Memorandum

UCD Economic Impact Analysis

The Economics of Land Use

Prepared for:
UC Davis

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Prepared by:
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EPS #182082

MEMORANDUM

To: Mabel Salon

From: David Zehnder and Tom Martens

Subject: UCD Economic Impact Analysis; EPS #182082

Date: January 31, 2022

Introduction

The University of California (UC) has been the fundamental economic driver for the City of Davis since UC's University Farm opened to students in 1908. For the first several decades of the 20th century, population in the City of Davis grew in tandem with the growth in enrollment at the campus. By the time the campus was transformed into a full-fledged UC in 1959, the city's population was still under 9,000; however, during the 1960s, the first decade operating as a UC campus, the city experienced its greatest rate of population growth, 164 percent, increasing to 23,000 residents by 1970.

Growth of the campus may have slowed in the past few decades, but the "college-town" environment the UC's presence fosters creates a self-affirming cycle of attraction to the City of Davis.

In addition to drawing households and the businesses that serve them to the City of Davis and the larger region, the University of California at Davis (UCD) generates significant local economic activity by directly supporting businesses that help satisfy the operational needs of the institution. Those UCD-supported businesses in turn support other local businesses.

In addition to supporting local businesses, UCD is a generator of new businesses in the City of Davis, the Greater Davis-Sacramento Region, and throughout California. Numerous startup firms that grow out of research conducted at UCD maintain links with the university and rely on a UCD-trained workforce and are therefore often compelled to operate locally. Others looking for global opportunities or faster growth will often migrate to larger markets, particularly the Bay Area, generating economic activity well beyond the Davis-Sacramento area.

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In addition to the businesses that spin off directly from the programs at UCD, countless others also locate to the City of Davis for access to an educated labor force, the marketing cache of a proximate leading university, or simply the college-town lifestyle preferences of senior executives.

Overview

Economic & Planning Systems, Inc. (EPS) was retained to evaluate the economic impact of UCD within a variety of contexts:

- Economic multiplier analysis to estimate the direct, indirect, and induced economic impacts from UCD (Davis and Sacramento Heath System) operating expenditures in the City of Davis, the Greater Davis-Sacramento Region,[1] and the State of California.
- Discussion of the importance of commercialization and an evaluation of the impact of Town-Gown collaboration.
- Analysis of trends in UCD technology commercialization activity and comparison of UCD commercialization activity to other UC campuses.

The economic impact analysis builds on Fiscal Year 2019 data and calendar year 2019 data, providing an overview of the university's impact based on the last pre-pandemic year conditions.

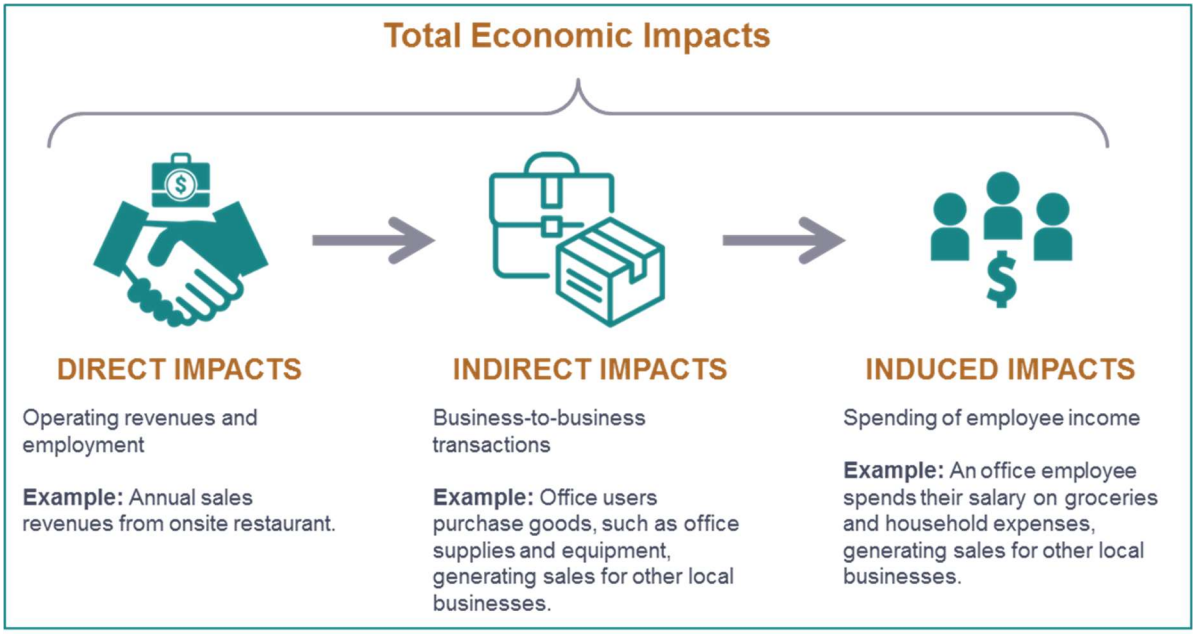
Economic Multiplier Analysis

The UCD campuses in Davis and Sacramento are significant engines of economic activity in both of those cities, the Greater Davis-Sacramento Region, and throughout the State of California. The campus creates **direct** economic impacts through wages/salaries paid to employees and through the purchase of goods and services needed to operate the campuses. The purchases made by the campus at businesses in Davis, the larger region, and elsewhere in the state then support to some extent the jobs and earnings of the employees of those businesses, which in turn, support additional **indirect** economic activity and accompanying jobs and earnings at additional businesses, with the cycle repeating until the impact becomes imperceptible. The wages and salaries of the campus employees are similarly recycled throughout the economy, referred to as **induced** impacts, as employee wages are spent on goods and services, supporting employment and earnings in other establishments, which then support additional economic activity.

Figure 1 provides an illustration of direct, indirect, and induced economic impacts.

[1] For this study, the Greater Davis-Sacramento Region consists of the counties of Yolo, Sacramento, Placer, El Dorado, Sutter, Yuba, and Solano.

Figure 1 Economic Multiplier Effects



Source: EPS.

Summary of Assumptions

UCD staff provided detailed operational expenditure, employee compensation, faculty/staff headcount, and construction spending data that provided the basis for the economic input-output modeling to calculate total economic impacts resulting from the activities of UCD. Note that the impact from student spending has not been included in the calculation of these economic impacts attributable to UCD activity.

