



# **The Economic Impact of Lincoln Memorial University-Proposed College of Veterinary and Comparative Medicine on the State & Regional Economies**

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# **The Economic Impact of Lincoln Memorial University-Proposed College of Veterinary and Comparative Medicine on the State and Regional Economies**

## **EXECUTIVE SUMMARY**

There is much excitement about the additional educational opportunities that will be introduced with the Lincoln Memorial University-proposed College of Veterinary and Comparative Medicine, hereafter referred to as LMU-CVCM. However, many are not aware of the huge economic contributions that LMU-CVCM will make to the State of Tennessee and to its primary impact region. The objective of this study is to estimate the economic contributions that LMU-CVCM will provide to the state and region. The economic contributions are measured in employment, income (wages, salaries, and benefits) and retail sales.

The College creates economic impact from four different activities. These include activities from (1) operations, (2) construction projects, (3) student non-university spending, and (4) visitor spending. The annual operations of the College involve the number of employees and the resulting wages, salaries, and benefits paid. In FY 2014, projected employment for LMU-CVCM is 59 full and part-time employees and a payroll of \$4.4 million.

Construction activities occur only during the year the construction occurs. In FY 2014, the University projects approximately \$6.0 million in construction projects. This generates 51 full- and part-time jobs and over \$1.9 million in payroll.

Students spend money off campus for such items as housing, food, gasoline, entertainment, etc. It is estimated that annual non-university spending will be almost \$1.7 million in FY 2014. This will create 15 full- and part-time jobs and over \$687,000 in payroll. Finally, visitors come to the campus and spend money in the region while visiting. Total visitor spending for FY 2014 is estimated at \$258,244. These expenditures will create 4 full- and part-time jobs with a payroll of \$103,700.

Using a computer program developed specifically to measure the economic impact of the college, the study estimated the direct economic contribution of the activities from the proposed LMU-CVCM and calculated the jobs and income that would be created in other businesses in FY 2014. The model was able to measure the economic impact of LMU-CVCM on the State of Tennessee as well as on its primary impact region. The impact results for the State of Tennessee are presented in **Executive Table 1**.

College operations create 59 full and part-time jobs. This activity has an employment multiplier of 1.68 which means that for every job created, another 0.68 job is created in other businesses due to the College and the its employees spending money. The total estimated impact of the LMU-CVCM operations is 99 jobs in FY 2014.

Likewise, the model can measure the economic impact of income (wages, salaries and benefits) on the economy. Projected payroll is \$4.4 million in FY 2014. The higher education sector income multiplier is 1.60 which means that for every \$1 of income paid by LMU-CVCM, another \$0.60 of income is generated in other businesses. Thus, the total income impact of LMU-CVCM's payroll will be slightly over \$7.0 million. The model also estimates retail sales and state sales taxes generated from this income. From LMU-CVCM operational activities, over \$2.6 million in retail sales will be generated and \$183,000 in state sales taxes will be collected.

When all of the activities are included, the FY 2014 total estimated impact of LMU-CVCM on the State of Tennessee economy is 221 full- and part-time jobs, \$12.1 million in income (wages, salaries and benefits,) \$4.5 million in retail sales and \$314,000 in sales tax collections.

The model was also applied to what was identified as the primary impact region. This included three counties in Virginia, ten counties in Kentucky and 14 counties in Tennessee.

Total estimated economic impact for FY 2014 on the primary impact region is 220 jobs, \$12.0 million income and \$4.6 million in retail sales subject to state sales tax. These 2014 estimates only represent the first operating year with the initial class of students. LMU-CVCM will not be fully operational until FY 2017 when the first class graduates. Many of the LMU- CVCM graduates will remain in Tennessee while some will practice in rural areas of the state. The bottom line is that LMU-CVCM contributes greatly to the economies of the State of Tennessee and to its primary impact region. LMU-CVCM is extremely important for educational reasons as well as economic reasons.

**Executive Table 1**  
**Economic Impact of LMU-Proposed College of Veterinary and Comparative Medicine on the State of Tennessee, FY 2014**

Sector	Direct	Employment Multiplier	Total Impact	Direct	Income Multiplier	Total Impact	Sales Tax	
							Retail Sales	7 Cent Tax
College Operations	59	1.68	99	\$4,414,423	1.60	\$7,063,077	\$2,613,338	\$182,934
Construction	51	1.74	89	\$1,955,799	1.88	\$3,676,902	\$1,360,454	\$95,232
Student Spending <sup>1</sup>	15	1.80	27	\$687,240	1.79	\$1,230,160	\$455,159	\$31,861
Visitor Spending	<u>4</u>	1.42	<u>6</u>	<u>\$103,700</u>	1.68	<u>\$174,216</u>	<u>\$64,460</u>	<u>\$4,512</u>
<b>TOTAL</b>	<b>129</b>		<b>221</b>	<b>\$7,161,162</b>		<b>\$12,144,355</b>	<b>\$4,493,411</b>	<b>\$314,539</b>

<sup>1</sup>Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-CVCM auxiliary revenue.

Source: Employment, spending and income data from LMU-CVCM pro forma financial statements; Multipliers and coefficients from 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce, Bureau of Economic Analysis.

# **The Economic Impact of Lincoln Memorial University Proposed College of Veterinary and Comparative Medicine on the State and Regional Economies**

## **INTRODUCTION**

Colleges and universities are many things to many people. Viewed through the lens of economics, however, they are key to the viability of local, state, regional and national economies. From this perspective, institutes of higher learning are sources of jobs and income to their employees and students. They are also large consumers which create additional jobs and income to suppliers of materials, services, equipment and capital structures. They provide entertainment and cultural opportunities. Colleges and Universities produce skilled labor, enhance the lifetime income of graduates and increase the productive capacity of the economy. Further, they contribute to the fund of knowledge through extension and technology transfer activities. Additionally, they also spin off and attract research and industrial enterprises (**Appendix A.**)

The objective of this study is to estimate the economic impact the proposed College of Veterinary and Comparative Medicine of Lincoln Memorial University, hereafter referred to as LMU-CVCM, will have on the economy. More specifically, the report will:

1. Present financial, student and other data reflecting LMU-CVCM activities,
2. Measure the economic impacts that LMU-CVCM operational and construction activities as well as student and visitor spending have on the State of Tennessee's economy through increased;
  - employment
  - wages, salaries and benefits
  - retail sales

3. Measure the economic impacts that LMU-CVCM operational and construction activities as well as student and visitor spending have on the primary economic impact region including parts of Tennessee, Kentucky and Virginia through increased;
  - employment
  - wages, salaries and benefits
  - retail sales

### **RESEARCH METHODOLOGY**

This report focuses primarily on the impacts to jobs and income (wages, salaries and benefits) created on an annual basis by the LMU-CVCM, its employees, its students, and its visitors to the campus. A review of previous literature relative to impact studies is given in **Appendix A**. Data for this study are projections for FY 2014 to represent the first year of operation. These impacts are concentrated on the local community, but also spill over to the surrounding counties and to the state. Much of the revenue is used to hire faculty, staff and maintenance employees. Most of the income provided directly through these jobs is spent and re-spent, creating additional jobs and income. As a result, the total number of jobs and the total income attributable to LMU-CVCM are larger than the number of jobs and wages and salaries that come directly from the system itself. The revenue that is not used to hire employees is used to procure various goods and services. Area businesses use this revenue to hire employees, pay salaries and purchase materials. This additional economic activity is called the multiplier effect.

To calculate the economic impacts noted above, a widely-accepted input-output model and data from IMPLAN were utilized to estimate the direct, secondary and total



impacts of LMU-CVCM on the economy of the State of Tennessee and a primary impact region including parts of Tennessee, Kentucky and Virginia. The economic impact in this report will be quantified as total employment including direct, secondary and total jobs and the associated wages, salaries and benefits. Detailed information on the model used in this report can be found in **Appendix B**. This study is directed by Dr. Gerald A. Doeksen, a renowned economist from Oklahoma State University, who is widely recognized for his research regarding economic impact studies of universities, health systems and industrial changes (**Appendix C**).

### **OVERVIEW OF PROPOSED LMU-CVCM**

As stated on the website, LMU has investigated the feasibility of a College of Veterinary and Comparative Medicine for over a year. The Tennessee Department of Agriculture identified four areas in the state that qualify for federal assistance to fill the shortage of large animal veterinarians. Some of the counties surrounding LMU are included in those areas. The federal program provides financial assistance to students in exchange for service in underserved areas. The proposed LMU-CVCM will expand the current veterinary technology program and compliment the mission of Lincoln Memorial University to provide programming and opportunities to the people in the Appalachian region. Large animal medicine is a core focus for the LMU program. Furthermore, LMU-CVCM students will have the opportunity to learn from the faculty presently teaching in the LMU medical school.

LMU-CVCM's curriculum is an accelerated six-year combined pre-veterinary and doctoral level veterinary medical curriculum. Currently, there is only one other veterinary school in Tennessee located at University of Tennessee, Knoxville.

## College Revenues

LMU-CVCM will finance its day-to-day operations with revenues derived primarily from tuition and fees. Student fees include registration, information technology, student activities, etc. Total projected revenues for LMU-CVCM by major funding source are shown in **Table 1**. Because this is the initial year of LMU-CVCM, only first year students will be attending. Projected revenues will continue to increase each year with additional enrollment. In FY 2014, the system's projected income will be approximately \$5.1 million.

**Table 1**  
**Sources of Operating Revenues for LMU-College of Veterinary and Comparative Medicine, FY 2014 Projections<sup>1</sup>**

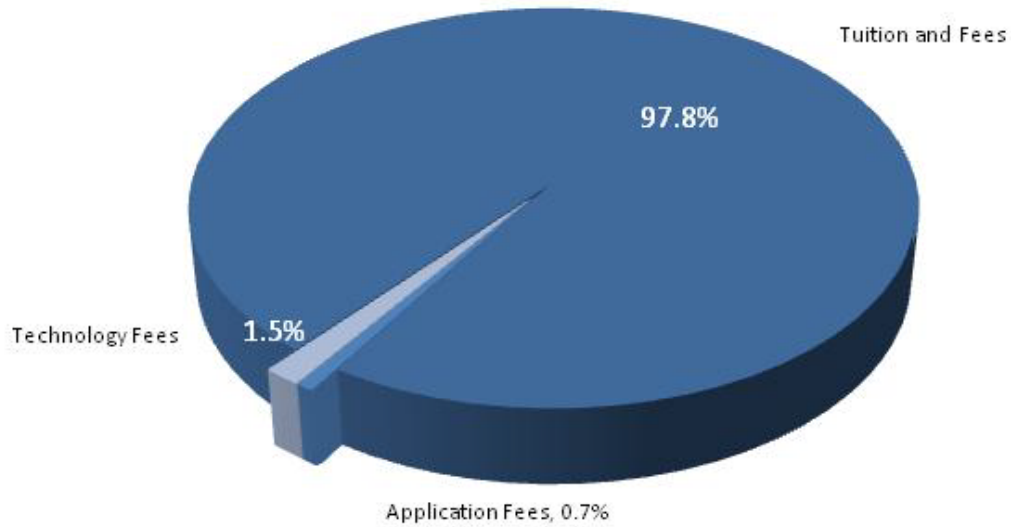
Source	Revenue	Percent
Tuition and Fees	\$5,018,000	97.8
Technology Fees	\$77,500	1.5
Application Fees	<u>\$37,500</u>	<u>0.7</u>
<b>TOTAL Operating Revenue</b>	<b>\$5,133,000</b>	<b>100.0</b>

<sup>1</sup>First year of operation only. Annual revenues will increase with additional enrollment

Source: LMU-CVCM pro forma financial statements

**Figure 1** further illustrates the revenue sources for LMU-CVCM. Almost 98 percent of projected FY 2014 revenues will be generated from tuition and fees. One and one-half percent will come from technology fees and the remaining revenues will come from application fees.

