RESEARCH ARTICLES

The Economic Impact of a College of Pharmacy

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Objectives. To quantify the dollar value of economic returns to a community when a college of pharmacy attains its fourfold mission of research, service, patient care, and education.

Methods. United States Bureau of Economic Analyses (BEA) RIMS II input/output analysis and data from student and faculty surveys were used to quantify the economic impact of the University of Tennessee's College of Pharmacy (UTCOP).

Results. The UTCOP's revenue of \$22.4 million resulted in an indirect output impact of over \$29.2 million, for a total impact of nearly \$51.6 million in output (production of goods and services), while supporting 617.4 jobs and total earnings of \$18.5 million during the 2004-2005 school year.

Conclusions. Demonstrating the economic value of colleges of pharmacy is critical when seeking support from state legislators, foundations, government agencies, professional associations, and industry. Based on this study, UTCOP was able to report that every dollar the state invests in UTCOP yields an estimated net return on investment of \$27.90.

Keywords: economic impact, RIMS II input/output analysis, pharmacy, college of pharmacy

INTRODUCTION

Colleges of pharmacy have the responsibility of training and preparing the next generation of pharmacists who will assume new roles and responsibilities in an ever-changing health care market. Educating this essential workforce is not the only contribution of colleges of pharmacy. A college of pharmacy's presence in the local community impacts the lives of all its citizens, either directly or indirectly.

In the process of providing higher education, universities and their colleges spend millions of dollars every year on the salaries of faculty and staff members and on the purchase of goods and services from suppliers. In turn, faculty and staff members spend large portions of their salaries in the local economy. Additionally, colleges of pharmacy attract students from around the state and nation, and the students often bring families with them. While enrolled, these students and their families spend their earnings and savings within the local economy as they go about their daily lives.

What is the value of the contributions made by colleges of pharmacy on the local community? Colleges of

pharmacy have research, service, patient care, and education as their mission. Most allocate substantial resources (especially for accreditation purposes) to tracking the products of these 4 missions. Colleges document the numbers of papers and books written, patents applied for and received, service and volunteer efforts, health improvements resulting from patient care, diversity and quality of the curriculum, and achievements of students as well as faculty members. These accomplishments are by and large reported to the community and are a source of community pride. But seldom is a dollar value attached to a colleges' attainment of their fourfold mission, at least not in terms of how these accomplishments provide an economic return to the communities surrounding the colleges.

This study uses the United States Bureau of Economic Analyses (BEA) RIMS II input/output analysis¹ to quantify the economic impact of the University of Tennessee's College of Pharmacy (UTCOP) on the economy of the state of Tennessee in terms of the dollar value of output (the production of goods and services produced as a result of the economic entity in question), earnings, and the number of jobs. The primary focus of the study is to provide an economic analysis of UTCOP revenue, expense, and capital data for the 2004-2005 fiscal year. Additionally, we provide a qualitative look at how UTCOP impacts the community it serves.

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The UTCOP serves as an excellent example of the potential economic contribution of a college of pharmacy. It ranks 17 out of 102 colleges of pharmacy nationally, is 107 years old, and has more than 68 full-time faculty members, 100 part-time faculty members, and over 300 affiliated and volunteer faculty members. UTCOP is a research-intensive institution with patient care services, research, service and administration, and education as its 4 missions. As a major research University, the development of new knowledge and the sharing of that new knowledge are essential to the College's mission.

UTCOP consists of the Department of Pharmaceutical Sciences and the Department of Clinical Pharmacy that had a combined enrollment of 486 students during the 2004-05 fiscal year and 552 during the 2005-2006 fiscal year. The College of Pharmacy is undergoing a period of expansion, with enrollment projected to grow to 800 students by 2009 in an effort to meet increased demand for pharmacists both in Tennessee and nationally. This represents an increase of nearly 65.0% over FY 2004-2005.

