

Valuing the Public Benefits of the Education Provided by Public Universities:

A Study of the University of Minnesota and the Minnesota State Colleges and Universities System

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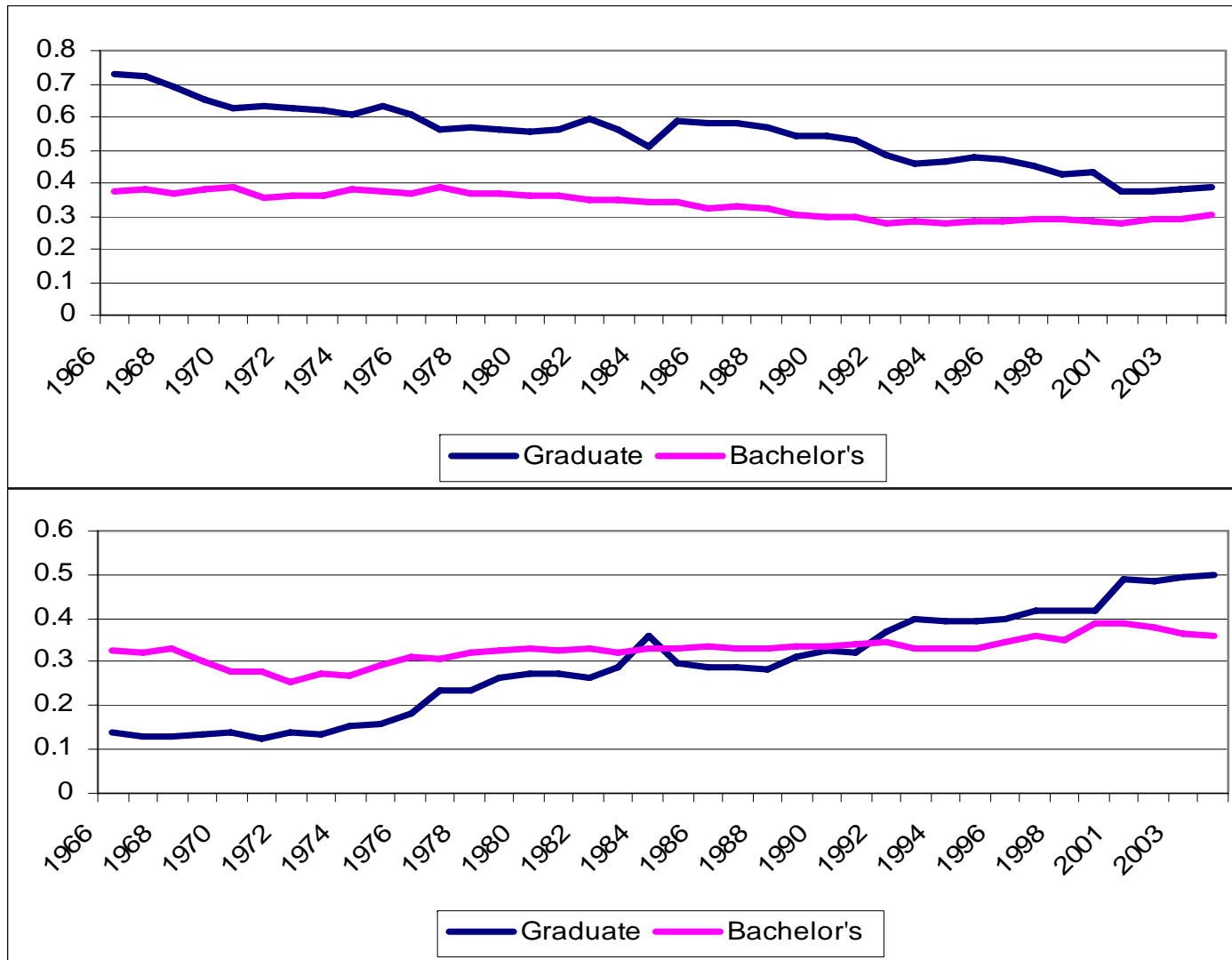
Objective of this paper

- The students who enroll in MN universities clearly benefit from state subsidies to higher education, but how much do taxpayers benefit from them?
- We examine whether ***educational services*** offered at Minnesota's public universities provide benefits to the general public.
- We attempt to quantify these public benefits, and compare them to the cost of state government support to public higher education in Minnesota.

