

SCHENECTADY COUNTY COMMUNITY COLLEGE HEALTH PROFESSION OPPORTUNITY GRANTS

Economic Impact Analysis

Prepared by EMSI
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EXECUTIVE SUMMARY

In this study EMSI analyzes the economic impact and investment feasibility of Schenectady County Community College's (SCCC) Health Programs Opportunity Grants (HPOG). The body of this report contains more detailed information on the HPOG program and the model used to determine its economic impact and return on investment.

In 2014, SCCC's HPOG program will generate an estimated \$8.80 million in added income to the regional economy. Of this amount, \$3.54 million is due to the operation of the HPOG program, which generates an impact through paying employees and purchasing goods and services from businesses within the region. The remaining \$5.26 million is due to the accumulated contribution of former students currently employed in the regional workforce. Other key findings of this analysis are as follows:

IMPACT OF PROGRAM OPERATIONS

- Using federal HPOG allocations and a small amount of its own resources SCCC spends an average of \$2.57 million per year to operate the HPOG program. This spending plus the resultant economic ripple-effects will lead to an impact of \$3.45 million. As long as SCCC continues to operate the HPOG program at the same scale, a similar annual impact can be expected in future years.

IMPACT OF STUDENT PRODUCTIVITY

- As of June 2014, there are 856 former HPOG students employed in the SCCC service area. Due to the education these individuals received at SCCC, they have increased their own earnings as well as the overall economic output of their employers'. On average each completer in the workforce will

contribute an economic impact of \$6,100 per person in 2014. This value represents net impact per person — a conservative measure that quantifies just the additional economic impact created due to students' increased education.

- An average SCCC completer in this program will collect the net present value of \$503,800 in future earnings as a result of this education — an \$81,200 improvement over what they likely would have earned had they never entered the program.

STUDENT RETURN ON INVESTMENT

- In return for the time sacrificed to receive their education, students will receive a combined present value of \$73.78 million in increased earnings over their working lives. This translates to a return of \$46.70 in higher future income for every \$1 in opportunity cost that students have invested in their education.

TAXPAYER RETURN ON INVESTMENT

- Over the previous three years, federal taxpayers have paid \$7.67 million to support SCCC's HPOG program. The net present value of the added tax revenue stemming from the students' higher lifetime incomes and the increased output of businesses amounts to \$55.36 million in taxpayer benefits. Savings to the public sector add another \$23 thousand in benefits due to a reduced demand for government-funded services.
- Dividing taxpayer benefits by the associated costs yields a 7.2 benefit-cost ratio, i.e., every \$1 in costs returns \$7.20 in benefits. The average annual return on investment for taxpayers is 18.7%.

INTRODUCTION

About the Report and the Health Profession Opportunity Grants (HPOG)

This report assesses two economic facets of the Health Profession Opportunity Grants (HPOG) managed by Schenectady County Community College (SCCC). First, we examine the economic impact of the HPOG program on the local business community. Second, we assess the return on investment generated by the HPOG program for two key stakeholder groups: students and taxpayers.

The HPOG program is authorized by the Affordable Care Act and is supervised by the Administration for Children & Families, a division of the U.S. Department of Health & Human Services. According to the Administration for Children & Families, the “program provides education and training to TANF [Temporary Assistance for Needy Families] recipients and other low-income individuals for occupations in the health care field that pay well and are expected to either experience labor shortages or be in high

demand.”¹ Since 2010, grant awards have been provided to 32 entities located across 23 states.

EMSI received data from SCCC that have been inputted into this report, specifically related to grant funding and the number and characteristics of students who have completed the HPOG program. EMSI inputted these data into its economic models which measure economic impact and return on investment. Where data were not available or not easily accessible, EMSI made estimates using available data and our experience with labor market economics. The contents of this report are solely the responsibility of EMSI and do not necessarily represent the official views of Schenectady County Community College or the US Department of Health & Human Services.

¹ Office of the Administration of Children and Families, <http://www.acf.hhs.gov/programs/ofa/programs/hpog/about>, accessed August 1, 2014.

