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Forging a Foundation for the Future:
Keeping Public Research Universities
Strong.

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FORGING A FOUNDATION FOR THE FUTURE

Keeping Public Research Universities Strong

A DISCUSSION PAPER FOR THE
APRIL 2010 REGIONAL MEETINGS ON RESEARCH UNIVERSITY

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PURPOSE

In this increasingly competitive world, innovation is a critical element in a nation's success. Research, of course, provides the base from which an important part of the most competitive innovations arise. The modern research university, with synergy flowing from a mix of research, graduate study and undergraduate instruction, is vital to simultaneously generating needed research while also educating future generations of researchers and able graduates primed by their education to take advantage of research findings. In recent decades, the core support for many U.S. research universities has deteriorated and their ability to serve the nation is threatened. The nation's web of public and private research universities is interdependent; significant weakening of major research universities reduces the ability of the system to serve the nation's needs. This paper is focused on the matter of preserving the nation's competitiveness by ensuring its research universities remain strong.

Consistent with the mission of A·P·L·U, this paper aims to provide a common background for A·P·L·U regional membership meetings during April 2010 that will focus on creating the conditions needed to assure the viability of public research universities. The paper:

- notes the historic contributions made by land-grant and other public research universities;
- reviews the deteriorating financial support for public research universities from their states and their continuing success in obtaining federal research funding;
- identifies the risks for the states and the country if this deterioration of financial support continues;
- speculates about the reasons for the deterioration; and
- outlines potential elements of the new foundation of support for public research universities that must be forged.

The paper's final section is divided into three short background papers on potential elements of a general solution to the research university funding problems as they are designed to serve as prompts for core breakout sessions at the five regional meetings.

The initiative for these meetings sprung from a session on Public Research University Competitiveness at the 2009 A·P·L·U Annual Meeting. The A·P·L·U [webpage](#) on the Future of Public Universities features a number of essays on various facets of the problem and proposals for resolution. The earlier A·P·L·U discussion papers on research competitiveness¹ and the cost and affordability of colleges² laid the groundwork for this paper.

¹ *Competitiveness of Public Research Universities & the Consequences for the Country: Recommendations for Change*, (A·P·L·U, March 2009) <http://www.aplu.org/NetCommunity/Document.Doc?id=1561>.

² *University Tuition, Consumer Choice and College Affordability: Strategies for Addressing a Higher Education Affordability Challenge*, (A·P·L·U, November 2008) <http://www.aplu.org/NetCommunity/Document.Doc?id=1296>.

PREFACE

In 2005, the National Academy of Sciences published *Rising Above the Gathering Storm*, a landmark report that recommended many courses of action to ensure the future competitiveness of the U.S. economy. Among their recommendations directly targeting research universities were: *Sustain and strengthen the nation’s traditional commitment to long-term basic research . . .*³ *become the most attractive setting in which to study and perform research so that we can develop, recruit, and retain the best and brightest students, scientists, and engineers from within the United States and throughout the world*⁴ and *ensure that universities and government laboratories create and maintain the facilities, instrumentation, and equipment needed for leading-edge scientific discovery and technological development.*⁵ While many of the recommendations of the report have been or are being implemented by actions at the federal level, the long-term reduction of real funding from the states to the nation’s public universities has reduced the ability of many of them to contribute to these goals. Given the national reliance on public universities for majority contributions to the nation’s need to advance knowledge and prepare new scientists and engineers, a serious decline in the capacity of public research universities critically risks the attainment of these national goals.

Concern about the future health of research universities is shared broadly. Just as *Rising Above the Gathering Storm* was initiated by a request from members of Congress, Senators Barbara Mikulski (D-MD) and Lamar Alexander (R-TN) and Representatives Bart Gordon (D-TN) and Ralph Hall (R-TX) asked the National Academy of Sciences on June 22, 2009 to initiate a new competitiveness study focused specifically on the health of research universities. Their request expressed concern that America’s research universities were “at risk” and asked that the National Academies study the competitive position of American research universities, both public and private, and respond to the following question:

*What are the top ten actions that Congress, state governments, research universities, and others could take to assure the ability of the American research university to maintain the excellence in research and doctoral education needed to help the United States compete, prosper and achieve national goals for health, energy, the environment, and security in the global community of the 21st century.*⁶

The National Academies agreed to perform the study and is now empanelling the study group. The deliberations and findings from A·P·L·U’s regional meetings will be summarized and submitted to the study group for their consideration. We will coordinate our communications to the National Academies study group with the American

³ *Rising Above the Gathering Storm*, (National Academies of Sciences, Washington, D.C., 2005) p. 6.

⁴ *Ibid*, p. 7.

⁵ *Ibid*, p. 8.

⁶ For a description of the letter and access to a PDF copy, see “Lawmakers Ask Academies to Study Ways to Help Research Universities,” *Inside Higher Education*, June 23, 2009 <http://www.insidehighered.com/news/2009/06/23/qt#201813>.

Association of Universities as they are also consulting their member universities on this same topic. But producing a document for the National Academies committee is not the sole purpose of the A•P•L•U regional meetings. Developing a common understanding of our funding problems and a consensus about solutions that should be implemented to preserve the health of public research universities will lead to productive courses of actions we might collectively and individually pursue in many venues.

Our focus is on public research universities because evidence of their deteriorating financial situation forces consideration of their critical ability to serve the nation's needs in the future. Writing in *The Chronicle of Higher Education* this year, Paul Courant, James Duderstadt and Edie Goldenberg describe a “failing” partnership between the states and federal government:

Today, the state side of the partnership is failing. Public institutions of higher education are gravely threatened. State support of public universities, on a per student basis, has been declining for over two decades; it was at the lowest level in 25 years even before the current economic crisis. As the global recession has deepened, declining tax revenues have driven state after state to further reduce appropriations for higher education, with cuts ranging as high as 20% to 30%, threatening to cripple many of the nation's leading state universities and erode their world-class quality.⁷

We trace the history of this decline in real public funding over recent decades by examining funding trends and discussing the effects and challenges that result. One potentially important indicator of public universities' decreased capacity resulting from this decline in public funding is their position relative to private research universities. We do not make these comparisons to argue public research universities should be funded on par with private universities; rather we seek to demonstrate a rapidly growing funding disparity. In an internationally competitive market for the human, intellectual and physical resources needed to produce high-quality research and education, a funding disparity of the magnitude we are seeing not only destabilizes the equilibrium that has long existed between U.S. public and private universities, but could put public research universities at a competitive disadvantage globally

A growing public/private research university salary, teaching load and student selectivity divide was first illustrated by the work of Thomas Kane and Peter Orszag⁸ in 2003. In areas such as faculty salaries, where parity between very high public and private research

⁷ Paul N. Courant, James J. Duderstadt, Edie N. Goldenberg, “Needed: A National Strategy to Preserve Public Universities,” *The Chronicle of Higher Education*, January 3, 2010, <http://chronicle.com/article/A-Plan-to-Save-Americas-Pu/63358/>.

⁸ Thomas Kane and Peter Orszag, “Funding Restrictions at Public Universities: Effects and Policy Implications,” *Brookings Institution Working Papers*, (Brookings Institution, September 2003); “Financing Public Higher Education: Short-Term and Long-Term Challenges,” *Ford Policy Forum*, (Brookings Institution, 2004), pp. 33-39; and with Emil Apostolov, “Higher Education Appropriations and Public Universities: Role of Medicaid and the Business Cycle,” *Brookings-Wharton Papers on Urban Affairs*, 2005, pp. 99-146.

universities was achieved in the decades of the 1970s, a 15 to 20 percent salary gap now exists.⁹

Our call is not to handicap private universities so public universities can compete. Indeed, their superior ability to secure funding has strengthened them to the benefit of their students, the nation and the advancement of learning. Rather, our call is to alert states, the federal government, private foundations and individual donors of the need to assist public research universities (and private ones that may also be financially disadvantaged) so that they, in concert with better funded private research universities, can continue to provide the quantity of high-quality research and education this nation requires.

What is the larger importance of this trend? This country depends on public research universities, which educate 85 percent of the undergraduate students and 70 percent of the graduate students enrolled in *all* research universities. Public research universities perform 62 percent of the nation's federally funded research while private institutions do 38 percent. If public universities should fail to be competitive for research grants or have to shrink the size of their student bodies due to budget restrictions, private research universities are unlikely to have available capacity to replace the lost output. Since the preponderance of enrollment growth in four-year university education has occurred among public universities in the past 50 years, there is reason to doubt whether private universities can or would expand enrollment in response to a decline in capacity at public institutions.

⁹ 2007 figures computed from IPEDS for Very High Research Universities on 2/09/10 are Public Full Professor, \$113,173, Associate Professor, \$79,551, Assistant Professor, \$68,703 and the Private counterparts, respectively are \$144,363,\$94,771, and \$79,999.

I. THE CONTRIBUTION OF PUBLIC LAND-GRANT AND RESEARCH UNIVERSITIES

Strong public research universities must be maintained because of the great research and educational contributions they make to society. Great treatises have been written on this matter and we will not repeat the evidence and arguments they contain.¹⁰ Rather we make explicit our premise: The education offered by public research universities is of high and unique character. These universities are committed to providing cutting-edge research and education at the bachelors, masters, professional and doctoral levels that is accessible to all students prepared to benefit from it.

Two streams have merged to produce today's public research university. The first is the well known land-grant stream which flows from the Morrill Act of 1862 and 1890. The second stream is other public research universities. A·P·L·U has 74 member universities in the former category and 114 in the latter. We distinguish the streams only because the purpose of the land-grant colleges was specifically spelled out in the founding legislation. Other public research universities were founded by the states from the late 1700s onward. Some began as private schools, some as seminaries, and some with the mission to deliver a classical education. But over time, all 188 of these institutions have come to orient themselves to the A·P·L·U mission statement that declares in part the historic mission of public higher education is:

... to offer access, opportunity, and a quality education to all who can benefit from the experience; to discover and develop the new technologies that will keep the nation competitive and safe; to produce a skilled workforce that meets America's needs and to provide new knowledge to citizens throughout their lifetimes; to contribute to the nation's national defense and security needs; and to support the advances in the sciences, arts, and humanities so vital to the cultural and social progress of this nation.

We thus acknowledge the different classifications of member universities with the understanding that the "public" in public research university has a substantive and reasonably uniform meaning for all of them.

Of A·P·L·U's 188 university members, 132 of them are classified by Carnegie (2005) as "high" or "very high" research universities. Clearly all of these universities fit into the "public research university" term we use here. But some of the 56 A·P·L·U members not in these two Carnegie classifications have a research intensive orientation when one considers indices like external grant dollars per faculty. The data we utilize in this paper for both public and private universities is for the three categories: "very high research," "high research," or both "high and very high research universities" with the category to

¹⁰ For example, see *The Future of State Universities*, Leslie W. Koepplin and David Wilson, Editors, (Rutgers University Press, New Brunswick, New Jersey, 1985); *Higher Learning, Greater Good*, Walter McMahon, (Johns Hopkins, 2009); and Jonathan Cole, *The Great American University*, (Public Affairs Press, 2009).

which the data applies identified in the text or footnote. Carnegie classifies 33 private universities as very high research and 27 as high research.

We intend by this expansive definition of research universities to acknowledge many universities have a legitimate claim to membership in the research university community. Because the actual degree of research intensity varies considerably across the universities in this group, some are minimally affected by the problems described here and others are maximally affected. Remedies should be tailored to the degree of impact applied on a merit basis, not across the board.

Our earlier paper, *Competitiveness of Public Research Universities and the Consequences for the Country*,¹¹ documented in some detail the scale of undergraduate and graduate education and its concentration in areas of national need—we do not repeat that analysis here. We also documented the scale and scope of public university research but find it helpful to add some texture to that discussion. It is critically important that research and education, both graduate and undergraduate, are joint products of public research universities. The character and quality of education depends on association with the generation of research. Public research universities produce high-quality research economically because of their public purpose and the interdependence of the educational and research functions.

Jonathan Cole, former provost of Columbia University, in his new book, *The Great American University*,¹² elegantly and effectively describes the major research achievements arising from U.S. research universities. Cole's approach is ecumenical; university and faculty names are used but the words "public" or "private" are not. This ecumenism is for good reason; research is not an event but a process occurring over time and space. Each individual idea is critically reviewed, refined, tested, and developed from notion to hypothesis, from theory to application. Almost every blockbuster discovery has such a chain stretching across public and private universities and across time. While credit for the final discovery or intellectual advance often gets associated in the public mind with a single university, those who understand research see the ecosystem that nurtured it.

