

Investing for Economic Growth in Colorado:

Linking University Funding to Policy Goals

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Investing for Economic Growth in Colorado

Executive Summary

In today's knowledge economy, states that hope to compete for new businesses and high-quality jobs in fields such as information technology and the biosciences depend on colleges and universities to produce well-qualified graduates in science, technology, engineering and mathematics (STEM disciplines). In Colorado, Colorado State University provides 30% of all student credit hours taken in these disciplines; the University of Colorado provides 27% – both far outpacing all other campuses in the state.

However, the current Colorado funding model for higher education penalizes those institutions that offer advanced graduate education and undergraduate programs in STEM disciplines because these courses are more expensive to deliver than courses in other fields.

As a result, the system for funding higher education actually works counter to the state's interests in promoting economic development and attraction of high-quality, high-paying jobs.

Other states have adopted innovative initiatives to more effectively link higher-education funding with strategic state goals. This paper explores three types of initiatives:

- Formula funding models that recognize differential costs of programs and provide incentives for their growth
- Research and development funding pools that encourage research funding in biosciences and information technology
- Alternative differential tuition models that recognize program costs

This paper suggests that continued economic growth and vitality in Colorado depends, in part, on the state's willingness to explore alternative models for funding higher education and adopt approaches that meet Colorado's needs.

Investing For Economic Growth in Colorado: ***Linking University Funding to Policy Goals***

Introduction

One of the greatest strengths of Colorado higher education is the diversity of its system: a blend of regional undergraduate campuses, community colleges and advanced research universities that offers broad opportunity for those seeking degrees or acquiring specialized training and education at all levels. As the state of Colorado and the United States move toward a knowledge-based economy, such diversity is critical to ensuring the availability of a highly skilled and adaptable workforce.

However, the state's current system of higher-education funding does not recognize variances in institutional mission and program cost, thus limiting the State's ability to operationalize policy and inhibiting the growth of those programs most closely linked with the state's economic development goals: science, technology, engineering and mathematics. As the state works to encourage job growth and attraction of key industries, it also needs to determine how to more effectively invest in the educational mechanisms that are essential to supporting those goals.

Investing for Growth

Individual financial investors seek to balance conservative and aggressive risks in their investment portfolios, recognizing that different types of investment yield different rates of return. This also holds true for funding higher education. The State of Colorado has a strong policy interest in encouraging job growth and strengthening a qualified workforce in the science, technology, engineering and mathematics (STEM) disciplines because these fields typically yield higher-quality, higher-income jobs that return significant benefit to the state and its tax base.

In outlining his 2006 priorities, Governor Bill Owens spoke to the importance of attracting such high-quality jobs to Colorado, and the benefits to the state from pulling in such jobs is clear: People who have a bachelor's degree earn, on average, one-third more over their working life than those who do not finish college, and nearly twice as much as people with only a high-school diploma. As education level increases, lifetime earnings potential also increases – a factor that has important implications for states concerned about their tax bases. In today's economy, many of the most attractive jobs are in information technology and the biosciences; in 2004 the average biosciences worker earned \$77,500, compared with the national average median household income of \$43,527.

Investing for Economic Growth in Colorado

Research universities have primary responsibility for educating the STEM workforce in Colorado. Colorado State University now provides 30% of all student credit hours taken in these disciplines statewide; the University of Colorado provides 27% – both far outpacing all other campuses in the state. Together, these two research universities plus the Colorado School of Mines represent Colorado’s labor engine for the high-technology and bioscience industries. Research universities also contribute to economic prosperity by contributing new ideas that enhance existing businesses and result in start-ups of new businesses. Nationally, the 188 major research universities surveyed by the Association of University Technology Managers reported sponsored research expenditures of \$38.525 billion in 2003 (the most recent survey year available), up 10.1 percent over the prior fiscal year. Total fiscal year 2003 sponsored research expenditures funded by federal government sources were \$25.501 billion, and industry funded \$2.857 billion. Within this environment, Colorado’s research universities have remained consistently competitive and successful. A December 2005 report by the National Center for Higher Education Management Systems found that Colorado and Utah are the highest performers, relative to their resources, in terms of the ability of state systems of higher education to attract competitive research and development grants from federal and industry sources.

