

A New Lesson Plan

How Increasing Graduation Rates Boosts Virginia's Economy



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Making the Grade

Virginia Succeeds in Key Areas of Education

Graduation Rate

In early 2008, the national newspaper *Education Week* ranked the Commonwealth in the top five states in terms of the overall quality of its education system. Just the year before, *Education Week* declared that Virginia's children were the most likely in the nation to succeed. While this national recognition speaks highly of the state's education system, Virginia still has much to gain from raising the high school graduation rate, particularly among targeted populations.

Research tells us that high school dropouts are more likely to be unemployed, in poverty, receiving welfare, in prison, on death row, unhealthy, and have children who drop out. A generation ago, high school dropouts could still find a well-paying job, and most who worked hard could expect to climb the economic ladder to a middle-class life in this country. But that promise is no more. The median earnings of families headed by a dropout declined by nearly one-third between 1974 and 2004. A global, knowledge-based economy continues to expand with demands for workers to be more educated and trained in the technological skills required to meet the challenges of 21st century jobs.

High School Dropouts have lower earnings and higher social costs.

The Virginia Department of Education's new four-year completion rate data indicate that more than eight in 10 students in the class of 2008 graduated in four years. Unlike previous efforts to annually capture the number of high school graduates and dropouts, this longitudinal approach tracks individual students for the first time in the state's history. The measure also adjusts for student mobility, a feature that enhances its accuracy.



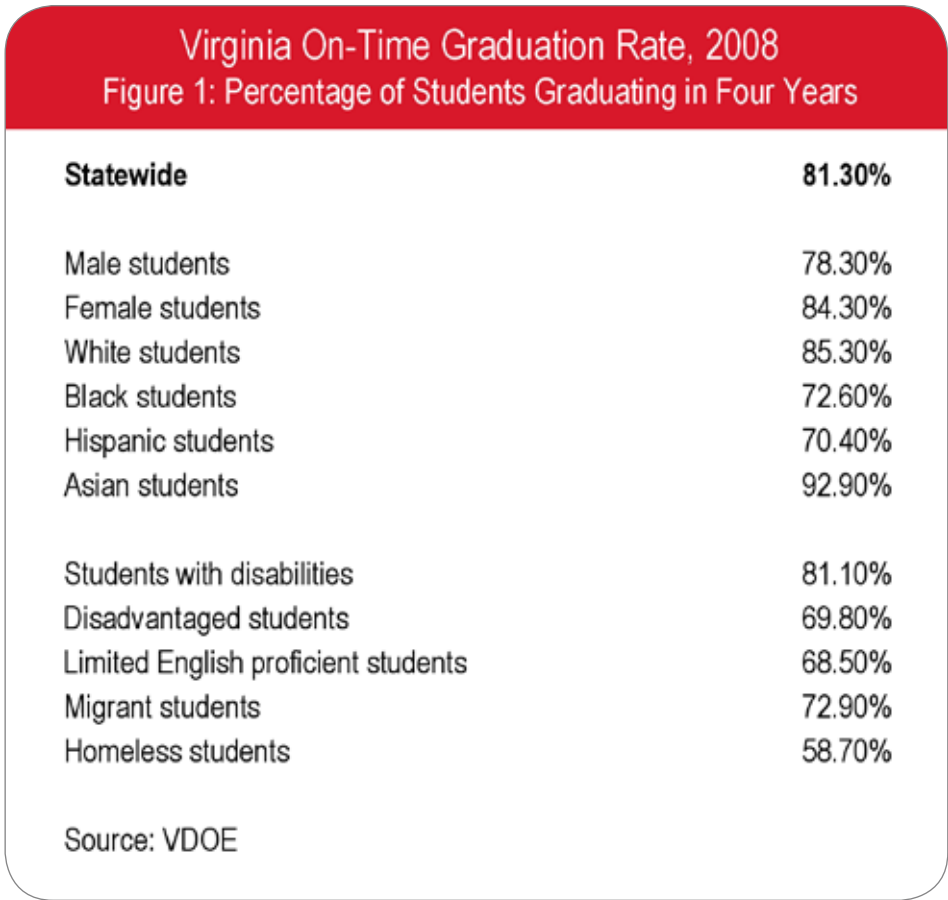
Figure 1 illustrates the on-time graduation rates for the class of 2008. Although the statewide rate of 81.3 percent places it above the national average estimated by the National Center for Education Statistics, Virginia's rate is substantially lower among certain subpopulations of students. The on-time graduation rate for females is 6 percentage points higher than that of males. The rate for white students is 12.7 percentage points higher than that of black students, and 14.9 percentage points above the rate for Hispanic students. Asian students exhibited the highest on-time graduation rate of any subpopulation at 92.9 percent. The rate is lowest — just 58.7 percent — among homeless students.