A majority of the students are based at UTCOP's Memphis campus. However, beginning with the 2007-2008 fiscal year, second- and third-professional year students will be split between the Memphis and Knoxville campuses, with the majority (125) remaining in Memphis and 75 in Knoxville. Additionally, students spend their last one and a half years of the PharmD program in advanced pharmacy practice experiences (APPEs) across the state, in approximately 65 of the 95 counties in Tennessee. In support of the clinical training that students go through during APPEs, UTCOP in 2005-2006 had:

- 210 volunteer faculty in community pharmacies and hospitals throughout Tennessee;

- 89 affiliate agreements;
- Exchange programs in 9 countries;
- Clinical education centers for fourth-professional year pharmacy students in Memphis, Jackson, Nashville, Knoxville, Chattanooga, and King-sport;
- Residency program affiliations statewide.

As a result, while the lion's share of UTCOP's economic impact is in the Memphis area, it is also spread across the entire state of Tennessee (Figure 1).

UTCOP embarked on conducting an economic impact study for a number of reasons. Primary among these was determining the community support role of UTCOP for Memphis, the Mid-South, and the State of Tennessee. UTCOP has long been an outstanding institution, but knowing the economic impact that it has on the community in terms of actual dollars is important for the community as well as the rest of the University of Tennessee. UTCOP is not alone in realizing the importance of identifying economic impacts. Currently, Michigan State University is looking at the economic impact of its outreach programs and has developed a tool to measure this on an annual basis.²⁻³ This tool is also being utilized by the University of Tennessee (UT) system to look at the total impact of UT's outreach programs. For examples of economic impact studies of higher education institutions, see reports on Tarleton State University,⁴ East Central University,⁵ and Duke University.⁶

Universities need to be good stewards of the resources that they garner both from state and private sources. In order to demonstrate the level of achievement of this stewardship, universities must know what the actual economic impact is. Without knowing the economic impact, it is extremely difficult to present a cogent stewardship

Figure 1. Map of University of Tennessee Health Science Center College of Pharmacy educational sites.

argument to a foundation, federal agency, or state agencies for funding. Agencies that are providing resources are looking at returns on investments and the value of their investments. An economic impact statement is a tool that provides that information on behalf of universities.

METHODS

The methodology used in this analysis looked at the link between the industry in question (UTCOP) and the economics of other local industries and households. Like other economic impact studies, this analysis provides an estimate of how the normal, day-to-day operations of the entity in question (UTCOP) economically impact the locality in which it exists in terms of the generation of goods and services, employment, and earnings. Economic impact studies have been used commonly to provide estimates of the impacts from events and entities such as professional sporting events, the construction of new stadiums, airports, labor strikes, and higher education facilities, to name but a few.

RIMS II Modeling

The Regional Input-Output Modeling System (RIMS II)¹ economic impact methodology employs deliveries to final demand as measured by total revenue of the entity in question as the primary driver of the economic impact model. Specifically, this analysis involved estimating the direct and indirect economic impact of the operations of UTCOP on the Memphis Metropolitan Statistical Area (MSA), primarily through the use of US Bureau of Economic Analysis (BEA) RIMS II multipliers. Economic impact multipliers are used in the modeling process to estimate the impact of the industry in question on output (ie, goods and services produced as a result of the economic activity in question), earnings, and employment. In essence, the assumption is that one cannot measure the economic effect of an entity solely by acknowledging the revenue it generates because those revenues become income and earnings for other entities. The total economic effect is a "multiple" of the entities' generated revenue. Thus, multipliers are needed and applied to the revenue data to generate a total economic impact.

RIMS II multipliers are available for counties, MSAs, or states, with county-level areas being the smallest region for the availability of multipliers. The multipliers used in this paper were derived from the BEA's accounting structure called an input-output (I-O) table:

RIMS II is based on an accounting framework called an I-O table. For each industry, an I-O table shows the industrial distribution of inputs purchased and outputs sold. A typical I-O table in RIMS II is derived mainly from two data sources: BEA's national I-O table,

which shows the input and output structure of nearly 500 U.S. industries, and BEA's regional economic accounts, which are used to adjust the national I-O table to show a region's industrial structure and trading patterns.¹

While it is beyond the scope of this paper to provide explicit instructions on how to perform an economic impact study, the interested reader is referred to BEA's RIMS II web site (<http://www.bea.gov/regional/rims/index.cfm>) for more specific information on RIMS II multipliers and economic impact modeling.

