



Stabilizing the Funding of NIH and ADAMHA Research Project Grants: A Background Paper (1985)

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**Stabilizing the Funding
of NIH and ADAMHA
Research Project Grants**

**A Background Paper
by
Richard L. Seggel**

for the

**Board on Health Sciences Policy
Institute of Medicine**

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INTRODUCTION AND SUMMARY

The proposal in the President's F.Y. 1986 Budget (submitted in February of F.Y. 1985) to eliminate retroactively the increases in the number of new and other competing research projects* provided by the Congress in the F.Y. 1985 appropriations for the National Institutes of Health (NIH) and the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) provoked a loud outcry from scientists and strong criticism in Congress. At issue was the five-year-old policy of attempting to stabilize the financial support of investigator-initiated projects by these agencies and how this policy should be interpreted and applied. The conflict over the F.Y. 1985 budget has ended in a compromise between the Executive Branch and Congress, but the future course on a stabilization policy remains uncertain.

The Institute of Medicine (IOM) considered how it might make a constructive contribution on this issue and decided that the appropriate action was to develop a staff paper that would provide scientists and the general public with useful information about events that led up to the F.Y. 1985 budget controversy and identify the problems and policy questions that might be worth further study and deliberation. The paper on the following pages draws heavily on data provided by NIH and ADAMHA and a number of interviews with officials involved in the decision-making process on this subject (who are listed at the end of the text). Its findings are summarized below and discussed in some detail in Parts I through IV, and some subjects for possible further exploration are listed in Part V.

Summary

I. The Origins of the Stabilization Policy

The stabilization policy, which became an acute budget issue in F.Y. 1985, had its origins in a 1979-80 health research planning effort, undertaken by the Department of Health, Education, and Welfare at the request of its secretary, to develop a five-year health research plan in the context of tightening budget constraints. A department committee, headed by the NIH director, was formed to direct this task. In its 1979 and 1980 reports the committee

- recognized that stabilization could be defined in various ways--with growth, no growth, or even a gradual decrease--but emphasized the overriding need of a predictable market for the ideas and skills competing for research support;
- determined that the stabilization of support for investigator-initiated research projects should be the number one priority (as it had been for some years before) while also recognizing the importance of stabilizing the support of other elements of the science base, including research training and research centers;
- proposed, against a background of fluctuations in funded NIH research projects during the last half of the 1970s ranging from 3,800 to 5,900, that the targets for F.Y. 1981 be the funding of new and other competing research projects totaling 5,000 for NIH and 569 for ADAMHA; and
- described these figures as "long-term floors", not ceilings, and included projections beyond F.Y. 1981 for

*"Other competing projects" are competing continuation and supplemental projects.

"moderate" and minimal" growth, as well as none, in its first report, but omitted growth projections from its second report.

Although there were some concerns expressed by sources both in and outside the department about some aspects of the stabilization initiative, the NIH figure of approximately 5,000 projects was made operational in the President's F.Y. 1981 budget. However, the ADAMHA figure of 569 was cut by the then new administration to 284 in a revised version of that budget, primarily to eliminate federal support of social research not deemed to be relevant to ADAMHA's mission.

II. The Budget History

Through F.Y. 1984, both the executive and legislative branches substantially adhered to a policy of stabilizing the support of competing NIH research projects at about 5,000 a year (which, because of rising costs, required significant funding increases each year) and of steadily raising the funding of ADAMHA competing research projects from 284 to 500.

The increases voted by Congress for F.Y. 1985--from 5,000 projects for NIH and 500 projects for ADAMHA in the President's budget to 6,526 and 583, respectively-- were explained in the House and Senate reports largely by pointing out that significant declines had occurred in award rates and paylines.

The President's F.Y. 1986 budget undertook to negate these increases by requiring that the funding increases appropriated by Congress for F.Y. 1985 be used for multi-year (forward) funding of 646 projects through F.Y. 1986 and 1987 and that the program levels of 5,000 for NIH and 500 for ADAMHA be continued for both F.Y. 1985 and F.Y. 1986*. However,

- the multi-year funding aspect of this proposal was subsequently found by the Comptroller General of the United States to lack legal authority;
- a compromise was reached in Congress on program levels of 6,200 and 550 competing projects for F.Y. 1985; and
- the President accepted this compromise for F.Y. 1985 but expressed reservations that cast some doubt on the outcome of appropriations action for F.Y. 1986 (at this writing still pending in Congress).

III. The Program Indicators

A. NIH

The often-cited declines in award rates and paylines# since the 1970s were caused primarily by substantial increases in the volume of applications (including amended applications) submitted to NIH. However, these declines were also caused in part by the fact that study sections have been approving steadily increasing percentages of the applications (to approximately 90 percent at present from 74 percent only 10 years ago) and assigning increasingly higher (lower numbered) priority scores.

*The established practice has been to fund NIH and ADAMHA research grants, averaging slightly over 3 years in length, for one year at a time. It is understood that there is a "moral commitment" to fund grants for their approved full length, but this requires appropriations each year for their "continuation" beyond the initial year.

#The award rate is the funded percentage of eligible (approved) applications; the payline is the point on the priority scoring scale at which funds are exhausted.

Much of the increase in the percentage of the applications approved and of the elevation of priority scores (often referred to as "study section creep") is attributed by NIH to improvements in the quality of the applications but some of it is considered to be a product of changes in the behavior of the study sections, caused by the apparent influence on their decisions of funding considerations. These changes in study section behavior cast doubt on the validity of using the number of "approved but unfunded projects" as a criterion for judging the adequacy of budget or appropriation actions.

Consideration is being given to the possibility of replacing the award rate (the percentage of approved applications that are funded) with a "success rate" (the percentage of all applications that are funded) This would make it evident that the downward shift from the 1970s was not as large as might be inferred from changes in the award rates and paylines, but it also would ignore the factor of improved quality. The approval by Congress and the President of a compromise figure of 6,200 NIH competing projects for F.Y. 1985 will enable NIH to achieve a success rate in that year at a level above where it was in F.Y. 1984.

If the present upward trend in applications were to continue in future years, the question arises as to whether the NIH could depend on continued funding increases in the future to keep pace with that upward trend. The President's Office of Management and Budget (OMB) would undoubtedly resist any effort to build automatic program increases into future budgets and Congress might also object to it. At present (August 1985), NIH is uncertain of its future course on the stabilization concept and the method for implementing it.

B. ADAMHA

The award rates and paylines for the ADAMHA programs, as for NIH, have declined since the 1970s, but the reasons are different. The ADAMHA declines were due largely to swings in funding--sharply down in F.Y. 1981 (to eliminate certain types of social research projects) and gradually upward thereafter, combined with some escalation in the priority scores assigned by the review groups. Contrary to the NIH experience, the volume of applications submitted to ADAMHA has not risen appreciably since 1979, and the approval rates for ADAMHA applications are well below those for the programs of NIH.

In all probability, ADAMHA will follow NIH's lead on the question of future stabilization policy.

IV. Other Program Aspects of Concern

The award rates and paylines among the NIH's individual institutes vary widely. NIH takes account of these differences in distributing budget increases but, because of the structure of individual institute appropriations and other factors, the agency has held the view that only small changes can be made from year to year in the comparative award rates and paylines of the institutes.

The HHS 1980 planning document emphasized that, if there were any indications that the stabilization policy was having an adverse effect on the support of young investigators, appropriate actions should be taken to arrest that trend. The latest available figures (through 1982-83) suggest somewhat of a downward trend emerging in the early 1980s with respect to the numbers of applications submitted by new principal investigators and the number and percentage of awards made to such investigators, but more recent data would be needed to ascertain any definitive trends. NIH recently established a new category of awards for investigators with meritorious ideas but little experience; some institutes have responded positively to this initiative, but others are not convinced of its necessity. NIH has been studying several important policy alternatives for its extramural programs, including the

possibility of making new-investigator research awards more attractive by extending their typical length from three to five years and also of taking measures to improve the stability of support for mid-career and well-established investigators. Obviously, these would involve important budget trade-offs.

Another concern initially expressed about the stabilization of support for investigator-initiated research projects was its possible deleterious effects on other elements of the science base. There have been steady increases in the percentages of NIH appropriations allocated to research projects, but these resulted from a policy of preferential treatment that started well before the initiation of the stabilization policy. The increases in research project grants have occurred mainly at the expense of research contracts and were accomplished in part by reclassifying certain types of projects from contracts to grants. The support of research training (through NIH fellowship awards and training grants) has remained more or less constant in the 1980s. Although there is little evidence that the initiation in 1980 of the stabilization strategy for support of research projects has been harmful to other program components of the science base, there remains the question of whether a continued commitment to such a strategy might unduly limit the agency's flexibility to determine future priorities among its various program components.

These findings are discussed at some length in the following pages.

I. THE ORIGINS OF THE STABILIZATION POLICY

One of the issues raised most often in the research sector is the desire for a stable and secure funding base. This issue figured prominently in the 1976 report of the President's Biomedical Research Panel^{1/}, in the 1977 IOM staff paper, "Policy Issues in the Health Sciences,"^{2/} and in the 1979 and 1980 reports of the Department of Health, Education, and Welfare (Health and Human Services in 1980) Steering Committee for the Development of a Health Research Strategy, chaired by Donald S. Fredrickson, Director, National Institutes of Health.^{3/}

A. HEW (HHS) Health Research Planning in 1979-80

The 1979 and 1980 HEW (HHS) reports stemmed from a concern expressed by the then secretary of the department, Joseph Califano, about the future of federal support for health research at a time when "an insufficiency of national resources to meet all competing demands makes the need for careful balancing of alternative requirements especially critical". Specifically, he called for the development of a comprehensive five-year research plan for the health-related agencies of the department^{4/}.

1979 HEW report

The department steering committee's 1979 report placed major emphasis on stabilizing the "science base" and established as the first priority the stabilizing of support for investigator-initiated projects (which had been NIH's first priority for some years). The chairman's overview in the 1979 report stated that, "It seems to me that any serious research planning must attend first to this fragile and unreplaceable (sic) center of the health science system"^{5/}. It argued that, "If it is accepted that excellence is sustained by cyclical competition for support, then an equally important requirement is a predictable market for the ideas and skills subjected to that competition. Otherwise, research will cease to compete for the career attentions of the most gifted"^{6/}.

To achieve this objective, the report called for an agreement on some reasonable targets, ideally both by the Executive Branch and the Congress, which would extend beyond single-year appropriations, "even though all concerned recognize that such expressions of intent cannot be taken as binding commitments"^{7/}. As the first health research planning initiative, the report proposed that steps be taken to establish a "long-term floor" to the capacity for funding investigator-initiated research by NIH and ADAMHA^{8/}.

The 1979 report recognized that stability can be defined in many ways. For example, it could be compatible with "a steady but slow rate of growth or decrease" in program levels for research activities over a multi-year period, or it could mean maintenance of those activities at the then current F.Y. (1981) program level for an indefinite period^{9/}. It emphasized, however, that, "in any case, stability must mean that the intended program levels will be protected from erosion by inflation"^{10/}. It described this kind of control in the year-to-year changes in the level of new, renewed and supplemental (competing) awards as a "minimum commitment" to this important aspect of the research effort, "independent of other special initiatives involving the science base, applications, training or transfer activities"^{11/}.

At the same time, it warned of other concerns. One of these was the need for continued attention to the needs of other research components, such as centers, epidemiology, research resources, and the intramural programs. In addition, it emphasized that special attention to new investigators must accompany any stability initiative and that, if there were any indications that new investigators were having difficulty establishing research careers as a result of such an initiative, "appropriate actions should be taken to arrest that trend"^{12/}.

