THE ECONOMIC ROLE OF THE UNIVERSITY OF MISSOURI IN THE STATE

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The University of Missouri (UM) has provided teaching, research, and service to the people of Missouri since its founding in 1839 – the first publicly supported institution of higher education in the Louisiana Territory.

The University resided exclusively on the Columbia campus until 1870, when a school of mines and metallurgy was established in Rolla. In the same year, an agricultural college was added in Columbia as the University assumed land-grant responsibilities.

In 1963 the University expanded again, acquiring the University of Kansas City, which had formerly been a private institution. Additionally, a new campus was built in St. Louis, creating the present four-campus System.

Today, the University of Missouri is one of the nation's largest higher-education institutions, with almost 64,000 students on four campuses and an Extension program with activities in every county of the state. The mission of the University, as a land-grant university and Missouri's only public research and doctoral-level institution, is to discover, disseminate, preserve, and apply knowledge.

INTRODUCTION TO THIS REPORT

In this report we quantify the economic effect of each of the four campuses and the University as a whole. We measure UM's influence on Missouri's economy by calculating the total economic activity generated across the state through its various activities and operations. Some of this economic activity occurs inside UM in the form of direct expenditures and employment (direct economic effects). Through such expenditures, additional economic activity is stimulated around the state (indirect economic effects). Indirect expenditures include expanded economic activities of other businesses that service UM. Increased disposable income associated with UM's economic activities also translates into increased economic activity within the state (induced economic effects). Through economic modeling, we estimate UM's direct, indirect, and induced economic effects on the state during 2005 and 2006.

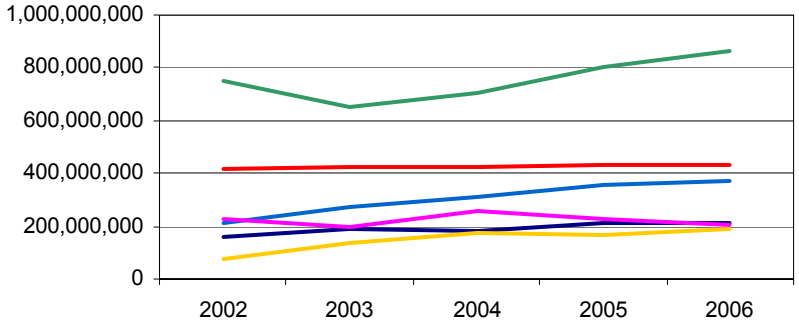
This report limits its exploration of the economic impact to the University's fiscal transactions. However, much like other major research universities, UM generates additional economic value that is not easily quantified. For example, UM contributes to the state's economic growth through the ongoing supply of skilled professionals and related improvements in labor productivity, as well as through technical innovation in the form of inventions, new products, and spin-off companies. UM also improves the quality of life of Missourians through, among other activities, the volunteer work of its employees and students; world-class, and often uncompensated, health-care services; a wide variety of athletic and cultural events; scientific conferences, workshops, and seminars; library services; and continuing education programs. Despite the difficulty in accounting for all this value, it is clear that UM has an integral role in the state.

UNIVERSITY OPERATIONS

REVENUES

In 2005 the University generated almost $2.2 billion in revenues – that figure increased 3.5% in 2006 to almost $2.3 billion (see Figure 1). Of that 2006 sum, $1.6 billion were operating revenues, which came largely from student fees, medical & other auxiliary services (e.g., student housing and bookstores), and research grants. Much of the increase in revenue came from auxiliary enterprises (e.g., hospital, TV station, and bookstore) and student fees. Increases in student fee revenues are both attributable to

Figure 1. Sources of UM Revenue: 2002-2006



Revenue	2002	2003	2004	2005	2006
Net Student Fees	209,897,000	273,419,298	313,012,803	355,516,249	374,926,032
Federal Funds	155,474,000	185,738,463	185,144,812	209,249,100	213,639,510
Auxiliary Enterprises	747,095,000	654,053,334	706,850,427	802,610,906	862,092,976
State Appropriations	414,794,000	423,330,152	421,433,936	430,126,735	428,892,595
Other Grants, Gifts & Contracts	229,108,000	198,933,605	259,811,420	226,009,693	203,443,325
Misc	72,016,000	134,580,597	172,140,492	170,031,944	187,345,333
TOTAL	**1,828,384,000**	**1,870,055,449**	**2,058,393,890**	**2,193,544,627**	**2,270,339,771**

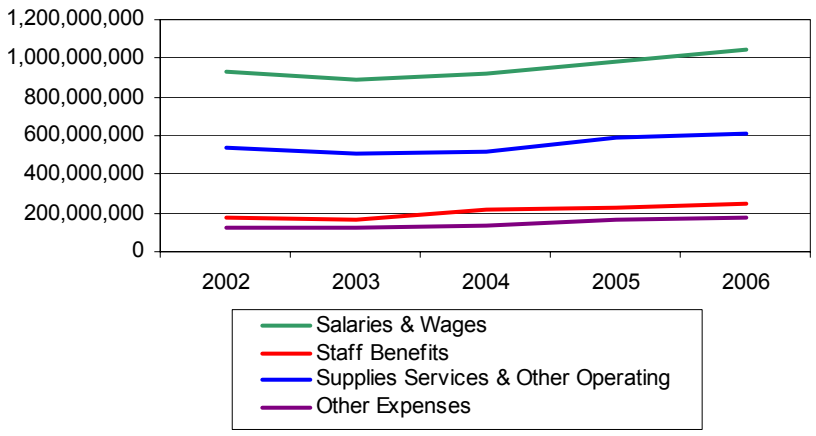
higher per-student costs and increasing attendance rates. The state's $429 million appropriation adds to the operating revenues, bringing it to just over $2.02 billion. The remaining revenues come from gifts and grants. In 2002 and 2003, the state appropriation contributed 23% to the operating budget of the University. That number has steadily decreased to 19% in 2006. The state appropriation and all other revenue coming from the state and its citizens (e.g., tuition) sum to 75% of all UM's total revenues. Out-of-state funds come largely from federal grants, out-of-state student fees, and private donations.

As the largest entity at UM, MU (Columbia) generated almost half of the total revenues in 2006, followed by UM Health Care and UMKC (Kansas City). MU also generated 57% of the out-of-state revenues, followed by UMKC, which had 17%.