A snapshot of the state of Colorado’s recent performance in critical science and technology industries, however, indicates some reason for concern. The state experienced job losses of 30% in the IT sector from mid-2001 to mid-2005, leaving Colorado ranked 47th nationally in IT job growth and 49th in wage growth. Colorado’s telecommunications industry ranks 36th in job growth, falling 13 percent between 2003 and 2005. While off-shoring may account for some of this decline, other states – particularly California – are seeing far more robust growth in these sectors. Some experts have expressed concern that Colorado is increasingly unable to compete for jobs in these critical industries.

And yet, the current Colorado funding model for higher education serves actually to penalize those institutions that offer more expensive, advanced graduate education and undergraduate programs in the STEM disciplines. It is a problem encountered by many other states that also fund institutions of varying size and mission, and those states have adopted innovative initiatives to ensure higher-education funding is more effectively linked with strategic state goals. These initiatives include:

- Formula funding models that recognize differential costs of programs
- Research and development funding pools that encourage research
- Alternative differential tuition models that recognize program costs

These states have recognized what Colorado now must acknowledge: Continued economic growth will require a different investment strategy.

Linking University Funding to Policy Goals

The Challenge

Colorado may lose ground with other states in its pursuit of high-technology businesses, and Colorado's research universities will continue to lose ground in competition with other states unless direct action is taken to address the differentiated cost of providing higher education and graduate education in those fields most directly linked to economic innovation, progress and vitality.

A credit hour in engineering – a field with relatively higher faculty salaries and expensive laboratory and classroom space as well as equipment – costs more to deliver than a credit hour in humanities. Yet states have traditionally provided the same level of General Fund and institutions traditionally have charged the same amount of tuition for both. In recent years, some institutions in Colorado (e.g., CSU and CU) have adopted “differential tuition” as the primary means of funding higher costs for science and technology courses. To the extent that Colorado provides equal levels of state funding for all student credit hours, without regard for the actual course cost, institutions become increasingly dependent on higher differential tuition or else they must limit growth in the number of graduates in critical competitive areas like science and technology. And as a result of this dependence on differential tuition as a means to pay for more costly programs, access to science and technology careers by those with lower incomes is restricted, and the total number of graduates in these fields may be restricted, as well.

This funding dilemma poses serious questions to the State of Colorado in terms of future economic viability. The ability of Colorado institutions, particularly research universities, to support state economic development needs already has been affected by significant reductions in state budget support. Over the last 25 years, Colorado has decreased appropriations of state tax funds for operating expenses for higher education by 67.5%, more than any other state in the country. The total CSU System General Fund budget is down 26% from its highpoint in July 2002. Between July 1, 2002, and July 1, 2005, Colorado State University's budget declined 26.8%. CSU-Pueblo's budget declined 26.5%. Today's state appropriation for the CSU System is \$109,183,992. A decade ago, in 1995-96, the state appropriation for the System was \$110,840,107 (excluding the budget for Fort Lewis College) in non-inflation-adjusted dollars. Over the same time period, enrollment in the System increased 15.4%, while both schools also experienced increased expenses from state-mandated costs and significant price increases for essential areas such as utilities.

The currently proposed FY07 funding levels for higher education, while more optimistic than in recent years given the passage of Referendum C, still leave Colorado State University with a \$5.6M budget shortfall and CSU-Pueblo with a \$550K shortfall. The Colorado Commission on Higher Education has provided revenue for mandatory costs for each institution, but the universities have significant additional commitments to make quality improvements that address critical research needs, economic development, student aid and faculty retention. Under this scenario, Colorado State University will lose serious ground in its ability to remain competitive with peer institutions in terms of academic quality, faculty retention and student scholarships.

Why is this important to economic development? **Colorado State now educates more Colorado undergraduates in the STEM disciplines than any other Colorado campus – and thus serves as a critical pipeline for state industries that depend on this workforce.**

