

CHAPTER

14

Impact of the Marketplace on the Financial Stability of American Public Research Universities

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INTRODUCTION

In the spirit of the Glion Conferences, this chapter seeks to describe North Carolina State University (NC State) as an exemplar of an American public research university that has accepted the need to develop additional non-traditional sources of revenue. NC State is a century-old institution of higher education with strong traditions and pockets of stubborn resistance to economically driven change. It has, nonetheless, sought actively to diversify revenue sources needed for improved campus operations in an era of financial austerity, increasing enrolment and rising public expectations for leadership in economic development.

North Carolina State University was founded in 1887 as a land-grant university, created to connect practical research and education in agriculture and the “mechanical and practical arts” to the needs of the state’s citizens. As a large, public, research-extensive university, NC State focuses on science, engineering and technology, but also offers students a strong general education in the arts and sciences, together with an array of technical disciplines and professions, such as architecture, veterinary medicine, teacher education, etc. NC State faculty have been active for many decades in collaborating and cooperating with the private sector. Historically, they have been inclined to work closely with industry in solving practical problems. NC State can be

used therefore as a case study of how market forces impact planning in technically oriented US universities. Its resource flow can illustrate the pressures felt by American public research universities as the result of troubled state economies and of rapidly changing demands in the character and skills of educated graduates. In many ways, NC State can be considered as the almost classic model of a truly public American research university.

DEFINING THE INSTITUTION

The state of North Carolina, the governmental home for NC State, is located at the northern edge of the “South”, as defined by the boundaries of the American Civil War in the mid-19th century. As a Southern state, it exhibits a certain gentility of behaviour and strong roots to the land. It has long excelled in traditional industries: cotton (and hence textiles); farming (and hence tobacco and animal agriculture); forest products (and hence furniture). Over the last century, the growing of tobacco created a comfortable middle class, as well as many wealthy philanthropists, including James Duke, who founded nearby Duke University as a private research institution.

With about 29,000 students, NC State is typically ranked in the top 30–40 among public research institutions in the U.S.A. In the Zemsky classification, NC State is a “name-brand” university. Although public, it is quite selective in its admissions, having sufficient space to accommodate only about one of every four students who apply. In addition to supporting its research faculty in Raleigh, NC State also manages a large extension operation, with offices or research centres in each of North Carolina’s 100 counties and in an included sovereign state, the Cherokee Indian reservation, located in western North Carolina.

North Carolina has a very long tradition of unquestioned respect and financial support for higher education. As a consequence, its people, acting through the legislature, have been generous in assuming a large fraction of the financial burden associated with higher education, relegating revenue from tuition as a low fraction of operating expenses. Tuition is exceptionally low, specifically because the state constitution states that “higher education, as far as practicable, be extended to the people of the state free of charge”. Although a detailed interpretation of this provision is the subject of annual debate, tuition and fees are among the lowest among its national peer universities. Some legislators will describe targets for tuition in the university system as being low enough to permit access to any deserving student, but high enough to keep individual students focused on progress toward their degrees. Establishing that balance is tricky, especially since North Carolina’s state appropriation to student financial aid is also among the lowest in the nation.

NC State is one of three research-extensive universities (with Duke University and the University of North Carolina at Chapel Hill) that have defined Research Triangle Park (RTP), one of the first American state-sponsored efforts at attracting and supporting research-based industries. This tract arose when North Carolina's political visionaries teamed with university leaders to look at the relationship between universities and industry in a new way. As early as the first years of the 1950s, state-supported incentives were offered to attract technically demanding industries to an area defined by the roughly 30-mile sides of a triangle defined by imaginary lines drawn from the centre of each campus to the other two. In fact, the industries that have located in the Research Triangle now have a long history of collaborating with the universities and of hiring their graduates.

