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REVIEWER:	**José Luis Santos**
E-MAIL ADDRESS:	**jsantos@gseis.ucla.edu**
PHONE NUMBER:	**(310) 825-7549**
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Summary of Review

The findings and conclusions of a new policy brief from the Mackinac Center for Public Policy are poorly grounded and misleading. The report, entitled "Michigan Higher Education: Facts and Fiction," does raise a number of important issues concerning the financing of public universities, but the study is firmly rooted in a strong, ideologically based conceptual framework. Rather than explore how universities have been affected by or responded to state cutbacks and how this resulting behavior affects state economic growth, the report seeks to confirm the authors' belief that there should be less government involvement in the funding of public universities. The authors narrowly focus on benefits from higher education that accrue to individual students, despite considerable empirical research from other scholars showing societal benefits. The report's attempt to model the relationship between state spending on public higher education and that state's economic growth suffers from these and other flaws. In short, the authors grossly overstate their findings and policy-makers should view with great caution the conclusions drawn and policy recommendation to reduce state funding for public universities.

Review

I. INTRODUCTION

The report released by the Mackinac Center for Public Policy, "Michigan Higher Education: Facts and Fiction,"[1] is essentially an advocacy document designed to push state and federal policy-makers toward the position that increased state appropriations for higher education are wasteful due to inherent inefficiencies and to the difficulty in measuring productivity.

Consistent with this intent, the report's authors, Richard Vedder and Matthew Denhart, focus almost exclusively on the relationship between government spending and economic growth. Their primary findings in this short study are as follows: 1) During a period of sharpest cutbacks in appropriations (between 2000 and 2004), Michigan public universities did just fine financially; and 2) higher state appropriations are associated with lower economic growth.

These findings are counter-intuitive and hard to accept at face value, and their believability is made even harder because—as explained below—such strong assertions come from a particularly weak data source (as acknowledged by the authors themselves). Further, the authors' analysis fails to sensibly account for revenue streams, such as tuition, fees, and private fundraising, in addition to state appropriations. In sum, the authors' strong assertion that no positive effects on economic growth are associated with higher education spending via state appropriations is far-fetched, given the weak dataset and the inherent complexity in understanding the causes of economic growth. The direct and indirect effects of state appropriations are certainly an important subject of investigation, but meaningful analyses need to take into account the layers of political and economic nuances embedded in those appropriations in any given budget cycle and state. In particular, indirect effects can accrue to society through what economists call "externalities." Vedder and Denhart describe externalities as "spillover effects," which is a reasonable way to characterize them. For instance, high-tech companies often choose to locate near research universities, thus bringing jobs and tax revenues to a region.[2] As discussed below, the new report expressly decides not to take these externalities into account.

Although the authors use appropriate econometric techniques to analyze their data, they grossly overstate their findings. This is in part because the authors seem to ignore weaknesses in data and what methodologists call "model specification" (discussed below) when they discuss conclusions and policy implications. Moreover, responsible scholars who examine higher education from an investment standpoint should take into account the political, economic, and social considerations resulting from those investments. These authors do not do so.

Because the long-term trend in most states is toward tighter budgets, universities have seen their share of state-level revenues decline, both in real (inflation-adjusted) dollar spending and relative to other core businesses of a state, such as K-12 education, public safety, and health and human services.[3] In order to maintain and increase their competitive positions in a global higher education marketplace, public universities have had to become more entrepreneurial and to shift greater financial demands to students and their families.[4] Specifically, most public universities have had to increase

their tuition and fee levels and put into place additional fees for technology, laboratory usage, recreation, and the like in order to offset real decreases in state appropriations. Moreover, public universities have had to increase their capital campaigns to raise record dollar amounts from private donors, usually monies that are for restricted use.[5]

II. FINDINGS AND CONCLUSIONS OF THE REPORT

A discussion of the two major findings of the report, below, is followed by a short discussion of some of the additional conclusions and assertions that the authors have interspersed throughout their report.

