



The Economic Impact of
**Communities
In Schools**

May 2012

emsi



Contents

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Rigorous analysis, like the model developed by EMSI for CIS, can empower and strengthen the nonprofit sector. Morgan Stanley was pleased to provide its analytical expertise in examining the work presented in this report. We commend CIS's effort to seek a calculated return on investment from its work with students in need of assistance.



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Executive Summary



Background

The paralyzing effects of the dropout epidemic—on individuals, families, society, and the economy as a whole—are well documented. Combating this problem has become the mission of many groups in the United States, and one such national nonprofit organization is **Communities In Schools**. For the last 35 years, CIS has become the national leader in school dropout prevention and intervention.

CIS' evidence-based and rigorously tested model has been shown to help at-risk students stay in school and graduate. The results of a national evaluation of CIS, a comprehensive five-year study that culminated in 2011, demonstrated that its model of integrated student services is unique in having a positive effect on two fronts—reducing dropout rates *and* increasing graduation rates. Further, the evaluation showed CIS' intensive case managed services have produced the strongest reduction in dropout rates of any existing fully scaled dropout prevention program that has been evaluated, and that CIS' model is effective across states, school settings (urban, suburban, rural), grade levels, and student ethnicities.

The national evaluation yielded promising findings, but it was only a first step in CIS' assessment process. CIS has since contracted with EMSI to specify its economic and social returns to society through a rigorous third-party investment analysis.¹ The purpose of this important next step is to

¹ EMSI's benefit-cost framework complies with standards set by the Office of Management and Budget (OMB).

quantify the return on investment of CIS’ 113 high school-serving affiliates in its network to taxpayers, businesses, and students. The analysis also shows the economic benefits when local affiliates go from implementing parts of the CIS model in some of their high schools to full implementation in all of their high schools.

Approach

To conduct the investment analysis, EMSI evaluated the total costs and benefits of CIS’ high school-serving affiliates. The costs include direct CIS investment dollars as well as opportunity costs of labor and capital. The benefits include higher earnings for students who progress through high school and graduate as well as social or taxpayer savings created and captured based on the student’s increased academic achievement. Because costs and benefits occur in the future, both were discounted back to present-value terms to account for the time value of money.

Further, the report should positively contribute to what is often a murky and confusing set of discussions regarding ROI in the social sector. Specifically, with EMSI’s industry-standard academic rigor and CIS’ third-party evaluation results, the report should set both a high standard for future ROI calculations and strengthen the field of evidence-based social programming to be more comprehensive (*i.e.*, inclusive of an economic analysis as an integral part of determining the quality of a program’s evidentiary base).

Findings

The key findings of the investment analysis are shown in Table A.1 and summarized in the following bullets:

TABLE A.1

NPV investment	\$2,554,047,270
Average Annual IRR	18.4%
B/C ratio	11.6
Payback Period (years)	9.0

- The net present value (*i.e.*, the present-value benefits minus the present-value costs) of the CIS investment in 113 high school-serving affiliates is nearly **\$2.6 billion**. This means that the discounted present-value benefits exceed the total investment costs by almost \$2.6 billion.
- The average annual return to society resulting from CIS’ investment is **18.4%**.
- CIS’ investment at the high school level results in a benefit-cost ratio of **11.6**, which means for every one dollar of CIS investment, \$11.60 of economic benefit is created. The only caveat is that we apply the regional specific parameters (*e.g.*, tax and unemployment rates, earning

levels, *etc.*) to the students served in that region regardless of potential migration.

- It will take **nine years** before all investment costs are fully recovered. In an age where financial investors are more concerned with the here and now and eager to get a quick return, a nine-year payback period may seem infeasible. However, it should be understood that an investment in human capital continues to pay dividends to both the individual and society well beyond the short-term timeframes used by today's financial investor.

In addition, EMSI's analysis included human capital components and estimated social savings resulting from investment in CIS. Highlights include the following:

- All students served will collectively increase their disposable income by \$63.0 million annually.
- The present value of the social savings (public and private) due to reductions in smoking, alcoholism, crime, welfare, and unemployment costs totals \$154.5 million.
- Currently 67 affiliates are implementing only parts of the CIS model in some of their high schools. If these 67 affiliates move to full implementation or implementation with fidelity in all of their high schools (*i.e.*, move from developing to comprehensive sites), these affiliates' net present value will increase by \$545.4 million, and their rates of return are likely to increase from 18.8% to 19.9%. The average benefit-cost ratio of all 67 affiliates will grow from 12 to 12.9 and total investment costs will be recovered roughly six months sooner.
- The average high school-serving affiliate produces 42 additional on-time graduates each year and promotes an additional 99 students to the next grade level.

SIF Case Study

EMSI also conducted a completely separate ROI analysis of the Social Innovation Fund (SIF), a specific three-year investment into the CIS network that focuses on current expansion efforts in California, North Carolina, and South Carolina. The SIF investment will infuse \$12 million over three years into the CIS network (\$6.5 million directed to the CIS local affiliates and \$5.5 million devoted to support activities in the CIS national and state offices).

The impact of the \$12 million investment in the three states and opera-

tional support from the national office indicate a very positive effect. Students will continue on in their education: some another year, some through high school, and some beyond into postsecondary degrees. With this higher educational attainment, the group will see an increase in their average annual disposable income of roughly \$11 million. Because of these higher earnings, state and federal governments will receive an additional \$3.6 million in tax revenue on average each year as a result of the \$12 million investment.

What it Means

EMSI's analysis makes a clear case that CIS' school dropout prevention and intervention programs have meaningful economic and societal impacts. Students benefit by making more over their lifetimes—a result of their educational persistence made possible by the value-add of having the CIS model of integrated student services in their schools. Businesses benefit by having a more skilled and productive workforce. Taxpayers benefit through a broadening of the tax base (*i.e.*, increased incomes directly translate into increased tax revenue), and the public in general benefits from reduced social costs (such as crime, alcoholism, and unemployment).

Introduction

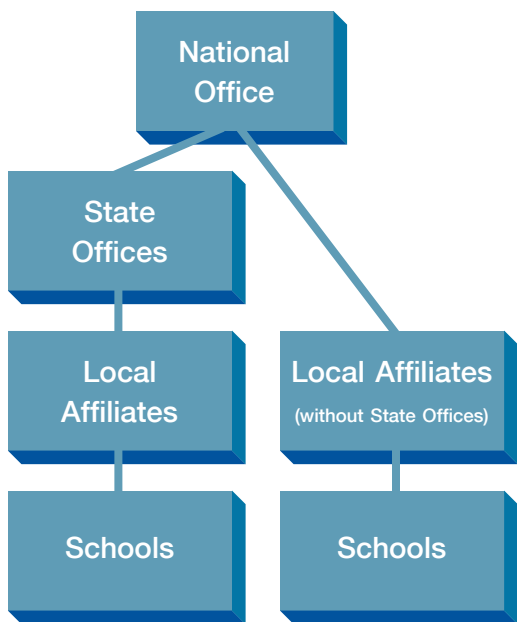


As the nation's businesses and workforce compete in an increasingly global market, national policy has shifted efforts that will increase America's economic competitiveness. Of all the steps that can (or should) be taken, a large portion of this work centers on increasing the skills and achievement of the future workforce. And nothing is more key than ensuring students attain a high school diploma. A diploma is more than the most basic certificate of entry into successful employment; it's also a portal to a post-secondary education, which is crucial for full participation in the workforce of the 21st century.

The public education system continues to struggle to provide equal opportunity to all students in pursuing the American Dream. Consequently, campaigns centered on improving graduation rates and the future economic success of students have been expanding across the nation. These efforts aim to help students make a better life for themselves on an individual basis, but they also have larger effects on issues of equity and economic growth. High school dropouts tend to come from low-income and minority homes, and targeting these at-risk youth helps bolster their chances of graduating and competing in the workplace [see Chapman, Laird, Ifill, and KewalRamani (2011), and Shapiro and Pham (2010)].

While changing lives and bringing social equality are completely valid goals in and of themselves, efforts at decreasing dropouts have an extra benefit of serving to strengthen the economy. Dropouts are not only an untapped

A nonprofit federation is a unique form of organizational structure in the United States. A nonprofit federation is a network or partnership that typically includes a national organization and a group of state and/or local organizations that share a mission, a brand, and the delivery of common services but maintain legal independence from one another. The federation establishes a structural framework through which the national office and local “partners” can maintain formal linkages and work together to achieve shared purposes and goals. CIS operates a multilevel structure with a national office, state offices, and local affiliates.

