

Final Report

UC Davis Economic Impact Analysis

The Economics of Land Use



Prepared for:
University of California, Davis, and UC Davis Health System

Prepared by:
Economic & Planning Systems, Inc. (EPS)

March 2016

EPS #142125

*Economic & Planning Systems, Inc.
2295 Gateway Oaks Drive, Suite 250
Sacramento, CA 95833-4210
916 649 8010 tel
916 649 2070 fax*

*Oakland
Sacramento
Denver
Los Angeles*

www.epsys.com

Table of Contents

EXECUTIVE SUMMARY	1
Summary of Findings	3
1. INTRODUCTION	5
Economic Contributions of Universities	6
Economic Impact Modeling	7
Direct Economic Effects	8
2. UC DAVIS ECONOMIC IMPACTS	11
Direct Economic Effects	11
Economic Impacts.....	11
3. UC DAVIS MAIN CAMPUS ECONOMIC IMPACTS	14
Direct Economic Effects	14
Economic Impacts.....	14
4. UC DAVIS HEALTH SYSTEM ECONOMIC IMPACTS	17
Direct Economic Effects	17
Economic Impacts.....	19

List of Figure and Tables

Figure 1	UC Davis Economic Impacts	2
Table 1	Background Data Summary.....	10
Table 2	Economic Impacts of Entire UC Davis Institution	12
Table 3	Economic Impacts of UC Davis Main Campus.....	15
Table 4	Economic Impacts of UC Davis Health System	18

EXECUTIVE SUMMARY

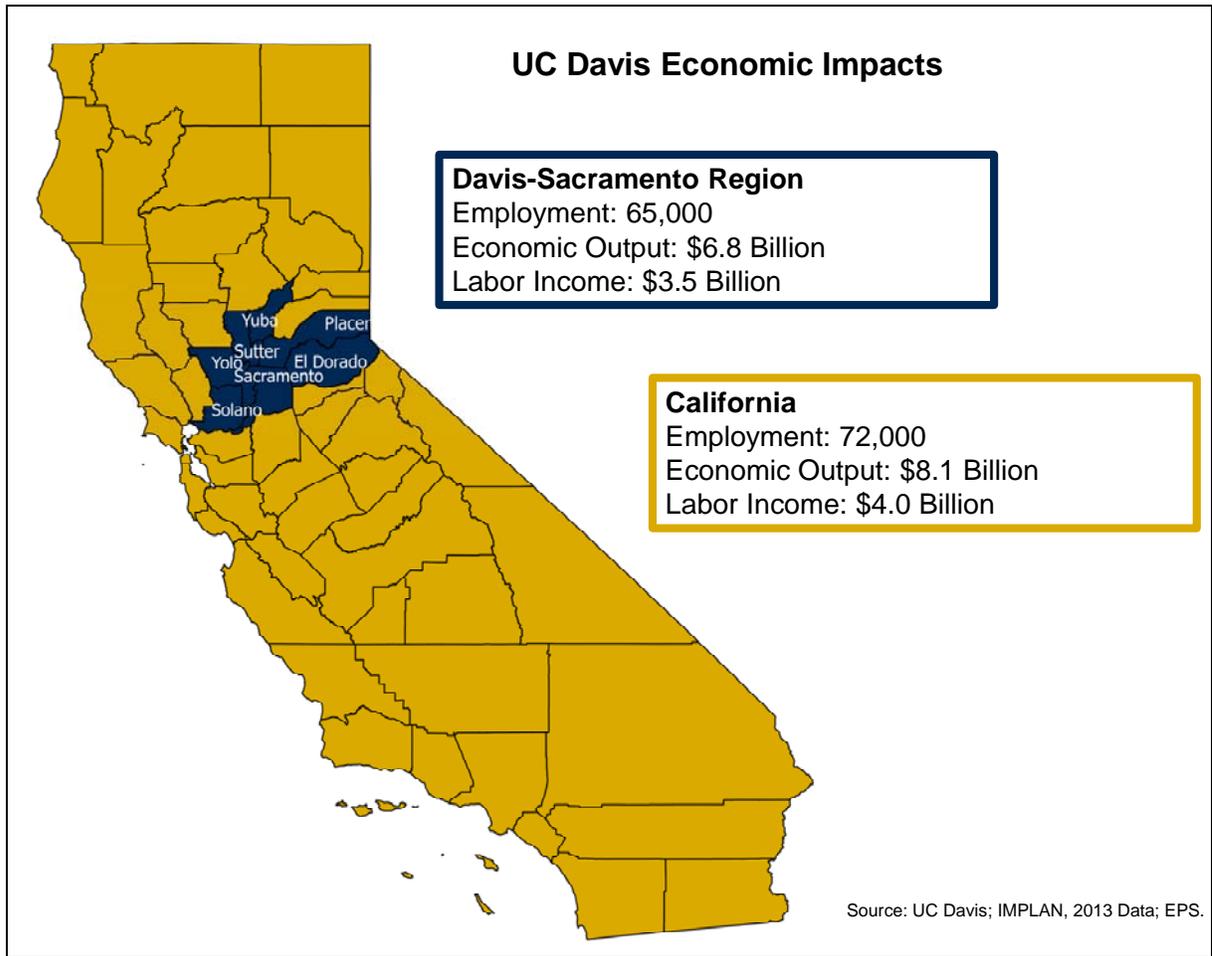
As one of the larger University of California campuses, with a robust range of educational programs, research activities, and clinical services, the University of California, Davis (UC Davis) is widely recognized for its academic excellence and global impact. In fulfilling its mission and building a global reputation, UC Davis also makes significant contributions to the regional and statewide economies. UC Davis engaged Economic & Planning Systems, Inc. (EPS) to conduct an evaluation of its economic activities and quantify the full range of economic impacts it generates in the Davis-Sacramento Region and California economies.