The data were categorized into the following functional groupings:

- Academic/Instructional and Administrative Support, excluding Health System (Davis Academics)—Davis
- Research, excluding Health System—Davis
- Veterinary Medicine Clinical Services—Davis
- Health System Academic/Instructional and Administrative Support (Health Academics)—Sacramento
- Health System Research—Sacramento

Economic activity data for each of the categories above included operating expenditures, employee compensation, and faculty/staff headcount. Both Davis Academics and Health Academics also included building construction/development expenditures. The construction expenditures were treated as annual institutional operating expenditures, as opposed to one-time expenditures, reflecting ongoing capital improvements to academic and administrative facilities.

Within each economic activity and functional grouping noted above, the data were collated by the following geographies:[2]

- City of Davis (plus campus)
- Greater Davis-Sacramento Region
- State of California

The number of employees and their labor income has been identified by the geographies where they reside, rather than where they work, for purposes of estimating their induced economic impacts.

The data provided by UCD were modeled using Implan input-output economic impact modeling software. Note that the "Direct" impacts provided in the results of the analysis mirror the inputs provided by UCD. The following sections summarize the economic input-output modeling, first for total UCD activity, followed by Davis Campus activity, and then Health Sciences activity.

As with prior evaluations of UCD activity, the input-output analysis estimates annual economic impacts associated with the operations of the campuses using three economic measures: total output (total market value of goods and services generated by affected industries, inclusive of labor income), employment (jobs), and labor income (total compensation associated with employment, including employee compensation, proprietor's income, and other profits, rents, and royalties income).

Total UCD Activity—Davis Campus and Health System

The combined economic impact of both the Davis and Sacramento campuses on the City of Davis, the Greater Davis-Sacramento Region, and the State of California is summarized in **Table 1**.

The geographic distribution of the economic impacts reflects both employee residential location choices and the ability of local market areas to provide the goods and services required for university operations.

[2] The larger geographies are inclusive of any smaller geographies.

Table 1 Economic Impact Summary—All UCD Activity

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
All UCD [2]			
Output			
Direct	$889,509,000	$3,340,441,000	$5,981,661,000
Indirect	$75,160,000	$1,159,371,000	$2,543,552,000
Induced	$23,166,000	$2,342,102,000	$4,040,401,000
Total	**$987,835,000**	**$6,841,914,000**	**$12,565,614,000**
Employment [3]			
Direct	9,900	25,100	33,900
Indirect	400	6,700	12,900
Induced	100	14,500	22,100
Total	**10,400**	**46,300**	**68,900**
Labor Income [3]			
Direct	$768,452,000	$2,946,810,000	$3,590,906,000
Indirect	$21,759,000	$400,897,000	$962,994,000
Induced	$7,442,000	$759,373,000	$1,362,663,000
Total	**$797,653,000**	**$4,107,080,000**	**$5,916,563,000**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Including Health System and Veterinary Medicine.
[3] Employment and Labor Income according to the geography of employee residence.

The Direct Output numbers above reflect actual UCD purchasing activity by the geography where the purchases were made. The resulting business-to-business activity associated with UCD's direct expenditures is reflected in the indirect impacts. Despite the relatively small size of the economic base in the City of Davis, a sizeable share of expenditures is made in Davis; however, many of these may be on-campus purchases. Tellingly, the resulting business-to-business impacts in the City of Davis are limited, as supported businesses appear to source their needs from either the larger metropolitan area or beyond.

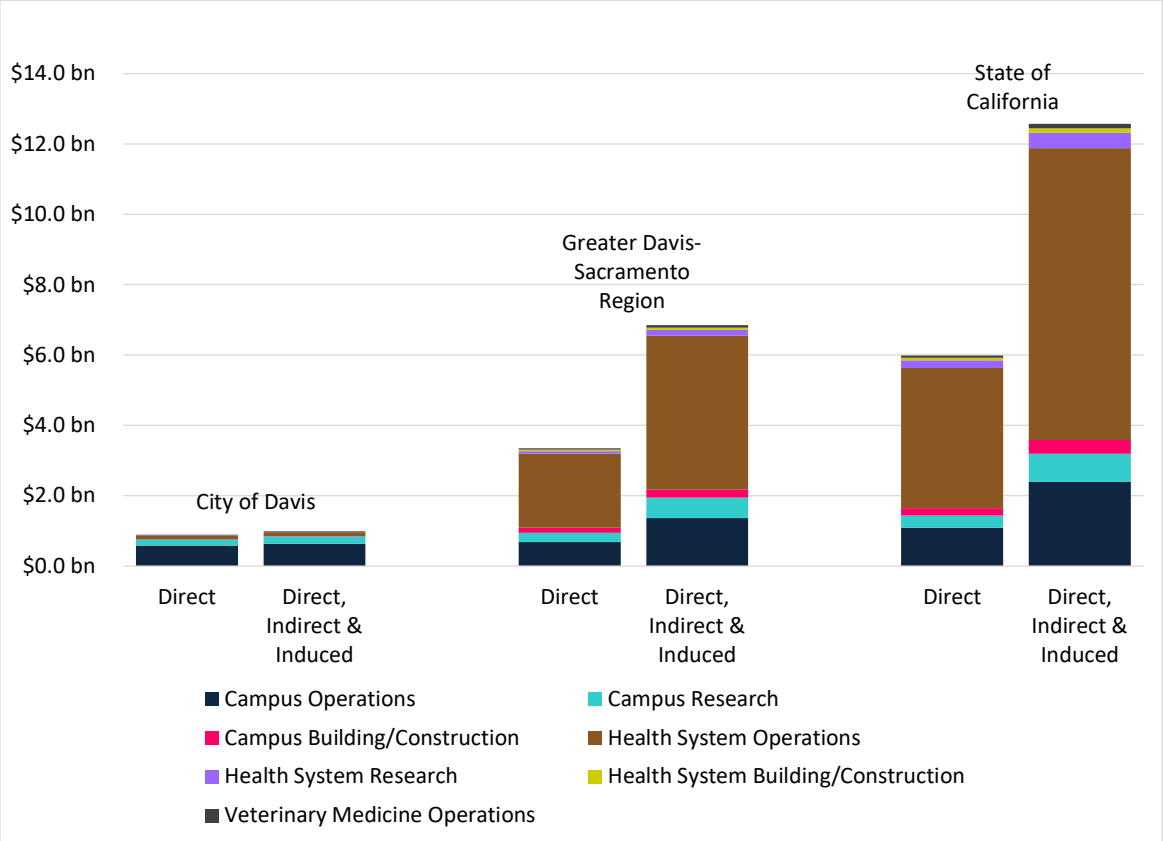
The City of Davis is naturally a desirable residential location for many faculty and staff on the Davis campus. However, for a variety of reasons, many faculty and staff on the Davis campus live elsewhere in the Greater Davis-Sacramento Region. Others reside in other parts of California, whether as commuters, part-time or temporary workers, or are tied to a permanent address elsewhere.