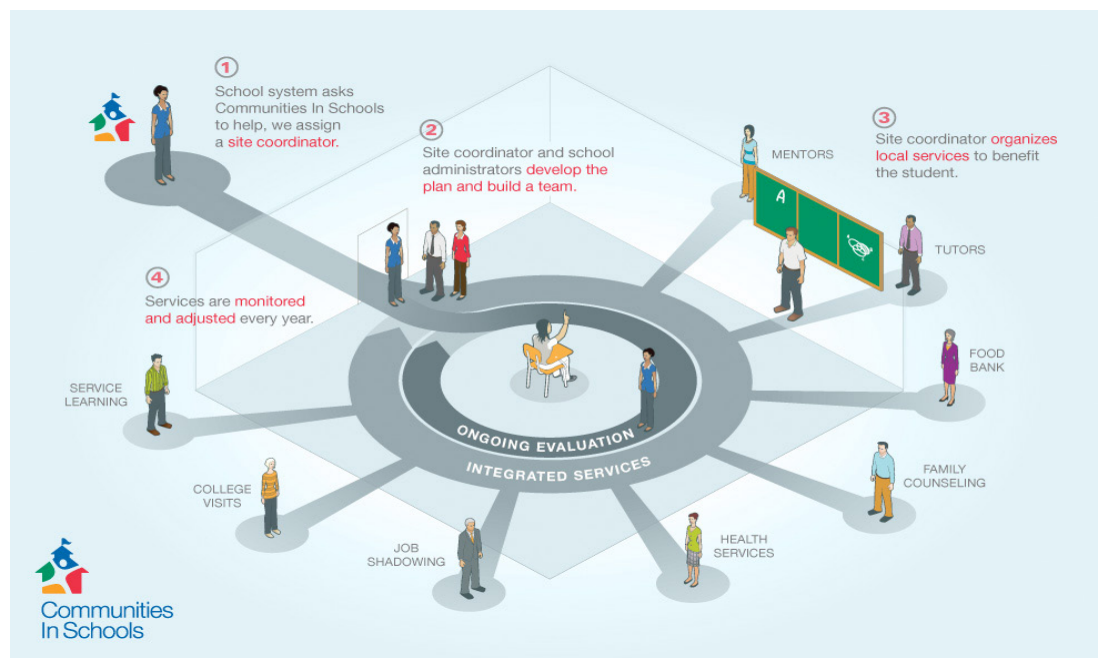


resource for the United States’ economic engine, they can even be a weight hindering the country’s growth. If dropouts become involved in crime, addicted to drugs, or dependent on social services, resources must be directed toward mitigating those behaviors rather than increased efficiency and innovation in the economy. Helping at-risk students gain a diploma, a key to successful employment, will also lead to economic growth.

Communities In Schools (CIS), an organization with 35 years of experience in school dropout prevention and intervention, recognizes the individual, social, and economic benefits to keeping kids in school. Fewer high school graduates results in fewer college graduates, a less-qualified workforce, lower average wages per worker, less federal and state tax revenue, as well as increased crime, unemployment rates, and health problems. The overall economic effects hamper the nation’s ability to compete on the global level.

The CIS nonprofit federation of 187 local affiliates, 14 state offices, and a national office (see organizational chart) combats the dropout problem through the delivery of its model of integrated student services. In nearly 3,000 schools across the country, CIS connects students and their families to critical community resources tailored to local needs. For decades, CIS has progressively moved in the direction of becoming an evidence-based organization, using research, data, and rigorous evaluation to develop and refine its model and demonstrate the effectiveness of integrated student services. Additionally, CIS has developed and implemented a national quality improvement program to drive evidence-based programming at scale within its network all while more than doubling the number of students it serves to almost 1.3 million annually.

CIS’ evidence-based and rigorously tested model (see chart below) has



been shown to help at-risk students stay in school and graduate. In 2011, CIS released the results of the most comprehensive evaluation of a dropout prevention organization ever conducted. The five-year study was led by ICF International, one of the nation's foremost social science evaluation firms, and underwritten by The Atlantic Philanthropies. After five years of rigorous study, the results demonstrate that CIS' model of integrated student services is unique in having a positive effect on both reducing dropout rates and increasing graduation rates; that its intensive case managed services have produced the strongest reduction in dropout rates of any existing fully scaled dropout prevention program that has been evaluated; and that CIS' model is effective across states, school settings (urban, suburban, rural), grade levels and student ethnicities. When the model is implemented with fidelity, it is the most effective.²

Armed with this information, CIS could have stopped here. But instead, the organization began asking the same questions that Americans, faced with the worst economic recession since the 1930s, have begun to ask: *Are we getting a good return on our investment?* Specifically, CIS set out to examine the economic implications of its work. Given the investments made at all levels of the CIS network (national, state, and local) and its evidence in hand regarding dropout and graduation rates, what are the economic and social returns to society? And with this information, how can CIS as a network drive efficiencies to maximize increasingly precious resources while preserving or increasing positive outcomes for the young people it serves?

To this end, CIS contracted with EMSI, a nationally recognized economic consulting firm, to conduct a third-party analysis of its evidence-based model. EMSI's ROI calculations include the human capital components required for an accurate investment analysis. While EMSI's complete methodology is explained in Appendix A, the basic steps of the analysis were as follows:

1. **Capture the costs.** These included direct CIS investment dollars as well as opportunity costs of labor and capital. The opportunity costs are costs incurred by the schools for their continued efforts and the costs incurred by the student for staying out of the labor market.
2. **Capture the benefits.** The benefits are higher earnings and higher market consumption rates achieved by individuals with higher levels of education. The more academic achievement a student attains, the

2 For more information about the five-year evaluation, please visit CIS' website at www.communitiesinschools.org. A published article of the findings can also be found at <http://dx.doi.org/10.1080/10824669.2011.545977> or Porowski, Allan and Passa, Aikaterini (2011) "The Effect of Communities In Schools on High School Dropout and Graduation Rates: Results From a Multiyear, School-Level Quasi-Experimental Study," *Journal of Education for Students Placed at Risk (JESPAR)*, 16: 1, 24–37.

higher the average benefits will be over the student's working life. In addition, social or taxpayer savings are created and captured based on the student's increased academic achievement.

3. **Discount the costs and benefits** over the investment period to present-value dollars to allow for an "apples-to-apples" comparison between the two.

The model relies on a conservative methodology that conforms to industry standards. Specifically, EMSI's benefit-cost framework complies with standards set by the Office of Management and Budget (OMB) in "Circular No. A-94 revised."³ The purpose of this circular is to provide general guidelines to ensure all elements for "sound benefit-cost and cost-effectiveness analyses" are accounted for.

A Note of Importance

EMSI's analysis looks only at CIS affiliates that serve high schools, not elementary and middle schools. Of the 187 developing or operational affiliates in 2009–10—the academic year used in the report—113, or 60%, serve high schools and are represented in this study. Across the network, 26% of sites served by CIS are high schools. The sites that solely serve elementary and middle schools still generate benefits, but because rigorous results providing a direct link between student outcomes in elementary and middle school and high school dropout and graduation are not currently available, the impact of the prevention and early intervention work of CIS is intentionally not captured here. By limiting the analysis to the most rigorous and defensible results available from CIS, we prevent the overstating of impacts. That is, we have taken the most conservative approach to this analysis.

The CIS network investment includes national and state office operations and network support costs (including staffing and infrastructure costs), direct program investments, and local affiliate operating costs. All national, state, and local costs associated with the 113 affiliates are captured in the analysis, but only results from high schools served by CIS are included. This indicates the conservative approach taken by EMSI and CIS.

The positive impacts of high school retention and graduation examined in this report can be broken into the following components:

- **Economic impacts** of higher lifetime earnings for high school graduates;

3 http://www.whitehouse.gov/omb/circulars_a094/

- **Fiscal impacts** of higher tax revenues generated from higher earnings;
- **Return on investment** from implementation of the CIS model;
- **Increased probability of student transition** into postsecondary education and training, which will again increase lifetime earnings and tax revenues.

To gain a better understanding of the integrated program and services provided by CIS, please refer to the following report: *Communities In Schools and the Model of Integrated Student Services: A Proven Solution to America's Dropout Epidemic*.⁴ The reader should be advised that the results of this impact study represent the success of the integrated approach developed and utilized by CIS and its affiliate network. Estimates of success are derived from a longitudinal quasi-experimental school-level study of CIS' services.⁵

Organization of Report

This report is organized into five chapters and several appendices. The first chapter outlines the economic impact of CIS' network of high school-serving affiliates and provides an illustration of the return on investment to specific states and communities resulting from a real investment into targeted areas of the CIS network. Chapter 2 shows how economic and social gains can change when resources are allocated to maximize results. That is, this chapter demonstrates what happens to the return on investment when local affiliates go from implementing parts of the CIS model in some of their high schools (*i.e.*, developing sites) to full implementation or implementation with fidelity in all of their high schools (*i.e.*, comprehensive sites). Chapter 3 outlines the different socioeconomic conditions that CIS operates under and how this affects the investment results. Chapter 4 summarizes a sensitivity analysis of assumptions and primary data pieces, while Chapter 5 highlights the key findings from this analysis and future opportunities for continuing to grow this body of research for CIS and the field of youth programs. The appendices include details of the methodology and assumptions, explanation of the EMSI Input-Output (IO) model, a glossary of key terms, and a bibliography of resources.

4 This document can be found at: http://www.communitiesinschools.org/media/uploads/attachments/CIS_Policy20Brief_09-08-081.pdf

5 Results from this study can be found at: <http://www.communitiesinschools.org/about/publications/publication/school-level-report-volume-1>



Chapter 1:

CIS High School-Serving Impacts

Increasing the number of high school graduates has positive financial benefits, both for the individual and the public. The individual gains increased earnings. The public benefits from the increased income and sales taxes (*i.e.*, broadening of the tax base), and from the reduction in social costs (*e.g.*, crime, alcoholism, and higher unemployment rates). The information below presents economic effects from varying perspectives:

- **Increased Disposable Income** – Disposable income is the amount a worker has to spend after taxes are removed from his wages. This is further divided into investment and spending. Investment, or savings, is the money an individual will put away toward future events, such as children's college costs or retirement. When an individual puts this money in a savings account or 401K, it is re-invested in the economy and spurs further growth. Spending is the amount the individual devotes to consumption, such as rent, groceries, gas, movie tickets, etc. This money is then income to those businesses and workers and continues to ripple through the economy.
- **Increased Tax Revenue** – This is the benefit the public receives from a student's higher level of education. As income increases, a student will reach higher tax brackets, returning an increasing amount to public coffers.
- **Reduced Social Costs** – As education and income rise for these students, the probability that they will draw on public resources such as welfare and unemployment declines. They will also be less likely to

commit crimes, smoke, or engage in other socially detrimental activities. All of this represents returns to society.

- **Present Value of Benefits** – Public and private benefits accrue over the course of a student’s career until he reaches retirement. This measure quantifies these lifetime benefits in present-day terms in order to compare them to costs.
- **Benefit-Cost Ratio** – This measure represents the net present value of the benefits divided by the costs of investment. Anything larger than 1.0 shows that the benefits outweigh the costs.