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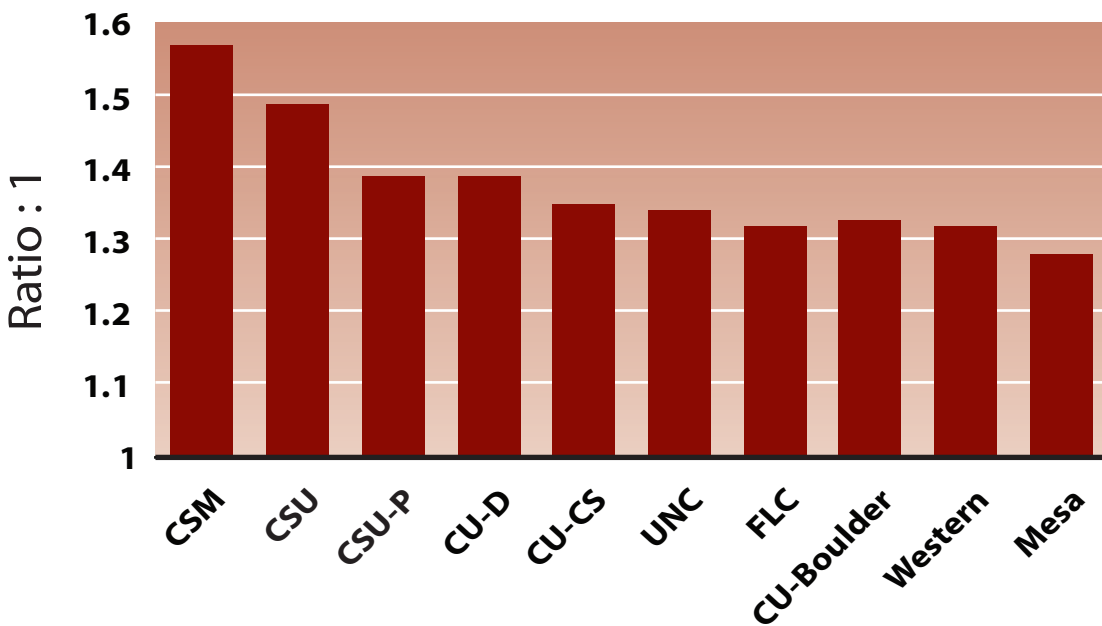
Potential Solutions

Formula Funding

Other states, to address this same problem, have adopted “formula funding” models such as those used in Texas, Florida, Ohio and Delaware. Such systems weight student credit hours based on cost, allowing “cost ratios” to be developed for each college and campus. To illustrate how such a system might work, the following analysis has been developed based on information provided by Colorado colleges and universities; Metropolitan State College is not included in this analysis because the institution has not provided its data for comparison.

Applying a “cost ratio” model,” the Colorado School of Mines has the highest lower division course-cost ratio in the state – not surprising given the institution’s technological focus and emphasis on engineering and mathematics (Figure 1). Somewhat more surprising to those who are not familiar with CSU’s concentration of students in the STEM disciplines is how closely Colorado State University follows the School of Mines cost structure, reflecting CSU’s significant enrollment of students in STEM disciplines. The Colorado School of Mines and Colorado State University are clearly different from other state institutions in the mix of high-cost programs offered at the lower-division (100-200) level.

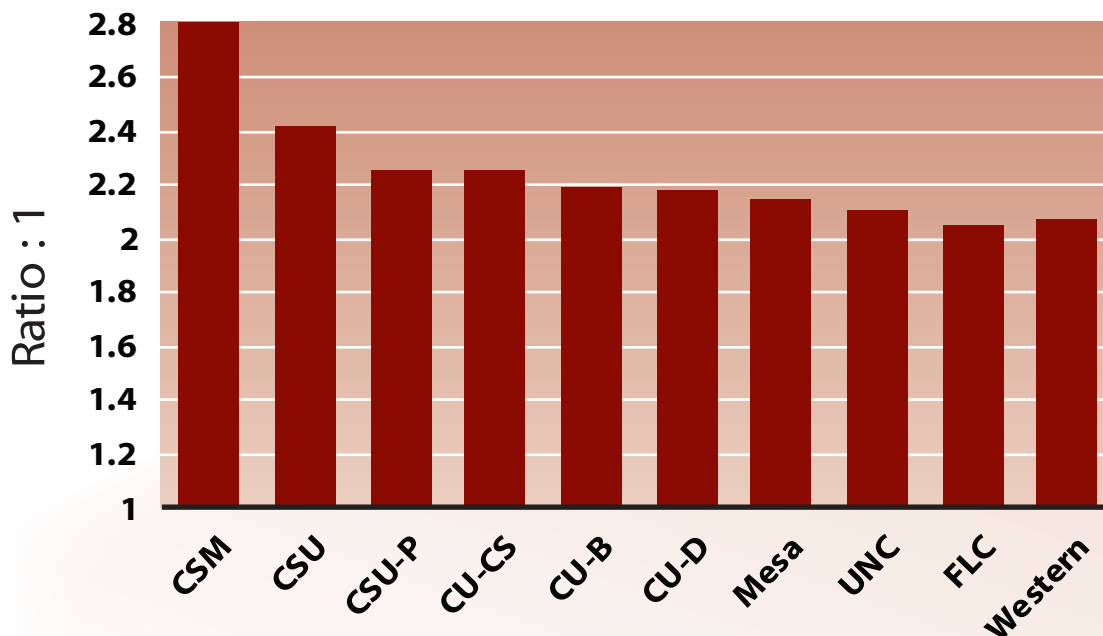
Figure 1 Lower Division Course Cost Ratios



