

# Public vs. Private Investment in College:

*An Exploratory Analysis*



Government Policy Research Center

**Michael J. Hicks, Ph.D.**

*Distinguished Fellow, Government Policy Research Center  
West Liberty University*

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*Director, Center for Business and Economic Research  
Miller College of Business, Ball State University*

The expense of a college education is a matter of much interest in households and legislatures across the United States. A central issue in any discussion about the level of private and public expenditure on higher education is a clear understanding of what those expenditures represent and how they compare to other similar investments – both public and private. Failure to understand this issue creates the opportunity for errors in public policy and household decisions to invest in higher education.

Establishing a clearer understanding what constitutes appropriate spending on higher education necessitates the answers to several questions. For households, it is useful to know how the treatment of higher education as a cost (such as automobile insurance) differs from treating it as an investment. Similarly, for state policy, it is helpful to understand differences in state spending on education due to college attendance rates. Likewise, it is important to understand how state or regional variation in tuition rates change the share of students attending college. Do tuition differences change the places where students attend college? Finally, how do factors such as household income influence both tuition and overall college spending, and what does this do to college attendance rates?

To better understand these issues, this report focuses on the role of higher education as an investment for both households and regions. To do so, we provide a review of estimates of higher education's benefits to households and regions. We also provide an analysis of the expenditure components for households and governments making higher education investments. In this section we provide a more complete picture of state-level spending on higher education. We also present new research on the role tuition, state-level college expenditures and household income play in college attendance rates. We then provide example micro-simulation of family expenditure decisions with respect to college attendance. We end with a summary and recommendations.

## Higher Education as an Investment

The research literature on the role of higher education as an investment provides a large body of evidence regarding both private and public (social) benefits. Private benefits accrue to individuals and households who directly make investments in higher education. The techniques for measuring private benefits focus primarily on wages, but there are also effects of higher education on morbidity and mortality, as well as other factors that contribute to private

Table 1: Non Risk Adjusted Rate of Return of Investments (Post WW2 Evidence)

Item	Real Rate of Return	Study Period
Stocks†	7.8	1946-1999
Stocks: DJIA*	10.83	1975-2003
Stocks: S&P††	6.8	1950-2004
Bonds†	1.3	1946-1999
Bills†	2.9	1946-1999
Long Term U.S. Treasuries***	-0.51	1950-1976
Gold†	-0.1	1946-1999
Higher Education: Social Benefit‡	7.9	1993-2006, average of various studies
Higher Education: Private Benefits‡	10.2	1993-2006, average of various studies
Higher Education Total Benefit‡	18.1	1993-2006, average of various studies
Real Estate (Hedged REITs)**	10.3	1978-1991
Commodity Futures***	9.81	1950-1976

† Siegel 1999, ‡ compiled by Psacharopoulos 2009, \* Reisch 2007, \*\* Giliberto 1992, \*\*\* Bodie and Rosansky 1980, †† Shiller 2005

rates of return. The most recent large study of rates of return (Psacharopoulos 2009) reviewed dozens of studies across the developed world, finding rates of return from 2.9 percent to 22.7 percent in

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Croatia and Turkey respectively. The average private rate of return across these countries was 10.2 percent. This study also reported social rates of return ranging from 2.0 percent in Switzerland to 16.0 in Hungary. The average real social rate of return was 7.9 percent. Importantly, the total returns are additive so that that the rate of return to both public and private entities of higher education averaged 18.1 percent in studies over the past decade. As Table 1 indicates, the returns to higher education exceed a full suite of other investment options facing households.

The return on investment in higher education exceeds the next highest ranked investment, the Dow Jones Industrial Average, by

more than 67 percent. Higher education returns also exceed Real Estate Investment Trusts by 75.7 percent and outperforms overall stocks, treasury bills of all types, commodities and bonds.

Importantly, the estimates in Table 1 are not adjusted for risk. Because returns to human capital carry a relatively low variability, higher education would outperform most, if not all, other investments listed above. The magnitude of the difference is more significant than the simple rate of return. Using these data, \$1,000 invested in each asset illustrates the significant effect over a working lifetime. For example, over a 30-year period, the benefits to education exceed those of stock investment by more than six fold.

