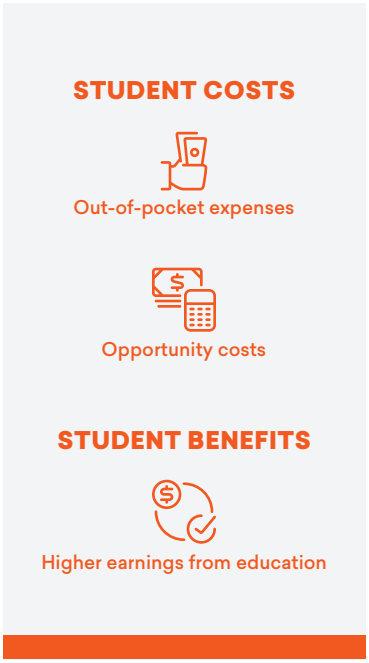
STUDENT PERSPECTIVE

To enroll in postsecondary education, students pay for tuition and forego monies that otherwise they would have earned had they chosen to work instead of attend college. From the perspective of students, education is the same as an investment; i.e., they incur a cost, or put up a certain amount of money, with the expectation of receiving benefits in return. The total costs consist of the tuition and fees that students pay and the opportunity cost of foregone time and money. The benefits are the higher earnings that students receive as a result of their education.



Calculating student costs

Student costs consist of two main items: direct outlays and opportunity costs. Direct outlays include tuition and fees, equal to $993.4 thousand from Figure 1.1. Direct outlays also include the cost of books and supplies. On average, full-time students spent $1,950 each on books and supplies during the reporting year.[20] Multiplying this figure by the number of full-time equivalents (FTEs) produced by PCC in FY 2019-20[21] generates a total cost of $2.3 million for books and supplies.

In addition to the cost of tuition, books, and supplies, students also experienced an opportunity cost of attending college during the analysis year. Opportunity cost is the most difficult component of student costs to estimate. It measures the value of time and earnings foregone by students who go to the college rather than work. To calculate it, we need to know the difference between the students' full earning potential and what they actually earn while attending the college.

We derive the students' full earning potential by weighting the average annual earnings levels in Table 1.4 according to the education level breakdown of the student population at the start of the analysis year.[22] However, the earnings levels in Table 1.4 reflect what average workers earn at the midpoint of their careers,

20 Based on the data provided by PCC.

21 A single FTE is equal to 30 CHEs, so there were 1,319 FTEs produced by students in FY 2019-20, equal to 39,643 CHEs divided by 30 (excluding personal enrichment students).

22 This is based on students who reported their prior level of education to PCC. The prior level of education data was then adjusted to exclude dual credit high school students.

not while attending the college. Because of this, we adjust the earnings levels to the average age of the student population (35) to better reflect their wages at their current age.[23] This calculation yields an average full earning potential of $20,914 per student.

In determining how much students earn while enrolled in postsecondary education, an important factor to consider is the time that they actually spend on postsecondary education, since this is the only time that they are required to give up a portion of their earnings. We use the students' CHE production as a proxy for time, under the assumption that the more CHEs students earn, the less time they have to work, and, consequently, the greater their foregone earnings. Overall, students attending PCC in FY 2019-20 earned an average of 7.9 CHEs per student (excluding personal enrichment students and dual credit high school students), which is approximately equal to 26% of a full academic year.[24] We thus include no more than $5,517 (or 26%) of the students' full earning potential in the opportunity cost calculations.

Another factor to consider is the students' employment status while enrolled in postsecondary education. It is estimated that 75% of students are employed.[25] For the remainder of students, we assume that they are either seeking work or planning to seek work once they complete their educational goals (with the exception of personal enrichment students, who are not included in this calculation). By choosing to enroll, therefore, non-working students give up everything that they can potentially earn during the academic year (i.e., the $5,517). The total value of their foregone earnings thus comes to $6.2 million.