Findings and Conclusions from the Short Study

There were two major findings offered by the authors of this report:

1. During a period of sharpest cutbacks in appropriations (between 2000 and 2004), Michigan public universities did fine financially; and

2. Higher state appropriations in Michigan have been associated with lower economic growth.

Table 1 on page 2 of the report is the main source of evidence to support finding No. 1. The table shows increased revenue per student (full-time equivalent student, or "FTE") in 2004, as compared to 2000. The authors' use of this table is misleading, however, since they switch back and forth between two very different types of numbers. Specifically, the authors are trying to debunk an empirical claim that state appropriations for higher education have declined (adjusted for inflation) over the last 20 or so years.[6] To do so they point to Table I and assert that "real revenues per FTE were higher" during the timeframe of interest. As the authors themselves acknowledge, however, state appropriations and revenues per FTE are not the same thing. The revenue per FTE reported in Table 1 is total revenue and thus includes, in addition to state appropriations, such items as endowment revenue, research and other grants, hospital revenues, tuition and fees, and non-academic funds. This includes, for instance, revenue generated when Michigan played USC at the Rose Bowl to end the 2003 football season. In other words, it is total revenue, irrespective of source. And the source does matter, since an increase in one source usually offsets a decrease in one or more other sources.

The report's authors use total revenue per FTE to argue that the University of Michigan-Ann Arbor "did not experience severe austerity" (p. 2). In fact, the authors pointedly tell the reader that the "University of Michigan-Ann Arbor was expanding its operations at a rapid rate at a time of genuine economic stress in the state" (p. 2). They make these arguments even after having acknowledged that the measure they use to compare the two years includes all revenue sources, including student fees, etc. That is, the authors' basic argument seems to be that higher education institutions, or at least the state's flagship university, can find ways to financially succeed even when the state cuts back its support.

It is, in fact, the case that the University of Michigan-Ann Arbor has demonstrated an ability to tap into new revenue streams above and beyond tax-supported dollars. Undoubtedly, this is university behavior that the report's authors embrace. But policymakers may want to exercise some caution before joining in the embrace. For even while the University of Michigan-Ann Arbor continues to generate offsetting revenues

to make up for state shortfalls, it finds itself behaving more and more like a private university, with students asked to pay higher tuition and fees in order to maximize the university's non-restricted revenue stream.[7] Caution is also warranted because less-sought-after colleges and universities will not be in the same position to demand higher tuition and fees, and smaller universities are usually not able to raise the amount of dollars that can be raised at larger ones.

In a nutshell, while revenues per FTE may have increased from 2000 to 2004 at almost all Michigan higher education institutions, the revenues from state appropriations were much lower. It is misleading to suggest that the two sets of numbers are the same or even have similar policy implications. And this certainly undermines this key finding from the report. Given the report's clear goals, an approach that would have been more honest with readers might have been for the authors to have presented an analysis of how public higher education institutions respond to state cutbacks. They might have then argued that the resulting shift toward privatized education is beneficial. Instead, they have written a report that confuses the reader by using data about pears to draw lessons about mangos.

The claim that higher state appropriations are associated with lower economic growth lacks a research foundation, particularly given that the authors here are trying to argue that the first causes the second. The authors present their results in strong, absolute, and definitive terms, rather than recognizing that the existing research on economic growth studies is far from definitive. It should go without saying that many other factors contribute to growth. Moreover, it is flat wrong to firmly assert that state appropriations have no positive spillover effects on a state's economy. The fact is that, for data availability reasons discussed in sections III and IV of this review, research to date has not established a clear relationship—positive or negative—between state spending on higher education and economic growth.

As also discussed later in this review (section IV), the authors present something called a "fixed-effects model," which is an attempt to isolate the effects on the state economy of spending on higher education, after controlling for other possible factors. The model is problematic, however, because the authors failed to consider important micro and macro variables linked to economic growth[8] that can be combined at different levels of aggregation: state, institution, and the higher education marketplace. As a result, the report's second finding (which associates higher spending with lower growth) rests on a weak foundation that can and should be revisited by taking into account the discrepancies pointed out throughout this review.

Extraneous Findings made throughout the Report

The authors include unsupported pronouncements that may lead readers to incorrectly believe that the veracity of the claim is without question. In doing so, they do not appear to have considered key realities surrounding higher education in general and public universities specifically.

