



KEEPING THE LIGHTS ON

Every year, the US government gives research institutions billions of dollars towards infrastructure and administrative support. A *Nature* investigation reveals who is benefiting most.

BY HEIDI LEDFORD



Last year, Stanford University in California received US\$358 million in biomedical-research funding from the US National Institutes of Health (NIH). Much of that money paid directly for the cutting-edge projects that make Stanford one of the top winners of NIH grants. But for every dollar that Stanford received for science, 31 cents went to pay for the less sexy side of research: about 15 cents for administrative support; 7 cents to operate and maintain facilities; 1 cent for equipment; and 2 cents for libraries, among other costs.

The NIH doled out more than \$5.7 billion in 2013 to cover these 'indirect' costs of doing research — about one-quarter of its \$22.5-billion outlay to institutions around the world (see 'Critical calculations'). That money has not been distributed evenly, however: research institutions negotiate individual rates with government authorities, a practice that is meant to compensate for the varying costs of doing business in different cities and different states. Data obtained by *Nature* through a Freedom of Information Act request reveal the disparities in the outcomes of these negotiations: the rates range from 20% to 85% at universities, and have an even wider spread at hospitals and non-profit research institutes. The highest negotiated rate in 2013, according to the data, was 103% — for the Boston Biomedical Research Institute (BBRI) in Watertown, Massachusetts. Under financial duress, it closed its doors that same year.

Faculty members often chafe at high overheads, because they see them as eating up a portion of the NIH budget that could be spent on research. And lack of transparency about how the money is spent can raise suspicions. "Sometimes faculty feel like they're at the end of the Colorado River," says Joel Norris, a climatologist at the University of California, San Diego. "And all the water's been diverted before it gets to them."

Nature compared the negotiated rates, as provided by the US Department of Health and Human Services, to the actual awards given to more than 600 hospitals, non-profit research institutions and universities listed in RePORTER, a public database of NIH funding (see 'Overheads under the microscope'). The analysis shows that institutions often receive much less than what they have negotiated, thanks to numerous restrictions placed on what and how much they can claim. Administrators say that these conditions make it difficult to recoup the cash they spend on infrastructure.

In addition, new administrative regulations have meant that universities have had to increase their spending, even as federal and state funding for research has diminished. "We lose money on every piece of research that we do," says Maria Zuber, vice-president for research at the Massachusetts Institute of Technology (MIT) in Cambridge, which has negotiated a rate of 56%.

But many worry that the negotiation process

CRITICAL CALCULATIONS

What are indirect costs?

Indirect costs — often called facilities-and-administrative costs — are expenses that are not directly associated with any one research project. This includes libraries, electricity, administrative expenses, facilities maintenance and building and equipment depreciation, among other things.

The United States began reimbursing universities for indirect costs in the 1950s, as part of a push to encourage more research. An initial cap was set at 8%, but that had risen to 20% by 1966, when the government began to allow institutions to negotiate their rates. Institutions were assigned to negotiate with either the US Department of Health and Human Services or the Office of Naval Research, depending on which supplied the bulk of their research funding. And the agreed rate holds across

all federal funders, irrespective of where the negotiations took place.

A common misconception is that indirect-cost rates are expressed as a percentage of the total grant, so a rate of 50% would mean that half of the award goes to overheads. Instead, they are expressed as a percentage of the direct costs to fund the research. So, a rate of 50% means that an institution receiving \$150 million will get \$100 million for the research and \$50 million, or one-third of the total, for indirect costs. But there are multiple caps that lower the base amount from which the indirect rate is calculated, or that limit the amount of money that a research institution can request. So very few institutions receive the full negotiated rate on the direct funding they receive. **H.L.**

allows universities to lavish money on new buildings and bloated administrations. "The current system is perverse," says Richard Vedder, an economist at Ohio University in Athens who studies university financing. "There is a tendency to promote wasteful spending."