EXPENDITURES

UM expenditures have been rising steadily over the last 5 years (Figure 2). In 2006, the University incurred $2.1 billion in operating expenses. The difference between the $2.1 billion in total expenses and the $2.3 billion in total revenues, $0.2 billion, includes additions to capital assets, endowments and other restricted funds, and unrestricted resources held in reserve. The latter may be used to fund future projects.

Figure 2. UM Expenditures: 2002-2006



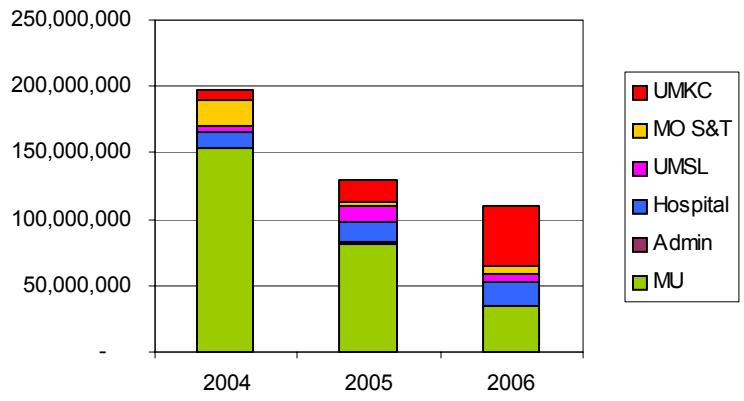
Expenses	2002	2003	2004	2005	2006
Salaries & Wages	927,460,000	892,415,178	919,418,028	987,239,873	1,044,462,621
Staff Benefits	177,514,000	168,225,368	214,178,609	226,968,761	248,687,903
Supplies Services & Other Operating	534,772,000	508,776,888	518,934,811	592,197,510	610,825,558
Other Expenses	122,907,565	126,687,347	133,794,663	162,152,330	175,981,302
TOTAL	**1,762,653,565**	**1,696,104,781**	**1,786,326,111**	**1,968,558,474**	**2,079,957,384**
Change in Assets	*62,304,000*	*173,950,668*	*272,067,779*	*224,986,153*	*190,382,387*

As with most entities in the knowledge economy, human capital represents the majority of expenditures. At UM, investments in faculty and staff comprise 62% of all expenditures – in the form of salaries and benefits. When expenditures are broken down by function, 54% are associated with instruction, research, and public service. Twenty eight percent of expenditures are associated with University Health Systems. Further, 10% of expenses are accrued by auxiliary enterprises (e.g., bookstores and TV station). Plant operation, maintenance, and depreciation account for the remaining 8% of total operating expenses.

CONSTRUCTION

Construction is an important consideration in calculating the economic role of the University of Missouri on the state, since they are usually large, up-front investments that spike employment and expenditures. Construction expenditures have dropped significantly from 2004, especially at MU, as several major projects were completed. UM expenditures fell from almost $200 million in 2004 to almost $110 million in 2006 (Figure 3). Still, construction is active on all campuses. In fact, the University system awarded 129 new construction projects in 2006 totaling $146 million.[1]

Figure 3. UM Construction Expenditures: 2004-2006



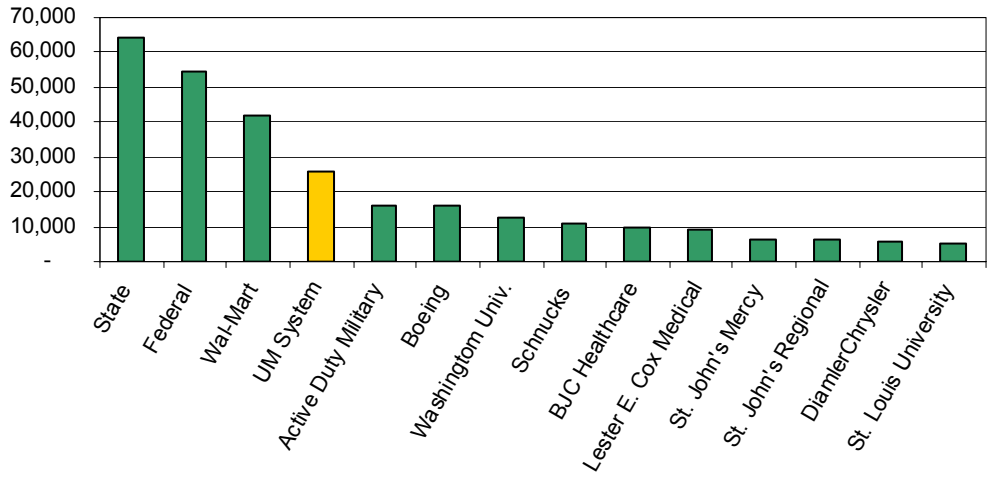
EMPLOYMENT

The University of Missouri is one of the state's largest employers. The UM system had almost 24,000 employees in 2006, growing 9% since 2001 (Figure 4). MU is responsible for the majority of this employment growth, creating more than 2,000 jobs during this period.[2]

Figure 4. Faculty and Staff Headcount (excluding student assistants)

	2001	2002	2003	2004	2005	2006
MU Columbia	14,108	14,559	14,215	15,297	15,752	16,233
UM Kansas City	3,033	3,671	3,530	3,553	3,625	3,483
Missouri S&T	1,271	1,282	1,307	1,316	1,367	1,340
UM St. Louis	2,214	2,253	2,228	2,312	2,245	2,337
System Administration	1,204	1,190	1,151	534	533	542
UM System	**21,830**	**22,955**	**22,431**	**23,012**	**23,522**	**23,935**

Figure 5. Top Missouri Employers in 2006



When consultants and irregular employees were included, there were 25,913 employees living in Missouri in 2006. This makes the University system the 2nd largest non-governmental employer in the state (Figure 5). In fact, UM is almost as large as the 2nd and 3rd largest private employers combined – Boeing and Schnucks – which have a total of 28,200 employees. UM employees generated $126 million in tax revenues for the state of Missouri, with a total of $940 million in employee salary returning to the state.

Many companies in Missouri are larger than UM in terms of both revenues and employment, but only Wal-Mart has more employees that are employed within Missouri. In fact, none of the top publicly traded firms headquartered in Missouri are in the top 15 employers (Figure 6). Because of the importance of employment to the regional economy, UM has a more significant impact on the Missouri economy than do much larger firms whose operations tend to be geographically dispersed.