Figure 1  
Sources of Operating Revenues for LMU-College of Veterinary and Comparative Medicine  
Fiscal Year 2014



### College Expenditures

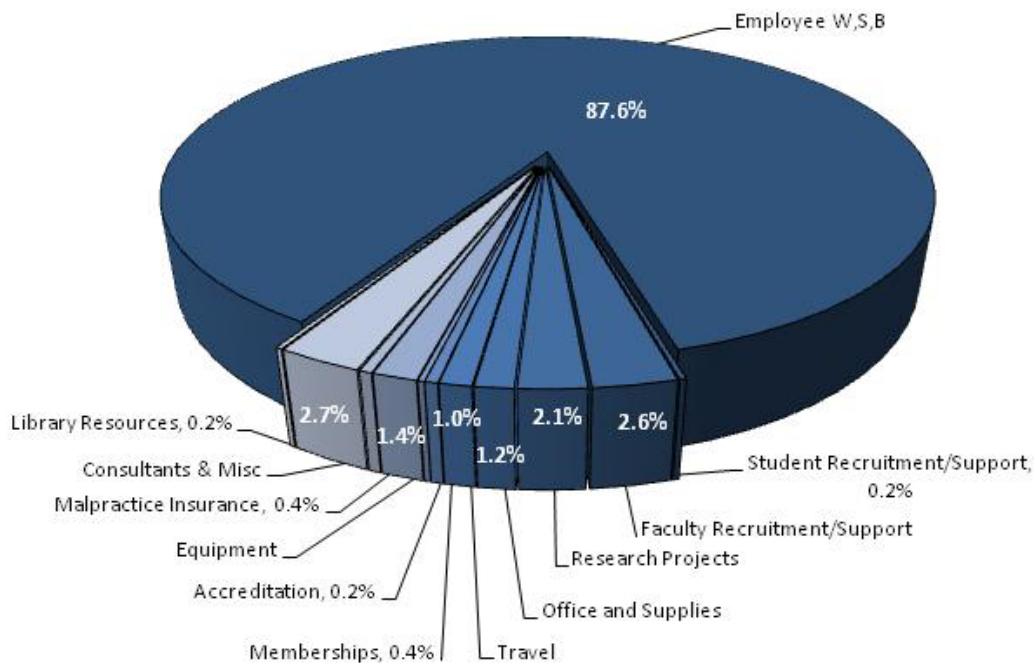
Total expenditures by category projected for FY 2014 are given in **Table 2**. **Figure 2** illustrates the proportions of college expenditures by category. Employee wages, salaries and benefits is the largest category utilizing 87.6 percent of total expenditures. Projected expenditures for faculty recruitment and support are 2.6 percent. Support for research expenditures will be about 2.1 percent or \$105,000. Total expenditures projected for FY 2014 are approximately \$5.0 million.

**Table 2**  
**Total Expenditures by Category for LMU-College of Veterinary and Comparative**  
**Medicine, FY 2014 Projection**

Funding Category	Expenditures	Percent
Employee Wages Salaries and Benefits	\$4,414,423	87.6
Faculty Recruitment/Support	\$132,563	2.6
Student Recruitment/Support	\$7,718	0.2
Research Projects	\$105,000	2.1
Office and Supplies	\$62,533	1.2
Travel	\$52,500	1.0
Memberships	\$21,175	0.4
Accreditation	\$11,025	0.2
Equipment	\$70,200	1.4
Malpractice Insurance	\$19,140	0.4
Consultants and Misc.	\$136,050	2.7
Library Resources	<u>\$8,820</u>	<u>0.2</u>
<b>TOTAL Expenditures</b>	<b>\$5,041,147</b>	<b>100.0</b>

Source: LMU-CVCM pro forma financial reports

**Figure 2**  
**Total Expenditures by Category for LMU-College of Veterinary and Comparative Medicine**  
**Fiscal Year 2014**



### **College Employment and Salaries**

Employment and wages, salaries and benefits are detailed below in **Table 3**. There will be 38 full-time faculty and other professionals on the payroll in FY 2014. Wages, salaries and benefits for professionals totaled \$3.4 million. In addition wages, salaries and benefits for 14 full-time and seven part-time staff were estimated at \$1,044,678. Total projected employee expenses for the 59 professional and support staff are \$4.4 million.

### **College Construction Expenditures**

Construction is another important activity. Projected construction costs for FY 2013 through 2015 total \$12.2 million (**Table 4**). Construction operations impact the local community and surrounding region as contractors purchase building materials and

employ construction workers, many of whom travel from other towns and spend part of their wages on food, drink and lodging.

**Table 3**  
**Estimated Number of Faculty, Staff and Student Employees at LMU-College of Veterinary and Comparative Medicine, FY 2014 Projection**

Category	Full-time	Part-time	Wages Salaries Benefits
<b>Professional</b>			
Administrative	11		\$1,959,505
Vet Technologist	6		\$144,000
Veterinarians	21		\$1,266,240
<b>Staff</b>	<u>14</u>	<u>7</u>	<u>\$1,044,678</u>
<b>TOTAL Employment</b>	<b>52</b>	<b>7</b>	<b>\$4,414,423</b>

Source: LMU-CVCM pro forma financial statement

**Table 4**  
**Total Construction Expenditures for LMU-College of Veterinary and Comparative Medicine from FY 2013 to 2015**

Fiscal Year 2013	\$150,000
Fiscal Year 2014	\$6,000,000
Fiscal Year 2015	\$6,000,000
<b>TOTAL Construction Expenditures</b>	<b>\$12,150,000</b>

Source: LMU-CVCM officials

### **Student Enrollment and Non-university Spending**

LMU-CVCM will welcome its first class of students in the 2013-2014 academic school year. There will be 100 students enrolled for this first class. LMU-CVCM will continue to accept 100 students each year resulting in a total enrollment of 400 students in four years. Student spending can be a challenge to estimate due to the wide-range of

spending patterns and number of commuter students. Estimated total student spending is provided in **Table 5**. These costs represent only the non-university portion of student spending for the first class of students enrolled in the fall and spring semesters. Tuition, fees, and a large portion of book purchases are not included as they are paid directly to the college and are captured through college revenues. This method was believed to best approximate student expenditures. It was estimated that the first 100 full-time students will spend \$852,900 per semester for an annual total of \$1,705,800.