The RIMS II methodology is 1 of 3 major economic impact modeling systems that are commonly used. The other 2 are REMI⁷ and IMPLAN.⁸ All 3 models rely upon BEA industry surveys that trace the linkages of dollar payments, jobs, and earnings between various industry sectors to create multiplier impact estimates. Rickman and Schwer⁹ compared all 3 modeling systems and found that the multiplier estimates from each do not differ significantly when the models are properly benchmarked (constructed). Therefore, the choice of the methodology (IMPLAN, REMI, or RIMS II) makes little difference upon estimated outcomes.

Since the majority of UTCOP operations, faculty members, and students are based in Memphis (particularly in the 2004-2005 fiscal year), BEA's RIMS II multipliers for the Memphis MSA were chosen for this analysis. While the study focuses on UTCOP's economic impact on the Memphis MSA, the results can be generalized to Tennessee as a whole since UTCOP's operations are spread throughout Tennessee and total revenues that fund all statewide operations were used in the analysis.

To calculate the economic impact of UTCOP revenue using the RIMS II multipliers, the revenue figures used in the analysis were converted into fiscal year 2000 dollars since the revenue amounts are stated in 2005 dollars and the RIMS II employment multipliers are based on 2000 dollars. If the conversion had not been done, the employment impact numbers would have been overstated in the final analysis. (See the RIMS II user handbook for more information on the specifics of the RIMS II methodology at <http://www.bea.gov/scb/pdf/regional/perinc/meth/rims2.pdf>.)

Siegfried, Sanderson, and McHenry¹⁰ describe some of the approaches and mistakes commonly made in economic impact studies of colleges and universities. Particular emphasis is made on the validity of the assumptions that go into model construction and assumptions about model outcomes. For example, "... expenditures by employees (eg, on local taxes or for charity) are not additions to the financial impact, but rather are included in payroll. Yet, many studies report them separately..."¹⁰

and, thus, overcount the institution's total economic impact. Accordingly, we enumerated faculty member, student, and visitor spending as supporting evidence of the total economic impact (a subset of the total impact) in order to avoid the mistake of overcounting UTCOP's impact on the state and local economy.

Data Collection

Most of the data for this analysis were provided by the UTCOP financial officer. The major sources of data included:

- UTCOP revenue from all sources for the 2005 fiscal year.
- Total Final-Demand Output, Earnings, and Employment Multipliers. The multipliers, from RIMS II as developed by the US Bureau of Economic Analysis, were used to measure linkages between output, job creation, and payroll generation. The use of RIMS II Total Final-Demand multipliers in conjunction with UTCOP's total revenues captured the entirety of UTCOP's economic impacts.¹¹
- Primary data collected via surveys of UTCOP faculty and students. These surveys provided data on spending habits of UTCOP faculty members and students, in addition to providing an estimate of the number of out-of-town guests who come to Memphis to visit UTCOP faculty members and students. The survey instruments used were adapted from Jafri, Dudley, and Buland.⁴ The survey instruments were designed with the explicit intent of gathering faculty member and student financial data to be used in the RIMS II modeling process as supporting evidence for UTCOP's total economic impact.

Faculty and student surveys were conducted electronically via the Internet. E-mails were sent to both faculty members and students inviting them to participate in the survey, with the intent of capturing data to be used to calculate the economic impact of spending by faculty members and students on the state's economy. Faculty members and students had the opportunity to take the survey from January 5-20, 2006. The survey instruments and the summary of responses may be found in the Appendix.

The economic impact of spending by faculty members and students is a subset of UTCOP's total economic impact. The economic impact of faculty and student spending, however, would not take place in Tennessee were it not for the presence of UTCOP. At the time of the study, there were no alternatives to UTCOP within the state of Tennessee for pharmacy and pharmaceutical ed-

ucation. In UTCOP's absence, it can reasonably be assumed that UTCOP faculty members and students would seek employment and education at colleges of pharmacy in other states and would, thus, take their economic impact with them.