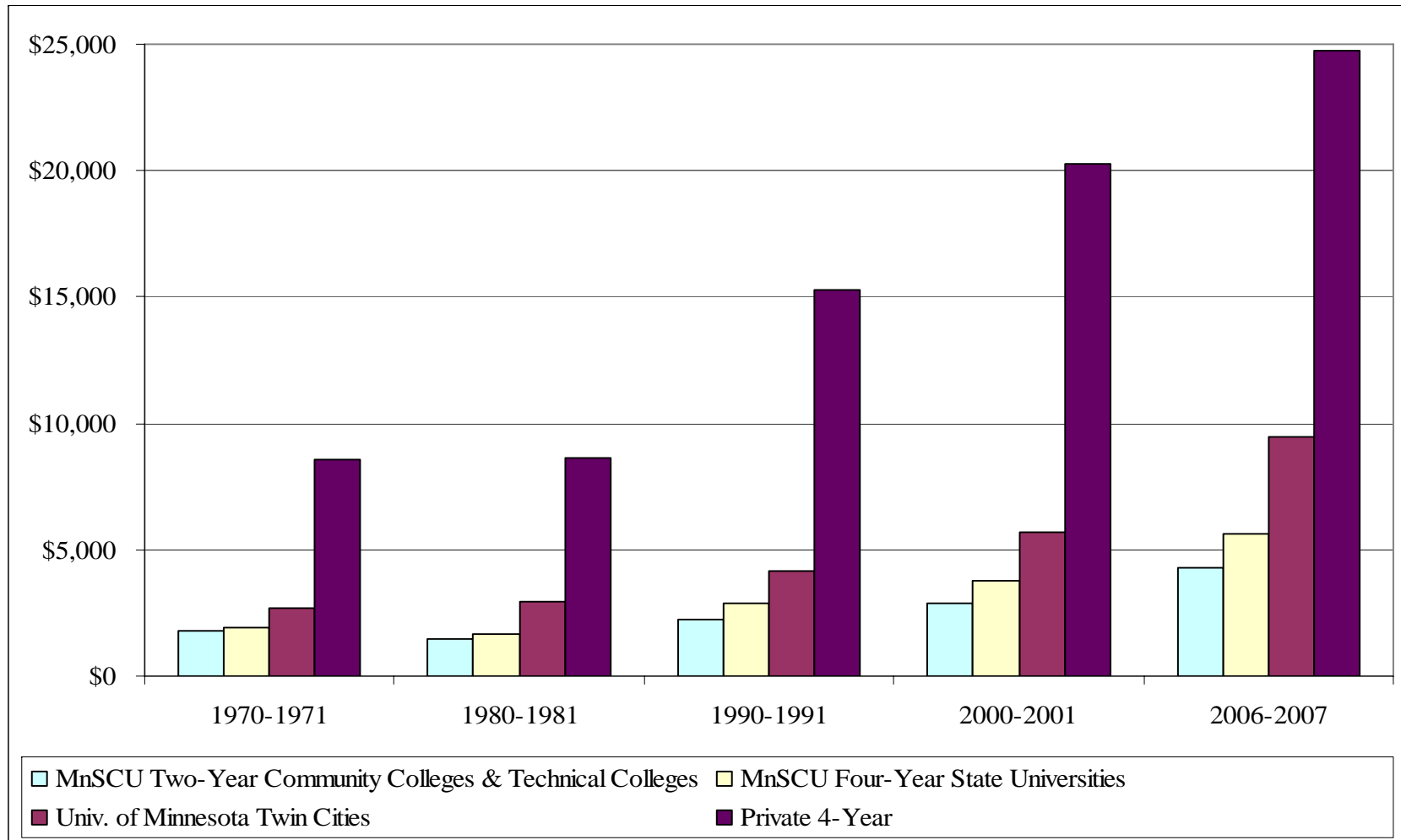
Justifications for the State Subsidization of Higher Education

