University Restructuring Based on False Premise?

Recent studies contest the British government's argument that big science departments are better than small ones

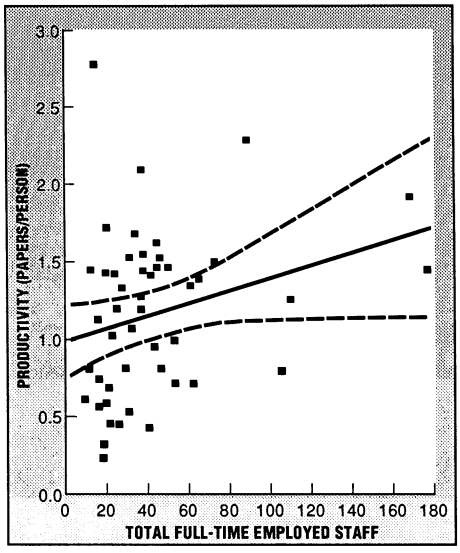
BRITISH UNIVERSITIES have recently been bracing for some radical restructuring by the Thatcher government, guided by the notion that large science departments are of higher quality and are more productive than small ones. As recently as last fall, government agencies were ready to close small science departments on the basis of that premise. Yet a recent analysis suggests the policy is misguided, because there is no empirical support for the idea that "Bigger is Better" in science.

The notion that bigger is better can be traced to a review of the earth sciences conducted in 1987 by Ron Oxburgh, professor of mineralogy and petrology at Cambridge University. Making use of a 1982 study by the U.S. National Academy of Sciences (NAS), Oxburgh concluded the five "best" U.S. geophysics departments had staffs of between 25 and 35. Comparatively few departments of geophysics in the United Kingdom were that size. The solution? Consolidate to create units of the right size.

In an article recently published in *Physics World*, however, Diana Hicks and James Skea of the Science Policy Research Unit at Sussex University argue that Oxburgh was wrong. Two of the five highly rated departments fall outside Oxburgh's "optimum" range, having 20 and 39 staff members. Furthermore, although there are fewer geophysics departments in the United Kingdom than in the United States, there is no significant difference between the two countries in the shape of the distribution curve for department size—and hence no need for consolidation to bring British departments into line with those in the United States.

Oxburgh is out of the United Kingdom and could not be reached for comment, but he has previously responded to Hicks and Skea by saying that distribution of departmental size was not the greatest influence on his thinking; less tangible measures were equally important. "But that's the only supporting argument which carries the weight of empirical evidence," Hicks points out.

Oxburgh was not alone, however. Two other reports—one by Sir Sam Edwards, professor of physics at Cambridge University, the other by Gordon Stone, professor of chemistry at Bristol University—came to similar conclusions about physics and chemistry. Hicks and Skea tear into them, too. They compiled lists of publications to assess the claim—made again in the Edwards and Stone reports—that big departments are more productive than small ones. Hicks and Skea conclude there is an effect of size on quantitative productivity (number of publications per individual), but that it is almost all due to two departments that happen to be both large and good: Oxford and Cambridge.



Deceptive outliers. *The two points at the far right are Oxford and Cambridge. When they are removed, the effect of department size on productivity vanishes.*

Hicks and Skea show that Oxbridge scientists *are* more productive than others: in physics they publish two papers a year to the outsider's one. But increased productivity, they say, is probably due not to department size but to other discrepancies: the teaching load at Oxbridge is lighter and they have extra sources of funding. If Oxford and Cambridge are removed from the data, the effect of department size on productivity vanishes.

According to Hicks: "If you're talking about making policy, you would look at that graph we've got [of department size versus papers per staff member—see graph on this page]. . . . Who's going to have a policy where you start closing university departments on the basis of a graph that's really fuzzy like that? It's ridiculous. There just isn't anything there. You find some small statistical result, but it's very easily destroyed by a very simple commonsense thing"—removing the points representing Oxford and Cambridge.

Another worker at Sussex—Jennifer Platt, a lecturer in sociology—concurs. Platt reviewed the literature and link between size and productivity and concluded that "the data are essentially random." She also found little evidence of consistent excellence at particular universities: The quality of a mathematics department, say, has little bearing on the quality of the chemistry department at the same university.

Yet notions about department size and the excellence of specific universities led the Advisory Board for the Research Councils (which advises the government on how research money should be distributed) to advocate concentrating resources in large departments at a few universities. "I would like to know on what basis do people make these confident policy decisions," Platt said.

Sir Sam Edwards responds with plenty of confidence—that the analyses from Sussex are wrong. They "totally contradict every piece of self-evident information" on the subject, he says. Edwards believes some universities are clearly better than others (noting that few foreigners could name more than 5 of the 50 British universities). Spreading resources around might increase the number of publications, "but you won't do research that anyone else in the world is going to take the slightest notice of."

Edwards also dismisses the findings of Platt, Hicks, and Skea on size. He thinks a department with 15 people cannot both teach a first-class physics course and do first-class research. "The Sussex people must be aware that either people are defaulting on their teaching duties or they're publishing trash. There are only 24 hours in a day."

This renewed debate comes at a critical time for British science. Until last October the Universities Funding Council (UFC), which decides how money will be spent for such things as salaries, equipment, and buildings, intended to close or amalgamate departments with fewer than 200 students and 20 staff members. The UFC has backed off but still says compliance with those guidelines will be a factor in deciding whether universities get funds.

Whether the "Bigger is Better" policy has withered away is unclear. What does seem clear is that the basis for that policy, trumpeted with such confidence a short time ago, has come in for potent skepticism.

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