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When the same cost-ratio model is applied at the upper division level (Figure 2), the School of Mines once again has the highest cost ratio at the upper division, as one would expect from what is essentially an engineering college. Colorado State again has the second highest upper-division ratio, followed by CSU-Pueblo and the University of Colorado at Colorado Springs with the third highest ratio. Here is how the institutions compare in terms of upper-division costs:

Figure 2 Upper Division Course Cost Ratios

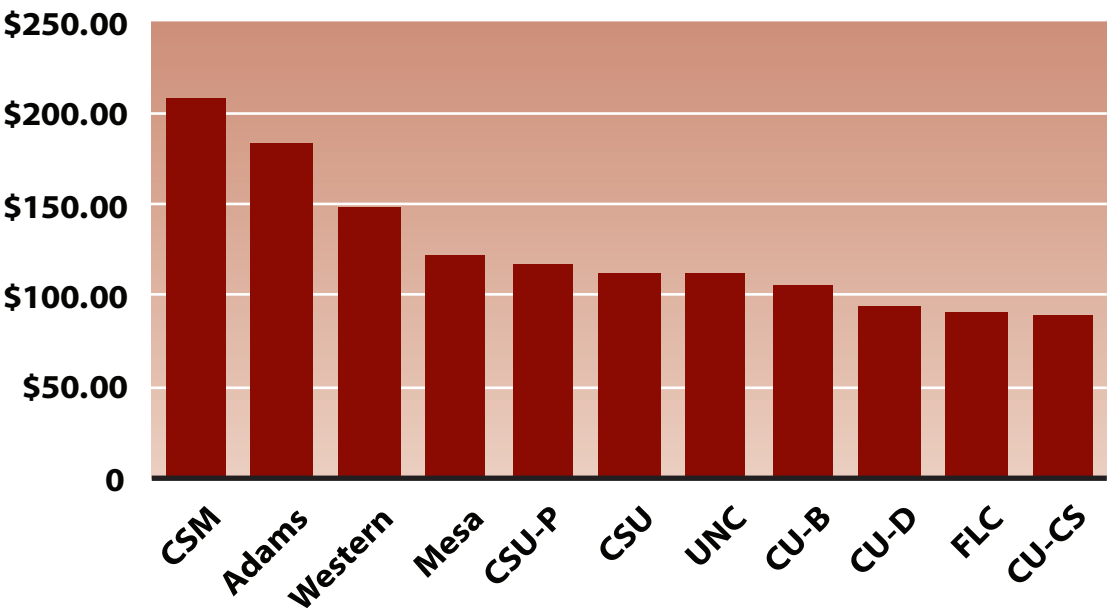


If Colorado were funding higher education so as to address the costs of education and encourage instruction in science and technology, we should see funding levels per credit hour that correspond to the ratios. As long ago as 1987, the Colorado Commission on Higher Education and the Colorado Legislature undertook a “Re-Exam of the Base [funding of colleges and universities]” to assure that the formula to fund higher education through the state’s General Fund appropriation per student closely reflected actual costs of education. At that time, Colorado State had the second highest appropriation per credit hour (as high as \$5,366 in FY01 per student credit hour), second only to the Colorado School of Mines. Such funding levels for these two universities were appropriate and consistent with their relative proportion of high-cost, STEM-heavy programs. But changes in approaches to funding, the state’s recession and other factors have introduced considerable change to per-student funding relative to the costs per student. As a result, General Fund appropriations per student – or state funding per credit hour – among institutions in Colorado no longer track the costs of education (Figure 3).