The 1979 report indicated that NIH proposed to award for F.Y. 1981 about 5,000 new and competing research projects and ADAMHA about 569. These F.Y. 1981 figures were accompanied by projections for later years under alternative approaches to stability--i.e., (1) with "modest" growth (from 5,000 in F.Y. 1981 to 5,931 by F.Y. 1984 for NIH and from 569 to 869 in this period for ADAMHA), (2) with "minimal" growth (to 5,436 for NIH and 719 for ADAMHA), and (3) with maintenance of the projected F.Y. 1981 levels (5,000 and 569)^{13/}.

IOM critique

In a specially commissioned review of the department steering committee's 1979 report, an Institute of Medicine committee expressed grave reservations about the specific numbers and goals chosen in that report^{*}. It pointed out that there was a serious possibility that implementation of the stabilization initiative would serve to "put a ceiling on growth rather than to provide a firm floor from which to build"^{14/}. In its view, the focus on the need for "predictable support" had been at the expense of the need, outlined in HEW's previously issued statement of Research Planning Principles, that support be "sustained and enhanced"^{15/}. It went on to say that the growth rates chosen were too restrictive for a forward-looking document, which ought to reflect the promise inherent in the knowledge gained from previous investments in research. It suggested that decisions to constrain health research budgets should be made with the full knowledge of lost scientific opportunities. The IOM committee report also called for renewed attention to stabilizing the entire science base, argued that the analysis should include detailed discussion and planning of research training, and expressed concern about the need for coming to grips with the problems connected with the support of young investigators^{16/}.

1980 HHS report

The 1980 report of the HHS steering committee described the goals set forth in the IOM critique as "ideal goals, indisputably the horizons sought by the HHS agencies"^{17/} but said the agencies can only move toward goals "at the pace and degree of directness permitted by the realities of the annual appropriations cycle"^{18/}. It noted that the 1979 proposal for approximately 5,000 new and competing research projects had already (that is, by December 1980) been "confirmed and made operational" in the President's F.Y. 1981 budget for NIH (although a similar initiative for ADAMHA had not been approved) and that the response of Congress had been generally positive and added that the initiative seemed to deserve further development in association with the F.Y. 1982 budget process[#]. It characterized the maintenance of a stable base of competing research project grants as the "most important step" toward stabilizing that base, but agreed that attention must be given to other critical elements of the research effort, as well^{19/}. It added that any effort to stabilize the funding of research must also take into account the important differences among the several components of NIH and ADAMHA.

^{*}In this connection, it should be borne in mind that the projection of 5,000 competing NIH projects for F.Y. 1981 was below the actual figures of 5,200 and 5,900 for F.Y. 1978 and F.Y. 1979.

[#]It is understood that some of the institute directors at NIH felt that the emphasis to be placed by the stabilization strategy on the research project grant line item in the budget would be a mistake and viewed it as an unnecessary limitation on their management prerogatives to allocate funds within their institutes among the various support mechanisms, including research training, research centers, etc.

Although the 1979 report had included projections for moderate and minimal growth to F.Y. 1984, the 1980 HHS report included only the F.Y. 1981 estimates for research projects (4,884 for NIH and 593 for ADAMHA)^{20/}.

B. Perspective of the Policy's Chief Architect

The context for the decision to recommend a stabilization figure of approximately 5,000 projects for NIH was described in a 1981 article by Donald Fredrickson, NIH director and chairman of the HHS steering committee^{21/}. He pointed out that the annual NIH budget had expanded 13-fold between 1956 and 1966 and that, even after the dramatic rate of growth had slowed down, the NIH budget continued to increase in constant 1969 dollars through F.Y. 1979. However, he observed that "after that, the tide turned". Congress, engaged in a struggle to set budget ceilings for itself, never passed an F.Y. 1980 appropriations bill for HHS, and the stop-gap continuing resolution approved for that fiscal year, due to a rapid growth in the inflation rate, represented a small reduction in purchasing power below the F.Y. 1979 appropriations^{22/}.

According to Dr. Fredrickson, the number of new and competing awards made each year is subject to considerable change, because the total number of grants in the portfolio of a given institute reflects several cumulative years of funding. The number of competing projects funded fell from 4,600 in 1975 to 3,460 in 1976, rose in 1978 to 5,200 and again in 1979 to 5,900, and then receded to 4,800 in 1980. Inflation and rises in indirect costs were also contributing to instability^{23/}. Dr. Fredrickson reported that the 96th Congress had debated levels that represented capacities to fund competing grants in F.Y. 1981 in numbers ranging from 3,800 to 5,000 and pointed out that, at the 3,800 level, an average of only one in four approved competing grant proposals would be fundable. He emphasized that in the F.Y. 1980 budget the Carter Administration agreed to request funds for approximately 5,000 competing grants, at the time enough to fund about one out of three approved applications, and Congress had appropriated funds for nearly that number. Although President Carter twice found it necessary to reduce his 1981 budget, the 5,000 grants survived both reductions, and Congress ultimately included funds for this number in its continuing resolution for F.Y. 1981. Dr. Fredrickson concluded that "The willingness of the Executive and Legislative branches to support the principle of stabilization through these difficult years is a dramatic gesture toward continued support of the biological revolution"^{24/}.

II. THE BUDGET HISTORY

A. F.Y. 1981-84: Support for Stabilization

Since the initiation of the stabilization policy in F.Y. 1981, the Reagan Administration has submitted budget estimates for approximately 5,000 NIH competing research projects involving increasing dollar amounts each year, with the single exception of F.Y. 1983 when the President's budget included a budget estimate of only 4,100 such projects (Table 1). From F.Y. 1981 until F.Y. 1984, congressional appropriations also provided for approximately 5,000 NIH competing projects a year (Table 1). However, Congress appropriated substantial increases in funds over the President's budget for NIH research projects in F.Y. 1983 and 1984--in 1983 to increase the number of projects from 4,100 to 4,971 and in 1984 to restore the amounts cut by the President's budget office--The Office of Management and Budget (OMB)--from the NIH estimates for average project costs. Thus, the stabilization policy initiated for NIH in the F.Y. 1981 budget, with its consequent commitment to ever-increasing dollar amounts because of rising unit costs, appears to have served a useful protective purpose for the NIH programs under the budget circumstances that existed in the first part of the 1980s. This seems especially evident in light of the general policy of the Reagan Administration to effect substantial reductions in the domestic portion of the budget.

As it turned out, NIH managed, from F.Y. 1982 to F.Y. 1984, to fund approximately 300 to 400 more projects per year than were estimated for the appropriations--e.g., to fund a total of 5,493 projects in F.Y. 1984 compared to the appropriations figure of 5,076 (Table 1). In F.Y. 1982 and 1983, these increases were achieved primarily through transfers of funds from other line items in the budget--e.g., from the research contract line item.* However, in F.Y. 1984, the increases resulted primarily from average costs per project being lower than NIH had originally projected (\$133,200 per grant compared with the appropriation figure of \$141,800)†.

For ADAMHA, in contrast to the NIH, no stabilization figure was established in the President's F.Y. 1981 budget. In fact, the initial ADAMHA projection of 569 competing projects for that fiscal year was cut back to 284 in President Reagan's revision of the Carter Administration's F.Y. 1981 budget--a figure 46 percent below the actual funded level of the previous year (526 projects). The cut was largely the result of a decision made by the new Administration to eliminate social research projects funded by the National Institute of Mental Health (NIMH) which were not deemed to be relevant to the institute's mission. Congress restored part of the cut--to 345 projects. Since then (F.Y. 1981), the Administration has been persuaded that the allegedly marginal types of proposals would not be funded by the NIMH and has, as a consequence, agreed to a steady rise in the total number of competing ADAMHA projects to 500 in F.Y. 1984, and Congress has more or less followed suit.

*See Part IV of this paper for discussion of such transfers.

†As a means of funding an increased number of grants, NIH made efforts to negotiate lower direct costs of awards than those recommended by the study sections. The actual average cost per project in F.Y. 1984 was still significantly higher than that used by OMB (\$124,600).

TABLE 1
NIH & ADAMHA Competing Research Projects
Number and Costs in Thousands of Dollars*
 F.Y. 1981 - 1986

NIH

<u>Fiscal Year</u>	<u>President's Budget</u>			<u>Appropriations</u>			<u>Actually Funded</u>		
	<u>Number</u>	<u>Total Cost</u>	<u>Average Per Project</u>	<u>Number</u>	<u>Total Cost</u>	<u>Average Per Project</u>	<u>Number</u>	<u>Total Cost</u>	<u>Average Per Project</u>
1981	4998	\$488,525	\$ 97.74	5079	\$537,818	\$105.89	5109	\$545,036	\$106.68
1982	4807	552,822	115.00	4741	527,585	111.28	5027	564,620	112.32
1983	4100	492,273	120.07	4971	606,351	121.98	5389	643,396	119.39
1984	5000	623,146	124.63	5076	720,044	142.84	5493	731,916	133.24
1985	5000	733,928	146.74	6526	937,637	143.67	----	---	---
1986	5000	778,223	155.64	----	---	---	----	---	---

ADAMHA

<u>Fiscal Year</u>	<u>President's Budget</u>			<u>Appropriations</u>			<u>Actually Funded</u>		
	<u>Number</u>	<u>Total Cost</u>	<u>Average Per Project</u>	<u>Number</u>	<u>Total Cost</u>	<u>Average Per Project</u>	<u>Number</u>	<u>Total Cost</u>	<u>Average Per Project</u>
1981	284	\$33,323	\$117.33	345	\$36,747	\$106.51	336	\$33,908	\$100.89
1982	360	36,970	102.65	417	45,823	109.89	401	40,475	100.94
1983	450	48,985	108.86	363	39,433	108.63	365	42,112	115.38
1984	500	56,133	112.27	479	58,893	122.95	485	55,345	114.11
1985	500	64,200	128.40	583	71,737	123.04	---	---	---
1986	500	64,186	128.37	---	---	---	---	---	---

Sources: NIH AND ADAMHA

*Include both direct and indirect costs. (Indirect costs for NIH projects increased from 24.9 percent of total costs in F.Y. 1975 to 31.2 percent in F.Y. 1984.)

B. F.Y. 1985-86: An Acute Budget Issue

Congressional action for F.Y. 1985

It is apparent from the budget history that congressional action in F.Y. 1985 to increase the NIH program level 30 percent* above the President's budget--i.e., from 5,000 competing projects to 6,526**--and the ADAMHA program level 17 percent above the President's budget--i.e., from 500 to 586 projects--represented an abrupt departure from Congress's own previous application of the stabilization policy. The congressional reasoning on the NIH was set forth in the report of the House Appropriations Committee, which stated that, "while the numbers of new and competing grants in recent years had stabilized at approximately 5,000, the award rates and paylines for these grants have declined and many high calibre investigators have not received funding"^{25/}. The report of the Senate Appropriations Committee contrasted the Administration's F.Y. 1985 budget request, permitting the funding of only about 31 percent of all approved NIH applications and a payline of barely 170, with the F.Y. 1979 award rate of 52 percent and payline of 240^{26/}. A similar line of reasoning was used by Congress in increasing the number of ADAMHA competing projects.

It should also be pointed out that, whereas in F.Y. 1984 the appropriations committees added more than \$100 million for NIH to restore the cut made by OMB in the average project grant costs projected by NIH, in F.Y. 1985 they were presented with a budget from the Executive Branch that included amounts deemed adequate to fully fund the 5,000 project estimate and thus for that year had more leeway for appropriating funds to increase the program level. Another factor undoubtedly working for program increases was that the F.Y. 1985 appropriations were enacted (and initially approved by the President) in a presidential election year.