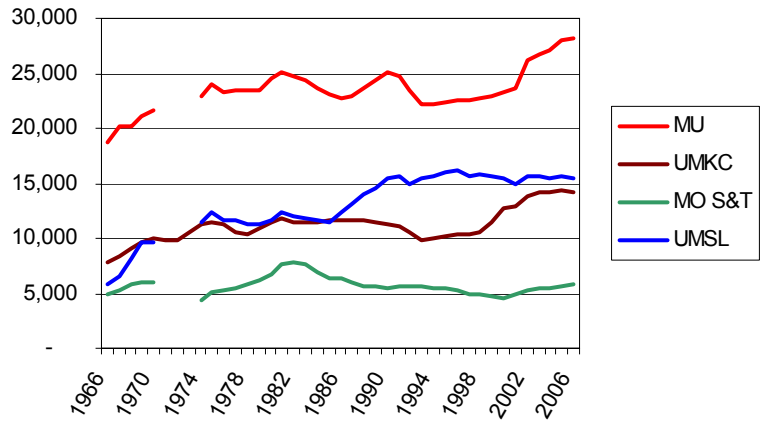
Figure 6. Largest Five Publically Traded Firms Headquartered in MO: 2006

State Rank	Company	Revenues ($ millions)[3]	City	Employees[4]
1	Emerson Electric	17,305	St. Louis	114,200
2	Express Scripts	16,266	Maryland Heights	13,800
3	Anheuser-Busch	15,036	St. Louis	31,485
4	Ameren	6,780	St. Louis	9,136
5	Monsanto	6,439	St. Louis	16,500

STUDENTS

The UM system provided an education to almost 64,000 students during the fall semester of 2006. The number of students attending UM has steadily risen, with much of the growth in the last decade being experienced at MU and UMKC (Figure 7). While the majority of growth is attributable to undergraduates, the graduate student enrollment has increased more quickly in the last 6 years. Professional enrollment has lagged the other degree types.

Figure 7. Fall Enrollment by Campus: 1966-2006



Three quarters of those students attending UM were undergrads, and the remaining 25% were either graduate students or professional students. Almost 80% of students came from Missouri, and 95% percent came from inside the US. Undergrads tended most often to be Missouri residents, while 59% of graduate students were from Missouri.

The growing population of students is matched with a growing number of graduates (Figure 8). More than 13,000 diplomas were awarded throughout the UM system in 2006. Sixty-four percent of the diplomas were undergraduate degrees, 24% were masters degrees, and 6% were professional degrees.

Figure 8. Degrees Granted By Type

Degree	2002	2003	2004	2005	2006
Baccalaureate	7,611	7,579	8,090	8,285	8,535
Graduate Certificate	130	222	202	257	259
Master's	2,734	3,122	3,194	3,215	3,227
Educational Specialist	76	94	82	77	91
Doctoral	401	432	417	439	470
First Professional Degree	692	728	756	711	741
Total	**11,664**	**12,177**	**12,741**	**12,984**	**13,323**

CALCULATING UM'S ROLE IN THE STATE'S ECONOMY

Evaluating the University's impact necessitates understanding the multitude of transactions that occur between the University and the

various industries of the State. Accordingly, a statewide accounting model (input-output model) that describes how goods flow across sectors and to the final consumers is necessary to analyze these transactions.

Input-output (I/O) modeling was first developed in the late 1930s and has become widely used in regional economics since that time.

The flow of one sector's output to another sector reflects the *linkages* in the economy. With I/O modeling, there is a "fixed proportion" of inputs for each unit of output. Fixed proportions imply there are no substitutions between inputs, regardless of price changes or new technology. In addition, all the firms in a sector are assumed to need the same average mix of inputs. For example, if a sector called "construction" includes companies involved in residential housing and road construction, I/O assumes the same proportion of inputs, capital, and labor are used in both types of companies. Fixed proportions also signify that small and large producers have the same input mix and efficiency in production. Another assumption in I/O modeling is "constant returns to scale." That is, in order for output to double, all of the inputs used in production must double.

There are several I/O models available to researchers today. One of the more popular models, and the model which is used in this study, is called IMpact Analysis for PLANning (IMPLAN). IMPLAN contains comprehensive national data that is used to estimate regional data on a county-by-county basis. This model allows the researcher to specify the geographic region of interest. In the context of the I/O model there are three types of effects that account for the total economic impact of UM.

- *Direct effects*: These effects reflect spending and employment by UM itself in the local economy.

- *Indirect effects*: These are additional impacts created as UM expenditures cycle through the state economy. Because of UM demand for goods and services, companies within the state create new jobs, increase their revenues, and purchase other goods and services as inputs in their own production processes.

- *Induced effects*: While direct and indirect effects measure the impacts of business-to-business interactions, induced effects are specific to the behavior of the labor force. UM employees and those of the related businesses spend their earnings in the local economy to purchase items such as food, transportation, housing and a variety of services all stimulating the economy.

The rate at which the direct, indirect, and induced effects impact the economy is often termed the multiplier or, simply, the amount $1 directly spent in the economy changes the output in the economy. The multiplier used for the core functions of UM included 0.346 for indirect effects and 0.604 for induced effects, which with the original 1.0 direct effect totals 1.951. As such, for every dollar spent by the University, $1.951 of spending occurs somewhere in the Missouri economy.[5]

To ensure an accurate depiction of the University, it is broken into its component functions within the IMPLAN model. This allows a unique multiplier to be assigned to each of the campuses and divisions of UM by aggregating the appropriate UM component activities. The separation of the component activities often results in a slightly lower multiplier than would result from UMs core activity – education. Bookstores are an example of an important activity of the University with a relatively low multiplier (1.846). In fact, many of UM's diverse activities with relatively low multipliers may offer significant social value beyond what an economic multiplier might suggest. The resulting output multipliers for each UM campus are shown in the following table (Figure 9).

Figure 9. 2006 University Operations' Output

	Direct	Indirect	Induced	Total[6]
UM	1	0.3489	0.5900	1.9389
MU	1	0.3282	0.6080	1.9363
MU Science & Tech	1	0.3323	0.5980	1.9303
UM-Kansas City	1	0.3180	0.6202	1.9382
UM-St. Louis	1	0.3368	0.5984	1.9352
University Hospital	1	0.4109	0.5379	1.9488
Extension/Administration/U-Wide	1	0.3462	0.6044	1.9506

The preceding impact multipliers are output multipliers that relate to the total sale of goods and services in the state. Value-added impacts are also calculated in this report, which consider only the component of these goods and services that is value-added within the state. This distinction is important; for example, a merchan-dise retailer may generate a relatively high output (sales) value because it oversees many transactions, but would have a much lower value-added impact because few of the products sold are produced within the state, thus not employing many of Missouri's industries. The advantage of calculating value-added is that it is directly comparable to the gross state product, a value-added measure of the state's economic performance.