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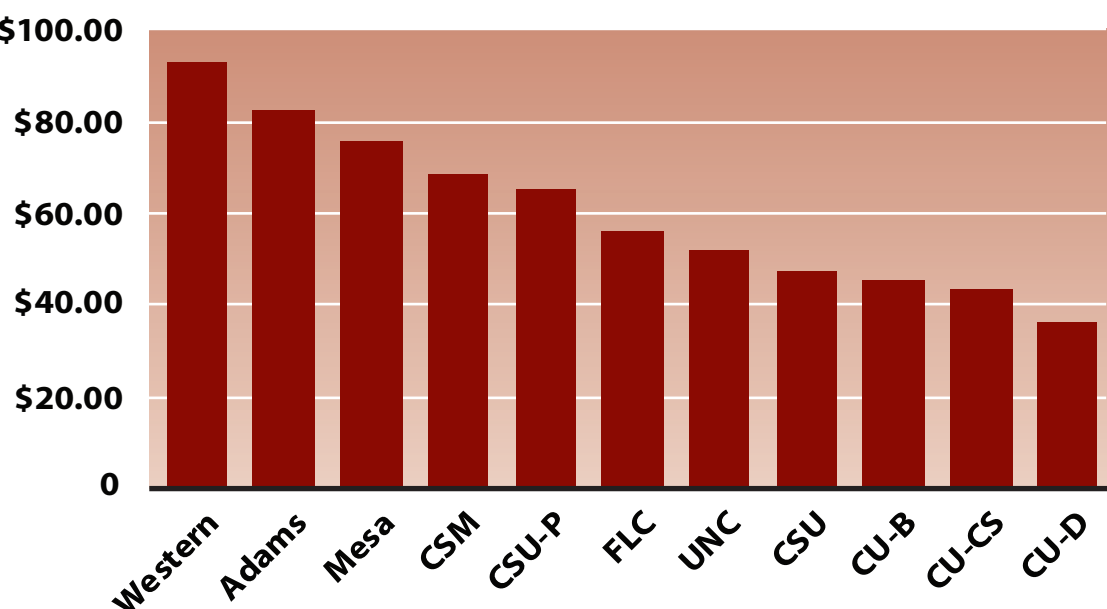
Here are the current funding levels:

Figure 3 General Fund per Resident Student Credit Hour



[Note that since state appropriations cannot be separated out by level, these calculations include all resident credit hours, *including very high cost graduate instruction.*]

Figure 4 General Fund per Resident Weighted Student Credit Hour

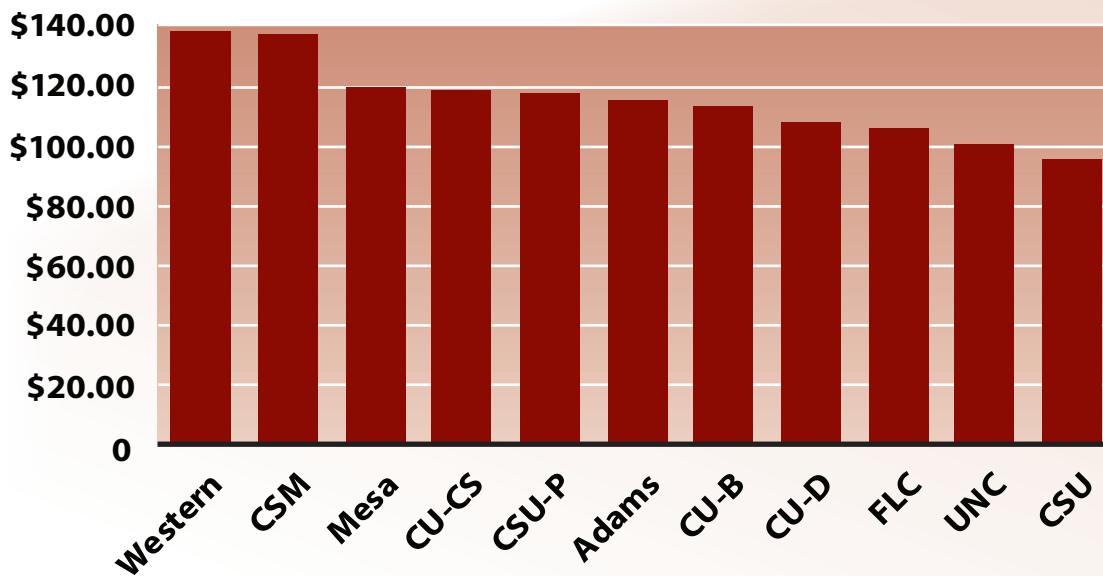


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When state funding is considered on a weighted student credit hour basis (with student credit hours “weighted” based on cost, as described at the beginning of this section), the Colorado School of Mines shows a reasonable relationship between its funding level per student credit hour and the cost of its programs (Figure 4), but its funding no longer represents its actual cost ratio with a heavy emphasis on economically critical courses in science, engineering and technology. Colorado State University and the CSU System are even more out of line in their levels of funding relative to costs of education in these critically competitive areas.

