from GAO Reports & Testimonies database: https://www.gao.gov/products/GAO-17-721

[10] Talesnik, G. (1994, November). *Dispelling the myths about indirect costs*. Chronicle of Higher Education. Retrieved from: http://www.chronicle.com/article/Dispelling-the-Myths-About/82780

[11] Rosenzeig, R. M. (1998). The politics of indirect costs. Journal of Papers – Council on Government Relations (pp. 1-12). Retrieved from: http://www.cogr.edu/sites/default/files/University_Technology_Transfer-__Evolution_and_Revolutions.pdf

[12] National Science Board (2016). Science and Engineering Indicators Digest. Retrieved from https://www.nsf.gov/nsb/publications/2016/nsb20162.pdf

[13] Lowen, R. S. (1997). *Creating the Cold War University: The transformation of Stanford*. University of California Press

[14] Association of American Universities (1988, September). *Indirect costs associated with federal support of research on university campuses: Some suggestions for change*. Report

of the AAU Ad Hoc Committee on Indirect Costs to the Executive Committee of the Association of American Universities (pp. i-61).

[15] Knezo, G.J. (1994, August 2). *Indirect costs for R&D at higher education institutions: Annotated chronology of major federal policies* (33 pp). Washington, DC: Congressional Research Service, The Library of Congress.

[16] National Science Board (2009). Investing in the future: NSF cost sharing policies for a robust federal research enterprise (pp. 1-36). (NSB 09-20). Retrieved from: https://www.nsf.gov/pubs/2009/nsb0920/nsb0920.pdf

[17] Council on Governmental Relations (2017, April 5). Untitled document, 3 pp.

[18] Feller, I. (2000). Social contracts and the impact of matching fund requirements on American research universities. Educational Evaluation and Policy Analysis, 22(1): 91-98.

[19] Seligman, R. P. (2000). *An Introduction to Cost Sharing: Why No Good Deed Goes Unpunished.* Research Management Review, Vol. 11, No. 1, p. 1-4.

[20] Bienenstock, A. (2000). Some Thoughts on Cost Sharing. Research Management Review, Vol. 11, No. 1, p. 5-8.

[21] Hardy, R. B. (2000). *Cost Sharing – Past, Present and Future*. Research Management Review, Vol. 11, No. 1, p. 9-19.

[22] Paoletti, C. R. (2000). *Cost Sharing – Just When I Thought I Knew All the Answers*. Research Management Review, Vol. 11, No. 1, p. 21-29.

[23] Feller, I. (2000). *The Remainder of the Cost Sharing Policy Agenda*. Research Management Review, Vol. 11, No. 1, p. 31-39.

[24] Kamerer, J. and S. Wasserman. (2000). *Cost Sharing and Effort Reporting: Breaking the Juggernaut.* Research Management Review, Vol. 11, No. 1, p. 41-44.

[25] Thibault, M. (2000). Cost Sharing: A Time to Be Traditional or a Time for Change? Research Management Review, Vol. 11, No. 1, p. 45-49.

[26] National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD), FY2015, Higher education R&D expenditures financed by institution funds, by year, source, and survey population: FY 1990–2015.

[27] National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD), FY2015, Table 12: Higher education R&D expenditures by select area by highest degree granted and institutional control by type of cost: FYs 2011-15, https://ncsesdata.nsf.gov/herd/2015/html/HERD2015_DST_12.html.

[28] David Kennedy, Council on Governmental Relations, October, 2017, Personal Communication.

[29] Association of American Universities (2017, June 30). Comparing Foundations to Federal Government Research Support (2 pp). Available at https://www.aau.edu/key-issues/comparing-foundations-federal-government-research-support

[30] National Science Board (2012). *Diminishing Funding and Rising Expectations: Trends and Challenges for Public Research Universities*. 34 pp. Available at https://www.nsf.gov/nsb/publications/2012/nsb1245.pdf .

