

The Economic Impacts of Iowa State University In Fiscal 2006

A Report Prepared by

**David Swenson &
Liesl Eathington
The Department of Economics
Iowa State University**

July 2007

Executive Summary of Findings

Iowa State University contributes significantly to the state's economy. This study isolates the economic impacts of the university as an Iowa educational, scientific, service, cultural, and recreational center. This study also measures the economic impact value of ISU student spending in central Iowa.

There are two primary sources of information for this analysis. The first is the Iowa State University Fact Book, 2006-2007. That resource is an annual compilation of relevant university student, performance, and operational data. The second is an input-output model that measures in very high detail the characteristics of the Iowa economy and which allows an estimate of the relationships that university and student activities have with other industries and service providers in the state. These relationships or linkages help us to identify the extent to which ISU activities and their students stimulate other economic activity in the state.

For the fiscal 2006 period, this research determined that the direct economic output value of all Iowa State University services was \$860.95 million, of which \$579.5 million in labor incomes were paid to 13,843 faculty, staff, and student workers. The university required \$180.64 million in Iowa-supplied goods and services further stimulating 2,230 jobs making \$62.67 million in labor incomes. When the university's workers and the supplying sectors' workers converted their labor incomes into household spending, they sparked another \$479.78 million in purchases, which yielded another 5,342 jobs making \$145.14 million in earnings. Summed, ISU either directly or

secondarily accounted for \$1.52 billion in state economic output, \$787.3 million in labor incomes, and 21,415 total jobs.

Student spending was assessed next. Using ISU student aid budgets to estimate all non-educational spending, it was determined that ISU students spent \$162.3 million in the central Iowa economy for necessary goods and services like housing, food, travel, medical care, entertainment, and all other necessary services. This spending, in turn, supported 1,805 jobs with \$37.12 million in incomes. When all of student spending rippled through the rest of the central Iowa by stimulating additional supply demands and household purchases, the total economic value of ISU student spending was \$229.4 million in industrial output, requiring 2,473 jobs making \$58.38 million in labor incomes. The effects of student spending can also be standardized: A thousand ISU students supported \$9.01 million in industrial output and 97 jobs earning \$2.29 million in labor incomes in Fiscal 2006.

There are other important economic impact aspects of ISU that are not measured in this research. The university is a cultural, recreational, and entertainment hub that draws thousands of visitors to the region. Those visitors, in turn, make important purchases from regional merchants that help maintain the vitality of the central Iowa economy. Those values are significant, but must be measured separately with reliable survey information and other estimates of the magnitude and the spending habits of those visitors. That research is beyond the scope of this study.

Introduction

This study measures the statewide economic values stimulated or sustained by Iowa State University and its operations. The first part of this study measures the institutional economic effects of ISU as an educational, research, cultural, service, and recreational entity. The second part of this research looks at the community-wide commercial effects attributable to student life. These are driven by the personal consumption spending of students in the community over and above their direct education costs.

There are other important aspects of ISU as a regional and statewide economic engine. It is a sports center, a place for the performing arts, and a venue for special events, camps, festivals, and other opportunities year round. These events entice visits and spending to the region in addition to spending for the ISU programs and activities that we will have accounted for in the overall analysis. We call this the visitor effect. Many of the dining, drinking, and hospitality services in the area are highly dependent on these visitors and their spending. However, absent a detailed and well administered survey of the scope and characteristics of visitors, it is not prudent to estimate their cumulative impact on the regional economy, though it is unarguably substantial.

Methods and Limits to the Analysis

The value of ISU to the state and regional economy is measured with an input-output (or, simply, I-O) econometric model. I-O models are detailed estimates of inter-industrial transactions in a region. An institution's output (here, the sum of receipts from all sources) requires employees along with capital, equipment, and service inputs.

The probability that the firm or the public institution purchases necessary inputs locally is estimated in the I-O model as also is the overall production recipe for the firm; i.e., the kinds of inputs that it purchases. Once the model is constructed, a simulation is run to measure how the current economy responds to or otherwise demonstrates dependence on the institution that we are studying.

There are several up-front limitations to these studies. First and foremost, absent highly detailed and costly industry surveys we must rely on national and regional averages when determining major input categories and the likelihood of a local purchase of inputs; however, the models are modified to as closely as possible reflect the actual characteristics of the institution that is being measured when such data are available, and as is the case in this assessment.

Adjustments to this model were made using Iowa Board of Regent's data on state central purchasing.