Figure 10. Multipliers of Selected Missouri Industries

	Output	Value-Added
Commercial & Institutional Const.	1.85	1.84
Transportation Const.	1.81	1.83
Footwear Mfg	1.97	2.54
Cement Mfg	1.61	1.72
Automobile Mfg	1.59	2.99
Automobile Part Mfg	1.67	2.76
Surgical & Medical Instrument Mfg	1.81	1.92
Truck Transportation	1.95	2.17
Warehouse & Storage	1.87	1.75
General Merchandise Stores	1.87	1.86
Legal Services	1.85	1.74
Scientific R&D Serv	1.99	1.86
Business Support Serv	1.85	1.84
Elementary & Secondary Schools	2.13	2.08
Colleges and Universities	1.95	1.98
Hospitals	1.95	2.05
Hotels and Motels	1.72	1.63

In a simple world, an economic planner might chose to invest in industries and activities that offer the largest multipliers for the particular region. The following list shows such multipliers for an eclectic selection of Missouri industries (Figure 10). The activities that are relevant to the University (e.g., research, colleges, hospital) tend to have relatively high multipliers, which approach 2. However, other choices exist that would also offer a "good investment," such as automobile manufacturing.

The Economic Role of University Operations

The expenses found on the UM financial statement do not exactly reflect cash outlays of the particular year, as capital projects are financed and depreciated over multiple years. Adjusting the budgets to current year expenditures, the University expended a total of $2.1 billion in 2006[7] (see Figure 11). Breaking this down into the relevant functions, in 2006, 36% of expenditures were associated with auxiliary services, 14% were for research, 5% for construction, and the remaining 45% for operations. Each of these groupings was further decomposed in the IMPLAN model to more accurately characterize the true economic functioning of the University.

Figure 11. Adjusted UM Expenditures: 2004-2006

	2004	2005	2006
Operating	810,609,235	882,051,289	937,575,391
Research	285,134,016	301,891,000	290,353,000
Aux Expenses	624,633,257	701,048,461	755,895,172
Construction	194,602,018	129,325,636	109,753,268
TOTAL	1,914,978,526	2,014,316,385	2,093,576,832

UM direct expenditures have increased over the last few years, although 2006 had more modest growth. Some of this can be attributed to a slight decrease in external research funding, but more significant is the decrease

in construction expenditures. In fact, at MU, total expenditures actually decreased in 2005 and again in 2006 as a result of construction, despite a general increase in operating expenditures.

In 2005, the $2 billion expenditures of UM led to $3.9 billion in sales throughout the state's economy, supporting 45,417 jobs (Figure 12). Conversely, UM was responsible for $2.2 billion in value-added, or 1% of the state's gross state product. In 2006 the UM system's operating and construction expenditure grew to $2.1 billion, which matriculated through the economy, affecting $4.1 billion in sales and 47,342 jobs. In 2006, MU value-added grew to $2.3 billion.

Figure 12. 2006 University Role in the State Economy: Operating Expenditures and Construction

	Direct	Indirect	Induced	Total	Total 2005
UM System					
Output	2,093,576,865	730,526,364	1,235,185,206	4,059,288,435	**3,904,230,014**
Employment	27,556	7,373	12,413	47,342	**45,417**
Value Added	1,130,651,924	456,296,777	690,631,731	2,277,580,432	**2,229,912,530**
UMC					
Output	878,960,550	288,515,200	534,429,019	1,701,904,769	**1,703,560,156**
Employment	11,514	2,951	5,371	19,836	**19,670**
Value Added	520,074,043	164,744,761	307,855,065	992,673,869	**994,671,065**
UMKC					
Output	317,652,666	105,557,708	189,968,568	613,178,942	**539,897,403**
Employment	4,755	1,100	1,909	7,764	**6,870**
Value Added	183,663,836	61,323,543	109,430,376	354,417,755	**313,124,035**
MO S&T					
Output	143,045,533	45,487,079	88,717,607	277,250,219	**258,507,652**
Employment	1,960	476	892	3,328	**3,090**
Value Added	85,470,571	26,462,984	51,105,315	163,038,870	**152,275,295**
UMSL					
Output	178,623,578	60,154,247	106,887,395	345,665,220	**335,823,462**
Employment	2,890	634	1,074	4,598	**4,442**
Value Added	103,350,366	35,271,208	61,571,896	200,193,470	**194,634,439**
HOSP					
Output	488,965,922	200,928,576	263,005,972	952,900,470	**872,918,238**
Employment	4,992	1,896	2,643	9,532	**8,728**
Value Added	189,315,264	150,900,103	130,613,018	470,828,385	**464,387,246**
Other					
Output	86,328,616	29,883,554	52,176,645	168,388,815	**193,523,103**
Employment	1,445	315	524	2,285	**2,617**
Value Added	48,777,844	17,594,178	30,056,061	96,428,083	**110,820,450**

THE ECONOMIC ROLE OF STUDENT SPENDING

The University attracts a large number of students, making their involvement in the local economy important, despite their expenditures not all being directly associated with the University. Students paid a total of $501 million in tuition and fees, with $126 million of that being offset through fee waivers and scholarships, leaving a net expenditure of $375 million dollars in 2006. These on-campus expenditures are only a fraction of most students' total expenditures, which don't include expenditures on food, clothing, housing, and personal items.[8] It is largely up to the local merchants to provide those markets and services.