Working students are able to maintain all or part of their earnings while enrolled. However, many of them hold jobs that pay less than statistical averages, usually because those are the only jobs they can find that accommodate their course schedule. These jobs tend to be at entry level, such as restaurant servers or cashiers. To account for this, we assume that working students hold jobs that pay 68% of what they would have earned had they chosen to work full-time rather than go to college.[26] The remaining 32% comprises the percentage of their full earning potential that they forego. Obviously, this assumption varies by person; some students forego more and others less. Since we do not know the actual jobs that students hold while attending, the 32% in foregone earnings serves as a reasonable average.

Working students also give up a portion of their leisure time in order to attend higher education institutions. According to the Bureau of Labor Statistics

23 Further discussion on this adjustment appears in Appendix 6.

24 Equal to 7.9 CHEs divided by 30, the assumed number of CHEs in a full-time academic year.

25 Emsi Burning Glass provided an estimate of the percentage of students employed because PCC was unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

26 The 68% assumption is based on the average hourly wage of jobs commonly held by working students divided by the national average hourly wage. Occupational wage estimates are published by the Bureau of Labor Statistics (see http://www.bls.gov/oes/current/oes_nat.htm).

American Time Use Survey, students forego up to 0.5 hours of leisure time per day.[27] Assuming that an hour of leisure is equal in value to an hour of work, we derive the total cost of leisure by multiplying the number of leisure hours foregone during the academic year by the average hourly pay of the students' full earning potential. For working students, therefore, their total opportunity cost is $7.2 million, equal to the sum of their foregone earnings ($5.9 million) and foregone leisure time ($1.2 million).

The steps leading up to the calculation of student costs appear in Table 3.1. Direct outlays amount to $3.3 million, the sum of tuition and fees ($993.4 thousand) and books and supplies ($2.3 million), not including $1.6 thousand in direct outlays of personal enrichment students (those students are excluded from the cost calculations). Opportunity costs for working and non-working students amount to $12.4 million, excluding $1 million in offsetting residual aid that is paid directly to students.[28] Summing direct outlays and opportunity costs together yields a total of $15.7 million in present value student costs.

Table 3.1: PRESENT VALUE OF STUDENT COSTS, FY 2019-20 (THOUSANDS)

Direct outlays in FY 2019-20	
Tuition and fees	$993
Books and supplies	$2,281
Less direct outlays of personal enrichment students	-$2
Total direct outlays	**$3,273**
Opportunity costs in FY 2019-20	
Earnings foregone by non-working students	$6,241
Earnings foregone by working students	$5,940
Value of leisure time foregone by working students	$1,231
Less residual aid	-$1,008
Total opportunity costs	**$12,404**
Total present value student costs	**$15,677**

Source: Based on data provided by PCC and outputs of the Emsi Burning Glass impact model.

Linking education to earnings

Having estimated the costs of education to students, we weigh these costs against the benefits that students receive in return. The relationship between education and earnings is well documented and forms the basis for determining student benefits. As shown in Table 1.4, state mean earnings levels at the midpoint of the average-aged worker's career increase as people achieve higher levels of

27 "Charts by Topic: Leisure and Sports Activities," American Time Use Survey, Last modified December 2016. http://www.bls.gov/tus/charts/leisure.htm.

28 Residual aid is the remaining portion of scholarship or grant aid distributed directly to a student after the college applies tuition and fees.

education. The differences between state earnings levels define the incremental benefits of moving from one education level to the next.

A key component in determining the students' return on investment is the value of their future benefits stream; i.e., what they can expect to earn in return for the investment they make in education. We calculate the future benefits stream to the college's FY 2019-20 students first by determining their average annual increase in earnings, equal to $4.4 million. This value represents the higher wages that accrue to students at the midpoint of their careers and is calculated based on the marginal wage increases of the CHEs that students complete while attending the college. Using the state of North Carolina earnings, the marginal wage increase per CHE is $111. For a full description of the methodology used to derive the $4.4 million, see Appendix 6.