In Fiscal Year (FY) 2013-14, UC Davis operations supported expenditures of nearly \$3.5 billion, with an employee headcount of more than 40,000. The spending activities of the institution's roughly 34,000 students and 3.2 million visitors also are directly tied to UC Davis. Student and visitor spending levels for FY 2013-14 are estimated to total close to \$429 million and flow into several industry sectors in the economy. UC Davis and its employees, students, and visitors purchase goods and services in the economy that create a "ripple" or "multiplier" effect, as those initial, direct expenditures generate successive rounds of spending in the economy.

EPS quantified the total economic impact associated with UC Davis using an input-output (I/O) analysis framework that considers the direct, indirect, and induced effects on economic output, employment, and labor income. Generally speaking, the direct effects capture the expenditures made by UC Davis, as well as student and visitor spending. Indirect effects relate to the demand on suppliers of goods and services generated by the direct economic activities. Induced effects represent economic activities that result from spending of employees supported by the direct and indirect effects. Combined, the direct, indirect, and induced effects reflect the full range of economic impacts generated by UC Davis.

Figure 1 displays the total economic impacts derived by UC Davis in the Davis-Sacramento Region and California, based on FY 2013-14 activity levels. All told, UC Davis supports 65,000 jobs in the Davis-Sacramento Region and generates \$6.8 billion of economic output. Statewide, the total economic impact equates to 72,000 jobs and \$8.1 billion of economic output annually.

Figure 1 UC Davis Economic Impacts



Summary of Findings

1. UC Davis is a major and highly respected institution in the Davis-Sacramento Region.

UC Davis ranks as the second-largest employer in the region, surpassed only by the State of California. According to the *Sacramento Business Journal 2014 Book of Lists*, the main campus in Davis is the top employer in Yolo County, and the UC Davis Health System in Sacramento is fourth among public- and private-sector employers in Sacramento County. UC Davis's academic programs and medical services consistently rank high in many prestigious rankings.

2. The direct economic contributions of UC Davis are significant, accounting for the institution's operations, as well as student and visitor spending.

According to FY 2013-14, UC Davis supported operational expenditures of nearly \$3.5 billion along with 40,000 employees to maintain its high-quality academic, research, and clinical activities. The institution's 34,000 enrolled students and 3.2 million visitors also directly supported an estimated \$429 million of spending that was circulated among several different industry sectors in the economy. Combining UC Davis operations and the demand supported by its students and visitors shows that the institution directly contributes approximately \$3.7 billion of economic output and 42,000 jobs to the Davis-Sacramento Regional economy on an annual basis. This direct contribution accounts for activities at FY 2013-14 levels and adjusts for estimates of student and visitor spending that flow outside the regional economy.

3. UC Davis generates a multiplier effect as a result of demand on suppliers of goods and services and employee spending.

The estimated multiplier effect associated with UC Davis shows that, for every dollar of economic output and 1 job directly supported by the institution, the regional economy benefits from another 80 cents of economic output and 0.5 jobs, respectively. This means that in addition to the direct economic contribution, UC Davis generates an estimated \$3.1 billion of economic output and 23,000 jobs through its demand on suppliers of goods and services (indirect impact) and employee spending (induced impact) in the Davis-Sacramento Regional economy.

4. The size of UC Davis' economic impact is larger than entire major industry sectors in the regional economy.

The total regional economic impact associated with UC Davis—accounting for direct, indirect, and induced effects—amounts to almost \$6.8 billion of economic output and 65,000 jobs. This total economic impact is the equivalent of roughly 4 percent of all economic output and 3 percent of all jobs in the Davis-Sacramento Regional economy. Put differently, the total economic output impact is larger than the region's entire Accommodation & Food Services industry and the employment impact exceeds the size of the complete Manufacturing industry.

5. As home to most of UC Davis' academic programs, administrative functions, and students, the main campus generates a considerable regional economic impact.