**Table 5**  
**LMU-College of Veterinary and Comparative Medicine Non-university Student**  
**Spending for School Year 2013-2014<sup>1</sup>**

	Fall 2013	Spring 2014
<b>Students Living Off-Campus</b>		
Full-time Students	100	100
Spending per Student	<u>\$8,529</u>	<u>\$8,529</u>
<b>TOTAL Student Expenditures</b>	<b>\$852,900</b>	<b>\$852,900</b>

<sup>1</sup>Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-CVCM auxiliary revenue.

Source: Based on estimated student budgets available on LMU website,  
<http://www.lmunet.edu>

### **Visitor Days and Spending**

Colleges attract a large number of visitors each year for various events and activities. Parents bring their sons and daughters to enroll, help them with their living arrangements and attend some of their activities. Alumni revisit the campus for athletic events and to attend banquets and other special events. In addition, several visitors are brought to campus by administrators and faculty to attend conferences and other

miscellaneous meetings. Each time a non-local visitor comes to campus for example, they spend money at local restaurants and often buy gas before they leave. Some of the activities require an overnight stay which generates revenue for the local lodging businesses. These are all local expenditures that occur due to the college's presence. The projected number of visitors was based on the 2007 study for LMU-DCOM in its first year of operation. Data in **Table 6** show that in 2014, the projected 2,112 non-local visitors to LMU-CVCM will spend \$258,244 while participating in on-campus activities.

**Table 6**  
**Projected Annual Expenditures from Non-local Visitors to LMU-College of Veterinary and Comparative Medicine, FY 2014**

	Visitors	Daily Spending	Total Expenditures
Student Visitors and Parent Activities	604	\$156	\$94,224
Alumni Activities	0	\$109	\$0
College Activities	1,500	\$109	\$163,500
Faculty and Staff Visitors	<u>8</u>	\$65	<u>\$520</u>
<b>TOTAL Visitor Expenditures</b>	<b>2,112</b>		<b>\$258,244</b>

Source: Visitor days was obtained from based on visitor data from 2007 study for LMU Debusk College of Medicine.

### **THE IMPACT OF LMU-CVCM ON THE TENNESSEE ECONOMY IN FY 2014**

As stated earlier, this report focuses on the economic impact as it relates to jobs, and wages, salaries and benefits resulting from activities associated with LMU-CVCM.

These activities are divided into the following categories

1. Operations;
2. Construction;
3. Student Non-university Spending; and



#### 4. Visitor Spending.

The previous section clearly documents that the direct activities of these categories are significant. However, this does not tell the complete story. Secondary economic impacts are created when the veterinary college and college employees, construction firms and their employees, students, and visitors all spend money. These secondary benefits are measured by economic multipliers.

#### **The Multiplier Effect**

To further illustrate the multiplier effect, consider the opening of a new veterinary college. The veterinary college purchases goods and services from other businesses and the dollars flowing to those businesses increase. Likewise, the veterinary college will hire employees who purchase goods and services locally. The purchases of the veterinary college and its employees will create additional jobs and wages and salaries throughout the local economy.

A multiplier from an input-output model such as IMPLAN can measure the effect created by an increase or decrease in economic activity. For example, an employment multiplier of 1.75 indicates that if one job is created by the veterinary college, then an additional 0.75 job is created in other businesses due to the college and employee spending. The model calculates employment and income multipliers.

#### **Economic Impact from Operational Activities**

The economic impact from activities related to operations is presented in **Table 7**. Employment (full and part-time) and income (payroll including wages, salaries, and benefits) from operational activities were obtained from LMU-CVCM pro forma financial statements. These activities occur every year. Projected LMU-CVCM

employment was 59 employees in FY 2014 (**Table 3**). The higher education sector employment multiplier is 1.68. This means that for every job in the college, another 0.68 job is created in other businesses in the state. The secondary employment generated in the state from LMU-CVCM is estimated at 40 jobs. LMU-CVCM will have a total impact of 99 jobs in the State of Tennessee in FY 2014.

Projected data on the income from employees are also presented in **Table 7**. Data from LMU-CVCM indicate that total income for the college will be \$4.4 million. Using the higher education sector income multiplier of 1.60, LMU-CVCM will generate secondary income of \$2.6 million for a total impact of \$7.0 million.

Income also has an impact on retail sales. The retail sales capture ratio can be used to estimate the impact of operational activities on retail sales. This ratio indicates the percent of personal income spent on items that generate sales tax. Data from the Tennessee Department of Revenue indicate that 37.0 percent of the income is spent in retail stores that collect state sales taxes. Thus, it is estimated that \$2.6 million would be generated in retail sales from operations. Given the current 7.0 percent state sales tax rate in Tennessee, an estimated state sales tax collection of \$182,934 will occur as a result of the retail sales from operational activities.

**Table 7**  
**Employment, Income and Retail Sales Impact of LMU-College of Veterinary and Comparative Medicine on the State of Tennessee from Operational Activities, FY 2014**

Category		Amount
<b>Employment Impact</b>		
LMU-CVCM Employment		59
Higher Ed. Sector Employment Multiplier	1.68	
Secondary Employment Impact		<u>40</u>
<b>TOTAL Employment Impact</b>		<b>99</b>
<b>Income Impact</b>		
LMU-CVCM Income		\$4,414,423
Higher Ed Sector Income Multiplier	1.60	
Secondary Income Impact		<u>\$2,648,654</u>
<b>TOTAL Income Impact</b>		<b>\$7,063,077</b>
<b>Retail Sales and Sales Tax Impact</b>		
Retail Sales		\$2,613,338
State Sales Tax (7%)		\$182,934

Source: Employment and income data from LMU-CVCM; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

### **Economic Impact from Construction Activities**

Universities spend a significant amount on construction activities. This impact is often overlooked. It must be remembered that these impacts only occur during the year of construction and are not recurring. LMU projected \$150,000 will be spent on construction projects in FY 2013 and approximately \$6.0 million in each of the following two years. (Table 8).