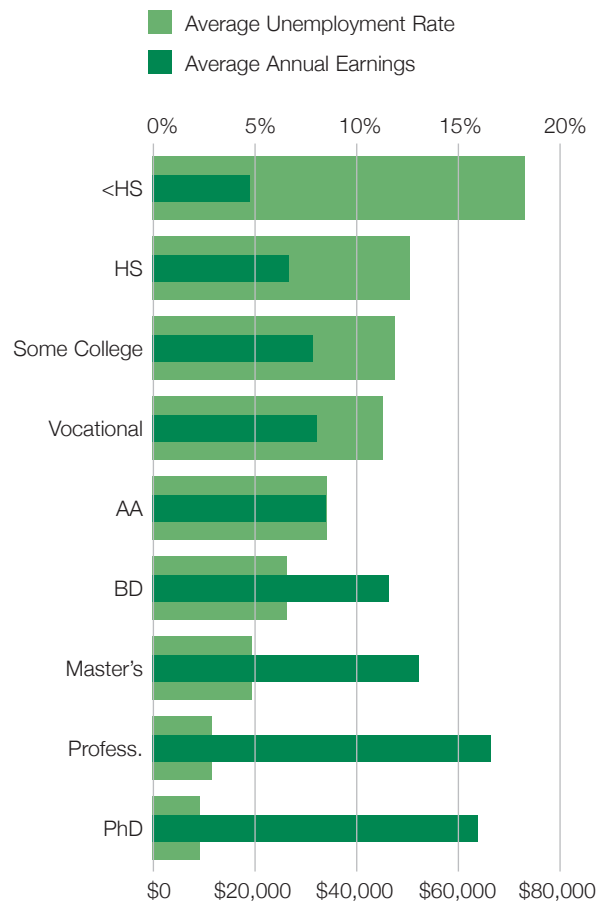
CIS’ High School-Serving Affiliate Investment

CIS provided data showing the increased number of high school graduates and grade promotions by each affiliate operating in high schools across the country.⁶ Having succeeded at the high school level, some of these new graduates will continue on to a postsecondary educational institution, an option they would not have had without the assistance of CIS. Once again, the data used were derived from the results of the CIS national evaluation that demonstrate the value-add of having the CIS model implemented in a high school. We assume that the increased incomes resulting from post-secondary education would not have been realized but for CIS. Presumably students would not achieve higher education levels and their associated higher incomes would not have occurred in the absence of CIS. The total return on CIS’ investment, however, is not limited to the increased earnings of the students; it also encompasses the reduced strain on public resources resulting from lower unemployment rates, reduced crime, etc. Figure 1.1 shows the dual effect (income growth and unemployment reduction) resulting from increased educational attainment across the United States.

By capturing the increased student earnings, the associated increased productivity of businesses resulting from having a more productive staff, and the reduced social burden resulting from the reduction in various types of delinquency, we begin to be able to calculate the true benefits resulting from CIS’ activities. The above-mentioned benefits will continue throughout these students’ lives, therefore we must project those benefits forward and then discount them back to present-value terms. Discounting future dollars to present value enables us to compare investments in the CIS network today against the benefits that will be realized in the future.

Table 1.1 outlines the total results for the high-school serving CIS affli-

FIGURE 1.1: EARNINGS AND UNEMPLOYMENT BY EDUCATIONAL ATTAINMENT



⁶ These data are tested in the sensitivity analysis presented in Chapter 4.

TABLE 1.1

TOTAL ANNUAL INCREASE IN DISPOSABLE INCOME

Increased Investment	\$800,704
Increased Spending	\$62,230,251
Increased Disposable Income	\$63,030,956

TOTAL ANNUAL INCREASE IN TAX REVENUES

Federal Income Tax Revenue	\$17,115,918
State Income Tax Revenue	\$1,412,958
State Sales Tax Revenue	\$4,138,536
Total Tax revenue	\$22,667,411

TOTAL HIGH SCHOOL SERVING AFFILIATE RETURNS

PV Benefits	\$2,796,091,362
PV Costs	\$(242,044,092)
CIS Direct Investment	\$184,047,621
NPV investment	\$2,554,047,270
Average Annual IRR	18.4%
B/C ratio	11.6
Payback Period (years)	9.0

* Totals may not add due to rounding.

Discount Rate and Present Value

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% discount rate from the student perspective and a 3% discount rate from the taxpayer perspective. The discount rate from the taxpayer perspective is lower because governments are large and can therefore spread their risks over a larger and more diverse investment portfolio than the private sector can.

ates based on current investment levels and regional earnings rates for the respective affiliates. The “Total Annual Increase in Disposable Income” subsection outlines the total increase in disposable income broken out between the amount students will save/invest and the amount they will spend on consumption (i.e., food, housing, transportation, etc.). Given the value of disposable income, we can determine the social and government fiscal impacts with regard to federal and state income taxes as well as state sales tax.⁷

Common investment measures conclude the table: net present value (NPV), average annual return (IRR),⁸ benefit-cost ratio (B/C), and the payback period or number of years it will take to recover all investment costs or the break-even point. Each of these measures exceeds its respective benchmark—NPV greater than zero, returns greater than the discount rate, and benefit-cost ratios greater than 1. The lengthy payback period may give some investors pause, but it must be remembered that education is a long-term investment.

Going into more detail, the present-value benefits (\$2.8 billion) represent the current value of the total dollars either gained by the individual or saved by society, along with additional income generated in the economy as a result of increased student productivity. The present-value costs (\$242 million) represent the current value of the CIS investment (\$184 million) plus the opportunity costs of time and capital. The CIS investment is the amount CIS spends annually in providing student services in all schools served by the 113 affiliates, including high schools.

The net present value (NPV) of the investment is simply the present-value benefits minus the present-value costs. The NPV of the investment then is \$2.6 billion. Note that the individual affiliate returns will vary widely across the nation depending on the demographics, earnings, industrial makeup of the region's industries, etc. (see Chapter 3 for a more detailed explanation).

The internal rate of return (IRR) answers the question, “What is the average annual percentage return on the \$242 million investment?” This value represents the average return being realized each year over the life of the investment. In the case of CIS, the IRR is 18.4%. Again, this is an average over the life of the investment. Returns will be small in the early years (when students first enter the workforce their earnings will still be relatively low) and be larger at the end of the students' working lives.

The benefit-cost (B/C) ratio is simply the present-value benefits divided

7 Not all states collect income or sales taxes. The figures in Table 1.1 reflect the collections of only those states where such taxes are collected. Note that city taxes, municipal bond revenues, property taxes, and other taxes are not included.

8 The internal rate of return (IRR) is a real return adjusted for inflation.

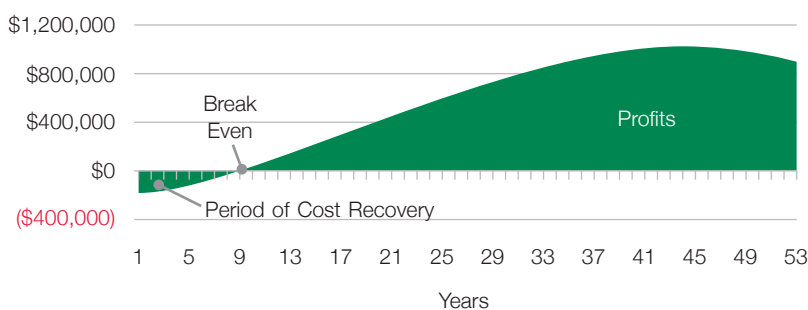
by the present-value costs.⁹ The \$2.8 billion divided by the \$242 million generates the 11.6 B/C ratio listed in Table 1.1. Since both of these numbers have been discounted for the time value of money, they may be used to answer the question, “For every dollar invested, how many dollars will I get back over the life of the investment? The answer here is \$11.60. Any B/C ratio over 1 constitutes a positive return and is a viable investment.

The payback period is the period of time, usually in years, that an investment will take to recover the initial investment. In this case, it will take nine years for the nation to get back the \$242 million.

Figure 1.2 provides a graphical representation of how to view the investment analysis. This initial starting point in Year 1 is when students receive services from CIS. This is the point where the “CIS direct investment” takes place. Because the initial investments are taken as costs, we begin in Year 1 with negative returns. As students realize benefits from their investment—as well as the investment of society and CIS—they begin to exhibit changed behavior and positive educational growth. As they progress through additional levels of education as well as enter the workforce, their efforts are felt in the economy. The economic benefits of increased wealth for themselves, the businesses they work for, and the reduced social costs are all results of the investment initiated by CIS.

These benefits, according to the CIS investment analysis, will take nine years to accrue to the point where they have paid back the cost of the initial investment. The point when benefits have matched costs is called the break-even point and is shown in Figure 1.2. From this point forward, the benefits continue to grow without any associated costs. These additional growing benefits are due to the effect of higher education and the associated additional income generated by individuals and the businesses that employ them. Notice around Year 49 the returns begin to trend down, demonstrating a waning of the benefits to society as students begin to retire or otherwise exit the workforce.

FIGURE 1.2: CUMULATIVE CASH FLOWS OVER TIME (\$ THOUSANDS)



⁹ In the benefit-cost calculation, costs are taken as a positive value.