An example of such a claim is the notion that "that the observed shrinkage in state appropriations over the first half of the decade was actually a positive development" (p. 1). This claim is consistent with an ideological belief rooted in the idea that public higher education is a cost to a state and that it is not a necessary or positive investment yielding returns to individuals and to GDP

in direct and indirect ways. But should not the authors and readers consider the effects of the tax savings? Were taxes lowered? Were the savings reinvested? If so, how? On its face alone, this claim is merely a polemic.

The authors also offer a rather unfounded comparison of two sets of states. They exalt the "10 states with the most rapid economic growth [which] expanded their spending on higher education on average at a modest pace, from 1.31 percent to 1.44 percent of personal income" (p. 5). And they disparage the "10 slowest growing states, [whose] higher education spending grew rapidly on average, from 1.80 percent to 2.21 percent of personal income" (p. 5). Yet while this cut of the data—this superficial comparison—may raise some interesting questions suggesting future, serious research, what is presented in the report is far from enough to draw even tentative conclusions. Higher education spending is merely a sliver of what explains economic growth. In fact, the authors in this case selectively chose a 20-year time period between 1980 and 2000 and they never address the implication of the two economic recessions during that time period (and they never address whether the results might be different if they included the recession that followed in 2001). Moreover, what is the proper baseline from which to draw conclusions about economic growth? If it is not the arbitrary time period the authors use, then what should it be?

The report's core findings, as well as these extraneous findings weaved throughout, are further weakened by the authors' frequently expressed sentiments about what is "wrong" with public higher education nationwide and why the state of Michigan should further reduce its spending on higher education.

III. THE REPORT'S USE OF RESEARCH LITERATURE

This policy brief fails to include a literature review. Instead, the report exclusively cites the first author's previous book ("Going Broke by Degree: Why College Costs Too Much"), as well as an article he authored that was published in the *Journal of Labor Research*, and a policy brief published by the Mackinac Center for Public Policy earlier in 2007.[9]

Vedder's book was thoroughly vetted by a renowned labor economist, econometrician, and higher education scholar, Ronald Ehrenberg, who is Irving M. Ives Professor Industrial and Labor Relations and Economics at Cornell University and Director of the Cornell Higher Education Research Institute. Ehrenberg raises a number of issues of concern stemming from Vedder's book, issues that carry over into the new report.[10] Ehrenberg's main critiques are as follows:

1. Vedder's book is a "good diagnosis of the uses facing public higher education, [but] it also often is a polemic in which political philosophy, rather than empirical evidence, shapes statements and drives policy conclusions;" (p. 739)

2. Absent from his vision of higher education is "any notion that research, graduate education, and extension and public service activities have value;" (p. 740)

3. Vedder "does not make clear here that tuition increases and cost increases are two different concepts;" (p. 742) and

4. Speaking to Vedder's question as to how have universities utilized their

> enhanced revenues, Ehrenberg points out that "increases [albeit small, 0.6 percent a year] in state appropriations per student for higher education have been insufficient to keep up with the rising costs of higher education" (p. 743).

Setting aside such concerns for a moment, many researchers and policy-makers would agree that the issues addressed in this new report are important and very much worthy of investigation. Serious policy questions exist around efficiency of spending and around the economic and social effects of higher education. Policy-makers in the state of Michigan, lawmakers throughout the country, and anyone interested in higher education finance issues in general would benefit from a better understanding of the complex relationship between public funding and public higher education institutions. What follows is a short literature review of the type that should be provided to policy-makers grappling with the complexities of the issues.

Importantly, one of the authors' key assumptions may, in fact, be correct—that "state appropriations for higher education have [by themselves] no positive effects on economic growth as claimed by many university presidents" (p. 1). When state appropriations are combined with other revenue streams, however, they may have a larger impact on a State's Gross Domestic Product, and, in the aggregate, have a positive relationship with economic growth.[11] Existing research has not established a clear relationship between state spending on higher education and that state's economic performance.[12] The ambiguity of the nature of the relationship is not suggestive of a lack of a link, however. To the contrary, it points to the difficulty in measuring many of the positive externalities (the spillover effects) that flow from the relationship and are difficult to measure.