Many Health System faculty and staff are also drawn to the qualities of the City of Davis as a residential location; however, because the Health System campus is in Sacramento, most of the school's workers reside in the City of Sacramento or elsewhere.

Faculty and staff earnings drive the induced impacts, as employees make personal/household purchases. Interestingly, much of the induced impact from faculty and staff personal/household spending appears to flow out from the City of Davis to the Greater Davis-Sacramento Region, reflecting the limited economic "receptors" in the City of Davis.

Figure 2 graphically depicts the total economic output, by geography, broken out by functional grouping.

Figure 2 Summary of Direct and Total Impacts by Function and Region



Health System operations drive the greatest economic impact in the Greater Davis-Sacramento Region, as well in the State of California overall. Despite the wide range of goods and services needed for the operation of the Health System, the local region captures a sizeable portion of the overall statewide economic impact.

Figures 3 through **5** illustrate the overall output, employment, and labor income by geography.

Figure 3 Combined Davis Campus and Sacramento Campus Economic Output

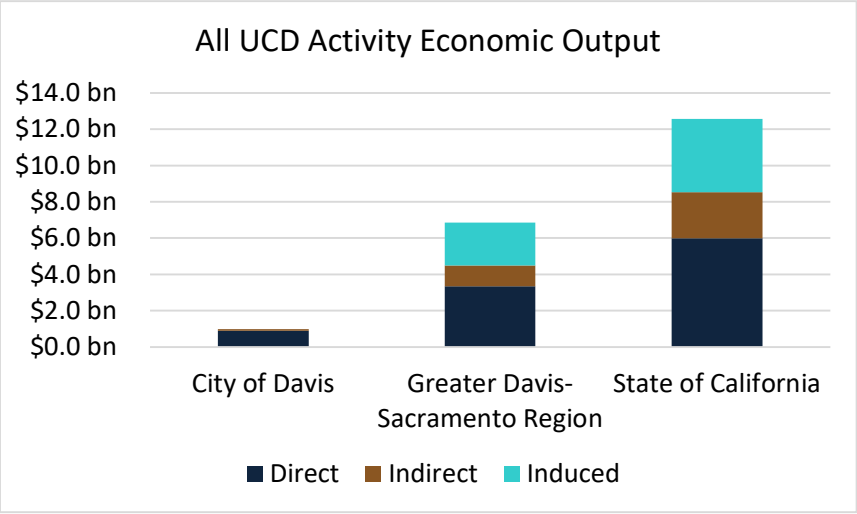
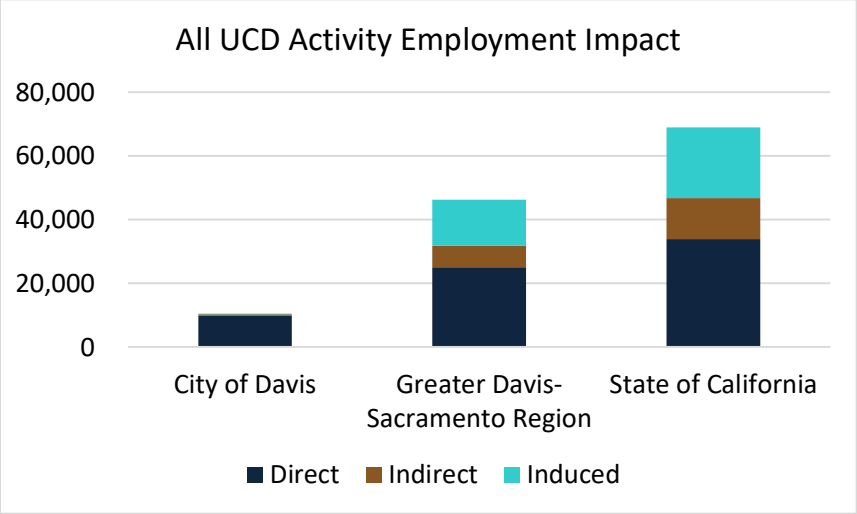
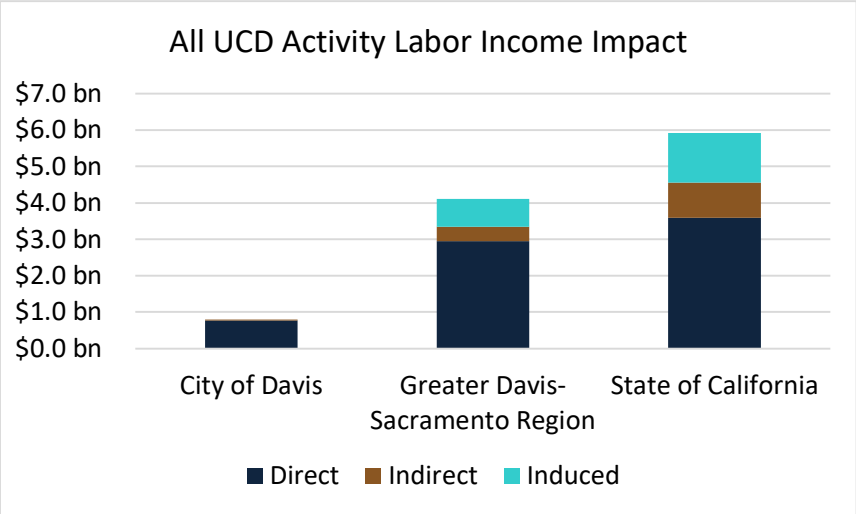


Figure 4 Combined Davis Campus and Sacramento Campus Employment



Note: Employment by employee resident location.

Figure 5 Combined Davis Campus and Sacramento Campus Labor Income



Note: Earnings by employee resident location.