The President's F.Y. 1986 budget

The HHS press release on the President's F.Y. 1986 budget stated that its provisions for eliminating the congressional increases for F.Y. 1985 were consistent with the policy followed on basic biomedical research by the department since 1980 in order to permit such research to flourish in "a stable environment without year-to-year fluctuations"^{27/}. It was also, however, in line with the Administration's general strategy of "freezing" funding for domestic programs to the extent possible. The plan for using the added funds in F.Y. 1985 to forward fund 646 projects through F.Y. 1986 and 1987 and maintaining the 5,000 project level at NIH through both years was designed to reduce the amount of appropriations (budget authority) required in F.Y. 1986 by \$538 million[#]--\$307 million by eliminating the need for appropriating funds in F.Y. 1986 to continue an added 1,526 grants started in F.Y. 1985 under the congressional appropriations for that year and the 646

*In comparison with the number of projects actually funded in the previous year (1984), the figure of 6,526 represented a 19 percent increase.

**This congressional action increased the total of all NIH research projects, including non-competing projects, from 17,172 in the President's F.Y. 1986 budget to 18,698. See appendix 1b for details.

[#]Savings in expenditures (outlays) would be less. The forward funding from F.Y. 1985 appropriations of 646 projects, although avoiding the need for appropriations in F.Y. 1986 to continue them through that year, would nevertheless involve expenditures for these projects in F.Y. 1986.

projects forward funded with F.Y. 1985 appropriations and \$231 million by avoiding the need for starting another 1,526 new and other competing grants in F.Y. 1986 to maintain the previous year's level of 6,526 such grants--and to avoid similar escalations in funding for the years to follow. (See appendix 1 for details).

The proposed use of multi-year (forward) funding was intended to bypass the process of seeking a rescission of budget authority under the Congressional Budget and Impoundment Act of 1974, which would have required the approval of both houses of Congress. Administration attorneys had advised that the use of multi-year funding by NIH and ADAMHA was legal. In any case, there is no question that it was contrary to the intent of Congress and thus an open invitation to a major conflict between the executive and legislative branches of government.

Response to the President's F.Y. 1986 budget

The reactions from the scientific and academic communities were quick and loud in coming. As an article in Science reported, the Congress was inundated with complaints from biomedical research groups that were "outraged and frustrated by OMB's raid on the budget"^{28/}. These related not only to the projected decrease in the total number of projects but also to the disruptive effect of a decision coming after the first of the three annual cycles of awards for F.Y. 1985 was already underway; this threatened to subject the awards for the second and third cycles later in the year to requirements that were much more stringent than those for the first cycle*.

Proposals for a joint resolution by the Senate and House of Representatives were introduced by Senator Edward Kennedy and Representative Henry Waxman, with a number of co-sponsors, to overturn the OMB action. They stated that the OMB action was in "direct contravention of Congressional intent" and "a blatant evasion of the Congressional Budget and Impoundment Act" and would have "a seriously disruptive impact" on the nation's research capacity^{29/}.

The cudgels were taken up by the chairmen of the appropriations subcommittees in the House and Senate and some of the other committee members. Representative William Natcher, chairman of the House subcommittee, said that he was "really disturbed", that "the people downtown know that they can't do this", and that "we'll get this thing resolved"^{30/}. Senator Lowell Weicker, Jr., chairman of the Senate subcommittee, charged that the Administration was "trying to circumvent the law" and asked the Comptroller General of the United States to determine whether the HHS's refusal to distribute funds for all 6,500 grants "amounts to an illegal impoundment"^{31/}.

In response to the initial outcry, a key OMB official stated that "over the last two-three years, we have operated under the impression that there was sort of a treaty out there" between government and researchers for 5,000 competing research grants and that he regarded the congressional action on the F.Y. 1985 appropriation to be "a change in the treaty"^{32/}. However, it soon became clear that the Administration wanted to avoid a confrontation

*The impact on the second and third F.Y. 1985 award cycles of basing the first cycle of awards on the assumption that funding would be available for 6,526 projects rather than 5,000 was reduced by canceling some of the first cycle awards before they were issued. The result was that about 33 percent of 5,000 awards were issued in the first cycle and 21 percent in the second cycle, compared with the customary rates of 30 percent for each. Now, with the final approval of 6,200 projects for F.Y. 1985, a major portion of the year's awards will have to be made toward the end of the fiscal year.

with Congress on this issue. In testimony on March 7, 1985 before the House Committee on Appropriations, David Stockman, OMB director, responded to a question from Mr. Natcher by saying that he hoped to persuade the committee of the merits of the Administration's proposal but recognized that, if it was not persuaded by the Administration's case, the committee had "ways of instructing us to do otherwise"^{33/}. The HHS Secretary, Margaret Heckler, in subsequent testimony, agreed to hold up any action on multi-year funding until July 1, 1985.

In a letter of March 18, 1985, the Comptroller General replied to Senator Weicker on the legality of the Administration's action. The Comptroller General ruled that multi-year funding of NIH grants was illegal because there was no specific statutory authority for it. Although he also ruled that the Administration's action did not constitute an illegal impoundment of funds, he observed that agencies that ignore the legislative history applicable to the use of appropriated funds do so at the peril of strained relations with Congress^{34/}.

The outcome

It was evident from the outset that a compromise had to be negotiated. The basic problem confronting the Administration and Congress was that of accommodating increases in appropriations for NIH and ADAMHA within the framework of an attempt to make a significant reduction in the huge federal budget deficit. If Congress were to insist on total restoration of the program level of 6,525 grants that it had approved the previous year in appropriating funds for NIH, it would require the addition in F.Y. 1986 of more than \$500 million for this item alone. At the same time, it was clear that some significant reductions in expenditures had to be made in the domestic portion of the budget.

Nevertheless, the Senate leadership succeeded in reaching a compromise with the Administration on 6,000 competing research projects for NIH and 540 for ADAMHA--about half of the increase over the F.Y. 1984 levels originally appropriated for F.Y. 1985 by Congress--and these figures were incorporated in the Joint Budget Resolution for F.Y. 1986, which was subsequently passed by the Senate. In addition, an F.Y. 1985 supplemental appropriations bill approved by the Senate provided for (1) using the difference between the estimated dollar amounts required for the originally approved number of 6,526 NIH research projects and those required for the compromise figure of 6,000 in F.Y. 1985 to forward fund a portion of the 6,000 projects (150 to 200 projects) for three years and (2) doing the same kind of thing for ADAMHA research projects. In other words, the bill sought precisely the same method as proposed in the President's F.Y. 1986 budget but would have applied it to a base of 6,000 NIH projects rather than 5,000.

The House of Representatives passed a Joint Budget Resolution for F.Y. 1986 but made no reference in it to this issue, and the version of the F.Y. 1985 supplemental appropriations bill approved by that body as well as the accompanying appropriations report were also silent on it. However, in late July, the House-Senate conferees on this bill reached an agreement to support a total of 6200 competing research projects for NIH and of 550 for ADAMHA in F.Y. 1985*. This agreement prohibited multi-year funding but allowed the unused funds to be carried over to F.Y. 1986. Both Houses subsequently approved this bill, and the President accepted it, although with some reluctance. In signing this legislation, the President said that he was

*The figure of 6,200 new and competing renewal projects for NIH was identical to that approved by the House in its original action on the F.Y. 1985 appropriations bill. (In the original action, the Senate approved 6,800 projects and the House-Senate Conference Committee compromised at 6,526.)

"concerned that the act mandates a specific and excessive number of new grants" to be awarded by NIH and added that such requirements "not only undermine the flexibility essential to the continued success of NIH, but also threaten the long-run stability of biomedical research funding". He further stated that "in signing this bill, it is my understanding that Congress will take future appropriations action to restore programmatic flexibility and budget stability to the NIH"^{35/}.

Just what this signifies for the F.Y. 1986 appropriations to NIH and ADAMHA remains to be seen. At the time of this writing (August 1985), action on the F.Y. 1986 appropriation bill was still pending in Congress.

III. THE PROGRAM INDICATORS

A. NIH

Causes of declines in award rates and paylines

Historically, the impact of budget decisions on the competing research grant programs of NIH and ADAMHA has been measured in terms of award rates and paylines. Table 2 shows the trends on award rates and paylines (see footnotes under the table for definitions of these terms) and on the numeric factors that contribute to them.

An examination of this table discloses that:

- (1) although the average number of funded NIH projects per year increased from about 4,600 in the F.Y. 1975-79 period to more than 5,100 projects in the F.Y. 1980-84 period, the average award rate dropped from 49 to 38 percent and the average payline from 235 to below 200 (187 in F.Y. 1984)*; these decreases were due primarily to substantial increases in the numbers of applications submitted through these years--from slightly over 10,000 in F.Y. 1975 to nearly 17,000 a year in the F.Y. 1982-84 period--and also to some extent to increases in application approval rates and the elevation of average priority scores (discussed later in this paper);
- (2) following the institution of the stabilization policy in F.Y. 1981, the award rates more or less leveled off through F.Y. 1984 at about 37 percent**, and the paylines at slightly below 190 (187 in F.Y. 1984)--mostly because the number of applications received per year leveled off at about the 17,000 figure during the F.Y. 1982-84 period;
- (3) major increases in applications to 18,000# and nearly 19,000 were expected for F.Y. 1985 and F.Y. 1986, respectively; if substantial increases in funding were not forthcoming, there would be further decreases in the award rates and the paylines.

Although the increasing volume of applications has been the major factor affecting award rates and paylines, other factors also contributed. As shown in Table 3, the review groups are approving an ever increasing percentage of the applications and, on the average, assigning higher and higher priority scores. The proportion of applications approved rose from less than 75 percent in F.Y. 1975 to more than 87 percent in F.Y. 1984 and was expected to reach nearly 90 percent in F.Y. 1985 and 93 percent in F.Y. 1986. Moreover, the average priority scores have been steadily getting higher (lower in the numbers) since F.Y. 1980--i.e., from 258 to 232--and the percentage approved with priority scores in the top-score quartile (100-200) has steadily crept upwards--i.e., from 35.8 percent in F.Y. 1980 to 45.8 percent in F.Y. 1984. In other words, the percentage of applications approved is nearing 100 percent and the percentage of priority scores in the upper 25 percent score bracket is nearing 50 percent.

*The varying figures for the individual institutes are shown in Part IV.

**This was higher than the one-third level projected at the time of the stabilization initiative because NIH managed to fund 300 to 400 projects above the 5000 level.

#A later estimate for F.Y. 1985, based on applications received by July 5, 1985, totaled 18,506.