RESULTS

Total Economic Impact

As shown in Table 1 column 1 of the Appendix, most of UTCOP's revenue of just over \$22.4 million in fiscal year 2004-2005 came from sources other than the traditional higher education sources of tuition, fees, and state appropriations. Only 45.8% of UTCOP's total revenue came from tuition, fees, and state appropriations. In fact, only 7.6% of UTCOP's total revenue came from state appropriations. Over 54% (54.2%) came from other sources, including nearly \$10.4 million in grants and contracts.

As discussed in the methodology section of this paper, to calculate the economic impact of UTCOP revenue using the RIMS II multipliers, the revenue totals presented in Table 1, column 1, were converted into fiscal year 2000 dollars since the revenue amounts are stated in 2005 dollars and the RIMS II employment multipliers are based on 2000 dollars. If the conversion had not been done, the employment impact numbers would have been overstated in the final analysis.¹¹ The Consumer Price Index data¹² indicated a 13.41% difference in economy-wide price levels between 2000 and 2005. This difference was used to deflate the revenue numbers in Table 1, column 2, with the results presented in column 3 of Table 1.

The inflation-adjusted spending numbers from column 3 of Table 1 were then placed into Table 2 in order to derive the multiplier impact. Since the output (output may also be thought of as the production of goods and services) and earnings multiplier impacts are stated in 2000 dollars, the numbers in Table 2, row 4, required re-inflation to 2005 dollars. This was done in Table 2, row 5. Note, however, that the employment estimates from row 4 were unaffected by the inflationary adjustment.

Table 1. UTCOP Total Revenue, 2004-2005 Fiscal Year

	2005 Dollars	2000 Dollars
Tuition and fees	\$8,564,628	\$7,551,916
State appropriations	1,706,649	1,504,849
Continuing education revenue	1,119,149	986,817
Grants and contracts	10,392,289	9,163,468
Endowment revenue	614,115	541,500
Total	\$22,396,830	\$19,748,550

Table 2. The Total Economic Impact of UTCOP on the Memphis Metropolitan Statistical Area (in 2000 and 2005 Dollars)

Year of \$	RIMS Category	Direct Revenue	Multipliers			Impacts		
			Output ^a	Earnings ^b	Employment ^c	Output	Earnings	Employment
	Colleges, Universities, and Junior Colleges		2.3044	0.8264	31.2641			
2000		\$19,748,550				\$45,508,557	\$16,320,201	617.4
2005		\$22,396,830				\$51,611,255	\$18,508,740	617.4

^aEach entry in this column represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry

^bEach entry in this column represents the total dollar change in earnings of households by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry

^cEach entry in this column represents the total change in number of jobs that occurs in all industries for each additional one million dollars of output delivered to final demand by the industry corresponding to the entry

Source of Multipliers: U.S. Bureau of Economic Analysis, Regional Economic Analysis Division

The indirect impact is a result of the businesses and individuals who work in affected industries (industries within which UTCOP, UTCOP faculty, and UTCOP students make purchases) spending their earnings and gross receipts in the local economy. As shown in Table 2, in 2005, UTCOP revenue of nearly \$22.4 million is estimated to have resulted in an indirect output impact of over \$29.2 million, for a total impact of nearly \$51.6 million in output (the production of goods and services), while supporting a total of 617.4 jobs and total earnings of over \$18.5 million. Since state appropriations accounted for just 7.6% of UTCOP's total revenue, the net impact on total output (less state appropriations and their associated impact on output) was just under \$47.7 million. In other words, UTCOP generated approximately \$27.94 in output for each dollar of state appropriations received in fiscal year 2004-2005.

The total economic impacts presented in Table 2 account for all of UTCOP's quantifiable economic activities including faculty and student spending, as well as all UTCOP spending for all activities (payroll, supplies, equipment, etc), per RIMS II methodology as discussed in this paper. The faculty and student spending impacts detailed subsequently are presented only as a means of providing a concrete illustration that elaborates how the total economic impact comes about.

Impact of Faculty and Students

Fifty-four of 168 full and part-time faculty members (32.1% response rate) and 163 of 552 students (29.5% response rate) responded to the survey. In comparison, the Jafri, Dudley, and Buland (2000) student survey (from which the current study was adapted) had a response rate of 17.2%. In comparison, the Jafri, Dudley, and Buland (2000) faculty survey response rate was 38.0%. The faculty survey did not distinguish between full-time and part-

time faculty members but it is probable that the response among full-time faculty members was greater than that among part-time faculty members.

