COMMITTEE ON PLANNING AND BUDGET
Report of the Subcommittee on Returns on Research Funding

To the Academic Senate, Santa Cruz Division:

Introduction

The goal of this study is limited: to provide a general answer to the frequently asked question of whether the campus research enterprise in net generates money or not. The research issue has special urgency in the current budgetary climate of the state. As the amount of state support allocated on a per student basis to the University of California has decreased through time, the question of whether (and the degree to which) research money can produce revenue to buffer the effect of declining state support requires examination. This study is designed to answer that specific question. There are much larger, more complex questions about research funding that are not addressed here.

What is NOT included in this report?

The Committee on Planning and Budget (CPB) cautions that this limited study of the returns on research does NOT address the larger effects on the financial state of the campus and possible future distributions of FTE among divisions. Instead, we envision the report as the first stage of a broad investigation, to be conducted in 2007-08, of what the financial implications are for the campus to grow differentially in those areas that generate research monies. Such a full-scale study would have to address the following:

1. What are the differential costs of each Division's use of central campus resources (IT, Business Administrative Services (BAS), risk management and toxic waste disposal, library, etc.)? How are these costs differentially offset by income generated by the Division through indirect costs returns and/or large, faculty-taught student enrollments?

2. What are the differential costs associated with each division's draw on central funds in the personnel process?

3. What are the differential costs by division of start-up packages in relation to the university opportunity funds generated by the average faculty member of a given division? (This is related to question #2: what proportion of start-up funds comes from divisional as opposed to central sources?)

4. What are the fiscal start-up requirements and time to financial maturity for new academic disciplines and/or schools?

The above represent some examples of the larger contextual issues that are NOT taken into account in this report. We have intentionally excluded questions of campus culture (such as divisional variation in recruitment incentives and other differential costs) that reflect local administrative practices that need/may not continue in the future.

What does this report cover?

Our starting point is to assume that there are clear benefits to a vibrant externally funded research enterprise. The specific question we address is whether, in a narrow sense, money flows into or out of the campus research enterprise. Research funding is utilized for a wide range of activities that benefit the campus, such as enabling and maintaining state-of-the-art laboratories and research efforts in a range of disciplines, enhancing graduate student funding through GSR's, and providing high-level research experiences for both graduate and undergraduate students. Moreover, the research enterprise often leverages gifts of equipment from private industry and can generate intellectual property income. Additionally, research-derived monies directly fund the grant program of the Committee on Research, thus providing cross-campus benefits to the enterprise. Thus, we address the questions of whether the campus research enterprise pays for itself, and if so how much additional money does it bring?

The specific goal of the report is to examine the trade-offs between indirect cost returns to the campus and campus expenditures on start-up expenses. This is a relatively limited data set that does not include such factors as the differential costs of salary and instruction across divisions. Nor does it factor in the differential rate at which central administrative services (Information Technology, Business and Administrative Services, library, etc.) are used across campus, or any differentially-derived sources of support for these services. The purview of this report is thus narrowly focused on indirect costs: what activities they support in carrying out research and how they are negotiated.

A primer on indirect costs

To provide a general context for this report, we briefly describe research overhead or, as it is synonymously known, indirect costs. Indirect costs are the amount of money derived from grants to support the infrastructure associated with conducting sponsored research. This infrastructure includes the research-attributable portions of departmental administration, building use, operation and maintenance, the library, general administration, student services administration and sponsored project administration. A few examples include: expenses as diverse as debt-service on buildings, janitorial services, hazardous waste disposal, earthquake and disaster preparedness and prorated portions of administrators' salaries enter into the overhead rate calculation. The manner in which the overhead rate (or, in the Office of Management and Budget [OMB] terms, Facilities and Administration Expenses) is calculated for a given institution is complex, and the guidelines for how this rate is determined are given in the U.S. Government's Office of Management and Budget Circular A-21 (http://www.whitehouse.gov/omb/circulars/a021/a021.html). At UCSC, the current federal indirect cost rate has been negotiated for on-campus, non-equipment grants to be 51 percent. Operationally, this means that if a campus researcher (faculty or otherwise) needs to bring in $100,000 for a combination of salary, graduate student researcher support, and miscellaneous research expenses, the granting agency will award the university $151,000 —thus the researcher gets $100,000, while the $51,000 goes toward indirect costs. Lower rates can be (and are) negotiated in some circumstances or with

some agencies, and for off-campus research—for example, the University Affiliated Research Center (UARC) currently has a negotiated overhead rate of 17.8 percent. Furthermore, extramural funding to purchase equipment is not subject to overhead (that is, its indirect cost rate is 0 percent).