TABLE 2
NIH Competing Research Project
Applications and Awards
F.Y. 1975 - 1986

<u>Fiscal Year</u>	<u># of Applica- tions Reviewed</u>	<u># of Applica- tions Approved</u>	<u>% of Applica- tions Approved</u>	<u># of Eligible Applica- tions Funded^(a)</u>	<u>% of Eligible Applica- tions Funded^(b)</u>	<u>Payline Priority Score^(c)</u>
1975	10,096	7,510	74.4	4,663	60.5	---
1976	10,119	7,231	71.5	3,464	47.7	241
1977	13,305	9,852	74.0	3,840	38.6	229
1978	14,500	11,429	77.6	5,200	45.3	230
1979	14,461	11,207	77.5	5,944	51.6	239
1980	14,142	11,220	78.7	4,785	42.3	218
1981	15,731	12,939	82.3	5,109	39.2	201
1982	16,989	14,396	84.7	5,027	34.7	188
1983	16,798	14,482	85.9	5,389	37.2	184
1984	16,901	14,755	87.3	5,493	37.3	187
1985 est.	17,967	16,142	89.8	5,000 ^(d)	31.0 ^(d)	170 ^(d)
1986 est.	18,774	17,387	92.6	5,000 ^(d)	28.8 ^(d)	170 ^(d)

SOURCE: NIH

- (a) "Eligible Applications" include applications approved by the Councils during the year (Column 2), plus approved applications carried over from the previous year. The number of approved applications carried over from the previous year by NIH is usually very small (See Appendix 2a).
- (b) Commonly termed the "award rate", which is calculated on the basis of all "eligible" applications--i.e., both applications approved during the year (Column 2) and approved applications carried over from the previous year.
- (c) The cut-off priority score at which funds are exhausted (90% for actual years; 100% for estimated years). The 90% cut-off is used because it encompasses nearly all the funded projects and eliminates a scattering of projects with lower priority scores that are funded for special program reasons.
- (d) Estimates in the President's F.Y. 1986 budget. (Based on the finally approved figure of 6,200 funded awards for F.Y. 1985, the projections for that year are as follows--:an award rate of approximately 37 percent and a payline of probably around 185.)

TABLE 3

NIH Competing Research Projects*
Applications -- Reviewed and Approved
 F.Y. 1975 - 1986

<u>Fiscal Year</u>	<u>Number of Applications Reviewed</u>	<u>Number of Applications Approved</u>	<u>% of Applications Approved</u>	<u>% Of Total Recommended in Upper Quarter of Priority Scores (199 or better)</u>	<u>Average Priority Scores</u>
1975	10,096	7,510	74.4	37.2	244
1976	10,119	7,231	71.5	35.3	252
1977	13,305	9,852	74.0	35.7	252
1978	14,500	11,429	77.6	36.5	254
1979	14,461	11,207	77.5	34.9	258
1980	14,142	11,220	78.7	35.8	258
1981	15,731	12,939	82.3	38.9	249
1982	16,989	14,396	84.7	42.6	242
1983	16,798	14,482	85.9	43.6	235
1984	16,901	14,755	87.3	45.8	232
1985 est.	17,967#	16,142	89.8	---	---
1986 est.	18,774	17,387	92.6	---	---

SOURCE: NIH

*These include not only the traditional R01 projects (the overwhelming majority) but also some related categories--R22, R23, R43, R44, P01, U01 and NIGMS P41 projects.

#The burden placed on the study sections by the expanding volume of applications was a subject of discussion at the fiftieth meeting of the Advisory Committee to the Director on November 19, 1984, pp. 1 and 5.

NIH officials attribute these trends in study section actions primarily to the generally improving quality of the applications, although this judgment is necessarily based on anecdotal evidence and impressions. A contributing factor to the rising approval rates has been the increasing number of amended applications being submitted each year; they increased from 16 percent of the applications in 1980 to 23 percent in F.Y. 1984 and tend to come from applicants who were close to the paylines with their first efforts and try to improve their applications enough to push them over the line, sometimes by improving their methodologies on the basis of the study section's "pink-sheet" critique of the first application. As one NIH official put it, "only the hardy souls stay in the game"; the marginal scientists--e.g., those with priority scores in the 300s and 400s on their first tries--tend to drop out of the system*. The NIH director, James Wyngaarden, has said that, as a consequence of the "improved quality of the applicants", a greater pressure has been placed on the peer review system to "discern subtle differences among individual applications making up the large body of projects"^{36/}.

At the same time, there doesn't seem to be much doubt that changes in the behavior patterns of the study sections also have something to do with what some have dubbed "study section creep", although there is no way of quantifying the extent of it. Study section members are not supposed to think in terms of funding but it is generally conceded that they do. The incentives to do so are all there. In the recommending process, study section members know full well that projects assigned priorities in the 400-499 and 300-399 brackets have no chance of obtaining funding and, therefore, are less inclined to take the "chilling" action of disapproving a project when the priority score will settle the matter. On the other hand, they know that, if a project is to have a chance of funding, it must be given a priority score in the top quartile--100 - 200.

Under the circumstances, it is somewhat misleading to compare today's award rates and paylines with those of yesteryear or to criticize budget or appropriation actions on the basis of the number of "approved but unfunded" projects. Dr. Wyngaarden has stated that "while the quality of science has certainly improved, there has been a change in study section behavior so that award rates were relatively inflated one or two decades ago in comparison with the current rates"^{37/}.

NIH has attempted to sensitize the study sections to the problems of escalating percentages of approval rates and priority scores but apparently without much success. For a period up to 1980, NIH followed a policy of permitting the institutes to "normalize" the priority scores for purposes of funding--i.e., converting them to scores based on something resembling a bell-shaped curve--and about half of the institutes did so. It is reported that the House Appropriations Committee complained that keeping two sets of books on priority scores was confusing, and, as a consequence, the normalization effort was discontinued in 1980. However, four of the institutes are, for purposes of funding, currently arraying the priority scores of each of the study sections in percentile ranks and selecting a uniform funding cut-off point on a percentile basis (e.g., in terms of the top 20 percent for each study section) instead of adhering strictly to priority scores across the board and thus rewarding the study sections with the higher sets of priority scores. Other institutes may very well adopt this practice. NIH has a study underway on the problems associated with the escalation of

*NIH officials also point out that, in contrast to the approval rates now going over 90 percent for the applications as a whole, the percentage of applications approved for the relatively new small-business set-aside program is in the neighborhood of only 50 percent, approximately the percentage that obtained for all NIH research projects in the 1950s.

priority scores and ways and means for addressing them but is currently uncertain about the possibilities for dealing with the escalation of approval rates.

The success-rate alternative

Dr. Wyngaarden has suggested that greater emphasis might be placed on the "success rate" than upon the award rate or payline and added that, when funding is expressed in terms of success rates, as the funded fraction of all applications received, "it becomes evident that the downward shift is not as large as might be inferred from changes in paylines or award rates"^{38/}. This is illustrated in Table 4, which indicates that, while the average award rate from the last half of the 1970s (excluding the very high year of 1975) to the first half of the 1980s dropped 17 percent, the success rate dropped only 9 percent.

The success rate measure has the merit of eliminating distortions caused by changes in study section behavior but, of course, totally discounts the improved quality factor, whatever the extent of that may be. If the success rate were to be used as the index for achieving stabilization, a rising volume of applications would drive up the funding levels that would be required to achieve the stabilization objective, although to a lesser degree than the award rate. For example, the use of the F.Y. 1984 success rate of 32.4 percent (slightly above the average for the 1980s) would, based on the current projections on the volume of applications, involve an increase in funding to provide for more than 5,800 projects in F.Y. 1985 and approximately 6,100 in F.Y. 1986. These are, however, under the compromise figure of 6,200 recently approved by Congress*.

Implications for future policy

A major uncertainty to be considered in connection with the future of a stabilization policy for NIH is whether the volume of applications will continue to rise over the next few years. The current pool of biomedical Ph.D. faculty members (the predominant source of applications for NIH research grants), after having expanded significantly in the 1970s, essentially leveled off in the 1980s^{**}. Moreover, as pointed out in Part IV of this paper, the number of applications NIH received from new principal investigators decreased significantly from the peak year of 1979 to 1982 (the latest year for which figures are available). Table 5 shows that the total number of applications involving entirely new proposals—both from previous applicants and first-time applicants—did level off through the 1982-84 period.

However, the F.Y. 1985 estimate (in Table 5), based on virtually a complete count of applications in hand, reflects approximately an 8 percent increase over the 1982-84 level in applications for entirely new projects. It has been speculated that this might be attributable, at least in part, to the better prospects for success afforded by the substantial increases in the F.Y. 1985 appropriations for NIH research projects[#]. NIH officials believe that

*Use of the F.Y. 1984 award rate would yield approximately 6,000 projects for F.Y. 1985 and 6,500 for F.Y. 1986.

**According to the 1985 report of the IOM/NAS Committee on National Needs for Biomedical and Behavioral Research Personnel, the number of biomedical science Ph.D.s employed in academia rose from 30,384 in 1977 to 33,566 in 1979 and to 36,842 in 1981 but only to 36,983 in 1983^{39/}.

#NIH analyses of past increases in applications do not show a close correlation between those increases and increases in funding.

TABLE 4
NIH Competing Research Projects
Trends In Paylines, Award Rates, and Success Rates
F.Y. 1975 - 1986

<u>Fiscal Year</u>	<u>Payline</u>	<u>Award Rate (a)</u>	<u>Success Rate (b)</u>
1975	NA	60.5 %	45.0 %
1976	241	47.7	34.1
1977	229	38.6	28.6
1978	230	45.3	35.7
1979	239	51.6	40.0
1980	218	42.3	33.9
1981	201	39.2	32.3
1982	188	34.7	29.4
1983	184	37.2	32.1
1984	187	37.3	32.4
1985 est.	170 (c)	31.0 (c)	28.2 (c)
1986 est.	170 (c)	28.8 (c)	26.1 (c)

Source: NIH (Success rates computed by author.)

- (a) Funded percentage of approved applications.
(b) Funded percentage of all applications.
(c) Estimates in the President's F.Y. 1986 Budget. (Based on the approved compromise at 6,200 funded projects for F.Y. 1985, the projections for this year are as follows--a payline of around 185, an award rate of around 37% and a success rate of about 34%.)

TABLE 5
 Number of NIH Competing Research Applications^(a)
 By Type
 F.Y. 1975 - 1985

	<u>New Applications</u>			<u>Other Competing Applications</u>		<u>Total</u>
	<u>Entirely New Proposals</u> ^(b)	<u>Amendments</u> ^(c)	<u>Sub-Total</u>	<u>Continuations</u>	<u>Supplementals</u>	
1975	6,194	916	7,110	2,708	275	10,093
1976	6,402	930	7,332	2,423	295	10,050
1977	8,308	1,083	9,391	3,609	304	13,304
1978	8,923	1,467	10,390	3,830	282	14,502
1979	9,435	1,429	10,864	3,328	266	14,458
1980	8,962	1,569	10,531	3,306	305	14,142
1981	9,561	1,678	11,239	4,209	283	15,731
1982	9,848	2,072	11,920	4,818	251	16,989
1983	9,847	2,295	12,142	4,470	186	16,798
1984	9,824	2,444	12,268	4,440	189	16,897
1985 est. ^(d)	10,633	2,943	13,576	4,733	197	18,506

Source: NIH

(a) Includes not only R01 applications (the overwhelming majority) but also R22, R23, R43, R44, P01, U01, and NIGMS P41 applications.

(b) Includes not only new applicants but also applicants who have submitted previous but different proposals. (For information on first-time applicants, available through 1982-83, see Part IV B on support of new investigators.)

(c) "Amendments" relate to applications submitted in a previous year. (A change submitted in the same year as the original application displaces the original application.)

(d) Estimate as of July 5, 1985. (The estimated total of 18,506 is higher than the earlier estimate of 17,967 contained in previous tables.)

the current increase is part of a continuing trend for the future. They point to the fairly significant numbers of Ph.D.s and the growing number of M.D.s who will remain in the applicant pool for many years and to the expanding research opportunities created by the rapid development of science and technology in this country. There is a definite upward trend in the numbers of amended applications, which account for over 20 percent of all new project applications; they have risen each year since F.Y. 1979. In addition, applications for grants under the small-business set-aside program have been increasing. Nevertheless, there are enough paradoxes in the available data to raise a question about NIH's present ability to make reasonably accurate predictions on future trends in the volume of applications*.