Of course one needs to understand the full story on the funding of education, and that can only be done by including tuition, general fund and differential tuition in programs like engineering. Earlier it was noted that one means to funding higher-cost programs is to place more of the burden on students with differential tuition. The following table focuses on the overall revenue per student credit hour, when those credit hours are weighted by cost (Figure 5).

Figure 5 General Fund + Resident Tuition per Resident Weighted Student Credit Hour



Available revenue for the Colorado School of Mines now tracks its cost ratios much more closely as a result of higher tuition. With relatively higher tuition at the CU universities and relatively lower tuition at the CSU universities, there is not a similarly close relationship between per-student revenue and the costs of education.

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Research and Development Funding Pools

In addition to formula funding, many states have developed programs to provide matching funds that enable their universities to compete for major grant support. Higher education will provide a strong and growing economic engine for Colorado in the areas of health, biomedicine, information technology and the environment, and by providing matching funds in these areas, the State will more effectively enable its universities to seek additional non-state grant that require a funding match.

Examples of such programs include The Kansas Economic Growth Act (\$500M over 15 years) and Massachusetts' Emerging Technology Fund (initial distributions of \$2.5M over five years).

An annually replenished pool of \$10 M in matching funds would allow Colorado's research universities to compete more effectively for federal, corporate and foundation grants, which in turn support graduate education in critical STEM fields. Fundamentally, this type of fund would serve to make the State of Colorado more competitive with other states in its competition for new businesses and jobs.

Alternative Tuition Models

Colorado remains a low tuition state by policy. Indeed, Colorado State University maintains in-state tuition of \$4,562, while its CCHE peers now have an average in-state tuition of \$5,659. The challenges of a low tuition model come from the restricted revenue – revenue to support high-cost programs like those addressed in this paper and revenue to provide scholarships for those students most in need. Despite low tuition, those families with the greatest unmet financial need are often unable to afford even Colorado's low tuition with substantial financial aid to cover tuition and related expenses of higher education.

As a matter of policy, Colorado confronts critical policy decisions associated with its pricing of higher education as well its approach to funding universities from the state's general fund. Other states have adopted different tuition models from those in place in Colorado to strengthen support for higher education, provide financial aid to those with the greatest need and allow enhanced emphasis on programs of critical state interest.

Some of these can be considered experimental and are being watched closely by other states and institutions. They include New York and Virginia's hybrid universities: Universities like Cornell and the University of Virginia operate with a mix of publicly supported and privately endowed units within the same university structure. This focuses state funding on units and programs that are deemed of critical state interest, leaving the operation and funding of remaining units/programs to the university. Another approach is Miami University of Ohio's full-cost pricing. Tuition is set at a flat rate for all students – resident and nonresident.

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This tuition rate is calculated to cover full costs of education, and financial aid dollars are reserved from the tuition revenue to ensure access for low-income resident students. Somewhat similarly, the state of Washington has considered a funding model that would charge wealthy families the full cost of educating their children, while giving low- and middle-income students a discount through financial aid. Pennsylvania State University is not part of the main state budget (unlike Pennsylvania's community colleges and state colleges, which are state owned), but is included in the non-preferred budget, which is set after the main budget is adopted. This state-related status also applies to Pennsylvania's two other research institutions, University of Pittsburgh and Temple. Their boards have complete control to set tuition.

Conclusion

The purpose of this paper is not to endorse a specific course of action but to recommend that the State of Colorado undertake a serious examination of how well its higher-education funding system tracks with desired state policy outcomes. Colorado has an opportunity to shape the direction of future economic growth and encourage high-quality job creation by investing in those academic disciplines most directly tied to economic prosperity in a knowledge economy. Such investments will encourage a larger labor pool and workforce in critically competitive jobs.

By contrast, our state's current funding model actually provides a disincentive to those institutions that offer graduate education and important, but costly, programs in such economically essential fields as science, engineering and nursing, while rewarding those that emphasize undergraduate programs in the liberal arts. Certainly, a solid grounding in the liberal arts is a part of a well-rounded college education; however, a prosperous and competitive state economy depends to a great extent on a well-prepared workforce that possesses advanced technological, scientific and professional skills.



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