We know that these effects exist, but we can't attach accurate numbers to them, so we cannot conclude whether or not their contributions to a state's economic performance results in an overall positive financial investment. For example, ample empirical evidence points to the economic returns to individuals with some college work or above.[13] What is more difficult to measure empirically are the economic returns to society. A person earning more is likely to pay more taxes, for instance. She also may be less likely to end up as an economic burden to the state, receiving public assistance or landing in prison.[14] But what exact benefit can be attributed to the state's investment in higher education? In general, we can link individual benefits to societal benefits, but we have a much more difficult time quantifying those benefits.[15] Public investment in higher education is a central factor in stimulating and enhancing economic growth and development because it furthers formation of "human capital" (productive skills and knowledge) and contributes to technological advances and discoveries. Further, benefits accrue to society in the form of such factors as lower crime rates, increased charitable giving, and improved quality of life for offspring.[16] Higher education also moves society towards income equality, which is a necessary condition for social mobility and stability.[17] This worthy goal is much more necessary today, given the growing social inequality that persists in this country.[18]

Again, among scholars and researchers there is little controversy about the existence of these benefits. The difficulty lies in attaching accurate numbers. Faced with this weakness in our current knowledge, the appropriate response is not to dismiss or ignore what we do know, the approach taken in the

new report; rather, it is to present readers with a transparent analysis that makes a best effort to account for all relevant factors.

In this regard, it should be noted that some scholars do argue that the relationship between public spending on higher education and economic health is marginal at its best and negative at its worst, mainly benefiting the middle and upper classes.[19] Similarly, scholars have charged that higher education spending is a form of regressive taxation, since costs are diffused throughout society while providing concentrated benefits to the few who go to college.[20] This view is, in fact, shared by the new report's authors.

Again, a balanced literature review for this report would have, at the very least, pointed out that economic growth studies are mixed and are not conclusive regarding the relationship between public spending and state economic growth.

IV. REVIEW OF THE REPORT'S METHODOLOGIES

The report's analyses relied heavily on the Integrated Postsecondary Education Data System (IPEDS) data.[21] This dataset is known by scholars and institutional researchers across the country to have certain limitations regarding its use for state comparisons.[22] The authors acknowledged that the "data are not perfect;" but they failed to clarify how this imperfection may or may not affect their results. What follows is an overview of some of the known imperfections and issues associated with relying heavily on IPEDS finance data.

With regard to higher education revenue, IPEDS reporting is problematic for reasons including the following:

1. When universities report their institutional data to the Department of Education, they vary widely in how and what they report. For example, some universities may include appropriations for their main campus only or for their main campus combined with branch campuses, medical and health science centers. In the case of public land grant universities, appropriations may or may not include agricultural extension and/or agricultural experiment stations.

2. Information on tuition and fees varies widely, as tuition refers to costs associated with instruction while fees are associated with athletics, technology, or the like.

3. Endowment income also varies widely in how it is reported and in whether these totals can be reconciled with public annual reports. This accounting issue is problematic and difficult to capture accurately.

On the expenditure side, IPEDS again has a number of known concerns. For example:

1. It is not always clear whether it is the state or the university that pays debt service, workers compensation, fringe benefits, retirement, and utilities.

2. Instruction and research expenditures vary widely in fund accounting, since definitions for instruction and research vary across institutions, thereby causing variations in how the information is presented in the dataset.

These are not the only concerns that researchers have with using IPEDS data for

state comparisons regarding revenue and expenditures. In fact, one of the biggest issues about university comparisons is the variance (within a university and between universities) that is associated with whether a school is a public land grant and whether it has a medical school. For this reason, researchers who do insist on comparing such institutions using IPEDS should apply a statistical correction for this known discrepancy.[23]

The sophistication of the econometric models used by Vedder and Denhart for the data seems appropriate. Omitted variable bias[24] may be present, however. That is, key variables may be missing from the authors' model.

For instance, the authors failed to control for the presence of private universities. That is, they omitted the effect that a low number of public universities or a high number of private universities has on any given state. For instance, Massachusetts and other northeast states have a high proportion of private universities, whereas Arizona has no private, not-for-profit, four-year universities comparable to the three public universities in that state. This wide-ranging effect should be accounted for in any attempt to model the effects sought after by the authors.