Notwithstanding these limits, when I-O studies are specified properly they give us a reasonably good simulation of the current inter-dependencies in the economy. They better answer the question: "Where are we today?" Instead of the more difficult question: "Where are we headed?" They help to define the relative linkages of an institution under study with the industries and households in the region.

Kinds of Economic Measures

I-O models produce reams of useful information. The most salient results for decision makers are (1) total output, (2) labor income (3) value added, and (4) jobs. *Total output* for most industries is simply

gross sales. For public institutions we normally include all public and private spending, all direct sales and subsidies received, to isolate the full economic value of their output. *Labor income* includes the wages and salaries of employees, along with normal proprietor profits. *Value added* is another appropriate measure of economic effects. It includes all labor income, plus returns to investors and indirect tax payments to government that are part of the production process. *Jobs*, the fourth measure, represent the number of positions in the economy, not the number of employed persons.

We also get detailed breakdowns of the aforementioned economic data: the direct, indirect, induced, and total economic effects. *Direct effects* refer to the operational characteristics of the firm that we are studying. *Indirect effects* measure the value of demands that the direct firm (ISU) places on supplying industries in the region. *Induced effects* accrue when workers in the direct and indirect industries spend their earnings on goods and services in the region. Induced effects are also often called household effects. *Total effects* are the sum of direct, indirect, and induced effects. They are the total of transactions attributable to the direct activity that we are measuring.

The term *multiplier* is often employed when referring to economic values or economic impacts. A multiplier, simply, is the total effects divided by the direct effects. In the first instance it is merely a ratio that helps us to understand how strongly industries or institutions are linked with one another in a study region. In addition, a multiplier can help us to anticipate how much the overall economy is expected to change per unit change in the direct effects (a dollar of output, a dollar of personal income, a dollar of value added, or a job). Multipliers help

us anticipate the potential change in the regional economy attributable to a change in direct activity in a particular industry. Firms with strong linkages to area supplying firms or that pay relatively high earnings may yield high multipliers. Firms that are otherwise not connected strongly locally or that pay lower than average wages will have lower multipliers. Urban areas with their more developed economies have, on the average, much higher multipliers than rural areas.

The Study Area

In as much as it is important to clearly specify the industry of study and its operational characteristics, it is also important to identify the primary area influenced by the institution. It is unarguable that ISU benefits the entire state of Iowa even the majority of ISU economic activity is realized within a comparatively small space. The twin greatest influences on determining the study territory are the industrial sources for a majority of the institutions inputs and the location of the labor force that serves it.

The goods and services available in the metropolitan Polk County area combined with Story County likely supply a large fraction of the University's inputs. The labor force serving the university is also concentrated: In the 2000 census, 85 percent of all state and local government workers in Story County came from Story County, and a combined 10 percent came from either Boone or Polk County. While we have constructed our I-O model to be reflective of the entire state, it is important to realize that the primary, thee-county core territory is where most of the direct, indirect, and household spending effects of ISU operations will be localized.

The Direct Values

The foundations for I-O analysis are measures of the industry's output or productivity. Examples include sales or output, jobs, or earnings. Because ISU is a public institution, all of its pertinent operational data are public. The more direct data that we have, the better is our estimate of economic effects in the region.*

Table 1 is a summary of the revenue and expenditure data for the ISU for fiscal year 2006. Revenues from all sources were \$860.925 million. State appropriations made up 28.5 percent of revenues, and tuition and fees another 23.1 percent. Contracts and grants amounted to 23.7 percent of revenues. The remaining revenues come from auxiliary enterprises, such as dorm charges, entertainment, book store sales, and sporting event revenues; independent operations, like Ames Labs; and other sources such as earnings on investments, educational services sales, and equipment sales.

Table 1. Iowa State University Revenues, FY 2006

	Amount (\$000)	Percent of Total
Revenues		
State Appropriations	245,570	28.5%
Federal Appropriations	14,136	1.6%
Tuition and Fees	198,719	23.1%
Contracts and Grants	204,467	23.7%
Auxiliary Enterprises	109,937	12.8%
Independent Operations	31,764	3.7%
Other	56,352	6.6%
Total	\$860,945	

* All direct data for this study were obtained from the Iowa State University Fact Book, 2006-2007. Office of Institutional Research, Iowa State University.

Table 2 lists expenditures by the function or the object of that spending. Instruction, research, public service and academic support account for almost 60 percent of spending. When characterized by the object of spending, salaries, wages, and benefits account for 59.8 percent of spending. The largest other category is general spending at almost 25 percent, which is mostly operational spending and educational support, followed by scholarships at 7.7 percent. The remaining 15 percent of spending is divided among scholarships, transfers, and capital outlays.