1. The educational services provided by public institutions of higher education are likely to generate “public benefits” well beyond the “private benefits” accruing to their graduates.
2. Publicly provided higher education may redistribute resources from better off citizens to those with lower incomes.
3. Public universities produce research that benefits the general public

Share of Bachelor's and Graduate Degrees Granted by University of Minnesota and Private Colleges



Average Annual Resident Undergraduate Tuition and Required Fees (2002 constant \$)



Sources of Operating Revenues for the University of Minnesota

| | 1996 | 2006 |
|--|---------------|---------------|
| <i>Total budget</i> | \$1.4 billion | \$2.5 billion |
| | | |
| <i>Budget Share, by Revenue Source</i> | (percent) | (percent) |
| Tuition and Fees | 15.6 | 21.3 |
| Gifts and Endowment Earnings | 16.7 | 10.8 |
| Sponsored Grants and Contracts | 20.2 | 21.4 |
| State Appropriation | 33.8 | 25.0 |
| Other Sources | 13.7 | 21.4 |

Private Benefits from Higher Education

Income Benefits

- Higher wages due to skills acquired from schooling.
- Lower rate of unemployment.

Non-Income Benefits

- Better health
- Direct enjoyment from learning and use of skills acquired from schooling

Public Benefits from Higher Education

Income Benefits

- Higher incomes due to diffusion of income generating skills from educated individuals to others via social interactions off the job

Non-Income Benefits

- Increased Civic Participation
- Reduced Crime
- Learning from, and more pleasant social engagement with, better educated individuals

Methodology for Calculating Public Benefits

- We use estimates from other studies to quantify the public benefits of state government subsidies to higher education in Minnesota.
- We use a “thought experiment” by simulating what would happen to the overall education levels in Minnesota if public higher education ***did not exist***.

Methodology of the thought experiment (cont'd.)

1. Assume that tuition at the University of Minnesota increases to \$22,500 for all students and that tuition at the seven MnSCU state colleges and universities increases to \$14,000 for all students.

Explanation:

These tuition increases will generate tuition revenue a little higher than the current subsidy for each institution. This allows them to operate without subsidies even if they experience some reductions in enrollment.

Methodology of the thought experiment (cont'd.)

2. We estimate the number of students who would *not* enroll in higher education because of these higher tuition rates.
3. Then use these estimates to assess the change in the distribution of education levels across Minnesota's working age population.

Methodology of the thought experiment (cont'd.)

4. We calculate the reductions in public benefits based on changes in the distribution of educational attainment among Minnesota's working age population from the lack of public education.
5. The public benefits we specifically calculate are: (1) wage spillovers, (2) reductions in voter participation, and (3) increases in incarceration costs (due to increased crime rates)

Methodology of the thought experiment (cont'd.)

6. We also estimate the *private* costs and benefits from changes in the distribution of educational attainment in Minnesota.
7. The private benefits we calculate are: (1) Higher wages due to skills acquired from schooling (2) Lower rate of unemployment.

Methodology of the thought experiment (cont'd.)

8. We then compare the current cost of state government subsidies (to the University of Minnesota and the seven MnSCU state universities) with the estimated loss of public and private benefits in the absence of those subsidies.
9. We use the present discounted value of future benefit streams with today's subsidies.

