



From the taxpayer perspective, the pivotal step is to determine the public benefits that specifically accrue to state and local government. For example, benefits resulting from earnings growth are limited to increased state and local tax payments. Similarly, savings related to improved health, reduced crime, and fewer welfare and unemployment claims, discussed below, are limited to those received strictly by state and local government. In all instances, benefits to private residents, local businesses, or the federal government are excluded.

Growth in state tax revenues

As a result of their time at PCC, students earn more because of the skills they learned while attending the college, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce. These in turn increase tax revenues since state and local government is able to apply tax rates to higher earnings.

Estimating the effect of PCC on increased tax revenues begins with the present value of the students' future earnings stream, which is displayed in Column 4 of Table 3.2. To these net higher earnings, we apply a multiplier derived from Emsi Burning Glass's MR-SAM model to estimate the added labor income created in the state as students and businesses spend their higher earnings.³⁴ As labor income increases, so does non-labor income, which consists of monies gained through investments. To calculate the growth in non-labor income, we multiply the increase in labor income by a ratio of the North Carolina gross state product to total labor income in the state. We also include the spending impacts discussed in Chapter 2 that were created in FY 2019-20 from operations and student spending, measured at the state level. To each of these, we apply the prevailing tax rates so we capture only the tax revenues attributable to state and local government from this additional revenue.

³⁴ For a full description of the Emsi Burning Glass MR-SAM model, see Appendix 5.

TAXPAYER COSTS



State/local funding

TAXPAYER BENEFITS



Increased tax revenue



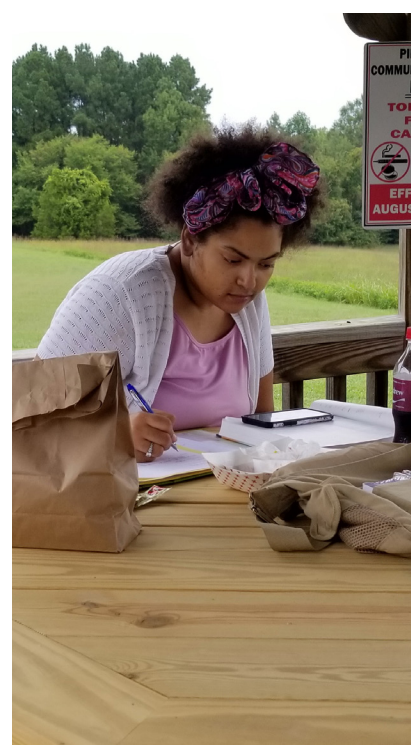
Avoided costs to state/local government

Not all of these tax revenues may be counted as benefits to the state, however. Some students leave the state during the course of their careers, and the higher earnings they receive as a result of their education leaves the state with them. To account for this dynamic, we combine student settlement data from the college with data on migration patterns from the Internal Revenue Service to estimate the number of students who will leave the state workforce over time.

We apply another reduction factor to account for the students' alternative education opportunities. This is the same adjustment that we use in the calculation of the alumni impact in Chapter 2 and is designed to account for the counterfactual scenario where PCC does not exist. The assumption in this case is that any benefits generated by students who could have received an education even without the college cannot be counted as new benefits to society. For this analysis, we assume an alternative education variable of 15%, meaning that 15% of the student population at the college would have generated benefits anyway even without the college. For more information on the alternative education variable, see Appendix 7.

We apply a final adjustment factor to account for the "shutdown point" that nets out benefits that are not directly linked to the state and local government costs of supporting the college. As with the alternative education variable discussed under the alumni impact, the purpose of this adjustment is to account for counterfactual scenarios. In this case, the counterfactual scenario is where state and local government funding for PCC did not exist and PCC had to derive the revenue elsewhere. To estimate this shutdown point, we apply a sub-model that simulates the students' demand curve for education by reducing state and local support to zero and progressively increasing student tuition and fees. As student tuition and fees increase, enrollment declines. For PCC, the shutdown point adjustment is 0%, meaning that the college could not operate without taxpayer support. As such, no reduction applies. For more information on the theory and methodology behind the estimation of the shutdown point, see Appendix 9.

After adjusting for attrition, alternative education opportunities, and the shutdown point, we calculate the present value of the future added tax revenues that occur in the state, equal to \$14.9 million. Recall from the discussion of the student return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.4%. This is the real treasury interest rate recommended by the Office of Management and Budget (OMB) for 30-year investments, and in Appendix 1, we conduct a sensitivity analysis of this discount rate.³⁵



35 Office of Management and Budget. "Discount Rates for Cost-Effectiveness, Lease Purchase, and Related Analyses." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified November 2020. <https://www.whitehouse.gov/wp-content/uploads/2020/12/discount-history.pdf>.

Government savings

In addition to the creation of higher tax revenues to the state and local government, education is statistically associated with a variety of lifestyle changes that generate social savings, also known as external or incidental benefits of education.

These represent the avoided costs to the government that otherwise would have been drawn from public resources absent the education provided by PCC. Government savings appear in Figure 3.2 and Table 3.3 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. Health savings include avoided medical costs that would have otherwise been covered by state and local government. Crime savings consist of avoided costs to the justice system (i.e., police protection, judicial and legal, and corrections). Income assistance benefits comprise avoided costs due to the reduced number of welfare and unemployment insurance claims.