TABLE 1.2

TOTAL PV SAVINGS FROM REDUCED SOCIAL COSTS	PV TOTAL	PV AVERAGE ANNUAL
Smoking Savings	\$34,450,282	\$650,005
Alcohol Savings	\$52,509,486	\$990,745
Incarceration	\$6,507,715	\$122,787
Victims	\$7,943,264	\$149,873
Product. Gained	\$36,121,304	\$681,534
Reduced Welfare	\$14,945,680	\$281,994
Reduced Unempl.	\$2,051,000	\$38,698
Total	\$154,528,730	\$2,915,636

The present value of the social savings (public and private) due to reductions in smoking, alcoholism, crime, welfare, and unemployment costs totals \$154.5 million. This figure has been discounted by 10%. Higher education is highly correlated with reductions in the aforementioned social burdens; however, correlation and causation are distinct. The 10% discounting allows us to correct for the possible overstatement of the degree to which education “causes” the reductions in such socially unaccepted behavior.¹⁰ Table 1.2 shows the total and average annual benefits from reducing social costs.

* Totals may not add due to rounding.

¹⁰ See Molitor and Leigh (2001).

SIF 3-Year Investment

This case study is intended to demonstrate the return on investment of a specific three-year investment into the CIS network—the Social Innovation Fund. Specifically, the investment focuses on current expansion efforts in California, North Carolina, and South Carolina. Essentially, this ROI analysis takes a three-year snapshot of the investment and students served, and examines the resulting benefits. It is important to note that, once established, the local affiliates are likely to continue to assist future high school students. The benefits from helping these future students, however, are not captured in this analysis, as they are not served under the current investment.

Overall, the SIF investment will infuse \$12 million over three years into the CIS network, primarily in California, North Carolina, and South Carolina. This includes \$6.5 million directed to the CIS local affiliates and \$5.5 million devoted to support activities in the CIS national and state offices. Over the three years of the investment, CIS expects to see an additional 1,300 students graduate, as well as another 2,925 students move successfully to the next grade instead of dropping out.

The impact of a \$12 million investment in the three states and operational support from the national office indicate a very positive effect. Students will continue their education: some another year, some through high school, and some beyond into postsecondary degrees. With this higher educational attainment, the group will see an increase in their average annual disposable income of roughly \$11 million. Because of these higher earnings, state and federal governments will receive an additional \$3.6 million in tax revenue on average each year as a result of the \$12 million investment.

California

Figure 1.3 shows the distribution of income levels by educational attainment in California. There is an increase in income between those who have a high school diploma and those who do not. Similar increases appear further along the education spectrum as well. Students would not have gained these increases in income without CIS' services.

Some of the high school graduates assisted by CIS will continue on with their education. Figure 1.4 illustrates the distribution of educational attainment achieved by those students completing high school. Of these new graduates, 50% will continue their education beyond high school, and each level is associated with an increase in earnings.

The increase in income resulting from further education is the main benefit to individuals. The SIF investment in California will increase the students' average annual income by \$4.4 million until they reach retirement. The total income is then divided between taxes, investment, and spending, each of which cause further positive ripples throughout the economy.

Increased tax revenue is considered the main benefit to the public. Students earn more as they increase their education, which pumps more dollars into the public treasuries. This increase comes from both income and sales taxes. In California, the state and federal government will receive an additional \$1.55 million in tax revenue on average each year as a result of the SIF' investment and service.

These individual and public benefits accrue throughout the lifetime of the individual. For a direct investment of \$714,622 by SIF, the public receives \$182 million in net benefits. This results in a benefit-cost ratio of 38.4. In other words, for every dollar invested in the CIS program in California, \$38.40 in public and private benefits is returned.

TABLE 1.3

AVERAGE ANNUAL INCREASE IN DISPOSABLE INCOME

Increased Investment	\$59,754
Increased Spending	\$4,353,303
Increased Disposable Income	\$4,413,057

AVERAGE ANNUAL INCREASE IN TAX REVENUES

Federal Income Tax Revenue	\$941,547
State Income Tax Revenue	\$296,982
State Sales Tax Revenue	\$315,614
Total Tax revenue	\$1,554,144

SIF CALIFORNIA RETURNS

NPV investment	\$181,948,637
Average Annual IRR	47%
B/C ratio	38.4
Payback Period (years)	3.9

* Totals may not add due to rounding.

FIGURE 1.3: AVERAGE ANNUAL INCOME

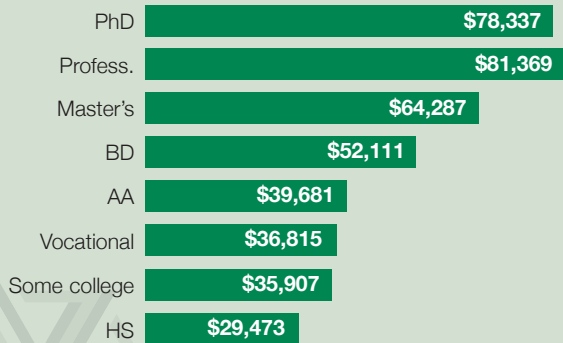
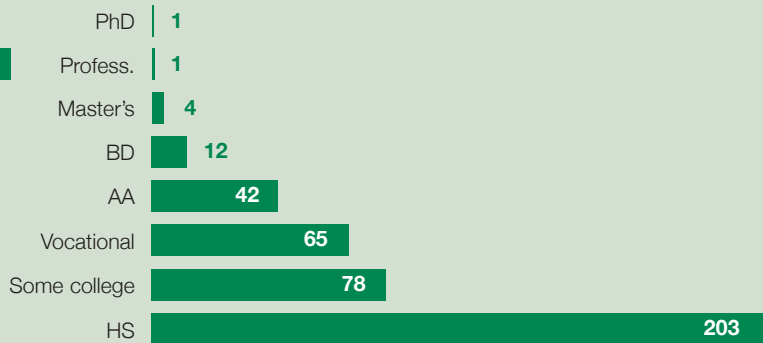


FIGURE 1.4: RESULTING INCREASE IN HUMAN CAPITAL



North Carolina

Figure 1.5 shows the distribution of income levels by educational attainment in North Carolina. As is common throughout the U.S., students who earn a high school diploma have a significant increase in income compared to students who drop out.

Figure 1.6 illustrates the estimated distribution of educational attainment achieved by the students CIS assisted in earning their diploma in North Carolina. Of these new graduates, 42% will continue their education beyond high school, thereby further advancing their lifetime earnings.

The SIF investment and resulting CIS services in North Carolina will increase the students’ average annual income by \$5.35 million. The total income is divided between taxes, investment, and spending, each of which cause further positive impacts in the economy.

From a public perspective, increases in earnings for high school graduates increases the state and federal tax base. In North Carolina, the state and federal government will see an additional \$1.8 million in tax revenue on average each year as a result of the SIF investment.

These individual and public benefits accrue throughout the lifetime of the individual. For the SIF investment of \$6.8 million, the public receives \$226 million in net benefits. This results in a benefit-cost ratio of 18.5. Otherwise stated, every dollar invested into CIS services generates \$18.50 in public and private benefits.

TABLE 1.4

AVERAGE ANNUAL INCREASE IN DISPOSABLE INCOME	
Increased Investment	\$66,028
Increased Spending	\$5,287,566
Increased Disposable Income	\$5,353,594
AVERAGE ANNUAL INCREASE IN TAX REVENUES	
Federal Income Tax Revenue	\$1,062,667
State Income Tax Revenue	\$482,968
State Sales Tax Revenue	\$251,159
Total Tax revenue	\$1,796,795
SIF NORTH CAROLINA RETURNS	
NPV investment	\$226,410,891
Average Annual IRR	25.8%
B/C ratio	18.5
Payback Period (years)	6.2

* Totals may not add due to rounding.

FIGURE 1.5: AVERAGE ANNUAL INCOME

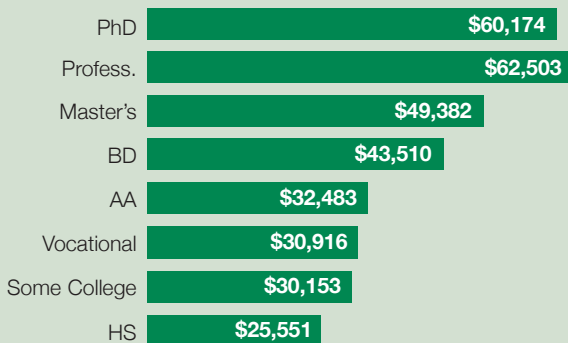
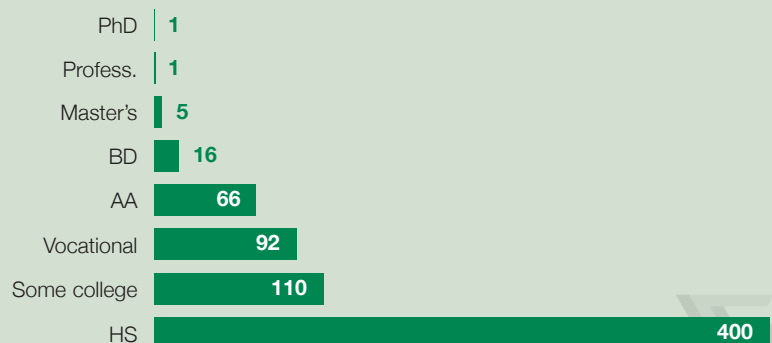


FIGURE 1.6: RESULTING INCREASE IN HUMAN CAPITAL



South Carolina

Figure 1.7 shows the distribution of income levels by educational attainment in South Carolina. A significant jump in earnings still exists between those who have a high school diploma and those who do not; however, income at the higher levels of education are lower compared to the other two states.

TABLE 1.5

AVERAGE ANNUAL INCREASE IN DISPOSABLE INCOME

Increased Investment	\$21,527
Increased Spending	\$1,321,595
Increased Disposable Income	\$1,343,122

AVERAGE ANNUAL INCREASE IN TAX REVENUES

Federal Income Tax Revenue	\$265,086
State Income Tax Revenue	\$121,048
State Sales Tax Revenue	\$79,296
Total Tax revenue	\$465,429

SIF SOUTH CAROLINA RETURNS

NPV investment	\$56,146,847
Average Annual IRR	20.9%
B/C ratio	13.2
Payback Period (years)	7

* Totals may not add due to rounding.