The authors also failed to include in their model the effect that other revenue streams in concert with state appropriations have on economic growth—such as tuition and fees, private monies, and the like. It is inaccurate to suggest that economic growth is narrowly dependent on state appropriations to public universities, since pubic universities have had to increase their tuition and fees largely to offset decreases in state appropriations. These universities have also had success in raising large sums of non-discretionary dollars from private donors resulting from capital campaigns.[25]

In addition to the data problems, the report suffers from the common trap of confusing correlation with causation. The purported negative relationship between higher education spending and economic growth may or may not exist.[26] But the relationship itself may be spurious, such as the correlation between airline travel and ownership of expensive cars. Neither causes the other; rather, their cause is found in other factors (in that case, overall wealth is likely the primary "cause"). Also, there is general consensus that better analyses involving time series designs are needed, as well as better data. That is, the time frame the authors choose is arbitrary and could have contributed to the findings. A different time period could lead to an opposite result.

In short, effective and complete economic growth equations would have to be too complex, given the available data. Too many direct and indirect effects exist and are usually not adequately specified in an econometric model of this type.

V. REVIEW OF THE VALIDITY OF THE FINDINGS AND CONCLUSIONS

The validity of the findings in this report is problematic because the authors have failed to consider key realities surrounding higher education in general and public universities specifically.

The authors' conclusions are pretty straightforward, and they do not mince words. The power and validity of their claims to direct public policy stand on shaky ground, however.

First, the authors state that the "alleged 'positive externalities'—or spillover effects of higher education—appear to be overblown, at least regarding economic considerations" (p. 6). In fact, they go on to say that "the opposite appears [to be] the case: more university spending might actually lower living standards for all, having negative spillover effects" (p. 6). What is problematic about these statements taken together is that in the first statement the authors implicitly acknowledge that this was a narrow research design that only considered a narrow economic variable. Yet, the authors then make sweeping assertions about lower living standards—the type of quality of life issue that transcends economic variables. These two statements cannot be reconciled; rather, the authors have carelessly pushed their conclusions considerably beyond what their data allow.

The authors state that the "benefits of higher education accrue primarily to the users [individuals] … wherever they choose to make their homes after graduation"(p. 6)—suggesting that a state should not be making such investments since that particular state may not benefit. This is not a valid conclusion and flies in the face of the empirical evidence linking social benefits to higher education.[27] Moreover, whether a state is an importer or exporter of college graduates, states do benefit from higher education investments.[28] These authors' clear beliefs have led them to conflate the idea of less state investment in public higher education with the idea of social optimality. That is, they believe that it is socially desirable to spend less money on public higher education.

VI. USEFULNESS OF THE REPORT FOR GUIDANCE OF POLICY AND PRACTICE

This report makes an argument centered on the notion that tax reduction is an economic growth-inducing strategy and the notion that higher education spending is not growth inducing, so state policy-makers should decrease spending on that activity.

This point of view lacks empirical support in the overall research literature (omitted from the report) and is not wholly supported by the findings of the report itself, since there are model specification errors and mischaracterizations of the benefits of higher education (the authors emphasize the benefits to individuals while ignoring the direct and indirect benefits to society), among others.

Moreover, this study fails to meaningfully lay out the menu of policy options that can be exercised if Michigan (or any other state) realistically chooses to reduce spending on higher education. The only policy option—which addresses economic growth but not higher education—offered by the authors is that the "fruits of higher tax revenues [resulting from constrained spending by both government and universities] over time would lower the tax burden" (p. 6). Policymakers are led to believe that this is the only policy option that leads to greatest economic growth.

While the conclusions of this study are sure to be cited in the often contentious budget appropriation deliberations among governors and legislatures across the country, the ideological framework, data, analyses, and policy recommendation should be viewed with great caution.

NOTES & REFERENCES

[1] Vedder, R. and Denhart, M. (2007). *Michigan Higher Education: Facts and Fiction*. Midland, Michigan: Mackinac Center for Public Policy. Retrieved July 11, 2007 from http://www.mackinac.org/archives/2007/s2007-08.pdf

[2] Huffman, D., & Quigley, J. M. (2004). The role of the university in attracting high tech entrepreneurship: A Silicon Valley tale. *The Annals of Regional Science, 36*(3), 403-419.

[3] For examples of such literature cited see:

Hovey, H. A (1999). *State spending for higher education in the next decade: The battle to sustain current support*. Prepared by State Policy Research, Inc. for The National Center for Public Policy and Higher Education. San Jose, Ca.