An estimate of total direct spending by UTCOP faculty members and students is presented in Table 3, and was nearly \$16.5 million. This included over \$900,000 in charitable spending, almost \$2.1 million on groceries and eating out, and nearly \$1.2 million in local property taxes.

To calculate the economic impact of spending by UTCOP faculty members and students using the RIMS II multipliers, the direct spending totals (Table 3) were converted to year-2000 dollars. The inflation-adjusted spending numbers (Table 4, column 2) were then used to derive the multiplier impact. Since the output (output may also be thought of as the production of goods and services) and earnings multiplier impacts were stated in 2000 dollars, the numbers in Table 4 could not be used until converted back to 2005 dollars. This is shown in Table 5. The employment estimates shown in Table 4 were unaffected by the inflationary adjustment in Table 5.

As shown in Table 5, direct faculty and student expenditures of almost \$16.5 million resulted in an estimated impact of over \$13.5 million in indirect expenditures, and a total impact of more than \$30.0 million in output (the production of goods and services), while supporting a total of 266.9 jobs and total earnings of greater than \$7.5 million. The indirect impact of \$13.5 million is a result of the businesses and individuals who work in each of the industries listed spending their earnings and gross receipts in the local economy.

Impact of Visitors to Faculty and Students

Data from the faculty surveys indicated that faculty members had an average of 1.2 out-of-town guests per

Table 3. Combined Direct Spending by UTCOP Faculty and Students (in 2005 Dollars)

Category	Faculty, \$ ^a	Students, \$ ^a	Total, \$
Real estate (rent, lease, or mortgage payments)	1,215,724	4,314,774	5,530,499
Utilities	217,369	805,470	1,022,839
Food purchases (grocery and eating out)	453,288	1,623,402	2,076,690
Retail trade	265,615	805,586	1,071,201
Transportation (car payment, gasoline, vehicle maintenance)	296,358	1,100,776	1,397,134
Other government enterprises (property taxes)	411,924	752,321	1,164,244
Insurance carriers (insurance premiums)	292,992	1,108,659	1,401,650
Amusements and recreation (recreation and entertainment)	163,962	471,040	635,003
Ambulatory health care services, hospitals, nursing homes, residential care (medical expenses)	142,868	492,022	634,890
Services (personal and business services)	277,508	375,639	653,147
Contributions to religious, civic, professional, and charitable organizations	318,050	587,135	905,184
Total	4055,656	12,436,825	16,492,481

^aEstimated spending amounts were based upon the averages from the surveys and then aggregated for all local full-time faculty members (68, average of 11 months in Memphis) and for the entire student enrollment (552, average 10.5 months in Memphis)

Note: all dollar amounts were rounded to the nearest whole dollar. Totals may not add due to rounding

month (or 14.4 visitors per year) who stayed an average of 2.7 days per visit. For the entire full-time faculty (68), this amounted to an estimated 979.2 visitors with an average stay of 2.7 days per visitor. More than 9.0% of faculty survey respondents indicated that their visitors usually stayed in hotels, generating an estimated 92.0 guests at local hotels.

Similarly, data from the student surveys indicated that students had an average of 1.3 visitors per month (or 15.6 visitors per year) in 2004-2005 with an average length of stay of 1.8 days. For the entire student body of 552 students, this amounts to an estimated 8,611.2 visitors with an average stay of 1.8 days per visitor. An estimated 1,214.2 (just over 14.0%) student visitors stayed in local hotels.

The Memphis Convention and Visitors Bureau (CVB)¹³ estimated that out-of-town guests spent an average of \$279 per day per average party of 2.75 persons (roughly \$101 per person) while in the Memphis area. To be conservative, \$100 per person per day was assumed for this analysis. Combining the CVB daily spending estimates with the faculty and student visitor numbers yields the total faculty and student visitor-spending estimates. Thus, visitors of UTCOP faculty members and students spent an estimated \$539,000 in the Memphis area during the 2005 fiscal year. After converting these figures to 2000 dollars and applying the multipliers, annual spending by visitors of UTCOP faculty and students has an impact on output (the production and sales of goods and services) of over \$1.0 million and over \$300,000 in earnings, while supporting 15 jobs (Table 6).