Total Davis Campus Activity (including Veterinary Medicine)

Table 2 summarizes the economic activity associated with the Davis campus. The strong preference for the City of Davis as a residential location for faculty and staff is evidenced by the share of regionally based employees that live in Davis, at 9,200 out of 13,500 (68 percent). The Davis campus includes a sizeable share of California-based employees from outside the local region. These may include commuters from areas such as the Bay Area, those who travel for infrequent classes, those in pre-retirement, or others.

Table 2 Economic Impact Summary—Davis Campus Activity

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
All Davis [2]			
Output			
Direct	$779,163,000	$1,126,706,000	$1,715,059,000
Indirect	$69,546,000	$354,991,000	$554,872,000
Induced	$20,053,000	$757,611,000	$1,441,699,000
Total	**$868,762,000**	**$2,239,308,000**	**$3,711,630,000**
Employment [3]			
Direct	9,200	13,500	21,000
Indirect	400	1,900	2,500
Induced	100	4,700	7,900
Total	**9,700**	**20,100**	**31,400**
Labor Income [3]			
Direct	$660,267,000	$978,537,000	$1,446,549,000
Indirect	$19,724,000	$108,306,000	$184,048,000
Induced	$6,442,000	$245,646,000	$486,190,000
Total	**$686,433,000**	**$1,332,489,000**	**$2,116,787,000**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Including Veterinary Medicine; excluding Health System.
[3] Employment and Labor Income according to the geography of employee residence.

Much of the direct operational spending by the campus is made locally in Davis (including on campus in unincorporated Yolo County), with 45 percent of statewide spending and 69 percent of regional spending made locally. However, as noted above, much of the indirect economic impact from spending in Davis occurs in the Greater Davis-Sacramento Region or elsewhere in the State of California because of the limited scope of economic activity in Davis to support businesses directly serving the campus. Spending in Davis results in an indirect multiplier effect of approximately 9 percent, while in the larger Davis-Sacramento Region, campus spending results in an indirect multiplier effect of approximately 31 percent. The statewide indirect multiplier effect is similar to that regionally, at 32 percent.

Household expenditures supported by employee earnings (induced effects) appear to impact the regional economy much more than the limited local Davis economy, with a fair amount of outflow of retail sales and other spending likely. Approximately 67 percent of regional Davis campus employee earnings are earned by City of Davis residents; however, only about 28 percent of the regional economic impact from those employee earnings is felt in Davis, according to the Implan input-output modeling software.

Figures 6 through **8** illustrate the Davis campus output, employment, and labor income by geography.

Figure 6 Davis Campus Economic Output

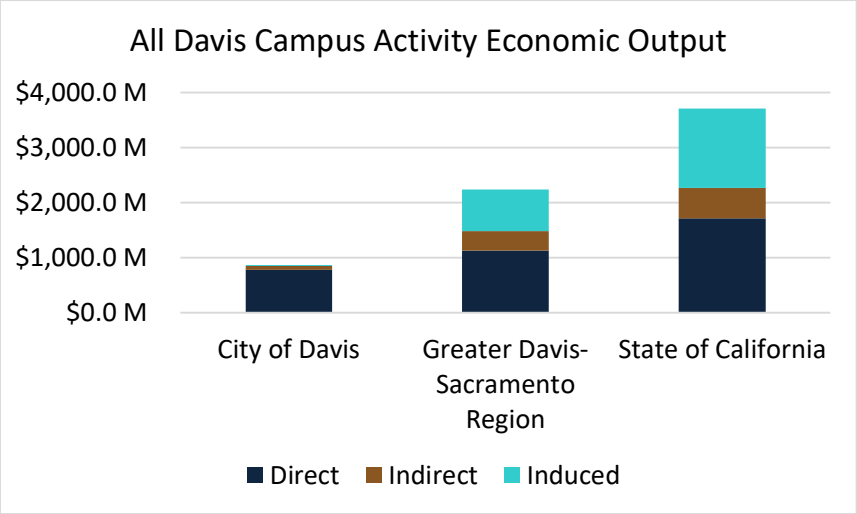
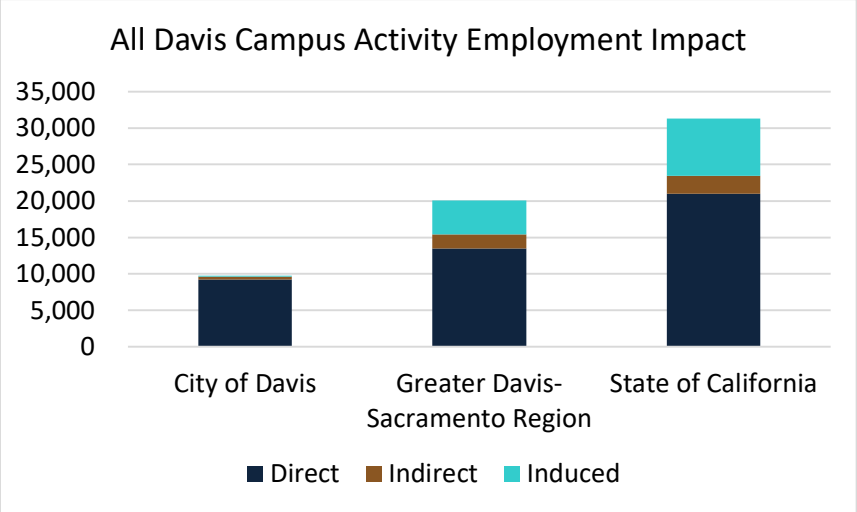
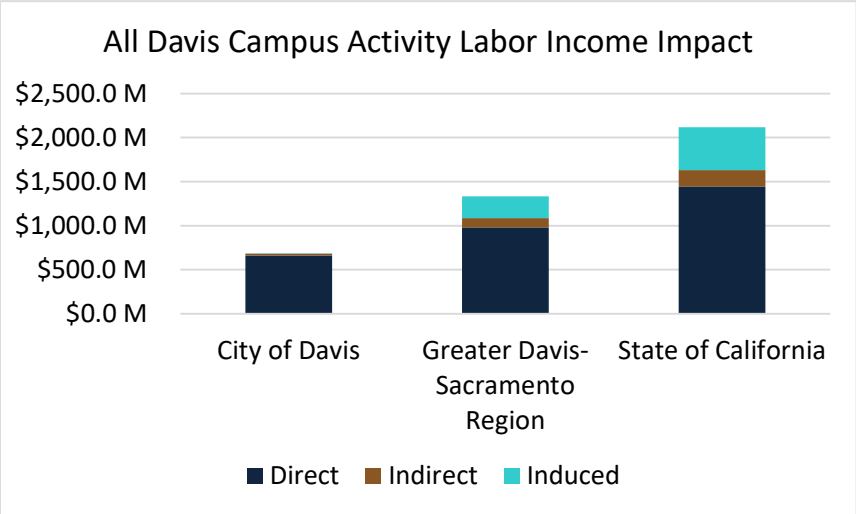


Figure 7 Davis Campus Employment



Note: Employment by employee resident location.