Figure 13. Student FTEs: 2006

	Undergraduate	Professional	Graduate	Grand Total
MU	19,781	1,083	3,319	24,183
UMKC	6,528	1,495	1,776	9,798
MO S&T	4,200		783	4,983
UMSL	7,873	173	1,422	9,468
	38,381	**2,751**	**7,299**	**48,431**

Off-campus student expenditures are quantified and broken down to account for buying behavior and patterns. The most recent data for such spending patterns was provided in a 1997 study for student spending at MU.[9] On a per-capita basis, students spent an average of $11,496. Per capita student costs were lowest at MO S&T ($9,191) and MU ($10,119), where a larger percentage of students live on campus and have their room and board subsumed in the University's operating budget. UMKC has the highest per-capita student expenditure ($15,629), which is largely due to the percentage of professional students who incur higher costs and the larger personal expenses forecasted by the UMKC financial aid department. These per-capita expenditures can be compared to the number of full-time equivalent students (Figure 13) to derive total student expenditures.[10]

Figure 14. 2006 Off Campus UM Student Expenditures

	Off -Campus Expenditures		On-Campus Expenditures
Housing	184,049,744	**Room & Board**	56,320,429
Transportation	178,446,527		
Food at Home	42,116,222		
Food Out	47,867,776		
Entertainment	38,726,711		
Apparel & Upkeep	34,471,028		
Health Care	20,852,844		
Personal Care	5,319,603		
Book and Reading	3,830,114	**Books & Supplies**	26,541,752
Total	555,680,570		82,862,181

Assuming that all student purchases are made within the state, students' non-tuition spending totaled $556 million in 2006 (Figure 14). To put this into context, students' off campus expenditures were significantly larger than their spending on tuition, but the expenditures were only a quarter of the magnitude of the total University operating expenditure. Students' largest

expenditures were on housing, followed closely by transportation. Food (at home and away) was a distant third, comprising $90 million.

The students' $556 million in spending multiplied through linkages in the economy to a total of $946 million (Figure 15). Although the resulting 1.70 output multiplier is smaller than the University's, 11,000 jobs and $575 million in value-added were associated with the students spending activities.

Figure 15. Economic Role of 2006 Student Non-Tuition Expenditures on Missouri

	Direct	Indirect	Induced	Total
UM System				
Output	556,712,976	179,429,432	210,101,646	946,244,054
Employment	7,551	1,734	2,111	11,397
Value Added	353,821,441	100,637,788	121,028,075	575,487,304
MU				
Output	245,754,150	79,154,000	93,235,462	418,143,612
Employment	3,336	765	937	5,038
Value Added	156,190,396	44,427,820	53,707,853	254,326,069
UMKC				
Output	153,092,180	49,380,855	57,416,292	259,889,327
Employment	2,075	477	577	3,129
Value Added	97,298,252	27,672,846	33,074,389	158,045,487
MO S&T				
Output	45,799,581	14,740,489	17,476,473	78,016,543
Employment	622	142	176	940
Value Added	29,108,224	8,280,235	10,067,240	47,455,699
UMSL				
Output	112,067,065	36,154,088	41,973,419	190,194,572
Employment	1,518	350	422	2,290
Value Added	71,224,569	20,256,887	24,178,593	115,660,049

If student off-campus expenditures are added to the UM operating expenditures, the total jumps to $2.6 billion. Further, its role in the state's total sales jumps to $5 billion. This impact equates to almost 71,000 Missouri jobs and 1.3% of Gross State Product.

Student expenditures also influence how the University's economic role is distributed across the state. The relative importance of non-educational entities (e.g., the hospital) decreases in importance relative to Kansas City, Rolla, and St. Louis campuses, which have proportionally large student populations. Although this analysis only considers statewide activity, the magnitude and local nature of student spending implies great importance to the local economies as well.

Economic Role vs. Economic Impact

The preceding results can only be thought of as statewide economic impacts in the short term. In other words, if the University, everything associated with it, and all its people were to instantly disappear, the state would lose the entirety of its economic role in the state. However, such a situation is barely conceivable, as even if the University were to close, many of its functions would still be undertaken around the state. For example, a portion of the students would take classes at other state institutions and some faculty and staff would find alternative jobs. In addition, much of the funding given to the University would go to other entities within the state. As such, total expenditures are best understood as the University's role in the economy and not the impact per se.

An accurate measure of true impact would be the value that is definitively lost in the absence of the University. Imagining what the state would look like without UM is hard to conceptualize and even harder to define economically. However, the state might be without research activity supported by the unique configuration of physical and knowledge capital of UM. It might also lose students who came to Missouri to study a particular subject or donations made by alumni who enjoyed their education, amongst other things.

Due to the difficulty in predicting this counterfactual, it is instructive to consider the economic impact as the new dollars brought into the economy as a result of UM's existence (e.g., expenditures of out-of-state student, federal grants, etc.). This, admittedly, omits some of the impact that UM might have on the state, but provides a floor from which to judge impact. In comparison the role of total expenditures can be thought of as the ceiling. The "true" impact is likely to be somewhere in the middle.

The Impact of Financial Inflows from Outside the State

The University is the recipient of significant financial inflows from outside the state. These inflows consist of federal appropriations, contracts granted from federal and private sources, and out-of-state student tuition and living expenditures, as well as visitor spending.

The share of the 2006 UM operating budget that came from outside the state was $454 million, or 20% of UM's total revenue (Figure 16). Rolla had the highest percentage with 36% and Columbia and Kansas City both had 26%.

Figure 16. Operating Revenues by Geographic Origin (thousands): 2006

	Out-of-state	In state	Total	% from out-of-state
Columbia	259,894	743,296	1,003,190	26%
Kansas City	78,554	228,045	306,599	26%
Rolla	56,076	100,399	156,475	36%
St. Louis	37,509	150,168	187,677	20%
Extension	13,952	37,144	51,096	27%
Hospital	3,473	544,140	547,613	1%
System Administration	4,215	69,732	73,947	6%
U-Wide Resources	161	7,236	7,397	2%
TOTAL	**453,763**	**1,816,497**	**2,270,260**	**20%**

Out-of-state students also contribute to the total out-of-state revenues. In addition, a percentage of students make Missouri their permanent home, further benefiting the state's economy. In 2006, more than 11,000 students came from outside the state of Missouri, comprising 21% of the total University population. The Kansas City and Rolla campuses had the largest proportion of out-of-state students, followed by Columbia (with 24%, 21% and 19%, respectively).

Based on standard spending patterns outlined in previous sections, these students spent in excess of $204 million in 2006 (Figure 17). Fifty-eight percent of these purchases were in the form of off-campus living expenses and 42% were associated with tuition and fees.