[31] Knezo, G.J. (1991). *Indirect costs at academic institutions: Background and controversy*. Washington, DC: Congressional Research Service, The Library of Congress.

[32] Knezo, G.J. (1997). *Indirect costs at academic institutions: Background and controversy*. Washington, DC: Congressional Research Service, The Library of Congress.

[33] U.S. Government Accountability Office (2013, September). Biomedical research: NIH should assess the impact of growth in indirect costs on its mission (Publication No. GAO-13-760). Retrieved from GAO Reports & Testimonies database: https://www.gao.gov/products/GAO-13-760

[34] U.S. Government Accountability Office (2017, May). *National Science Foundation: Preliminary observations on indirect costs for research* (Publication No. GAO-17-576T). Retrieved from GAO Reports & Testimonies database: https://www.gao.gov/products/GAO-17-576T

[35] U.S. Government Accountability Office (2017, September). National Science Foundation: Actions needed to improve oversight of indirect costs for research (Publication No. GAO-17-721). Retrieved from GAO Reports & Testimonies database: https://www.gao.gov/products/GAO-17-721

[36] Gibbons, M.T. (2017). *Research space at academic institutions increased 1.4% between FY2013 and FY2015: Smallest growth in three decades* (InfoBrief NSF 17-315). Arlington, VA: National Science Foundation, Directorate for Social, Behavioral, and Economic Sciences.

[37] U.S. Government Accountability Office (1995, March). *University Research: Effect of Indirect Cost Revisions and Options for Future Changes* (Publication No. RCED-95-74). Retrieved from GAO Reports & Testimonies database: https://www.gao.gov/products/RCED-95-74

[38] Council on Governmental Relations (2014, June). Finances of research universities (pp. 1-28). Washington, DC. Retrieved from: http://www.cogr.edu/sites/default/files/COGR_Research_Finances_JUNE_20_FINAL.pdf

[39] Kaiser, J. (2017, June). *NIH plan to reduce overhead payments draws fire*. Science. doi:10.1126/science.aan6926. Retrieved from: http://www.sciencemag.org/news/2017/06/nih-plan-reduce-overhead-payments-draws-fire

[40] Office of the Senior Vice President and Provost, and Office of the Vice President for Research, University of Oklahoma Health Sciences Center campus, 2017 data.

[41] Oklahoma Medical Research Foundation (2017). *Make No Mistake: Cuts to F&A Costs* are *Cuts to Research. Period*. Available from OMRF, 825 N.E. 13th Street Oklahoma City, Oklahoma 73104

11. Selected Relevant U.S. Government Accounting Office (GAO) Reports and Testimonies

A Need for Improved Accountability, PSAD-78-135: Published: Aug 18, 1978. https://www.gao.gov/products/PSAD-78-135

Ascertaining Indirect Costs on Research Grants (26 pp). Published: Apr 22, 1969. https://www.gao.gov/products/094483

Assuring Reasonableness of Rising Indirect Costs on NIH Research Grants--A Difficult Problem (66 pp). HRD-84-3: Published: Mar 16, 1984. https://www.gao.gov/products/HRD-84-3

Biomedical Research: Issues Related to Increasing Size of NIH Grant Awards (60 pp). HRD-88-90BR: Published: May 6, 1988. https://www.gao.gov/products/HRD-88-90BR

Biomedical Research: NIH Should Assess the Impact of Growth in Indirect Costs on Its Mission (36 pp). GAO-13-760: Published: Sep 24, 2013. https://www.gao.gov/products/GAO-13-760

Federal Funding Mechanisms in Support of University Research (192 pp). RCED-86-53: Published: Feb 13, 1986. https://www.gao.gov/products/RCED-86-53

Federal Research: System for Reimbursing Universities' Indirect Costs Should Be Reevaluated (52 pp). RCED-92-203: Published: Aug 26, 1992. https://www.gao.gov/products/RCED-92-203