Overview Of the Report

ECONOMIC IMPACT ANALYSIS

To derive the economic impact, EMSI relied on a specialized Social Accounting Matrix (SAM) model to calculate the additional income created in the Schenectady regional economy. This additional income was generated by SCCC’s spending in support of the program and added skills of SCCC HPOG students. The program’s economic impact can be split into two basic categories: the program operations’ effects and the student productivity effect.

Program operations describes both the income generated due to faculty and staff employment and the expenses required to operate the program such as office supplies, equipment, energy, and so forth. The

student productivity effect describes the full range of economic effects that can be directly attributed to the educational aspects of the HPOG program including: increased wages for completers, the increased productivity for employers, and the increased earnings for other workers who either get jobs or are enabled to be more productive due to the contributions of SCCC’s HPOG completers.

It is important to note that the economic impact reported here represents a snapshot for 2014. One aspect of the economic impact will remain relatively stable with time and another aspect will compound. Annual expenses in support the HPOG program will change little from year to year, so the program operations effect will remain relatively stable as long as the

HPOG program operates at roughly the same scale. On the other hand, as more students complete the HPOG program, the number of former students productively contributing to the economy will increase, thereby enlarging the economic impact of students' productivity. Economic impact analyses are fundamentally placed within a specific period of time and as such it is difficult to accurately forecast the economic impact of the HPOG program far into the future. However, based on the increasing completion numbers over the past three years, it is reasonable to expect the program's overall economic impact will increase over the next few years.

RETURN ON INVESTMENT ANALYSIS

The second component of the study is a standard investment analysis to determine how money spent on the HPOG program at SCCC performs as an investment over time. The investors in this case are students and taxpayers, each of whom pays a certain amount in fiscal and opportunity costs to support HPOG educational activities. To determine the feasibility of the investment, EMSI's model projects benefits into the future, discounts them to their present value, then compares that figure to the present value costs. Results of the investment analysis for students and taxpayers are displayed in the following four ways: net present value of benefits, rate of return, benefit-cost ratio, and payback period.²

Unlike the economic impact analysis, the return on investment analysis is based on the cumulative benefits and costs that have been realized since the initiation of the HPOG program in 2010. The return on investment analysis differs from the economic impact analysis in another regard as well. Producing more graduates will inevitably require more spending on the part of taxpayers and more opportunity cost sacrificed on the part of students, so the return on investment measures presented in this report are not expected to improve significantly over time.

² Details on the discount rate, payback period and net present value are explained in Appendix A under "Financial Metrics."

Students enter the HPOG with zero out-of-pocket expenses, but some do bear an opportunity cost of attending college as opposed to spending those hours working.³ In return for these investments, students receive higher income over their working lives. Taxpayers contribute their investment in terms of government funding and they benefit from an expanded tax base as well as a collection of public sector savings. Since the HPOG program is funded by a federal grant, it is not directly traceable back to local taxpayers. Therefore EMSI developed a model to estimate the return on investment generated for federal taxpayers to support the HPOG program at SCCC. Though the HPOG program is offered at many colleges throughout the country, this report only assesses the return on investment to federal taxpayers for supporting the HPOG program at SCCC.

GEOGRAPHIC REGION OF THE ANALYSIS

The geographic area used to determine the economic impact comprises the following three counties in New York: Albany, Saratoga, and Schenectady. The return on investment analysis for students also utilizes this same region, but the return on investment for taxpayers is based on a nationwide region as federal taxpayers are not limited just to the SCCC region.



Figure 1: Map of SCCC Service Area

³ For more on EMSI's procedure for estimating opportunity cost, see Appendix B under "Financial Metrics."