Figure 1.8 illustrates the estimated distribution of educational attainment achieved by the students CIS assisted in earning their diploma. Of these new graduates, 40% will continue their education beyond high school.

The SIF investment in South Carolina will increase students' average annual income by \$1.3 million. The total income is divided between taxes, investment, and spending, each of which cause further ripples in the economy.

From a public benefit perspective, the state and federal government will see an additional \$465,429 in average annual tax revenue resulting from services in South Carolina.

These individual and public benefits accrue throughout the lifetime of the individual. Total private and public lifetime benefits of these students, converted into current dollars, provides the present value of the additional South Carolina affiliate schools. For a direct investment of \$2.8 million the public in South Carolina receives \$56 million in net benefits. This results in a benefit-cost ratio of 13.2.

FIGURE 1.7: AVERAGE ANNUAL INCOME

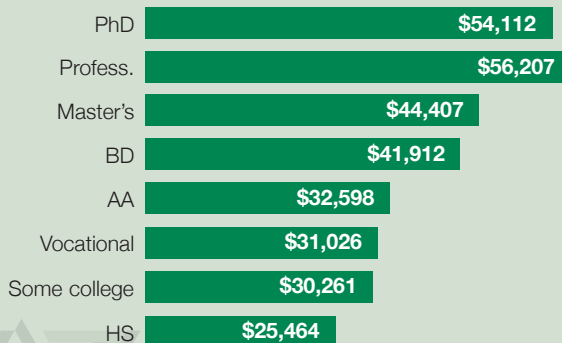
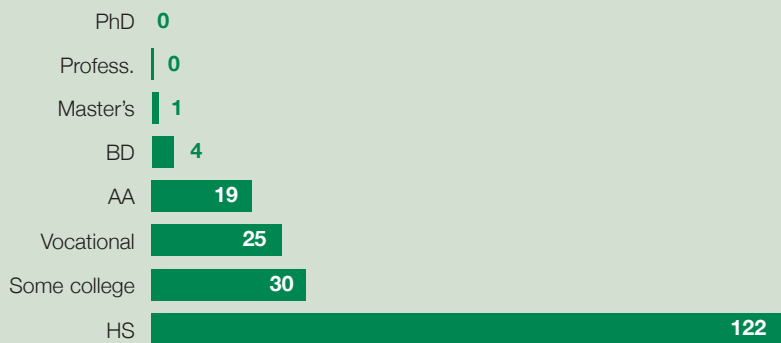


FIGURE 1.8: RESULTING INCREASE IN HUMAN CAPITAL



Chapter 2:

Current vs. Potential Returns to Affiliates with Developing Sites



The CIS network consists of 187 affiliates in 25 states. Of these affiliates, 113 (or 60%) served high schools in 2009-2010. The other 74 affiliates are only serving elementary and middle schools and are not captured in this analysis because of data limitations (see Chapter 5 for a further discussion on this).

CIS categorizes the sites or schools in which it operates as either comprehensive or developing. Comprehensive sites are those where the CIS model of integrated student services is implemented with the highest degree of fidelity, whereas developing sites are only implementing parts of the model. Based on results from the third-party national evaluation, comprehensive sites have been proven to yield more high school graduates and to promote more students than developing sites (almost double in number).

Currently 67 of the 113 affiliates under analysis are serving developing high school sites. CIS is working to bring all sites up to comprehensive status to maximize its impact on student success, but as with any growing organization, these improvements take time and resources.

This chapter is designed to look at the current investment figures of the 67 affiliates that are operating developing high school sites and calculate what changes would likely occur if all of the 248 developing sites within those affiliates were able to implement the full CIS model with fidelity and become comprehensive sites. As such, our focus will be to ascertain what the current results look like and what they would look like once all high school sites move to full implementation of the model (or comprehensive status).

A site is considered comprehensive if all of the following conditions are met:

- Presence of at least a half time site coordinator
- A needs assessment and site plan are developed for the school
- 5–10% of the student population is receiving intensive, case-managed services (percentage is specified in the Total Quality System standards based on the size of the school)
- All case managed students have a case plan
- 75% of the student population receives whole-school prevention services
- A minimum of 8 whole-school services are provided each year

TABLE 2.1: CURRENT VS. POTENTIAL RETURNS TO AFFILIATES WITH DEVELOPING SITES

	CURRENT	POTENTIAL
Students Graduating	4,757	6,041
Students Promoted	11,242	15,169
NPV Investment	\$1,706,146,854	\$2,251,586,728
Average Annual IRR	18.8%	19.9%
B/C ratio	12.0	12.9
Payback Period (years)	8.8	8.3

Typically we would discourage comparisons of results since the regional data and economic conditions would cause an apples-to-oranges comparison. In this case, however, we are looking at the exact same cohort of affiliates and under the same economic climates. The only difference is that we have exogenously shocked the model to see what changes would occur if all high school sites were comprehensive. Cost and benefit increases are estimated based on previous research from past sites that have moved from developing to comprehensive status.¹¹ Clearly all metrics show marked improvement. The argument can be made that since the infrastructure for CIS is in place, marginal increases in costs to move to all comprehensive sites will yield significantly higher benefits in terms of improved graduation and promotion rates, thus improving the overall returns. As shown in Table 2.1, the NPV for these affiliates will grow by \$545 million, and the rates of return are likely to increase from 18.8% to 19.9%. Under a comprehensive approach, the benefit-cost ratio will grow from 12.0 to 12.9 and total investment costs will be recovered roughly 5½ months sooner. The benefits of moving to comprehensive implementation make it clearly an appropriate move from an economic perspective.

11 Under a comprehensive framework, the average cost per student declines but the total number of students served grows significantly, causing an overall increase in total costs. For the high school-serving affiliates, the average cost per student declines by roughly 30% under a comprehensive framework. The ratio of increased graduates and promotions to students served is assumed to remain constant.

Chapter 3:

Regional Differences Among Affiliates



Because comparisons between affiliates and the desire to compare the bottom line is an ever-present reality, we want to give some guidance to that discussion. As mentioned previously, such comparisons are dubious and often misleading since adjustments for economic influences outside of CIS' control cannot be normalized. Industrial mix within local economies differ. Even endowments of natural resources between regions may cause relative comparisons to be spurious. Indeed, the assumptions and calculations behind benchmarking frameworks will differ markedly from those used in investment and impact analysis.

Using investment metrics or impact statements for benchmarking purposes is problematic at best. As such, we would always encourage comparison to economic benchmarks (*i.e.*, having benefit-cost ratios above 1, having net present values greater than zero, and rates of return that exceed 3%). It is also important to remember that the focus of CIS is to assist would-be high school dropouts. This goal will necessitate CIS to have a presence in “low return” areas since affluent and economically sound economies are less likely to be burdened by issues leading to high school dropouts.

It is helpful to understand the range of economic climates and situations that affiliates will find themselves in. We looked at regions served by affiliates to provide a range of external factors that will nonetheless result in variances in returns.

TABLE 3.1: UPPER AND LOWER BOUNDS

	LOWER BOUND	UPPER BOUND
Average Earnings	\$22,024	\$71,240
Unemployment rate	15.10%	5.10%
Cost of Living Index	76	162
Average educational attainment (years)	11	15

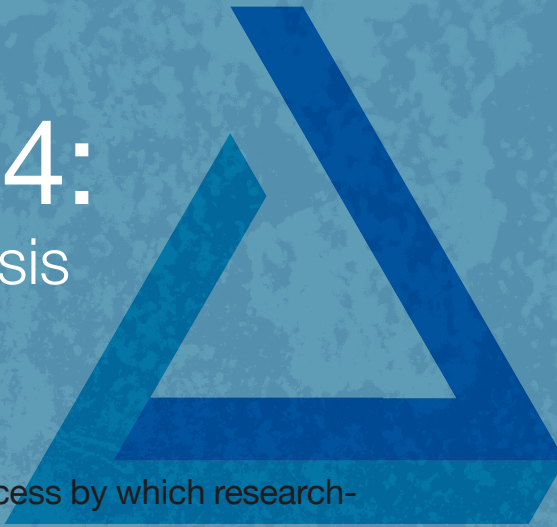
The disparate regions that can be seen in Table 3.1 show the diversity of affiliate circumstances that must be managed by the CIS network. Some affiliates are operating in regions with very low wages, as can be seen by the lower bound of \$22,024 per year. Where CIS has a presence in an impoverished area, such as this, the costs of serving students is very high. Nonetheless, the students that CIS helps to persevere through high school have significant personal gains as a result. CIS affiliates operating in affluent areas where earnings often exceed \$71,000 per year have very high benefit-cost ratios since building the framework for success is less costly. With an average unemployment rate of 15.1%, affiliates operating in struggling socioeconomic conditions will find it difficult to recognize their full impact until the students they serve are able to find employment. The cost of living index tells a similar story in demonstrating the diversity of the regions CIS operates within. Perhaps the most telling factor is the contrast in the educational attainment levels between economies. In struggling economies, high school dropouts (with an average of 11 years of education) make up the bulk of the labor force; in more stable economies, the average individual in the labor force is one year short of a bachelor’s degree.

There are two fundamental ways an affiliate may improve their economic returns. One would be to increase the number of graduates (and promotions) without infusions of additional funds. This method would cause benefits to grow without incurring additional costs (*i.e.*, the benefit-cost ratio would rise due to the growth in the benefits). The second approach would be to decrease funding while maintaining the number of graduates (and promotions) generated. This will cause the benefit-cost ratio to rise through the reduction of costs. The story is not that dollars need to be drawn away from what are most assuredly the most depressed and troubled regions. Rather, these results should raise the question of how to make the dollars that are already there more productive. This was discussed in more detail in Chapter 2.