There is also an additional entrepreneurial analog of RTP on the NC State campus. Noting NC State's tradition as a research-active, land-grant institution, the governor of North Carolina gave to NC State 1,000 acres of land, adjacent to its main Raleigh campus, expressly for the purpose of fostering university-industry collaborations. NC State's Centennial Campus, so named because the land allocation took place in 1987, the university's centennial year, would focus on small firms, start-ups, and focused research units of large corporations that were not yet ready for major plant siting in Research Triangle Park. It has grown rapidly and is recognized widely as one of the most successful of such ventures in the nation.

The chance to build a completely new campus, while advancing the more standard operations of a strong traditional campus, is an irresistible opportunity for many highly independent academics and entrepreneurs. This new campus could focus on intellectual property development, ultimately leading to commercialization, as well as attracting start-up businesses that could collaborate in facilitating this new kind of technology transfer, while providing valuable experience and financial support to our undergraduate and graduate students.

NC State is one of 16 campuses of the University of North Carolina (UNC) System. Two of these, the University of North Carolina at Chapel Hill and NC State University, grant academic and professional degrees at the bachelor, master, and doctoral level, focusing on basic research, broadly defined, and its applications. About one quarter of NC State students are pursuing an advanced degree. The relationship between NC State and UNC-Chapel Hill is strong, in part because the two institutions share a common funding source in the North Carolina legislature. In addition, there is very little programmatic redundancy. Instead of duplicating areas of NC State's expertise, UNC-Chapel Hill offers professional training and advanced degrees in the arts, sciences and humanities (hence, programmes in business, law, medicine, fine arts, journalism, etc). Our intercollegiate collaborations

are therefore natural and easy, and, despite our close proximity, our competition is restricted largely to athletic events. For example, a Ph.D. degree in Biomedical Engineering is offered jointly by the two schools, drawing expert faculty from both sites. This is an appreciable advantage compared with many other American states.

The 14 other UNC institutions do not focus on the generation of knowledge per se, with six instead responding to local needs, usually offering degrees at the bachelor's and master's levels and an occasional doctoral degree relevant to regional requirements. Thus, for example, UNC-Wilmington offers a Ph.D. in Marine Science, taking advantage of its location at the edge of the Outer Banks. One institution is a School of the Arts, focusing on film-making, vocal and instrumental performance, theatre, etc; and another is a small liberal arts institution.

There are also six institutions that have historically served under-represented groups in the pre-1960s days of racially segregated schools in the American south. These schools are now integrated, but are targeted for special growth as the demand for a college education is likely to exceed available slots in the research universities in the next several years. (One of them, NC A&T University, also is a land-grant institution, founded later in the 19th century with the intent of supporting the farm needs of African-Americans. Collaborations in extension between NC A&T and NC State are also very productive.) The heritage of the minority-serving institutions is strong in the United States, and these universities have effective legislative advocates who emphasize serving African-American and Native American students. The existence of such sister schools permits the high selectivity in admissions for NC State by providing access to some public institution of higher learning for every interested and qualified student.

A virtually explicit compact with the citizens of North Carolina presupposes active participation of NC State in recruiting, retaining and supporting new and existing businesses, thus creating jobs and fostering economic growth. Only rarely does a week go by in which the NC State Chancellor is not called to assist the NC Department of Commerce in recruiting industries to relocate to or stay within North Carolina. This role is not universal among presidents and chancellors at universities in the United States, but it is becoming much more common at public, land-grant institutions.

UNIVERSITY REVENUE SOURCES

Because each institution has a different support base, the funds derived from endowment, legislative appropriation, tuition and fees vary significantly from one school to another. Even so, an in-depth look at the operating budget of

NC State might serve as the basis for a comparison with other similar schools.

NC State’s annual operating budget is about \$800 million. Over the past 20-30 years, the funding base of the university has changed appreciably. Whereas as much as 80 % of total funding came from state and federal appropriations and tuition in the 1960s, the most recent budget year (FY 03) includes funding from a much wider set of sources, with the state appropriation reduced to 41.5 % of derived revenue (Table 1).