The returns to education are both private and social. As noted above, the private returns are dominated by higher wages related to the change in skill level associated with education. They also include lower morbidity rates and higher life expectancy, though most studies do not address these issues. Social returns to higher education include benefits that do not directly accrue to the individual receiving the education. There is a large body of research on these social effects.

Among the most common findings of interregional studies of economic performance is the correlation between per capita income and per capita educational attainment. While a share of this relationship is primarily private (more highly educated workers are paid more), there is a well developed body of economic research identifying spillovers to education. The effect on workers and firms of the presence of more educated education has been found positive and statistically meaningful in virtually all studies of the issue. (see Engelbrecht 1996; Barrio-Castero, et al. 2002; Redding 1996).

Social benefits of higher education include not only higher productivity in regions, but also effects as diverse as lower crime and greater levels of political participation (see Moretti 2005). Higher level of education are also associated with lower public health care costs on such items as smoking, obesity, and addiction. Despite the abundant and consistent set of research findings regarding both private and social benefits of higher education, the policy debate in many places remains stubbornly affixed to the expenditures governments and households make to support higher education.

Exacerbating the issue of treating higher education expenditures as akin to municipal waste disposal fees is a cacophony of poorly done, advocacy-based research on the issue. One well known group recently rated all but one state (California) with an F on college affordability. In addition to ignoring the investment aspect of education, maltreating demographics and failing to account for grants in aid, this study ignored the enormous state tax burden in California. This is important because California taxpayers provide the majority of college costs. This leads us to conclude that this naïve approach provides no significant decision support for policymakers, university officials or families. Instead we provide a two-pronged approach to estimating the expenditures made by private and public sources, including families, on higher education.

Table 2. College Expenditures by State and Households

State	Overall College Expenses as a Share of Income	2006-2007 Tuition (\$)	Total Higher Education Spending (\$Thousand)	Available Income per Student (\$)	College Budget per Potential College Student (\$)
U.S.	1.263%	5,836	160,601,788	461,920	7,626
Alabama	1.261%	4,915	3,312,497	389,792	10,399
Alaska	1.021%	4,195	574,883	411,068	10,454
Arizona	1.161%	4,676	3,552,201	402,847	8,236
Arkansas	1.391%	5,298	1,610,090	380,963	8,641
California	0.978%	4,560	25,783,758	466,032	9,486
Colorado	0.941%	4,646	1,444,394	493,469	4,240
Connecticut	0.990%	7,140	1,809,890	720,936	8,091
Delaware	1.500%	7,410	462,311	494,162	7,899
Florida	0.653%	3,336	7,529,049	510,789	6,555
Georgia	0.962%	3,913	5,426,311	406,874	8,309
Hawaii	0.939%	4,257	1,005,406	453,189	10,954
Idaho	1.091%	4,159	770,686	381,239	7,406
Illinois	1.696%	8,133	6,561,986	479,449	7,142
Indiana	1.589%	6,555	2,751,282	412,514	6,444
Iowa	1.462%	5,900	1,600,361	403,467	7,427
Kansas	1.290%	5,149	1,912,610	399,235	9,057
Kentucky	1.447%	5,758	2,403,323	397,802	8,805
Louisiana	0.999%	3,796	2,890,193	379,812	8,605
Maine	1.376%	6,583	511,969	478,274	6,532
Maryland	1.249%	7,241	3,325,388	579,572	8,817
Massachusetts	1.322%	7,585	2,519,096	573,816	5,418
Michigan	1.800%	7,661	4,962,518	425,607	7,307
Minnesota	1.511%	7,495	2,671,950	496,146	7,432
Mississippi	1.383%	4,455	1,844,491	322,046	8,607
Missouri	1.557%	6,531	2,175,522	419,587	5,449
Montana	1.363%	5,255	350,419	385,584	5,068
Nebraska	1.306%	5,224	1,380,485	399,984	10,356
Nevada	0.662%	3,651	1,238,329	551,284	8,005
New Hampshire	1.631%	9,114	244,903	558,906	2,963
New Jersey	1.395%	9,298	4,159,110	666,424	7,700
New Mexico	1.167%	3,985	2,033,952	341,342	14,102
New York	0.934%	5,046	9,640,803	540,005	6,887
North Carolina	1.009%	4,063	6,810,377	402,557	10,861
North Dakota	1.730%	5,509	430,824	318,411	7,170
Ohio	2.150%	9,357	4,415,150	435,150	5,790
Oklahoma	1.091%	4,246	2,117,659	389,353	7,837
Oregon	1.229%	5,576	1,507,011	453,575	6,210
Pennsylvania	1.849%	9,041	4,058,403	488,870	4,894
Rhode Island	1.483%	6,756	378,781	455,423	4,891
South Carolina	2.105%	7,916	2,183,291	376,014	7,185
South Dakota	1.238%	4,940	359,492	398,943	6,020
Tennessee	1.137%	4,974	2,869,981	437,364	7,312
Texas	1.416%	5,940	13,960,836	419,395	7,939
Utah	1.427%	3,891	1,421,390	272,683	5,851
Vermont	2.106%	9,800	151,228	465,374	3,586
Virginia	1.328%	6,558	3,583,935	494,004	6,571
Washington	1.112%	5,617	3,193,054	505,255	7,246
West Virginia	1.035%	4,152	903,253	401,176	8,180
Wisconsin	1.401%	6,044	3,060,251	431,542	7,789
Wyoming	0.676%	3,515	736,707	519,672	18,966