OVERALL ECONOMIC IMPACT RESULTS

In 2014, the HPOG program will generate an estimated \$8.80 million in added income to SCCC service area. This \$8.80 million represents the economic impact in 2014 but a value greater than this is expected in future years, as alumni advance in their careers and earn higher wages. Of this amount, \$3.54 million is due to the operation of the program itself, which generates an impact through paying employees and purchasing goods and services from businesses within the region. The remaining \$5.26 million is produced in the following three manners: increased wages collected by former students as a direct result of their education, the increased output of businesses that employ these students, and the multiplier effects that occur as both parties spend money at other businesses. The \$5.26 million in impacts attributable to increased student productivity is a net measure rather than gross, meaning that EMSI has taken a conservative approach by quantifying just the additional (net) economic impact created due to students' increased education, instead of the full sum (gross) of their economic contributions.

As of June 2014, there are 1,035 former SCCC students who have attained a postsecondary certificate through

the HPOG program. According to SCCC data, roughly 856 (or 83%) of these former students are now employed. Due to the education these individuals received at SCCC, they have increased their own earnings as well as the overall economic output of their employers. On average each completer in the workforce will contribute an economic impact of \$6,100 per person in 2014. As with the student productivity impact, this value represents the net impact per person, which is a conservative measure that quantifies just the additional economic impact created due to students' increased education.

An average SCCC completer in this program will collect the net present value of \$503,800 in future earnings as a result of this education — an \$81,200 improvement over what they likely would have earned had they never entered the program.

Table 1: 2014 Overall Economic Impact of HPOG Program

CATEGORY	VALUE (\$Thousands)
Program operations	\$3,541
Student productivity	\$5,257
Total added regional income	\$8,799

Program Operations Effect Details

The program operations effect for SCCC's HPOG program takes account of all funding contributed by the federal government through the HPOG program and all of SCCC's "in-kind" costs to support the program. When performing economic impact analyses, economists count all expenses as a positive effect on the regional economy. These expenses lead to income both for college faculty and staff and other organizations from which services and supplies are purchased. The efficiency of spending is better addressed via a return on investment analyses, such as the one covered later in this report.

Table 2 contains information on HPOG funding, including funds received directly from the federal

government and the "in-kind" support of SCCC. The grant received by SCCC covers all staff costs, equipment costs, and miscellaneous expenses, but does not cover all occupancy related costs. Those capital expenses are quantified as SCCC's in-kind contributions in Table 3. The in-kind support figure was calculated by EMSI with input from SCCC. To arrive at the \$24,000 shown in Table 3, EMSI and SCCC examined the amount of square footage occupied by the HPOG program compared to total overhead cost of the building where training occurs. This percentage was then applied to the total cost of renting and operating that space.

Table 2: Average Annual Expenses for SCCC HPOG Operations

CATEGORY	VALUE (\$Thousands)
HPOG Funding	\$2,570
SCCC In-Kind Support	\$24
Total Spending	\$2,594

Table 3 shows the effects of these expenses once they are distributed to workers at the college and spent on other services from local and non-local organizations. The program operations effect is categorized according to the following four effects: the initial effect, the direct effect, the indirect effect, and the induced effect. Initial effects refer to wages paid to SCCC employees. Direct effects occur as SCCC purchases goods and services from other local companies. Indirect effects occur as this secondary round of businesses purchase more goods and services from local companies with the increased income. And finally, induced effects occur as these purchases create additional income for employees of all local businesses.

The full amount that SCCC spends on facilities (\$24,000) is not shown in Table 3 for two reasons. Firstly, the \$24,000 listed in Table 3 represents gross expenses of SCCC toward facilities services, but this number differs from the actual income returned to residents of the region. When an economic transaction occurs, income is generated for a host of different parties including employees, business owners, and government. Not all company revenue is returned to these parties because businesses have other costs including buying raw materials, office supplies etc. Ultimately, any portion of an economic transaction that does not create income for workers, income for the government in the form of taxes, or income for business owners in terms of profits is removed from the college’s gross expenses to determine the economic impact of that transaction. Secondly, some

of the \$24,000 spent by SCCC on facilities expenses exits the SCCC service region when the college makes purchases from vendors and suppliers outside of the area. EMSI’s specialized Social Accounting Matrix (SAM), which accounts for trade relationships between industries for every county in the United States, estimates the degree to which these expenses are reduced to determine the economic impact within the SCCC service area. Due to these two adjustments, the \$24,000 shown in Table 3 has been reduced to the \$16,000 shown under “direct effect” in Table 4.