Extramural support is thus reported in two categories: overall/total and indirect costs. Total extramural support (much of it federal and in support of research) to the campus in 2006-07 was $110.6 million. The campus' total operating budget, for reference, was 485.3 million with the state's contribution to this being 182.1 million. The federal indirect cost return to the campus in 2006-07 was $13.3 million[1] (see divisional breakdown in footnote).

The federal indirect costs are, in turn, formulaically divided up and distributed according to the algorithm of Figure 1. 6 percent is retained at the UC Office of the President. The remainder is returned to the campus, divided into three categories: 20 percent goes toward the "off-the-top fund" which funds the administration of contracts and grants; 44 percent goes towards the campus general fund; 36 percent goes to University Opportunity Funds. This last category, University Opportunity Funds, produces clearly identifiable, and trackable, research-generated money that is distributed around the campus. This 36 percent (of 94 percent) is, in turn, subdivided into 40 percent that is returned to the Academic Division that generates the funds, 40 percent to the Provost/EVC for building infrastructure costs, faculty start-ups and other uses, 15 percent to the VC Research for seed funds and matching funds, and five percent to the well-known Senate Committee on Research grants. The University Opportunity Funds (UOF) thus provides the research-derived flexible funding that both contributes to the research enterprise and provides flexible monies that benefit the campus as a whole.

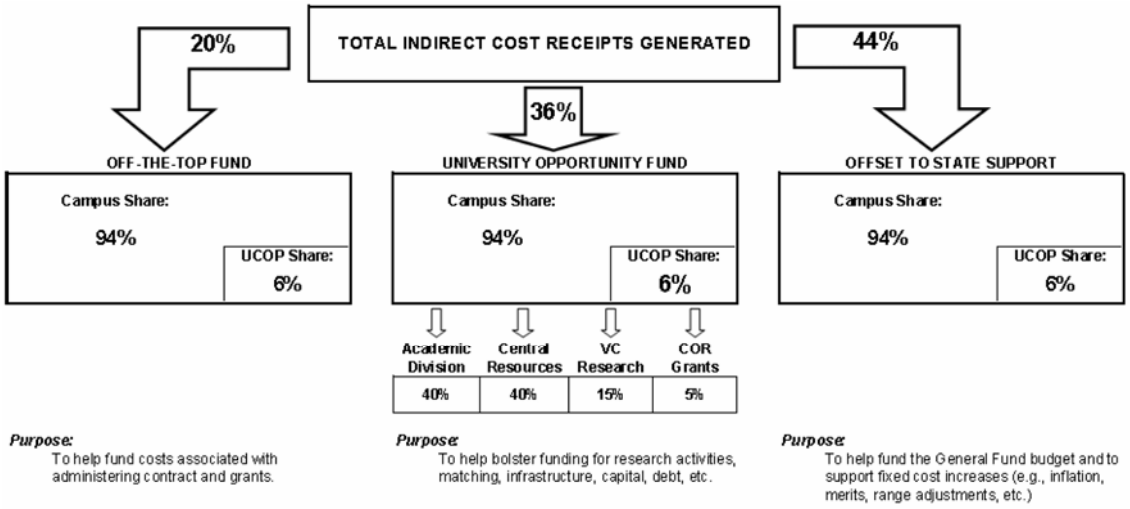

Figure 1. Allocation algorithm for indirect costs. From UCSC's Planning and Budget Office.

[1] The federal indirect cost recoveries (rounded) by division/unit for 2006-07 were: Arts, $25,000; Engineering, $2.5 million; Humanities, $14,000; Phys/Biol Sciences, $6.7 million; Social Sciences, $353,000; UCO-Lick, $1.1 million; UARC, $2.3 million.