**Table 8**  
**Employment and Income Generated from LMU-CVCM Capital Investment**  
**Projects, FY 2013 through FY 2015**

Year	Capital Investment	Full-time and Part-time Employees	Wages, Salaries and Benefits
FY 2013	\$150,000	1	\$38,349
FY 2014	\$6,000,000	51	\$1,955,799
FY 2015	\$6,000,000	51	\$1,955,799

Source: LMU, 2011 Implan Data, Minnesota Implan Group Inc.

From IMPLAN, the statewide ratios for employment and wages generated per million dollars of construction were used to estimate employment and income for each fiscal year. In FY 2014 (first year of operation), the projected \$6.0 million capital investment will create 51 full- and part-time jobs and approximately \$2.0 million in wages, salaries and benefits.

The total employment impact from LMU-CVCM construction activities is presented in **Table 9**. The construction employment multiplier of 1.74 indicates that another 0.74 job is created in other businesses in the state due to these expenditures. Those jobs in other businesses are referred to as secondary jobs. The estimated secondary employment impact for FY 2014 is 38 jobs, making a total employment impact total 89 full- and part-time jobs from construction activities.

**Table 9**  
**Employment Impact of LMU-CVCM from Projected Construction Activities**  
**FY 2013 through FY 2015**

Year	Direct Employment	Construction Employment Multiplier	Secondary Employment Impact	Total Employment Impact
FY 2013	1	1.74	1	2
FY 2014	51	1.74	38	89
FY 2015	51	1.74	38	89

Source: 2011 IMPLAN Data, Minnesota Implan Group Inc.

The impact on income is presented in **Table 10**. The construction income multiplier is 1.88 which means that for each dollar of wages and salaries paid to construction workers, another \$0.88 of wages is generated in other businesses in the state. The estimated secondary income for FY 2014 is \$1.7 million and the total income from construction activities is an estimated \$3.7 million. Total retail sales are estimated at \$1.4 million with a 7.0 percent sales tax rate generating \$95,000.

**Table 10**  
**Income, Retail Sales and Sales Tax Impact of LMU-CVCM on the State of**  
**Tennessee from Projected Construction Spending, FY 2013 through FY 2015**

Fiscal Year	Direct Income	Construction Income Multiplier	Secondary Income Impact	Total Income Impact	Retail Sales	Sales Taxes
2013	\$38,349	1.88	\$33,747	\$72,096	\$26,676	\$1,867
2014	\$1,955,799	1.88	\$1,721,103	\$3,676,902	\$1,360,454	\$95,232
2015	\$1,955,799	1.88	\$1,721,103	\$3,676,902	\$1,360,454	\$95,232

Source: Construction data from Lincoln Memorial University; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail Sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

## **Economic Impact of Student Non-university Spending**

When students attend classes at the veterinary college, they will spend money for housing, food, entertainment, etc. The money they spend locally, outside of the university, will stimulate additional economic activity that in turn will generate jobs and income in other businesses. Student non-university expenditures were estimated in a previous section. From IMPLAN, the statewide ratios for employment and wages generated per million dollars of student spending were used to estimate employment and income for the first fiscal year. **Table 11** contains the estimates.

In FY 2014, the projected non-university spending from the veterinary students will be \$1,705,800 (**Table 5**). Jobs created from this student spending were estimated at 15. The employment multiplier for retail trade and services was utilized to measure the multiplier impact. The employment multiplier for this sector was 1.80. Thus, 12 secondary jobs were created in other businesses and the estimated total employment impact from student non-university spending is 27 jobs.

Income generated from these student expenditures is estimated at \$687,240. The income multiplier for retail trade and services was utilized to estimate the secondary income impact of \$542,920. The total income impact from student non-university spending was \$1.2 million. This income generates \$455,000 in retail sales and almost \$32,000 in state sales tax.

**Table 11**  
**Employment, Income and Retail Sales Impact of LMU-College of Veterinary and Comparative Medicine on the State of Tennessee from Student Spending, FY 2014**

Category	Amount
<b>Employment Impact</b>	
Jobs from Student Non-university Spending	15
Retail Trade and Services Employment Multiplier	1.80
Secondary Employment Impact	<u>12</u>
<b>TOTAL Employment Impact</b>	<b>27</b>
<b>Income Impact</b>	
Income from Student Non-university Spending	\$687,240
Retail Trade and Services Income Multiplier	1.79
Secondary Income Impact	<u>\$542,920</u>
<b>TOTAL Income Impact</b>	<b>\$1,230,160</b>
<b>Retail Sales and Sales Tax Impact</b>	
Retail Sales	\$455,159
State Sales Tax (7%)	\$31,861

Source: Student spending data from LMU-CVCM; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

### **Economic Impact from Visitor Spending**

LMU-CVCM activities attract many visitors to campus. These visitors spend dollars that contribute to the local economy. Data in **Table 6** estimates that 2,112 non-local visitors will spend \$258,244 in FY 2014. These data were converted to jobs and income based on ratios of expenditures to jobs and income from IMPLAN. The impact of visitor spending is presented in **Table 12**.

Jobs created in businesses due to visitor spending were estimated at 4. The employment multiplier of 1.42 estimated that 2 secondary jobs were created. The total impact on employment was 6 jobs generated due to visitor spending at LMU-CVCM.

Income generated from visitor spending was estimated at \$103,700. The estimated secondary impact was \$70,516 using the retail trade and services sector income multiplier of 1.68. This yielded a total income impact from visitor spending of \$174,216. This income resulted in retail sales of \$64,460 and state sales taxes of \$4,512 with a 7.0 percent rate.