Table 2. Iowa State University Expenditures by Function and by Object, Fiscal 2006

	Amount (\$000)	Percent of Total
Expenditures and Transfers by Function		
Instruction	\$180,976	21.1%
Research	167,484	19.5%
Public Service	74,887	8.7%
Academic Support	87,729	10.2%
Student Services	29,555	3.4%
Institutional Support	30,120	3.5%
Operations and Maintenance	44,492	5.2%
Scholarship	66,268	7.7%
Auxiliary Enterprises	112,387	13.1%
Independent Operations	32,984	3.8%
Mandatory Transfers Out (Educ. & General)	9,633	1.1%
Non-Mandatory Transfers Out	21,065	2.5%
Total	\$857,580	
Expenditures and Transfers by Object		
Salaries and Wages	\$403,907	47.1%
Benefits	109,314	12.7%
General	212,616	24.8%
Scholarships	66,268	7.7%
Capital	16,216	1.9%
Mandatory Transfers	28,194	3.3%
Non-Mandatory Transfers	21,065	2.5%
Total	\$857,580	

Another critical component of an economic impact assessment is the characterization of jobs at the institution under study. Table 3 itemizes employment at ISU. As of October, 2006, there were 13,843 full and part-time jobs at ISU. Faculty was 12.4 percent, professional and scientific were 17.8 percent, merit employees 12.9 percent, and 56.3 percent were graduate and undergraduate student workers.

Table 3. Summary of ISU Employment, October 2006

	Jobs	Percent of Total
Faculty	1,719	12.4%
Professional and Scientific	2,458	17.8%
Merit	1,784	12.9%
Contract Employees	95	0.7%
Student and Other Part-Time	7,787	56.3%
	13,843	

Most of the relevant data necessary for conducting the I-O assessment are in Tables 1 through 3. The total receipts from all sources for fiscal 2006 were \$860.945 million. That is the direct economic value of ISU activities in the Iowa economy and the amount that was entered into the modeling system as the total industrial output of the university. Next, all labor income must be determined. That value is the sum of all salaries, wages, and benefits paid by ISU, \$513.221 million in fiscal 2006. To that amount is added the value of scholarships as these can be considered indirect payments to individuals. Including scholarships brings the labor income amount up to \$579.5 million. Last, the model needs to know how many jobs are in the institution that is being assessed. As of October 2006 ISU had 13,843 workers.

ISU Economic Effects

The overall benefits of ISU as an institution of higher learning and as a cultural and educational center are absorbed by the entire state. The direct spending associated with ISU operations and personnel outlays, however, accrue significantly to the three core counties of Story, Polk, and Boone. Acknowledging this, for this segment of analysis, a model of the state of Iowa was compiled for calculating the total statewide economic values attributable to Iowa State University operations and activities.

Table 4 isolates ISU's economic impact as an institution of learning, research, and service. The direct output at ISU of \$860.95 million is produced by 13,843 jobs requiring \$579.5 million in labor and other income. In so doing, ISU stimulates \$180.64 million in indirect purchases from Iowa suppliers, which require an additional 2,230 jobs making \$62.7 million in labor income. When the employees of ISU and the workers in the supplying sectors convert their pay into household spending, they induce \$479.8 million in output, further requiring 5,342 jobs making \$145.14 million in labor income. Total estimated output (or total sales) in the state linked to ISU operations is \$1.52 billion, which required 21,415 jobs earning \$787.3 million in labor income.

Table 4. Iowa State University Operations Economic Impacts, Fiscal 2006

	Direct	Indirect	Induced	Total
Output (\$)	860,945,024	180,639,898	479,782,826	1,521,367,749
Value Added (\$)	582,854,016	93,990,448	273,326,190	950,170,653
Labor Income (\$)	579,489,024	62,673,947	145,136,197	787,299,167
Jobs	13,843	2,230	5,342	21,415

Table 5 lists the appropriate multipliers for each of the categories in Table 4. A multiplier is the total value in the category measured divided by the direct value. The output multiplier below of 1.77 means that for every dollar of ISU output \$.77 in additional spending is supported in the remainder of the Iowa economy. The value added and labor income multipliers are lower. The value added multiplier of 1.63 means that for every dollar in value added supported by ISU activities, an additional \$.63 in value added was stimulated in the rest of the economy. For every dollar of labor income at ISU, \$.36 in additional labor income is supported in the state.* Finally, for every job at ISU, 55/100^{ths} of a job is supported in the rest of the economy.