Almost 2 in 10 students aren't graduating on time.

While the on-time graduation rate is a significant improvement from previous measures, it is not without limitations. Students not captured by the four-year graduation rate are not necessarily dropouts, but may require a longer period of time to finish high school.

Performance Measures

Virginia's Standards of Learning (SOL) establish objectives for student learning in grades K-12 in mathematics, science, English, history/social science, and a variety of other subjects. In addition to these state-defined objectives, Virginia's schools must meet goals in mathematics and science set under the No Child Left Behind Act (NCLB) in order to be considered to have made adequate yearly progress (AYP) in a given academic year. Schools not making AYP for two consecutive years must develop a plan to improve academic achievement. In addition, under NCLB, Title I funding is tied to participation in the National Assessment of Educational Progress (NAEP) testing.



A global economy demands workers be more educated and trained in technology skills.

In academic year 2007-2008, 74 percent of Virginia's schools and 41 percent of its divisions made AYP.ⁱ In terms of SOL pass rates, 80.4 percent of students passed the third grade reading exam in the 2006-2007 academic year. In 2007, Virginia's performance on the NAEP exceeded the national average in fourth and eighth grade mathematics and reading.



Adding Up the Numbers

The Return on Investment for Targeted Dropout Preventions

According to the recently introduced Virginia On-Time Graduation Rate data, almost 2 in 10 Virginia students are not graduating from high school. This has important economic and social consequences for the Commonwealth and its citizens. As a result, an incentive exists for the state to invest in reducing the number of high school dropouts. Given the current fiscal constraints placed upon the state, it is even more important that investments in education produce positive outcomes. If the benefits of producing additional high school graduates outweigh the costs of the interventions necessary to produce them, then the case for enhanced public investment in Virginia's K-12 education system is made more fiscally compelling.

This analysis examines six interventions that have been demonstrated to increase the high school graduation rate. These interventions are 1) pre-kindergarten education; 2) class size reduction; 3) increased teacher salaries; 4) The Virginia Teaching Scholarship Loan Program; 5) comprehensive school reform, including career and technical education and science, technology, engineering, and mathematics education; and 6) the Jobs for Virginia Graduates program. The following (summarized in Fig. 2) provides a brief description of each intervention included in this analysis and its demonstrated outcomes:

Virginia Preschool Initiative (VPI)

The Virginia Preschool Initiative provides programs for at-risk 4-year-olds. While VPI is centered on quality preschool education, it also includes health services, social services, parental involvement, and transportation. Programs may operate on a half-day or full-day schedule.

Research on the effectiveness of early childhood education demonstrates high returns. The Chicago Child-Parent Center program tracked the outcomes of 989 participants and a control group of 550 non-participants through age 24. The study found that 11 new graduates are produced for every 100 children who participate in early childhood education programs.ⁱⁱ

Class Size Reduction

Reducing class size produces strong positive effects on the graduation rate. Tennessee's Project STAR (Student Teacher Achievement Ratio) randomly assigned students to smaller regular-sized classrooms in grades K-3. The project tracked these students throughout their K-12 career and found that students placed in the smaller classrooms had improved academic performance as evidenced by higher GPA and test scores, higher graduation rates, and increased likelihood of continuing their education.ⁱⁱⁱ

More specifically, the students placed in smaller K-3 classes demonstrated graduation rates 11 percentage points higher than the students assigned to classrooms of regular size. Of students eligible for free lunch, the effect was even greater — an 18 percentage point increase in the graduation rate. Additionally, Project STAR data

More new graduates are produced among those who participate in early childhood education programs.



suggests that smaller elementary class sizes help to cut in half the gap between the number of white and African American students who take college entrance exams.^{iv}

Students in smaller K-3 classes have higher graduation rates

Increased Salaries for Educational Professionals

High-quality teachers play a critical role in raising the level of student performance.^v One key strategy for attracting and retaining higher quality teachers is raising baseline teacher compensation. Research shows that a 10-percent increase in K-12 teacher salaries is associated with a 5- to 8-percent decrease in the high school dropout rate.