Toutkoushian, R. (2003). Weathering the storm: Generating revenues for higher education during a recession." In F. K. Alexander & R. G. Ehrenberg (Eds.), *Maximizing Revenue for Higher Education. New Directions for Institutional Research, 119,* (pp. 27-40). San Francisco: Jossey-Bass.

Santos, J. L. (2007). Resource allocation within public research universities. *The Review of Higher Education, 30*(2), 125-144.

[4] For examples of such literature cited see:

Pfeffer, J., & Salancik, G. (1978). *The external control of organizations: A resource dependence perspective*. New York: Harper & Row.

Slaughter, S., & Rhoades, G. (2004). *Academic capitalism and the new economy: Markets, state, and higher education*. Baltimore: The Johns Hopkins University Press.

[5] See Santos, J. L. (2007). Resource allocation within public research universities. *The Review of Higher Education, 30*(2), 125-144.

[6] For examples of such literature cited see:

Rizzo, M. J. (2004a). A (less than) zero sum game? State funding for public education: How public higher education institutions have lost. Unpublished doctoral dissertation, Cornell University. Ithaca.

Santos, J. L. (2007). Resource allocation within public research universities. *The Review of Higher Education, 30*(2), 125-144.

[7] Winston, G. C. (1999). Subsidies, hierarchies and peers: The awkward economics of higher education. *Journal of Economics Perspectives 13*(Winter), 13–36.

[8] E.g., low-growth state vs. high-growth state, professional legislature vs. non-professional legislature, public vs. private, 4-yr vs. 2-yr, high endowment vs. low endowment, high-tuition/high aid vs. low-tuition/low aid, technology cluster activity vs. no technology cluster activity.

[9] The authors primarily cite the senior author's work where he uses an ideological framework to situate his work and findings that support such conceptions of higher education and how it works. For complete citations see the policy briefs Footnotes section on page 6.

[10] For a complete review of *Going Broke by Degree: Why College Costs Too Much* and Vedder's retort, see Ehrenberg (2005) and Vedder (2005) in the *Journal of Labor Research*).

Ehrenberg, R. (2005). Going Broke by Degree: A review essay. *Journal of Labor Research, XXVI*(4), 739-752.

Vedder, R. (2005). Reviewing the reviewer: Ehrenberg on Going Broke by Degree. *Journal of Labor Research, XXVI*(4), 753-758.

[11] Multiplier effects—for every dollar invested in higher education X dollars are returned to the state—this effect varies across states and institutions themselves have estimated their own multiplier effects—see Economic Development Offices at universities for these figures.

[12] Jones, B. D., & Vedlitz, A. (1993). Higher education, business creation, and economic growth in the American states. In W. E. Becker and D. R. Lewis (Eds.), *Higher education and economic growth* (pp. 51-86). Boston, MA: Kluwer Academic Publishers.

[13] Pencavel, J. (1993). Higher education, economic growth and earnings. In W. E. Becker and D. R. Lewis (Eds.), *Higher education and economic growth* (pp. 163-175). Boston, MA: Kluwer Academic Publishers.

[14] See Institute for Higher Education Policy [IHEP] (2005). The investment payoff: A 50 state analysis of the public and private benefits of higher education. Washington, D.C: Author.

[15] Sianesi & Reenan's work point to the difficulty in measuring positive externalities. Stephen Hoaeneck's, IHEPs, Enrico Moretti's, and Michael Rizzo's work point to the various direct and indirect benefits of higher education:

Hoeneck, S. A. (1993). Higher education and economic growth. In W. E. Becker and D. R. Lewis (Eds.), *Higher education and economic growth*. Boston, MA: Kluwer Academic Publishers.

Institute for Higher Education Policy [IHEP] (2005). The investment payoff: A 50 state analysis of the public and private benefits of higher education. Washington, D.C: Author.

Moretti, E. (2004). Estimating the social returns to higher education: Evidence from longitudinal and repeated cross-section data. *Journal of Econometrics, 121*(July/August), 175–212.

Rizzo, M. (2004b). The public interest in higher education. Cornell Higher Education Research Institute Working Paper 55. Retrieved July 5, 2007 from, http://www.ilr.cornell.edu/cheri/.

