

Analysis of the Economic Impact and Return on Investment of Education

THE ECONOMIC VALUE OF
NORTH DAKOTA STATE UNIVERSITY

EXECUTIVE SUMMARY



Executive summary

North Dakota State University (NDSU) creates value in a variety of ways. The university improves higher education delivery throughout the region and helps students increase their employability and potential. The university facilitates new research and company developments and also draws visitors to the region, generating new dollars and opportunities for the NDSU Service Area.

The value of NDSU influences both the lives of students and also the regional economy. The university serves a range of industries in the NDSU Service Area, supports regional businesses, and benefits society as a whole in North Dakota from an expanded economy and improved quality of life. The benefits created by NDSU extend as far as the state government through increased tax revenues and public sector savings.

This study investigates the economic impacts created by NDSU on the business community and the benefits that the university generates in return for the investments made by their key stakeholder groups—students, taxpayers, and society. The following two analyses are presented:

- **Economic impact analysis**
- **Investment analysis**

All results reflect student and financial data for Fiscal Year (FY) 2015-16. Impacts on the regional business community are reported under the economic impact analysis. The region is referred to as NDSU Service Area and consists of the state of North Dakota and 18 counties in western Minnesota. Results are measured in terms of added income. The return on investment to students, taxpayers, and society are reported under the investment analysis. Both analyses are described more fully in the following sections.

Since 1890, NDSU has been North Dakota's land grant university and the keystone of the North Dakota University System. NDSU boasts over 300 programs at the undergraduate, graduate, and post-graduate levels, as well as a high volume of research activity. Over the last fifteen years, its enrollment has grown by more than 50%, to approximately 14,500 students served in fall of 2015. At its main campus, its NDSU Downtown facilities, and its many extension locations throughout the state, NDSU offers the benefits of education not just to students but to all of North Dakota and even parts of Minnesota.

Economic impact analysis

NDSU promotes economic growth in the NDSU Service Area through its direct expenditures and resulting expenditures of students, visitors, and regional businesses. The university serves as an employer and buyer of goods and services for its general and research operations. Numerous start-up and spin-off companies have formed through programs and knowledge at NDSU. The university’s reputation and activities attract students and visitors from outside the NDSU Service Area, whose expenditures benefit regional vendors. In addition, NDSU is a primary source of education to the NDSU Service Area residents and a supplier of trained workers to the region industries, increasing overall productivity in the regional workforce.

OPERATIONS SPENDING IMPACT

NDSU is an important employer in the NDSU Service Area. In FY 2015-16, the university employed 1,899 full-time and part-time faculty and staff (less research employees). Of these, 99% lived in the NDSU Service Area. Total payroll at NDSU was \$195 million (less research activities), much of which was spent in the region for groceries, dining out, clothing, and other household expenses.

NDSU is itself a large-scale buyer of goods and services. In FY 2015-16 the university spent \$63 million (less research activities) to cover its expenses for facilities, professional services, and supplies.

NDSU added a gross value of \$298.2 million in income to the region during the analysis year as a result of its day-to-day operations. This figure represents the university’s payroll, the multiplier effects generated by the spending of the university and its employees. This value is adjusted downward to account for the impact of \$88 million that would have occurred in the region regardless of NDSU. Therefore, NDSU added \$210.2 million in income is equivalent to supporting 2,139 jobs.

RESEARCH SPENDING IMPACT

Research activities impact the economy by employing people and requiring the purchase of equipment and other supplies and services. Over the last four years, NDSU received 202 invention disclosures, filed 72 new US patent applications, and produced 282 licenses. Total license earnings over the same four-year time period grew from \$2.2 million in 2012-13 to \$2.8 million in FY 2015-16, an approximate \$606.5 thousand increase.

TABLE 1: Research Developments created by NDSU

INVENTIONS	PATENTS	LICENSES
58	20	60
2012-13		
42	10	51
2013-14		
44	20	77
2014-15		
58	22	94
2015-16		
202	72	282
Total		



In FY 2015-16, NDSU spent \$83.9 million on payroll to support research activities, creating a net total of \$103.1 million in added income for the regional economy. This added income is equivalent to supporting 1,206 jobs.

START-UP AND SPIN-OFF COMPANY IMPACT

NDSU creates an exceptional environment that fosters innovation and entrepreneurship, evidenced by the number of NDSU start-up and spin-off companies created in the region. Start-up companies, created specifically to license and commercialize NDSU technology or knowledge, have a strong and clearly defined link to NDSU. Spin-off companies, created and fostered through university programs or faculty and alumni, have a clear but weaker link to NDSU.

In FY 2015-16, NDSU start-up and spin off companies added \$9.3 million in income to the NDSU Service Area economy, which is equivalent to supporting 121 jobs. Of this added income, \$8.6 million was due to the start-up companies, with the remainder due to spin-off companies.