GLOBAL DISPARITY

Reimbursement for overheads is dealt with differently around the world. The United Kingdom calculates indirect costs on a per-project basis. Japan has a flat rate of 30%. And last year, to the dismay of some institutions, the European Union announced that it would no longer negotiate rates and instituted a flat rate of 25% for all grant recipients in its Horizon 2020 funding programme (see *Nature* 499, 18–19; 2013).

The comparatively high overhead reimbursement in the United States has generated envy, and at times controversy. About 20 years ago, government auditors found that Stanford was using funds for indirect costs to cover the depreciation in value of its 22-metre yacht moored in San Francisco Bay, and to buy decorations for the president's house, including a \$1,200 chest of drawers.

Other universities — including MIT and Harvard University in Cambridge — soon came forward to correct overhead claims that they feared would be perceived as inappropriate. In the end, Stanford paid the government \$1.2 million and accepted a large reduction — from 70% to 55.5% — in its negotiated rate. But the damage was done. The government layered on new regulations, including an explicit ban on reimbursement for housing and personal living expenses, and a 26% cap on administrative costs, although only for universities.

Two decades later, researchers still worry that the system carries the taint of impropriety.

Administrators say that changes at some institutions — such as increased transparency about spending and how indirect costs are calculated — have allayed faculty concerns. But not everywhere. "People often think this is about secretarial staff and bloating the mid-level research administration," says Tobin Smith, vice-president for policy at the Association of American Universities in Washington DC. "The faculty doesn't often think about all the other costs: the lights are on, the heat is on, you're using online services the university provides."

Despite the high level of scrutiny for universities, they did not top the chart for negotiated rates in the data that *Nature* collected. Few universities have rates above 70%, and they would probably face an outcry from faculty if they raised rates too high, says Samuel Traina, vice-chancellor for research at the University of California, Merced.

No such threshold seems to exist at non-profit research institutes: more than one-quarter of the 198 institutes for which *Nature* obtained data negotiated rates above 70%. Fourteen of them have rates of 90% or higher, meaning that their indirect costs come close to equalling their direct research funding. According to Robert Forrester, an independent consultant in Belmont, Massachusetts, who helps institutions to determine their indirect costs, these institutes need to negotiate higher rates because the entire facility is dedicated to research, whereas universities and hospitals also use facilities for other things, such as teaching, that generate funding and must share the burden.

Comparisons of negotiated rates against the RePORTER data mined by *Nature* come with caveats. For example, many smaller institutions negotiate a provisional rate with the NIH that is later adjusted to match actual overhead costs,

OVERHEADS UNDER THE MICROSCOPE

In 2013, the US National Institutes of Health (NIH) awarded more than US\$5 billion to research institutes for indirect costs: shared overhead expenses such as lighting, heat and maintenance. Institutes negotiate the rate at which they will be reimbursed, and it is expressed as a percentage of the direct costs for research in a grant. Data obtained by *Nature* reveal the disparity in the outcomes of these negotiations and show that the amount received is usually much lower than that negotiated.



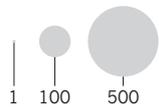
UNIVERSITIES
Received \$3.9 billion, at an average rate of 31%

NON-PROFITS
Received \$611 million, at an average rate of 38%

HOSPITALS
Received \$550 million, at an average rate of 38%

BOSTON BIOMEDICAL RESEARCH INSTITUTE
(funding figures from 2012)
Total funding: **\$5,802,769**
Negotiated rate: **103%**
Calculated rate: **67%**