If the volume of applications were to continue its present upward trend, the use in budgets for stabilization purposes beyond F.Y. 1986 of a flat figure, such as the 6,200 projects approved for F.Y. 1985, would have adverse effects on future award rates and paylines. Indexing the number of funded competing projects to the volume of applications in budget proposals--perhaps on the basis of success rates--would be a logical alternative for achieving stabilization.

However, the feasibility of this alternative is questionable. The OMB would undoubtedly resist any effort to build automatic program increases (or any kind of an "entitlement" concept) into future budgets, and Congress might object to it as well. In addition, the question about the predictability of future trends in applications would be an important consideration. At this point (August 1985), NIH is uncertain about its future course concerning a stabilization policy. With the enactment of appropriations to support an all-time high level of 6,200 competing projects for F.Y. 1985 and probably for F.Y. 1986, the issue of stabilization may now seem less urgent. However, the foregoing analysis does raise policy questions which appear to warrant further examination in the near future (See Part V for a listing of possible subjects for further exploration).

B. ADAMHA

The award rate for ADAMHA's competing projects declined from 57 percent in F.Y. 1979 to a low point of 35 percent in F.Y. 1981 and has risen since to 42 percent in F.Y. 1984, but paylines steadily declined throughout this period from 250 to 172 (Table 6). The President's budgets for F.Y. 1985 and 1986 would have lowered these to 35 percent and 168, and the congressional increase for F.Y. 1985 would have essentially continued the F.Y. 1984 levels of 42 percent and 172.

Unlike NIH, the volume of ADAMHA applications has not risen appreciably since F.Y. 1979, although the agency has been projecting an increase for F.Y. 1985 and F.Y. 1986. The percentages of applications approved by the review groups are far below those of NIH but are gradually rising--from 48 percent in F.Y. 1979 to about 63 percent in F.Y. 1984. Despite steady increases in the number of projects funded and relatively stable award rates through the 1980s, the ADAMHA paylines steadily decreased, which means that, as for the NIH programs, more and more of the approved ADAMHA applications were being scored in the high priority bracket.

In all probability, the position on a stabilization strategy for ADAMHA will in the future, as in the past, be tied to that for NIH.

*A paper, forecasting increases over the years in new research project grant applications (a simulation based on trends in manpower data), by a staff member of NIH's Office of Program Planning and Evaluation, is currently in preparation.

TABLE 6
ADAMHA Competing Research Project Applications and Awards
F.Y. 1975 - 1985

	<u># of Applications Reviewed</u>	<u># of Applications Approved</u>	<u>% of Applications Approved</u>	<u># of Eligible Applications Funded (a)</u>	<u>% of Approved Applications Funded (b)</u>	<u>Payline Priority Score</u>	<u>% of All Applications Funded (c)</u>
1975	1,477	732	50	503	57	280	34
1976	1,665	737	44	512	57	281	31
1977	1,939	896	46	500	50	265	26
1978	1,817	847	47	452	45	254	25
1979	1,768	850	48	598	58	250	34
1980	1,928	870	45	526	53	257	27
1981	1,858	900	48	336	35	219	18
1982	1,527	847	55	401	43	206	26
1983	1,585	891	57	365	39	180	23
1984	1,753	1,102	63	485	42	172	27
1985 Appropriation	1,900	1,242	65	583	42	171	31
1985 President's Revision	1,900	1,242	65	500	35	168	26
1985 Senate Compromise	1,900	1,242	65	540(d)	43	169	28

Source: ADAMHA (Last column calculated by the author.)

- (a) "Eligible Applications" include those approved during the year (Column 2), plus approved applications carried over from the previous year. The proportion of approved applications carried over from the previous year at ADAMHA tends to be higher than at NIH.
- (b) ADAMHA calculates these percentages (award rates) on the basis of applications approved during the year only, rather than on the basis of all eligible applications, including the carry-over of approved applications from the previous year, as NIH does.
- (c) These percentages (success rates) are calculated on the basis of applications reviewed during the year only.
- (d) Subsequently, 550 funded projects were approved by Congress for F.Y. 1985.

IV. OTHER PROGRAM ASPECTS OF CONCERN

A. Variations Among the Institutes in Award Rates and Paylines

Table 7 shows that there are wide variations among the NIH institutes on award rates and paylines. For example, at one extreme, the National Institute on Aging and the National Institute on Child Health and Human Development had award rates under 30 percent in F.Y. 1984, and, at the other, the National Eye Institute and the National Institute of Environmental Health Sciences had award rates of over 49 percent in that year. Paylines in F.Y. 1984 for the individual institutes of NIH ranged from 163 to 224.

Such variations are largely the products of the separate appropriation histories of the individual institutes. To what extent, if any, they represent significant disparities in resource allocations and distortions of priorities is a question beyond the scope of this paper. The NIH director takes account of these variations when he has an opportunity to distribute budget increases among the institutes, but it has been NIH's view over the years that only a little fine tuning is feasible from year to year.

Table 8 for ADAMHA's three institutes shows that the award rates and paylines for the National Institute of Mental Health and the National Institute on Drug Abuse are very similar. The award rates for the National Institute on Alcohol Abuse and Alcoholism are below those of the other two institutes, but its paylines are slightly higher. On the whole, the differences among the figures of the three institutes are not striking.

B. Support of New Investigators

In the planning exercise of 1979 and 1980, both the HHS Steering Committee For the Development of A Health Research Strategy and the IOM review committee expressed concern about the possible effect a stabilization initiative might have on the support of young research investigators. Table 9 contains the latest data (through F.Y. 1982) on new Principal Investigator (PI) applicants for the traditional investigator-initiated research (R01) grants. It shows that the number of new PI applicants declined nearly 18 percent from the peak year of 1979 to 1982. The award rates for approved new PI applicants (through F.Y. 1983) also declined in these years, but their success rates were much higher than those of other applicants. More recent data would be needed to ascertain any definitive trends.

In 1984, the NIH established a new category of awards for new investigators (R23 awards) with criteria for considering the proposals of "relatively inexperienced investigators with meritorious ideas". Approved R23 applications are incorporated into the over-all priority system and no funds are set aside for this purpose. In other words, the outcome of the applications for these awards is basically determined by the actions of the study sections, as are other applications.

Some institutes, such as the National Heart, Lung, and Blood Institute, have tried to stimulate the study sections supporting their programs to give these applications some special consideration, while others feel that the record to date does not indicate the necessity for such action under the current budget constraints. Some institute officials are of the opinion that new investigators fare just as well in submitting regular R01 applications as they would by submitting the R23 application,* but the majority of the institutes believe that the R23 awards do make a difference. Some advisors, on the other hand, have advanced the position that the emphasis should be placed on those investigators who are already in the system, that providing them with greater stability is a more efficient use of funds. The

*Many new principal investigators continue to submit applications for the standard R01 awards.

TABLE 7
 NIH Award Rates and Paylines By Institute
 For Competing Research Projects
 F.Y. 1981 - 1986

<u>Institute</u>	<u>Award Rates</u>					
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985 est.*</u>	<u>1986 est.*</u>
National Cancer Institute	35.8	29.9	33.9	38.2	28.4	25.7
National Heart, Lung and Blood Institute	40.7	37.2	35.4	40.2	31.3	28.3
National Institute of Dental Research	45.1	39.3	32.8	43.5	36.6	47.5
National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases	41.0	32.5	38.9	38.8	29.6	27.2
National Institute of Neurological and Communicative Disorders and Stroke	40.6	34.9	36.4	34.5	32.3	30.7
National Institute of Allergy and Infectious Diseases	34.9	28.6	37.1	36.0	30.0	31.9
National Institute of General Medical Sciences	40.1	38.9	40.9	35.9	34.8	31.2
National Institute of Child Health and Human Development	39.2	35.0	34.7	29.2	27.1	25.1
National Eye Institute	52.4	48.4	44.7	49.8	43.8	37.0
National Institute of Environmental Health Sciences	47.5	38.0	46.7	49.3	28.0	31.8
National Institute on Aging	<u>23.6</u>	<u>35.4</u>	<u>32.1</u>	<u>28.1</u>	<u>24.8</u>	<u>18.8</u>
NIH Total	<u>39.2</u>	<u>34.7</u>	<u>37.2</u>	<u>37.3</u>	<u>31.0</u>	<u>28.8</u>

<u>Institute</u>	<u>Paylines†</u>					
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985 est.*</u>	<u>1986 est.*</u>
National Cancer Institute	197	183	181	184	170	160
National Heart, Lung and Blood Institute	208	196	195	201	180	170
National Institute of Dental Research	225	213	208	210	200	220
National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases	202	180	184	175	170	160
National Institute of Neurological and Communicative Disorders and Stroke	206	189	185	169	160	160
National Institute of Allergy and Infectious Diseases	178	162	166	167	160	160
National Institute of General Medical Sciences	193	175	170	163	160	160
National Institute of Child Health and Human Development	196	187	179	180	170	170
National Eye Institute	212	203	201	193	180	180
National Institute of Environmental Health Sciences	247	226	220	224	190	200
National Institute on Aging	<u>213</u>	<u>208</u>	<u>190</u>	<u>179</u>	<u>170</u>	<u>160</u>
NIH Total	<u>201</u>	<u>186</u>	<u>184</u>	<u>188</u>	<u>170</u>	<u>170</u>

SOURCE: NIH

*The President's F.Y. 1986 Budget.
 †90% for actual years; 100% for estimated years.

TABLE 8
ADAMHA Award Rates and Paylines By Institute
For Competing Research Projects
F.Y. 1981 - 1985

<u>Institute</u>	<u>Award Rates (%)</u>				
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985est.*</u>
National Institute of Mental Health	36	50	41	43	32
National Institute on Drug Abuse	35	30	42	47	45
National Institute on Alcohol Abuse and Alcoholism	<u>23</u>	<u>36</u>	<u>31</u>	<u>33</u>	<u>34</u>
ADAMHA-Total	34	43	39	42	35
	<u>Paylines‡</u>				
National Institute Mental Health	220	214	170	170	165
National Institute on Drug Abuse	208	175	170	167	170
National Institute on Alcohol Abuse and Alcoholism	<u>219</u>	<u>198</u>	<u>189</u>	<u>178</u>	<u>175</u>
ADAMHA-Total	219	206	180	172	168

Source: ADAMHA

*The President's P.Y. 1986 budget estimate for P.Y. 1985.
‡90% for actual years; 100% for estimated years.

TABLE 9

**New Principal Investigator Applications and Awards
Compared With the Total Number of
Applications and Awards For New Projects
National Institutes of Health
F.Y. 1975 - 1983**

ROI Projects - Type 1 Only*

	<u>Applications</u>			<u>Awards</u>			
	<u>Total</u>	<u>New PIs</u>		<u>Total†</u>	<u>New PIs</u>		
	<u>No.</u>	<u>No.</u>	<u>% of Total Applications</u>	<u>No.</u>	<u>No.</u>	<u>% of Total Awards</u>	<u>% of New PI Applications (Success Rate)</u>
1975	5,484	2,096	38.2%	2,531	1,384	54.7	66.0
1976	6,108	2,382	39.0	2,021	1,072	53.0	45.0
1977	6,669	2,515	37.7	1,926	1,033	53.6	41.7
1978	7,336	2,658	36.2	2,645	1,364	51.6	51.3
1979	7,971	2,780	34.9	3,286	1,655	50.4	59.5
1980	7,647	2,705	35.4	2,475	1,238	50.0	45.8
1981	7,623	2,418	31.7	2,337	1,150	49.2	47.6
1982	7,805	2,288	29.3	2,180	949	43.5	41.5
1983	NA	NA	NA	2,505	1,077	43.0	NA

Source: NIH (Success rates calculated and table re-arranged by the author.)