Table 1. Summary: NC State University Revenue Sources (In Millions)

	1998	1999	2000	2001	2002
Tuition/Fees	\$76.0 (11.2 %)	\$78.9	\$83.7	\$91.7	\$105.1 (13.3 %)
State Approp.	\$302.1 (44.4 %)	\$335.5 (45.0 %)	\$340.1 (44.2 %)	\$352.5 (43.3 %)	\$328.2 (41.5 %)
Fed Approp.	\$21.9	\$24.4	\$23.1	\$21.8	\$20.5 (2.6 %)
State Grant	\$18.3	\$22.3	\$26.1	\$33.7	\$24.9 (3.1 %)
Fed Grant	\$74.0	\$73.1	\$71.6	\$83.4	\$89.2 (11.3 %)
Private Grants/Gifts	\$61.6	\$68.0	\$75.4	\$79.6	\$75.3 (9.5 %)
Sales	\$110.4	\$123.6	\$129.3	\$134.3	\$135.8 (17.2 %)
Other Sources	\$16.6	\$19.0	\$19.5	\$16.0	\$11.2 (1.4 %)
Total	\$680.9	\$744.8	\$768.8	\$813.0	\$790.2
#students	27,529	27,960	28,011	28,619	29,286

Revenue received from enrolled students is listed as “Tuition and fees”. Differentiation between these two revenue sources is crucial in North Carolina, where university support levels, including those funds to support enrolment expansion, are set by the legislature. Our elected leaders then establish a specific formula for incremental annual cash flow, and appropriated money is allocated to specific line-item categories. More than two-thirds of the sum shown in Figure 1 is represented by tuition. Tuition is revenue associated with the delivery of instruction, which is set in North Carolina by the state

legislature, whereas fees are assessed, with the advice of student representatives and the institution's Board of Trustees. Fees are used to support student life, through recreational sports, athletics events, local transportation, student government, etc.

Revenue derived from tuition at NC State is low, compared with direct state appropriation. Although North Carolina is atypically generous compared with most U.S. states in providing this level of appropriated support, the state government in North Carolina insists that levied tuition also be kept very low and provides very little support through student financial aid. Even within the UNC System, there is a substantial variation in tuition, from about \$2,500 per year at NC State to about \$1,000 per year at Elizabeth City State University. These numbers are much lower than at private institutions: our neighbour Duke University, for example, set tuition at over \$30,000 for the same period, and couples the tuition payments with substantial investments in student financial aid grants.

In addition to state appropriations, NC State receives a substantial federal appropriation, largely from the U.S. Department of Agriculture, to operate the North Carolina Cooperative Extension Service. This service provides professional advice to growers and breeders and maintains support service offices or research centres throughout North Carolina. Substantial support for these efforts requires careful managerial supervision and yearly contractual negotiation with each cooperating county. Annual budgets for each centre range from about \$100,000 to several million dollars. This is a responsibility not shared by most European rectors or, indeed, by many US presidents and chancellors.

This work is complementary to a newer Industrial Extension Service (IES) that provides financial or technical advice to small businesses through a fee-for-service agreement. Some IES services are subsidized by the U.S. Department of Commerce. Services provided include, for example, assistance with environmental regulations, collaboration on urban planning or natural resource management, writing effective business plans, or brokering loans for businesses seeking to expand.

Federal grants are funds awarded in response to specific proposals by individual faculty members or small groups. Securing sufficient external sponsorship for their scholarly research is a major commitment of time and effort by nearly all U.S. faculty. This is necessary because state appropriations are almost always directed toward instruction in public universities, rather than to research. Increasingly, federal grants require multi-investigator efforts targeting interdisciplinary problems, and may often include collaborators from other institutions in the U.S. or abroad. Generally, no funds are received from the federal government to manage or promote university inventions or

other intellectual property. Instead, technology transfer offices are generally self-supporting.

Lacking a medical school, NC State's focus on physical sciences, technology and engineering has produced slower growth in federal research support than in other comprehensive universities that focus on human health. Growth in NC State's federal research thus mimics growth in those agencies that support basic physical sciences, mathematics and engineering rather than in the National Institutes of Health, which have experienced explosive growth over the last decade. As a result, NC State has relied more heavily on collaborative industrial research as a key component of its sponsored research portfolio. In industrial research, it has ranked consistently among the top ten universities in the nation.