Expanded Scholarship Loan Programs

The Virginia Teaching Scholarship Loan Program (VTSLP) is designed to provide financial assistance to education students preparing to teach in one of Virginia’s critical teaching shortage areas. Each year, the Supply and Demand Survey of Administrative and Instructional Personnel determines critical teaching shortage areas. The Department of Education distributes the survey to every school division in the state.

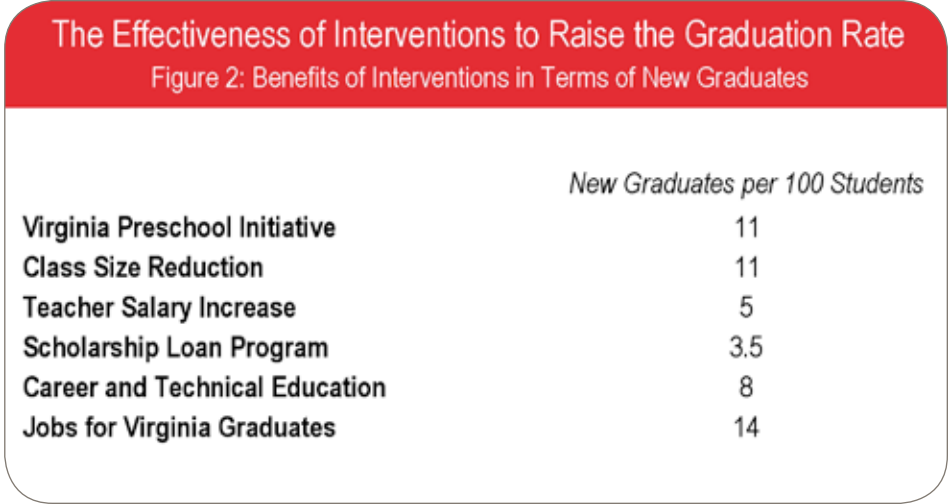
Students selected for the scholarship may receive up to \$3,720 and may reapply for the scholarship in subsequent years. In the 2007-2008 school year, there were 289 recipients — up from 279 in the previous academic year. The size of the current award represents a salary increase of roughly 7 percent of the average teacher salary in Virginia in 2007. If the same recipients receive the awards for multiple years, then expansion of the scholarship loan program is likely to produce a 3 to 4 percent decline in the high school dropout rate.^{vi}

Comprehensive School Reform: Enhanced Career and Technical Education

Comprehensive school reform is a systemic approach to improving student achievement through the integration of research-based reforms that touch every aspect of education. The Talent Development program is an example of successful comprehensive school reform. Virginia’s science, technology, engineering, and mathematics (STEM) initiatives, including the Governor’s Academies for Career and Technical Education share many characteristics with the Talent Development program.

The Talent Development reform model is designed for high schools struggling with attendance, discipline, achievement, and high dropout rates. The model is comprised of five elements: small learning communities, curricula leading to advanced mathematics and English coursework, extra help sessions for those requiring additional academic support, professional development strategies for staff, and parent and community involvement.^{vii} It is estimated that the Talent Development model produces roughly eight additional high school graduates for every 100 students.^{viii}

Higher teacher salaries helps lower dropout rates



Talent Development produces 8 new additional high school graduates for every 100 students



Jobs for Virginia Graduates

Jobs for Virginia Graduates began in 1996 as an affiliate of the national Jobs for America's Graduates national network. The program's principal mission is to assist high school youth who are economically disadvantaged and to provide the support that enables them to graduate high school and to secure and retain quality jobs. School divisions offer either one of two models: the Senior School-To-Career Program for 12th graders or the Multi-Year Dropout Prevention Program in grades 9-12.

A review of data on the outcomes of participants in the Jobs for Virginia Graduates program reveals that the intervention increases the graduation rate by nearly 15 percentage points.

The Jobs intervention increases the graduation rate by nearly 15%

Present Value and Discounting

Cost and benefit streams occur at different points in a project's time horizon. In order to account for this in a cost-benefit analysis, it is necessary to put all costs and benefits into comparable terms, or what is known as present value.