The second step is to project the $4.4 million annual increase in earnings into the future, for as long as students remain in the workforce. We do this using the Mincer function to predict the change in earnings at each point in an individual's working career.[29] The Mincer function originated from Mincer's seminal work on human capital (1958). The function estimates earnings using an individual's years of education and post-schooling experience. While some have criticized Mincer's earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Card (1999 and 2001) addresses a number of these criticisms using U.S. based research over the last three decades and concludes that any upward bias in the Mincer parameters is on the order of 10% or less. We use state-specific and education level-specific Mincer coefficients. To account for any upward bias, we incorporate a 10% reduction in our projected earnings, otherwise known as the ability bias. With the $4.4 million representing the students' higher earnings at the midpoint of their careers, we apply scalars from the Mincer function to yield a stream of projected future benefits that gradually increase from the time students enter the workforce, peak shortly after the career midpoint, and then dampen slightly as students approach retirement at age 67. This earnings stream appears in Column 2 of Table 3.2.

As shown in Table 3.2, the $4.4 million in gross higher earnings occurs around Year 6, which is the approximate midpoint of the students' future working careers given the average age of the student population and an assumed retirement age of 67. In accordance with the Mincer function, the gross higher earnings that accrue to students in the years leading up to the midpoint are less than $4.4 million and the gross higher earnings in the years after the midpoint are greater than $4.4 million.

29 Appendix 6 provides more information on the Mincer function and how it is used to predict future earnings growth.

Table 3.2: PROJECTED BENEFITS AND COSTS, STUDENT PERSPECTIVE

1	2	3	4	5	6
Year	Gross higher earnings to students (millions)	% active in workforce*	Net higher earnings to students (millions)	Student costs (millions)	Net cash flow (millions)
0	$3.7	41%	$1.5	$15.7	-$14.1
1	$3.8	63%	$2.4	$0.0	$2.4
2	$4.0	68%	$2.7	$0.0	$2.7
3	$4.1	74%	$3.0	$0.0	$3.0
4	$4.2	80%	$3.4	$0.0	$3.4
5	$4.3	95%	$4.1	$0.0	$4.1
6	$4.4	95%	$4.2	$0.0	$4.2
7	$4.5	95%	$4.3	$0.0	$4.3
8	$4.6	95%	$4.4	$0.0	$4.4
9	$4.7	94%	$4.4	$0.0	$4.4
10	$4.8	94%	$4.5	$0.0	$4.5
11	$4.8	94%	$4.5	$0.0	$4.5
12	$4.9	94%	$4.6	$0.0	$4.6
13	$5.0	93%	$4.6	$0.0	$4.6
14	$5.0	93%	$4.7	$0.0	$4.7
15	$5.0	93%	$4.7	$0.0	$4.7
16	$5.1	92%	$4.7	$0.0	$4.7
17	$5.1	92%	$4.7	$0.0	$4.7
18	$5.1	92%	$4.6	$0.0	$4.6
19	$5.1	91%	$4.6	$0.0	$4.6
20	$5.0	91%	$4.6	$0.0	$4.6
21	$5.0	90%	$4.5	$0.0	$4.5
22	$5.0	89%	$4.5	$0.0	$4.5
23	$4.9	89%	$4.4	$0.0	$4.4
24	$4.9	88%	$4.3	$0.0	$4.3
25	$4.8	87%	$4.2	$0.0	$4.2
26	$4.8	86%	$4.1	$0.0	$4.1
27	$4.7	85%	$4.0	$0.0	$4.0
28	$4.6	84%	$3.9	$0.0	$3.9
29	$4.5	83%	$3.7	$0.0	$3.7
30	$4.4	82%	$3.6	$0.0	$3.6
31	$4.3	81%	$3.5	$0.0	$3.5
Present value			**$68.1**	**$15.7**	**$52.5**

* Includes the "settling-in" factors and attrition.
Source: Emsi Burning Glass impact model.

Benefit-cost ratio	Internal rate of return	Payback period (years)
4.3	24.2%	4.7

The final step in calculating the students' future benefits stream is to net out the potential benefits generated by students who are either not yet active in the workforce or who leave the workforce over time. This adjustment appears in Column 3 of Table 3.2 and represents the percentage of the FY 2019-20 student population that will be employed in the workforce in a given year. Note that the percentages in the first five years of the time horizon are relatively lower than those in subsequent years. This is because many students delay their entry into the workforce, either because they are still enrolled at the college or because they are unable to find a job immediately upon graduation. Accordingly, we apply a set of "settling-in" factors to account for the time needed by students to find employment and settle into their careers. As discussed in Chapter 2, settling-in factors delay the onset of the benefits by one to three years for students who graduate with a certificate or a degree and by one to five years for degree-seeking students who do not complete during the analysis year.