Sales represent income derived from auxiliary enterprises managed by the university. This includes athletics, fees for services provided such as housing and food service, income from the bookstore, parking, and the student health center (Table 2)

Table 2. NC State 2002 Sales Revenues (In millions)

Residential Life	\$22.0
Dining	\$17.7
Bookstore	\$12.7
Athletics	\$23.4
Parking	\$7.8
Student Center	\$4.9
Student Health	\$7.8
Other	\$11.9
Educational Services	\$27.6
Total Sales & Services	\$135.8

Notice that the figure for "sales" is larger than many of the other categories that are more traditionally thought of as being a university's responsibility. Other sources include real-estate leases, licensing agreements for trademarks and intellectual property, various marketing efforts, etc.

CAPITAL EXPENSE

Over the last five years, as state appropriations have declined as a share of the NC State budget, the number of enrolled students has continued to grow

substantially. This reflects the high premium that U.S. students place on attending, and graduating from, top-quality research universities. This growth in absolute numbers, which is taking place under intense pressure from politicians, is greater at NC State than at any of our sister schools, giving us, for example, a larger student body than at UNC-Chapel Hill. Like most American states, North Carolina is experiencing a demographic bubble, with about 20 % more students now in the 9th grade of our secondary schools than was the case when our current freshman class was in that same grade.

This growth puts additional pressure on space, and for many of our colleges the number of enrolled students now exceeds capacity, especially for teaching laboratories in the basic sciences. As a result, NC State must invest substantially in capital for new buildings and for renovation and repair; that is, for expansion space and to address deferred maintenance. This capital expense is being financed through a referendum passed by popular election by North Carolina voters in Nov. 2000 that provides \$3.1 billion for construction for post-secondary public institutions, \$2.5 billion of which will fund the 16 campus University system. NC State's share of those funds is \$468 million to finance over 100 buildings and major renovation projects on the Raleigh campus. This referendum provides support only for classrooms and teaching laboratories, and the university has been forced to locate private sources for all other building requirements. As a result, about \$400 million in other needs (student apartments, a visitor/admissions centre, a conference centre and hotel, athletics facilities, recreational/fitness facilities, an alumni centre, and libraries) will be constructed from donations received from private sources or from usage fees. The state provides only approval for self-liquidating financing of these facilities.

CENTENNIAL CAMPUS FINANCES

NC State's Centennial Campus (CC) is recognized widely as one of the best academic-industrial collaborations in the U.S.A. CC currently houses about 60 private companies and hundreds of University faculty in about 1.5 million square feet of space. Its buildings are of several different types, ranging from academic buildings fully funded by state appropriations, through jointly operated buildings financed as self-liquidating projects deriving from the state's bonding authority, to completely private buildings that provide only land lease revenue. As such, CC represents a complex financial stream that includes a huge investment from the private sector that does not appear in our annual operating budget.

State-appropriated buildings are constructed with funds from a specific allocation and house our academic programmes, thus providing space only

for NC State students and faculty. Research buildings are owned by NC State, funded through bonded-indebtedness guaranteed through the state, with monthly lease fees from university research groups being used to retire debt. Partnership buildings are those owned by a private developer, retiring debt through lease agreements approved by the university. Venture buildings are those constructed and financed by a private developer, operating on a long-term land lease after which the land and building improvement revert to the university. All leases are at or above local market rates, although the university can choose to subsidize specific research faculty who need specially configured space for sponsored research projects.

All CC tenants must have either an established research connection with NC State faculty or a fully executed licence agreement to develop NC State intellectual property. As such, partnerships on CC are viewed widely as an important and unique opportunity for providing a unique, competitive advantage to the NC State faculty that is not widely available elsewhere. The university reserves the right to veto any lease agreement in a privately owned building, if the lessee is judged incompatible with the university's teaching, research and service mission. We define programme compatibility in potential private-sector partners through a deliberative process involving a broad campus discussion.