Present value represents what a payment in the past or future equals today. For example, if \$200 is invested today with an interest rate of 3 percent, then with the interest the investment earns, it becomes worth \$206 next year. Likewise, \$100 invested one year ago has a present value of \$103 today.

The process by which past or future payments are put into present value is called discounting. Discounting is particularly important in this analysis because the costs of intervention occur long before the benefits of high school graduation start appearing.

While the lifetime earnings difference between a high school graduate and a dropout is estimated to be more than \$266,000, this additional lifetime income stream equals only \$133,828 in present value (assuming a discount rate of 3.5%).

Methodology

Determining the cost effectiveness of intervention programs that aim to increase Virginia's graduation rate requires comparing the necessary investment with the benefits expected from producing an additional high school graduate.

There are both fiscal and social benefits associated with high school graduation. In terms of the fiscal benefits, this study examines the additional tax revenues arising from a graduate's higher earnings, and the public savings associated with reduced state expenditures on health, crime and welfare. In terms of the social benefits, this study examines private income gains, reduced insurance expenditures and quality of life costs associated with reduced crime, and the positive externalities generated by a more educated population.

Using existing research and data, this analysis estimates the net present value of the intervention costs required to produce

an additional graduate and the benefits that are associated with an additional Virginia high school graduate at age 20. The benefits are calculated over the course of the graduate's lifetime — from age 20 to 65 — and are discounted using a rate of 3.5 percent.

Fiscal Benefits

Tax Revenues

Research indicates that the strongest causal effect of high school graduation is an increase in income.^{ix} Based upon median wage data for Virginia high school graduates and non-graduates, the additional state tax revenues collected by graduates versus non-graduates can be estimated.

The latest data on median earnings by education level shows that Virginia high school graduates earn roughly \$31,336 per year during their first years out of school, while Virginians with less than a high school diploma earn just \$25,156 during their first years out of school.^x Assuming that historical wage growth patterns hold for these two groups in the next 45 years, the lifetime income differential between



High school graduation leads to increases in income

Virginia high school graduates and non-graduates is \$266,125.

This additional \$266,125 in income (or \$133,828 in present value at age 20) earned by Virginia's high school graduates translates into roughly \$6,693 in additional state income tax dollars. A portion of this additional income is also spent on housing and goods and services, which means that roughly \$2,800 in additional property taxes and \$3,428 in additional sales and excises taxes are collected by the Commonwealth

from high school graduates compared to non-graduates. In addition, high school graduates contribute \$28,616 more in federal taxes than high school dropouts during the course of a lifetime. These contributions are broken down in Figure 3.

While this study focuses on interventions to increase the graduation rate, it is reasonable to assume that in raising the number of high school graduates, some of these students may choose to continue their education beyond the high school level. This assumption would only serve to increase the estimates of the fiscal benefits of the interventions examined. The State Council of Higher Education for Virginia estimates that roughly 36 percent of Virginia's high school graduates enter into a four-year college or university, and

Virginia's High School Graduates Contribute More in Taxes

Figure 3: Present Value at Age 20 of Lifetime Tax Payments

Less Than High School:

State income tax	\$18,375
Federal taxes	\$55,620
Property tax	\$12,732
Sales and excise tax	\$27,475
<i>Total</i>	\$114,202

High School Graduate:

State income tax	\$25,069
Federal taxes	\$84,236
Property tax	\$15,533
Sales and excise tax	\$30,902
<i>Total</i>	\$155,740

Source: ACS, and ITEP microsimulation model.

according to a survey by the Department of Education, more than half of all high school graduates have plans to continue their education. Of those high school graduates who enter college, roughly 61.6 percent are estimated to complete their degrees.^{xi}

Using these estimates of academic progress, it can be assumed that at least one in three new high school graduates will obtain some level of post-secondary education. And of these individuals, one in every two will complete their degree. This additional education raises the lifetime earnings of high school graduates by roughly \$458,000 for those who complete some college, and more than \$1.3 million for those who obtain degrees.^{xii}

Health

Research also indicates that high school graduates are associated with better health status and lower rates of mortality than high school dropouts.^{xiii} Because individuals with higher levels of education tend to earn higher incomes, they use public health programs at lower rates. This reduction in costs for Medicaid and

High school graduation reduces incidence of high-cost crimes

for uninsured care saves the state a total of \$15,523, and the federal government another \$15,523, in present value lifetime expenditures per additional high school graduate.^{xiv}