Beyond the first five years of the time horizon, students will leave the workforce for any number of reasons, whether death, retirement, or unemployment. We estimate the rate of attrition using the same data and assumptions applied in the calculation of the attrition rate in the economic impact analysis of Chapter 2.[30] The likelihood of leaving the workforce increases as students age, so the attrition rate is more aggressive near the end of the time horizon than in the beginning. Column 4 of Table 3.2 shows the net higher earnings to students after accounting for both the settling-in patterns and attrition.

Return on investment for students

Having estimated the students' costs and their future benefits stream, the next step is to discount the results to the present to reflect the time value of money. For the student perspective we assume a discount rate of 4.5% (see below). Because students tend to rely upon debt to pay for education—i.e. they are negative savers—their discount rate is based upon student loan interest rates.[31]

Discount rate

The discount rate is a rate of interest that converts future costs and benefits to present values. For example, $1,000 in higher earnings realized 30 years in the future is worth much less than $1,000 in the present. All future values must therefore be expressed in present value terms in order to compare them with investments (i.e., costs) made today. The selection of an appropriate discount rate, however, can become an arbitrary and controversial undertaking. As suggested in economic theory, the discount rate should reflect the investor's opportunity cost of capital, i.e., the rate of return one could reasonably expect to obtain from alternative investment schemes. In this study we assume a 4.5% discount rate from the student perspective and a 0.4% discount rate from the perspectives of taxpayers and society.

30 See the discussion of the alumni impact in Chapter 2. The main sources for deriving the attrition rate are the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics. Note that we do not account for migration patterns in the student investment analysis because the higher earnings that students receive as a result of their education will accrue to them regardless of where they find employment.

31 The student discount rate is derived from the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs—March 2020 Baseline. https://www.cbo.gov/system/files/2020-03/51310-2020-03-studentloan.pdf.

In Appendix 1, we conduct a sensitivity analysis of this discount rate. The present value of the benefits is then compared to student costs to derive the investment analysis results, expressed in terms of a benefit-cost ratio, rate of return, and payback period. The investment is feasible if returns match or exceed the minimum threshold values; i.e., a benefit-cost ratio greater than 1.0, a rate of return that exceeds the discount rate, and a reasonably short payback period.

In Table 3.2, the net higher earnings of students yield a cumulative discounted sum of approximately $68.1 million, the present value of all of the future earnings increments (see the bottom section of Column 4). This may also be interpreted as the gross capital asset value of the students' higher earnings stream. In effect, the aggregate FY 2019-20 student body is rewarded for its investment in PCC with a capital asset valued at $68.1 million.

The students' cost of attending the college is shown in Column 5 of Table 3.2, equal to a present value of $15.7 million. Comparing the cost with the present value of benefits yields a student benefit-cost ratio of 4.3 (equal to $68.1 million in benefits divided by $15.7 million in costs).

Another way to compare the same benefits stream and associated cost is to compute the rate of return. The rate of return indicates the interest rate that a bank would have to pay a depositor to yield an equally attractive stream of future payments.[32] Table 3.2 shows students of PCC earning average returns of 24.2% on their investment of time and money. This is a favorable return compared, for example, to approximately 1% on a standard bank savings account, or 10% on stocks and bonds (30-year average return).