Economic Impact Summary

Table 7 shows a summary of the economic impacts generated. The faculty/student impact figures come from Table 5 and reflect the economic impact of faculty and student spending data as shown in Table 3. The UTCOP visitor impact numbers come from Table 6 and reflect the economic impact generated by the spending of persons coming to Tennessee to visit UTCOP faculty members and students.

The grand total impact figures are presented in Table 2 and reflect all economic activities associated with the normal, day-to-day operations of UTCOP in fiscal year 2004-2005. All other impacts listed in Table 7 (faculty/student spending impact, UTCOP visitor spending impact, and other impacts are a subset of UTCOP's grand total economic impact (Table 2). Again, the use of RIMS II total final-demand multipliers in conjunction with UTCOP's total revenues (in Table 2) captured all of UTCOP's total economic impacts; thus, the elaboration of subset economic impacts was an unnecessary step but was done as a means of providing supporting evidence.

DISCUSSION

The UTCOP is an important contributor to the educational and earnings opportunities of its students. UTCOP also contributes to the economic base of the state. For every dollar invested in UTCOP by the state of Tennessee, the net economic impact on output (the value of the production and of goods and services generated as a result of the activity in question) through the efforts of UTCOP is \$27.90. This substantial return is particularly

Table 4. The Economic Impact of UTCOP Faculty and Student Spending on the Memphis Metropolitan Statistical Area (in 2000 Dollars)

RIMS Category	Direct Expenditures, \$	Multipliers			Impacts		
		Output ^a	Earnings ^b	Employment ^c	Output, \$	Earnings, \$	Employment
Real estate (rent, lease, or mortgage payments)	4,876,553	1.4264	0.1662	7.021	6,955,915	810,483	34.2
Utilities	901,895	1.5794	0.3522	8.8369	1,424,453	317,647	8.0
Foods purchases (grocery and eating out) ^d	1,831,135	2.0922	0.6561	35.1008	3,831,100	1,201,316	64.3
Retail trade	944,538	2.0284	0.6246	26.0095	1,915,901	589,959	24.6
Transportation (car payment, gasoline, vehicle maintenance) ^e	1,231,932	1.9171	0.5492	20.9736	2,361,696	676,577	25.8
Other government enterprises (property taxes)	1,026,580	1.9976	0.5183	16.6697	2,050,696	532,076	17.1
Insurance carriers (insurance premiums)	1,235,914	2.1148	0.5815	17.0665	2,613,712	718,684	21.1
Amusements and recreation (recreation and entertainment)	559,918	1.9889	0.6187	26.8154	1,113,620	346,421	15.0
Ambulatory health care services, hospitals, nursing homes, residential care ^f	559,819	2.1971	0.819	24.4395	1,229,978	458,464	13.7
Services (personal and business services)	575,916	2.0137	0.6216	26.719	1,159,723	357,900	15.4
Contributions to religious, civic, professional, and charitable organizations ^g	798,152	2.2881	0.7887	34.7763	1,826,252	629,529	27.8
Total	14,542,352				26,483,045	6,639,146	266.9

^aEach entry in this column represents the total dollar change in output that occurs in all industries for each additional dollar of output

^bEach entry in this column represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry

^cEach entry in this column represents the total change in number of jobs that occurs in all industries for each additional one million dollars of output delivered to final demand by the industry corresponding to the entry

^dThe multipliers used for food purchases (grocery & eating out) represent an average of the multipliers for (1) retail trade & (2) food services & drinking places

^eThe multipliers used for transportation represent an average of the multipliers for (1) automotive repair and maintenance, except car washes, (2) nondepository credit intermediation and related activities (car payments) & retail trade (gasoline)

^fThe multipliers used for ambulatory health care services, hospitals, nursing homes, residential care (medical expenses) represent an average of the multipliers for (1) ambulatory health care services & (2) hospitals, nursing, & residential care facilities

^gThe multipliers used for contributions to religious, civic, professional, and charitable organizations represent an average of the multipliers for (1) religious organizations, (2) grant-making and giving and social advocacy organizations, and (3) civic, social, professional, and other organizations

Note: all dollar amounts were rounded to the nearest whole dollar. Totals may not add due to rounding

Source of Multipliers: U.S. Bureau of Economic Analysis, Regional Economic Analysis Division

important for Tennessee because of its tight budget status and no existing state income tax.