The titles of three of Cole's chapters capture in a few words the expansive nature of U.S. research university achievements. The first, "It began with a Fly: Genetics, Genomics and Medical Research," takes us to Columbia University; University of California, San Francisco; Stanford University; Massachusetts Institute of Technology; University of California, Berkeley; and dozens of other universities from which basic discoveries led to treatments in use today to preserve, prolong and enhance human, animal and plant life. "Buckyballs, Bar Codes, and the GPS: Our Origins, Our Planet, Our Security and Safety," examines the nature of matter and the key steps of discovery that led to products like the computer and the Internet. Great universities like Princeton University; Iowa State University; University of Chicago; Stony Brook University; University of Washington; and University of Illinois are part of those steps. The third chapter, "Nosce

¹¹ *Op. cit.* <http://www.aplu.org/NetCommunity/Document.Doc?id=1561>.

¹² Jonathan Cole, *The Great American University*, (Public Affairs Press, 2009).

te Ipsum: Culture, Society and Values,” takes the reader into the arts, humanities and social sciences developments without which the word “university” would have far less meaning. Harvard University; University of California, Los Angeles; Yale University; University of Wisconsin; Johns Hopkins University; University of Virginia; University of Houston; and Yeshiva University are among those featured.

Without the set of research university developments Cole describes, life today would be far less productive, far less rewarding, far more mysterious and far shorter. Given the linkages of these great institutions, private and public, land-grant and other public research universities, one must speculate about the subjunctive. Were several great universities to have been so weakened that they could not support research, would the chain of research developments been broken? What would not have been discovered or invented that is key to today’s civilization? The probability that progress would have been interrupted or derailed is, of course, far greater if the whole set of public or private universities had been weakened. The intricate matrix that is society’s endowment of knowledge is dependent on investments made by tax payers at state and national levels, scholars, scientists, graduate students and donors. They jointly are responsible for the endowment that enriches us all.

The innovation of the 1860s—the land-grant university—combined highly qualified faculty interested in investigating phenomena and problems of both basic and applied natures with the education of both graduate and undergraduate students. That combination generated synergy that benefitted both education and research. It also fueled a dynamic outreach effort that dramatically improved agricultural and industrial productivity.

This innovation for most of its nearly 150 years needed less “selling” than is the case today. The federal inducement in the form of grants of land and the confidence of citizens that universities would benefit their lives provided sufficient motivation to prompt the necessary state expenditure. While the generosity of states waxed and waned with the contractions of the economy, funding for land-grant universities increased over time. In fact, most states over the ensuing years founded additional public research universities because benefits flowing from the land-grant schools were abundantly evident and replication was easily justified. Students, both undergraduate and graduate, were drawn to these new public universities by the modest cost of attending and the opportunities available upon graduation.

The last 20 years have seen a reversal of state generosity to public research universities as real per student appropriations have declined. How can we change the situation such that adequate public funding is again available? A look at the past may be helpful. In 1931, A·P·L·U’s predecessor, the Association of Land-Grant Colleges and Universities, commissioned four papers by land-grant university presidents and former presidents around the general theme “The Spirit of the Land-Grant Institutions.”¹³ At this time,

¹³ *The Spirit of the Land-Grant Institutions, Addresses Delivered at the Forty-fifth Annual Convention of the Association of Land-Grant Colleges and Universities*, (University of Arizona, 1931; reprinted 1961).

public universities were experiencing deep funding reductions as the country settled into the Great Depression. Rather than dwell on the worsening economic tragedy, the four presidents chose to celebrate the contributions land-grant universities—the public research universities of that day—made, in the belief that those contributions were so significant that public funding ultimately would be restored.

Particularly useful in detailing the functions of these universities were the remarks by W.J. Kerr, president of Oregon State University.¹⁴ He declared this new spirit of higher education had four elements:

1. The spirit of initiative—Pioneering;
2. The spirit of growth—Progress;
3. The spirit of equal opportunity for all—Democracy; and
4. The spirit of helpfulness—Service.

“Pioneering” was mastering existing barriers to progress and attacking others as they appeared. Scientific approaches to agriculture and engineering were invented at these schools and became disciplines of study for students. Despite skepticism expressed by the educational establishment that these new schools were “dreams of amiable but visionary enthusiasts” and “another illustration of the folly of attempting to make a silk purse out of a sow’s ear,”¹⁵ they rose to the occasion by teaching classics with skill and dignity while successfully developing and applying knowledge to emerging problems. They created the curricula needed to support society’s advancement on many new fronts.

“Progress” was described as what we today would refer to as research, both basic and applied. But to Kerr, progress also involved the university forging new applications of old endeavors, e.g., further developing the study of business and applying it in a rigorous way to farming, trade and manufacture. Another example of progress was social in nature: admitting women to these new universities on the same basis as men. Remember this was 1931 and, except for a relatively few universities, racial segregation at universities was the norm.

“Democracy” was many things to Kerr, but at the core of his thinking democracy was enabled by the ability of citizens to aspire to the high goals that they realistically could attain. Public higher education became the route through which the children of ordinary citizens most frequently achieved those goals. Democracy and higher education were mutually reinforcing. In the words of President Edward Elliott of Purdue: “If the land-grant college fails, neither democracy’s goal of education nor education’s goal of democracy will be reached.”¹⁶ Examples include: higher education’s creation of opportunity for students to choose to enter what he characterized as “thousands” of professions that grew up around the new fields and subfields of study these schools made available; the development of respect by those in agriculture and industry for higher

¹⁴ Ibid, pp. 7-23.

¹⁵ Ibid, p. 14.

¹⁶ Ibid, p. 18.

education and educators; and the increased efficiency of workers that relieved them from drudgery and provided the opportunity for enlightenment and leisure.

“Service” was fulfilling the obligation of the public research university to the entire commonwealth by sharing with the public both the new knowledge gained and graduates in whom that knowledge had been inculcated. Material gains that followed from scientific discoveries and the application of those discoveries to practical enterprises were the tangible payoffs. Kerr cited deserts made productive by modern methods; a sugar cane industry saved from the ruin caused by mosaic; standardized testing of sewer pipes, drain tiles and culverts that have affected enormous economies; better bridges; the modern carburetor; the long distance transmission of electricity; etc.¹⁷ Kerr saw the education of youth as the greatest service provided by universities but also recognized the difference that adult education programs produced for those who benefitted from it and their communities. Finally, he attributed much of the nation’s success in WWI to advances produced in the universities and to the technical and leadership abilities of the more than 100,000 university-educated officers.

The expectation that the new land-grant and public research universities would provide *pioneering, progress, democracy and service* constituted the compact among the federal government, the states and these universities in 1931. In a single sentence, as applicable today as it was then, Kerr summarized the key challenges the country needed public research universities to tackle:

*. . . of a developing frontier; of agriculture awakening to new problems and the possibility of increased production through machinery and new knowledge; of industry and commerce quickened by invention and enlarged demand for goods; of science offering new and unusual aids to education and life; of increasing dissatisfaction with the traditional type of higher education and growing demand for a new type suited to the needs of all rather than of a few.*¹⁸

Kerr’s summary has present day counterparts—our elementary knowledge of the genome is sufficient to demonstrate the existence of a vast frontier; most industries clearly see the potential for fantastic production increases through the application of technology; the Internet has provided only the first fruits of commerce quickening and markets enlarging; brain science is revealing pathways that can lead to improved learning; and the need to democratize learning to ensure our nation, with its reservoirs of citizens surviving at the margins and its continual flow of immigrants, realizes the benefits has never been greater. These and other challenges make public research universities as relevant and valuable today as in 1862 or 1931.

¹⁷ Ibid, p. 21.

¹⁸ Ibid, p. 12.

Perhaps the best current description of what public land-grant and research universities have accomplished is found in Atul Gawande's *New Yorker* article, "Testing, Testing."¹⁹ Gawande carefully outlines how research advances born in public research universities got to farmers through pioneering efforts we know today as extension, with the result that agricultural productivity flourished and cost per unit produced dropped accordingly. Importantly, he holds this up as a model for how the U.S. might conquer its health care cost problem while improving delivery.

Surely we can find ways to convince governments that public research universities have proved themselves by delivering *pioneering, progress, democracy and service* and should be properly funded so they can continue to provide these services in the future. We can demonstrate that the system of research universities, public and private, land-grant and other public research universities, adequately funded to attract, retain and support capable faculty, can continue the flow of innovation and ideas on which the quality of life we largely take for granted depends.

¹⁹ Atul Gawande, "Testing, Testing," *The New Yorker*, December 14, 2009
http://www.newyorker.com/reporting/2009/12/14/091214fa_fact_gawande?printable=true#ixzz0ZOUvSFQ.

II. DESPITE THE VALUE OF PUBLIC RESEARCH UNIVERSITIES THEIR REAL FINANCIAL SUPPORT FROM THE STATES HAS DIMINISHED

In the last 20 years, state governments have reduced the budgetary emphasis they place on higher education. During this period, states have collected a fairly stable proportion of personal income through taxes,²⁰ but have reduced the proportion of personal income they appropriate for higher education²¹ (Table 1). While the proportion of income taxed by the states has varied little, the proportion of personal income appropriated by the states for higher education has declined by roughly 30 percent.

Table 1: Taxation and Purpose

	Percent Taxed for All Purposes	Percent Taxed for Higher Education
1989-90	9.8%	1.07%
1999-00	9.6%	.88%
2008-09	9.7%	.72%

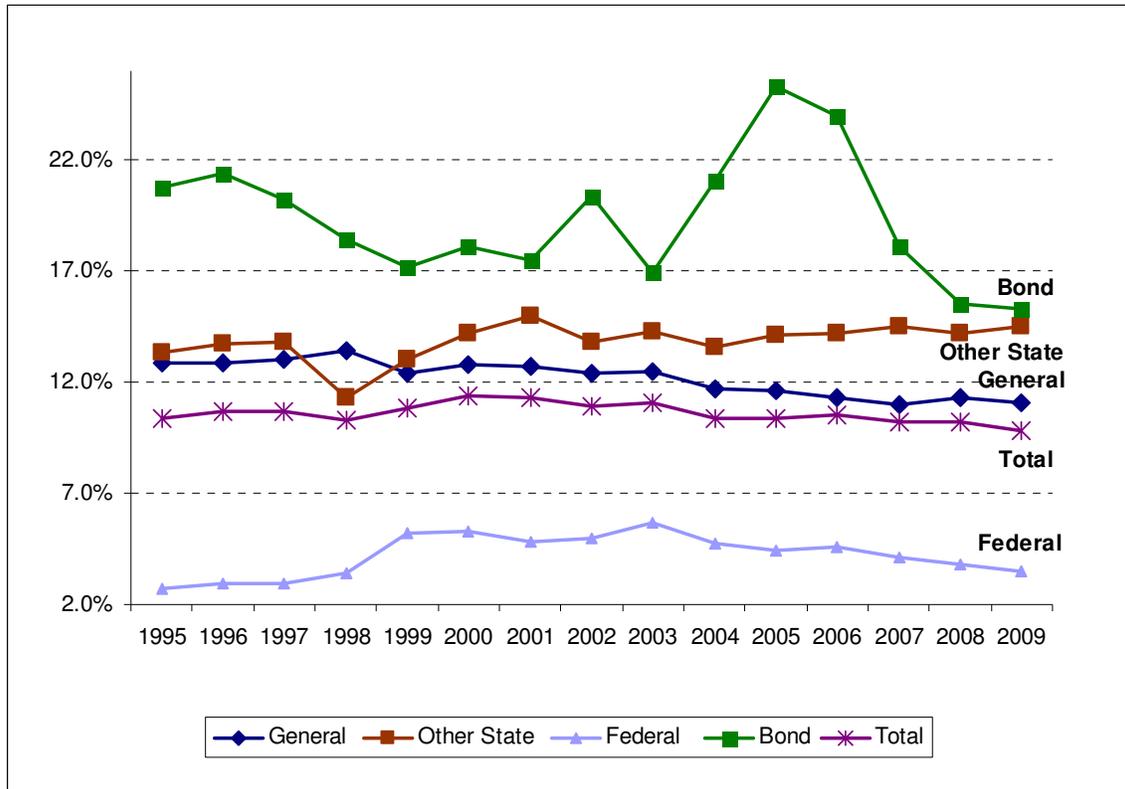
Source: See footnotes from the paragraph above.

The same picture with a little more complexity emerges by examining the proportion of state funds spent on higher education by fund source. In 1995, 12.9 percent of the general fund, the primary source of state expenditures, was spent on higher education. By 2009, only 11.1 percent was spent on higher education (Figure 1). Expenditures from other funds were more variable over this time period, but the aggregate of all funds exhibited the same downward trend as the general fund; 10.4 percent of total state funds were spent on higher education in 1995, but in 2009, 14 years later, this figure dropped to 9.8 percent. Thus, the shifting of expenditures among state sources that occurred during this period did not obliterate the overall downward trend in the aggregate figures.