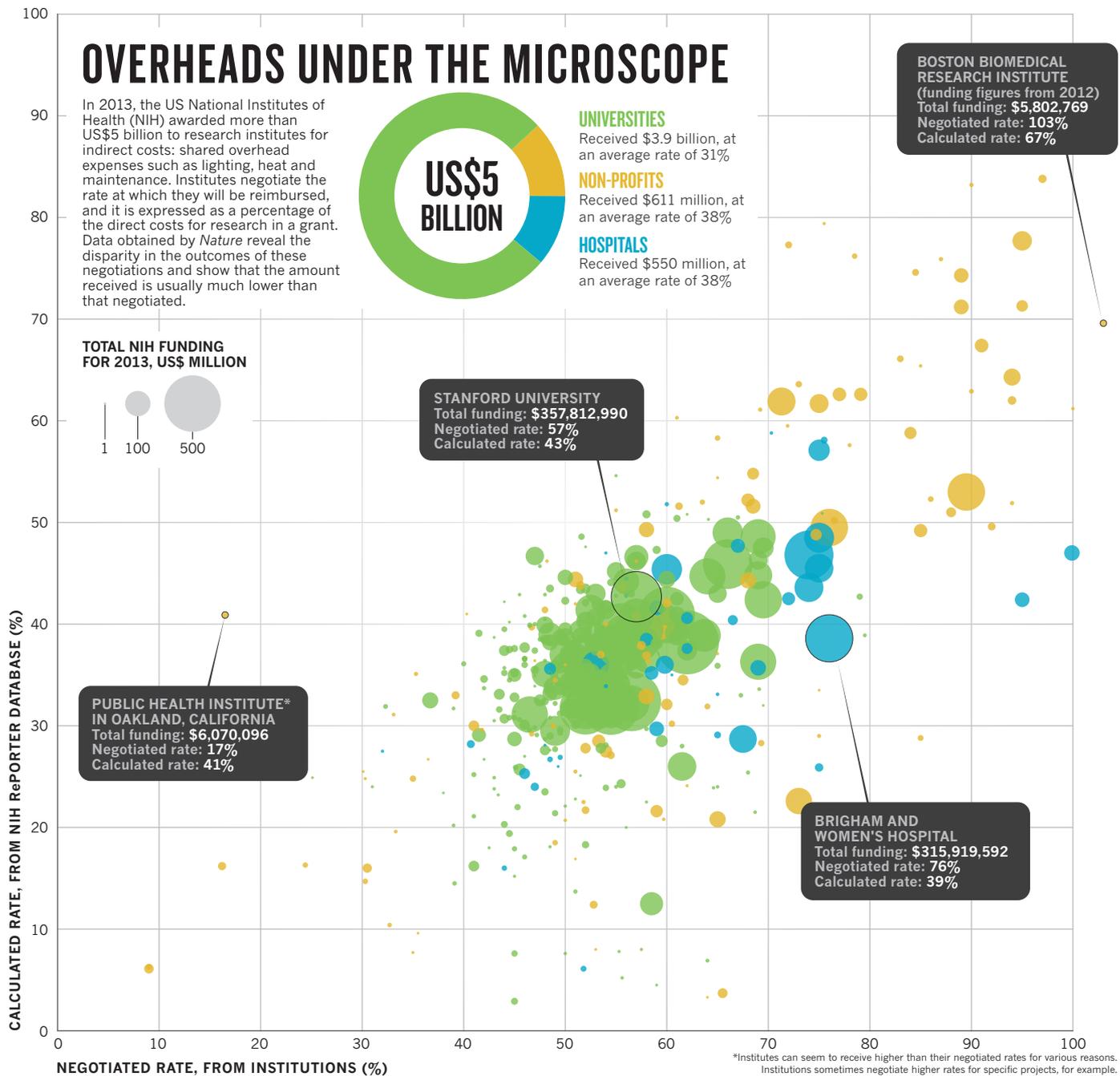
TOTAL NIH FUNDING FOR 2013, US\$ MILLION



STANFORD UNIVERSITY
Total funding: **\$357,812,990**
Negotiated rate: **57%**
Calculated rate: **43%**

PUBLIC HEALTH INSTITUTE* IN OAKLAND, CALIFORNIA
Total funding: **\$6,070,096**
Negotiated rate: **17%**
Calculated rate: **41%**

BRIGHAM AND WOMEN'S HOSPITAL
Total funding: **\$315,919,592**
Negotiated rate: **76%**
Calculated rate: **39%**



*Institutes can seem to receive higher than their negotiated rates for various reasons. Institutions sometimes negotiate higher rates for specific projects, for example.