To sum up the contents of Table 4, the wages and benefits paid to SCCC employees (\$2.57 million) is recorded as the initial effect. SCCC’s expenses on facilities services, reduced to account for out-of-region spending and expenses that do not register as income (\$16 thousand) are recorded as the direct effect. The \$2 thousand recorded as the indirect effect represents the purchases made by SCCC’s facilities vendors to purchase goods and services from other vendors locally. Lastly, the \$953 thousand listed recorded as the induced effect represents the additional income generated as all people who received wages through the initial, direct and indirect effects spend those wages on various consumer products and services within the region (such as groceries, entertainment, etc.) By totaling each of these four independent effects, we arrive at the economic impact of operating the HPOG program at SCCC, amounting to an annual average of \$3.54 million.

Table 3: Average Annual Operations Effect for SCCC’s HPOG Program

Total Effect	\$3,541
Initial Effect	\$2,570
Direct Effect	\$16

Student Productivity Effects Details

Table 4 displays the total student productivity effect attributable to HPOG completers. This measurement includes the initial impact (former students’ increased earnings due to their education at SCCC) and other associated multiplier effects. Multiplier effects refer to the additional income created in the economy as

SCCC alumni and their employers spend money within the region, creating income for other residents. As with the program operations effect, the student productivity effect is categorized according to the following four effects: the initial effect, the direct effect, the indirect effect, and the induced effect. In this case, the initial

effects refer to wages paid to SCCC alumni by employers. Direct effects occur as employers purchase goods and services from other local companies. Indirect effects occur as this secondary round of businesses purchase more goods and services from local companies. And finally, induced effects occur as these purchases create additional income for employees of all local businesses.

The figures in Table 4 represent just the estimated economic impact of students in 2014. The impact will generally increase with time for two reasons. First, as more students enter the labor force, the program’s total economic impact will increase. Secondly, even if no additional completers entered the workforce, the economic impact would increase with time as alumni gain greater work experience and earn higher wages.

Table 4: 2014 Student Productivity Effect for SCCC’s HPOG Program

FIELD	VALUE (\$Thousands)
Total Economic Impact in 2014	\$3,389
Initial Effect	\$523
Direct Effect	\$91
Indirect Effect	\$1,253
Induced Effect	\$5,257

Table 5 displays the student productivity effect per worker. To indicate the program’s total output, we display the number of students who have completed since the program’s inception in 2010 and are employed (856).⁴ Next we display the annual economic impact per completer, which is the total economic impact displayed in the first table divided by the net number of working students who have remained in the region. The estimated lifetime earnings measurement represents the present value of earnings for an average completer over the course of his or her working life.⁵ Present value indicates that future values have been discounted based on the riskiness of students’ investment in education and the time value of money. These earnings figures are simulated using EMSI’s program specific earnings forecast model, which accounts for educational level, years of experience, race/ethnicity, gender, occupation, and average regional earnings by occupation.

⁴ These figures were updated as of June 17, 2014.

⁵ An average student is a composite of an average age and average racial composition among all program completers. For more information on this model, see Appendix A.

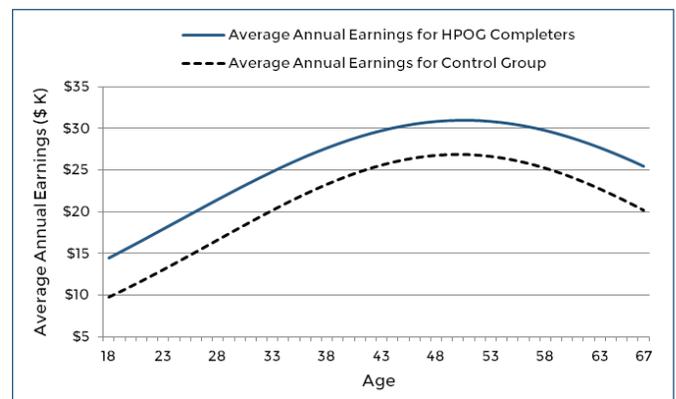
Table 5: Student Productivity Effects per Worker for HPOG Program