STUDENT SPENDING IMPACT

Around 38% of students attending NDSU originated from outside the region in FY 2015-16, and some of these students relocated to the NDSU Service Area to attend NDSU. These students would not have come to the region if the university did not exist. In addition, a number of in-region students would have left the region for other education opportunities if not for the existence of NDSU. While attending the university, these relocators and retained students spent \$63.8 million to purchase groceries, rent accommodation, pay for transportation, and so on. A significant portion of these expenditures occurred in the region, generating \$39.9 million in added income in the regional economy during the analysis year, which is equivalent to supporting 533 jobs.

VISITOR SPENDING IMPACT

Thousands of visitors from outside the region were attracted to NDSU during the analysis year to attend commencement, sports events, and other activities sponsored by the university. While in the region, visitors spent money for lodging, food, transportation, and other personal expenses. The off-campus expenditures of the university’s out-of-region visitors generated a net impact of \$4.4 million in added income for the region economy in FY 2015-16. This \$4.4 million in added income is equivalent to supporting 114 jobs.

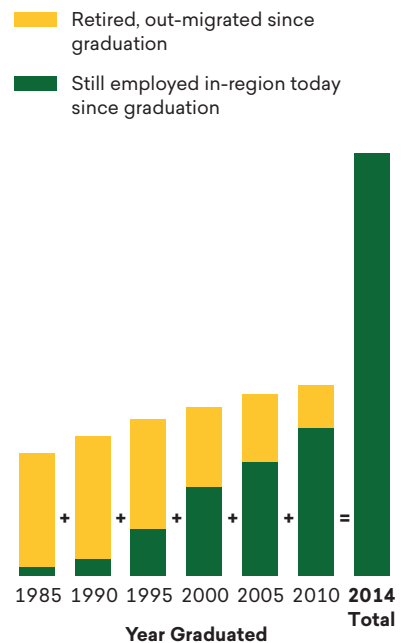
ALUMNI IMPACT

The education and training NDSU provides for region residents results in the greatest impact. As shown in Figure 1, since the university was established, students

TABLE 2: Impacts created by NDSU in FY 2015-16

ADDED INCOME	JOBS
\$210.2 million	2,139
Operations spending impact	
\$103.1 million	1,206
Research spending impact	
\$9.3 million	121
Start-up and spin-off company impact	
\$39.9 million	533
Student spending impact	
\$4.4 million	114
Visitor spending impact	
\$560.4 million	7,773
Alumni impact	
\$927.3 million	11,886
Total impact	

FIGURE 1: NDSU alumni working in-region today



have studied at NDSU and entered the regional workforce with new skills. Today, thousands of former students are employed in the NDSU Service Area.

During the analysis year, past and present students of NDSU generated \$560.4 million in added income for the region. This figure represents the higher wages that students earned during the year, the increased output of the businesses that employed the students, and the multiplier effects that occurred as students and their employers spent money at other businesses. This \$560.4 million in added income is equivalent to supporting 7,773 jobs.

TOTAL IMPACT

The overall impact of NDSU on the local business community during the analysis year amounted to \$927.3 million in added income, equal to the sum of the operations spending impact, the research spending impact, the start-up and spin-off company impact, the student spending impact, the visitor spending impact, and the alumni impact. The \$927.3 million in added income was equal to approximately 1.3% of the GRP of the NDSU Service Area. By comparison, this contribution that the university provides on its own is more than half the size of the entire Accommodation & Food Services industry in the region.

The total impact is also expressed in terms of the jobs supported by the added income; they are calculated by jobs-to-sales ratios specific to each industry. Overall, the \$927.3 million impact supports 11,886 jobs.

A portion of the total \$927.3 million is broken out into an industry-by-industry impact ordered by added income. Table 3 outlines the top industries impacted by NDSU. Because industries have different jobs-to-sales ratios, the associated jobs supported by the NDSU impact differ by industry. Nonetheless, these are impacts that would not have been generated without the university's presence.

TABLE 3: Top industries impacted by NDSU

TOTAL INCOME (MILLIONS)	JOBS
\$155.9	1,814
Professional & Technical Services	
\$88.5	1,135
Government, Non-Education	
\$60.8	1,041
Health Care & Social Assistance	
\$48.3	406
Manufacturing	
\$39.1	483
Construction	
\$534.6	7,009
All other industries	
\$927.3	11,886
Total impact	



Investment analysis

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 and considered profitable.

NDSU received a total of \$458.5 million in FY 2015-16. Tuition and fees comprised 25% of total revenue, student aid from government sources comprised another 52%, and all other revenue comprised the remaining 23%. This study considers NDSU as an investment from the perspectives of those whom provided these revenues - students, taxpayers, and society. The backdrop for the analysis is the entire North Dakota economy.