Sensitivity of Enrollment to Tuition Level

- We use estimates from Card and Lemieux (2000) to simulate the impact of withdrawing state government subsidies to Minnesota's public universities on the proportion of the population in Minnesota with bachelor or graduate degrees.
- A one unit increase in the (natural) log of annual tuition (about \$1500 in 1988 dollars) charged by public colleges and universities decreases the college/university enrollment rate of men between 19 and 21 years of age by about 1.1 percentage points, and of women in the same age group by about 3.8 percentage points.
- Averaging over men and women leads to a drop in college enrollment of about 2.5 percentage points for every one unit increase in the (log of) tuition charged by public universities

Change in Distribution of Education in Minnesota after Tuition Increase

| | Current Distribution of Degrees (percent) | Distribution after Large Tuition Increases (percent) | |
|-----------------------|---|--|---------------------------------|
| | | <i>Bachelor's Programs Only</i> | <i>Adding Graduate Programs</i> |
| Less than high school | 5.1 | 5.1 | 5.1 |
| High school diploma | 26.8 | 29.0 | 29.0 |
| Some college | 32.8 | 31.7 | 31.7 |
| Bachelor's | 23.7 | 22.6 | 23.2 |
| Master's | 8.0 | 8.0 | 7.6 |
| Professional degree | 2.2 | 2.2 | 2.1 |
| Doctorate | 1.4 | 1.4 | 1.3 |

Calculating Public Benefits from Higher Education

Public Benefits #1: Wage Spillover Effect
Median Annual Earnings by Gender and Education
Level in United States, 2003

| Education Level | Male | Female |
|------------------------|------------------|---------------|
| | <i>(dollars)</i> | |
| Less than High School | 24,121 | 18,125 |
| High School Graduate | 35,412 | 26,074 |
| Some College | 41,348 | 30,142 |
| Associate Degree | 42,871 | 32,253 |
| Bachelor's | 56,502 | 41,327 |
| Master | 70,640 | 50,163 |
| Ph.D. | 87,131 | 67,214 |
| Professional | 100,000 | 66,491 |

Public Benefits #1: Wage Spillover Effect

Estimated Impacts of Increase in Educated Population on the Wages of Other Workers

| | <i>One Percentage Point Increase in Labor Force with:</i> | | | |
|---|---|------------------------------------|--|------------------------------------|
| <i>Percentage Change in Wages for Labor Force with:</i> | <i>Bachelor's degree</i> | | <i>Graduate Degree</i> | |
| | Moderately conservative assumption | Very conservative assumption | Moderately conservative assumption | Very conservative assumption |
| Less than High School Education | 0.75 | 0.5 | 1.0 | 0.75 |
| High School Degree | 0.75 | 0.5 | 1.0 | 0.75 |
| Some College | 0.5 | 0.3 | 0.75 | 0.5 |
| Bachelor's Degree | 0.5 | 0.3 | 0.75 | 0.5 |
| Graduate Degree | 0.0 | 0.0 | 0.5 | 0.3 |

Source: Authors' assumptions based on Moretti (2004) and Lange & Topel (2006).

Public Benefits #1A: Wage Spillover Effect

Moderately Conservative Estimate of Reduction in Wage Spillovers from Withdrawal of Public Subsidies to Minnesota's Public Universities

| Education Level | Current Population (thousands) | Annual Wages (dollars) | Estimated Education Distribution after Tuition Increase | Total % Wage Change from Change in Bachelors and Graduate | Total Spillover Effect Per Capita | Total Spillover (in millions per year) |
|-----------------------|--------------------------------|------------------------|---|---|-----------------------------------|--|
| less than high school | 132,028 | \$21,645 | 131,160 | 0.90% | \$218 | \$29 |
| high school diploma | 689,709 | \$30,766 | 746,463 | 0.90% | \$310 | \$231 |
| some college | 843,394 | \$35,714 | 814,926 | 0.70% | \$258 | \$210 |
| bachelors | 609,633 | \$49,889 | 595,202 | 0.70% | \$360 | \$214 |
| masters | 204,601 | \$59,508 | 195,455 | 0.30% | \$176 | \$34 |
| professional degree | 57,072 | \$95,699 | 54,007 | 0.30% | \$283 | \$15 |
| doctorate | 35,333 | \$79,403 | 33,433 | 0.30% | \$235 | \$8 |
| Total | 2,571,770 | - | 2,571,770 | | | \$742 |