FIELD	VALUE
Number of Completers in Workforce in 2014	856
Annual Economic Impact Per Completer	\$6,100
Estimated Lifetime Earnings Per Completer	\$503,800

The estimated annual earnings of completers of the HPOG program at every age between 18 and 67 are displayed in Figure 2. This graph also contains the estimated annual earnings for these individuals had they never completed the HPOG program (termed the “control” group). The expected earnings generated for the control group are a weighted average based on a mixture of low-skill occupations in which the student cohorts would be likely to work based on their educational characteristics. It includes occupations such as cashiers, janitors, food service workers, and general laborers.

Figure 2 should be used as an illustration tool only. It compares median earnings of HPOG program completers and members of the control group for individuals who are labor force participants between 18 and 67 years of age. We are aware that most students will not be full-time labor force participants over this period of time, and therefore these factors have been built into both the economic impact and return on investment analyses. In fact, the average HPOG student is 30 years of age at program entry so the left side of the curve (between 18 and 30) will only apply for students who complete the program at younger than average ages. Also it is natural that some individuals will drop out of the labor force for certain periods of time due to unemployment, military service, family responsibilities, etc.

Figure 2: Lifetime Earnings Curve of HPOG Completers vs. Non-HPOG Completers



TAXPAYER RETURN ON INVESTMENT RESULTS

Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be feasible. If costs outweigh benefits, then the investment will lose money and is thus not feasible. However, it is important to keep in mind that just

because a project is feasible it does not necessarily mean that it is the best course of action, as other investments may yield a higher return. In this section, we consider SCCC's HPOG program as an investment from the student and federal taxpayer perspectives.

Student Return on Investment

Analyzing the benefits and costs of education from the perspective of students is critical, as students give up time and money to go to college in return for the expectation of a lifetime of higher income. The principal of the student return on investment analysis is simple. We compare the cost of education borne by students to the benefits realized due to a lifetime of higher earnings due to their education.

SCCC's HPOG program is unique in that students bear zero cost for their education, so the most obvious cost component of educational investment is not relevant in this case. However, students of the program still give time that could have been spent working in order to obtain their education. In economic terms this represents the "opportunity cost" to the students of receiving an education. EMSI estimates student opportunity costs based on the difference between the students' full earning potential and what they actually earn while attending college. Their expected full-time earnings potential is calculated based on multiple data points related to students at program entry that EMSI received from SCCC. These include student level of education, average age, average duration of education, and percent of students employed. All other relevant variables have been calculated using data from national and regional sources.⁶

Having estimated the opportunity 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. 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 the future in return for the investment they make in education). We calculate the future benefits stream to SCCC's HPOG students based on a unique earnings function developed by EMSI. This function predicts the change in earnings at each age in an individual's working career using the occupational mix provided by SCCC.⁷ Lastly, EMSI makes adjustments to these figures based on the earnings that will be lost due to alumni who exit paid employment due various reasons including death, retirement, or unemployment.

After estimating students' costs and their future benefits stream, the next step is to discount the results to the present time to reflect the time value of money. For the student perspective, we assume an annual discount rate of 4.5%.⁸ 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.

⁷ For more information on this process see Appendix A under "Methodology" and Appendix B: Occupations Associated with the HPOG program.

⁸ The student discount rate is derived from the baseline forecasts for the ten-year zero coupon bond discount rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs - March 2012 Baseline, Congressional Budget Office Publications, last modified March 13, 2012, accessed July 2013, http://www.cbo.gov/sites/default/files/cbofiles/attachments/43054_StudentLoan-PellGrantPrograms.pdf.

⁶ For more information on EMSI's process see Appendix A under "Financial Metrics."

The investment is feasible if returns match or exceed the minimum threshold values (i.e. a benefit-cost ratio greater than one, a rate of return that exceeds the discount rate, and a reasonable payback period).