The UC Davis main campus, including 4 colleges and 4 professional schools, generates direct, indirect, and induced effects in the Davis-Sacramento Region totaling \$2.8 billion of economic

output and 40,000 jobs. This total economic impact accounts for the main campus' academic, administrative, research, and construction activities, as well as spending from students and visitors that touch several different industry sectors in the regional economy. As a major academic and research hub with nearly 33,000 enrolled students, the total economic contribution is substantial, equating to more than 1 percent of all economic output generated in the regional economy and almost 3 percent of the total employment base.

6. The UC Davis Health System alone accounts for a large share of UC Davis' total economic contribution to the regional economy.

The UC Davis Health System—composed of the UC Davis School of Medicine, Betty Irene School of Nursing, UC Davis Medical Center, and UC Davis Medical Group—directly contributes roughly \$2.2 billion of economic output and 13,000 jobs to the Davis-Sacramento Regional economy annually as a result of its educational, research, and clinical operations, as well as associated student and visitor spending. UC Davis Health System's total economic impact, which adds the indirect and induced effects to the direct contribution, equates to more than \$3.9 billion of economic output and 25,000 jobs. Measured both through economic output and employment, UC Davis Health System's total impact is equal to almost 2 percent of the entire Davis-Sacramento Regional economy.

The remainder of this report discusses the economic impact analysis approach and resulting estimates in greater detail.

1. INTRODUCTION

UC Davis is one of 10 campuses in the world-renowned University of California system. UC Davis is unique among this group of institutions in that it is one of the oldest campuses, has the largest land area, and hosts six professional schools, including education, law, management, medicine, veterinary medicine, and nursing. The campus and many of its academic programs consistently rank among the top public universities and programs in the country, and the medical services provided through UC Davis Health System have received strong marks in several prestigious rankings. The institution offers almost 102 undergraduate majors and 90 graduate programs for its roughly 34,000 students to pursue. UC Davis also receives a significant amount of research funding, placing it among the top 10 public universities in the country on this measure, along with several other distinguished research-based institutions.

UC Davis clearly is recognized as a leader in education, clinical services, and research, but the institution's role as a major contributor to the statewide and regional economies is sometimes not widely understood or acknowledged. According to the *Sacramento Business Journal 2014 Book of Lists*, the main campus in Davis is the leading employer in Yolo County, and UC Davis Health System, located in the City of Sacramento, is ranked fourth among the largest public- and private-sector employers in Sacramento County. UC Davis and the UC Davis Health System, combined, rank as the second-largest employer in the broader region, just behind the State of California and ahead of major regional headquarters such as VSP Global, Raley's, Sutter Health, PRIDE Industries, and Aerojet.

As a major institution in the regional economy, UC Davis' contribution does not end with its \$3.5 billion operating budget and 40,000 employees. UC Davis also supports ongoing economic activities among its suppliers of goods and services and those establishments that benefit from the spending supported by its employee paychecks. In addition, spending associated with enrolled students and campus visitors supports a significant amount of economic activity, and major construction projects undertaken by the institution create a short-term stimulus to the economy. UC Davis has commissioned studies in the past to help it understand and communicate its contribution to the statewide and regional economies, with the most recent work completed by the Center for Strategic Economic Research (CSER) in 2011.

UC Davis engaged EPS to provide an updated economic impact analysis that builds on the 2011 study and examines the impact of the entire institution, as well as that of UC Davis and UC Davis Health System individually. This report presents the results of the economic impact analysis, which estimates the institution's contribution to both the Davis-Sacramento Region and California economies based on FY 2013-14 operations levels. The remainder of this chapter discusses the general types of economic contributions of universities, provides an overview of the economic impact modeling approach, and defines the direct economic effects. **Chapter 2** of this report presents the full range of economic impacts associated with the entire institution, and **Chapters 3** and **4** showcase the economic impacts exclusively related to the main campus and UC Davis Health System.

While the approach to calibrating the economic impact models and building direct data assumptions are similar, it is important to note that there are several key differences between this study and the previous economic impact analysis commissioned in 2011, which limit the ability to make direct comparisons. Any comparisons between the two reports should be made with caution and an understanding that there are other factors influencing the results beyond purely economic activities.¹

Economic Contributions of Universities

Large research universities with affiliated medical schools directly contribute to their host economies in several distinct ways. If a university is removed from its host area entirely and associated activities are not replaced, the local economy will cease to experience the significant benefits derived from the direct economic contributions. The predominant, distinct, direct economic activities are highlighted below:

- **Academics and administration**—Providing instruction and related services requires significant investments in a sizeable base of faculty and staff, as well as the necessary facilities and equipment to deliver instruction.
- **Research**—Conducting basic and applied research across several disciplines creates a need for spending on supporting programs, specialized facilities, technical equipment, and related staff.
- **Health services**—Providing health services through medical centers and clinical groups similar to other health care providers entails spending to support hospitals, medical office, and administration, as well as a workforce that includes doctors, nurses, and other support staff.
- **Administration**—Providing the services and facilities to support teaching, research, clinical, and service missions requires investment in a variety of administrative functions (e.g., human resources, finance, facilities maintenance, or regulatory compliance).
- **Construction projects**—Investing in major construction projects generates short-term spending and demand on entities such as construction contractors, consultants and professional service providers, and equipment sellers.
- **Student spending**—Expenditures from enrolled students on housing, food, transportation, consumer goods, and other personal services flow into a wide range of industry sectors in the local economy.