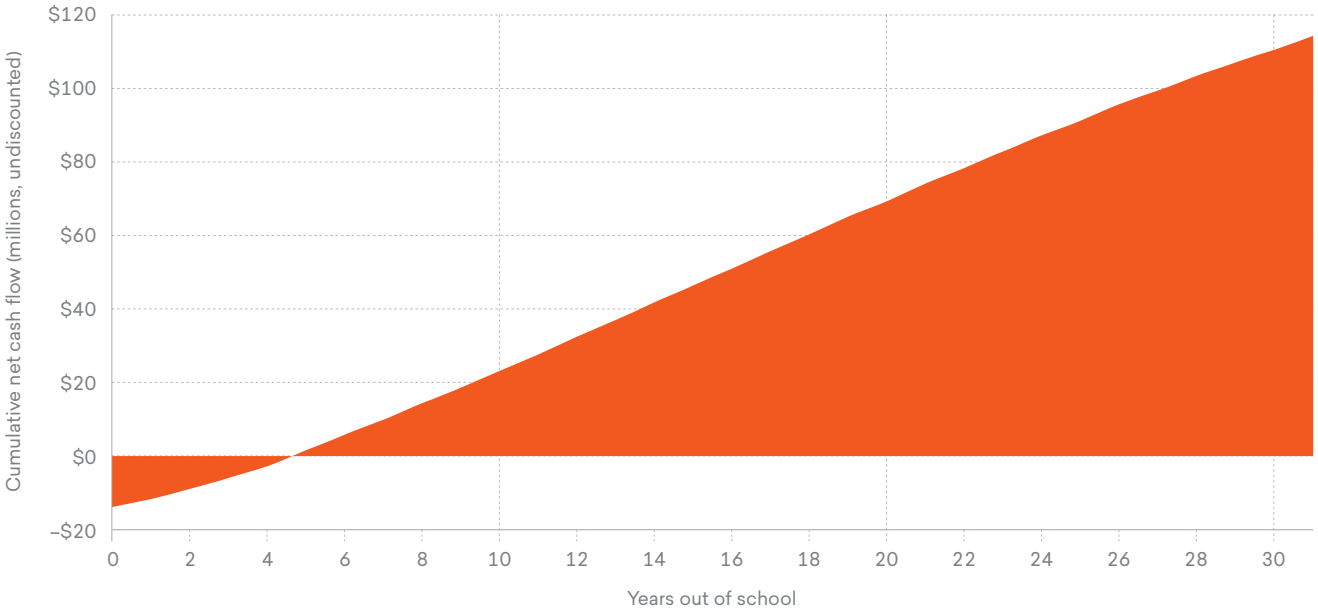
> PCC students see an average rate of return of **24.2%** for their investment of time and money.

Note that returns reported in this study are real returns, not nominal. When a bank promises to pay a certain rate of interest on a savings account, it employs an implicitly nominal rate. Bonds operate in a similar manner. If it turns out that the inflation rate is higher than the stated rate of return, then money is lost in real terms. In contrast, a real rate of return is on top of inflation. For example, if inflation is running at 3% and a nominal percentage of 5% is paid, then the real rate of return on the investment is only 2%. In Table 3.2, the 24.2% student rate of return is a real rate. With an inflation rate of 2.1% (the average rate reported over the past 20 years as per the U.S. Department of Commerce, Consumer Price Index), the corresponding nominal rate of return is 26.3%, higher than what is reported in Table 3.2.

32 Rates of return are computed using the familiar internal rate-of-return calculation. Note that, with a bank deposit or stock market investment, the depositor puts up a principal, receives in return a stream of periodic payments, and then recovers the principal at the end. Someone who invests in education, on the other hand, receives a stream of periodic payments that include the recovery of the principal as part of the periodic payments, but there is no principal recovery at the end. These differences notwithstanding comparable cash flows for both bank and education investors yield the same internal rate of return.

The payback period is defined as the length of time it takes to entirely recoup the initial investment.[33] Beyond that point, returns are what economists would call pure costless rent. As indicated in Table 3.2, students at PCC see, on average, a payback period of 4.7 years, meaning 4.7 years after their initial investment of foregone earnings and out-of-pocket costs, they will have received enough higher future earnings to fully recover those costs (Figure 3.1).

Figure 3.1: STUDENT PAYBACK PERIOD



Source: Emsi Burning Glass impact model.

33 Payback analysis is generally used by the business community to rank alternative investments when safety of investments is an issue. Its greatest drawback is it does not take into account the time value of money. The payback period is calculated by dividing the cost of the investment by the net return per period. In this study, the cost of the investment includes tuition and fees plus the opportunity cost of time; it does not take into account student living expenses.