Although every dollar invested in the UTCOP is a dollar the state cannot expend on alternative programs, obtaining such a high rate of return on its investment in UTCOP confirms that the state is using its resources wisely.

There are many competing uses of a state's resource dollars. An allocation of those resources to a

college of pharmacy is but one of them. Our data do not indicate whether or not state expenditures for a college of pharmacy achieve the greatest return on investments, compared to other alternatives available to the state. However, UTCOP's non-state revenue sources are expected to grow substantially once the new pharmacy building in Memphis is completed and the college expansion program is completed in 2010.

Table 5. The Economic Impact of UTCOP Faculty and Student Spending on the Memphis Metropolitan Statistical Area (In 2005 Dollars)

RIMS Category	Direct	Impacts		
	Expenditures, \$	Output, \$	Earnings, \$	Employment
Real estate (rent, lease, or mortgage payments)	5,530,499	7,888,703	919,169	34.2
Utilities	1,022,839	1,615,472	360,244	8.0
Food purchases (grocery and eating out)	2,076,690	4,344,850	1,362,412	64.3
Retail trade	1,071,201	2,172,824	669,072	24.6
Transportation (car payment, gasoline, vehicle maintenance)	1,397,134	2,678,399	767,306	25.8
Other government enterprises (property taxes)	1,164,244	2,325,695	603,428	17.1
Insurance carriers (insurance premiums)	1,401,650	2,964,210	815,060	21.1
Amusements and recreation (recreation and entertainment)	635,003	1,262,957	392,876	15.0
Ambulatory health care services, hospitals, nursing homes, residential care (medical expenses)	634,890	1,394,918	519,944	13.7
Services (personal and business services)	653,147	1,315,242	405,996	15.4
Contributions to religious, civic, professional, and charitable organizations	905,184	2,071,152	713,949	27.8
Total	16,492,481	30,034,421.	7,529,455	266.9

Note: all dollar amounts were rounded to the nearest whole dollar. Totals may not add due to rounding

Further, if UTCOP's revenue grows at the same pace as student enrollment, then the total impact could grow by 64.6% to \$84,952,126 by FY 2009-2010. Even if UTCOP revenue were to grow only half as fast as student enrollment, the total impact could still grow by 32.3% to \$68,281,690 by FY 2009-2010.

While substantive, our/this estimated economic impact of UTCOP is an underestimate. At present, scientists within the Department of Pharmaceutical Sciences are heavily involved in both the development of new molecules and the testing of new medicines. UTCOP pharmaceutical researchers have developed a number of new drug molecules that have been patented and at the time of this writing are in the drug development process, with one product in a Phase II study. Some products are being developed by individual faculty members, while others are being developed in collaboration with pharmaceutical firms such as Memphis-based GTX, Incorporated. Furthermore, the college has 3 companies that have been started as a result of faculty member's drug patents: EDLABS, Inc; RxBio, Inc.; and GenotypeRx, Inc.

New drug development is an area where the value of the contribution can only be estimated before the product goes to market. A major limitation of our study is that although new drugs have potential value, we can not quantify this value with certainty or show that it has a quantifiable economic impact at early stages. We could only show grant dollars that have been generated and salaries generated from drug development research, as included herein. Therefore, this study focused solely on tangible economic impact.

The development of patented medicines has the potential to bring UTCOP significant royalty revenues in the future. Additionally, the development of new medications in some instances brings about the possibility of improved health and longer, more productive lives for many individuals. However, the economic impact of the development of new drugs is beyond the scope of this research as each new drug or pharmaceutical development may warrant its own economic impact study.