Sianesi, B., & Van Reenan, J. (2000). *The returns to education: A review of the macro-economic literature*, (Discussion Paper 6). London, U.K: Centre for the Economics of Education.

[16] See Institute for Higher Education Policy [IHEP] (2005). The investment payoff: A 50 state analysis of the public and private benefits of higher education. Washington, D.C: Author.

[17] Bowen, H.R. (1977). Investment in learning: The individual and social value of American higher education. San Francisco, CA: Jossey-Bass.

Also, see Institute for Higher Education Policy [IHEP] (2005). The investment payoff: A 50 state analysis of the public and private benefits of higher education. Washington, D.C: Author. This resource provides a complete listing of the array of public and private economic benefits as well as the public and private social benefits accrued to states as a result of tax effort

[18] Neckerman, K. M. (Ed.). (2004). Social inequality. New York: Russell Sage Foundation.

[19] For examples of such literature cited see:

Feller, 2004 Feller, Irwin. 2004. Virtuous and Vicious Cycles in the Contributions of Public Research Universities to State Economic Development Objectives. Economic Development Quarterly 18 (2):138-150.

Sanders, J. (2003). Does spending on higher education drive economic growth? 20 years of evidence reviewed. In *Policy Report*. Phoenix, AZ: Goldwater Institute. (This report was quickly dismissed in Arizona having used flawed methodologies. Arizona State University President cited numerous economists who pointed out serious methodological issues in the report)

Vedder, R. (2004). Private vs. social returns to higher education: Some new cross-sectional evidence. *Journal of Labor Research, XXV*(4), 677-686.

Wolf, A. (2002). Does education matter? Myths about education and economic growth. London: Penguin Books.

[20] Lowi, T. (1964). American business, public policy, case-studies, and political theory. *World Politics, 16*(4), 677-715.

See also Vedder, (2004) and Sanders (2003).

[21] IPEDS was established as the core postsecondary education data collection program for the National Center for Education Statistics (NCES), is a system of surveys designed to collect data from all primary providers of postsecondary education. IPEDS is a single, comprehensive system designed to encompass all institutions and educational organizations whose primary purpose is to provide postsecondary education. The IPEDS system is built around a series of interrelated surveys to collect institution-level data in such areas as enrollments, program completions, faculty, staff, finances, and academic libraries. IPEDS can be accessed at http://nces.ed.gov/ipeds/.

[22] Gater, D. (2003). Using national data in university rankings and comparisons. Retrieved July 3, 2007 from http://mup.asu.edu/gaternatldata.pdf

See also (Lapovsky, L. (1991). Uses and sources of financial data for institutional management. *New Directions for Institutional Research,* 69, 75 - 82

[23] In 2002 institutional research colleagues and I examined the effects of statistically backing out the University of Arizona's medical school in order to make better state comparisons between its peer institutions. In essence, the findings were effective in showing university's underfunding with respect to its peers.

Nzeukou, M., Miley, W., Rhodes, T., & Santos, J. L. (2002). *A trend analysis of student educational expenditures in the 1990s*. Tucson, AZ: The University of Arizona, Office of the President, The University of Arizona.

[24] Omitted-variable bias may occur when a study concludes that X_1 predicts Y, but there exists another variable, X_2 , that was not included in the study but which also predicts Y. When this type of bias is present, X_1 and X_2 together are a stronger predictor of Y than X_1 or X_2 alone.

See Greene, W. H. (2003). Econometric analysis (5^{th} ed.). Upper Saddle River, NJ: Prentice Hall

[25] See Santos, J. L. (2007). Resource allocation within public research universities. *The Review of Higher Education, 30*(2), 125-144.

[26] See Hoeneck, S. A. (1993). Higher education and economic growth. In W. E. Becker and D. R. Lewis (Eds.), *Higher education and economic growth*. Boston, MA: Kluwer Academic Publishers.

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Krueger, A. B., & Lindahl, M. (2001). Education for growth: Why and for whom? *Journal of Economic Literature, XXXIX* (December), 110-1136.

[27] See Hoeneck (1993); IHEP, (2005); Moretti (2004); and Rizzo, (2004b).

[28] See Ehrenberg, R. (2005). Going Broke by Degree: A review essay. *Journal of Labor Research, XXVI*(4), 739-752.

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