Crime

High school graduation also has an effect on criminal activity, which is shown most directly in incarceration rates that vary by education level.^{xv} Crime places a significant financial burden on the state, including prevention and policing costs, trial and sentencing costs, and incarceration costs. Nationally, more than 50 percent of the prison population is made up of dropouts.^{xvi}

Research has shown that high school graduation reduces the incidence of high-cost crimes, such as murder, rape/sexual assault, violent crime, property crime, and drug offense by up to 20 percent.^{xvii} This reduction results in lower arrests, trials, sentencing and incarceration. Using data

from the Virginia State Police and the Bureau of Justice Statistics, this reduction in high-cost crime translates into lifetime cost savings for the state and the federal government of roughly \$29,056 per new high school graduate.

Social Services/Welfare

An additional fiscal impact of high school graduation is a reduction in the use of social services. Higher levels of educational attainment are associated with lower need for public assistance programs such as cash aid, food benefits, training, etc.^{xviii} This effect is largely the result of the rise in income that comes from higher educational attainment. Due to a lack of data on the entire spectrum of state assistance programs that are likely to decline as the graduation rate rises, this analysis focuses only on receipt of Temporary Assistance for Needy Families (TANF) and food stamps.

High school graduation leads to reductions in the use of social services

Data from the Current Population Survey indicates that graduation from high school reduces the probability of TANF receipt by 40 percent. High school graduation also reduces the probability of participation in the food stamps program by 19 percent. The average monthly TANF benefit in Virginia is \$269, and the average monthly food stamp benefit is \$89.^{xix} Based on these figures, Virginia stands to save roughly \$9,947 in lifetime social services expenditures per new high school graduate.

Aggregate Fiscal Impact

In summary, Virginians who graduate high school earn higher incomes, use public health and social services at lower



rates, and are less likely to participate in criminal activity. These characteristics of high school graduates produce substantial economic benefits for the Commonwealth. More specifically, the average lifetime cost savings to the state per new expected graduate is \$111,586. Figure 4 breaks down this quantity by category.

While the lifetime cost savings to the state are likely to vary according to a number of factors such as the graduate's sex and race, the estimates in Figure 4 provide a solid baseline of the economic impact of high school graduation.

Social Benefits

In addition to the fiscal benefits associated with high school graduation, there are also substantial social gains. Although these benefits do not directly affect state revenues or expenditures, they serve to better the lives of the Commonwealth's citizens and may have secondary effects on the state's budget. The largest of these social benefits is the increase in private income earned by each additional high school graduate. The second social benefit is a reduction in crime. Victims of crime face both a reduced quality of life and monetary losses. For these reasons, Virginians invest in insurance and other protections to cushion themselves from the potentiality of being a crime victim. Finally, there are positive externalities associated with a more educated population and workforce.^{xx} Workers with high human capital investments may enhance their productivity and that of their co-workers. This productivity may attract new investment into Virginia.

It is much more difficult to estimate the social benefits than the fiscal benefits of high school graduation. The social savings from reductions in crime are estimated to be between 2.5 and 4.5 times the fiscal savings.^{xxi} The positive externalities that spring from a more educated population are estimated to total between 37 and

The Fiscal and Social Benefits to the State of Raising Virginia's High School Graduation Rate

Figure 4: Present Value Lifetime Public Benefits

	<i>Per Graduate</i>
State Tax Revenues:	\$12,921
Federal Tax Revenues:	\$28,616
Health Expenditures:	\$31,046
Crime Expenditures:	\$29,056
Social Services Expenditures:	\$9,947
Total fiscal benefits:	\$111,586
Total social benefits:	\$470,624
TOTAL BENEFITS:	\$582,210

61 percent of the total market returns to high school graduation.^{xxii} Using these estimates, the social benefits of high school graduation equal roughly \$470,624 per additional graduate. Adding these social benefits to the fiscal benefits results in total benefits of \$582,210 per graduate.^{xxiii} Considering that there were more than 20,000 dropouts in Virginia this year, the total opportunity cost to the state is roughly \$22 million annually.

Costs of Intervention

Virginia Pre-School Initiative

The best estimates of the per participant costs of VPI range from \$6,790 to \$7,920. This is a one-year expenditure per 4-year-old pupil. Because this investment is required at such an early age, in present value at age 20, this intervention requires an investment of \$11,774 per student.