Figure 17. 2006 Expenditures by Out-of-State Students

	Non-Tuition Expenditures	Net-Tuition	Total
UMC	46,050,000	39,637,000	85,687,000
UMKC	45,679,000	28,044,000	73,723,000
MO S&T	12,949,000	9,767,000	22,716,000
UMSL	13,265,000	9,063,000	22,328,000
	117,943,000	86,511,000	204,454,000

Together, the out-of-state revenues and the out-of-state student expenditures total $572 million[11] (Figure 18). The impact of this new money entering the Missouri economy is over $1 billion in statewide sales. This activity creates 13,000 jobs and $609 million in value-added – almost .5% of the Gross State Product. Measuring just this portion of economic impact reveals the University's significant importance to the state.

Figure 18. 2006 Out-of-State Revenue Impacts

	Direct	Indirect	Induced	Total
UM System				
Output	571,777,397	182,493,898	337,930,553	1,092,201,848
Employment	7,745	1,879	3,396	13,020
Value Added	379,114,638	74,452,603	155,095,408	608,662,649
MU				
Output	305,943,620	95,907,220	187,939,014	589,789,854
Employment	3,988	991	1,889	6,867
Value Added	219,560,657	24,513,269	68,693,565	312,767,491
UMKC				
Output	124,233,617	40,559,745	66,671,064	231,464,426
Employment	1,782	414	670	2,866
Value Added	74,960,222	23,358,336	38,405,520	136,724,078
MO S&T				
Output	69,025,073	21,413,386	42,079,660	132,518,119
Employment	874	220	423	1,517
Value Added	42,362,450	12,328,637	24,239,776	78,930,863
UMSL				
Output	50,774,087	16,827,300	28,296,855	95,898,242
Employment	759	173	284	1,217
Value Added	30,116,835	9,752,327	16,300,252	56,169,414
HOSP				
Output	3,473,000	1,441,817	1,866,596	6,781,413
Employment	35	14	19	68
Value Added	1,758,692	764,701	1,075,242	3,598,635
Other				
Output	18,328,000	6,344,430	11,077,364	35,749,794
Employment	307	67	111	485
Value Added	10,355,782	3,735,333	6,381,053	20,472,168

In addition to those out-of-state expenditures directly related to the University, visitors also have an impact on the state and local economies. In any given year, UM draws many visitors who come for a variety of reasons, such as cultural and athletic events, campus tours, commencements, and other special events. Those visitors spend money on food, lodging, transportation, and entertainment. Since it is difficult to determine the number of visitors that attend the diverse events offered by the University of Missouri, and even more difficult to determine the geographical origin of those visitors, the impact of visitor spending is not included in this report, although it is expected to be significant to the state and the local economy.

OTHER UNIVERSITY IMPACTS

In addition to its direct role in the Missouri economy, the University affects Missouri by creating value for its citizens. The impact of this value can be difficult to quantify, but it may exceed the impact of the University's expenditures.

THE VALUE OF EDUCATION

The predominant function of the University is to educate – an activity with immense value. Published reports show positive linkages between education level and a large host of quality-of-life standards, including higher levels of saving, increased personal/professional mobility, better consumer decision making, more hobbies, better health, and the tendency to be more socially aware and more rational. Many of these benefits also tend to be passed along to succeeding generations.

This value is easy to conceptualize but can be more difficult to calculate. Perhaps the most clearly calculable benefit associated with an educated labor force is the increase in work-life earnings of people with degrees. While workers with only a high school degree have an average work-life salary of $26,000 per year, those with bachelor's degrees have an average work-life salary of $45,000 per year.[12] This higher wage-earning capacity shows that the average worker with a bachelor's degree can expect to earn $700,000 more than their counterpart with a high school diploma over their work-life, even after accounting for all the costs of education. The benefits of advanced degrees are even more significant. These additional wages are an indication of the economy's valuation of education in respect to worker productivity and performance.

In the following tables, the opportunity cost of wages given up for education and the cost of tuition costs are netted from the work-life salary benefits. While the costs are significant, they are dwarfed by the total benefit. In fact, the opportunity cost and tuition cost of a UM education is only 16% of the total benefit for bachelor's and master's graduates, 12% for doctoral students, and 10% for professional students.

In 2006, the degrees awarded by UM facilitate the holders earning a total of $11.7 billion more than they would have with only a high school degree (Figure 19). Graduates from the Columbia campus alone are responsible for almost half of that value.

Not all graduates remain in the state. Those students that leave the state do not directly impact the Missouri economy, since they take with them

Figure 19. 2006 Total Value Conferred to Students Associated With Wage Improvement Afforded by a Degree

	Bachelor's Degree	Master's Degree	Doctoral Degree	Professional Degree	Total
MU	3,026,546,045	1,326,747,603	483,732,662	686,645,408	5,523,671,718
UMKC	965,478,184	795,870,218	105,999,114	975,502,432	2,842,849,948
MO S&T	507,664,271	435,422,739	128,365,841	-	1,071,452,851
UMSL	1,284,914,740	797,853,545	87,729,139	108,037,418	2,278,534,841
TOTAL	5,784,603,239	3,355,894,104	805,826,757	1,770,185,258	11,716,509,358

the value of the education that the state subsidized.[13] Accordingly, those students that leave the state should be removed from the analysis to get a better picture of the value retained.[14] Figure 20 considers only those students that work in Missouri the year after graduation.

The total benefit of students staying in Missouri after graduation is $6.6 billion. The total wage benefit of higher education (including 2-year institutions and certificate programs) for all Missouri graduates in 2006 is projected to be $45,390,566,850. Of those graduates that remain in the state after graduation, $26,875,682,125 is retained. UM accounts for almost 25% of this total value created by education in Missouri.

If the 2006 class alone is associated with $6.6 billion in value, the wage benefits enjoyed by all alumni is immense.[15] Moreover, the knowledge and skills obtained by these alumni help to enrich both their lives and Missouri as a whole.