¹ The key differences between the two studies include some variation in the coordination and methods used by UC Davis to collect and provide background data, changes in campus operational expenditures and staffing levels, the inclusion of a new professional school (Betty Irene Moore School of Nursing), and shifts in regional and statewide economic structures reflected in the most current economic impact modeling data sets.

- **Visitor spending**—Visitors drawn to campus facilities for a variety of events and activities (e.g., sports, performing arts, or lectures) spend money locally on items such as food, gas, accommodations, and retail products.
- **Community giving**—Providing direct funding to support the delivery of external community programs and services (e.g., health clinics, education services, or children’s activities) drives economic activity across the entities receiving the funding.

There are several other economic benefits that come with hosting a large university that are generally less tangible and harder to measure than those described above. Student, faculty, and partnership research activities tend to create market value through technology transfers, spin-off or start-up companies, royalties, and acquisitions. In addition, the educational attainment and workforce development outcomes are beneficial to local economic development as an area’s workforce increasingly is being recognized as one of its most important competitive attributes. Further, communities that host universities often benefit from the campus amenities (e.g., performing arts, sports, or recreation) and a generally high quality of life that are key to attracting and retaining talent, residents, and businesses. These types of benefits are not analyzed in this report.

Economic Impact Modeling

The economic impact analysis uses an I/O modeling framework to quantify UC Davis’ contributions to regional and statewide economic output, employment, and labor income. The I/O modeling framework is premised on the concept that industries in a geographic region are interdependent in the sense that they purchase output from and supply input to other industries. This analysis relies on IMPLAN (Impact Analysis for Planning) software, an I/O model that draws on data collected by the IMPLAN Group, LLC, from several state and federal sources, including the Bureau of Economic Analysis (BEA), Bureau of Labor Statistics (BLS), and the Census Bureau. The model is used widely for estimating economic impacts across a wide array of industries and economic settings.

Economic impact analyses and I/O models in particular provide a means to estimate total regional effects stemming from a particular industry. Specifically, I/O models produce quantitative estimates of the magnitude of regional economic activity resulting from some initial activity (e.g., university operations or building construction). I/O models rely on economic “multipliers” that mathematically represent the relation between the initial change in one sector of the economy and the effect of that change on economic output, income, or employment in other local industries. These economic data provide a quantitative estimate of the magnitude of shifts in jobs and revenues in the regional economy.

Economic impacts using an I/O model are based on an initial change in economic output or employment in a specific industry sector. The model then translates the initial change into changes in demand for output from other interdependent sectors, corresponding changes in demand for inputs to those sectors, and so on. These effects commonly are described as direct, indirect, or induced and generally are defined as follows:

- The **direct** effect represents the change in economic output or employment attributable to a certain economic activity; in this case, UC Davis itself and the entities directly receiving spending related to the construction projects, students, and visitors (e.g., construction contractors, retail establishments, or restaurants).
- The **indirect** effect reflects the economic activities that result from the response to demand on suppliers of goods and services from the direct economic activity. For example, office equipment used for campus operations or building materials provided for construction projects are captured as part of the indirect effect.
- The **induced** effect captures household purchases of goods and services in the economy tied to employee income supported by the direct and indirect activities. For instance, employees of these establishments spend their paychecks on household needs such as groceries, retail purchases, health care, and mortgage or rent payments, all of which are considered in the induced effect.

The total impact is the sum of the direct, indirect, and induced effects. The total effect measures the impact of an activity as it “ripples” throughout the regional economy. For this analysis, the regional economy is defined as the Davis-Sacramento Region, which includes El Dorado, Placer, Sacramento, Solano, Sutter, Yolo, and Yuba Counties. IMPLAN generates a model of the industrial structure and household profile for the regional economy, which in turn determines the extent to which spending is captured and recirculated in the local economy rather than being allowed to leak outside the geographic area. This analysis also examines the statewide economic impacts where additional direct economic activities and much of the regional leakage is captured, leading to larger multiplier effects. In the subsequent sections, the statewide and regional economic effects described above are reported in three categories:

- **Economic output** represents the total market value of goods and services derived from the direct, indirect, and induced effects associated with the subject economic activity.
- **Employment (jobs)** represents the estimated number of direct, indirect, and induced jobs in the study area economy resulting from the subject economic activity. Employment reported by IMPLAN represents a headcount and includes both full-time and part-time workers.
- **Labor income** reflects the estimated amount of direct, indirect, and induced annual employment income (i.e., salaries, wages, and benefits) resulting from the associated employment. It is important to note that labor income is a component of economic output and is not an additive economic impact.