It is also important to recognize that affiliates and schools are simply microcosms of the CIS network. If all things are constant, as each school sees their benefit-cost ratios rise, affiliates will as well—provided no sites see reductions in the ratios. Likewise, states and the network as a whole will see their returns grow in accordance with ground-level improvements.

Chapter 4:

Sensitivity Analysis



Sensitivity analysis is the process by which researchers determine how variations in the background data and assumptions impact the results of the study. When the magnitude of the results is highly sensitive to a particular assumption or variable, it is essential that there be a high degree of confidence in the accepted assumptions. Assumptions that have little impact on the results still need to be reasonable, but the degree of confidence in those variables is less constraining.

In this chapter we test the sensitivity of the results to the following three variables: (1) the discount rate; (2) the time horizon over which CIS may claim benefits; and (3) the volume of students promoted or graduating as a result of CIS' influence.

Discount Rate

The discount rate is used to account for the time value of money (*i.e.*, how much is money earned tomorrow worth today?). This rate is published by the Office of Management and Budget, but due to the volatility of interest rates and other economic factors we conduct a sensitivity analysis to show the range of returns that might exist if factors influencing the discount rate caused changes therein.

Table 4.1 shows the results where the discount rate fluctuates between 1% and 5%. Only the NPV and B/C ratio are calculated since the discount rate is not used in the calculation of the IRR and payback period. A lower discount rate results in higher overall returns since future dollars are not

TABLE 4.1: SENSITIVITY ANALYSIS OF DISCOUNT RATE

	1%	2%	BASE CASE 3%	4%	5%
NPV investment	\$4,663,276,541	\$3,430,762,048	\$2,554,047,270	\$1,922,379,536	\$1,461,318,266
B/C ratio	20.2	15.2	11.6	9.0	7.1

discounted as heavily as they would be with larger discount rates. To be conservative we use a 3% discount rate, though the OMB currently shows a real discount rate of 2%. Were the discount rate to fall to 1% the reported NPV would grow an additional \$2.1 billion to \$4.7 billion and the benefit-cost ratio would almost double to 20.2.

On the other extreme, if the discount rate were to grow to 5%,¹² the NPV would fall to \$1.5 billion and the benefit-cost ratio would likewise drop to 7.1. It is important to note that even under these extreme conditions, the investment remains very strong—especially when understood as a public investment.

Time Horizon

Though similar types of peer-reviewed research [see Cecile Rouse (2005)] use the same time horizon for the students working careers, some still question the validity of the lengthy period. We show in Table 4.2 what the results would be under 10-, 25-, and 53-year time horizons. Note that the working life is assumed to be 45 years, but because some students persist in their education through the Ph.D. level the benefits stream extends an additional eight years.

Again, the payback period is unaffected and thus not included in Table 4.2. Even under the most conservative condition (10 years), the investment remains viable with a benefit-cost ratio of 1.3. The associated NPV and IRR are \$67.9 million and 7.5%, respectively. The effects of education, and by corollary the effects of CIS, are far more long lasting than 10 years.

TABLE 4.2: SENSITIVITY ANALYSIS OF TIME HORIZON

	10 YEARS	25 YEARS	BASE CASE 53 YEARS
NPV investment	\$67,890,058	\$958,509,400	\$2,554,047,270
Average Annual IRR	7.5%	17.6%	18.4%
B/C ratio	1.3	5.0	11.6

12 The last time the discount rate approached 5% was in 1995.

Student Outcomes


Though the data provided on the number of high school students promoted to the next grade and number of students graduating as a result of CIS was conservative, we test the sensitivity of this variable to show how the results would change if the data were over- or under-reported.

All results stay well above any threshold values (*i.e.*, the NPV is everywhere greater than zero, rates of return are in excess of the 3% discount rate, benefits are 10 to 13 times larger than costs, and payback periods are reasonable given the type of investment being analyzed). Even if the number of students promoted and graduating due to CIS were overstated by 25%, the benefit-cost ratio of 10 and \$2.0 billion NPV would still warrant the investment.

TABLE 4.3: SENSITIVITY ANALYSIS OF STUDENT OUTCOMES

	75%	90%	BASE CASE 100%	110%	125%
NPV investment	\$2,036,557,529	\$2,346,589,740	\$2,554,047,270	\$2,760,826,934	\$3,070,928,231
Average Annual IRR	16.7%	17.8%	18.4%	19.0%	19.9%
B/C ratio	10.0	10.9	11.6	12.1	13.0
Payback	9.9	9.3	9.0	8.7	8.3





Chapter 5:

Conclusion and Future Direction

EMSI's analysis clearly makes the case that CIS' school dropout prevention and intervention program has meaningful economic and societal impacts. The analysis shows the net present value (or the present-value benefits minus the present-value costs) of the investment in high school-serving affiliates is nearly \$2.6 billion. This means that the discounted present-value benefits exceed the investment costs by roughly \$2.6 billion. Further, the average annual return to society resulting from CIS' investment is 18.4%.

Other key findings are as follows:

- CIS' investment at the high school level results in a benefit-cost ratio of 11.6, which means the organization brings back a present-value return of \$11.60 for every \$1 invested.
- It will take nine years before all investment costs are fully recovered. In an age where society is more concerned with the here and now and eager to get a quick return, a nine-year payback period may seem infeasible. However, it should be understood that an investment in human capital continues to pay dividends to society well beyond the normal short-term timeframe used by today's investor [see Cecilia Rouse (2005)].
- The total present value of the social savings (public and private) due to reductions in smoking, alcoholism, crime, welfare, and unemployment costs totals \$154.5 million.
- By moving from a developing to comprehensive site, an affiliate's

net present value will grow on average 31%, and the rates of return are likely to increase by 5.2%. Under a comprehensive approach, the benefit-cost ratio will grow from 11.9 to 12.6 and total investment costs will be recovered roughly 8½ months sooner.

- The average affiliate produces 42 additional on-time graduates each year and promotes an additional 99 students to the next grade level. These students in aggregate will see their annual disposable incomes rise, on average, by \$555,505 over their lifetime.

The bottom line is that CIS has a sizable return on investment to investors, students, businesses, and taxpayers. Students who stay in school and graduate benefit by making more over their lifetimes. Businesses benefit by having a more skilled and productive workforce. Taxpayers benefit through a broadening of the tax base (*i.e.*, increased incomes directly translate into increased tax revenue), and the public in general benefits from reduced social costs (such as crime, alcoholism, and unemployment).

Future Direction

CIS has made great strides in its mission to surround students with a community of support. As the CIS network of affiliates grows, the importance in understanding its impact—not only in terms of student achievement but also in economic and investment terms—has become critical. CIS seeks to leverage its energy and investment dollars to the greatest extent possible and to that end this report shows it has laid the foundation for an ongoing data-driven decision support system. CIS now has the ability to understand and communicate economic and investment impacts and returns to its stakeholders. Its interactive investment model will provide valuable information and insights into directing resources to the highest yielding opportunities. While this information is powerful and will result in more efficient and productive CIS operations, there is still much work to be done.

Third-Party Assessments

CIS continues to engage in obtaining third-party assessments of its implementation and impact. Currently CIS has engaged MDRC, a nonpartisan, nonprofit education and social policy research organization, to conduct a school-level comparative interrupted time series study. This study will validate the results of the previous national evaluation on the impact of CIS' integrated student services model in elementary, middle, and high schools. Additionally, the evaluation consists of a large-scale randomized controlled trial (RCT) to assess CIS' impact on ensuring middle school

students are on track for high school and high school students stay in school and graduate. The previous RCTs focused only on transition years. CIS is committed to pursuing the strongest evidence of its impact and using new evidence to refine the economic impact calculations.

Report All Sites and State Level Data

CIS investment and economic impacts can be broken down into four main levels: national, state, affiliate, and site. As this report details, CIS is now capturing and reporting results on two of these four levels (national and affiliate). In order to manage its investments and resources to the fullest extent, CIS needs to also capture and analyze data at the site and state levels. This would complete the effort to have a data-driven management system that looks at the entire network—top to bottom.

Prevention Program Impact for Middle and Elementary Schools

There are over 70 CIS affiliates that do not yet offer services to high schools. These affiliates are currently serving students in elementary and middle schools. If these local affiliates were to expand into high schools, the return on investment is expected to be very high. CIS needs to empirically demonstrate ROI at the elementary and middle school grades and more importantly, demonstrate its link to high school graduation. This could perhaps be done through a longitudinal quasi-experimental study.

This type of study would track a cohort of students receiving CIS services and compare the results against a cohort of students not receiving services. The groups would be matched as close as possible to cover differences in region and socio-economic characteristics. These two groups would be tracked for several years through the educational process, and data would be collected on their standardized achievement test scores as well as success with grade level promotions and stay-in-school retention rates. All of these measurement criteria have a correlation to a student's high school success rate.

All Sites Reporting


Comparing, reporting, and projecting impacts at the site level allows CIS to acquire, target, and manage investments at all levels of the CIS operations. Individual site investment and economic impact performance should be captured and reported. This allows for targeted investments, directing resources to the highest-performing sites. Unique site-level investment results could be given to a school board, city council, and state officials, increasing the opportunities for CIS to implement its services and improve the local, state, and national economy.

Web-Based Interactive Model

Keeping its data current and available is critical to help CIS maximize investments and performance. CIS would benefit from having its investment and economic impact results available to all decision makers within the network. CIS personnel would benefit from having a private web-based tool that would perform “what-if” scenarios as well as continual tracking of their performance.