Figure 20. 2006 Total Value Conferred to the State Associated with Wage Improvement Afforded by a Degree

	Bachelor's Degree	Master's Degree	Doctoral Degree	Professional Degree	Total
MU	1,906,724,008	769,513,610	183,818,412	260,925,255	3,120,981,285
UMKC	608,251,256	461,604,726	40,279,663	370,690,924	1,480,826,570
MO S&T	319,828,491	252,545,188	48,779,020	-	621,152,699
UMSL	809,496,286	462,755,056	33,337,073	41,054,219	1,346,642,634
TOTAL	3,644,300,040	1,946,418,580	306,214,168	672,670,398	6,569,603,186

RESEARCH

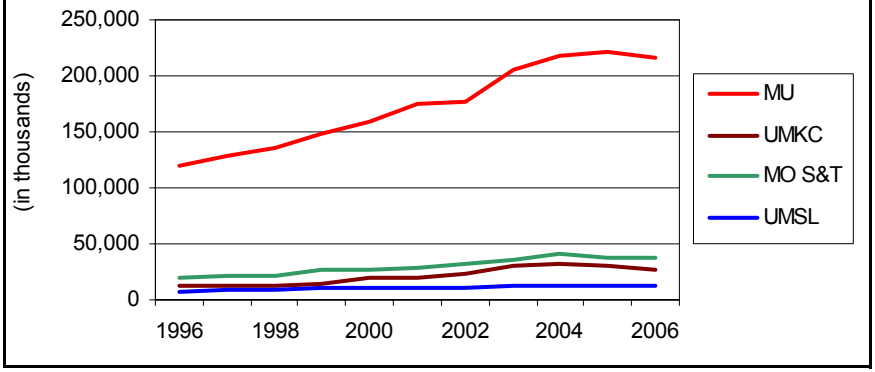
The predominant benefit of research is obviously the value generated from advances in technology. These advances benefit society in diverse ways: by combating diseases, facilitating healthy life, improving communication, cleaning up pollution, and meeting growing energy needs, to name a few things. More immediately, however, research plays an integral role in laying a foundation for new industries providing

education and training opportunities for students – our state's future scientists and engineers. Research also leads to spinoff businesses that create and add substantially to the tax base, as well as enhance cooperation between government, universities, and industries.

The State of Missouri was the home to $842 million of academic research in 2004 and $893 million in 2005. This ranks Missouri as the 16th largest state in terms of science and technology research. Washington University's $490 million in expenditures accounted for the largest share of Missouri's research, followed by the University of Missouri System with $303 million. Together, these two institutions accounted for 94% of all academic research funding in the state. Of the competitive funding awarded to new Missouri research projects, 50% went to UM in 2005. Of those funds going to public universities, 98% was awarded to UM.

UM's research expenditures have grown steadily but appear to have slowed in recent years (Figure 21). Part of the reason for the slower growth in research funding at UM may be the overall slowdown in research funding growth nationally. In addition, UM is claiming a slightly smaller share of the total research funding over time. Regardless, UM research has grown 22% in the 1997 to 2005 period. Much of that growth has come from federal funding, which accounted for 46% of the total in 2005. Institutional funds were the second largest source of research funds, comprising 39%. Comparing the four UM campuses, MU is home to 74% of the research expenditures, and MO S&T conducts 13%, followed closely by UMKC.

Figure 21. Trends in UM Science and Engineering Funding



In 2005, U.S. universities expended a total of $45.8 billion in research. To put UM research into context, MU ranked 74th in university research funding and the UM System ranked 55th. The following table (Figure 22) places the UM system with its peer research universities.

Figure 22. Science and Engineering R&D Expenditures of UM Peers (in thousands)

	Rank 04	Rank 05	2002	2003	2004	2005	% Growth 2005/1997
University of California-Davis	17	17	456,653	482,145	511,757	548,873	105%
Louisiana State University	37	36	287,363	314,446	341,634	356,828	74%
University of Nebraska	49	44	247,948	276,424	299,090	333,126	103%
University of Georgia	43	49	284,660	299,748	313,160	316,806	41%
University of Kentucky	50	52	236,275	272,062	297,610	306,653	146%
North Carolina State University	52	54	290,018	286,025	292,720	302,596	32%
University of Missouri System	**49**	**55**	**244,812**	**285,134**	**303,189**	**301,891**	**78%**
VA Polytechnic State U.	55	56	232,560	247,807	268,752	289,994	71%
University of Tennessee	66	65	188,261	217,389	228,760	255,699	66%
Colorado State University	70	70	178,845	187,054	214,888	236,211	84%
Missouri University	**69**	**74**	**177,011**	**205,212**	**217,550**	**220,718**	**72%**
Iowa State University	73	78	188,664	199,566	211,996	209,545	35%
MU Peer Group average			259,125	278,267	298,037	315,633	73%
All University S&E funding			36,367,358	40,056,637	42,945,081	45,750,413	88%

Figure 23. 2006 Impact of Research

	Direct	Indirect	Induced	Total
UM System				
Output	290,353,000	75,811,022	212,813,967	578,977,989
Employment	2,119	779	2,139	5,036
Value Added	191,934,633	42,768,490	122,590,518	357,293,641
MU				
Output	215,240,000	56,199,056	157,759,962	429,199,018
Employment	1,571	577	1,585	3,733
Value Added	142,282,016	31,704,477	90,876,909	264,863,402
UMKC				
Output	26,016,000	6,792,766	19,068,403	51,877,169
Employment	190	70	192	451
Value Added	17,197,588	3,832,112	10,984,267	32,013,967
MO S&T				
Output	37,384,000	9,760,942	27,400,569	74,545,511
Employment	273	100	275	648
Value Added	24,712,280	5,506,597	15,783,973	46,002,850
UMSL				
Output	11,713,000	3,058,258	8,585,033	23,356,291
Employment	86	31	86	203
Value Added	7,742,749	1,725,304	4,945,369	14,413,422

The research expenditures of the University have a meaningful impact on the Missouri economy. Research budgets are used to purchase labor, equipment, and other items from a range of industries. In 2006, UM expended $290 million on research, which, through its multiplier effect, influenced almost $580 million of the Missouri economy. This is a multiplier of almost 2 (Figure 23). These research expenditures can also be associated with 5,000 jobs and $357 million in value-added in the Missouri economy.

ECONOMIC DEVELOPMENT

By adding the function of economic development to its mandate, the University acknowledged its responsibility to contribute to a healthy Missouri economy.

To this end, the University has sought to actively facilitate the commercialization of its technology and the establishment of new businesses. UM has undertaken this role through its active affiliation with five research/technology parks, including: the Missouri Research Park in St. Charles, the MRP Business Center in Fort Leonard Wood, the Rolla Research Park, the St. Louis Research Park, and the new University of Missouri Discovery Ridge Research Park in Columbia. Such research parks foster innovation, commercialization, and economic competitiveness through collaboration among universities, industry, and government.

The Missouri Research Park was the first to be developed, incorporated in 1986 under the ownership of the University of Missouri. Today the 200-acre research and development park includes 15 companies and two federal agencies, with more than 1.5 million square feet under one roof and approximately 2,000 employees. The remaining research parks bring similar opportunities to other parts of the state.