*ROI projects are the conventional investigator-initiated research projects and Type 1 are new ROI projects--i.e., not competing renewals.

†Total includes previous applicants who submit wholly new or amended proposals, as well as new (first-time) applicants.

Office of the Director, NIH, is studying various policy alternatives for the extramural programs, including the means for making research project grant awards more attractive to new applicants, perhaps by replacing the present 3-year limit on R23 awards with a 5-year award and raising the ceiling on the award amount*. However, there is also concern at NIH about the "half-life" of established investigators--i.e., an apparent decline in the number of first-time investigators who go on to receive their second or third awards--and the possible need for enhancing the stability of mid-career investigators and even well-established investigators by providing longer-term support than the typical three-year awards**. There would be difficult trade-offs; these steps would add to the total amounts of funds required for continuation grants and average costs per grant and, thus, make it more difficult to obtain further increases in funds to keep pace with increases in applications for new awards.

C. Support for Elements of the Science Base other than Research Projects

The 1979-80 health research planning documents of the department took note of the concerns expressed by the IOM committee and other observers about the possible deleterious effects of stabilizing research projects on other elements of the science base, including research training. Table 10 indicates that the percentage share of total NIH funds allocated to research project grants has risen--from approximately 39 percent in F.Y. 1977 to 54 percent in F.Y. 1985.

Over half of this rise came at the expense of research contracts, which declined in this period from about 15 to 7 percent. The shifts toward research-project grants and away from research contracts began well before the advent of the stabilization policy in F.Y. 1981; it will be noted that Table 10 shows a drop in the proportion of funds allocated to research contracts from 14.9 percent in F.Y. 1977 to 11.8 percent in F.Y. 1980. The National Cancer Institute, which has by far the largest contract program in NIH, had in earlier years been using contract funds for grant-like projects and, partly as a result of criticisms it received about this practice, started to reclassify these projects as grants and generally to cut back on contracts#. Added to this were such general factors as the growing burdensomeness of the contract device as a result of added regulations and an increasing caution about the perceptions in the extramural community that NIH might be using the contract device for activities that could be performed as well or better under grants awarded through the standard peer review process.

*At this writing (August 1985), NIH is definitely moving ahead with a plan to establish the 5-year award as the basic instrument for the support of new investigators.

**For a discussion of these alternatives, see the minutes of the 50th meeting of the Advisory Committee to the Director, National Institutes of Health, November 19, 1984.

#The percentage of the total NCI budget allocated to research contracts dropped from 27.5 percent in F.Y. 1977 to 20.4 percent in F.Y. 1981 and, since F.Y. 1981, to 11.9 percent. There were also significant declines in the percentages for NHLBI and other institutes as well.

TABLE 10
Distribution of NIH Funds by Program Component
 P.Y. 1977 - 1986

	<u>1977</u> <u>Actual</u>	<u>1978</u> <u>Actual</u>	<u>1979</u> <u>Actual</u>	<u>1980</u> <u>Actual</u>	<u>1981</u> <u>Actual</u>	<u>1982</u> <u>Actual</u>	<u>1983</u> <u>Actual</u>	<u>1984</u> <u>Actual</u>	<u>1985</u> <u>Approp.</u>	<u>1985</u> <u>Current</u> <u>Estimate</u>	<u>1986</u> <u>Request</u>
Extramural:											
Res. Proj. Grants	38.5%	40.6%	44.1%	46.5%	49.4%	50.3%	52.2%	53.2%	54.1%	54.3%	53.8%
Centers	10.8	10.9	10.7	9.9	9.5	9.6	9.3	9.5	9.3	9.4	8.5
Other Research	5.9	6.0	6.0	6.1	5.8	5.7	5.4	5.5	6.0	6.0	6.3
R&D Contracts	<u>14.9</u>	<u>14.5</u>	<u>13.5</u>	<u>11.8</u>	<u>9.7</u>	<u>8.8</u>	<u>8.0</u>	<u>7.7</u>	<u>7.0</u>	<u>7.0</u>	<u>7.4</u>
Subtotal	<u>70.1</u>	<u>72.0</u>	<u>74.3</u>	<u>74.3</u>	<u>74.4</u>	<u>74.4</u>	<u>74.9</u>	<u>75.9</u>	<u>76.4</u>	<u>76.7</u>	<u>76.0</u>
Research Training	4.9	5.1	4.5	5.1	4.9	4.1	4.1	3.7	4.2	4.2	4.5
Intramural Research	10.5	11.0	10.8	11.0	11.6	12.4	12.4	12.1	11.4	11.3	11.6
Other*	<u>14.5</u>	<u>11.9</u>	<u>10.4</u>	<u>9.6</u>	<u>9.1</u>	<u>9.1</u>	<u>8.6</u>	<u>8.3</u>	<u>8.0</u>	<u>7.8</u>	<u>7.9</u>
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Includes Cancer Control and Construction, Research Management and Support, National Library of Medicine, Office of the Director, and Buildings and Facilities.

With respect to research training, Table 11 indicates that the number of trainees funded by NIH fellowship awards and training grants dropped only slightly from F.Y. 1980 to F.Y. 1984. There was a bigger decrease in F.Y. 1985, but in this year a 38 percent increase in funds was provided to raise trainee stipends. The President's F.Y. 1986 budget would maintain the same program level for the coming fiscal year*.

It is noteworthy that the percentage of funds devoted to intramural research remained quite stable through this period, gradually increasing from 10.5 percent in F.Y. 1977 to 12.1 percent in F.Y. 1984.

Certainly, preferential treatment given research-project-grant funding, combined with the prospects and realities of increasingly tight budgets, did force some degree of fund shifting, both before and after F.Y. 1981, but this is, after all, the essence of priority setting.

*These figures do not include funding of training (graduate students and post-doctoral salaries) supported through research grants.

TABLE 11

NIH Research Training Grants
and Fellowship Awards
F.Y. 1978 - 1976

<u>Fiscal Year</u>	<u>Trainees Number</u>	<u>Thousands of Dollars</u>	
		<u>Amount</u>	<u>Average Cost</u>
1978	11,123	\$143,926	\$12.9
1979	11,197	143,661	12.8
1980	10,644	176,388	16.6
1981	10,695	175,172	16.4
1982	10,406	150,493	14.5
1983	10,577	164,764	15.6
1984	10,514	166,462	15.8
1985	9,891	217,943	22.0
1986 est.	9,891	217,943	22.0

Source: NIH

V. POSSIBLE SUBJECTS FOR FURTHER EXPLORATION

The analysis on the preceding pages suggests a number of subjects for further assessment and deliberation. Some of those that seem especially important are listed below.

- o The future utility of the stabilization strategy for supporting competing NIH and ADAMHA research-project grants:
 - the implications for continuing such a strategy of recent policy developments in Congress and the President's reservations about them;
 - future priorities for other elements of the science base and how they might be affected by a commitment to a continued strategy for stabilizing budget support of research-project grants;
 - the appropriate means for carrying out such a strategy (degree of flexibility, etc.), if it were to be continued.

- o The quality and size of the biomedical research manpower pool:
 - the basic causes of the current increases in applications for NIH research project grants;
 - recent trends in applications from new investigators for NIH and ADAMHA research grants and in the loss of established investigators from the research grant systems of these agencies, and their consequences;
 - the comparative priorities which should be assigned to the support of new and established investigators, alternative methods for implementing them, and the budget trade-offs involved.

- o The integrity of the study-section process:
 - the effects on study sections of the increasing volume of applications and competition for grant awards and of recent abrupt changes in budget decisions;
 - the causes and policy implications of the escalating approval rates and priority scores of NIH and ADAMHA study sections, and possible measures for dealing with them.

- o Differences among the NIH institutes:
 - the degree to which major differences in award or success rates and paylines among the institutes reflect significant disparities in the allocation of resources;
 - the desirability and feasibility of attempting to make significant reductions in these disparities.

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Interviews

Michele W. Applegate, Associate Administrator For Extramural Programs, ADAMHA*

George A. Bowden, Division of Program Analysis, Office of Program Planning and Evaluation, NIH

Joseph A. Brackett, Chief, Reports, Analysis and Presentations Section, Statistics and Analysis Branch, Division of Research Grants, NIH

John F. Cogan, Associate Director for Human Resources, Veterans, and Labor, Office of Management and Budget, Executive Office of the President

Donald S. Fredrickson, President, Howard Hughes Medical Institute#

George J. Galasso, Associate Director For Extramural Affairs, NIH

William H. Goldwater, Extramural Program Management Officer, Office of Extramural Research and Training, NIH

John C. James, Assistant Director For Special Projects, Division of Research Grants, NIH

Joseph R. Leone, Associate Administrator of Management, ADAMHA

Edward J. Lynch, Acting Director, Program Planning Branch, Division of Program Analysis, Office of Program Planning and Evaluation, NIH

Norman D. Mansfield, Director, Division of Financial Management, Office of Administration, NIH

Richard Miller, Assistant Director for Budget, Division of Financial Management, Office of Administration, NIH

Henry A. Neil, Jr., Principal Staff Assistant, Sub-Committee on Labor, Health and Human Services, and Education, Committee on Appropriations, U.S. House of Representatives

William F. Raub, Deputy Director For Extramural Research and Training, NIH*

S. Stephen Schiaffino, Director, Division of Research Grants, NIH

*Included comments on a draft of this paper.

#Commented on a draft of this paper.

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Appendix 1a

Estimated Reductions of Budget Authority
(Requested Appropriations) in the President's F.Y. 1986 Budget
For NIH Research Projects

	F.Y. 1986 <u>Estimated Reductions*</u> (Budget Authority)
<u>Non-competing projects</u>	
(1) 1,526 less projects started in F.Y. 1985 which would need continuation funding in F.Y. 1986, and (2) 646 less projects which would need to be funded from F.Y. 1986 appropriations because of multi-year funding from F.Y. 1985 appropriations	\$306,949,000#
<u>Competing projects</u>	
1,526 less new projects which, under Congress's original F.Y. 1985 appropriations, presumably would be started in F.Y. 1986 to maintain a level number of new starts from F.Y. 1985 to F.Y. 1986	<u>229,610,000#</u>
Total	<u>\$536,559,000#</u>

*That is, reductions below the dollar levels projected on the basis of the original Congressional action on the F.Y. 1985 budget for NIH.

#See next table for complete figures (compare last column on "1986 Current Services" with "1986 Request").