Increase CIS Network Awareness

Communications and branding of the organization will increase awareness of CIS and the effective programs it has developed to reach youth. Awareness is critical to establishing a broader donor base. CIS should continue its focus on spreading the word about the positive effects of CIS efforts—both from an investment and economic impact standpoint. If potential donors are familiar with the work of CIS and identify with its goals and values, the donations to the organization are likely to increase. This takes the form of both monetary contributions and volunteer hours, both of which are used to directly implement CIS’ successful model of integrated student services and influence the lives of young people. The more successful its communication and advocacy campaign is, the more investors and policymakers will think of CIS when it comes to solving our nation’s dropout crisis.



Appendix A:

Methodology and Key Assumptions

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 profitable. If benefits outweigh costs, then the investment is worthwhile. If costs outweigh benefits, then the investment will lose money and is thus considered not economically feasible.

We analyze the current CIS network using common corporate financial measures such as net present value (NPV), average annual internal rate of return (IRR), benefit-cost (B/C) ratio, and payback periods. Definitions of these important terms can be found in Chapter 1.

Note on CIS/EMSI Approach

We believe that this report should positively contribute to what is often a murky and confusing set of discussions regarding ROI in the social sector. Specifically, with EMSI's industry standard academic rigor and CIS' third-party evaluation results, the report should set both a high standard for future ROI calculations and strengthen the field of evidence-based social programming to be more comprehensive (i.e., inclusive of an economic analysis as an integral part of determining the quality of a program's evidentiary base).

Data Collection & Modeling Techniques

Our analysis does not look at returns to CIS, but returns to students, businesses, and taxpayers. Students will benefit from increased future income, a result of their educational persistence made possible by the value-add of having the CIS model of integrated student services in their schools. Businesses will benefit from a more productive and well-trained

workforce, and taxpayers will benefit through a broadening of the tax base (*i.e.*, increased incomes will directly translate into increased tax revenue).

Based on the results of their five-year national evaluation, CIS provided estimates of the reduced number of dropouts and the number of additional graduates an affiliate would recognize as a result of CIS' investment. Many of these students will continue their education beyond high school, an option that would not have been available to them without CIS. Arguably these students would not have continued their education without the initial investment made by CIS. Thus any increases in earnings a student may receive as a result of postsecondary training can be attributed to CIS.

Persistence

To capture the number of students that move beyond high school we look at regional persistence rates of the population over 25 years old. This begins to give us a probability distribution representing how an average student's educational life will unfold. Because these students were likely to be dropouts, we must discount the probability that the students persist at the same rate as an average student.

Much of the literature addressing the need for this discounting is conducted by Cameron and Heckman (1993), Cameron (1994), and Heckman and Rubinstein (2001). These studies demonstrate that the cognitive and non-cognitive capacities of high school dropouts, GED completers, and high school graduates differ significantly, though the cognitive differences between GED holders and high school graduates are quite similar. Based on this literature we slow the persistence rates by roughly 26%. That is, an average high school graduate would be 26% more likely to continue their education than a "would-be" dropout.

Once regional persistence rates are captured, we calculate the students expected lifetime incomes. Earnings levels do not remain constant; rather, they start relatively low and gradually increase as the worker gains more experience. Research also indicates that the earnings increment between educated and non-educated workers grows through time. This means that annual higher income will be lower at the start of the students' career and higher near the end of it, gradually increasing at differing rates as the students grow older and advance further in their careers. To model this change in earnings, we use the well-known and well-tested Mincer function, which we discuss more fully in the next section.

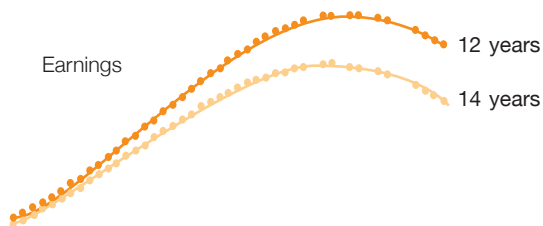
Generating a Benefits Stream

The two names most often associated with human capital theory and its applications are Gary Becker and Jacob Mincer. The standard human capital earnings function developed by Mincer appears as a three-dimensional

surface with the key elements being earnings, years of education, and experience. Figure 4.1 shows the relationship between earnings and age, with age serving as a proxy for experience. Note that, since we are using the graph strictly for illustrative purposes, the numbers on the axes are not shown.

Figure 4.1 illustrates several important features of the Mincer function. First, earnings initially increase at an increasing rate, later increase at a decreasing rate, reach a maximum somewhere after the midpoint of the working career, and then decline in later years. Second, at higher levels of education, the maximum level of earnings is reached at an older age. And third, the benefits of education, as measured by the difference in earnings for two levels, increase with age.

FIGURE 1: EARNINGS FOR 12 VS. 14 YEARS OF EDUCATION



In the model, we employ the Mincer function as a smooth predictor of earnings over time,¹³ for as long as students remain active in the workforce. Using earnings at the career midpoint as our base, we derive a set of scalars from the slope of the Mincer curve to model the students’ increase in earnings at each age within their working careers. The result is a stream of projected future benefits that follows the same basic shape as the Mincer curve, where earnings gradually increase from the time students enter the workforce, come to a peak shortly after the career midpoint, and then dampen slightly as students approach retirement at age 65.

The benefits stream generated by the Mincer curve is a key component in deriving the students’ benefits. However, not all students enter the workforce at the end of the reporting year, nor do all of them remain in the workforce until age 65. To account for this, we delay the students’ benefit stream in the first few years of the time horizon to allow time for those who are still continuing in postsecondary education to complete their educational goals and find employment. Mincer’s work demonstrated that working life is typically unaffected by educational attainment, thus, an individual who has obtained a higher level of education is expected to work the same number of years as someone with less education. This means that though an educated individual will enter the workforce later in life they will continue to work beyond the retirement age of 65. With the earnings profile, and combined with the educational persistence rates, we are able to ascertain the time horizon for which the student body under analysis will be operating within. Benefits will begin to be captured as soon as high school graduates enter the workforce and will continue to be generated until students persisting through a Ph.D. program (if any)

13 The Mincer equation is computed based on estimated coefficients presented in Robert J. Willis, “Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Function” in *Handbook of Labor Economics*, Vol. 1 (Amsterdam: Elsevier Science Publishers, 1986): 525–602. These are adjusted to current year dollars in the usual fashion by applying the GDP implicit price deflator. The function does not factor in temporary economic volatility, such as high growth periods or recessions. In the long run, however, the Mincer function is a reasonable predictor.

retire. Thus the time horizon for which benefits are calculated covers a 53-year period, rather than the standard working life of 46 years [see Mincer (1974), Rouse (2005), and Heckman, Lochner, and Todd (2006)].

The increased incomes of students not graduating, but continue to be promoted through high school (*i.e.*, freshman, sophomores, and juniors) are captured in a similar fashion, though they are not projected into higher levels of education. Rather their expected increases in earnings due to the past year of education are captured, projected through their lifetime using the Mincer profiles and then discounted back to present values. Because these students have not yet graduated from high school we cannot project their increased persistence rate, though we do know that increased promotion enhances the probability that they will graduate.

Increased Income & Marginal Propensity to Consume (MPC)

Income growth occurs as the higher earnings and added skills of CIS students stimulate the production of income in the economy. Students earn more because of the skills they have obtained in school, and businesses earn more because student skills make capital more productive (*i.e.*, buildings, machinery and everything else).

The bulk of personal taxes (federal and state income tax and sales taxes) are subtracted from the students' incomes yielding what economists refer to as disposable income. This disposable income is broken out between savings/investment and consumer spending. A large portion of consumer spending occurs as autonomous consumption, *i.e.*, spending necessary to a subsistence living. Additional consumer spending is calculated using marginal propensity to consume (MPC). Marginal propensity to consume calculates the increase in consumer spending resulting from an increase in additional income beyond the autonomous level. Any residual of the disposable income, after accounting for autonomous and marginal consumption, is put into savings/investment.

CIS student income growth comprises the direct impacts on benefits. Indirect effects occur as students' consumption spending and investment dollars ripple through the economy creating additional rounds of income and spending. To quantify the impact of these several rounds of spending, we apply a multiplier¹⁴ derived from EMSI's specialized input-output (IO) model, described more fully in Appendix 2.

Social Benefits

Education is highly correlated with a predictable and positive effect on

¹⁴ Multipliers are common to economic impact analysis and are used to measure how money cycles through the economy.

a diverse array of social benefits. These, when quantified in dollar terms, represent significant avoided social costs that directly benefit the public as whole, including taxpayers. The CIS approach takes into account three main benefit categories: 1) improved health, 2) reductions in crime, and 3) reductions in unemployment and welfare.

The statistical databases bear out the simple correlation between education and improved health, lower incarceration rates, and reduced welfare and unemployment. These by no means comprise the full range of benefits one can link to education. Other social benefits certainly may be identified in the future as reliable statistical sources are published and data are incorporated into analytical frameworks. Two such examples of additional social benefits are obesity and mental health. The fact that these incidental benefits occur and can be measured enhances the analysis and more fully captures the benefits resulting from CIS operations.

It is important to note that social benefit data and estimates presented here should not be viewed as exact, but rather as indicative of the positive impacts of education on an individual's quality of life. The process of quantifying these impacts requires a number of assumptions to be made, creating a level of uncertainty that should be borne in mind when reviewing the results. That said, we have discounted our results according to the vast economic literature surrounding such social measures, so as not to overstate the impacts of these metrics. All results shown are therefore quite conservative.¹⁵

The difficulty in measuring social statistics is that there are several multi-correlated factors (*e.g.*, alcohol-induced crimes). Measuring the benefits of education on alcoholism will indirectly capture the effects of alcoholism on crime, then measuring the reduction in crime related to education may potentially double count the benefits already captured under prevention of alcoholism. As such, very specific datasets must be utilized in our calculations. Not all social factors have such datasets available which has limited the scope we are willing to use in our calculations, namely smoking, alcoholism, crime, and welfare and unemployment.