²⁰ The Tax Foundation, State and Local Tax Burden, <http://www.taxfoundation.org/taxdata/show/335.html>.

²¹ "Ranking of the States on Appropriations of State Tax Funds for Higher Education per Capita and per \$1,000 of Personal Income," Historical Data, 1989-90, 1999-00 and 2008-09; *Grapevine*, (Center for the Study of Education Policy, Illinois State University) <http://www.grapevine.ilstu.edu/historical/index.htm>.

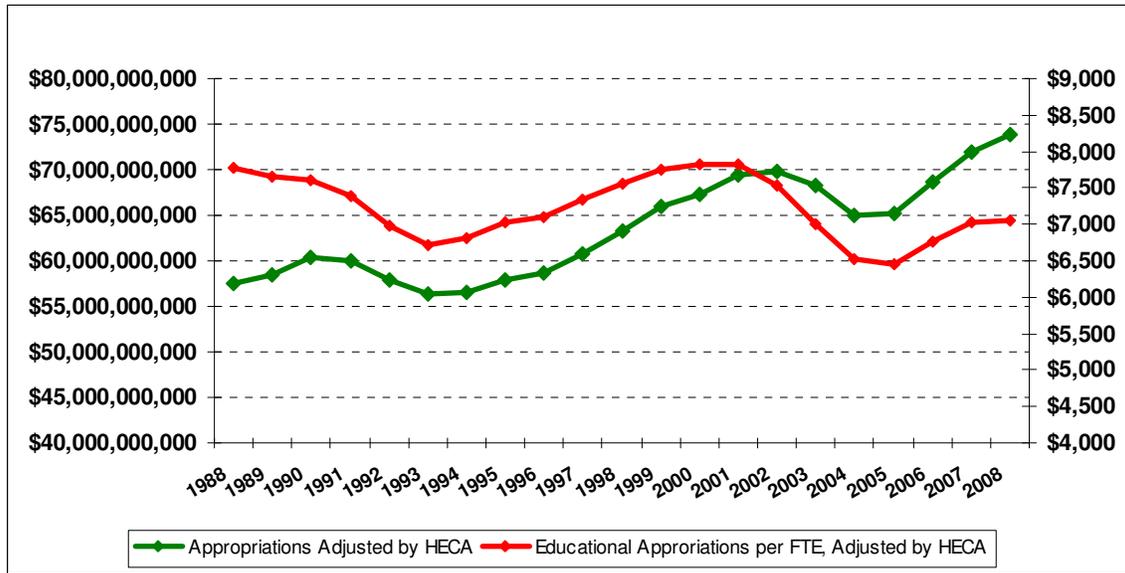
Figure 1: Proportion of State Funds by Source Spent on Higher Education



Source: National Association of State Budget Officers

State expenditures, in both real and current dollars, have increased over time so that even with a shrinking share allocated to higher education revenue increased. But the growth of revenue over the last 20 years was not large enough to outpace the growth in enrollment. Thus, the last 20 years saw the state contribution to public universities and community colleges per full-time enrolled (FTE) student in real terms decline (Figure 2). FTE students enrolled at public institutions increased 42 percent from 7.4 million in 1988 to about 10.5 million in 2008. This massive increase turned a 28.5 percent increase in real appropriations into a 9.1 percent decline in real appropriations per FTE.

Figure 2: Change in Real Appropriations and Per FTE Appropriations

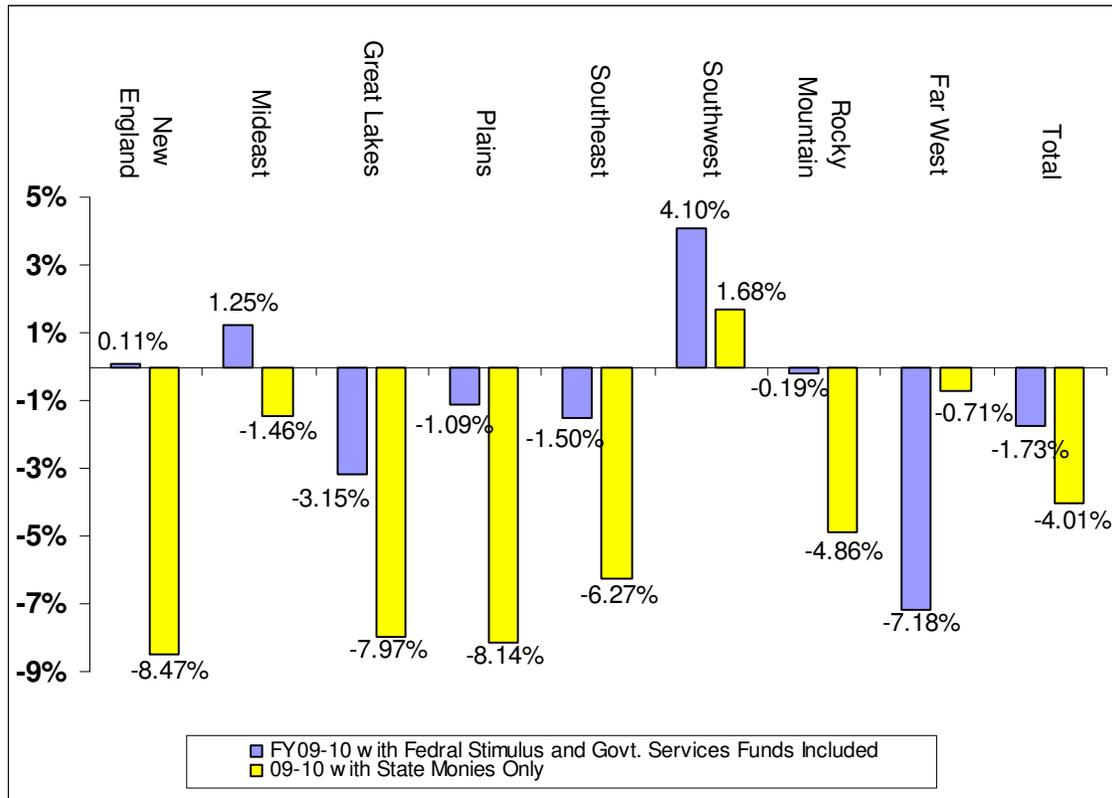


Source: Computed from SHEEO/SHEF

Note: “HECA” is the Higher Education Cost Adjustment, an index with seventy-five percent of its weight is given to the U.S. Bureau of Labor Statistics Employment Cost Index (ECI) and 25 percent of its weight is made up of the Implicit Price Deflator (IPD). HECA is routinely used by the SHEEO as their preferred adjustment for inflation.

Additionally, the short-run prospects for improving funding are exceedingly bleak. In January 2010, *Grapevine* and the State Higher Education Executive Officers Association surveyed states on their higher education funding, separating funding into that arising from federal stimulus and federal service funds and state sources only. Figure 3 below is derived from that survey with the data expressed in real terms (using the Implicit Price Deflator as a deflator). Since most of the federal stimulus funding has been allocated by the states and because state revenues generally have not begun to rebound from the recession, the state appropriations base in 2010 may be a predictor of total state appropriations to state universities in 2011, producing dire budget outlooks unless there is sufficient new federal funding produced from a “jobs bill.” The longer term outlook is also difficult unless there is significant and sustained growth in state economies and state revenues.

Figure 3: Public Higher Education Real Appropriated Funding Change between FY2009 and 2010 With and Without Federal Funds



Source: SHEEO and *Grapevine 2010*, http://www.grapevine.ilstu.edu/tables/FY10/GPV10_50state.xls

The decline in state support has been especially severe during the period 1987-2007 at public universities classified by the Carnegie Foundation as “high” and “very high” research universities. Real per FTE student state appropriations revenue declined 13.2 percent at very high research public universities and 12.9 percent at the high research publics. This stands in contrast to the slightly smaller real decline of 9.1 percent for all state higher education per FTE student.

Public research universities have raised tuition, but the increased revenue has amounted to just slightly more than enough to offset the decline in public funding. As a result, real educational expenditures per student at both high and very high research public universities have essentially remained constant, increasing at a meager 0.9 percent compounded annual rate between 1987 and 2007. Only at the very high public research universities was the compounded annual growth rate 1.09 percent.

III: FUNDING DIFFERENTIALS BETWEEN PUBLIC AND PRIVATE RESEARCH UNIVERSITIES HAVE WIDENED IN RECENT DECADES

One potentially important indicator of the decreased capacity of public universities resulting from the decline in public funding is their position relative to private research universities. We do not make the comparisons below to argue public research universities should be funded on par with private universities; rather we seek to demonstrate a growing funding disparity is developing. Because of the growth of the private/public funding differentials, faculty salaries have not kept up and competition for the most able students has become more difficult.

The superior ability of some private research universities to secure funding has strengthened them to the benefit of their students, the nation and the advancement of learning. We examine data on the differentials to alert states, the federal government, private foundations and individual donors of the need to assist public research universities (and private ones that may also be financially disadvantaged) so they, in concert with better funded private research universities, can continue to provide the quantity of high-quality research and education this nation requires.

During the 20 years (1987 to 2007) in which support for public universities was declining, private very high research universities have fared much better. Real, per student tuition revenues have increased at an annual compounded rate of 2.44 percent, nearly three times the rate educational revenues rose in their public counterparts. Tuition revenue per student alone for the private universities in 2007 was more than 1.61 times the sum of per student tuition plus state appropriations at public universities. The revenue per student disadvantage of the public research university becomes worse when endowment, investment and gift revenues are considered. During the period 1987-2007 at private research universities, on a real per student basis, these revenues increased from \$11,310 to \$73,496, a 9.81 percent annually compounded rate of increase. At public universities, these revenues rose from \$1,630 to \$2,540, an annually compounded 2.24 percent rate of increase.²²

Revenue from all sources has permitted private very high research universities to outspend, per student, their public counterparts by increasingly large amounts. Since both public and private universities hire faculty, recruit graduate and undergraduate students, buy supplies and build buildings in competitive markets, this resource deficit has meant public universities were less competitive than the privates in acquiring these key inputs to the educational process. These deficits are normalized on a per student basis.²³ Again, our concern is not the absolute differences but the fact that the funding

²² Data from Delta Cost Project IPEDS Extract.

²³ We use normalization on a per FTE student basis following the convention established in *The Growing Imbalance* (Delta Cost Project, 2008). We acknowledge that the data could be calculated on another basis, such as expenditures per degrees granted and it would exhibit a different pattern. The difficulty is that IPEDS does not identify costs with specific degree programs. Because private

differences between these competitors for faculty, students and other resources have grown in recent years.

IPEDS data, from which the data in this section were derived, generally are not posted for 18 to 24 months after the fall semester during which they were collected. That means the most recent IPEDS data, which will be posted in spring 2010, will be for the fall 2008 semester. The recent precipitous meltdown of stock markets began in fall 2008 and market averages did not reach their nadir until early in the second quarter of 2009.

Thus the major effect of the stock market on endowments²⁴ and hence, on university expenditure from endowments, will not begin to show up in IPEDS reported expenditure data until fall semester 2009 figures are posted in spring 2011. Similarly, the decline in state revenues, as the economy apparently fell into recession in the fourth quarter of 2008, and the consequent drop in state appropriations to public universities will not be fully reflected until the complete IPEDS posting in spring 2011. We cannot determine at this time from the IPEDS data whether the long-term decline in public university per student expenditure relative to private university expenditures was interrupted by the recession.

We know market values have rebounded from the 2009 trough since the second quarter of 2009 but state appropriations to universities continue to fall. Since gift, endowment and investment revenue made up 53 percent of the median private very high research university per student revenue (in 2006) but only 8 percent of the median public,²⁵ the precipitous market decline undoubtedly had a more pronounced effect on expenditure in private institutions. Similarly, the market rebound had the greatest relative effect on some of the private universities given their greater dependence on endowment income. Many endowment totals have recovered to the 2007 levels on which the IPEDS returns cited here are based.²⁶ We note the severe endowment decline (average of 18.7 percent in 2009) was just sufficient to take endowment levels back to where they were toward the end of 2006 as endowment values fell on average 3 percent in 2008 but grew by 17.2 percent in 2007 and 15.3 percent in 2006.²⁷ The continuing decline in gift income continues to negatively affect spending.

State appropriations made up 31 percent of public very high research university revenues per student in 2007 and essentially none of private revenue; thus the continuing decline in

research universities have a higher proportion of graduate students than public research universities, the interpretability of the resulting calculations would be problematic. But the important element in the data is the rate by which the deficit of public funding is growing. Because the difference in graduation rates between public and private universities have been relatively stable, the data formulated on a per graduate basis would exhibit the same trend as does the data formulated on a per student basis.