The model quantifies government savings by calculating the probability at each education level that individuals will have poor health, commit crimes, or claim welfare and unemployment benefits. Deriving the probabilities involves assembling data from a variety of studies and surveys analyzing the correlation between education and health, crime, and income assistance at the national and state level. We spread the probabilities across the education ladder and multiply the marginal differences by the number of students who achieved CHEs at each step. The sum of these marginal differences counts as the upper bound measure of the number of students who, due to the education they received at the college, will not have poor health, commit crimes, or demand income assistance. We dampen these results by the ability bias adjustment discussed earlier in the student perspective section and in Appendix 6 to account for factors (besides education) that influence individual behavior. We then multiply the marginal effects of education times the associated costs of health, crime, and income assistance.³⁶ Finally, we apply the same adjustments for attrition, alternative

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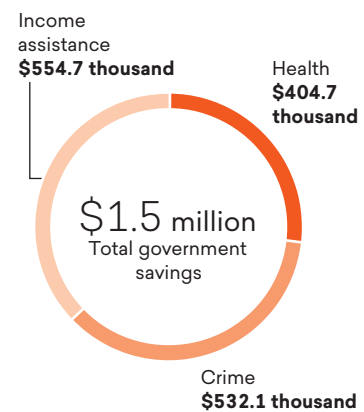
Table 3.3: PRESENT VALUE OF ADDED TAX REVENUE AND GOVERNMENT SAVINGS (THOUSANDS)

Added tax revenue	\$14,942
Government savings	
Health-related savings	\$405
Crime-related savings	\$532
Income assistance savings	\$555
Total government savings	\$1,491
Total taxpayer benefits	\$16,433

Source: Emsi Burning Glass impact model.

³⁶ For a full list of the data sources used to calculate the social externalities, see the Resources and References section. See also Appendix 10 for a more in-depth description of the methodology.

Figure 3.2: PRESENT VALUE OF GOVERNMENT SAVINGS



Source: Emsi Burning Glass impact model.



education, and the shutdown point to derive the net savings to the government. Total government savings appear in Figure 3.2 and sum to \$1.5 million.

Table 3.3 displays all benefits to taxpayers. The first row shows the added tax revenues created in the state, equal to \$14.9 million, from students' higher earnings, increases in non-labor income, and spending impacts. The sum of the government savings and the added income in the state is \$16.4 million, as shown in the bottom row of Table 3.3. These savings continue to accrue in the future as long as the FY 2019-20 student population of PCC remains in the workforce.

Return on investment for taxpayers

Taxpayer costs are reported in Table 3.4 and come to \$12.7 million, equal to the contribution of state and local government to PCC. In return for their public support, taxpayers are rewarded with an investment benefit-cost ratio of 1.3 (= \$16.4 million ÷ \$12.7 million), indicating a profitable investment.

At 2.4%, the rate of return to state and local taxpayers is favorable. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.4%, the real treasury interest rate recommended by the Office of Management and Budget for 30-year investments.³⁷ This is the return governments are assumed to be able to earn on generally safe investments of unused funds, or alternatively, the interest rate for which governments, as relatively safe borrowers, can obtain funds. A rate of return of 0.4% would mean that the college just pays its own way. In principle, governments could borrow monies used to support PCC and repay the loans out of the resulting added taxes and reduced government expenditures. A rate of return of 2.4%, on the other hand, means that PCC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs. It is unlikely that other government programs could make such a claim.




A rate of return of **2.4%** means that PCC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs.

37 Office of Management and Budget. "Discount Rates for Cost-Effectiveness, Lease Purchase, and Related Analyses." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified November 2020. <https://www.whitehouse.gov/wp-content/uploads/2020/12/discount-history.pdf>.

Table 3.4: PROJECTED BENEFITS AND COSTS, TAXPAYER PERSPECTIVE

1	2	3	4
Year	Benefits to taxpayers (millions)	State and local government costs (millions)	Net cash flow (millions)
0	\$1.3	\$12.7	-\$11.4
1	\$0.4	\$0.0	\$0.4
2	\$0.4	\$0.0	\$0.4
3	\$0.5	\$0.0	\$0.5
4	\$0.5	\$0.0	\$0.5
5	\$0.6	\$0.0	\$0.6
6	\$0.6	\$0.0	\$0.6
7	\$0.6	\$0.0	\$0.6
8	\$0.6	\$0.0	\$0.6
9	\$0.6	\$0.0	\$0.6
10	\$0.6	\$0.0	\$0.6
11	\$0.6	\$0.0	\$0.6
12	\$0.6	\$0.0	\$0.6
13	\$0.6	\$0.0	\$0.6
14	\$0.6	\$0.0	\$0.6
15	\$0.6	\$0.0	\$0.6
16	\$0.6	\$0.0	\$0.6
17	\$0.6	\$0.0	\$0.6
18	\$0.5	\$0.0	\$0.5
19	\$0.5	\$0.0	\$0.5
20	\$0.5	\$0.0	\$0.5
21	\$0.5	\$0.0	\$0.5
22	\$0.5	\$0.0	\$0.5
23	\$0.5	\$0.0	\$0.5
24	\$0.5	\$0.0	\$0.5
25	\$0.4	\$0.0	\$0.4
26	\$0.4	\$0.0	\$0.4
27	\$0.4	\$0.0	\$0.4
28	\$0.4	\$0.0	\$0.4
29	\$0.4	\$0.0	\$0.4
30	\$0.4	\$0.0	\$0.4
31	\$0.3	\$0.0	\$0.3
Present value	\$16.4	\$12.7	\$3.7

Source: Emsi Burning Glass impact model.

	<p>Benefit-cost ratio</p> <p>1.3</p>		<p>Internal rate of return</p> <p>2.4%</p>		<p>Payback period (years)</p> <p>20.1</p>
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