TOP 10 EARNERS

The 10 universities that get the most money from the NIH together received more than \$1.1 billion towards their indirect costs. Their negotiated and calculated rates were slightly higher than the average for all universities.

INSTITUTION	TOTAL FUNDING	INDIRECT COSTS (%)	
		NEGOTIATED	CALCULATED
1 JOHNS HOPKINS UNIVERSITY	\$574,844,637	62	43
2 UNIVERSITY OF CALIFORNIA, SAN FRANCISCO	\$501,656,900	60	41
3 UNIVERSITY OF WASHINGTON	\$454,274,167	57	40
4 UNIVERSITY OF PENNSYLVANIA	\$451,194,908	57	39
5 UNIVERSITY OF MICHIGAN	\$412,016,862	57	38
6 UNIVERSITY OF PITTSBURGH	\$396,728,993	56	37
7 UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL	\$383,752,058	55	35
8 UNIVERSITY OF CALIFORNIA, SAN DIEGO	\$362,004,733	55	32
9 STANFORD UNIVERSITY	\$357,812,990	53	32
10 DUKE UNIVERSITY	\$350,249,092	52	32

NATURE.COM
For an interactive version and details on the methods used, see: go.nature.com/j9nefd

so some grants in RePORTER seem to have a reimbursed rate that exceeds the negotiated value. A change to the negotiated rate in the middle of a year can also cause a disconnect between the data *Nature* obtained and the rates given in RePORTER.

But overall, the data support administrators' assertions that their actual recovery of indirect costs often falls well below their negotiated rates. Overall, the average negotiated rate is 53%, and the average reimbursed rate is 34%.

The shortfall is largely due to caps imposed by the NIH on some grants and expenditures, says Tony DeCrappeo, president of the Council on Governmental Relations (COGR), an association in Washington DC that is focused on university finance. Some training grants, such as 'K' awards for early-career investigators, cap indirect costs at 8%. The NIH also does not award money for conference grants, fellowships or construction. And it has placed limits on specific categories, such as costs associated with research using genomic microarrays.

Such restrictions can make it hard to make ends meet, says Eaton Lattman, who heads the Hauptman-Woodward Medical Research Institute in Buffalo, New York. The institute negotiated a rate of 94%, but received just 52%. Although it does not incur some of the costly administrative burdens of hospitals or universities, it still fails to recoup its full investment on research, Lattman says.

The increasing competition for NIH grants is a major factor in that. Because funds used to support researchers who lose grants or have yet to win one cannot be reimbursed as indirect costs, Hauptman-Woodward must draw from its endowment to keep them working until they can support themselves. "If you don't want to kill their research career, you have to provide bridge funding," Lattman says.

The BBRI faced similar strains. The institute was dependent on NIH funding, and could not cope when the NIH budget tightened and faculty members brought in less grant money (see *Nature* 491, 510; 2012). "The general cost of operating the organization did not diminish as fast as the direct dollars," says Charles Emerson, former head of the institute and now a developmental biologist at the University of Massachusetts Medical School in Worcester. "So we were able to negotiate a higher rate at the end of our time there, just to keep the operation going."

By 2012, the BBRI's negotiated rate had swelled to 103%, the highest for any organization in the data provided to *Nature*. But it ended up recouping just 70%, or \$2.4 million on \$3.4 million in direct funding.

Although non-profit institutes command high rates, together they got just \$611 million of the NIH's money for indirect costs. The higher-learning institutes for which *Nature* obtained data received \$3.9 billion, with more than \$1 billion of that going to just nine institutions, including Johns Hopkins University in Baltimore, Maryland, and Stanford (see "Top 10

earners'). At 38%, the average rate for these nine institutions is about 4% higher than that for all institutions with available data. But the range for higher-learning institutions was wide, with one receiving 62% (York College in Jamaica, New York), and one receiving just under 3% (Dillard University in New Orleans, Louisiana).