Figure 8 Davis Campus Labor Income



Note: Earnings by employee resident location.

Total Health System Activity

Table 3 summarizes the economic activity associated with the Sacramento-based operations of the Health System. Approximately 90 percent of the employees reside in the Greater Davis-Sacramento area, with about 6 percent of those residing in Davis. Induced economic impacts from employee personal/household spending generally reflect the distribution of employee households and their earnings, with some leakage of induced economic activity out of the local region to other parts of California.

Table 3 Economic Impact Summary—Health System Activity

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Health System [2]			
Output			
Direct	$110,346,000	$2,213,735,000	$4,266,602,000
Indirect	$5,614,000	$804,380,000	$1,988,680,000
Induced	$3,113,000	$1,584,491,000	$2,598,702,000
Total	**$119,073,000**	**$4,602,606,000**	**$8,853,984,000**
Employment [3]			
Direct	700	11,600	12,900
Indirect	0	4,800	10,400
Induced	0	9,800	14,200
Total	**700**	**26,200**	**37,500**
Labor Income [3]			
Direct	$108,185,000	$1,968,273,000	$2,144,357,000
Indirect	$2,035,000	$292,591,000	$778,946,000
Induced	$1,000,000	$513,727,000	$876,473,000
Total	**$111,220,000**	**$2,774,591,000**	**$3,799,776,000**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Including academic operations and support, research activity, and capital program.
[3] Employment and Labor Income according to the geography of employee residence.

Slightly more than half of all statewide direct operational expenditures, which drive total output, occur in the Greater Davis-Sacramento Region. The specialized nature of many of the goods and services consumed as part of Health System operations results in much greater geographic dispersion of economic activity, with minimal activity in the City of Davis and a large share of activity beyond the region. Economic impacts in the United States overall were not examined, but it is likely a sizeable share of specialized equipment is sourced elsewhere in the U.S. or abroad.

Figures 9 through **11** illustrate the Sacramento Health System campus output, employment, and labor income by geography.

Figure 9 Sacramento Campus Economic Output

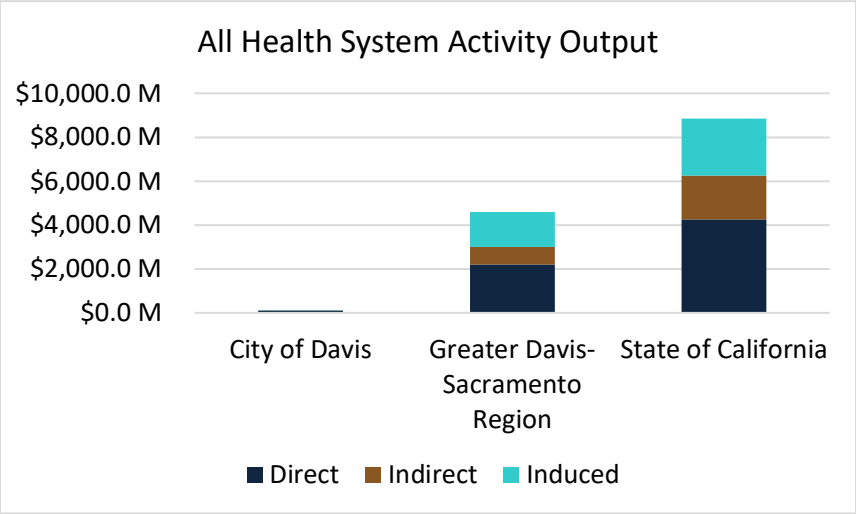
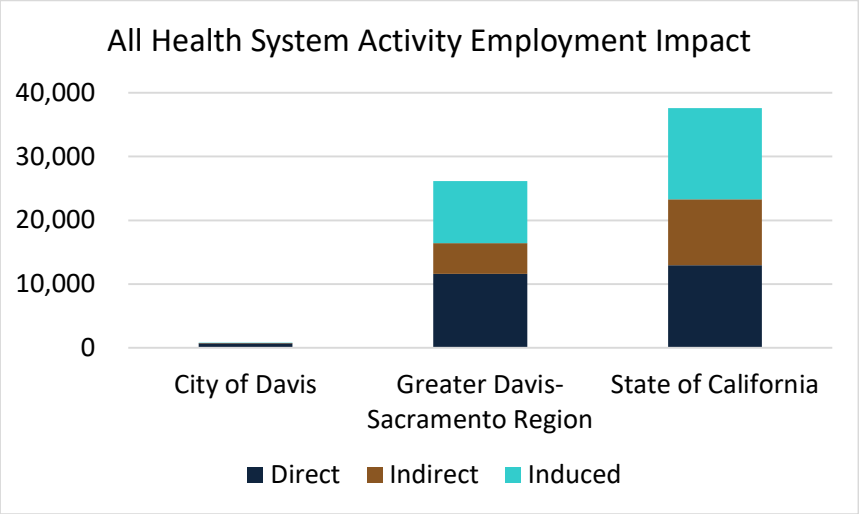
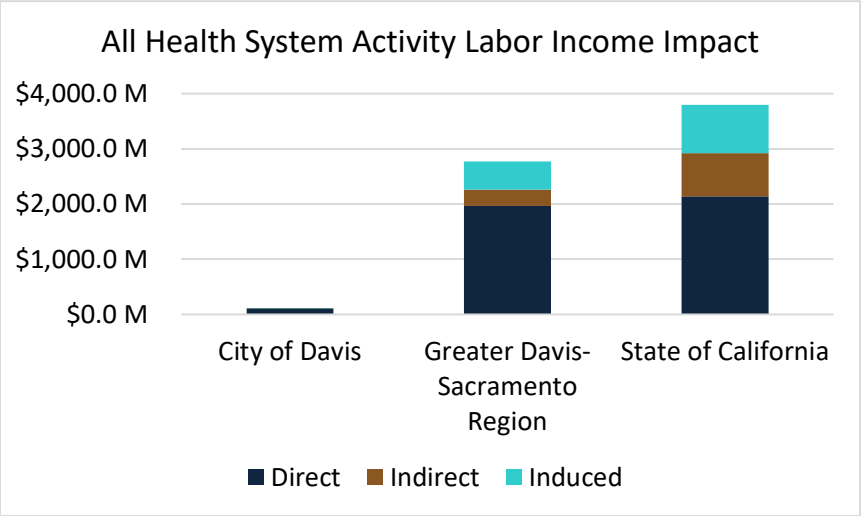


Figure 10 Sacramento Campus Employment



Note: Employment by employee resident location.