In our campus strategic planning, four areas for research emphasis have been identified to build on university core competencies: biotechnology, with emphasis on genomics and bio-informatics; advanced materials; information technology and networking; and environmental sustainability. Those working in these or closely allied areas would be judged to be appropriate partners, and lease negotiations at current market rates would be initiated. In these discussions, we insist on full compatibility of our co-located partners with our traditional academic values of ethics, scholarly openness and published dissemination after a short review period, normally not to exceed 90 days.

Companies located on our campus range from major international companies, like the corporate offices of Red Hat and a research wing of ABB, to small start-ups whose names are not yet widely recognized. A status report about the size and type of partners on our campus is shown in Table 3.

A recent expansion of role on CC is the construction of a research wing attached to a public middle school that will provide a sound research basis for educational interventions for students of ages 11-13, particularly those that encourage girls and members of racial minorities to consider careers in science, mathematics, engineering, or technology. Support services for Distance Education and for learning in a technology-rich environment are also located on CC. We consider such activities as the logical new extension of our land-grant mission.

Table 3. NC State Centennial Campus Update: May 2003-11-27

	April 2003	May 2003	May 2002
Number of Companies (Total)	61	57	59
By Type:			
Advanced Materials	4	3	3
Biosciences	11	11	9
Education	2	2	1
Environmental	12	12	10
Information/Communication Tech	17	16	18
Other Partner Organizations	15	13	18
By Size			
Start-up Companies (Total)	13	12	13
IT	5	4	6
Biosciences	8	8	7
Small Business	12	12	12
Non-Profit	8	7	7
Major Corporations	16	14	16
Government Agencies	8	8	7
Services	4	4	4
Number of Employees (Total)	1,445	1,439	1,566
Information/Communication Tech.	583	577	540
Biosciences	49	49	51
Environmental	259	257	244
Education	79	79	70
Advanced Materials	13	12	15
Other Partner Organizations	470	465	646
Number of NC State students employed with CC companies (to our knowledge)	142	146	107
Number of Faculty Involved with CC companies (to our knowledge)	244	252	152

Reflecting a downturn in the national economy, the vacancy rate for research space at RTP is now about 30 %, while that on CC is below 3 %. While the number of employees on the Centennial Campus decreased by about 10 % over the last year during a national recession, the number of associated faculty and students has grown dramatically (by over 50 %). So while companies are reluctant to take on or maintain permanent employees because of the economy, our students appear to be benefiting in having access to great opportunities for co-ops and internships that support their educational goals. Thus, both the company and our students benefit from these collaborations. The increased participation may also represent a shift in attitude as more faculty seek collaborative opportunities with industrial partners close to their academic homes.

A special category of CC units include those involved in multi-company consortia. For example, a new research consortium on the production of non-woven fabrics for industrial purposes has attracted over 25 large multi-national sponsors to a joint laboratory on the CC. The more comfortable interactions fostered by co-location on CC have also had the effect of speeding up contract negotiations, and thus improving the chances of future collaborations and of faster commercialization. The presence of such companies also has had the effect of attracting entrepreneurial students who enrich the character of our management and engineering schools. Many of the most highly qualified industrial partners are contributing frequently to economic, social and cultural aspects of university life by serving as adjunct professors, sponsoring conferences and workshops, serving as external examiners for dissertation examinations, etc. Their presence provides an invaluable contribution to our students' education.

LESSONS LEARNED: SPECULATION ABOUT THE FUTURE

American public higher education has entered a new era characterized by rapidly increasing enrolment, declining state support, and rising expectations for involvement in wealth creation. In this environment, North Carolina's long-standing philosophy of "free" access to education provides an insufficient revenue stream to maintain quality based on state appropriations and student tuition and fees. The seemingly careless withdrawal of state support from higher education makes it increasingly difficult to extend the benefits of a college education to the ever-larger numbers of American high-school graduates who have historically populated the student bodies of public research universities. The quality of the workforce is then impaired and stable state financing for the university becomes even more elusive. As the

management of higher education becomes ever more complex, the reality that such institutions cannot rely solely on the state or on student tuition becomes even more certain.