²⁴ Resulting in average losses in endowment value of 23 percent; see “The Truth About the Crisis in Higher Education Finance,” Burton Weisbrod and Evelyn D. Asch, *Change Magazine*, January/February 2010, p. 24.

²⁵ Delta Cost Project IPEDS Data.

²⁶ *Ibid*, p.25.

²⁷ “Endowments Declined 18.7%”, FY2009, (NACUBO/Common Fund Study of Endowments, Washington, D.C.).

state appropriations has its negative effect on public university expenditures. The decline that began in 2008 appears likely to continue into 2011.

Public universities increasingly use debt financing for facilities. The Council on Governmental Relations (COGR) cites a Moody's report that the largest public universities with Aaa and Aa1 credit ratings increased their debt for financing facilities by 54 percent between 2002 and 2006 while large private universities with Aaa ratings increased their debt by 38 percent.²⁸ The larger increase in debt for public universities might reflect their worsening base funding situation but clearly demonstrates public universities cannot rely on state governments to fund their facilities.

Prior to the recent recession, private research universities clearly were the better-funded sector and their economic circumstances may well improve more quickly. In a market economy the consequences of competitors having unequal funding are quite real and the equation may become more unbalanced.

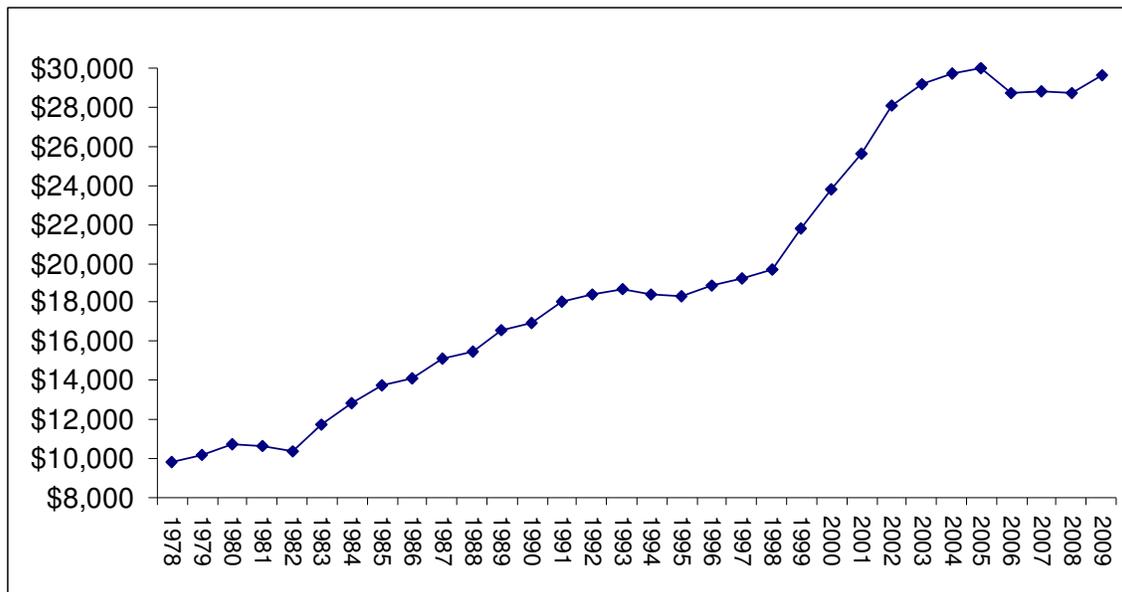
²⁸ *Finances of Research Universities* (Council on Governmental Relations, Washington, D.C., March 2008) p. 9.

IV: THE FEDERAL FUNDING PATTERN

This paper focuses on factors affecting the research competitiveness of public universities. Nonetheless, it is important to note the critical and sizeable role played by the federal government in enabling all segments of the population to access higher education through its extensive student financial aid commitments, including the GI Bill, subsidized student loans, Pell Grants, and Work-Study. The conferral of non-profit status both encourages donations and permits universities to put all of the earnings on endowments toward supporting students and research. It is appropriate to focus on the more than \$30 billion in support of university research provided by federal government agencies and foundations (Figure 4).

Thus far, declining support for public research universities does not seem to have affected their competitiveness for federal research grants and contracts. Real federal funding for basic research increased rapidly from 1999 to 2005 as Congress corrected budgets for the slow growth of the previous decade. From 2005 to 2008, funding fell and did not begin to increase until the American Recovery and Reinvestment Act or stimulus money was appropriated in 2009. Over the last 20 years, real growth occurred at a compounded annual rate of 2.93 percent per year, in marked contrast to the decline in state appropriations to public universities during this period. We note the increase in research funding has not benefitted all fields of research equally. The annual real rate of growth in agriculture research has declined from 3.58 percent in the 1950s and 1960s, to 1.74 percent during the 1970s and 1980s, to 0.99 percent in the 1990 to 2007 period.²⁹

Figure 4: Federal Basic Research Funding (Constant 2008 dollars, in millions)

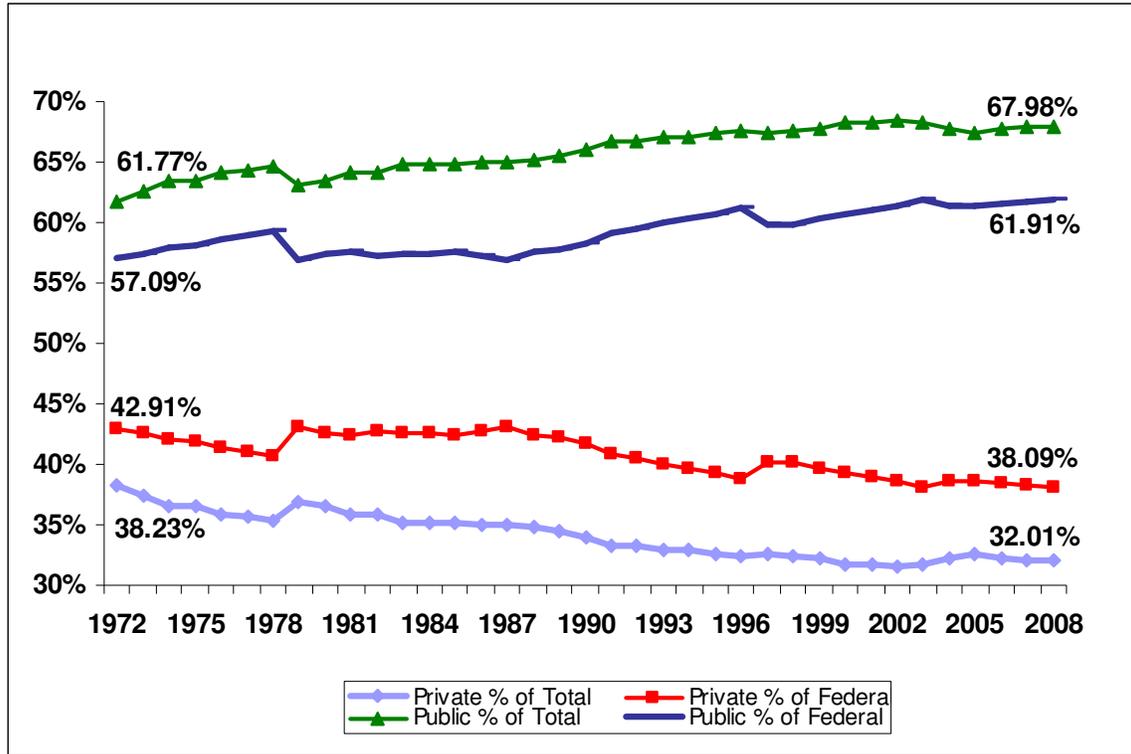


Source: Table 36: Referral Research and Development Obligations, National Science Foundation, <http://www.nsf.gov/statistics/nsf08315/tables/tab36.xls>

²⁹ Philip Pardey and Julian Austin, *U.S. Agricultural Research in a Global Food Security Setting* (Center for Strategic and International Studies, Washington, D.C. 2010) p. 4.

As judged by the share of available money received (Figure 5), public universities have been slightly more successful than private universities in competing for a share of federal research funding.

Figure 5: Public and Private University Percentage of Total University R&D and Federal R&D Expenditures.



Source: Calculated from *Federal Funds for R&D* (various years), National Science Foundation, <http://www.nsf.gov/statistics/fedfunds/>

V: EFFECTS OF REDUCED STATE FUNDING ON PUBLIC UNIVERSITIES

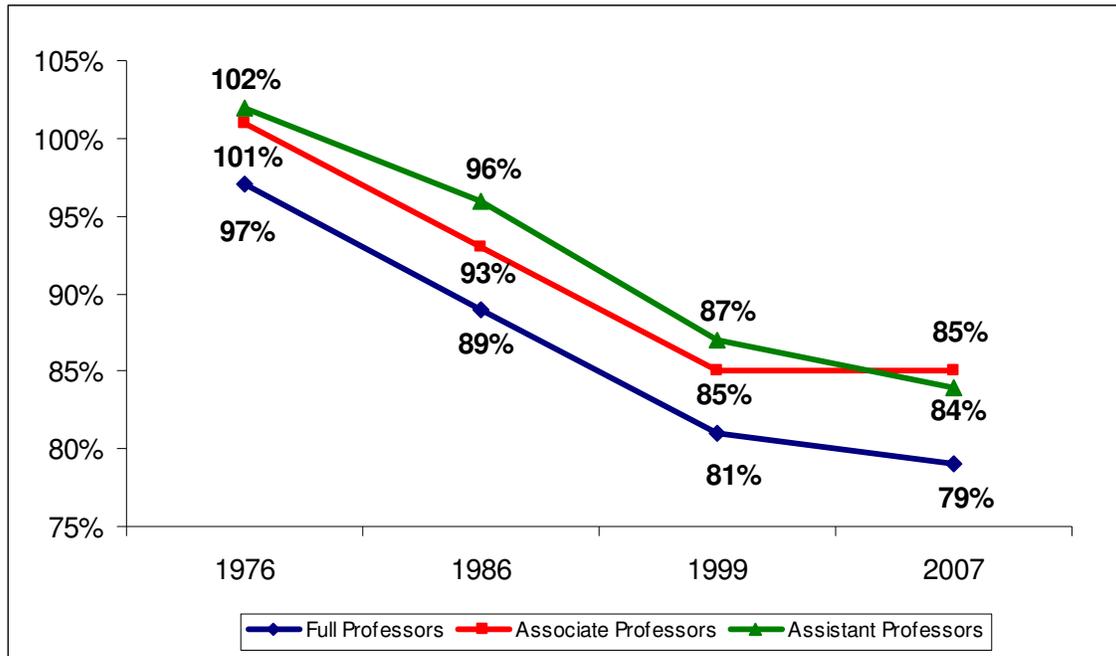
Long-term decline in the competitiveness of public research universities is obvious to anyone affiliated with our institutions. Though difficult to compile national data, it is evident in the effects of state budget stringency that are experienced to varying degrees across public research universities, including:

1. Difficulty in positioning faculty for competitive research grants because of the need to create start-up funds or laboratory facilities comparable to those being created by the investments being made by private universities in the United States and by other nations in their best universities.
2. Shrinkage of tenure-track positions available to young faculty and new Ph.D.s. Growing dependence on part-time faculty discourages the best and brightest to pursue academic careers.
3. Loss of existing prominent faculty and some increasing difficulty in attracting top caliber young faculty in competition with private universities. Public university average faculty salaries have moved from on par with private universities down to the 80 to 85 percent level, depending on faculty rank^{30,31} (Figure 6).
4. In ability to develop and capitalize on new ideas, new degree programs, and new initiatives because proposals for new initiatives cannot compete with existing programs for scarce funds.
5. Eliminate or cut back research centers funded by institutional funds, largely in the humanities and social sciences.
6. Resistance to or elimination of the possibility of interdisciplinary centers or programs because departmental resources are shrinking and they call upon faculty to concentrate on departmental activities.
7. Declining access to a broad spectrum of students, especially the middle class, because of rising tuition and greater recruitment of full tuition payers from out-of-state. The consequences of the resulting squeeze are perhaps felt most severely by the middle class.

³⁰ We seek data to determine if and whether this public/private faculty salary disparity varies by discipline. The American Society for Engineering Education provided data for Engineers by rank for the years 2006 and 2008. That data show public engineering salaries to be about 95 percent of those in private universities.