Unlike research parks, technology incubators provide more resources for hands-on encouragement of embryonic technology businesses. The University of Missouri has invested in two incubators, the Center for Emerging Technologies (CET) in St. Louis and, more recently, the Life Science Business Incubator Initiative in Columbia.

CET, developed in 1995 by the University of Missouri, was the first effort. CET is a not-for-profit life science incubator and accelerator with 92,000 square feet of R&D space. Currently, 13 start-up companies are housed at the Center for Emerging Technologies. The Center facilitates companies by helping them develop strategic business plans; with marketing research and strategic market planning; assistance with acquisition of public and private funding; assistance with patenting, licensing, and FDA and other approvals; and assistance in working with professional service providers (lawyers, accountants). In addition to providing developmental services for its client businesses, CET also provides a number of outreach services for entrepreneurs across the state, including training programs.

University Services

The University also provides a number of ancillary services that benefit Missourians both directly and indirectly. University Health Systems is one example. In 2006, MU Health had 580,308 outpatient clinic visits, 39,366 emergency center visits, 20,411 patients were admitted, and there were 17,913 surgeries. Of that care, $47 million was uncompensated.

University of Missouri Extension is another example, disseminating information and recommendations, which leverage the knowledge generated by Missouri researchers. Extension offers programs in agriculture, community development, human environmental sciences, business development, youth development, and continuing education that reach more than one million Missourians a year. Extension has offices in every county in the state and in eight regional offices. This presence throughout the state provides access to all of the University's services and generates economic stimuli to every part of the state.

Despite the breadth of UM services, among the most visible are the athletic and cultural activities hosted by the University. Such events provide entertainment that draws many to the UM campuses. Other resources frequented at the campuses include: libraries, museums, testing laboratories, recreational facilities, professional development classes, testing, meeting facilities, etc.

Concluding Comments

The University of Missouri is a major participant in the state's economy. In 2006 it generated almost $2.2 billion in revenues and spent nearly that amount, leading to the employment of 24,000 faculty and staff, as well as the education of 64,000 students. The funds earmarked for UM go to provide a number of important services, ranging from educational instruction to research, to medical care and entertainment. Its economic activity places the University near the top of the list of largest employers of Missourians. While a number of private businesses may be larger in terms of revenues (both from inside and outside the state), few of them create as much in-state economic activity (value-added) as the University of Missouri.

In 2006 the University's $2 billion expenditures led to $3.9 billion in total spending in the Missouri economy. 21,500 jobs, in addition to those inside the University, were indirectly supported by UM activities. In fact, UM accounted for 1% of Missouri's $226 billion Gross State Product. When the

expenditures of UM's students are included, its role increases to 1.3% of the state's economy.

While the University plays a large role in the state, it is also a good investment. It draws almost $572 million dollars into the Missouri economy from outside sources, including federal grants, private donations, and out-of-state tuition. This money circulates through the economy, ultimately creating more than $1.1 billion in economic activity and accounting for over 12,000 jobs. This $1.1 billion is a net economic impact that would be wholly lost to the state without the University.

Perhaps even more important than the short-term, tangible economic impacts of the University are the long-term, intangible benefits that are generally difficult to quantify. The most calculable of these benefits is the improved earning potential of UM graduates. The 2006 graduating class alone benefited from potential lifetime wage benefits of $11.7 billion, and the Missouri economy stands to benefit from the $6.6 billion associated with those graduates who stay in the state. Finally, UM adds immeasurably to the quality of life of all Missourians. Lifelong learning, arts and culture, sports, and a sense of place are all enhanced and provided at minimal cost by Missouri's leading public university.

ENDNOTES

[1] Not all of the $146 million construction expenditure is expected to occur in that year.

[2] The table shows a significant decrease in employment at UM administration. This was likely to be largely due to a re-categorization of Extension positions from UM to MU and not reflective of layoffs.

[3] Source: Fortune, 2006.

[4] Source: Hoovers, Dec. 2006.

[5] This is a net addition to the state economy only if it is assumed that the human and financial resources would not have been used elsewhere in the state if UM did not operate. This would be true if, for example, all university activities currently associated with UM would have occurred out of state if UM did not exist.

[6] These multipliers represent state-level weighted averages of IMPLAN multipliers for various activities. Since each campus and extension has a different mix of activities, these multipliers differ. The differences do not reflect the different locations of expenditures within the state.

[7] The inclusiveness of the University's financial statements also complicate the calculation of current expenditures by double counting some transactions. University revenues include those that potentially also involve University expenditures. For example, consider staff parking revenues which come directly from staff salaries paid by the University. Other issues of such double counting include: revenues from vendors and university food service from staff purchases, healthcare purchased by staff, bookstore revenues, etc. Where University financials allow, University expenditures are netted from double-counted revenues; however, not all can be accurately accounted for. The double counting that remains should represent a relatively minor portion of the University's operations.

[8] Student expenditures are difficult to track and a number of assumptions were made due to a lack of available information. The amount of student expenditure was taken from the annual projection of each admissions/financial aid department for each student type (i.e., MU undergrad, UMKC graduate, MU vet med, etc.). The allocation of the student expenditures was based on a study from Ed Robb. This study was developed to show student spending patterns at MU. The expenditures assume that all students live either on campus, according to residency, or off campus where they pay for housing. This is likely not to be the case for a moderate proportion of students, especially at UMKC and UMSL.

[9] Ed Robb. 1998. Economic Impact Study of Higher Education on Columbia.

[10] St. Louis and Kansas City maintain a much higher percentage of part-time students than either Columbia or Rolla.

[11] Due to the difficulty in discerning expenditures by the geographic origin of funds, revenues must be used as a proxy for expenditures.

[12] Work-life earnings are taken from the US Census Bureau and US Department of Commerce report P23-210 "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings," by Jennifer Cheeseman and Eric Newburger, 2002.

[13] While graduates who leave the state for employment do not contribute directly to the labor force, income, taxes, and other measures, they have other indirect impacts. They may invest in the state and have higher levels of economic linkages with businesses in the state. As alumni they often support the University and other state institutions monetarily.

[14] These figures only consider the work-life benefits of 2006 degree holders staying in MO one year after graduation. The value of education to the state is dramatically effected by worker migration. Much of the effect of the Missouri graduates moving to other states is mitigated by graduates of other states moving to Missouri.

[15] Calculating the total impact of education over time is complicated by the double counting associated with individuals getting multiple degrees.