**Table 12**  
**Employment, Income and Retail Sales Impact of LMU-College of Veterinary and Comparative Medicine on the State of Tennessee from Visitor Spending, FY 2014**

Category	Amount
<b>Employment Impact</b>	
Jobs from Visitor Spending	4
Retail Trade and Services Employment Multiplier	1.42
Secondary Employment Impact	<u>2</u>
<b>TOTAL Employment Impact</b>	<b>6</b>
<b>Income Impact</b>	
Income from Visitor Spending	\$103,700
Retail Trade and Services Income Multiplier	1.68
Secondary Income Impact	<u>\$70,516</u>
<b>TOTAL Income Impact</b>	<b>\$174,216</b>
<b>Retail Sales and Sales Tax Impact</b>	
Retail Sales	\$64,460
State Sales Tax (7%)	\$4,512

Source: Visitor data from 2007 LMU-DCOM; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

**Summary of LMU-CVCM Impacts**

In summary, LMU-CVCM's total impact as it relates to jobs, income, retail sales and sales tax on the State of Tennessee economy is presented in **Table 13**. Total estimate for FY 2014 was 129 direct jobs. When including the secondary impacts, the total employment impact is 221 full- and part-time jobs. The direct income activities were



estimated at almost \$7.2 million with the total income impact from LMU-CVCM on the State of Tennessee of over \$12.1 million. These dollars resulted in almost \$4.5 million in retail sales and over \$314,000 in state sales taxes.

**Table 13**  
**Economic Impact of LMU-College of Veterinary and Comparative Medicine on the State of Tennessee, FY 2014**

Sector	Direct	Employment Multiplier	Total Impact	Income			Sales Tax	
				Direct	Multiplier	Total Impact	Retail Sales	7 Cent Tax
College Operations	59	1.68	99	\$4,414,423	1.60	\$7,063,077	\$2,613,338	\$182,934
Construction	51	1.74	89	\$1,955,799	1.88	\$3,676,902	\$1,360,454	\$95,232
Student Spending <sup>1</sup>	15	1.80	27	\$687,240	1.79	\$1,230,160	\$455,159	\$31,861
Visitor Spending	<u>4</u>	1.42	<u>6</u>	<u>\$103,700</u>	1.68	<u>\$174,216</u>	<u>\$64,460</u>	<u>\$4,512</u>
<b>TOTAL</b>	<b>129</b>		<b>221</b>	<b>\$7,161,162</b>		<b>\$12,144,355</b>	<b>\$4,493,411</b>	<b>\$314,539</b>

<sup>1</sup>Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-CVCM auxiliary revenue.

Source: Employment, spending and income data from LMU-CVCM pro forma financial statements; Multipliers and coefficients from 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

## **THE IMPACT OF LMU-CVCM ON THE PRIMARY IMPACT REGION ECONOMY IN FY 2014**

LMU-CVCM is located on the extreme northern border of Tennessee. Thus, it was decided to measure the economic impact of the veterinary college on its primary impact region. Most of the economic impact will occur in this region. The region shown in **Figure 3** consists of three counties in Virginia, ten counties in Kentucky, and 14 counties in Tennessee as identified by LMU-CVCM. The location and distribution of current veterinarians in the service area can also be identified in **Figure 3**.

The methodology presented in the previous section was utilized to estimate the economic impact of LMU-CVCM on the impact region. Again, the study analyzed the impact relative to four activities. These include the economic activity resulting from LMU-CVCM:

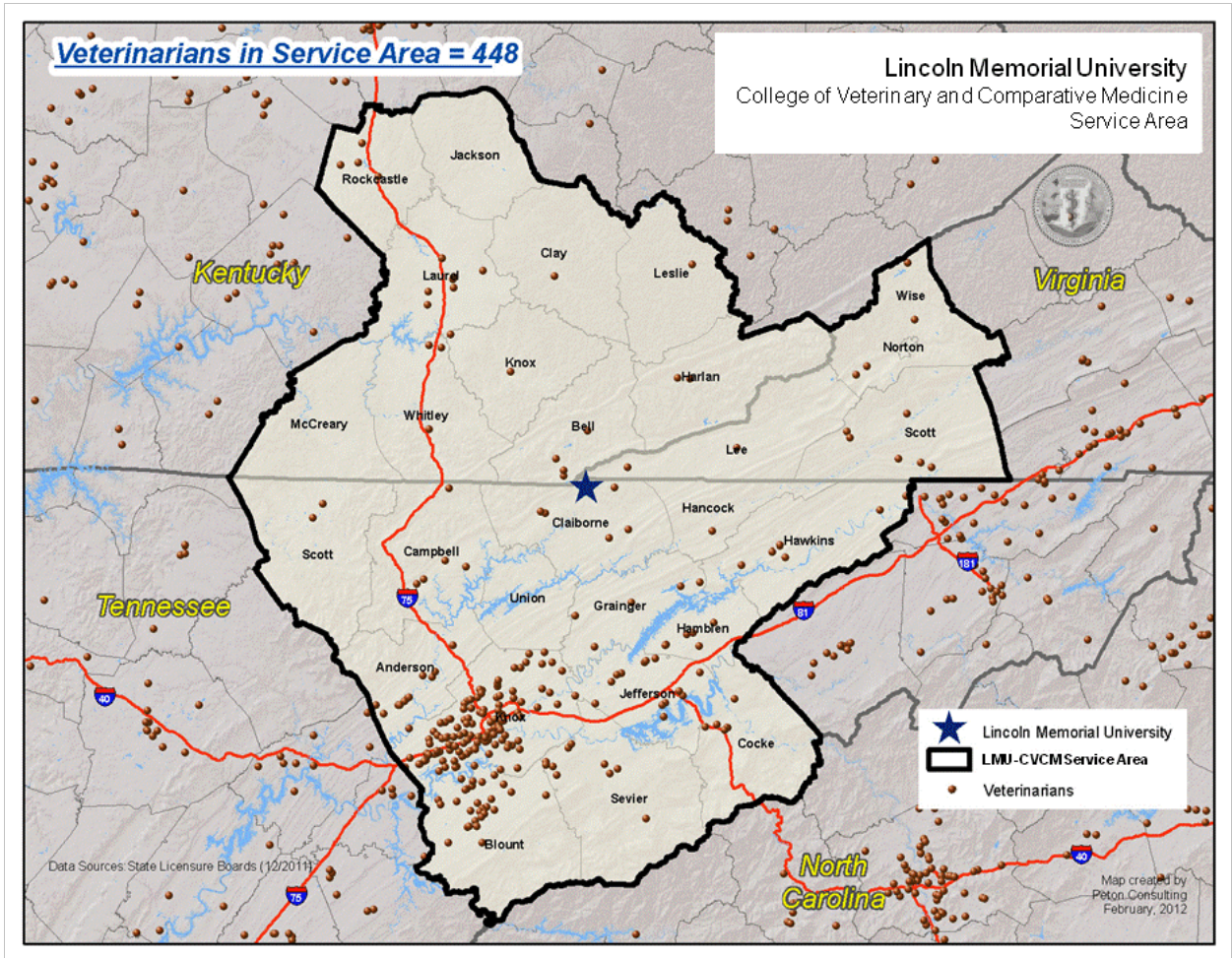
1. Operations;
2. Construction;
3. Student Non-university Spending; and
4. Visitor Spending.