In Table 6, the net added income of SCCC students yields a cumulative discounted sum of approximately \$73.78 million. This represents the present value of earnings for students who are currently in the workforce and those students who are currently enrolled in the program. The opportunity costs of going through SCCC’s HPOG program are also shown in Table 5. The aggregate cost is equal to a present value of \$1.58 million. Comparing the cost with the present value of benefits yields a student benefit-cost ratio of 46.7 (equal to \$73.78 million in benefits divided by \$1.58 million in opportunity 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.⁹ Table 5 shows

⁹ Rates of return are calculated as an “internal rate of return.”

SCCC HPOG students earning average returns of 944.4% over the course of their worker careers on their investment of time and money. This is a remarkably favorable return compared, for example, to an approximate 1% on a standard bank savings account, or 7% on stocks and bonds (thirty-year average return). The payback period is defined as the length of time it takes to entirely recoup the initial investment. As indicated in Table 7, students who complete the SCCC HPOG program see, on average, a payback period of 1.1 years on their forgone time.

**Table 6: HPOG Students (2010-2014)
Return on Investment Metrics**

Net benefits (\$ thousands)	\$73,778
Net costs (\$ thousands)	\$1,581
NPV (\$ thousands)	\$72,197
Rate of return	944.4%
Benefit/cost ratio	46.7
Payback period	1.1

Federal Taxpayer Return on Investment

The federal government supports the HPOG program across the United States with an interest in helping low-income adults obtain skills in order to achieve higher levels of income. The question is whether these investments are successful at increasing income levels (and therefore taxable income) and decreasing negative economic effects commonly associated with poverty and lower educational attainment levels, such as criminal offenses, unemployment, and increased health care costs.

To determine whether the investment is feasible, EMSI first looks at how SCCC’s HPOG program increases income for former students and how that income is translated into additional federal tax revenue. In addition to the creation of higher income, 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 that would have otherwise been drawn from private and public resources absent the education provided by SCCC. Social benefits break down

into three main categories: 1) health savings, 2) crime savings, and 3) welfare and unemployment savings. Health savings include avoided medical costs, lost productivity, and other effects associated with smoking, alcoholism, obesity, mental illness, and drug abuse. Crime savings consist of avoided costs to the justice system (i.e., police protection, judicial and legal, and corrections), avoided victim costs, and benefits stemming from the added productivity of individuals who would have otherwise been incarcerated. Welfare and unemployment benefits comprise avoided costs due to the reduced number of social assistance and unemployment insurance claims.

Table 7 presents the present value of the benefits to taxpayers. Added federal tax revenue appears in the first row. These figures are derived by multiplying the net benefit (or total income growth) figures in Table 6 by the prevailing federal government tax receipts as percent of total GDP. For social externalities, we add the benefits that reduce the demand for government-supported social services and the benefits resulting from

improved productivity. Added tax revenue composes the lion's share of the positive change at \$55.36 million, with the addition of government savings the present value comes to approximately \$55.38 million.

Table 7: Present Value of Added Tax Revenue and Government Savings

	VALUE (\$THOUSANDS)
Added tax revenue	\$55,360
Government savings	
Health-related savings	\$18
Crime-related savings	\$5
Welfare/unemployment-related savings	\$1
Total government savings	\$23
Total taxpayer benefits	\$55,383

Taxpayer costs reported in Table 8 come to \$7.67 million, equal to the total value spent by SCCC from its federal HPOG award over the past three academic years. In return for their public support, therefore, taxpayers have been rewarded with an investment benefit-cost ratio of 7.2 (equal to \$55.38 million divided by \$7.67 million), indicating a profitable investment. At 18.7%, the annual rate of return to state taxpayers is also favorable. We assumed a 1.1% discount rate when dealing with government investments

and public finance issues. 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 1.1% would mean that the college would just break even.¹⁰ A rate of return of 17.8%, on the other hand, means that SCCC's HPOG program not only pays its own way, but it also generates a surplus that state government can use to fund other programs.