³¹ The 1976 and 1986 data are taken from Kane and Orszag (*op. cit.*) pp. 6, 7 and 26. The 1999 and 2007 data are from AAUP Annual Salary Surveys, and 1976 and 1986 data from Kane and Orszag, *Funding Restrictions (op. cit.)* pp. 26. The data from the earlier pair of years are not strictly comparable to that from the latter pair as the 2005 Carnegie classifications were used for the later years and the 2000 Carnegie classifications were used for the earlier years.

Figure 6: Ratio of Salaries of Full, Associate and Assistant Professors: Public/Private



Source: See footnotes in the paragraph above.

8. Difficulty of students to register for the classes necessary to graduate on time because of cutbacks in offerings and unfilled faculty positions.
9. Inability to invest in campus infrastructure, such as computational capacity, libraries or classroom modernization as necessary.
10. "Privatization" of many aspects of the university, such as professional schools, which often are required to generate their own revenue.
11. Shift of scarce resources toward disciplines that generate revenue through overhead, at the expense of others, such as humanities and social sciences.
12. High levels of debt are incurred by graduate students because the stipends paid for research assistantships or teaching assistantships cannot support them and the fringe benefits available, especially health insurance, tend to be .
13. Cutbacks in the service functions of public universities in their states and communities because universities do, and should, put serving students first.
14. Cuts in services to students, such as psychological counseling, academic advising, career advising, career centers, learning and tutorial centers, health centers, etc., leaving students more on their own and more vulnerable at the time they may need the most help. Alternatively, charging for these services results in an additional financial burden for students.

15. A decline in competitiveness for the nation’s best undergraduate students. Private research universities now draw their students from the top 10 percent of the high school graduating class while public universities draw from the top half. This represents a significant change during the 1986-2007 years (Table 2).

Table 2: Change in SAT Scores of Entering Freshmen, 1986 to 2007

	Public Very High Research Universities 2001	Private Very High Research Universities 2001	Public Very High Research Universities 2007	Private Very High Research Universities 2007	Relative Gain of Private Over Public Universities 2001-2007*	Relative Gain 1986 to 2000 Matched Selective Group of Public and Private Institutions**
Sat Critical Thinking 25th percentile	516	626	517 (55 th percentile of all students)	638 (87 th percentile of all students)	11	12 to 18
SAT Critical Thinking 75th percentile	627	719	632 (85 th percentile of all students)	736 (98 th percentile of all students)	12	12 to 13
SAT Math 25th percentile	537	652	544 (58 th percentile of all students)	659 (88 th percentile of all students)	0	16 to 23
SAT Math 75th percentile	649	737	657 (87 th percentile of all students)	753 (97 th percentile of all students)	8	17 to 23

Source: Computed from IPEDS ** from Thomas Kane and Peter Orszag, Brookings Institution Working Paper, September 2003, p.12. Percentile ranks from SAT percentile ranks, College Board

This relative decline in the preparation of entering students is a complicated issue. Public universities are appropriately under pressure to educate students from all income and social backgrounds. They have been increasing their need-based aid more than their merit-based aid to help accomplish this end.³²

³² *Opportunity Adrift: Our Flagship Universities are Straying from their Public Mission*, (Education Trust, Washington, D.C., 2010) p. 11
[http://www.edtrust.org/sites/edtrust.org/files/publications/files/Opportunity%20Adrift\(\).pdf](http://www.edtrust.org/sites/edtrust.org/files/publications/files/Opportunity%20Adrift().pdf)

VI. RISKS TO STATES AND THE NATION FROM DIMINISHED PUBLIC RESEARCH UNIVERSITIES

We have no evidence to show the resource challenges facing public universities have caused the quality of instruction to decline, nor research quality to suffer either in absolute terms, or in comparison with private universities.³³ We know that despite the growing revenue disadvantage per student, public research universities have slightly increased the proportion of federal grants they receive. However, with their rapidly diminishing ability to compete head-to-head with private universities for the best faculty and students, one has to worry that some decline in the quality of teaching and/or research at public research universities may be in the offing.

The mechanism through which the effect of relatively smaller resources at public universities than at private universities is transmitted is the labor market. Lower pay, higher teaching loads and a smaller proportion of high-ability students makes faculty positions at public universities less attractive. On each of these dimensions, the level of competitiveness of public universities has steadily worsened over the last 20 years and the private minus public gap is now quite noticeable. Today private universities have a competitive advantage over public universities when competing for faculty. It would be a strange market if the employers offering the best pay and working conditions did not use that ability to hire the most productive faculty members.

Perhaps a harbinger of the first stages of research decline by public universities is the recent National Bureau of Economic Research (NBER) working paper by James Adams.³⁴ He found that the number of citations to published scholarly papers by faculty members at public universities in the United States is failing to keep pace with the flow from their private counterparts. His statistical investigation revealed a slowdown in the growth of resources was closely associated with this development. The abstract of his piece states the connection: “These developments can be traced to slower growth in tuition and state appropriations in public universities compared to revenue growth, including from endowment, in private universities.”³⁵

The relative decline in citations to published scholarly articles in journals that select papers after careful peer review could suggest a relative decline in the productivity of public university researchers already has occurred. If so, this is not a positive sign for graduate education and for future competitiveness for federal research grants.

³³ The Voluntary System of Accountability (VSA) with its measurement of learning outcomes is not part of the private universities’ University and College Accountability Network (UCAN).

³⁴ James D. Adams, “Is the U.S. Losing its Preeminence in Higher Education,” *NBER Working Paper #5233*, August 2009.

³⁵ Ibid.

Any decline in the quality or output of research from U.S. public universities, could impact the nation's global standing. Confirming evidence of the United States' relative decline in scholarly publications comes from a recent study reported by the *Financial Times*.³⁶ It found China, Brazil and India led the United States in the rate of growth in scholarly publications from 1990 to 2008. While the United States remains the largest producer of scholarly journal articles, China is now second and, "if it continues on its trajectory it will be the largest producer of scientific knowledge by 2020." Evidence of this change can be found in the rapidly multiplying international rankings of universities and the declining dominance of U.S. institutions. While there is some disagreement about the importance given to these rankings,³⁷ there is much evidence emerging that the energy and resources being invested in universities worldwide will challenge U.S. dominance in higher education in the future. Further funding losses in the large public sector American research universities can only hasten the decline.

In the breakout background paper for the group discussing full payment of overhead by the federal government, we document the increase in use of institutional funds to pay for research over time. Public universities have increased the proportion of total research paid for with institutional funds from 14.2 percent in 1972 to 24 percent in 2008.

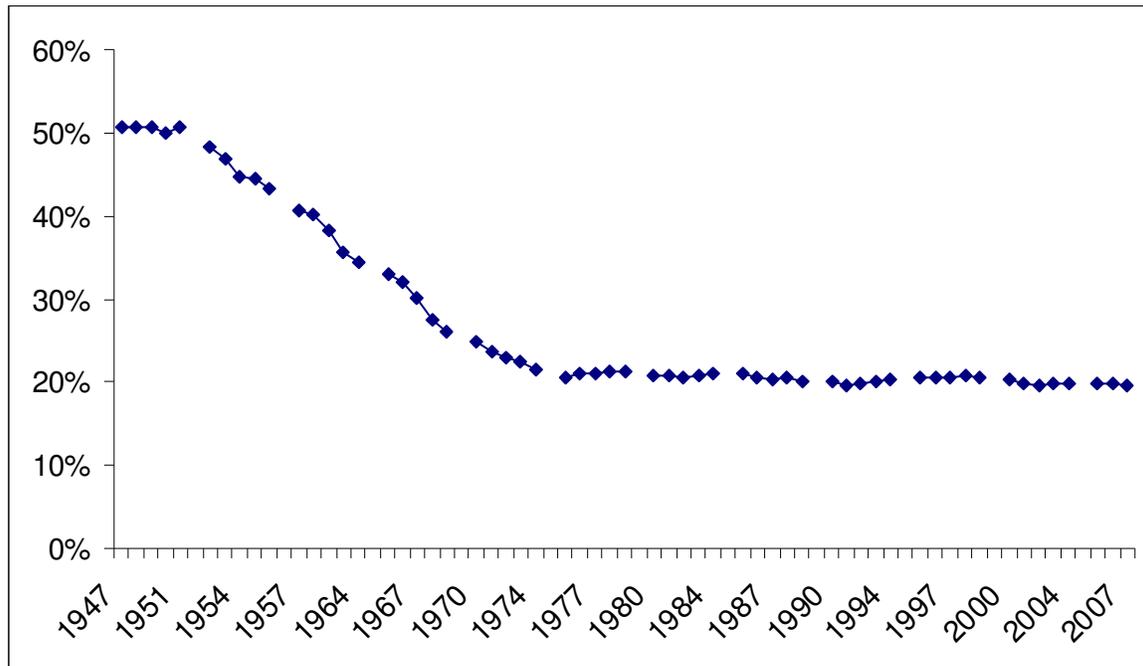
Given the smaller volume of resources available to public universities, this five percentage point increase in research supported with university funds is worrisome. With their real appropriations per student diminishing and demands to subsidize student access increasing, supporting a larger proportion of research with university funds is clearly an unsustainable practice. It appears public universities have used their own funds to support research to help recruit and retain faculty who on average could have earned more at private universities. If this has been the cause of this practice and internal funds become less available to support research in the future, public universities will be less able to compete with universities around the world for the faculty who enable them to contribute to global scientific advancement.

What is the larger importance of this trend? This country depends on public research universities, which educate 85 percent of the undergraduates and 70 percent of the graduate students educated in all high and very high research universities. They perform 62 percent of the nation's federally funded research. If public universities should fail to be competitive for research grants or have to shrink the size of their student bodies due to budget restrictions, private research universities are unlikely to have available capacity to replace the lost output. Since the preponderance of enrollment growth in four-year university education has occurred in the public universities in the last 50 years, there is reason to doubt whether private universities can or would expand enrollment in response to a decline in public capacity (Figure 7).

³⁶ Clive Cookson, "China Scientists Lead World in Research Growth," *Financial Times*, January 25, 2010, <http://www.ft.com/cms/s/0/7ef3097e-09da-11df-8b23-00144feabdc0.html>.

³⁷ For a recent discussion of the changing face of international rankings see Aisha Labi, "Rankled by Rankings", *The Chronicle of Higher Education*, February 2, 2010, http://chronicle.com/article/Criticism-of-Global-Rankings/63786/?sid=at&utm_source=at&utm_medium=en.

Figure 7: Percent of U.S. Postsecondary Degree Granting Enrollment in Private, Not-for-Profit Institutions



Source: Table 188: *Digest of Education Statistics, 2008*

The February 16, 2010 report, the Annual Licensing Activity Survey by the Association of University Technology Managers (AUTM), highlights the importance of public universities to our economy. During the reporting year research at public universities created 358 start-up companies, executed 2,891 new technology licenses (16,555 are actively in force), applied for 6,460 new patents and had 1,791 patents issued to their researchers. These are absolutely large numbers and represent in each category about two-thirds of the total activity by research universities³⁸. Interestingly, this proportion is about the same as that of the federal research and development performed by public universities.

The consequences for the United States should public university education or public university research become second rate in quality or decline in overall delivery capacity are significant. Given their large proportion of total higher education and funded research activity, our economy's international competitiveness would decline over time as loss of public research university capacity led to decline in our overall level of human and intellectual resources. In 2008, the United States ranked 10th among Organisation for Economic Co-operation and Development (OECD) countries in the proportion of its 25 to 34-year-old population with terminal degrees; this was a sharp decline from our 4th position in 1997. What would our rank fall to in a few years if public universities failed

³⁸ Goldie Blumenstyk, "University Inventions Sparked Record Number of Companies in 2008," *The Chronicle of Higher Education*, February 15, 2008 http://chronicle.com/article/University-Inventions-Sparked/64204/?sid=pm&utm_source=pm&utm_medium=en.

to maintain their level of degree production? Adams' ³⁹ work on the decline in scientific publications that he traces to public sector funding problems suggests relative intellectual resource decline may already be underway.

The warning to this country in Thomas Friedman's *The World Is Flat* is barriers that once served to protect a nation's commerce are relatively ineffective in a world where work of many types can be done anywhere. *Rising Above the Gathering Storm* warned that unless we kept our basic research current and enabled the best scholars from throughout the world to practice their creativity in the United States, we would be exposing this country to a competitive decline. The important public research university sector has been allowed to deteriorate due to state under-funding. We are increasingly putting the competitiveness of our economy at risk and proving the accuracy of the warnings we've been given.

³⁹ Ibid.

VII: WHY ARE THE STATES REDUCING THEIR SUPPORT?