Figure 11 Sacramento Campus Labor Income



Note: Earnings by employee resident location.

Innovation Factors

UCD's beginnings as an agricultural outpost of UC are still evidenced by the school's leading position nationally and globally in agricultural sciences and veterinary sciences. Building on that foundation, the university has also become a leading research institution in biotechnology, chemistry, and other physical sciences. The Health System is the leading regional medical center and a nationally renowned medical research and teaching institution.

The commercial potential for practical applications of UCD research activities provides significant opportunities for economic activity locally, regionally, and beyond. Technological innovations that grow out of UCD research drive base economic activity when those innovations can be commercialized. Commercialization of new technologies typically results in significant economic spinoff effects as it draws in capital from outside the region and catalyzes additional economic activity.

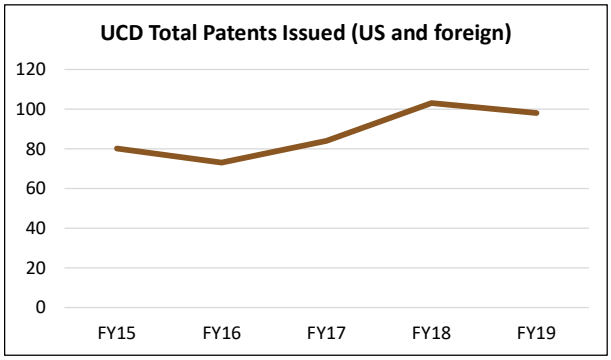
As shown in the sections below, UCD's core strength, and the source of a large, steady stream of commercialization revenue for the campus, derives from agricultural product licensing. However, the data indicate many other areas of commercialization activity.

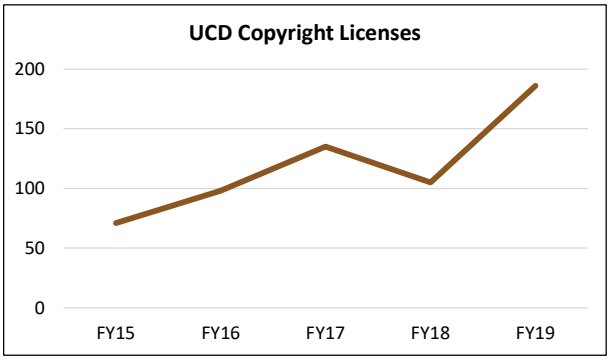
UCD Commercialization Activity

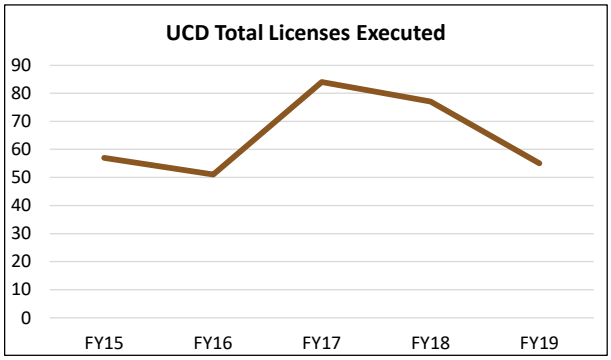
This section describes UCD commercialization activity trends over the last 5 years of available data (FY2015-FY2019). Charts illustrating these trends follow the discussion below:

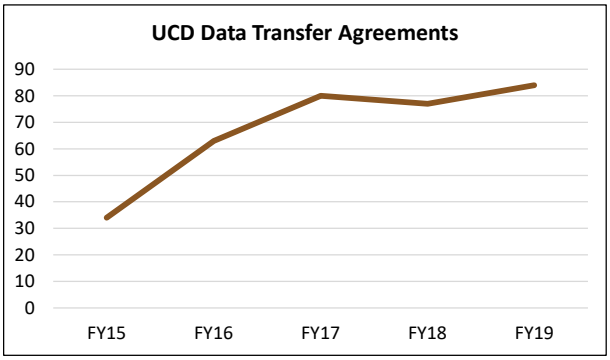
- **Total Patents Issued**—The overall number of patents issued per year has increased moderately over the period, roughly from 80 to 100. The share of U.S. and foreign patents varies year to year but on the whole appear to be roughly evenly split, based on years with available data.
- **Total Licenses Executed**—The number of licenses executed has fluctuated within the range of roughly 50 to 80 per year over the last several years.
- **Material Transfer Agreements**—Consistent with UCD's longstanding leadership in agricultural research, material transfer agreements, which typically govern the transfer of biological and other tangible materials, dominate the campus' commercialization activity. The large volume of material transfer agreement activity is relatively stable year over year, providing a steady stream of commercialization activity.
- **Copyright Licenses**—Copyright licenses increased 162 percent between FY2015 and FY2019, from about 70 to almost 190.
- **Data Transfer Agreements**—Data transfer agreements, which typically cover human subject data, have increased 147 percent between FY2015 and FY2019, from 34 to 84.
- **Records of Invention**—In contrast to the other steady or increasing indicators of commercialization activity, the number of records of invention has declined by one-third over the 5-year period, from an average of about 250 per year during the first 3 years covered, to a little more than 150 in FY2019.