## Expenditures on Higher Education

Federal and state governments, businesses, households and university endowments contribute billions of dollars annually to educating students beyond high school. Any assessment of the cost of higher education must evaluate how these costs are borne by different entities. As mentioned above, substituting state for private expenditures does not necessarily reduce per-student costs either in total or to families. As a consequence, comparing “overall expenditures per student” by both households and governments provides a better cost assessment than a naïve comparison of tuition as a share of household income that plagues so many other studies.

In effect, the appropriate question of college affordability is, how much within a state—as a share of available resources per student—is available for college expenses? For example, using national data from the 2006-2007 school year, it would have required about 1.26 percent of all available income nationally to pay for tuition for all college-aged students. By comparison, inflation alone swallowed 3 percent of income during the same period; Americans spent roughly 4 percent of income on restaurants.<sup>1</sup>

Table 2 provides state-level data on college tuition, the calculated share of college expenses from total available income (per potential student), the reported 2006-2007 state average tuition rates, total higher education spending, available income per student and the total expenditure on college per potential student in 2006-2007 school year.

These data are important because they highlight the differences across states in available income for education and the share of income dedicated to college education. This variability makes elusive any simple interpretation about tuition and college expenditures across states.

As mentioned above, treating tuition separately does not provide a useful understanding of the true costs of college, and more importantly, how much of those costs are borne by individual students and their families. States with a high level of governmental support for higher education are subsidizing families with students in college, so tuition rates may be far lower than in states where individuals are expected to bear the highest share of college expenses.

In Table 3, we have rank-ordered (from lowest to highest) the college expenditures, tuition and expenditure per student. These data clarify the misguided approach at examining only tuition when explaining college costs and expenditures. For example, Mississippi, which ranks 30th for overall college expenditures, has the 14th lowest tuition costs. The state offsets much of the cost of higher education, making the raw tuition data nearly meaningless as a tool in understanding who pays for the investment in higher education.