The payback period is defined as the length of time it takes to entirely recoup the initial investment. As shown in Table 8, federal taxpayers see a payback period of 7.0 years on average to re-earn the dollars spent to support SCCC's HPOG program.

Table 8: Federal Taxpayer Return on Investment

Net benefits (\$ thousands)	\$55,383
Net costs (\$ thousands)	\$7,665
NPV (\$ thousands)	\$47,718
Rate of return	18.7%
Benefit/cost ratio	7.2
Payback period	7.0

¹⁰ For more information on discount rates see Appendix A: Discount Rates.

APPENDIX A: METHODOLOGY

About the Program Specific Economic Impact Model

In this report, EMSI aims to assess the economic impact of Schenectady County Community College's (SCCC) Health Profession Opportunity Grant (HPOG) on the local economy, as well as the feasibility of this program as an investment for students and federal taxpayers. EMSI also offers a college-wide economic impact study (EIS) that analyzes the broader impact of the college in terms of additional factors such as student spending.

The unique challenge of the program specific model is predicting the lifetime earnings curve of workers by occupation. Research on the relationship between earnings, education and experience extends back to economist Jacob Mincer, who first explored the issue in the 1930s. At the time, he developed a model, later termed the Mincer Curve, to explain how education

and experience affect earnings. Since that time, economists have continued to use and improve upon the tools developed by Mincer, but EMSI is the first to integrate occupational-specific effects into its model. This is critically important for producing a program-specific economic impact model because individuals in different occupations receive different returns on education and experience. For example, many professional occupations, such as lawyers and professors, will continue to see appreciation in annual earnings late into their working careers; whereas, occupations that require intense physical labor such as electricians and automotive repair see peak wages much earlier in their careers. Likewise, some workers, such as those in management and education, experience a greater return for educational attainment than other types of workers.

Financial Metrics

DISCOUNT RATE

The estimated lifetime earnings values shown in this report are calculated based on the expected earnings of completers for each year of their careers. These values are not reported in gross terms but rather discounted to account for future value. This discount rate converts future monies to their equivalent present value. In investment analysis, the discount rate accounts for two fundamental principles: 1) the time value of money, and 2) the level of risk that an investor is willing to accept. Time value of money refers to the value of money after interest or inflation has accrued over a given length of time. An investor must be willing to forgo the use of his money in the present if he wishes to receive compensation for it in the future. Typically this minimum rate of return is determined by the known returns of less risky assets where the investors might alternatively

consider placing their money. In this study, EMSI assumes a 4.5% discount rate for students and a 1.1% discount rate for the federal government.¹¹

RATE OF RETURN

Note that the returns reported in this study are reported as real (i.e. adjusted for inflation) returns, not nominal. When a bank pays a certain rate of interest on a savings account, it employs a nominal rate.

¹¹ This student discount rate is based on the baseline forecasts for the 10-year zero coupon bond discount rate published by the Congressional Budget Office. (See the Congressional Budget Office, Student Loan and Pell Grant Programs - March 2012 Baseline). The government discount rate is the recommended real treasury interest rate from the Office for Management and the Budget (OMB) for a 30-year investment. (See the Office of Management and Budget, Real Treasury Interest Rates in "Table of Past Years Discount Rates" from Appendix C of OMB Circular No. A-94 (revised December 2012).

Bonds operate in a similar manner. If it turns out that the inflation rate is higher than the nominal rate of return, then money is lost in real (i.e. purchasing power) terms. The real rate of return controls for 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 2%. For example, in Table 6, regarding student return on investment, the 944.4% student rate of return is a real rate. With an inflation rate of 2.5% (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 946.9%.

PAYBACK PERIOD

Payback analysis is generally used by the business community to rank alternative investments when safety

of investments is an issue. Its greatest drawback is that it takes no account of 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 or interest on loans.