What governs how much indirect costs are generated?

What factors determine how much the campus receives in indirect costs? Clearly, the disciplinary distribution of the faculty plays a key role, in that research in some disciplines requires more funding than research in other areas. The demographics and caliber of the faculty in overhead-rich areas also play critical roles. Mid-career and more senior faculty, on average, bring in substantially more grant money than junior faculty, and maturation of faculty (and their research enterprises) produces increased receipt of indirect costs: a possible example of this effect is the fact that the School of Engineering has doubled its rate of federal indirect cost recovery in the last half-decade. Thus, the demographics of the UCSC faculty in fields that yield significant indirect costs are important in determining the likely future of indirect cost receipts for the campus. For reference, the School of Engineering faculty is the youngest of any of the Divisions on campus, with (as of 2004) 78 percent of their faculty below the age of 49 (Arts is second with 53 percent; Physical and Biological Sciences [PBSci] third with 51 percent; Social Sciences had 49 percent; and Humanities 35.5 percent). Accordingly, while discipline-specific age distributions could profoundly shift where overhead is garnered, the overall demographics of the faculty are consistent with indirect-cost growth in engineering, and no retirement-driven crisis emerging in PBSci.

External effects such as the overall health of the federally funded research budgets of NIH, NSF and NASA will clearly impact indirect cost receipts, and future trends are difficult to predict in an uncertain national budgetary climate. Yet the currently available budgetary projections for NSF involve a projected increase (inflation adjusted) of 31 percent between 2007 and 2011 (e.g., http://www.aaas.org/spp/rd/nsf07p.pdf), and the NSF budget falls under the framework of the President's American Competitiveness Initiative, which provides some protection from anticipated future cuts in many domestic programs. The projected NIH budget is a different matter (http://www.aaas.org/spp/rd/07pch4.htm)--present projections anticipate a net decrease of 12 percent in this agency's budget over the next five years. If worse budget scenarios come to pass with respect to federal funding, we note that the most competitive investigators will receive funding. Thus, the ability to recruit and retain the best faculty possible is a key ingredient in obtaining significant indirect costs.

Our net overhead income for the campus has notably increased over the last half-decade (Figure 2). The causes of this increase are multi-fold, and include a general increase in federal funding to both the PBSci and Engineering Divisions as well as the onset of the UARC. From a UC-wide perspective, campuses that have medical schools (UCD, UCI, UCLA, UCSD, and UCSF) tend to have higher overhead income; among those without a medical school, UCSC has a slightly higher rate of overhead income per faculty FTE than Riverside, lags UCSB by 15 percent, and has about half the rate of UCB.

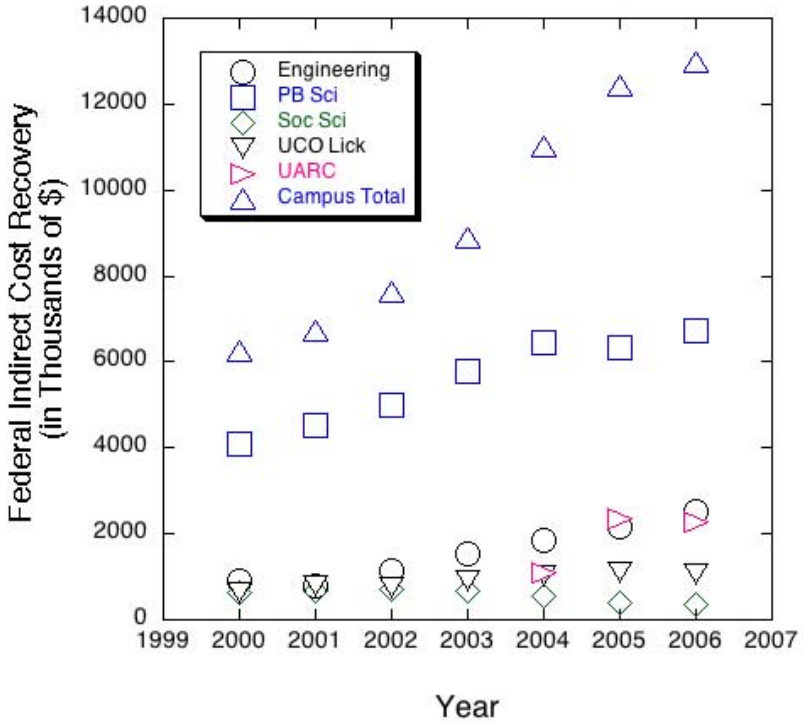

Figure 2. Federal indirect costs generated by different divisions and units on campus from 2000-2006.