SHORT CHANGE

Even if universities did receive the full, negotiated rate, it would still be less than the actual costs of supporting research, says DeCrappeo. The cap on administrative costs that emerged in the wake of the Stanford scandal has remained

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unchanged even though administrative burdens have swelled. COGR members maintain that their actual costs are about 5% higher than the cap, says DeCrappeo. The rest of the money must come from other revenue, such as tuition fees, donations and endowments.

The best solution, according to Barry Bozeman, who studies technology policy at Arizona State University in Phoenix, is not to raise the cap, but to cut costs by getting rid of administrative rules and regulations that are simply wasting time and money. "The research bureaucracy has inflated wildly in universities and it is expensive." That inflation, he says, is evident in grant applications. Thirty years ago, administrative requirements associated with grants were relatively low. "Nowadays, the actual content of the proposal — what people are going to do and why it's important — is always a small fraction of what they submit," he says.

As an illustration of the growing bureaucracy, DeCrappeo says that when the COGR began to keep a guide to regulatory requirements for its members in 1989, the document was 20 pages long. Now it is 127 pages. And Bozeman says that he has to fill out forms relating to the care of laboratory animals when he applies for grants, even though he has never used animals.

The regulatory burden can be particularly high for medical schools, which must adhere to regulations for human-subject research, privacy protection and financial conflicts of interest, among others. The Association of American Medical Colleges in Washington DC says that 70 of its members have spent \$22.6 million implementing conflicts-of-interest reporting guidelines that came into effect this year.

Other funders place strict limits on their

reimbursements. The US Department of Agriculture, for example, caps many of its reimbursements at 30%. Many philanthropic organizations do not reimburse for overheads at all, and those that do often pay less than the government rate (see *Nature* 504, 343; 2013). As a result, some institutions are reluctant to allow researchers to apply for such grants — providing another source of friction between faculty members and the administration.

Tight budgets and fierce competition for federal grants mean that faculty members are keenly sensitive to anything that might affect how much money they receive, says Lattman. Recipients of grants from the National Science Foundation (NSF) are particularly rankled, he says, because the NSF allocates money for indirect costs — at the federal negotiated rate — from the total grant awarded. In other words, researchers told that they will receive a \$1-million NSF grant might see only 60% of the money. The NIH, by contrast, typically gives faculty members the full \$1 million and then reimburses indirect costs in a separate payment to the university.

Even so, would-be NIH grant recipients often fear that a high indirect-cost rate at their institution will hurt their chances of getting a grant funded, despite the lack of evidence supporting any such trend. Others are troubled by the lack of transparency at many institutions as to how the indirect costs are calculated and the funds distributed. Because indirect-cost revenue is considered a reimbursement for money the university has already spent, much of the cash received from the government disappears into a university's general fund. "Faculty have always been somewhat in the dark," says Edward Yelin, who studies health policy at the University of California, San Francisco.

Although the payout for indirect costs is high, officials at the NIH say that the proportion of the NIH budget dedicated to overheads has held steady for more than two decades. When a 2013 report by the US Government Accountability Office warned that indirect costs could begin to eat up an increasing proportion of the NIH's research budget, the NIH countered that this was unlikely.

DeCrappeo is hopeful that regulations due to come into effect in December will rein in the proliferation of caps on indirect cost rates. The regulations will require officers at agencies such as the NIH to have any new caps on overhead reimbursement approved by the head of the agency and provide a public justification for the change. DeCrappeo says that this could lead to a more transparent process.

And for those who fret about where this money is going, DeCrappeo urges them to look beyond their own research programmes. "If all you're concerned about is the direct costs, it won't take long for your facilities to deteriorate," he says. "You can't do research on the quad." ■

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