STUDENTS' OPPORTUNITY COST

EMSI approximates students' opportunity costs based on numerous factors including students' expected wages had they not entered the HPOG program, the percentage of students who were working prior to entering the program, and amount of time students sacrifice in order to enroll in the HPOG program. Ultimately, HPOG students' opportunity cost is relatively small, amounting to just \$1,233 per student.

About EMSI Data

The program specific model utilizes five-year panel data from the American Community Survey Public Use Microdata (PUMS) 2008-2012. The PUMS data contain detailed records of employment status, occupational category, earnings, age, and numerous other fields for roughly 1.4 million workers per year. Using these data, EMSI ran a multivariate regression to estimate wages based on occupation, years of education, years of experience, and other control variables.

To determine economic impacts, we rely on a specialized Social Accounting Matrix (SAM) model to calculate the additional income created in the SCCC Service Area economy as a result of the added skills of SCCC students. EMSI's Multi-Regional Social Accounting Matrix (MR-SAM) represents the flow of all economic

transactions in a given region. It replaces EMSI's input-output (IO) model, which operated with some 1,100 industries, four layers of government, a single household consumption sector, and an investment sector. The old IO model was used to simulate the ripple effects (i.e., multipliers) in the regional economy as a result of industries entering or exiting the region. The SAM model performs the same tasks as the old IO model, but it also does much more. Along with the same 1,100 industries, government, household and investment sectors embedded in the old IO tool, the SAM exhibits much more functionality, a greater amount of data, and a higher level of detail on the demographic and occupational components of jobs (16 demographic cohorts and about 750 occupations are characterized).

APPENDIX B: OCCUPATIONS ASSOCIATED WITH THE HPOG PROGRAM

SCCC provided data regarding occupational outcomes of HPOG graduates including the number of completing participants who obtained employment in each occupational field according to Standard Occupational Classification (SOC). Given the number of participants who are or have been employed in each category, EMSI weighted the median earnings and future earnings trajectory to mirror the actual mix of occupations of SCCC alumni.

The table below displays the occupations linked to SCCC’s educational programs. This table contains the following information: SOC code, job title, the number of 2013 regional jobs, regional median hourly earnings, and the average annual job openings forecasted by EMSI between 2013 and 2018. Average annual openings include both new job growth and turnover job replacements, making it a more comprehensive figure than net new job growth.

Table B.1: Related Occupational Data for the Health Professional Opportunity Grant (HPOG) Program

SOC	TITLE	2013 JOBS	REGIONAL MEDIAN HOURLY EARNINGS	AVERAGE ANNUAL JOB OPENINGS 2013-2018
29-1141	Registered Nurses	8,475	\$28.93	281
31-1011	Home Health Aides	3,674	\$11.00	167
31-1014	Nursing Assistants	3,922	\$13.12	104
29-2041	Emergency Medical Technicians and Paramedics	759	\$15.70	48
31-9097	Phlebotomists	142	\$13.88	5
31-1015	Orderlies	119	\$10.96	4
51-9081	Dental Laboratory Technicians	57	\$20.06	4

APPENDIX C:

GLOSSARY OF TERMS

DIRECT EFFECT

Income generated as SCCC regional alumni employers purchase goods and services from other local companies

DISCOUNTING

Expressing future revenues and costs in present value terms.

INDIRECT EFFECT

Income generated as companies within the supply chain of companies that employ SCCC alumni purchase goods and services from yet another round of local companies.

INDUCED EFFECT

Income generated as workers supported at all stages of the supply chain spend their money supporting other local businesses; this is also known as the household spending effect.

INITIAL EFFECT

Income generated by wages paid to SCCC alumni by employers

INPUT-OUTPUT ANALYSIS

Relationship between a given set of demands for final goods and services and the implied amounts of manufactured and intermediate inputs, raw materials, and labor that this requires.

MULTIPLIER EFFECT

Additional income created in the economy as SCCC alumni's employers spend money in the region. It consists of the income created by the supply chain of the industries initially affected by the spending of businesses (i.e., the direct effect), income created by the supply chain of the initial supply chain (i.e., the indirect effect), and the income created by the increased spending of the household sector (i.e., the induced effect).