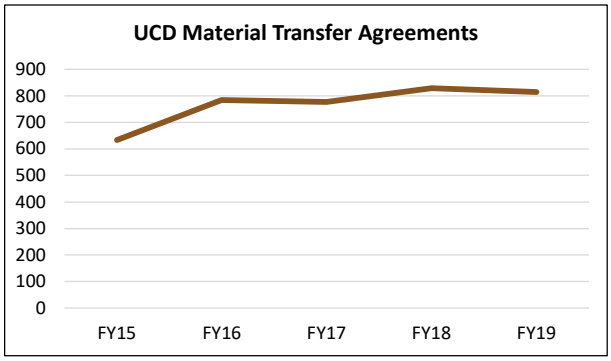
Figure 12 UCD Commercialization Activity Charts

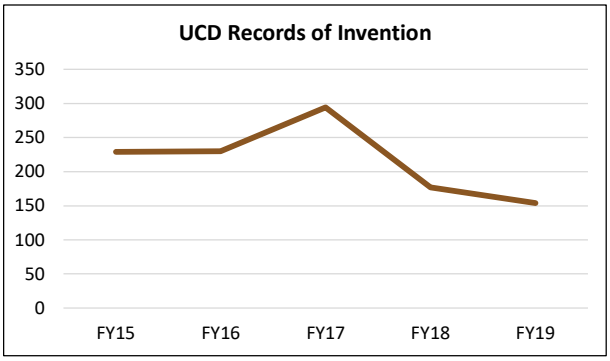












Source: UC Davis Office of Research; EPS.

UC Campus Comparison

This section compares UCD commercialization activity with that of the other UC campuses, based on FY2018 data released by the UC Office of the President. Bar charts illustrating these comparisons follow the discussion below, followed by additional pie charts illustrating the shares of startups and royalty/fee income among the campuses:

- **Active Inventions**—UCD was the 4th ranked UC campus in terms of active inventions in FY2018, with 1,575 active inventions, only 7 more than UC Berkeley (UCB). UC San Diego (UCSD) and UCLA led the campuses in this measure, at approximately 2,500 and 2,400 respectively. UCSF was roughly midway between the UCSD-UCLA and UCD-UCB groupings, at just under 2,000 active inventions.

- **Active Patents**—UCD's ranking in active U.S. patents, at 7th out of the 10 campuses, is its lowest comparative ranking among the commercialization measures provided by the Office of the President's Commercialization Report for FY2018. UCD's ranking in active foreign patents, however, is moderately higher at 5th out of the 10 campuses.

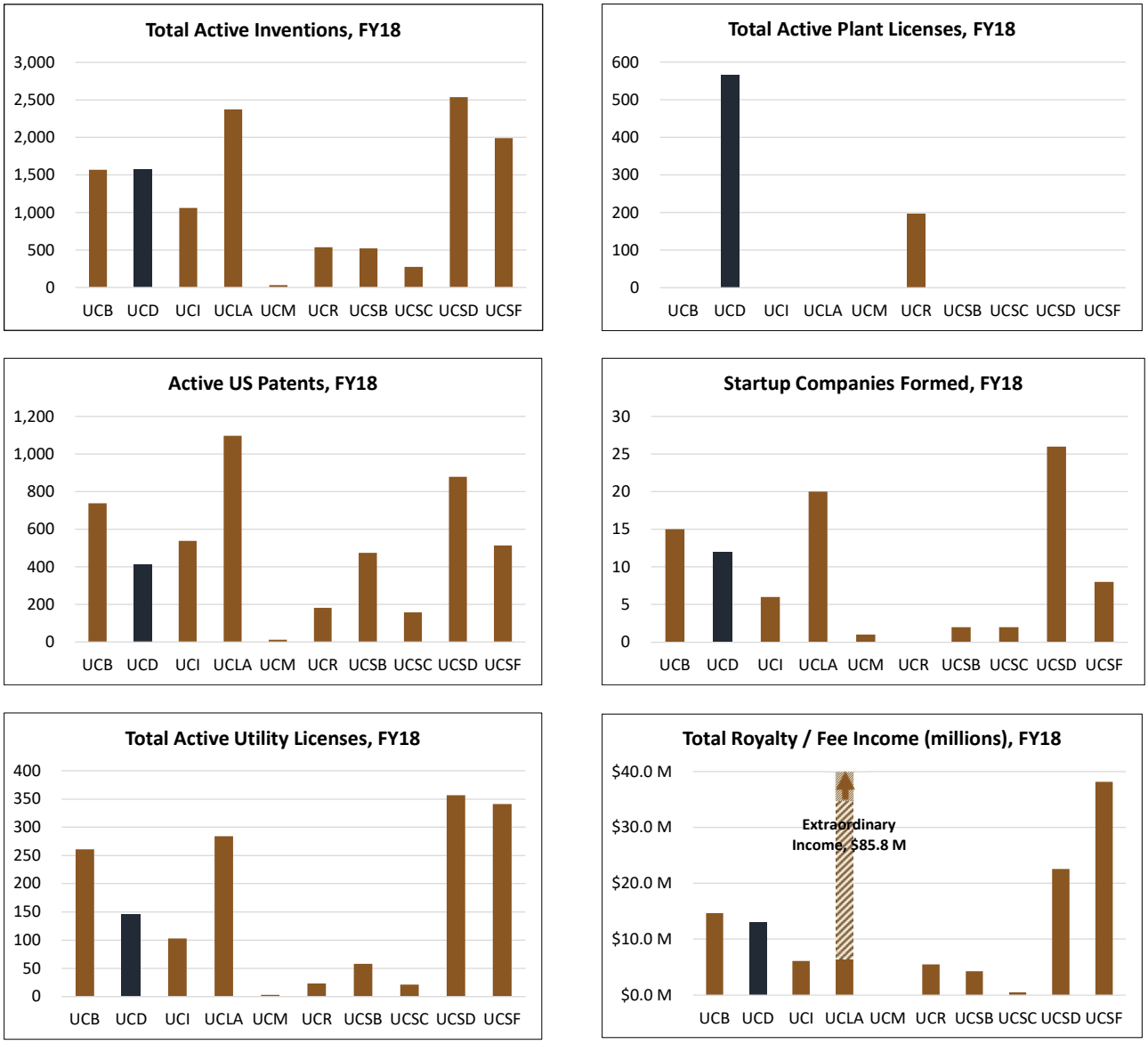
- **Active Utility Licenses**—UCSD and UCSF lead the rankings for active utility licenses, with both roughly around 350 such licenses, followed by UCLA and UCB, each with such licenses numbering between 250 and 300. UCD's 146 active utility licenses place it at a ranking of 5 out of the 10 campuses.

- **Active Plant Licenses**—UCD clearly dominates the active plant licensing at 77 percent of the systemwide activity, with 565 licenses. The remaining 196 active plant licenses were all with the UC Riverside campus.

- **Startups Formed**—There were 12 startups that formed out of UCD in FY2018, ranking the campus 4th in this measure of the 10 campuses. UCSD and UCLA led in startup generation, at 26 and 20 startups respectively during the timeframe, followed by UCB at 15. UCSF followed UCD in startups at 8.