Appendix 1b

DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH

(Dollars in thousands)

	1985		1985*		1986*		1986 Based on		1986	
	Appropriation		Current Est. (a)		Request		1985 Approp.		Current Services	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants										
Research Projects:										
Noncompeting projects	12,172	\$1,830,697	12,172	\$1,830,697	11,242	\$1,822,388	13,319	\$2,126,675	13,319	\$2,126,675
Administrative supplementals	(499)	18,665	(499)	18,665	(400)	12,027	(486)	14,689	(486)	14,689
One year competing projects	6,526	937,637	5,000	733,928	5,000	778,223	5,000	778,223	6,526	1,007,833
Three year competing projects	0	---	(646)	203,709	0	---	0	---	0	---
Subtotal, competing	6,526	937,637	5,000	937,637	5,000	778,223	5,000	778,223	5,000	1,007,833
Subtotal, research projects (Incl. multi-year funded grants)	18,698	2,786,999	17,172	2,786,999	16,242	2,612,638 (16,888)	18,319	2,919,587	18,319	3,149,197
Research Centers:										
Specialized/comprehensive ctrs.	347	322,442	328	306,196	312	289,953	347	337,274	347	337,274
General clinical research ctrs.	77	88,096	76	82,675	72	77,254	77	93,558	77	93,558
Biotechnology research ctrs.	62	34,962	51	26,736	37	18,504	62	36,570	62	36,570
Lab animal sciences & primate res.	46	32,276	44	29,663	33	24,681	46	33,761	46	33,761
Gorgas memorial institute	1	1,999	1	1,999	1	1,999	1	2,091	1	2,091
Subtotal, one year centers	533	479,775	500	447,269	455	412,391	533	503,254	533	503,254
Two year centers	0	---	(45)	34,875	45	---	---	---	---	---
Subtotal, research centers	533	479,775	500	482,144	500	412,391	533	503,254	533	503,254
Other Research:										
Research career programs	1,336	75,081	1,335	75,081	1,284	74,083	1,284	74,083	1,335	78,573
Cancer organ systems	1	1,000	1	1,000	1	1,000	1	1,000	1	1,046
Clinical education programs	58	5,000	53	5,000	51	5,000	51	5,000	53	5,231
Cooperative clinical research	257	53,579	303	53,579	291	53,777	291	53,777	303	56,043
Biomedical research support	701	96,335	701	96,335	701	96,335	701	96,335	701	100,766
Minority biomed. res. support	83	34,869	83	34,869	79	35,031	79	35,031	83	36,424
Other research related	530	45,155	526	42,786	519	38,213	519	38,213	526	51,496
Subtotal, other research	2,966	311,019	3,002	308,650	2,926	303,439	2,926	303,439	3,002	329,579

*President's F.Y. 1986 Budget.

(Continued on next page)

Appendix 1b continued

DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH

(Dollars in thousands)

	1985		1985*		1986*		1986 Based on		1986	
	Appropriation		Current Est. (a)		Request		1985 Approp. For RPGs & CTRs		Current Svcs.	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants										
Training										
Individual awards	1,458	37,890	1,458	37,890	1,397	36,275	1,397	36,275	1,397	37,332
Institutional awards	8,433	180,053	8,433	180,053	8,494	181,668	8,494	181,668	8,494	188,710
Total, Training	9,891	217,943	9,891	217,943	9,891	217,943	9,891	217,943	9,891	226,042
Research & Development Contracts	1,171	360,713	1,171	360,713	1,152	360,924	1,152	360,924	1,171	376,566
Intramural Research		584,657		579,291		561,653		561,653		608,444
Research Management and Support		218,260		210,013		205,107		205,107		229,068
Disease Control		63,878		62,834		61,555		61,555		66,756
Construction		13,100		13,100		13,100		13,100		13,702
Subtotal, IRDs		5,036,344		5,021,687		4,748,750		5,146,562		5,502,608
National Library of Medicine		54,824		54,408		53,320		53,320		58,898
Office of the Director		37,087		36,903		35,710		35,710		40,377
Buildings and Facilities		21,730		21,730		14,900		14,900		14,900
Subtotal, NIH		5,149,985		5,134,728		4,852,680		5,250,492		5,616,783
Reserve (b)		---		4,809		---		---		---
TOTAL, NIH		5,149,985		5,139,537		4,852,680		5,250,492		5,616,783

(a) Reflects absorption of pay costs in the amount of \$13,415 and a proposed rescission of \$10,448.

(b) To be placed in reserve in accordance with Section 515 of the Treasury Postal Service Appropriations Act.

*President's F.Y. 1986 Budget.

SOURCE: NIH

National Institutes of Health

BUDGET PROFILE
(Dollars in thousands)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u> (a)	<u>1984</u> (b)
Appropriation	\$2,544,078	\$2,842,936	\$3,189,976	\$3,428,935	\$3,569,406	\$3,641,875	\$4,025,293	\$4,493,588
Obligations (c)	2,581,988	2,828,014	3,184,641	3,428,842	3,572,506	3,643,461	4,013,135	4,493,553
	<u>1985</u> <u>Approp.</u>	<u>1985*</u> <u>Curr. Est.</u>	<u>1986*</u> <u>Request</u>				<u>Percentage Growth of 1986 Request</u> <u>Over 1977 Over 1985 Over 1985</u> <u>Approp. Approp. Curr. Est.</u>	
Appropriation (c)	\$5,149,985	\$5,134,728	\$4,852,680				90.7%	-5.8%
Obligations (c)	---	---	---					-5.5%

PERCENTAGE DISTRIBUTION BY MECHANISM

	Actual Obligations								1985 Approp.	1985* Current Estimate	1986* Request
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>			
Research Project Grants	38.5	40.6	44.1	46.5	49.4	50.3	52.2	53.2	54.1	54.3	53.8
Research Centers	10.8	10.9	10.7	9.9	9.5	9.6	9.3	9.5	9.3	9.4	8.5
Other Research Grants	5.9	6.0	6.0	6.1	5.8	5.7	5.4	5.4	6.0	6.0	6.3
Training	4.9	5.1	4.5	5.1	4.9	4.1	4.1	3.7	4.2	4.2	5.1
Contracts	14.9	14.5	13.5	11.8	9.7	8.8	8.0	7.7	7.0	7.0	7.4
Intramural Research	10.5	11.0	10.8	11.0	11.6	12.4	12.4	12.0	11.4	11.3	11.6
Research Management and Support	5.1	5.1	4.8	4.9	5.0	5.2	5.0	4.7	4.3	4.1	4.2
Other (d)	<u>9.4</u>	<u>6.8</u>	<u>5.6</u>	<u>4.7</u>	<u>4.1</u>	<u>3.9</u>	<u>3.6</u>	<u>3.8</u>	<u>3.7</u>	<u>3.7</u>	<u>3.1</u>
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SELECTED DATA FOR RESEARCH PROJECT GRANTS

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u> <u>Approp.</u>	<u>1985*</u> <u>Current</u> <u>Estimate</u>	<u>1986*</u> <u>Request</u>
Award Rate	38.6	45.3	51.6	42.3	39.2	35.0	37.2	37.3	40.4	31.0	28.8
Payline	N/A	N/A	N/A								
Average Cost:											
Competing	79.9	80.9	88.4	98.7	106.7	112.3	119.4	133.2	143.7	146.8	155.6
Noncompeting	81.9	90.3	91.5	96.5	105.9	114.4	124.5	138.6	150.4	150.4	162.1

(a) Includes transfer of \$1,424 for pay costs.

(b) Includes transfer of \$1,294 for pay costs.

(c) Includes obligations from prior year balances in the Buildings and Facilities account.

(d) Includes Cancer Control, Construction, National Library of Medicine, Office of the NIH Director, and Buildings and Facilities.

NOTE--1985 Current Estimate reflects proposed rescission and funds in reserve under Section 515 of Treasury Postal Service Appropriation Act.

*President's F.Y. 1986 Budget.

SOURCE: NIH

Appendix 1d
 NATIONAL INSTITUTES OF HEALTH
 History of Research Project Grants and Research Training
 (Dollars in thousands)

	1978			1979			1980		
	Number	Amount	Avg.	Number	Amount	Avg.	Number	Amount	Avg.
Research Projects									
Noncompeting	7,869	\$ 726,203	\$92.3	9,391	\$ 877,595	\$93.5	11,413	\$1,120,567	\$98.2
New/competing	5,200	420,850	\$80.9	5,944	525,473	\$88.4	4,785	472,488	\$98.7
Subtotal, Projects	13,069	\$1,147,053		15,335	\$1,403,068		16,198	\$1,593,055	
Research Training	11,123	\$ 143,926	\$12.9	11,197	\$ 143,661	\$12.8	10,644	\$ 176,388	\$16.6
	1981			1982			1983		
	Number	Amount	Avg.	Number	Amount	Avg.	Number	Amount	Avg.
Research Projects									
Noncompeting	11,371	\$1,221,604	\$107.4	10,943	\$1,268,247	\$115.9	11,529	\$1,451,000	\$125.9
New/competing	5,109	545,036	\$106.7	5,027	564,640	\$112.3	5,389	643,396	\$119.4
Subtotal, Projects	16,480	\$1,766,640		15,970	\$1,832,887		16,918	\$2,094,396	
Research Training	10,695	\$ 175,172	\$ 16.4	10,406	\$ 150,493	\$ 14.5	10,577	\$ 164,764	\$ 15.6
	1984			1985*			1986*		
	Number	Amount	Avg.	Number	Amount	Avg.	Number	Amount	Avg.
Research Projects									
Noncompeting	11,812	\$1,657,637	\$140.3	12,172	\$1,849,362	\$151.9	11,242	\$1,834,415	\$163.2
1-year Competing	5,493	731,916	\$133.2	4,354	639,524	\$146.9	5,000	778,223	\$155.6
3-year Competing	---	---	---	646	298,113	\$153.8	646	---	---
Subtotal, Projects	17,305	\$2,389,553		17,172	\$2,786,999		16,888	\$2,612,638	
Research Training	10,514	\$ 166,462	\$ 15.8	9,891	\$ 217,943	\$ 22.0	9,891	\$ 217,943	\$ 22.0

*President's F.Y. 1986 Budget.

SOURCE: NIH

Appendix 1e

ADAMHA Research by Mechanism
(Dollars in thousands)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	1985 Current Estimate	1986 Estimate
Extramural:								
Research Projects	\$124,117	\$131,252	\$121,601	\$113,585	\$123,080	\$148,913	\$183,923	\$185,392
Research Centers	14,308	12,590	13,815	13,898	16,309	21,508	20,789	20,907
Research Contracts	11,026	12,573	9,041	9,689	12,164	13,691	10,161	11,891
Other Research*	7,431	13,705	15,941	15,632	18,255	22,862	21,148	22,361
Intramural	<u>39,154</u>	<u>41,596</u>	<u>46,236</u>	<u>52,838</u>	<u>63,428</u>	<u>64,265</u>	<u>69,106</u>	<u>70,944</u>
Total	\$196,036	\$211,716	\$206,634	\$205,642	\$233,236	\$271,239	\$305,136	\$311,495

ADAMHA Research by Mechanism
(Percentages)

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Extramural:									
Research Projects	64.3%	63.3%	62.0%	58.8%	55.2%	52.8%	54.9%	60.3%	59.5%
Research Centers	6.1%	7.3%	5.9%	6.7%	6.8%	7.0%	7.9%	6.8%	6.7%
Research Contracts	4.9%	5.6%	5.9%	4.4%	4.7%	5.2%	5.1%	3.3%	3.8%
Other Research*	4.3%	3.8%	6.5%	7.7%	7.6%	7.8%	8.4%	7.0%	7.2%
Intramural	<u>20.4%</u>	<u>20.0%</u>	<u>19.7%</u>	<u>22.4%</u>	<u>25.7%</u>	<u>27.2%</u>	<u>23.7%</u>	<u>22.6%</u>	<u>22.8%</u>
Total	100.0%								

*Includes small grants, RSDAs, cooperative agreements, and small business innovation research awards; excludes the community support program.