Construction activity only occurs during the construction year, whereas the other activities occur every year. Since the same methodology was used as in the previous section, only the summary impact table is presented. Data relative to the employment, income, and retail sales are presented in **Table 14**.

LMU-CVCM is expected to have 59 employees and the regional higher education sector employment multiplier is 1.63. This means that for each job created at LMU-CVCM, another 0.63 jobs will be created in other businesses due to LMU-CVCM and its

employees spending money in the primary impact region. The total estimated employment impact from LMU-CVCM operations is 96 jobs.

**Figure 3**  
**Primary Impact Region for LMU-College of Veterinary and Comparative Medicine**



Source: LMU-CVCM officials.

**Table 14**  
**Economic Impact of LMU-College of Veterinary and Comparative Medicine on the Primary Impact Region, FY 2014**

Sector	Direct	Employment Multiplier	Total Impact	Direct	Income Multiplier	Total Impact	Retail Sales
College Operations	59	1.63	96	\$4,414,423	1.58	\$6,974,788	\$2,706,218
Construction	51	1.78	91	\$1,955,799	1.84	\$3,598,670	\$1,396,284
Student Spending <sup>1</sup>	15	1.79	27	\$687,240	1.79	\$1,230,160	\$477,302
Visitor Spending	<u>4</u>	1.41	<u>6</u>	<u>\$103,700</u>	1.64	<u>\$170,068</u>	\$65,986
<b>TOTAL</b>	<b>129</b>		<b>220</b>	<b>\$7,161,162</b>		<b>\$11,973,686</b>	<b>\$4,645,790</b>

<sup>1</sup>Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-CVCM auxiliary revenue.

Source: Employment and income data from LMU-CVCM pro forma financial statements; Multipliers and coefficients from 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

The economic impact of construction, student spending and visitor spending activities was also measured and yielded a total impact of 220 jobs in the region. Projected FY 2014 income for LMU-CVCM operations is \$4.4 million. With the region's higher education sector income multiplier of 1.58, the total impact on income in the primary impact region due to operational activities will be \$7.0 million. In total, when including all activities of LMU-CVCM, the total estimated income impact in the region is \$12.0 million.

By applying the regional sales capture ratio of 38.8 percent to the income impacts generated from all four activities, it was estimated that the impact on retail sales was \$4.6 million. Therefore, a one-cent sales tax would generate over \$46,000 in sales tax. Total impact on sales tax collection was not estimated due to the different tax rates throughout the region.

The tremendous educational contributions that LMU-CVCM will provide to the State of Tennessee and to its primary impact region are well understood. This study clearly documents that LMU-CVCM will also have a significant economic impact on both the State of Tennessee and the school's primary impact region.

## **Appendix A**

### **Review of Literature Relative to Impact Studies**

## **Appendix A**

### **Review of Literature Relative to Impact Studies**

For many years, researchers have been interested in quantifying the benefits, beyond the provision of degrees, of universities and colleges. One of the first detailed guides to measure the economic benefits of a college or university to the local community was requested by the American Council on Education (ACE) in 1968.<sup>[2]</sup> Based on some previous impact studies, Caffrey and Isaacs identified four primary groups that generated economic activity through spending. These four categories were: 1. the college, 2. faculty and staff, 3. students, and 4. visitors to the college. They developed several models and sub-models to estimate the spending. These models have provided the foundation for numerous economic impact studies since and are still being adopted today. For example, the Association of American Medical Colleges has been measuring the economic impact of their member institutions on the individual states in which they were located for a number of years. The results are based on adaptations of the ACE models with the latest study completed in 2006.<sup>[3]</sup>

Since the development of the ACE models, technology has simplified the process for deriving multipliers. The original ACE model depends upon numerous surveys to faculty, staff, students, local businesses and community residents and relies heavily upon proportional spending calculations to estimate indirect economic impact. It is a difficult model to implement and is less applicable to some colleges such as community colleges.<sup>[4]</sup> The proportion of money spent locally can be difficult to estimate. More recently, computer models have been created utilizing input-output analysis that not only make estimating the multiplier effect more reasonable, but allow different multipliers to be created for local, regional or state impacts (**Appendix B**). Two frequently used



computer models are the Regional Input-Output Modeling System (RIMS II) published by the U.S. Bureau of Economic Analysis and MicroIMPLAN developed by the United States Forest Service. These computer models have been used to estimate the impact of universities, medical schools, hospital construction and physician clinics, just to name a few.<sup>[5-11]</sup> For example, a detailed study estimating the impacts of the University of Nevada School of Medicine (UNSOM) on the Nevada economy was complete using the IMPLAN model.<sup>[5]</sup> The study includes estimates of the employment and payroll impacts of UNSOM medical education, patient care activities and construction in 2006. In 2001, the National Association of State Universities and Land-Grant Universities surveyed its members for their most recent economic impact reports. They published a summary analysis based on data from 96 member institutions and 10 member university systems.<sup>[12]</sup>

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## **Appendix B**

### **Model and Data Used to Estimate Employment and Income Multipliers**

## **Appendix B**

### **Model and Data Used to Estimate Employment and Income Multipliers**

A computer spreadsheet that uses state IMPLAN multipliers was developed to enable community development specialists to easily measure the secondary benefits of the health sector on a state, regional or county economy. The complete methodology, which includes an aggregate version, a disaggregate version, and a dynamic version, is presented in Measuring the Economic Importance of the Health Sector on a Local Economy: A Brief Literature Review and Procedures to Measure Local Impacts (Doeksen, et al., 1997). A brief review of input-output analysis and IMPLAN are presented here.