Direct Economic Effects

EPS worked with UC Davis representatives to collect appropriately detailed background data to define the direct economic effects for the institution overall and specifically related to the UC Davis Health System. Data was provided in categories that reflect those outlined in the Economic Contributions of Universities section above—this allowed EPS to model distinct

economic activities appropriately, rather than treating all activities collectively as higher education. **Table 1** provides a summary of the background data based on both the information provided by UC Davis for its FY 2013-14 operations and EPS estimates for student and visitor spending.

The student and visitor spending estimates were developed by EPS based on financial aid student budget estimates and published studies on average visitor spending levels around University of California campuses. In terms of student spending, annual budgets used ranged from around \$1,800 to \$22,000, depending on the level and type of degree being pursued and whether the student lives on or off campus.² The split of spending on housing, food, personal expenses, and transportation across specific industries was based on details provided in the graduate student budgets and consumer expenditure surveys. The visitor spending estimates used a conservative average level of \$24, which is only slightly higher than the previous UC Davis analysis that relied on data exclusively from a 2004 Sedway Group study but is in line with reports covering other University of California campuses. UC Davis provided visitor counts that accounted for events with 500 or more participants for the main campus and continuing medical education conferences and courses for the UC Davis Health System.

The background data show that, based on FY 2013-14 operations levels, UC Davis directly supports more than \$3.5 billion of economic activity with roughly 40,000 employees and an associated \$2.4 billion of employee compensation. In addition, its nearly 34,000 students and 3.2 million visitors inject another \$429 million into the economy through spending activities. The UC Davis Health System is a major driver of the institution's direct economic effects, with more than half of all operating expenditures and close to one-third of the employees.

² The low end of the range represents on-campus undergraduate students whose spending is isolated to personal expenses and transportation costs as other spending categories (e.g., housing) are assumed to go directly to the institution. The high end of the range accounts for off-campus professional graduate students with all spending categories flowing into the economy.

Table 1
UC Davis Economic Impact Analysis
Background Data Summary, FY 13-14

Measure	Value
<u>Entire Institution</u>	
Faculty & Staff Headcount	40,388
Employee Compensation [1]	\$2,430,581,961
Construction Expenditures	\$123,479,419
All Other Operating Expenditures	\$904,424,988
Student Count	33,668
Visitor Count	3,193,432
Student & Visitor Spending	\$428,569,304
Community Program Funding [2]	\$2,305,992
<u>Main Campus</u>	
Faculty & Staff Headcount	27,945
Employee Compensation [1]	\$1,026,496,470
Construction Expenditures	\$117,563,419
All Other Operating Expenditures	\$103,872,177
Student Count	32,862
Visitor Count	3,191,103
Student & Visitor Spending	\$412,664,118
<u>Health System</u>	
Faculty & Staff Headcount	12,443
Employee Compensation [1]	\$1,404,085,492
Construction Expenditures	\$5,916,000
All Other Operating Expenditures	\$800,552,811
Student Count	806
Visitor Count	2,329
Student & Visitor Spending	\$15,905,186
Community Program Funding [2]	\$2,305,992

"bkgnd"

Source: UC Davis; EPS

[1] Employee Compensation includes salaries/wages and benefits.

[2] Community Program Funding covers only discrete external programs funded and does not include sponsorship or other marketing-related funding.

Note: Operating expenditures include the following items:
employee compensation, construction expenditures,
all other operating expenditures, and community
program funding.

2. UC DAVIS ECONOMIC IMPACTS

This chapter quantifies the economic impacts generated in regional and statewide economies by the entire institution based on FY 2013-14 operations levels. Not only does UC Davis provide essential educational opportunities through its 4 colleges and 6 professional schools, cutting-edge research from its distinguished faculty and numerous research units, and indispensable health services by way of its veterinary and medical programs, but it also makes a significant contribution to the economy. Supporting operations requires considerable expenditures and a relatively large workforce, plus UC Davis students, visitors, and employees spend money for household and personal purposes in a wide range of industries. The Davis-Sacramento Region and California economies benefit from the considerable economic activity generated by UC Davis.



Direct Economic Effects

UC Davis posted operational expenditures totaling nearly \$3.5 billion in FY 2013-14 to maintain its high-quality academic, research, and clinical activities, as indicated in the Entire Institution section of **Table 1**. University operations at this level supported roughly 40,000 employees with salaries, wages, and benefits of about \$2.4 billion. Also included in these expenditures was more than \$123 million of campus construction activity to renovate existing space and build new facilities. With student enrollment of around 34,000 and nearly 3.2 million visitors coming to the campus for various events, the university also directly supported an estimated \$429 million of spending across several industry sectors in the economy.