Class Size Reduction

The Project STAR model assumes a reduction in class size from 22 to 15 for K-3. Reducing class sizes in Virginia from the existing school-wide pupil to teacher ratio of 21:1 to the Project STAR recommended 15:1 requires an additional investment of \$929 per participant for four years. In present value, this intervention requires an investment of \$5,917 per student.

Increased Teacher Salaries

A 10-percent increase in teacher salaries increases the per pupil costs of education by roughly \$231 per academic year. Implementing this increase across the K-12 years requires an investment of approximately \$4,127 per student in present value.

Expanded Virginia Teaching Scholarship Loan Program (VTSLP)

The current value of the scholarship awarded to each recipient of the VTSLP is \$3,720 per year. Expanding this program so that recipients could renew their scholarship across multiple years would require an additional investment of \$177 per student per year. In present value, this intervention requires an investment of \$3,162.

Comprehensive School Reform: Enhanced Career and Technical Education

A study by Manpower Demonstration Research Corporation estimated the additional cost per student of operating a Talent Development career academy to be between \$250 and \$350. Because this study took place in the Philadelphia area and Pennsylvania's per pupil expenditures are below that of Virginia, the adjusted estimate cost per pupil in Virginia is \$426 per year across the 9-12 grades. In present value, this intervention requires an investment of \$1,991 per student.

Jobs for Virginia Graduates

The Jobs for Virginia Graduates program requires an investment of \$1,300 per student per year of the program. Based on

The Costs of Selected Interventions

Figure 5: Present Value Costs per Intervention at Age 20

	<i>Costs Per Student</i>	<i>Costs Per New Graduate</i>
Virginia Preschool Initiative	\$11,774	\$107,036
Class Size Reduction	\$5,917	\$53,791
Teacher Salary Increase	\$4,127	\$82,540
Scholarship Loan Program	\$3,162	\$90,338
Career and Technical Education	\$1,991	\$24,888
Jobs for Virginia Graduates	\$2,475	\$17,679



the composition of Virginia's programs, with 77 percent of participants in the senior model, and 23 percent in the multi-year program, the present value investment required per student is roughly \$2,475.

Comparison of Costs and Benefits of Intervention

For every intervention examined in this study, the costs of the intervention are outweighed by the benefits. This means that each and every intervention pays for itself in the lifetime of the student. A benefit/cost ratio of greater than 1 indicates a positive return on investment. A larger ratio indicates a greater rate of return. The ratio of benefits to costs is largest for Jobs for Virginia Graduates; followed by Comprehensive School Reform and class size reduction. Figure 6 shows the ratio of benefits and costs associated with each intervention.

Conclusion

The dollars invested in Virginia's K-12 system are precious. For this reason, it is especially important that state education funding is invested wisely and in initiatives that yield high rates of return. Although Virginia's education system has received national recognition for its quality and outcomes in recent years, new data from the Department of Education reveals that only 81 percent of Virginia's students are graduating high school on-time. Because high school graduates earn higher incomes than dropouts, have better health, and are less likely to commit crime, the Commonwealth stands to gain roughly \$111,586 more for every additional high school graduate that it produces. The opportunity cost to the state of allowing nearly 19 percent of the class of 2008 to leave the school system without a high school degree is more than \$22 million.

Many interventions to reduce the high school dropout rate have demonstrated substantial success. Among these proven interventions are early childhood education, reduced class sizes, efforts to increase teacher quality, career and technical education, and the Jobs for America's Graduates model. In addition to increasing the graduation rate, these interventions are cost-effective. The lifetime benefits associated with an additional high school graduate are, on average, 2.75 times the cost required to produce them.

Public Returns on Interventions

Figure 6: Benefit/Cost Ratios for Selected Interventions

	Dropout Intervention					
	Virginia Pre-School Initiative	Class Size Reduction	Increased Teacher Salaries	Scholarship Loan Program	CSR/STEM	Jobs for Virginia Graduates
Per additional New High School Graduate						
Costs	\$107,036	\$53,791	\$82,540	\$90,338	\$24,888	\$17,679
Benefits (fiscal)	\$111,586	\$111,586	\$111,586	\$111,586	\$111,586	\$111,586
Benefit/Cost Ratio	1.04	2.07	1.35	1.24	4.48	6.31
Net Present Value	\$4,550	\$57,795	\$29,046	\$21,248	\$86,699	\$93,907

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