#### **A Review of Input-Output Analysis**

Input-output (I/O) (Miernyk, 1965) was designed to analyze the transactions among the industries in an economy. These models are largely based on the work of Wassily Leontief (1936). Detailed I/O analysis captures the indirect and induced interrelated circular behavior of the economy. For example, an increase in the demand for health services requires more equipment, more labor, and more supplies, which, in turn, requires more labor to produce the supplies, etc. By simultaneously accounting for structural interaction between sectors and industries, I/O analysis gives expression to the general economic equilibrium system. The analysis utilizes assumptions based on linear and fixed coefficients and limited substitutions among inputs and outputs. The analysis also assumes that average and marginal I/O coefficients are equal.

Nonetheless, the framework has been widely accepted and used. I/O analysis is useful when carefully executed and interpreted in defining the structure of a region, the interdependencies among industries, and forecasting economic outcomes.

The I/O model coefficients describe the structural interdependence of an economy. From the coefficients, various predictive devices can be computed, which can be useful in analyzing economic changes in a state, a region or a county. Multipliers indicate the relationship between some observed change in the economy and the total change in economic activity created throughout the economy.

### **MicroIMPLAN**

MicroIMPLAN is a computer program developed by the United States Forest Service (Alward, et al., 1989) to construct I/O accounts and models. Typically, the complexity of I/O modeling has hindered practitioners from constructing models specific to a community requesting an analysis. Too often, inappropriate U.S. multipliers have been used to estimate local economic impacts. In contrast, IMPLAN can construct a model for any state, region, county, or zip code area in the United States by using available state, county, and zip code level data. Impact analysis can be performed once a regional I/O model is constructed.

Five different sets of multipliers are estimated by IMPLAN, corresponding to five measures of regional economic activity. These are: total industry output, personal income, total income, value added, and employment. The total impact of a change in the economy consists of direct, indirect, and induced impacts. Direct impacts are the changes in the activities of the impacting industry such as the addition of another physician and corresponding medical staff to the medical service area. The increased purchases of inputs by the new physician clinic as a result of the direct impact are the indirect impact on the business sectors.

Two types of multipliers are generated. Type I multipliers measure the impact in terms of direct and indirect effects. However, the total impact of a change in the economy consists of direct, indirect, and induced changes. Both the direct and indirect impacts change the flow of dollars to the state, region, or county's households. Subsequently, the households alter their consumption accordingly. The effect of the changes in household consumption on businesses in a community is referred to as an induced effect. To measure the total impact, a Type II multiplier is used. The Type II multiplier compares direct, indirect, and induced effects with the direct effects generated by a change in final demand (the sum of direct, indirect, and induced divided by direct). IMPLAN also estimates a modified Type II multiplier, called a Type SAM multiplier, which also includes the direct, indirect, and induced effects. The Type SAM multiplier further modifies the induced effect to include spending patterns of households based on a breakdown of households by nine different income groups.

**Minnesota IMPLAN Group, Inc. (MIG)**

Dr. Wilbur Maki at the University of Minnesota utilized the I/O model and database work from the U. S. Forest Service's Land Management Planning Unit in Fort Collins to further develop the methodology and to expand the data sources. Scott Lindall and Doug Olson joined the University of Minnesota in 1984 and worked with Maki and the model.

As an outgrowth of their work with the University of Minnesota, Lindall and Olson entered into a technology transfer agreement with the University of Minnesota that allowed them to form MIG. At first, MIG focused on database development and provided data that could be used in the Forest Service version of the software. In 1995,

MIG took on the task of writing a new version of the IMPLAN software from scratch. This new version extended the previous Forest Service version by creating an entirely new modeling system that included creating Social Accounting Matrices (SAMs) – an extension of input-output accounts, and resulting SAM multipliers. Version 2 of the new IMPLAN software became available in May of 1999. For more information about Minnesota IMPLAN Group, Inc., please contact Scott Lindall or Doug Olson by phone at 651-439-4421 or by email at [info@implan.com](mailto:info@implan.com) or review their website at [www.implan.com](http://www.implan.com).



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## **Appendix C**

### **Dr. Doeksen's Professional Accomplishments**

## **Appendix C**

### **Dr. Doeksen's Professional Accomplishments**

Dr. Doeksen has 40 years of experience working with economic impact models. He has applied impact models to a variety of situations and also has advanced the theory of impact models. Dr. Doeksen's Master's thesis and Ph.D. dissertation both utilized input-output analysis, which is the most frequently used impact model. Both his thesis and dissertation received national awards.

Dr. Doeksen's early work in input-output analysis is referenced in textbooks such as Harry W. Richardson's book titled Input-Output and Regional Economics. He is given credit for groundbreaking work related to aggregation and size of multipliers.

Over the years, Dr. Doeksen has over 60 journal articles and publications regarding impact analysis. He has been involved with over 350 economic impact studies. These include such applications as to measure the economic impact of a university hospital, critical access hospital, golf course, manufacturing plant, large urban health clinic, medical program on a state's economy, dental practices, recreational facility, hotel, agricultural services, agricultural programs, etc. Results were used by local, state and federal policy makers to influence and justify political action. In addition, Dr. Doeksen is constantly being invited to speak at state, regional, national, and international conferences. He makes over 30 speaking engagements each year. Dr. Doeksen has recently received a lifetime achievement award from the Southern Agricultural Economics Association and the Bonnie Teeter Lifetime Achievement Award from the Southern Rural Development Center. Finally the Oklahoma Rural Health Association named his community development assessment model as the program of the year.

Dr. Doeksen's latest work with impact models is the founding of the National Center for Rural Health Works. The Center has been in operation over 10 years and its primary purpose is to train professionals in other states to measure the impact of health services on the rural economies. The Center is funded by the Federal Office of Rural Health Policy. Programs have been started in over 32 states. Dr. Doeksen continues to operate as Director and is continually developing new applications of the economic impact models.

In summary, Dr. Doeksen is nationally known for his economic impact studies and research applications. These applications relate to rural economies, many of which focus on various segments of the health sector.