Table 5. ISU Total Multipliers

	Total Multiplier
Output	1.77
Value Added	1.63
Labor Income	1.36
Jobs	1.55

The economic values identified in this section of the study are directly attributable to ISU spending, the wages that it pays, and the people it employs; most of the primary and secondary effects accrue to a relatively small region of the state. The next section estimates the more localized economic outcomes that are associated with student spending while in attendance at the university. There are other important economic values that are not included in this study. Those are the visitor effects to local commerce that are associated with the

* The labor income multiplier is lower than in previous studies for two reasons: first, all scholarship amounts were added as labor income generated by the university; second, a much more informed estimate of input purchases relying in part on Board of Regents research modified the assumption of in-state purchases by both character and amount, thus lowering jobs and labor income in the induced sector.

attraction of outsiders to entertainment, cultural, conference, and recreational activities hosted by ISU. All gate payments or other fees paid by such patrons are already included in the first part of this study. All other spending in the community, however, is not included and cannot be studied without first conducting a detailed survey of visitors.

Student Life Economic Values

This next section assesses the community-wide commercial effects attributable the personal consumption spending by students in the community over and above their direct education costs or any other purchases the students make from ISU (housing, food, and other university-related services and goods).

The region assessed for this part of the study is smaller than previously employed and is made up of Story, Boone, Dallas, and Polk Counties. The vast majority of students that attend ISU during the regular school year reside in these counties, and these four counties account for most of the direct spending by students while in attendance at ISU. Story County, of course, commands the lion's share of spending. Polk and Dallas County combined, due to their size, proximity, and the mix of retail and entertainment services, also receives a substantial fraction of student spending. The linkage of labor and commerce between Boone County and Story County is also acknowledged in this configuration.

Elements of Student Life

Students attending ISU divide their spending among several essential and discretionary non-education categories. All students require food, shelter, transportation, medical care, and other goods and services. A subset of the ISU student population purchases much of its housing

and food from the university's housing and food services facilities. That subset of students, however, still will spend substantial amounts in the community on retail and service goods. More students live off of campus than on campus. Consequently, a quite sizable portion of the area economy is designed to accommodate their housing, dining, service, and retail goods needs.

Table 6 lists the distribution of housing among ISU's 25,462 full-time students at the beginning of the 2006 school year. All university housing accounted for 30.4 percent of the students, 51.4 percent lived in the city of Ames not in ISU facilities, 17 percent lived outside of Ames, and no information was available for just one-percent of the students.

Table 6. Student Housing Characteristics, October 2006

	Students	Percent of Total
University Housing	7,747	30.4%
Residence Halls	7,056	27.7%
Student Apartments	691	2.7%
Off Campus	17,715	69.6%
Fraternities and Sororities	1,029	4.0%
All Other Housing in Ames	12,076	47.4%
Outside of Ames	4,359	17.1%
No Information	251	1.0%
Total	25,462	

Listed next is expected spending for students by kind of student. Those data were derived from university financial aid considerations, and they provide broad direction on the average allocation of student spending. The data are contained in Table 7.

A basic budget for a typical undergraduate student (excluding tuition and fees) is \$10,410 per year. For graduate and professional students and for veterinary students, non-tuition costs are \$12,804 and \$13,686 respectively per year. The largest fraction of non-tuition spending is for housing, followed by all personal discretionary spending.

Table 7. Average Attendance Costs for Resident ISU Students

	Undergraduate	Graduate and Professional	Veterinary
Tuition & Fees	\$6,060	\$6,866	\$14,834
Room/Board (Estimated)	\$6,445	\$8,143	\$8,143
Books/Supplies (Estimated)	\$892	\$892	\$1,038
Total University Expenses	\$13,397	\$15,901	\$24,015
Anticipated Personal Expenses	\$3,069	\$3,769	\$4,503
Total Expected Cost of Attendance	\$16,470	\$19,670	\$28,520

Using these data, coupled with enrollment information on the total number of students that were undergraduates, graduates, or full or part-time, total expected non-education spending for all students attending ISU was estimated. The amounts are contained in Table 8.

After considering the full and part-time distribution of students and the distribution of students by level of enrollment, total student spending linked to attendance at ISU in Fiscal 2006 was estimated at \$189.6 million.* That represented the amount of spending introduced into the

* Student spending data for the 2006-2007 academic year were deflated by 3 percent to approximate costs for fiscal 2005-2006. Non-academic spending by foreign students is no different than resident students.

I-O model to gauge the economic impacts for the area. That amount is treated as student discretionary spending and constitutes the basis for modeling their impact on the regional economy.