Why have the states reduced real appropriations per student over the last two decades when those cuts may portend such negative consequences for the country? There are many possible explanations, but despite the frequently cited explanation that demands for public dollars for other government purposes (e.g., providing prisons, meeting the federally imposed requirement for Medicaid matching funds, improving elementary and secondary education or rising health care costs, etc.) have outstripped revenue growth and taken funds from higher education, the bottom line is states are *choosing among alternative beneficiaries* and higher education has not been competitive.

While we speculate about reasons for reduced state support in this section of the paper, a strong foundation for the future must have as an element the return to solid state financial support of public research universities. It should be noted that increasing the proportion of state budgets going to higher education by only a couple of percentage points, e.g. from 9 to 11 percent, would greatly change the picture. Budgetary priority of that magnitude fits the historical pattern and is consistent with the growing importance of higher education in our society. Nevertheless, states have not made the choice to expand their emphasis on higher education. Clearly states must continue to play an important role in financing public universities because there is no alternative source of funds to support important parts of their activities, but public higher education's historical financing model that kept tuition low compared to private universities by subsidizing basic functions with state dollars is under severe strain.

Much has changed in the nearly 150 years since the Morrill Act was passed. In 1862 state borders confined most university graduates and applications of research to the state in which the university that granted the degrees or conducted the research was located; this proximity ensured citizens of the state who paid the university's bills were the beneficiaries of the expenditures. Some public research university graduates and their research products escaped state borders but the "leaks" were very slow. Thus if teachers, accountants or lawyers were needed, most of them had to be produced by institutions within the state. If the farmers or manufacturers were to derive benefit from agricultural and mechanical research before their competitors in other states had access to it, that research had to be done in their state university. Washington apple farmers, Michigan auto firms, and Georgia peanut growers were unlikely to have access to the specific research results and technical assistance they needed, except from their state research universities.

Today labor markets are worldwide as are product and services markets. Not only do educated people move in and out of state and national borders but even the services that educated people produce (like audits, actuarial and legal services) move electronically across borders with ease. Educated people do not even have to move across state borders as the products of their education move across them so easily. The fruits of research are instantly shared through the Internet. University of California research on grapes benefits California vintners, but it almost immediately benefits Chilean, Australian, South African and Virginian vintners as well. University of Washington semi-conductor research serves

the successful firms in Washington state but Chinese, British and Massachusetts firms benefit from it quickly. State borders in 2010 confine little economic activity.

Courant, Duderstadt and Goldenberg applied an analogous argument to graduate education:

The model of state-based support of graduate training made sense when university expertise was closely tied to local natural-resource bases like agriculture, manufacturing, and mining. But today's university expertise has implications far beyond state boundaries. Highly trained and skilled labor has become more mobile and innovation more globally distributed. Many of the benefits from graduate training—like the benefits of research—are public goods that provide only limited returns to the states in which they are located. The bulk of the benefits is realized beyond state boundaries.⁴⁰

To have an educated workforce in one's state, even a state with a vigorous economy can at least partially rely on attracting students educated in other states. With on-line education students within a state can stay at home and earn degrees from institutions elsewhere. Borders today are reliably porous.

Clearly states benefit from having robust public research universities within them. Their presence helps keep some of the best and brightest from moving out of state, they bring faculty and students from throughout the world and they serve as magnets to attract industry.

Thus it is not that states fail to derive any benefit from public universities, it is that they may perceive they derive as large a fraction of the benefits public universities generate as they once did. Reduced funding may produce the same results as Garret Hardin's "tragedy of the commons." While each state needs more educated citizens, drawing them from the limited supply available rather than enlarging the supply gradually results in a reduction of the living standards of everyone. Multiplication rather than division is required to solve the nation's human resource shortage.

It is not surprising that as markets have widened through technology and the fading of cultural borders, real state funding per student has declined. This trend is aggravated by the economic downturn; those benefits like education and research that a state can obtain with reduced expenditure are at an even larger disadvantage in attracting funding in this economically depressed period.

As Jonathan Cole, former Columbia University provost, expresses in his new book *The Great American University*

"Over the past decade, all the great public institutions have had to struggle to remain competitive with their peers in the private sector. Their quality will

⁴⁰ *Needed: A National Strategy to Preserve Public Research Universities, (op. cit.).*

*diminish unless the states begin to invest much more heavily in these universities.*⁴¹

Much of this backing away from support of public universities by the states ought to be resolved by a compact among the states—committing each state to do its fair share to support public research universities.

Public research universities have every incentive not to let the relative decline in state funding reduce their competitive positions. They seek funds from other sources to make up for the scarcity of state money. Donors are an obvious source of such funds. While the biases of donors may be changing, some donors may choose to contribute to private rather than public universities because they believe states are obligated to fund state schools. Nonetheless, public university presidents continue serious and frequently successful efforts to build endowments.

An obvious replacement funding source is tuition. Public universities in fact have raised tuition to offset state funding reversals. Resident tuition at public doctoral universities averaged \$7,797 in fall 2009 while their private university counterparts averaged \$32,349.^{42,43} Few would argue tuition at public universities could be raised enough to reduce the difference between their levels and those of private universities without a significant enrollment loss. Moreover, few would argue that significant, rapid tuition increases by public universities are wise. Tuition increases have differential impacts on those from low-income families. Indeed, Bowen, Chingos, and McPherson found four-year graduation rates for those in the lower quartile of family incomes were reduced by 4.5 percent for each \$1,000 increase in net tuition. Interestingly, tuition increases had essentially no effect on graduation rates for those in the third and top income quartile.⁴⁴ These findings suggest public universities ought to award need-based aid to mitigate the undesirable impacts of tuition increases.

Tuition is likely to grow as a proportion of public research university funding. The current recession has accelerated this trend. But if we are to keep public universities fully accessible to the children of the less affluent, tuition cannot be permitted to cover most of the costs. Because political forces militate against continuing into the future the pattern of large tuition increases that would be needed to make up the gap between public and private university per student funding, other sources must be identified.

⁴¹ Jonathan Cole, *The Great American University*, (Public Affairs Press, 2009) p.478.

⁴² *Trends in College Pricing 2009* (College Board, 2009) p.6.

⁴³ Of course, discounting of tuition is a reality, so net tuition is less than sticker price tuition. In 2004-05 tuition discounting amounted to 14.7 percent of tuition revenues at public 4-year institutions and 33.5 percent at their private counterparts. Sandy Baum and Luci Lapovsky, *Tuition Discounting: Not Just a Private College Practice* (College Board, 2006).

⁴⁴ William G. Bowen, Matthew M. Chingos, Michael S. McPherson, *Crossing the Finish Line*, (Princeton University Press. September 2009).

VIII: FORGING THE FOUNDATION FOR PROGRESS

We propose at least three breakout sessions at each regional meeting, along the following themes. The purpose of these sessions is to gather further understanding of the challenges facing public research universities; discuss these potential solutions and develop others; and begin building support both within our community and by others for promoting these solutions.

Breakout Session A: Improving University Alignment with State Needs

Public research universities must have a new foundation for progress that leads to appropriate and sustained funding by the state and federal governments. This foundation requires a more robust understanding by the governmental units of the benefits provided by public research universities. In turn, those universities may have to renew and explicitly state their commitments to provide those benefits.

Individual public research universities already promote their value to their states and deliver much of what would be in such a package. The question here is not about supplying elements; it is about satisfying major portions of state agendas, perhaps as part of some kind of two-tiered state/national packaging.

The questions for this break-out session are:

- **“Can we develop a package of commitments to achieving state priorities sufficiently compelling to stimulate a return to a level of funding for public research universities that would permit them to remain competitive in both research and the provision of high-quality undergraduate and graduate education?”**
- **What would the elements of that package be?**
- **Should we work together to fully develop such a package?**

Before turning to the specific questions, let’s examine how much more state support is needed for public higher education to be more competitive. Is obtaining that level of funding feasible? In our earlier paper on competitiveness of public research universities, we estimated this amount:⁴⁵

We therefore pick a period when each of the ratios was more favorable and data quality was reasonably good and then calculate how much additional state support it would take to return to that year.

Such a year was 1986. At that time \$7,424 (in 2007 constant dollars) per student was appropriated by the states for public higher education at all levels. By 2007, state appropriations had fallen to \$6,773 per student. To return to the 1986 per

⁴⁵ *Competitiveness of Public Research Universities, (op. cit.) p. 45.*

student funding level in 2007, the states would have to appropriate \$6.68 billion more than they actually appropriated in 2007. Not only would appropriations per student have to increase by \$651, but the additional amount would have to be appropriated for 10.24 million students, 3.05 million more students than were enrolled in 1986.¹ Thus total additional appropriation would have to increase by \$6.658 billion. This is absolutely a large amount; it represents an increase of 9.69% over the \$69.3 billion appropriated in 2007.

*If we could turn the clock back in this manner the additional funding might permit full professor salaries to rise at the publics as compared to the privates from 79 to 89%. We might see the student to faculty ratio of the publics fall from 1.47 times that of the privates to 1.25 times. We might see the 75th percentile SAT critical thinking scores of entering students at the publics rise by 23 to 31 points relative to the privates. (p 45, *Competitiveness of Public Universities*)*

Our overall aggregate target would be to increase the portion of state funding devoted to public higher education from 9.8 percent in 2009 to about 10.75 percent of state revenues.⁴⁶ Although we ought not minimize the difficulty in achieving this, it is incredibly enticing to note that an increase of about 1 percent of state budgets spent on higher education would take universities back to the peak proportion of states' budgets that occurred in 1986. This aggregate target for the portion of state spending is not out of reach, in that it has been exceeded in recent years; in 2002 the states spent 10.9 percent of their revenues on higher education and they spent 11.4 percent in 2000. **Thus if the states would return to the 11.4 percent of state funding they budgeted for higher education in 2000, higher education's state appropriations would increase by 16 percent.** Of course state revenues have fallen with the recession so it would also require state revenues recover their pre-recessionary levels. The point is only modest shifts in state priorities are required for public higher education to be significantly better funded.

California Governor Arnold Schwarzenegger's recent proposal⁴⁷ of a change to the California constitution requiring higher education receive no less than 10 percent of the state spending while California's prisons receive no more than 7 percent is essentially a proposal to reprioritize state spending to favor higher education. Higher education in California receives about 7.5 percent of the state's expenditure now and prisons receive approximately 11 percent. According to Schwarzenegger, 30 years ago higher education received 10 percent of state expenditure.

Interestingly, just months before Gov. Schwarzenegger's proposal, Cole called for states to use tax dollars to create their own, "long range stimulus package for higher education that could recreate the situation in the 1970s and 1980s, when Berkeley was in many ways the equal of Harvard, Yale, Columbia, Chicago, and its rival on the peninsula."⁴⁸ He continued, "That could be done in California, Florida, North Carolina, Michigan,

⁴⁶ Calculated by increasing present state funding by the 9.69 percent figure derived in the box.

⁴⁷ Jennifer Steinhauer "Schwarzenegger Seeks Shift From Prisons to Schools," *The New York Times*, January 6, 2010, <http://www.nytimes.com/2010/01/07/us/07calif.html>.

⁴⁸ *The Great American University* (op. cit.) pp. 484, 485.

Wisconsin, Illinois and Minnesota as well as New York, creating stiff competition for the rich private universities.”⁴⁹

We pose whether university advocacy in their individual states could be aided by well-conceived and executed programs reminding states of the services of *pioneering, fostering progress, creating conditions in which democracy thrives and service to the public* that public research universities have provided traditionally. This sort of reminder, accompanied by efforts to further align these universities with emerging state needs, might constitute an effective and persuasive package.

We list possible elements of a “package” below to stimulate discussion. This is a complex matter, already captured in varying ways by individual universities and breakout group participants should add, subtract and modify as their experiences guide:

i. Make clear to states the contributions already being made by research universities

- Creating visibility for university accomplishments might involve detailing the history of innovations fostered by universities. Some schools have created new disciplines, added important concepts and analytical techniques, led to new genres of literature, dance or drama. How have these benefitted the states?
- Pioneering is an ongoing activity, not just a historical one. What are the “new grounds” being broken by our schools? What impacts might these new frontiers hold for the state?
- The amount of real progress our universities have fostered is astounding. While parceling out the bits of economic, educational, governmental, social, etc., progress for which a given university is responsible is difficult; taking the opportunity to at least identify our schools with major developments is essential. Are there major developments for which we are not getting the credit due?
- As our universities carry out customary functions they are strong economic forces on their local and state economies. It is not uncommon for a public university to handle a billion dollars or more per year in state appropriations, student tuition, fees, research grants and contracts and income from auxiliary enterprises ranging from residence halls to intercollegiate athletics. Yet such universities seldom get the same attention for their economic impact a local business handling the same amount of money would get. The art of telling the story of economic impact is sadly lacking and there is cynicism about every economic impact study campuses release. Learning to tell the story of our economic impact more effectively could increase the degree to which institutions are valued.
- We foster progress when we help those who have been at the periphery of society and economic activity move to the center. Universities have been facilitators of such movement and, in our rapidly changing society, will continue to be. Can we document better our roles in this area?