Public Benefits #1B: Wage Spillover Effect

Very Conservative Estimate of Reduction in Wage Spillovers from Withdrawal of Public Subsidies to Minnesota's Public Universities

| Education Level | Current Population (thousands) | Annual Wages (dollars) | Estimated Education Distribution after Tuition Increase | Total % Wage Change from Change in Bachelors and Graduate | Total Spillover Effect Per Capita | Total Spillover (in millions per year) |
|-----------------------|--------------------------------|------------------------|---|---|-----------------------------------|--|
| less than high school | 132,028 | \$21,645 | 131,160 | 0.70% | \$156 | \$21 |
| high school diploma | 689,709 | \$30,766 | 746,463 | 0.70% | \$222 | \$166 |
| some college | 843,394 | \$35,714 | 814,926 | 0.40% | \$165 | \$135 |
| bachelors | 609,633 | \$49,889 | 595,202 | 0.40% | \$231 | \$137 |
| masters | 204,601 | \$59,508 | 195,455 | 0.20% | \$105 | \$21 |
| professional degree | 57,072 | \$95,699 | 54,007 | 0.20% | \$170 | \$9 |
| doctorate | 35,333 | \$79,403 | 33,433 | 0.20% | \$141 | \$5 |
| Total | 2,571,770 | - | 2,571,770 | | | \$493 |

Public Benefits #2: Increased Voter Participation

| | Students Getting Degrees because of State Subsidies | Increase in Number of Voters | Total Cost Savings (per year) |
|--------------|--|-------------------------------------|--------------------------------------|
| some college | 28,468 | 2323 | \$1,115,026 |
| bachelors | 14,431 | 2355 | \$1,130,443 |
| masters | 8,398 | 685 | \$328,914 |
| professional | 3,269 | 400 | \$192,060 |
| doctorate | 2,189 | 357 | \$171,489 |
| Total | | | \$2,937,932 |

Source: Dee (2004), and authors' calculations.

Note: The decrease in voting assumes an average 60% rate of voter participation, each year of schooling increases the probability of voting by 6.8%, and each vote is valued at \$16 each year for 30 years.

Public Benefits #3: Decreased Cost of Incarceration

| Education Level | Change in Population, by Degree | Cost per Year of Increased Incarceration (\$200 per person) |
|-----------------------|------------------------------------|---|
| High school graduates | 55,205 | |
| Some college | -28,468 | -5,693,556 |
| Bachelors | -14,431 | -2,886,139 |
| Masters | -8,398 | -1,679,501 |
| Professional degree | -3,269 | -653,800 |
| Doctorate | -2,189 | -437,830 |
| Total | | -11,350,826 |

Note: It costs \$20,000 per year to incarcerate a person. Finishing college reduces probability of incarceration by 1%. Each person that gets above a high school degree saves the state \$200 in incarceration costs

Distribution of Public and Private Benefits

Decreased State Tax Revenue

| Education Level | Change in Population with Education Level | Estimated Wage Premium (assuming 8% increase in earnings) | Decline in Tax Revenue (per capita) | Total Decline in Tax Receipts per year (millions of dollars) |
|---------------------|---|---|-------------------------------------|--|
| High school diploma | 57,010 | \$0 | 0 | 0 |
| Some college | -28,468 | \$12,153 | \$1,069 | \$30 |
| Bachelor's | -14,431 | \$20,400 | \$1,795 | \$26 |
| Masters | -9,146 | \$24,042 | \$2,116 | \$18 |
| Professional degree | -3,065 | \$36,532 | \$3,215 | \$11 |
| Doctorate | -1,899 | \$36,532 | \$3,215 | \$7 |
| Total | 0 | - | - | \$92 |

Note: Assume everyone whose education decreases pays 8.8% of their gross income in state taxes.