Table 7. Estimated Non-University Student Spending, Fiscal 2006

	Undergraduate	Graduate and Professional	Total
Housing and Food	83,672,084	34,209,313	117,881,397
All Other Personal Expenses	57,197,542	14,483,858	71,681,400
Transportation	11,306,034	2,233,418	13,539,452
Medical and Dental	9,650,100	1,906,301	11,556,401
Miscellaneous	36,241,408	10,344,139	46,585,547
All Student Spending	\$ 140,869,626	\$ 48,693,171	\$ 189,562,797

Student Life Economic Impacts in the Four-County Region

Student spending in the amount of \$189.6 million was entered into the four-county model. In order to more accurately reflect student spending, several sectors were manually manipulated. Chief among them were the real estate sector, food stores, and dining and drinking as these are categories where very high fractions of student spending are concentrated. The remaining spending was distributed in the manner of an average household making between \$15,000 and \$20,000 per year as our proxy for student households.

Table 8 contains the estimated total economic values attributable to student spending in central Iowa. The model determined that \$162.3 million was likely spent within the region, the remainder leaking to other areas of the state or nation. That demand for goods and services by ISU students generated \$80.5 million in value added, of which \$37.02 million went to 1,804 jobs. To supply those goods and

services to students required \$35.4 million in additional, regionally-supplied inputs, which paid \$11.2 million in labor incomes to 333 jobs. When the workers in the direct and the indirect sectors converted their labor incomes into household spending, they induced another \$31.7 million in output (or sales), further requiring 335 jobs making \$10.119 million in labor incomes. Combined, in the four-county region, ISU student spending supports \$229.4 million in total industrial output, \$119.1 million in value added, \$58.4 million in labor income, a subset of value added, and 2,473 jobs.

Table 8. Iowa State University Student Spending Economic Impacts, Fiscal 2006

	Direct	Indirect	Induced	Total
Output (\$)	162,296,796	35,393,280	31,661,028	229,351,108
Value Added (\$)	80,511,528	19,566,738	19,024,830	119,103,096
Labor Income (\$)	37,024,296	11,234,374	10,118,517	58,377,188
Jobs	1,805	333	335	2,473

Table 9 contains the total multipliers associated with student spending. The output multiplier of 1.41 means that for every dollar of student spending that is in the region, another \$.41 in additional output is sustained in the region. The value added multiplier of 1.48 means that for every dollar of value added created by direct spending by students, another \$.48 in value added is created in the rest of the regional economy. The labor income multiplier of 1.58 means that for every dollar in labor income generated in the industries where students spend their money, \$.58 in additional labor income is sustained in the

region. Last, a jobs multiplier of 1.37 means that for every job that they directly support through their spending, another 37/100^{ths} of a job is maintained elsewhere in the regional economy. The jobs multiplier is quite low as most of the jobs stimulated by student spending are concentrated in retail and service firms.

Table 9. Total Student Spending Multipliers

	Total Multiplier
Output	1.41
Value Added	1.48
Labor Income	1.58
Jobs	1.37

Standard Comparisons of Student Impacts

The preceding discussions give a sense of student spending in central Iowa and the likely economic impacts that can be expected. Another manner of comparing economic impacts is to standardize the outcomes per fixed unit of spending or fixed number of students. Tables 10 and 11 contain those standard estimates.

In Table 10 it is shown that per million dollars of spending that actually stays in the four-county region, ISU students support, considering all industrial linkages, \$1.413 million in total output, \$.734 million in value added, and \$.3597 million in labor income to 15.2 jobs.

Table 10. Iowa State University Student Spending Economic Impacts Per Million Dollars of Regional Spending

	Direct	Indirect	Induced	Total
Output (\$)	1,000,000	218,078	195,081	1,413,159
Value Added (\$)	496,076	120,561	117,222	733,860
Labor Income (\$)	228,127	69,221	62,346	359,694
Jobs	11.1	2.1	2.1	15.2

Table 11 displays the same information, but on a per-1,000 ISU student basis. Considering the mix of all students, a thousand ISU students sustain \$9.01 million in regional industrial output, \$4.7 million in value added, and 2.3 million in labor incomes to 97 jobs.

Table 11. Iowa State University Student Spending Economic Impacts Per 1,000 ISU Students

	Direct	Indirect	Induced	Total
Output (\$)	6,374,079	1,390,043	1,243,462	9,007,584
Value Added (\$)	3,162,027	768,468	747,185	4,677,680
Labor Income (\$)	1,454,100	441,221	397,397	2,292,718
Jobs	70.9	13.1	13.2	97.1