Accounting for the UC Davis operations (at FY 2013-14 levels) and the demand generated from student, visitor, and construction spending (taking associated leakage into consideration), altogether, the institution directly contributes approximately \$3.7 billion of economic output, 42,000 jobs, and \$2.5 billion of labor income to the Davis-Sacramento Regional economy on an annual basis. Extended to the statewide level, where additional university activities and related spending is captured, the institution's direct economic contributions total nearly \$3.9 billion of economic output, 44,000 jobs, and \$2.6 billion of labor income. These data are shown as the direct impacts in **Table 2**.

Economic Impacts

Table 2 shows that, in addition to the direct economic contribution, UC Davis generates an estimated \$3.1 billion of economic output, 23,000 jobs, and \$1.0 billion of labor income through its demand on suppliers of goods and services (indirect impact) and employee spending in the Davis-Sacramento Regional economy (induced impact).

Table 2
UC Davis Economic Impact Analysis
Economic Impacts of Entire UC Davis Institution

Measure [1]	Impact Type			Total Impact	Multiplier Effect
	Direct	Indirect	Induced		
<u>Davis-Sacramento Region</u>					
Economic Output	\$3,716,502,000	\$1,169,239,000	\$1,895,452,000	\$6,781,192,000	1.8
Employment	42,000	9,000	14,000	65,000	1.5
Labor Income	\$2,516,851,000	\$366,325,000	\$638,383,000	\$3,521,559,000	1.4
<u>California</u>					
Economic Output	\$3,889,371,000	\$1,607,869,000	\$2,597,306,000	\$8,094,546,000	2.1
Employment	44,000	10,000	18,000	72,000	1.6
Labor Income	\$2,572,272,000	\$553,292,000	\$913,664,000	\$4,039,228,000	1.6

"inst_total"

Source: UC Davis; IMPLAN, 2013 Data; EPS

[1] Results are rounded to the nearest thousand. Multipliers are calculated using full estimates.

The aggregation of direct, indirect, and induced effects in the Davis-Sacramento Region shows that the total gross economic impact associated with UC Davis amounts to almost \$6.8 billion of economic output, 65,000 jobs, and \$3.5 billion of labor income. The estimated multiplier effect shows that, for every dollar of economic output and 1 job directly supported by UC Davis, the regional economy benefits from another 80 cents of economic output and 0.5 jobs, respectively.

The economic impacts associated with UC Davis touch nearly every major industry sector in the regional economy. Specifically, the Professional, Scientific, & Technical Services; Administrative & Waste Services; and Real Estate & Rental industries see the greatest indirect impacts as a result of the demand on suppliers of goods and services. In terms of induced impact from employee spending, the most pronounced effects are seen in the Health & Social Services, Retail Trade, and Finance & Insurance industries.

To put the magnitude of the institution's total economic impacts in perspective, the regional economy supports roughly \$221 billion of economic output and contains around 1.5 million jobs, meaning that the university's contribution is equivalent to approximately 4 percent of all economic output and 3 percent of all jobs. Moreover, the total economic output impact is larger than the entire Accommodation & Food Services industry (i.e., hotels, restaurants, and bars), and the employment impact surpasses the size of the full Manufacturing industry (i.e., production of durable and non-durable goods) in the Davis-Sacramento Region. According to 2013 IMPLAN model data, the Accommodation & Food Services industry produces \$6.4 billion of economic output, while the Manufacturing industry supports about 50,000 jobs.

Expanded to the entire state, the total economic impact associated with UC Davis increases by about 15 percent on average across all measures. The California economy benefits from an estimated \$8.1 billion of economic output, 72,000 jobs, and \$4.0 billion of labor income on an annual basis as a result of the direct, indirect, and induced effects attributable to UC Davis. The multiplier effect at the statewide level indicates that for every dollar of economic output and 1 job directly created by UC Davis, another \$1.10 of economic output and 0.6 jobs are generated in the economy, respectively. This multiplier effect is within the range identified through studies of other major universities in California.³

³ For example, a 2013 study looking at the economic impacts of the University of California, Los Angeles (UCLA), which is larger than UC Davis, showed an economic output multiplier effect of 2.3 and an employment multiplier effect of 2.2.

3. UC DAVIS MAIN CAMPUS ECONOMIC IMPACTS

This chapter summarizes the estimated economic impacts of the UC Davis main campus on the Davis-Sacramento Region and statewide economies. These economic impacts are a subset of the estimates for the entire institution presented in **Chapter 2**. The main campus houses most of the institution's administrative functions, as well as all 4 colleges (Agricultural and Environmental Sciences, Biological Sciences, Engineering, and Letters and Sciences) and 4 of the 6 professional schools (Graduate School of Management, School of Education, School of Law, and School of Veterinary Medicine). Almost 98 percent of the institution's enrolled students and nearly all of the visitors are associated with the main campus. The main campus's academic programs, administrative and research activities, and student and visitor spending make a notable contribution to the regional and statewide economies.