This economic impact analysis provides requisite data for the UTCOP to justify budget and program

Table 6. Multiplier Impacts of Visitors of UTCOP Faculty and Students (in 2005 Dollars)

RIMS Category	Direct Expenditures, \$	Impacts		
		Output, \$	Earnings, \$	Employment
Hotels and other lodging places	65,650	128,489	38,668	2
Eating and drinking places	221,538	437,294	128,736	7
Miscellaneous retail and services	251,652	473,358	140,850	6
Total	538,840	1,039,141	308,253	15

Table 7. Summary of UTCOP Economic Impacts

Impact Category	Output, \$	Impacts	
		Earnings, \$	Employment
Faculty/student impact	30,034,421	7,529,455	266.9
UTCOP visitor impact	1,039,141	308,253	15.0
Other UTCOP impacts ^a	20,537,693	10,671,032	335.5
Grand total impact	51,611,255	18,508,740	617.4

^aThese impacts occur as a part of the business process of running a college of pharmacy as UTCOP purchases within the community becomes income for its vendors and suppliers and their employees and this income is subsequently respent

Note: all dollar amounts were rounded to the nearest whole dollar. Totals may not add due to rounding

expenses at the campus, University-system, and state levels. The data are being presented to foundations and granting agencies to demonstrate that an investment in the UTCOP will generate a substantial return on invested dollars. Additionally, our findings are being presented to local legislators to garner support for the college.

Finally, an essential consideration when universities embark on preparing impact studies is the demonstration that the results are not biased and are valid. One way to address this potential concern is to seek the assistance of outside vendors who are experienced in the methodology to perform/prepare the economic impact statement.

CONCLUSION

Knowing its regional economic impact empowers a college of pharmacy to demonstrate its economic importance to state and local governing bodies and other financial contributors. There are 102 communities with colleges of pharmacy that need to know what opportunities their communities would fail to capitalize on if these colleges were not present to generate economic returns.

Equipped with knowledge of the value of the economic contributions of colleges of pharmacy, state legislators and local businesses will be more willing to provide financial support for pharmacy education. Moreover, they will have a clear understanding of what the return on their investments in the colleges will be.

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Appendix 1. The University of Tennessee College of Pharmacy Faculty and Student Spending Survey Results

Item	Faculty and Student Spending Survey Results	Faculty Results (n = 54)	Student Results (n=163)
1	a. Including yourself, how many people live in your household?	Average: 2.9	Average: 2.2
	b. Does this number include other UTCOP Faculty/Students?	Yes = 18.5%	Yes = 30.7%
		No = 81.5%	No = 69.3%
	c. If “Yes”, how many faculty members/students in total live in your household?	Average: 1.2	Average: 2.0
2	What is your household’s monthly gross income?	Average: \$11,155	Average: \$2,781
		Per Capita: \$4,427	Per Capita: \$1,264
3	Take a moment and think about how much you spend locally on living expenses each month. Please estimate the following monthly expenses to the nearest dollar amount.	Average	Average
	a. Rent, lease, or mortgage payment:	1,625.	744
	b. Utilities (electricity, water, gas, sewer, garbage—if not included in rent):	291	139
	c. Food purchases (grocery and eating out):	606	280
	d. Retail purchases (clothing, computers, shoes, CDs, DVDs, etc):	355	139
	e. Transportation (car payment, gasoline, vehicle maintenance):	396	190
	f. Property taxes (if not included anywhere above):	551	130
	g. Insurance premiums (health, auto, property– if not included with mortgage):	392	191
	h. Recreation and entertainment (local purchases if not included above):	219	81
	i. Medical expenses (whether paid personally or by insurance but not health insurance premiums):	191	85
	j. Personal and business services (dry cleaners, barbers, beauticians, child care, lawyers, plumbers, lawn care, home cleaning, etc.):	371	65
	k. Contributions to charitable and or religious organizations:	425	101
4	On average, how many friends/relatives from outside the Memphis area visit you each month?		
	a. Number of visitors:	1.2	1.3
	b. Average length of stay:	2.7 days	1.8 days
	c. Where do they usually stay when they come to town? Please check one:		
	Hotel	9.4%	14.1%
	In my household	86.8%	77.3%
	Other	3.8%	8.6%
5	On average, how many months of the year do you live in the Memphis area?	11.0	10.5