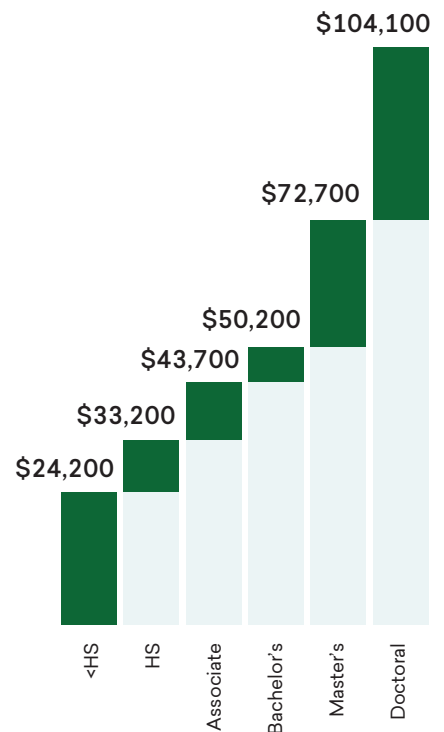
STUDENT PERSPECTIVE

In FY 2015-16, NDSU served 16,019 credit students and 2,083 non-credit students (the unduplicated headcount for Summer 2015, Fall 2015, and Spring 2016). In order to attend the university, students paid for tuition, fees, books, and supplies. They also gave up money that they would have otherwise earned had they been working instead of attending the university. The total investment made by NDSU's students in FY 2015-16 amounted to \$374.8 million, equal to \$127.9 million in out-of-pocket expenses plus \$247 million in forgone time and money.

In return for their investment, NDSU's students will receive a stream of higher future wages that will continue to grow through their working lives. As shown in Figure 2, mean earnings levels at the midpoint of the average-aged worker's career increase as people achieve higher levels of education. For example, the average bachelor's degree completer from NDSU will see an increase in earnings of \$17,000 each year compared to someone with a high school diploma or equivalent. Over a working lifetime, this increase in earnings amounts to an undiscounted value of approximately \$731,000 in higher earnings.

The present value of the higher future wages that NDSU's students will receive over their working careers is \$898.7 million. Dividing this value by the \$374.8 million in student costs yields a benefit-cost ratio of 2.4. In other words, for every \$1 students invest in NDSU in the form of out-of-pocket expenses and forgone time and money, they receive a cumulative of \$2.40 in higher future wages. The average annual rate of return for students is 10.7%. This is an impressive return, especially when compared to the 10-year average 7.2% return to the US stock market (Figure 3).

FIGURE 2: Higher earnings by education level at career midpoint in North Dakota



Source: Emsi complete employment data.

TAXPAYER PERSPECTIVE

NDSU generates more in tax revenue than it takes. These benefits to taxpayers consist primarily of taxes that the state government will collect from the added revenue created in the state. As NDSU students earn more, they will make higher tax payments. Employers will also make higher tax payments as they increase their output and purchase more supplies and services. By the end of the FY 2015-16 students' working careers, the state government will have collected a present value of \$133.4 million in added taxes.

Benefits to taxpayers consist of the savings generated by the improved lifestyles of students and the proportionally reduced government expenditures. Education is statistically correlated with a variety of lifestyle changes that generate taxpayer savings across three main categories: 1) health, 2) crime, and 3) unemployment. Improved health habits lower the students' demand for national health care services. Students are also less likely to commit crimes, so the demand for law enforcement and criminal justice services is reduced (study references are available in the main report). Students are also more employable, so the demand for welfare and unemployment benefits, such as earnings assistance and welfare benefits, is reduced. For a list of study references to these statistical benefits, please contact the university for a copy of the main report. All of these benefits will generate a present value of \$67.1 million in savings to state taxpayers.

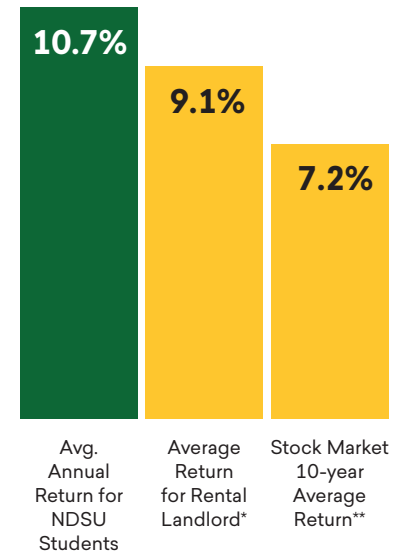
Total benefits to taxpayers equal \$200.4 million, equal to the sum of the added taxes and public sector savings. Comparing this to the taxpayer costs of \$165.3 million—equal to the funding that NDSU received from the state government during the analysis year—yields a benefit-cost ratio of 1.2. This means that for every \$1 of public money invested in NDSU, taxpayers receive a cumulative value of \$1.20 over the course of the students' working lives. The average annual rate of return is 2.6%, a solid investment that compares favorably with other long-term investments in both the private and public sectors (Figure 3).