These tables provide some insight as to the relationship between tuition and total college expenditures. However, they do not directly evaluate the impact of tuition, expenditure or other information on college attendance rate. To evaluate this more deeply, we propose a model that examines the combined effect of how total higher educational spending, tuition rates and median household income play

Table 3. College Tuition and Expenditure Rankings

State	Lowest Rank = 1, Highest Rank = 50		
	College Expenditure Rank	Tuition Rank	Expenditure per Potential Student
Alabama	23	18	45
Alaska	12	11	46
Arizona	18	17	35
Arkansas	31	25	39
California	8	15	43
Colorado	6	16	3
Connecticut	9	38	33
Delaware	39	40	30
Florida	1	1	15
Georgia	7	6	36
Hawaii	5	13	48
Idaho	15	10	24
Illinois	44	45	18
Indiana	42	34	13
Iowa	37	30	25
Kansas	24	22	42
Kentucky	36	29	40
Louisiana	10	4	37
Maine	29	36	14
Maryland	22	39	41
Massachusetts	26	42	7
Michigan	46	43	22
Minnesota	40	41	26
Mississippi	30	14	38
Missouri	41	33	8
Montana	28	24	6
Nebraska	25	23	44
Nevada	2	3	32
New Hampshire	43	47	1
New Jersey	32	48	27
New Mexico	19	7	49
New York	4	21	17
North Carolina	11	8	47
North Dakota	45	26	19
Ohio	50	49	9
Oklahoma	14	12	29
Oregon	20	27	12
Pennsylvania	47	46	5
Rhode Island	38	37	4
South Carolina	48	44	20
South Dakota	21	19	11
Tennessee	17	20	23
Texas	34	31	31
Utah	35	5	10
Vermont	49	50	2
Virginia	27	35	16
Washington	16	28	21
West Virginia	13	9	34
Wisconsin	33	32	28
Wyoming	3	2	50

1. Data on restaurant expenditures from USDA, Economic Research Services: Table 7. Food CPI and Expenditures.

Table 4. Determinants of College Attendance

	Attend College	Attend In-State College	Attend Out-of-State College
C	21.73197	265.7847***	-248.784***
Tuition	7.709101*	2.569917	5.796455*
Median household income	-7.37762	-28.4626***	21.61933***
State expenditures	5.330719	7.18879*	-2.59658
Log likelihood	-167.4717	-168.702	-2.92201
Pseudo R-squared	0.02	0.49	0.33

on college attendance rates. Using data from the National Center for Educational Statistics, we construct the following model:

$$\frac{\text{College-bound students}}{\text{High school graduates}} = \alpha + \beta_1(\text{Tuition}) + \beta_2(\text{Median Household Income}) + \beta_3(\text{State Expenditures}) + \varepsilon_i$$

...where the share of college bound high school graduates is a function of a common intercept, state-level average tuition rates, state median household income and total state expenditures on higher education. The separate  $\beta$ s are to be estimated in this model, in which we include the common white noise error term  $\beta$  to capture unexplained variation.\*

\* Each of these models are as a percentage bound [0, 1] so we employ a limited dependent variable estimation technique, and treat the standard errors with a version of White's heteroscedasticity invariant, variance-covariance matrix to correct for that problem.

We test the model in semi-log form for ease of interpretation and include three different specifications. In the first, outlined in the equation above, we estimate the role that tuition, median household income and total state higher education expenditures play on the college attendance rate in each state. In the second model, we examine the role of these variables on the share of high school students who attend college in their home state. In the third model, we estimate the role these variables play on the out-of-state share of students. The results appear in Table 4.

These estimates provide a very interesting insight into the role tuition and total state support play in the share and geographic choice of college-bound students. In the first model, the overall performance of the regression is poor with the overall statistical value of the estimate beneath the threshold of valuable interpretation. This means that tuition rates, state expenditures and median household income do not affect the college attendance rate among high school students across the states. However, the next two models tell an important story. When examining the share of students who stay in a given state, income and own state spending play an important role. States with lower median household income see larger shares of students choosing in-state colleges and universities. In these

Table 5: Simulated College Costs

Family Characteristics	Total College Costs (\$)	Daily Savings (\$)
U.S. Average Tuition, no student aid	25,844	3.76
U.S. Average Tuition, Promise/Hope Scholarship (\$3,000 per annum)	13,844	2.03
U.S. Average Tuition, Promise/Hope and \$2,500 annual scholarship	11,344	1.63
Current GI Bill (\$1,386 per month)	0	0

cases, higher state expenditures on education also increase in-state students at colleges and universities. When we test the out-of-state model, we expect a very similar result, and we find that students from higher income states do attend out-of-state college at higher rates. Also, states with lower state expenditures tend to see higher rates of students leaving the state for school, but this does not reach the statistically significant level. Finally, higher tuition rates within a state lead to a higher share of students attending college out-of-state.