⁴⁹ Ibid, p. 485.

- The highly literate and educated populations our universities have produced involve themselves deeply in civic life. They demand much of government, public schools, elected officials and they, in turn, make society better. The education our universities provide informs the perspective and judgment to shape civic life wisely. As National Endowment for the Humanities Chairman Jim Leach put it in 2009 at the Lincoln/Morrill conference at the University of Illinois: “*Citizens, after all, need to apply perspective and judgment to the issues they face in their families and communities and we as a country confront in the world. Without reference to the guideposts of the humanities, society loses its soul. It risks becoming rudderless in a sea of historical change.*”⁵⁰ Finding ways to remind our states of the real wisdom and value brought to civic life by the highly educated citizens we produce may be of immense value to this effort.
- Service to the public is a strong element of the land-grant and public research university, past and present. It encompasses a strong but increasingly severely under-funded extension program but continues reaching to work with industry, the schools, science development projects, etc. Making the impact of that service mission real to states is critical.

ii: Elements of a package that would better align public research universities with the needs of their states

- *Alignment of the public schools with higher education.* The United States now ranks 10th in the world in tertiary degree attainment, down sharply from 4th in the world a decade ago. This motivates us to get serious about increasing the proportion of our citizens who earn post-baccalaureate degrees. Failure to do so will see the U.S. fall behind and lead to relative declines in our living standards. The nation will be more likely to achieve degree attainment goals if students graduate from high school fully prepared to enter and succeed in college. Careful alignment of the high school curriculum with college is a prerequisite. Aggressive efforts by universities to work with state systems and local districts likely will produce significant results. University efforts to help launch and make effective the Common Core Standards efforts of the National Governors Association will help produce alignment on a national level, even though at the minimal requirements end of the scale.
- *Alignment with community colleges.* Graduation rates from community colleges and transition rates from study at community colleges to study at four-year universities are abysmally low. To improve these rates and reach the nation’s degree attainment goals are to be met, public research universities will have to reach out to community colleges and their students. Curricular coordination must be real and meaningful; bureaucratic barriers to transfer will have to be lowered significantly. The university academic community must become a more hospitable environment for the community college student.

⁵⁰ Comments of Jim Leach, Lincoln’s Unfinished Works: The Morrill Act and the Future of Higher Education Conference, University of Illinois, October 24, 2009, <http://www.aplu.org/NetCommunity/Document.Doc?id=1965>.

- *Alignment of teacher education programs with the needs of the public schools.* For too long many public research universities felt serious preparation of highly qualified teachers for the public schools was not a priority, particularly in the science and mathematics areas. This attitude meant research universities with large and sophisticated science and mathematics departments could play only a minimal role in preparing teachers for the public schools. With the coming of A·P·L·U's Science and Mathematics Teacher Imperative (SMTI), this mindset has changed rapidly. So far, 121 member institutions have joined this effort and are committed to expanding significantly both the number of science and math teachers they graduate and the quality of the education the teachers receive. This is fundamental alignment with state needs.
- *Alignment of economic engagement with the needs of industry and broader society.* Commerce Secretary Locke's recently stated, "It's not tenable for the United States to continue with the status quo. In a world where innovation is critical to U.S. competitiveness, we must do everything in our power to optimize commercialization that stems from our nation's vast research investments."⁵¹ Whether Locke's perception of the state of tech transfer and commercialization is accurate, is beside the question. The fact that many business and government officials hold similar perceptions suggests that sincere efforts at the individual and collective level to address alignment of the broader role of universities in economic development with the needs of the state would pay dividends. That alignment would include maximizing the broad contributions of universities in all areas of state economic activity through targeted education and training programs, expert consulting, purchase of goods and services, as well as access to sponsored research.
- *Alignment with the new focus on student success.* Do students persist in their studies? Do they earn degrees? These two questions have largely replaced the process-based questions used to guide evaluations in the past. Federal programs, university systems and state evaluation schemes increasingly are focused on success measures. Because public higher education has a record of intense focus on ensuring degrees have substantial meaning, it might benefit member institutions to embrace the student success measures while ensuring only degrees of substance gain credit in the evaluations.
- *Alignment with efficiency expectations.* Much of higher education is faced with criticism related to efficiency. Often the indicator that catches attention is the four- and six-year graduation rates. The variation in rates across similarly selective universities strongly suggests that graduation rates can be improved without sacrificing quality. Similarly the sharp increase in graduation rates from four years to six years leads to questions of why one-hundred and fifty-percent of the degree period is needed for many students. Again, time to a degree is managed more effectively by some universities than others. Innovations like those of Carol Twigg's National Center for Academic Transformation point out inefficiencies in our methods of doing business that we should move more pointedly to correct.

⁵¹ Gary Locke, "Commerce Secretary Gary Locke Announces Plans for Forum on R&D Commercialization at Universities," Department of Commerce News Release, January 19, 2010.

Senator Alexander's call for a three year degree,⁵² a suggestion from one of higher education's best legislative friends, is one that we fail to fully investigate at our own peril. However, we must balance efforts to meet these expectations with the growing reality of fundamental changes occurring in the student demographic. A growing proportion of our students now enroll on a part-time basis, increasingly through online distance education. Achieving our mission to educate these students, who are predominantly older adults attaining new skills and credentials, must remain an over-arching goal that is well understood by our external constituencies.

iii: Should we work together to fully develop such a package

- Would there be value to your state advocacy to have an aggregate package—or at least some common elements to be used nationally—on the contributions of public research universities? Would it help you to have such material nationally branded, such as by the membership of A·P·L·U?
- How would we develop such material and how could it draw on material already used by individual universities?

⁵² Senator Lamar Alexander, "The Three-Year Solution," *Newsweek*, October 17, 2009, <http://www.newsweek.com/id/218183>.

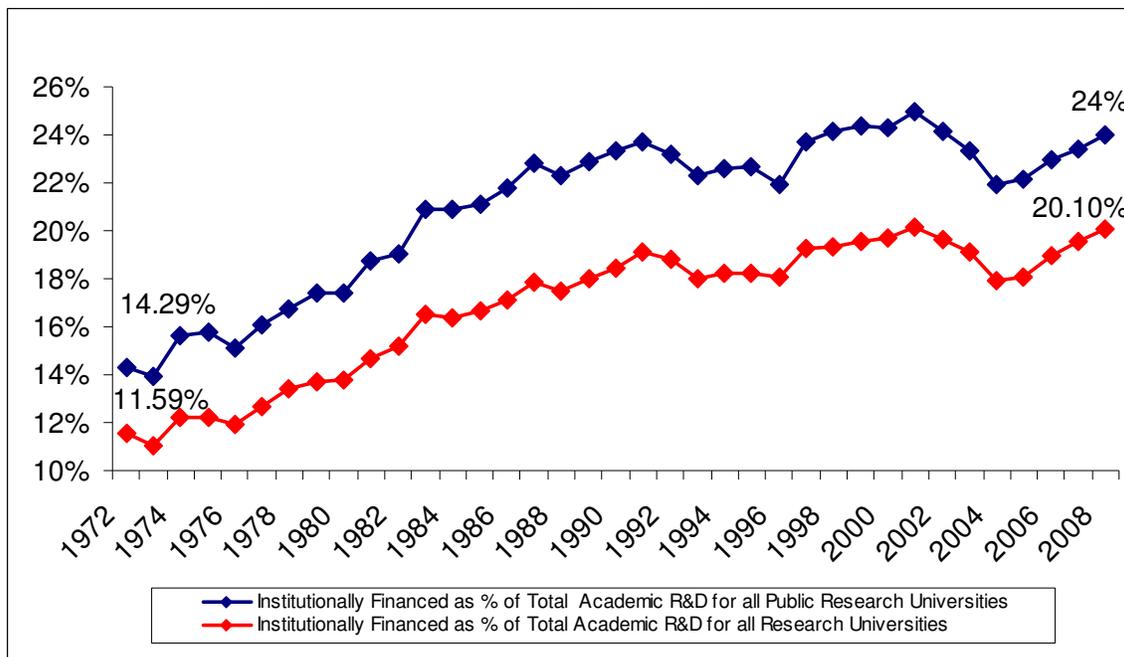
Breakout Session B: Federal Payment for the Full Facilities and Administration (F&A) Cost of Research

The central question for this breakout session is:

Does the federal government adequately compensate universities for the indirect costs that are associated with conducting federally-funded research? If not, what remedy does our community desire?

In March, 2008, COGR released its study, *Finances of Research Universities*. This detailed analysis estimated the university subsidy to all research, federal and non-federal, exceeded \$2.3 billion per year, and “a majority of that subsidy can be attributed to federal programs.”⁵³ Their analysis relied on data from the National Science Foundation’s (NSF) annual survey on Research and Development (R&D) Expenditures at Universities and Colleges. The data element from that survey relevant to this matter is the ratio of university Institutional Funds used to support research to all academic R&D expenditures. Total university R&D amounted to \$51.9 billion in 2008; federally funded R&D, \$31.4B billion, and university-funded R&D, \$10.4 billion. Thus, university-funded R&D was 33.4 percent of federally funded R&D in 2008.

Figure 8: Institutionally Funded Research Expenditure as a Percent of All University Research and Development Expenditures



Source: *Federal Funds for R&D for various years*, National Science Foundation
<http://www.nsf.gov/statistics/fedfunds/>

⁵³ *Finances of Research Universities* (Council on Governmental Relations, Washington, D.C., March 2008) p. 13.

An Important Reservation about the Data: *We note that caution is appropriate in interpreting elements of this data. Because submission of the data element on institutional funding is not required by NSF, some universities simply leave the data element blank. Inspection of this data by our colleagues at the Association of American Universities reveals that some large private universities have followed this practice. If leaving the data element blank is a more frequent practice at private than at public research universities, this would result in exaggerated differences between the recorded contribution of public and private research universities. For this reason we place little importance on the apparently growing gap between public and private research universities. We place our emphasis on the increase in the public and total institutionally financed research. We do not know of any reasons why the incentive to leave this element blank in reports to NSF would have changed overtime and therefore we join the authors of the COGR report in treating this trend as meaningful.*

COGR listed the factors that force universities to subsidize federal research.⁵⁴ Those factors are:

- Agency and/or statutory restrictions. As a matter of policy, some agencies pay less than the negotiated facilities and administration (F&A) rate for all research; others pay less on certain types of awards, e.g., career development or education training grants. Some agencies have statutory requirements limiting what they pay, e.g., U.S. Department of Agriculture (USDA), [National Institute for Food and Agriculture](#) (NIFA), and Department of Defense (DOD) basic research.
- Cost Sharing. Items such as salaries, equipment, graduate student tuition, etc., are often contributed by universities. While NSF has limited this practice, other agencies continue it. Interestingly, the COGR report notes cost sharing negatively affects universities not only by directly reducing the size of grants but also in a fundamental way: “The mechanics of F&A rates are such that cost sharing results in an increase in the research base, a reduction in the F&A rate, while providing no method for F&A recovery on the cost shared amounts.”⁵⁵
- Research Compliance Costs and the 26-percent Administrative Cap. The cap’s basis is average administrative costs at universities prior to 1991. New compliance requirements after 1991 increasing administrative costs include: “animal care, lab and hazardous waste safety, human subjects protection, electronic research administration, effort reporting, data security, conflict of interest, research misconduct, export control, and the education program to ensure a campus-wide knowledge base.”⁵⁶ COGR judges that, “almost every research university can support a rate above the 26-percent cap” and present data to demonstrate that more than “90 percent of all research universities”⁵⁷ do so. Using a minimal estimate of 28 percent for average university administrative cost, they calculate the arbitrary 26 percent cap is costing universities \$500 million per year.

⁵⁴ Ibid, pp. 13, 14.

⁵⁵ Ibid, p. 13.

⁵⁶ Ibid.

⁵⁷ Ibid.