SOCIAL PERSPECTIVE

Society as a whole within North Dakota benefits from the presence of NDSU in two major ways. The first and largest benefit that society receives is an increased state economic base. As discussed in the previous section, the higher student earnings and increased business output occurs across the state. This raises prosperity in North Dakota and expands the economic base for society as a whole.

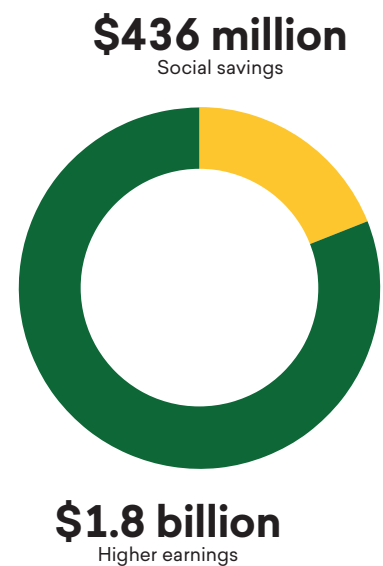
Benefits to society also consist of the savings generated by the improved lifestyles of students. Similar to the taxpayer section above, education is statistically correlated with a variety of lifestyle changes that generate social savings. Note that these costs are avoided by the consumers, and are distinct from the costs avoided by taxpayers outlined above. Health savings include avoided medical costs associated with smoking, alcoholism, obesity, drug abuse, and mental disorders. Crime savings include reduced security expenditures and insurance administration, lower victim

FIGURE 3: Student rate of return



*RealityTrac's Q3 2014 study of 586 counties nationwide.
 **Forbes' S&P 500 (compounded annualized) avg. return, 1994-2014.

FIGURE 4: Present value of higher earnings and social savings in North Dakota



costs, and reduced criminal justice system expenditures. Unemployment savings include the reduced employer contributions towards unemployment claims. For a list of study references to these statistical benefits, please contact the university for a copy of the main report.

Figure 4 shows the present value of the higher earnings and social savings that will occur in North Dakota over the working lifetime of the FY 2015-16 student population at NDSU. Higher earnings amounts to a present value of \$1.8 billion due to the increased lifetime earnings of students and associated increases in business output. Social savings amount to \$436 million, the sum of health, crime, and unemployment savings in North Dakota. Altogether, total benefits to society equal \$2.2 billion (in present value terms).

Society invested \$674.5 million in NDSU educations during the analysis year. This includes all expenditures by NDSU, all student expenditures, and all student opportunity costs. For every dollar of this investment, society as a whole in North Dakota will receive a cumulative value of \$3.30 in benefits, equal to the \$2.2 billion in benefits divided by the \$674.5 million in costs. These benefits will occur for as long as NDSU’s FY 2015-16 students remain employed in the state workforce.

SUMMARY OF INVESTMENT ANALYSIS RESULTS

Table 4 presents the results of the investment analysis for all three of NDSU’s major stakeholder groups—students, society, and taxpayers. As shown, students receive great value for their educational investment. At the same time, the investment made by state taxpayers to the university creates a wide range of benefits to society and returns more to government budgets than it costs.



TABLE 4: Summary of investment analysis results

	STUDENT PERSPECTIVE	TAXPAYER PERSPECTIVE	SOCIAL PERSPECTIVE
Present value benefits (thousands)	\$898,722	\$200,402	\$2,198,443
Costs (thousands)	\$374,828	\$165,285	\$674,502
Net present value (thousands)	\$523,894	\$35,117	\$1,523,941
Benefit-cost ratio	2.4	1.2	3.3
Rate of return	10.70%	2.60%	N/A*

* The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.



Conclusion

The results of this study demonstrate that NDSU creates value from multiple perspectives. The university benefits local businesses by increasing consumer spending in the region and supplying a steady flow of qualified, trained workers into the workforce. It enriches the lives of students by raising their lifetime earnings and helping them achieve their individual potential. It benefits state taxpayers through increased tax receipts across the state and a reduced demand for government-supported social services. Finally, it benefits society as a whole in North Dakota by creating a more prosperous economy and generating a variety of savings through the improved lifestyles of students.

ABOUT THE STUDY

Data and assumptions used in the study are based on several sources, including the FY 2015-16 academic and financial reports from NDSU, industry and employment data from the U.S. Bureau of Labor Statistics and U.S. Census Bureau, outputs of Emsi's Social Accounting Matrix (SAM) model, and a variety of studies and surveys relating education to social behavior. The study applies a conservative methodology and follows standard practice using only the most recognized indicators of investment effectiveness and economic impact. For a full description of the data and approach used in the study, please contact NDSU for a copy of the technical report.



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