These results point convincingly towards an interpretation that tuition rates alone play no role in the choice to attend college. They do, however, play a role on where students attend school. Viewed from this prism, tuition rates for colleges are clearly balanced against state aid and are set in part to manage enrollment. One of the strongest tools in enrollment management is aid to students. The most recent data from the National Center for Educational Statistics reports that roughly 73 percent of full-time students receive some type of aid and that, for students in the median household income levels, more than 75 percent of enrolled students receive grants for educational expenses. This highlights the point that tuition is a poor proxy for the cost of higher education, either for governments or households.

To illustrate this we provide a microsimulation of a household college decision. We choose a representative family choice, initially without regard to income. Using the national average tuition rate today, a bank interest rate of 2.1 percent, and annual fee and book costs of \$2,500, we calculate total college costs at \$25,844.<sup>2</sup> In order to pay for these costs in a lump sum for the day the student begins college, we estimate the family would need to save \$3.76 per day over the child's lifetime to achieve this goal. As Table 5 demonstrates, under several different scenarios this cost drops. In our second simulation we use a modest state scholarship such as Georgia's Hope Scholarship, West Virginia's Promise Scholarship or Indiana's 21st Century Fund scholarship. Here we use an example of \$3,000 per year in scholarship funds. This reduces the daily cost of saving to \$2.03 for a lump sum college pay-off. With an additional scholarship grant of \$2,500 (this amount is received by roughly 75 percent of students below the national household income levels). This reduces the cost of college to \$11,344 and the daily savings needed to \$1.63. The current GI bill (which the author of this study used for his graduate schooling) pays the full cost of schooling.

2. Importantly, we do not include room and board as these are expenses borne by the student whether or not they attend college. This is not something worth mentioning except that others have committed this most basic of errors.

Clearly, college students also need room and board, which is often less expensive in the group quarter settings than they would be for individuals within a household. Also, the opportunity cost of college in terms of deferred earnings is also a burden on individuals. However the college enrollment numbers suggests individuals fully understand the implication of the studies highlighted in Table 1, which report high personal benefits to college education.

## Summary & Policy Recommendations

The expense of a college education to both households and state governments is a serious matter and deserves sober reflection, especially in light of the current fiscal and economic conditions nationally. However, a college education is the most significant investment most individuals and households will ever undertake. The rate of return on a college education is double the most commonly used investment instruments before accounting for its social benefits. Consequentially, analysis should focus on the relative private and public benefits in order to balance costs across taxpayers and students. Further, policymakers who are concerned that tuition rates discourage college attendance should be more sanguine in their concerns. There is no evidence that college attendance is reduced due to tuition rates, although *where* individuals attend college is influenced by tuition costs. Finally, household prudence in the preparation for a college education is not onerous. Daily savings equivalent to the

cost of a child's meal at a fast food restaurant or a premium coffee drink more than offset the average college tuition nationally. For households that have not displayed this prudence, grants and loans are widely available and employed by more than 75 percent of all full-time students.

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West Liberty University, West Liberty, WV 26074  
[www.govpolicy.org](http://www.govpolicy.org)

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*Author Contact:*

**Michael J. Hicks, Ph.D.**

*Distinguished Fellow*, Government Policy Research Center  
West Liberty University

*Director*, Center for Business and Economic Research  
Miller College of Business, Ball State University  
[mhicks@bsu.edu](mailto:mhicks@bsu.edu) | 765-285-5926 | [www.bsu.edu/cber](http://www.bsu.edu/cber)

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