Direct Economic Effects

Based on FY 2013-14 information, the UC Davis main campus supported operational expenditures totaling more than \$1.2 billion to provide and administer its academic program, perform research activities, and invest in construction projects. Nearly 28,000 employees worked at the main campus in FY 2013-14 with associated compensation of approximately \$1.0 billion. With close to 33,000 students and 3.2 million visitors, related spending totaled almost \$413 million. **Table 1** summarizes these background data in the Main Campus section.

As shown in **Table 3**, accounting for main campus operations, as well as the flow of spending from students and visitors, the estimated direct annual economic contribution equates to about \$1.5 billion of economic output, 30,000 jobs, and \$1.1 billion of labor income in the Davis-Sacramento Regional economy. The main campus's direct economic contribution to the California economy on average is approximately 7-percent larger than the regional contribution as a result of incremental operations, student levels, and greater capture of spending activity.

Economic Impacts

The indirect and induced effects, which account for demand on suppliers of goods and services, as well as employee spending, are shown in **Table 3**, along with the total estimated economic impact and associated multiplier effects. In addition to the notable direct effects discussed above, the main campus supports indirect and induced effects totaling roughly \$1.3 billion of economic output, 10,000 jobs, and \$445 million of labor income in the regional economy.

Table 3
UC Davis Economic Impact Analysis
Economic Impacts of UC Davis Main Campus

Measure [1]	Impact Type			Total Impact	Multiplier Effect
	Direct	Indirect	Induced		
<u>Davis-Sacramento Region</u>					
Economic Output	\$1,490,256,000	\$519,346,000	\$827,074,000	\$2,836,676,000	1.9
Employment	30,000	4,000	6,000	40,000	1.3
Labor Income	\$1,107,394,000	\$164,724,000	\$280,130,000	\$1,552,248,000	1.4
<u>California</u>					
Economic Output	\$1,660,603,000	\$707,706,000	\$1,150,682,000	\$3,518,991,000	2.1
Employment	31,000	5,000	8,000	44,000	1.4
Labor Income	\$1,161,734,000	\$240,791,000	\$407,292,000	\$1,809,817,000	1.6

"camp_total"

Source: UC Davis; IMPLAN, 2013 Data; EPS

[1] Results are rounded to the nearest thousand. Multipliers are calculated using full estimates.

Overall, the total gross economic impact generated by the main campus equates to about \$2.8 billion of economic output, 40,000 jobs, and \$1.6 billion of labor income. This total accounts for direct, indirect, and induced effects in the Davis-Sacramento Region. The multiplier effect derived from the main campus illustrates that for every dollar of economic output and 1 job supported by direct economic activities, the regional economy benefits from an additional 90 cents of economic output and 0.3 jobs, respectively.

The main campus' indirect and induced effects are distributed across several different industry sectors. All in all, the Professional, Scientific, & Technical Services; Administrative & Waste Services; and Real Estate & Rental industries benefit the most from demand on suppliers of goods and services reflected in the indirect effects. The three industries that rank at the top of the list for the induced effects from employee spending include Health & Social Services, Retail Trade, and Real Estate & Rental.

Accounting for the direct, indirect, and induced effects shows that the main campus is a major contributor to the Davis-Sacramento Regional economy, with the total economic impact capturing more than 1 percent of all economic output and nearly 3 percent of the entire regional employment base. Looking at the contribution in another way reveals that the total economic impacts of the main campus are larger than entire industry sectors in the regional economy. For example, the main campus' total economic output impact exceeds the size of the Agriculture, Fishing, & Forestry industry, while the employment impact is larger than the Arts, Entertainment, & Recreation industry. IMPLAN model data for 2013 show the Agriculture, Fishing, & Forestry industry at approximately \$2.7 billion of economic output and the Arts, Entertainment, & Recreation industry at around 31,000 jobs.

At the statewide level, the total economic impact associated with the main campus is, on average, about 17-percent larger than at the regional level. This is a result of the additional direct economic activities in other parts of the state, as well as the incremental indirect and induced effects captured in the larger statewide economy. The total gross economic impact in California is estimated at approximately \$3.5 billion of economic output, 44,000 jobs, and \$1.8 billion of labor income. The statewide multiplier effects show that the main campus generates an additional \$1.10 and 0.4 jobs for every direct dollar of economic output or 1 job, respectively.

4. UC DAVIS HEALTH SYSTEM ECONOMIC IMPACTS

This chapter discusses the discrete economic contributions of the UC Davis Health System, which are included as part of the economic impacts of the entire institution described in **Chapter 2**. The UC Davis Health System comprises four main entities: the UC Davis School of Medicine, Betty Irene School of Nursing, UC Davis Medical Center, and UC Davis Medical Group. These entities focus on a core set of valuable activities, including educating healthcare professionals at many occupational levels, conducting high-impact research, providing quality patient care in its hospital and medical offices, and engaging with diverse communities on health-related issues. UC Davis Health System operations associated with these activities, along with spending tied to students and visitors, generate significant economic impacts in the Davis-Sacramento Region and California economies.