Start-up expenses

Faculty start-up packages are among the principal research-related expenses. Start-up packages provide funding to new hires to jump-start their research efforts and are a critical part of recruitment packages in overhead-yielding disciplines. From 2003-04 to 05-06, such expenses varied between $48,000 and $655,000 for FTE hired in the PBSci Division (average of $284,000 for each FTE over this period), and between $65,000-$405,000 for the School of Engineering (averaging $174,000 over this period). Taken together, the combined start-up packages of these two divisions averaged $2.7 million/year over this three-year span. For comparison, the campus generated about $3.5 million dollars in Opportunity Funds in 2005-2006. These start-up expenses do not include recruitment incentives such as housing allowances that are not directly related to the research enterprise—these provide an additional expense associated with faculty recruitment, but one that is not exclusive to PBSci/Engineering.

Funds to provide start-up packages typically come from a combination of University Opportunity Funds (one of the portions of indirect costs, as shown in Figure 1) and from salary savings from faculty turnover (the amount retained in excess of an entry-level faculty salary) and divisions holding FTE open to accrue salary savings. In low-cost fields, the latter two are potentially sufficient to cover start-up costs. Of note, start-up packages are not used only for new FTE, but also for replacement FTE's; accordingly, both growth and attrition/replacements of FTE in these areas require strategic fiscal planning.

Analysis of the balance between start-up/recruitment expenses and indirect cost recovery

We examined the trade-offs between the fraction of indirect costs that go into opportunity funds and the net expense of hiring faculty with average-sized start-up packages. For this analysis, we made several assumptions, as detailed below.

First, we assumed that the negotiated overhead rate and its apportionment into off-the-top funds (20 percent of 96 percent, Figure 1) and offsets to state support (40 percent of 96 percent, Figure 1) cover the expenses of the general infrastructure of research, exactly as it is intended to do (e.g., power to labs, the Sponsored Projects Office, the research portion of Environmental Health & Safety, building use, etc.). We thus did not include this research cost in our balance calculation, because it should be covered by the off-the-top and offset-to-state-support portions of the indirect costs.

Our second assumption was that the average faculty member in PBSci and Engineering will bring in indirect costs at a rate comparable to that generated in 2005-06—an assumption that is, intentionally, conservative, given the faculty-disproportionate increases in overhead income shown in Figure 2.

Our third assumption was that the expense of start-up packages is represented by the expense of such packages in 05-06. In figuring these costs, it is important to make a distinction between actual research-related start-up expenses and total recruitment expenses. The latter include recruitment incentives that vary considerably by division. (See point #3 above, in section titled “What this report does not include.”) The net trend for actual start-up costs appears to be towards progressively larger average packages over time (for reference, the median does not show as clear a trend), but the level of appointments and the discipline and focus of the new FTE play primary roles in determining this number. Indeed, this trend is largely a consequence of the number of comparatively large start-up allocations that a division has utilized. As an example, over the last three years PBSci has allocated 70 percent of its start-up funds to 40 percent of its faculty hires, and the larger start-ups have been driven by the field and level of the FTE’s. In addition, there have been proportionally more high-end start-ups (loosely defined as larger than $350,000) in the last three years than previously. As a programmatic illustration of this effect, theoreticians generally have significantly smaller start-ups than experimentalists; the trade-off is that their anticipated overhead income may be smaller, as well. From a different perspective, a competitive offer to a senior hire may require a significantly larger start-up than a junior hire. The programmatic and demographic distributions of new hires thus play a principal role in the magnitude of start-up expenditures, and we take the faculty hired in 05-06 as a representative cadre of hires moving forward into the future.