Despite declines over the last several decades in overall U.S. crime rates, the disparity in criminal activity by education level still persists. Crime statistics are well documented in the literature. Figure 4.1 reports the prevalence of crime by education level, based on data provided by the Bureau of Justice Statistics (BJS).¹⁶ As indicated, the percent of persons who commit crimes significantly declines between the less than high school and the high school levels.

15 See Molitor and Leigh (2001). "Estimating the Returns to Schooling: Calculating the Difference Between Correlation and Causation."

16 Harlow, Caroline Wolf. "Education and Correctional Populations." Department of Justice: Bureau of Justice Statistics.

The BJS reports the population of adults who are currently incarcerated by state.¹⁷ We use this information to create an index value by which we adjust the national prevalence data on criminal activity to each state. For example, Mississippi has incarceration rate of 545 per 100,000 people, which is 1.3 times higher than the 460 per 100,000 people nationwide. Thus Mississippi has an index value of 1.3.

The savings related to reductions in crime are broken out between victim costs and public costs (*e.g.*, court costs, enforcement costs, prison costs, *etc.*). These data are also derived from the BJS. A per crime cost is calculated and multiplied by the projected number of CIS students that will, as a result of their education, not engage in criminal activity.

For alcoholism, smoking, and welfare and unemployment, similar approaches are taken by looking at the reduced probability of claimants and multiplying that reduction by a per claimant cost. Welfare and unemployment have one additional step included in that we index by affiliate service area rather than state. This is done because there is an abundance of data linking unemployment rates to sub-state geographies, largely because unemployment can vary markedly within a state.

Total Benefits and Total Costs

Once the direct and indirect income effects (along with the social benefits) are calculated, we are able to estimate the total benefits stemming from the investment in CIS. Because the stream of lifetime higher income occurs in the future, for both the promoted students and those that graduate, we must discount those dollars back to present-value terms to account for the time value of money.¹⁸ Similarly, the students generate opportunity costs by remaining in school and out of the labor market. In essence, every hour students are working on academic goals they are giving up earnings. The state also incurs increased marginal costs from having to serve students longer. Any future opportunity costs of this type are likewise discounted back to the present value using the same discount rate as the benefits stream, thus accounting for the time value of money. The goal is to express all future dollars in present-value terms so that they can be compared in an apples-to-apples manner. We calculate the benefit-cost ratio by taking the total present-value benefits and dividing by the sum of CIS investment dollars (current dollars) and the present-value opportunity costs of the students and state.

Recall that this ratio reflects the measure of all benefits generated regard-

¹⁷ Center for Disease Control and Prevention (CDC), Prevalence and Trends Data. Tobacco Use – 2008; Adults who are current smokers (accessed June 2009).

¹⁸ EMSI uses Office of Management and Budget discount rates for long-term investments. The prevailing discount rate ranges between 2–4%. EMSI uses the high side of this range in order to be conservative.

less of those to whom they may accrue. Students are the beneficiaries of higher income; employers are beneficiaries of lower absenteeism and increased worker productivity. These are widely dispersed benefits that do not necessarily return to investors in CIS. Inasmuch as investors and beneficiaries are not the same individuals, measures common to standard investment analyses such as rate of return and payback period no longer apply. From the social perspective, therefore, the benefit-cost ratio should be viewed strictly as a comparison between societal benefits and CIS investments.

Attrition

The investment model also accounts for death, retirement, migration, and unemployment among high school graduates. As recipients of CIS investments, a percentage of these high school graduates will leave the county labor force and affect the affiliate's overall economic impact on labor and tax contribution. To account for this, we have included attrition parameters to adjust the impact to the local CIS affiliate tax base. Migration data from the IRS, life tables from the CDC, retirement data from SSA, and regional unemployment rates from the BLS' LAUS data set are used to determine the amount of labor that has exited out of the area. The amount of reduced tax revenue associated with the labor, also referred to as investment "leakage," is then subtracted from the overall effects of the investment.

Appendix B:

EMSI Input-Output Model

Introduction and data sources

EMSI's input-output model represents the economic relationships among a region's industries, with particular reference to how much each industry purchases from each other industry. Using a complex, automated process, we can create regionalized models for geographic areas comprised by counties or ZIP codes in the United States.

Our primary data sources are the following:

1. The Industry Economic Accounts from the Bureau of Economic Analysis (BEA); specifically the "make" and "use" tables from the annual and benchmark input-output accounts.
2. Regional and national jobs-by-industry totals, and national sales-to-jobs ratios (from EMSI's industry employment and earnings data process).
3. Proprietor earnings from State and Local Personal Income Reports (BEA).

Creation of the national Z matrix

The BEA "make" and "use" tables (MUTs) show which industries make or use which commodity types. These two tables are combined to replace the industry-commodity-industry relationships with simple industry-industry relationships in dollar terms. This is called the national "Z" matrix, which shows the total amount (\$) each industry purchases from others. Industry purchases run down the columns, while industry sales run across the rows.

The value 1,532.5 in this table means that Industry 2 purchases \$1,532,500,000 worth of commodities and/or services from Industry 1.

TABLE 1: SAMPLE "Z" MATRIX (\$ MILLIONS)

	INDUSTRY 1	INDUSTRY 2	...	INDUSTRY N
Industry 1	3.3	1,532.5	...	232.1
Industry 2	9.2	23.0	...	1,982.7
...
Industry N	819.3	2,395.6	...	0

The whole table is basically an economic double-entry accounting system, configured so that all money inflows have corresponding outflows elsewhere.

In addition to regular industries (such as “oil and gas extraction,” “machinery manufacturing,” “food and beverage stores,” “hospitals,” and so on), there are three additional rows representing labor earnings, profits, and business taxes, which together represent industry “value added” and account for the fact that industries do not spend all of their income on inputs from other industries. There are also three rows and columns representing federal, state, and local government (we later separate federal government into civilian and military sectors).

We create two separate Z matrices since there are two sets of MUTs—annual and benchmark. The benchmark data are produced every five years with a five-year lag and specify up to 500 industry sectors; annual data have a one-year lag but specify only 80 industrial sectors.

The basic equation is as follows:

$$Z = VQ^{-1}U$$

where V is the industry “make” table, Q^{-1} is a vector of total gross commodity output, and U is the industry “use” table.

In reality, this equation is more complex because we also need to “domesticate” the Z matrix by removing all imports. This is needed because we are creating a “closed” type of national model.

In addition, there are a number of modifications that need to be made to the BEA data before the calculations can begin. These are almost all related to the conversion of certain data in BEA categories to new categories that are more compatible with other data sets we use in the process, and describing them in detail is beyond the scope of this document.

Disaggregation of the national Z matrix

The previous step resulted in two national Z matrices—one based on the benchmark BEA data (five years old, approximately 500 industries) and the other based on the annual BEA data (one year old, but only about 80 industries). These initial national Z matrices are then combined and disaggregated to 1,125 industry sectors. Combining them allows us to capitalize on both the recency of the annual data and the detail of the benchmark data. The disaggregation is performed for each initial Z matrix using probability matrices that allow us to estimate industry transactions for the more detailed sectors based on the known transactions of their parent sectors. The probability matrix is created from detailed EMSI industry earnings data, which are available for all 1,125 sectors and are created using a separate process.

Creation of the national A matrix

The national disaggregated Z matrix is then “normalized” to show purchases as percentages of each industry’s output rather than total dollar amounts. This is called the national “A” matrix.

TABLE 2: SAMPLE “A” MATRIX

	INDUSTRY 1	INDUSTRY 2	...	INDUSTRY 1125
Industry 1	.001	.112035
Industry 2	.097	0065
...
Industry 1125	.002	.076	...	0

Each cell value represents the percentage of a row industry’s output that goes toward purchasing inputs from each column industry. Thus, the cell containing .112 above means that Industry 1 spends 11.2% of its total output to obtain inputs from Industry 2.

At this point, our additional rows representing earnings, profits, and business taxes are removed. However, we will use them in a different form later.

Regionalization of the A matrix

To create a regional input-output model, we regionalize the national A matrix using that region’s industry mix.

The major step in the process is the calculation of per-industry out-of-region exports. This is performed using a combination of the following standard techniques that are present in the academic literature:

1. Stevens regional purchase coefficients (RPCs)
2. Simple location quotient of value added sales
3. Supply/demand pools derived from the national A matrix

We try to maximize exports in order to account as fully as possible for “cross-hauling,” which is the simultaneous export and import of the same good or service to/from a region, since it is quite common in most industries.

Another major part of the process is the regionalization of consumption, investment, and local government “row industries” (rows referring to the rows of the A matrix). These represent the percentage of each industry’s sales that end up going toward consumption, capital purchases, and taxes to local government, respectively. They are created from the “value added” rows that we removed earlier. Consumption is calculated using each industry’s earnings and profits, as well as a constant called “the average

propensity to consume,” which describes the approximate percentage of earnings and profits that are spent on consumption. Investment and local government rows are calculated by distributing the known total investment and endogenous local government for the entire region to individual industries proportionally to their value added.

The A-matrix regionalization process is automated for any given region for which industry data are available. Although partially derived from national figures, the regional A matrix offers a best possible estimate of regional values without resorting to costly and time-consuming survey techniques, which in most cases are completely infeasible.

Creating multipliers and using the A matrix

Finally, we convert the regional “A” matrix to a “B” matrix using the standard Leontief inverse $B = (I - A)^{-1}$. The “B” matrix consists of inter-industry sales multipliers, which can be converted to jobs or earnings multipliers using per-industry jobs-to-sales or earnings-to-sales ratios.

The resulting tables and vectors from this process are then used in the actual end-user software to calculate regional requirements, calculate the regional economic base, estimate sales multipliers, and run impact scenarios.

Appendix C:

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