Direct Economic Effects

In FY 2013-14, the UC Davis Health System maintained operational expenditures of more than \$2.2 billion to administer and deliver its esteemed medical and nursing education programs, innovative research activities, and comprehensive health services. UC Davis Health System operations in this period supported more than 12,000 employees with compensation totaling more than \$1.4 billion. Spending activities of the UC Davis Health System's more than 800 students and 2,000 continuing and professional education visitors also directly generated nearly \$16 million of demand for goods and services across a wide variety of industry sectors in the economy. The UC Davis Health System section of **Table 1** summarizes these background data.

Combining UC Davis Health System operations and the demand supported by its students and visitors shows that the organization directly contributes roughly \$2.2 billion of economic output, 13,000 jobs, and \$1.4 billion of labor income to the Davis-Sacramento Regional economy annually. This direct contribution, shown in **Table 4**, accounts for activities at FY 2013-14 levels, as well as estimates of spending that leaks outside the regional economy. Examining the UC Davis Health System's direct economic contribution at a statewide level reveals only a modestly larger effect because of the concentration of activities at the regional level and the relatively small amount of additional activities and spending captured statewide.

Table 4
UC Davis Economic Impact Analysis
Economic Impacts of UC Davis Health System

Measure [1]	Impact Type			Total Impact	Multiplier Effect
	Direct	Indirect	Induced		
<u>Davis-Sacramento Region</u>					
Economic Output	\$2,226,246,000	\$649,893,000	\$1,068,378,000	\$3,944,516,000	1.8
Employment	13,000	5,000	8,000	25,000	1.9
Labor Income	\$1,409,457,000	\$201,601,000	\$358,253,000	\$1,969,311,000	1.4
<u>California</u>					
Economic Output	\$2,228,769,000	\$900,162,000	\$1,446,623,000	\$4,575,554,000	2.1
Employment	13,000	6,000	10,000	28,000	2.2
Labor Income	\$1,410,538,000	\$312,501,000	\$506,372,000	\$2,229,411,000	1.6

"hs_total"

Source: UC Davis; IMPLAN, 2013 Data; EPS

[1] Results are rounded to the nearest thousand. Multipliers are calculated using full estimates.

Economic Impacts

Estimates of the additional economic effects generated as a result of demand on suppliers of goods and services and employee spending are shown in **Table 4**. The indirect and induced effects supported by the UC Davis Health System add approximately \$1.7 billion of economic output, 13,000 jobs, and \$560 million of labor income to the Davis-Sacramento Regional economy on an annual basis on top of the significant direct effects.

The UC Davis Health System's total gross economic impact, which includes direct, indirect, and induced effects, equates to more than \$3.9 billion of economic output, 25,000 jobs, and \$2.0 billion of labor income. Overall, the multiplier effect tied to the UC Davis Health System demonstrates that for every dollar of economic output and 1 job derived from direct economic activities, the Davis-Sacramento Regional economy gains an additional 80 cents of economic output and 0.9 jobs, respectively.

A wide range of industry sectors benefit from indirect and induced effects generated by the UC Davis Health System. The top three industries that experience the greatest impact resulting from demand on suppliers of goods and services are Professional, Scientific, & Technical Services; Administrative & Waste Services; and Real Estate & Rental. Employee spending in the regional economy produces the greatest benefits in the Health & Social Services, Retail Trade, and Finance & Insurance industries.

The magnitude of the total economic impact derived from the UC Davis Health System is significant. In terms of both economic output and employment, the UC Davis Health System's total impact is equal to almost 2 percent of the entire Davis-Sacramento Regional economy. To put this in perspective, the total economic output and employment impacts generated by the UC Davis Health System are estimated to be larger than the region's Agriculture, Fishing, & Forestry industry on its own, which supports \$2.7 billion of economic output and around 24,000 jobs, according to 2013 IMPLAN model data.

The total economic impact at the statewide level captures some additional economic activities and spending for the direct effects, as well as incremental supplier and employee spending demand accounted for in the indirect and induced effects. The California economy benefits from close to \$4.6 billion of economic output, 28,000 jobs, and \$2.2 billion of labor income as a result of the total economic impact generated by the UC Davis Health System. The multiplier effects are somewhat larger in the state, with about \$1.10 and 1.2 jobs derived from every dollar of economic output or 1 job directly supported by the UC Davis Health System, respectively. These multiplier effects are within the range revealed in other studies examining the economic impacts of university-related medical schools and clinical activities in the state.⁴

⁴ For instance, a 2013 study examining the economic impacts of UCLA's Health Sciences and Health System, which accounts for a somewhat different grouping of activities, estimated an economic output multiplier effect of 2.3 and an employment multiplier effect of 2.5.