- Other F&A restrictions. These stem from the OMB A-21 methodology for computing overhead, i.e., the library expense calculation formula does not fairly fit research universities and utility expenses are capped at 1.3 percent with the caveat that even this limited 1.3 percent is available to only the 66 universities that had previously conducted utility studies.⁵⁸

The COGR report relies on the *increasing* proportion of total R&D that is funded by institutional funds to argue that under-funding universities to perform federal R&D is a growing problem. They conclude “*the risk is that additional financial burdens will move universities closer to a ‘tipping point’.* *The result could be decline in the quality of research infrastructure and compliance initiatives, as well as a gradual degradation of research laboratories and facilities.*”⁵⁹

COGR describes a problem facing public and private universities alike: under-funding true F&A costs. Interestingly, universities receive lower indirect payments than do federal laboratories and industrial laboratories. RAND reports a 1996 study of indirect cost payments by Arthur Andersen found, “As a fraction of total costs, universities had the lowest percentage classified as indirect (31 percent). Federal laboratories were somewhat higher at 33% and industrial laboratories were higher still at 36%.”⁶⁰

In addition, public universities probably do a greater portion of federal research with agencies that do not pay the full negotiated overhead rate. Certainly, the larger proportion of USDA research is done in public rather than in private universities and that is also likely the case with the Department of Education.

But there is evidence on another front. Overhead rates set by Health and Human Services (HHS) are “negotiated” rates. Many public universities relate having been told by HHS negotiators that, regardless of the F&A rate they justify, they will not permit the institution’s F&A rate to increase more than a percentage point or two beyond their last negotiated rate. The result is F&A rates carry a large component of history, perhaps outweighing variation in the factors included explicitly in the F&A calculations.

We examined F&A rates for public and private very high research universities (Carnegie 2005 classification) and found variations in those negotiated rates that were difficult to explain based on what we knew about the factors that make up the F&A rate calculations. The 48 public universities for which we had data had average negotiated F&A rates of 51.12 percent, while the 21 private universities had average negotiated F&A rates of 59.29 percent. It appears there has been considerable convergence in these rates; universities with rates historically very high have tended to have their rates reduced while those with historically low rates have had them increased. Significant gaps remain that are hard for the casual observer to understand.

⁵⁸ Ibid, p. 14.

⁵⁹ Ibid, p. 15.

⁶⁰ Charles Goldman, Traci Williams, David Adamson, Kathy Rosenblatt, *Paying for University Research Facilities and Administration*. (The RAND Corporation, 2000) p 29.

We have documented the decline in state support for public research universities. Any federal underpayment of actual F&A related to research would compound this trend, potentially diminishing the capacity of public universities to compete globally. Public universities increasingly have subsidized research with their own funds ostensibly to enhance their competitiveness for research grants and bolster their scientific standing. However, they will not be able to deliver the type and volume of research their state needs and their mission calls for or to provide education matching their mission if their resources are stretched still further.

Does this mean funds public research universities use to subsidize research come from student tuition? No. Students at public research universities pay roughly 50 percent of the cost of their education in tuition, so it is the student who is being subsidized, not the other way around. The bulk of institutional funds used to subsidize research come from endowment giving, general state appropriations, and both unreimbursed and reimbursed research facilities and administration funds.⁶¹ These funds could be used for other mission-related purposes if they were not used to fund research. The rapid decline in state appropriations per student occurring during the present recession reduces the availability of institutional funds further. Hence, using institutional funds at current levels to subsidize research is not sustainable.

A·P·L·U works closely with AAU and COGR in considering and promoting any changes in policies for research costs, as in other advocacy for research. The purpose of this working group is to explore options and get a strong sense of perspectives of member institutions.

Options for the breakout group to consider, modify, add or subtract from:

1. Setting Indirect Cost Rates

- A. How might F&A rate setting be improved?
- B. Should the 26 percent cap on Administration be removed? Raised? Should principal investigators be permitted to include administrative assistance that would relieve them from grant paper work burdens as part of the direct cost of the grant?
- C. Should F&A rate setting be transformed from “negotiated” to “calculated based on a precise formula”?

2. The Use of Indirect Cost Rates

- A. Should every federal funder be required to use the HHS or ONR negotiated rate?

⁶¹ Examples of “Institutional funds” are “general-purpose state/local government appropriations applicable to research, gifts, mandatory and voluntary cost sharing, and unreimbursed indirect (F&A) costs” from *Finances of Research Universities* (Council on Governmental Relations, Washington, D.C. March 2008) p. 12. Our inference is based on our limited experience and not on rigorously assembled data.

- B. Should sub-negotiated rates for special categories of funding be eliminated?
- C. Does cost-matching remain a problem? If so, in which agencies? What ought to be done about it?

3. Reforming the Indirect Cost Process

- A. Should reforming overhead rates be accomplished regardless of whether there are “new” federal funds to pay for them— i.e., that we likely are facing a near zero-sum budgeting climate? Under this scenario financing reforms could come as a partial reduction in direct funding for research? How strongly ought the community promote reforms under such a zero-sum scenario?
- B. Other proposals for change?

Breakout Session C: Federal Supplementation of Public Research University Funding

The questions for this breakout session are:

- **Can we make a compelling case for support by the federal government of certain research, education and institutional support functions that are inadequately funded by the states?**
- **If so, how do we make that case?**
- **What form should that federal support take?**

The main body of the background paper focuses in some detail on the peripatetic nature of benefits from public research universities. While they are located within individual states, for many categories of activities, a (sometimes significant) portion of the benefits produced accrue to the nation and the world. Understandably, states are reluctant to finance activities when citizens of other states reap much of the benefits. The remedy would be to shift a portion of the cost of such activities from the states to the federal government.

What sorts of activities fit into this category? Unfortunately for state funding of public research universities, many of the activities they consider core have the characteristic of producing benefits to those far beyond their state funding base. Prominent examples are:

Basic research: By definition, such research does not lead directly to commercial or even to practical application. It holds the potential of serving as the key building block on which the most consequential practical and commercial applications are based (transistors, genetically engineered plants, etc.), but the path to that end is uncertain. Generations may elapse between basic discovery and application and many such discoveries may never yield valued applications. Applications may come from anywhere in the world. Thus, appeals to state legislators to fund basic research ventures generally are less successful than appeals that promise potential of attracting or directly spawning industry within the state. Yet, the blockbuster applications rely on the pipeline that begins with basic research. Failure to fund it adequately reduces the flow of applied research in the future.

Applied research when the industry is geographically widespread: Even when there is the promise of direct commercial benefit from research, there is often the possibility that benefits will accrue to firms located outside the state in which the research is conducted. When patenting or some other form of intellectual property protection can ensure return of revenue, incentive remains to invest state and university dollars. But in lower technology industries where innovations from research cannot easily be protected, benefits of research may well flow quickly to all producers.

Graduate Education: Examine any graduate school catalogue's list of doctoral degrees and then consider the proportion of degree recipients from each program likely to be employed in the state in which the university is located. Some programs clearly produce personnel needed in the state, from which citizens will derive benefits; others produce doctoral recipients, most of whom will have to move away from the state to find employment. It is not unusual for some of the most highly regarded of a university's

doctoral programs to be in the latter category. While this suggests economies are realized in that a few universities specialize in providing the highly specialized doctoral-educated personnel needed for the country or world's needs, such programs produce few tangible benefits within the state and are difficult to fund adequately. In response to state fund cuts it appears such programs may have suffered more in budget reductions than have other programs.

Undergraduate education in arts and humanities: Including the arts and humanities in a listing of items some states are less willing to support is controversial. Most agree they are so intrinsically valuable to society state funding should be nearly automatic. Nonetheless, it appears funding for arts and humanities is declining in most states. We list them here, not because the benefits of arts and humanities are more likely to fall beyond state borders than are other areas of teaching and research, but because funding patterns suggest the emphasis placed on them relative to the sciences is declining.

Graduate student support, physical facilities, computing, library support, etc., for programs like those above: If the research or educational programs themselves produce relatively few tangible benefits for the state, those resources needed to support the programs also are vulnerable to cuts. Often physical facility, computing and library requirements are unique to the research/education program. They become attractive targets when budgets have to be cut and do not compete well when budget increases are allocated.

Some nations, e.g., Canada, Australia and the United Kingdom, have systems of national research universities. This organization eliminates the problem on which we are focused. The United States has a limited number of nationally funded universities, certainly not enough to provide research and program needs. There is little sentiment to nationalize public research universities to solve this problem so we do not consider that solution here. In addition, the large proportion of benefits produced by public research universities directly benefiting the states that partially fund them suggests the majority of costs for public research universities appropriately fall on the states in which they are located.

On occasion states form a compact specifying that research/graduate programs like those discussed above will be distributed across the members of the compact in such a way that one state's expenditure to support its compact program(s) is offset against that of another state. Such agreements should be encouraged, but generally no mechanism exists to spread the costs of such programs beyond state borders to the areas that derived benefit from them. This suggests that the government entity that encompasses most such beneficiaries, the United States, become the supporter of such efforts. Some programs have beneficiaries spread across the world but no feasible mechanism exists to collect and distribute revenue to those bearing the cost.

Thus, we suggest a system of federal funding for at least some of the costs of programs like those listed here is warranted. Why single out research universities for direct federal investment? Why not include all public universities?

There are two reasons:

1. The high-level recipients of bachelors through doctoral degrees from public research universities are part of the most geographically extensive labor markets. They are less likely to be contained by state borders than are community college and regional non-research university graduates. Thus, states may view investment, even in research university undergraduate programs, as more likely to produce benefits to other states than are their investments in regional universities.
2. For international competitiveness, the nation needs the research capability of these universities.

There is real synergy between education and research. Additional federal funding supporting core research university activities will provide education and research at a lower cost than if we attempted to fund education and research activities independently of one another. This synergy is easy to see when one considers that doctoral programs rely on immersion of graduate students in research as a critical part of their education.

But there also is research/education synergy at the undergraduate level. The 2009 book by Bill Bowen, Matthew Chingos and Michael McPherson found bright young people were more likely to earn a degree if they attend a public research university rather than a less intellectually demanding school.⁶² Challenging environments focus the mind and students thus challenged are more likely to persist in their studies until they earn a degree.

To reverse the real funding decline per FTE student is to shift from the state level to the federal level responsibility for a portion of public research university funding associated with such programs. Below we suggest several breakout group models participants might consider. These suggestions are for illustrative purposes only; breakout groups should freely examine other models, modify these models and generally exercise ingenuity. Each of the models below involves allocating federal funding on a competitive basis. We suggest competition as limited federal funding will provide the most benefit if allocated to universities that will put it to the most efficient and effective use.

Model I: Supplement to F&A for Support of Research Capacity of National Significance (RCNS)

In this model, a supplement is added to F&A earned when a university receives a grant from a federal funding agency. The supplement could be some fixed percent of the grant or F&A amount. (With federal support for academic science and engineering around \$30 billion annually, 10 percent for Research Capacity of National Significance (RCNS) would distribute \$3 billion additionally per year). The competitive mechanism here would bolster the nation's research capacity by scaling funding to the success of universities in competing for grants. The RCNS funds would be awarded to the university directly and not to the principal investigators of the grants, their departments/colleges/schools/institutes or to the institutions' research administration or research vice president. The president would be directed to use the funds to support the institution's research or graduate education

⁶² *Crossing the Finish Line, (op. cit.)* pp. 192-201.

efforts whose benefits were primarily to the nation rather than to the state in which the institution was located. The president would then allocate the funds in support of basic research, applied research or graduate school programs that meet the criteria. The funding could be used for purposes such as faculty, graduate students, support staff, salary supplementation, facilities, equipment, computing, libraries, etc., as the institution decides.

Model II. Competitive Grants for RCNS Support

This is a more traditional granting model in which the federal research funding agencies would make competitive awards for RCNS Support. The awards could be specific to building facilities, acquiring equipment, supporting faculty, etc. The distinguishing feature from previous programs of this nature is that funding agencies would specifically select projects for funding competitions based upon the RCNS nature of the project.

Model III. Competitive Grants to Build Endowments to Support RCNS

Much of the competitive disadvantage experienced by public research universities relative to their private counterparts is that they do not have earnings from substantial endowments to provide venture or support funding for RCNS projects. A competition to build endowments, the earnings of which would be used to support RCNS, would help those universities receiving the funds to compete more equally. This idea is not novel; we note that the National Endowment for the Humanities has long made challenge grants to build purpose-specific endowments at universities.

Model IV. Collaborative RCNS funding

The 2010 Department of Energy appropriation included a research hubs program that serves as a prototype for this model. Universities would collaborate to propose research hubs focused on the research problem the funding agency specifies. The funding request would cover the variable cost of the research but also a significant portion of the faculty, graduate student and salary costs needed to maintain RCNS programs at the cooperating universities.

Models V and up as suggested by participants.

In addition to working through the models, breakout groups should consider whether funding for RCNS should come from existing federal funding appropriations or should be from additional appropriations. The questions to be considered are:

Should RCNS be funded regardless of whether there are “new” federal funds to pay for them, given that we are facing a near zero-sum budgeting climate? Under this scenario, which is likely, financing reforms could come as a partial reduction in direct funding for research. How strongly ought the community promote RCNS reforms under such a zero sum scenario?