SOURCE: ADAMHA

Appendix 2a

NUMBER OF
NIH COMPETING RESEARCH PROJECT APPLICATIONS - BY TYPE
FISCAL YEARS 1975 - 1984

	<u>1984</u>	<u>1983</u>	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>	<u>1977</u>	<u>1976</u>	<u>1975</u>
<u>ALL TYPES</u>										
Reviewed	16,792	16,798	16,989	15,731	14,142	14,458	14,502	13,304	10,050	10,093
Recommended	14,672	14,425	14,396	12,939	11,220	11,208	11,251	9,851	7,162	7,510
Eligible	14,739	14,479	14,477	13,027	11,301	11,510	11,489	9,932	7,171	7,701
Awarded	5,493	5,389	5,027	5,114	4,785	5,937	5,200	3,839	3,464	4,663
<u>NEW</u>										
Reviewed	12,163	12,142	11,920	11,239	10,531	10,864	10,390	9,391	7,332	7,110
Recommended	10,208	9,943	9,561	8,717	7,885	7,886	7,496	6,363	4,808	4,878
Eligible	10,255	9,991	9,617	8,794	7,941	8,119	7,664	6,432	4,814	5,024
Awarded	3,115	3,101	2,675	2,786	2,762	3,685	2,941	2,110	1,950	2,745
<u>Competing Continuations</u>										
Reviewed	4,440	4,470	4,818	4,209	3,306	3,328	3,830	3,609	2,423	2,708
Recommended	4,306	4,335	4,626	3,991	3,088	3,107	3,523	3,258	2,123	2,423
Eligible	4,326	4,341	4,651	4,002	3,099	3,174	3,589	3,268	2,126	2,466
Awarded	2,267	2,196	2,231	2,180	1,840	2,079	2,111	1,600	1,375	1,762
<u>Supplemental</u>										
Reviewed	189	186	251	283	305	266	282	304	295	275
Recommended	158	147	209	231	247	215	232	230	231	209
Eligible	158	147	209	231	261	217	236	232	231	211
Awarded	111	92	121	148	183	173	148	129	139	156

NOTE: Data include NIH (except DRR and NLM) RO1, R22, R23, R43, R44, PO1, UO1, and NIGMS P41 applications (the latter for F.Y.'s 1981 and 1982 only). Projects are counted only once for a fiscal year. Fiscal year is defined as F.Y. of appropriation for funded applications and F.Y. of start date for unfunded applications. Applications withdrawn before council review are excluded.

SOURCE: NIH

Appendix 2b

NATIONAL INSTITUTES OF HEALTH
RESEARCH PROJECT APPLICATIONS REVIEWED AND FUNDED, 1984
(Dollars in thousands)

-ACTUAL-

	-----DIRECT COSTS ONLY-----						-----TOTAL COSTS-----					
	Reporting Year		Applications		Council		Total Eligible		Funded		Award Rate	
	Reviewed	Amount	Council Recommended	Amount	Rate	For Funding	Amount	Number	Amount	Number	Amount	
	Number		Number		Number	Amount	Number	Amount	Number	Amount	Number	Amount
NCI	3,029	\$356,334	2,598	\$246,306	85.8	69.1	2,534	\$346,450	969	\$157,635	38.2	45.5
NHLBI	2,445	263,877	2,115	183,601	86.5	69.6	2,119	262,900	852	119,808	40.2	45.6
NIDR	372	30,488	282	19,972	75.8	65.5	283	28,786	123	13,430	43.5	46.7
NIADDK	2,247	217,378	2,020	160,644	89.9	73.9	2,024	228,882	785	96,542	38.8	42.2
MINCDS	1,908	176,279	1,629	127,067	85.4	72.1	1,634	180,337	564	70,907	34.5	39.3
MIAID	1,498	137,871	1,398	107,154	93.3	77.7	1,408	156,928	507	61,252	36.0	39.0
NIGMS	2,113	198,850	1,953	152,666	92.4	76.8	1,955	217,693	702	89,322	35.9	41.0
NICHD	1,661	149,134	1,405	110,221	84.6	73.9	1,422	160,323	415	51,835	29.2	32.3
NEI	660	58,657	613	46,076	92.9	78.6	620	68,288	309	35,387	49.8	51.8
NIHNS	323	32,028	279	24,083	86.4	75.2	280	34,334	138	16,481	49.3	48.0
NIA	645	70,480	463	43,625	71.8	61.9	459	60,691	129	19,309	28.1	31.8
TOTAL, NIH	16,901	\$1,691,376	14,755	\$1,221,415	87.3	72.2	14,738	\$1,745,612	5,493	\$731,916	37.3	41.9

NOTE: In prior NIH submissions, the total eligible for funding included applications the council recommended for approval plus carryovers from prior year that were eligible and considered for funding in the subsequent year. A policy decision has recently been made to change the way in which carryover is reported to ensure a greater degree of uniformity in data presentation among the NIH awarding units. As a result of this change, 1) in all years for which actual data are available, the total eligible for funding includes the applications the council recommended for approval plus funded carryover from the prior year; and 2) for the current year and budget year estimates, the total eligible for funding includes only those applications recommended for approval by council.

SOURCE: NIH

DHHS - NATIONAL INSTITUTES OF HEALTH
Competing Research Project Grants-Applications Funded

(Dollars in thousands)

F.Y. 1983 Actual					F.Y. 1984 Actual [*]					
Number	Amount	Paylines	Award Rate	Average Cost	Number	Amount	Paylines	Award Rate	Average Cost	
NCI	886	\$111,896	181	33.9%	\$126.3	969	\$157,635	184	38.2%	\$162.7
NHLBI	748	116,989	195	35.4	156.4	852	119,808	201	40.2	140.6
NIDR	133	13,505	208	52.8	101.5	123	13,438	210	43.5	109.3
NIADDK	777	87,331	184	38.8	112.4	785	96,542	175	38.8	123.0
NINCDS	539	53,479	185	35.5	99.2	564	70,907	169	34.5	125.7
NIAID	522	59,910	166	37.1	114.8	507	61,252	167	36.0	120.8
NIGMS	835	92,760	170	40.9	111.1	702	89,322	163	35.9	127.2
NICHD	452	45,852	179	34.7	101.4	415	51,835	180	29.2	124.9
NEI	247	25,930	201	44.7	105.0	309	35,387	193	49.8	114.5
NIHES	98	14,717	220	46.7	150.2	138	16,481	224	49.3	119.4
NIA	152	21,027	190	32.1	138.3	129	19,309	179	28.1	149.7
Total, NIH	5,389	\$643,396	184	37.2	\$119.4	5,493	\$731,916	188	37.3	\$133.2

F.Y. 1985 Appropriation					
Number	Amount	Paylines	Award Rate	Average Cost	
NCI	1,030	\$175,835	180	37.1%	\$170.7
NHLBI	949	154,555	200	40.9	162.9
NIDR	130	15,107	220	47.6	116.2
NIADDK	800	108,527	180	38.6	135.7
NINCDS	785	110,830	180	42.2	141.2
NIAID	563	73,859	180	39.2	131.2
NIGMS	1,013	136,588	180	45.4	134.8
NICHD	550	66,846	190	35.4	121.5
NEI	390	46,016	210	57.1	118.0
NIHES	115	16,480	210	36.6	143.3
NIA	201	32,994	190	32.4	164.1
	6,526	\$937,637	190	40.4	\$143.7

* Payline represents the 90th percentile priority score based on scores assigned by NIH Study Section. Percentile ranking used for making decisions in NHLBI and NICHD when converted to priority score paylines resulted in somewhat lower figures than the 90th percentile convention reported (NHLBI 181; NICHD 170).

F.Y. 1985 Current Estimate [†]					F.Y. 1986 Estimate [†]					
Number	Amount	Paylines	Award Rate	Average Cost	Number	Amount	Paylines	Award Rate	Average Cost	
NCI	790	\$128,441	170	28.4%	\$162.6	807	\$135,298	160	25.7%	\$167.7
NHLBI	727	127,148	180	31.3	174.9	681	127,677	170	28.3	187.5
NIDR	100	11,677	200	36.6	116.8	143	17,580	220	47.5	122.9
NIADDK	613	86,083	170	29.6	140.4	631	108,328	160	27.2	171.7
NINCDS	601	85,826	160	32.3	142.8	630	85,310	160	30.7	135.4
NIAID	431	57,127	160	30.0	132.5	491	72,038	160	31.9	146.7
NIGMS	776	108,560	160	34.8	139.9	728	107,978	160	31.2	148.3
NICHD	421	52,958	170	27.1	125.8	422	56,354	170	25.1	133.5
NEI	299	36,146	180	43.8	120.9	249	31,374	180	37.0	126.0
NIHES	88	12,862	190	28.0	146.2	106	15,740	200	31.8	148.5
NIA	154	27,100	170	24.8	176.0	112	20,546	160	18.8	183.4
Subtotal	5,000	\$733,928	170	31.0	\$146.8	5,000	\$778,223	170	28.8	\$155.6
Multiyear (646)		203,709				---	---			
Total, NIH	5,000	937,637				5,000	778,223		28.8	155.6

†The President's F.Y. 1986 Budget.

SOURCE: NIH

Appendix 3a

PRIORITY SCORES FOR NIH COMPETING RESEARCH PROJECTS*
AT VARIOUS PERCENTILES, FISCAL YEARS 1976-1984

ELIGIBLE APPLICATIONS

<u>PERCENTILE</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
25th	179	180	178	181	180	177	170	164	161
50th	234	233	234	237	238	232	225	217	211
75th	317	313	323	329	332	316	302	286	282

AWARDS

90th Percentile	241	229	230	239	218	201	188	184	187
50th Percentile	181	172	177	186	174	168	159	155	154

*Based on number.

SOURCE: NIH, DRG, STATISTICS AND ANALYSIS BRANCH

Appendix 3b

DISTRIBUTION OF NUMBER OF ELIGIBLE NIH COMPETING RESEARCH PROJECT APPLICATIONS
BY PRIORITY SCORE GROUP, FISCAL YEARS 1975 - 1984

<u>Fiscal Year</u>	<u>Priority Score Grouping</u>					<u>Average Priority Score</u>
	<u>100-150</u>	<u>151-200</u>	<u>201-250</u>	<u>251-300</u>	<u>Over 300</u>	
1975	11.9	25.3	22.6	15.2	25.0	244
1976	11.4	23.9	21.4	14.5	28.8	252
1977	11.0	24.7	20.9	15.7	27.8	252
1978	11.0	25.5	19.4	14.1	30.1	254
1979	10.3	24.6	19.5	14.0	31.5	258
1980	10.1	25.7	17.7	13.7	32.8	258
1981	10.5	28.4	17.8	14.9	28.4	249
1982	12.4	28.2	18.3	15.8	25.2	242
1983	14.8	28.8	18.3	16.2	22.0	235
1984	15.5	30.3	18.0	15.6	20.7	232

SOURCE: NIH, DRG, STATISTICS AND ANALYSIS BRANCH

Appendix 3c

DISTRIBUTION OF NUMBER OF NIH COMPETING RESEARCH PROJECTS AWARDED
BY PRIORITY SCORE GROUP, FISCAL YEARS 1975 - 1984

<u>Fiscal Year</u>	<u>Priority Score Grouping</u>					<u>Average Priority Score</u>
	<u>100-150</u>	<u>151-200</u>	<u>201-250</u>	<u>251-300</u>	<u>Over 300</u>	
1975	18.7%	38.9%	31.1%	9.2%	2.1%	195
1976	22.6	44.1	27.5	4.8	1.0	185
1977	26.9	48.8	19.6	4.0	0.7	178
1978	23.2	50.3	23.2	2.9	0.4	180
1979	19.4	45.5	29.0	5.6	0.5	188
1980	23.1	55.3	20.0	1.4	0.2	176
1981	26.0	63.5	10.0	0.5	0.0	169
1982	34.6	60.3	4.9	0.2	0.0	160
1983	38.2	57.7	3.4	0.5	0.2	158
1984	40.5	53.6	4.4	0.8	0.7	159

SOURCE: NIH, DRG, STATISTICS AND ANALYSIS BRANCH