Federal Research: Minor Changes Would Further Improve New NSF Indirect Cost Guidance (18 pp). RCED-93-140: Published: Jun 3, 1993. https://www.gao.gov/products/RCED-93-140

Federal Research: Advanced Technology Program's Indirect Cost Rates and Program Evaluation Status (12 pp). RCED-93-221: Published: Sep 10, 1993. https://www.gao.gov/products/RCED-93-221

Federally Sponsored Research: Indirect Costs Charged By Stanford University (31 pp). T-RCED-91-18: Published: Mar 13, 1991. https://www.gao.gov/products/T-RCED-91-18

Federally Sponsored Research: Indirect Costs Charged by Selected Universities (23 pp). T-RCED-92-20: Published: Jan 29, 1992. https://www.gao.gov/products/T-RCED-92-20

Federally Sponsored Contracts: Unallowable and Questionable Indirect Costs Claimed by CH2M Hill (11 pp). T-RCED-92-37: Published: Mar 19, 1992. https://www.gao.gov/products/T-RCED-92-37

Grants Management: Programs at HHS and HUD Collect Administrative Cost Information but Differences in Cost Caps and Definitions Create Challenges (30 pp). GAO-15-118: Published: Dec 12, 2014. https://www.gao.gov/products/GAO-15-118

Indirect Cost Payments Foregone by Institutions Receiving Minority Biomedical Support Grants What Can Be Done? HRD-77-55: Published: Mar 9,1977. https://www.gao.gov/products/HRD-77-55

Maintaining Public Accountability Without Inhibiting Creative Research (17 pp). Published: Apr 10, 1979. https://www.gao.gov/products/094378

Management of Federally Financed Research by the University of Michigan--A Case Study (131 pp). B-117219: Published: Sep 25, 1970. https://www.gao.gov/products/092557

National Institutes of Health Extramural Research Grants: Oversight of Cost Reimbursements to Universities (18 pp). GAO-07-294R: Published: Jan 31, 2007. https://www.gao.gov/products/GAO-07-294R

National Science Foundation: Preliminary Observations on Indirect Costs for Research (17 pp). GAO-17-576T: Published: May 24, 2017. https://www.gao.gov/products/GAO-17-576T

National Science Foundation: Actions Needed to Improve Oversight of Indirect Costs for Research (30 pp). GAO-17-721: Published: Sep 28, 2017. https://www.gao.gov/products/GAO-17-721

National Nuclear Security Administration: Laboratories' Indirect Cost Management Has Improved, but Additional Opportunities Exist (43 pp). GAO-13-534: Published: Jun 28, 2013. https://www.gao.gov/products/GAO-13-534

NIH Biomedical Research: Agencies Involved in the Indirect Cost Rate-Setting Process Need to Improve Controls (49 pp). GAO-16-616: Published: Sep 7, 2016. https://www.gao.gov/products/GAO-16-616

Nonprofit Sector: Treatment and Reimbursement of Indirect Costs Vary among Grants, and Depend Significantly on Federal, State, and Local Government Practices (32 pp). GAO-10-477: Published: May 18, 2010. https://www.gao.gov/products/GAO-10-477

NSF's Academic Facilities Program (8 pp). RCED-95-153R: Published: Apr 26, 1995. https://www.gao.gov/products/RCED-95-153R

University Finances: Research Revenues and Expenditures (66 pp). RCED-86-162BR: Published: Jul 11, 1986. https://www.gao.gov/products/RCED-86-162BR

University Research: Effect of Indirect Cost Revisions and Options for Future Changes (34 pp). RCED-95-74: Published: Mar 6, 1995. https://www.gao.gov/products/RCED-95-74

University Research: Policies for the Reimbursement of Indirect Costs Need to Be Updated (71 pp). GAO-10-937: Published: Sep 8, 2010. https://www.gao.gov/products/GAO-10-937