The current average federal indirect cost recovery per faculty FTE in Engineering and PBSci are, in round numbers, $40,000 and $60,000/year, respectively, yielding

University Opportunity Fund yields of approximately 15,000/yr and 20,000/yr/FTE[2]. This amount reflects solely the indirect cost recovery generated by these divisions; the UARC is not included in this calculation.

Our ultimate goal was to ascertain the fiscal consequences of the CP/EVC's current Divisional FTE planning projections to a 19,500-enrollment build-out. With respect to start-up, it is important to note that the effect of FTE growth is modest compared to costs generated by the natural attrition of faculty; in the case of all divisions, more separations (and thus replacements) are anticipated before 2020 than the number of new faculty that are planned to be added. Thus, even without *any* faculty expansion, significant start-up resources and recruitment expenses would have to be allocated simply to maintain our current faculty distribution.

The estimated annual cost of hiring over 15 years the PBSci and Engineering faculty necessary both to replace and meet growth projections is near $4.7 million/year[3]. The total faculty[4] in these two divisions will generate $5.8 million/year of Opportunity Funds within their respective divisions. As stated above, 20 percent of the Opportunity Funds benefits the entire campus, and thus the current plan is anticipated to generate $1.1 million/year for the campus.

A reduction in faculty allocations to these Divisions is less expensive for the campus in the year of hiring, but correspondingly produces lower overhead returns on an ongoing basis. Conversely, additional hiring in these divisions costs the campus more in the short term, and generates greater ongoing overhead returns. For example, decreasing the number of hires in SOE and PBSci each by 10 faculty decreases the annual cost of recruitment to $4.2 million (from $4.7 million), and the corresponding Opportunity Funds generated by these divisions to $5.45 million/year (from 5.8 million).

Conclusion

The research income of the campus has markedly increased over the last half-decade, fueled partially by the ability to generate large scientific initiatives (for example, Lick's Center for Adaptive Optics) and other overhead-generating mechanisms (such as the UARC). The net trade-off between major faculty research expenses (primarily faculty

[2] University Opportunity Funds are the middle portion of Figure 1, and are 36 percent of 94 percent of the total indirect costs.

[3] The calculation was done by assuming over the next 15 years, as we grow to 19,500 enrollment, we will hire 80 faculty in SOE and 110 faculty in PBS. We used an average start up cost of $350,000 or $380,000, per SOE or PBS faculty, respectively. This start up cost includes a $50,000 recruitment incentive plus an estimate of research-related start up costs that is based on the recent average cost extrapolated up based on past trends in start up costs (from Planning and Budget Office). The divisional contribution of $50,000 and the salary savings from keeping a position open for one year were subtracted before arriving at the above number. This number, thus, includes costs that are not strictly related to research, but is an accurate estimate of the true cost of hiring in these divisions.

[4] Total faculty in SOE is estimated at 107 and PBSci at 212; this number is based on an SOE total of 125 and PBSci total of 235, with 10-15 percent open positions.

start-up expenses) and indirect-cost-generated opportunity funds appears, at the moment, to be roughly equivalent. This equivalence alone represents a major achievement, given that significant portions of the UCSC research enterprise are nascent or in the early stages of growth (such as large parts of the School of Engineering). The expense of faculty start-up illustrates the importance of faculty retention for the economic health of the research enterprise: to lose faculty recruited with large start-up packages within a few years of their arrival represents a significant economic loss to the campus. Finally, there is some inter-divisional flow of resources derived from overhead and thus the campus as a whole benefits from the enterprise: this benefit accrues both from the Committee on Research Grants, and, potentially, from the portion of University Opportunity Funds allocated centrally.

Acknowledgments: CPB gratefully acknowledges the invaluable assistance of Kathleen Dettman, Director of Academic Planning, Resources and Analysis, and Meredith Michaels, Vice-Chancellor of Planning and Budget, in putting together this report.

Respectfully submitted,

COMMITTEE ON PLANNING AND BUDGET
Faye Crosby, *ex-officio*
Ray Gibbs
Emily Honig
David Evan Jones
Tracy Larrabee
Karen Otteman
Grant Pogson
Ravi Rajan
Quentin Williams, *ex-officio* — Eben Kirksey, GSA Representative
Susan Gillman, Chair — Bryant Mata, SUA Representative

September 4, 2007