Reduced Unemployment Insurance Payments

| | Students Getting Degrees Due to State Subsidies | Unemployment Rate | Unemployed | Cost per year to the State for unemployment insurance - |
|---------------------------|---|-------------------|------------|---|
| High School Graduates: | 56,754 | 0.05 | 2,838 | \$31,910,010 |
| some college | -28,468 | 0.045 | -1,281 | (\$14,405,408) |
| bachelors | -14,431 | 0.03 | -433 | (\$4,868,195) |
| masters | -8,398 | 0.025 | -210 | (\$2,360,749) |
| professional | -3,269 | 0.017 | -56 | (\$624,919) |
| doctorate | -2,189 | 0.018 | -39 | (\$443,106) |
| Total Cost Savings | | | 769 | \$9,207,634 |

Reduced Charitable Contributions

| | Change in Students Getting Degrees of UMN | Average Charitable Donations by Education Level | Decrease in Charitable Donations per year (millions of dollars) |
|------------------------|---|---|---|
| Less Than High School | 0 | \$0 | \$0.0 |
| High School Graduates: | 55,205 | \$1,134 | \$62.6 |
| Some college | 28,468 | -\$2,938 | -\$83.6 |
| Bachelors | 14,431 | -\$3,238 | -\$46.7 |
| Masters | 8,398 | -\$2,902 | -\$24.4 |
| Professional | 3,269 | -\$6,528 | -\$21.3 |
| Doctorate | 2,189 | -\$3,664 | -\$8.0 |
| Total | | | -\$119.7 |

Note: Average charitable contributions are 65% higher for college graduates compared to high school graduates. (Andreoni, Brown, and Rischall, 2003)

Private Benefits: Tuition Savings

| | Students Getting Degrees because of the UMN & MnSCU | Subsidized Tuition | Tuition Saved per year |
|---------------------|--|---------------------------|-------------------------------|
| some college | 28,468 | 9,400 | \$267,597,117 |
| bachelors | 14,431 | 9,400 | \$135,648,521 |
| masters | 8,398 | 10,000 | \$83,975,069 |
| professional degree | 3,269 | 20,000 | \$65,380,015 |
| doctorate | 2,189 | 10,000 | \$21,891,501 |
| Total | | | \$574,492,223 |

Summary of Costs and Benefits ...

| <i>Intuitive (“Common Sense”) Perspective</i> | | <i>Economic Perspective</i> | |
|---|--------------------|---|----------------|
| Costs (millions of US \$) | | Costs (millions of US \$) | |
| State government appropriations | 791 | | |
| Of which: Transfers to non-marginal students | 765 | NOT an economic cost (just a transfer) | -- |
| Payments to marginal students | 26 | } More acad. resources for marginal students | 58 |
| Tuition payments of marginal students | 32 | | |
| Deadweight cost of taxation (15% of revenue) | 119 | Deadweight cost of taxation (15% of revenue) | 119 |
| Opportunity cost of marginal students | 107 | Opportunity cost of marginal students | 107 |
| TOTAL COST | 1,050 | TOTAL COST | 284 |
| Benefits (millions of US \$) | | Benefits (millions of US \$) | |
| Lower tuition for non-marginal students (private) | 765 | NOT an economic benefit (just a transfer) | -- |
| Higher wages for marginal students (private) | 336 | Higher wages for marginal students (private) | 336 |
| Of which: Increased state tax revenue | 30 | NOT an economic benefit (just a transfer) | -- |
| Increased charitable giving | 53 | NOT an economic benefit (just a transfer) | -- |
| Wage spillovers of marginal students (public) | 326/216 | Wage spillovers of marginal students (public) | 326/216 |
| Of which: Increased state tax revenue | 29/22 | NOT an economic benefit (just a transfer) | -- |
| Lower unemployment of marginal students(priv) | 5 | Lower unemployment of marginal students (priv) | 5 |
| Of which: Compensated by unempl. benefits | 4 | NOT an economic benefit (just transfer) | -- |
| Reduced crime/incarceration costs (pub.) | 5 | Reduced crime/incarceration costs (pub.) | 5 |
| Increased civic engagement (public) | 1 | Increased civic engagement (public) | 1 |
| Benefits of additional research (public) | ??? | Benefits of additional research (public) | ??? |
| TOTAL BENEFIT (conservative/very conserv.) | 1,438/1,328 | TOTAL BENEFIT (conservative/very conserv.) | 672/562 |