Given that a continuing erosion of state support seems to be inevitable, public research universities must rely on other sources. Most universities, therefore, seek to diversify their portfolio of revenues and to attract private-sector investment. Although universities plan investments and set priorities at a high level, there is a constant tension among competing units in pursuing fund-raising opportunities. When private support is sought by universities, greatest success is attained at the level of colleges and departments, where faculty have been closest to former students who represent the best pool of willing donors. These units are sometimes low on the university organization chart, and the flow of support from the colleges to the university can be slow. In fact, most funds raised in colleges and departments are restricted to a specific purpose, and support received is not readily fungible from the donor's interests into other high priority projects.

Thus, public research universities have become highly decentralized, with each unit behaving as a tub on its own financial bottom. The central administration is then forced to tax and control the units, billing them for electricity, water, maintenance, accounting services and so forth. This financial reality reinforces faculty loyalty to the discipline or the department, rather than to the university, and the consequent decentralization pushes responsibility to generate support and to control costs to the faculty. Operational efficiencies and a focus on economies of scale become significant factors in research universities, but the enhanced demands of politically-demanded larger numbers of students and of burgeoning unfunded mandates make it impossible to balance most university budgets by restructuring.

The university then must pursue other broader sources of support. It develops auxiliary enterprises, like athletics. It pursues federal and industrial grant and contract support. It commercializes intellectual property and derives income from royalties received and equity interests in start-up companies. It explores new opportunities for market-driven support, like the partnerships working on the NC State Centennial Campus. It moves away from its traditional extension and engagement activities, provided free of charge for many decades through state subsidies, to include instead fee-for-service structures. It seeks to secure endowments for retaining outstanding faculty and for covering operating costs.

In this environment, these alternative funding sources must, and will, be actively sought. The greatest successes in doing so will be achieved by adapting to market forces.

KEY ASSETS IN RESPONDING TO A MARKET-DRIVEN FUTURE

The United States is a country of entrepreneurs. American willingness to take risks and to resist bureaucracy is one of our proudest traits and one of our principal assets in developing innovative, new financial models to support higher education. More and more frequently, public research universities have embraced the priority of wealth creation consequent to research discoveries or the development of new technologies as key core missions. The ease of moving exciting new applications from their conception in basic research through potential commercialization is becoming particularly embraced within the faculties of professional schools of comprehensive universities. It is imperative then that such universities pay due attention to providing a complete understanding and justification of their activities to the state citizenry of this important, evolving university mission. Although we are experiencing a downturn in the economy, it is particularly attractive to invest in capital facilities when interest rates are so very low.

Most public research universities are willing to give up (at least partially) state support in exchange for greater autonomy, as generally expressed through the university's ability to control its own destiny. The availability of flexible resources is much more important to many institutions than is the absolute level of support received from the state. When coupled with multi-year financing options, entrepreneurial universities can invest in long-term needs for space and the range of skilled personnel required for attacking serious, multidisciplinary problems.

As with any business, debt financing capacity for major research units is determined by credit rating, and variation from one year to another, when deficits are encountered, can cause real trouble. Because Americans naturally celebrate risk-taking, it is all the more important that the home universities of active academic entrepreneurs accept the importance of establishing reserves, thus being prepared for unforeseen financial needs and challenges. Reserves are particularly important for institutions with substantial investments in, and cash flow from, health care and athletics, and are particularly important as America becomes an increasingly litigious nation. Some major universities, like the University of Michigan, retain one year's budget as an appropriate reserve. In this environment, secure, long-term, stable funding of sponsored research is essential, and is highly sought and rewarded.

Finally, private philanthropy, both from individuals and from private corporations, provides an invaluable source for investing at the margin in projects that foster excellence, team work and creativity. Most public research universities are able to attract and retain top-quality professors only if they can provide to individual faculty members the financial flexibility associated with income derived annually from large, dedicated endowments.

Endowments now exist in major universities for at least some of nearly every programmatic and individual need, ranging from starting new interdisciplinary degrees to scholarships for financially needy undergraduates.

POSSIBLE THREATS

As university budgets rely less significantly on state appropriations and on tuition and fees, stability in sponsored research across emerging disciplines becomes crucial. In recent years, rapidly expanding funds for the support of the life sciences have stood in sharp contrast with the flat or declining sources of support for the physical and mathematical sciences and engineering. An imbalance in federal and state support over more than a decade has had the extremely worrisome effect of drying up the store of basic discoveries on which future technological breakthroughs depend. The risk created by this imbalance is seen most evidently in the shifting demographics of the various scientific disciplines, where real growth in the American scientific workforce has been concentrated in health sciences. Each university president or chancellor is then forced to expend significant effort in achieving legislative intervention at the state and federal levels to maintain expertise in centrally important disciplines.

The growth in the importance of private donations for university operations can also be a double-edged sword. Despite the importance of philanthropy in the operation of cutting-edge research institutions, it is important to realize that public universities have worked at securing philanthropic support for only about 20 years. It is not the American tax structure alone that leads to substantial private investment. It is more generally the perceived responsibility to "give back" to an institution (and to come to the aid of the next generation of students) that prompts generous private contributions.

The reality is that there are enormous costs associated with profitable development operations and with the pursuit of grants and contracts from private foundations. Trained professionals are required to manage prospect lists, to monitor compliance and donor satisfaction, and to identify special interests compatible with university priorities. Leaders must make convincing cases that their universities have been key in improving the quality of the donor's life, either through the education received or through the extremely positive effect a research university exerts on the local community. In addition, many states strictly forbid state funds to be used for raising money, at the same time that donors wish their entire contributions to be allocated to their identified project or endowment. Often donors rebel at contributing to the costs of raising additional support for other purposes.

University leaders must also guard against the assumption that generous private donations relieve public sources of their responsibility to support

higher education. Some enlightened state governments even supply a matching pool to encourage private donations, while promising that established revenue streams would be maintained irrespective of external funding success.

Increased reliance on the private sector for day-to-day operations demands close attention to the real rate of growth of revenue, and real returns lower than about 3 %, adjusted for inflation, mean financial trouble for any institution. American universities that are most financially secure are the private, highly recognized universities that have achieved net return above 5 % for the last decade. It is imperative therefore that if private-sector donations are to provide the margin of excellence that differentiates the best research universities from their peers that excellent financial management be secured for the university.

This requirement, in turn, affects university governance, with financial expertise and the capacity to make personal financial contributions becoming more highly sought characteristics of a good Board member than academic creativity. Management skills among academic leaders become vital, although the academic origins of most university leaders provide little focused training on each of the challenges to be encountered in these complex organizations. These administrators must not only manage day-to-day challenges, but must also resist system bureaucracy and constraints. And as focus moves away from major investment in front-line discovery, it becomes increasingly important for public research universities to resist levelling of complex higher education systems such that institutional mission becomes obscure and university aspirations erode to a common, mediocre level.

CONCLUSIONS

The American public research university faces new challenges characterized by more students, lower levels of state support, and more challenging goals associated with economic development. As is true of the missions they pursue, American public research universities are becoming more decentralized, more complex and more entrepreneurial. Diversification of revenue sources is becoming more important, and it is ever more critical that university administrators guard against loss of evident public purpose. In this environment, it is vitally important to maintain emphasis on the traditional functions of the public land-grant university: teaching and learning as life-long commitments, scholarship as a public trust, and full engagement with societal needs. The public research university must always pursue as its primary goal the formation of the next generation of scholars, leaders and innovators. The search for alternative sources of financial support must be related to these goals, which in turn must continue to reflect public purpose and an enduring commitment from the local or regional citizenry.

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