- **Royalty/Fee Income**—UCD ranked 4th in royalty and fee income during FY2018 after adjusting for extraordinary income received by UCLA. UCLA earned a total of $92 million in royalty/fee income in FY2018; however, $86 million was due to a legal settlement. Excluding the extraordinary income from the settlement results in a ranking of 5th for UCLA, increasing UCD's rank to 4th. UCSF and UCSD earned $38 million and $23 million respectively. UCD and UCB were comparable, with royalty and fee income of $13 million and $15 million respectively.

Figure 13 UC Campus Commercialization Comparison Charts



Source: University of California Office of the President; EPS.

Figure 14 UC Campus Shares of Systemwide Startup Activity

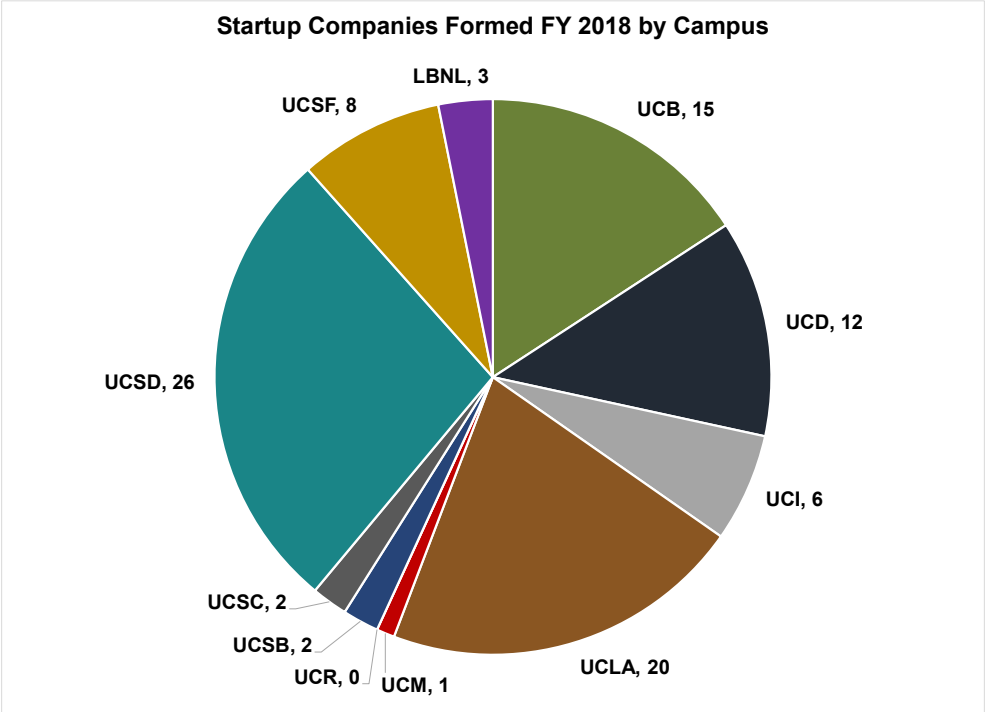
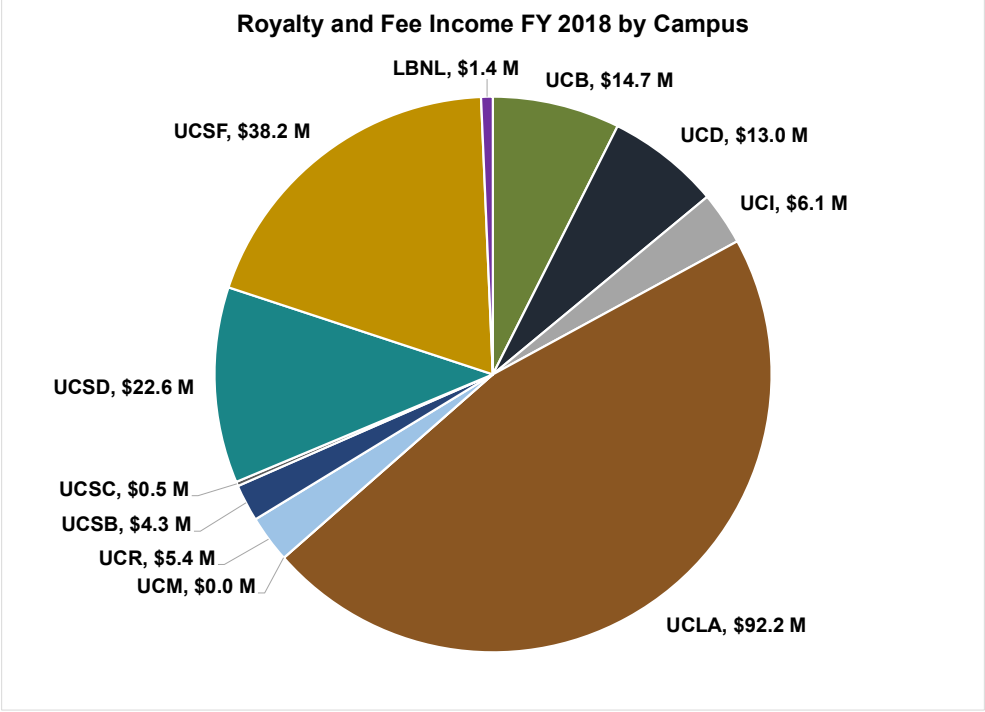


Figure 15 UC Campus Shares of Systemwide Commercialization Revenue ($millions)



Source: University of California Office of the President; EPS.

Innovation Maximization Strategies

Based on key informant interviews with individuals having first-hand knowledge of UCD's local commercialization activity, firms that grow out of UCD often remain locally based during their initial startup phases. However, as they begin to grow, the allure of the Bay Area becomes stronger for various reasons. Some firms arising out of UCD often bypass Davis altogether, heading straight to the Bay Area.

The primary lure of the Bay Area for biotechnology and life sciences firms that grow out of UCD are the existing industry clusters that exist there, known as localization effects.[3] Chief among the localization effects that attract companies is access to skilled workers. Other benefits include proximity to customers, suppliers, and other affiliated companies.

Additional attractions of the Bay Area for these growing innovation companies include many attributes that are largely a result of metropolitan size, such as superior national and international air transportation links, a wider range of workplace options than the facilities available in the local market, and greater variety of cultural amenities, collectively known as urbanization effects.[4]

A key characteristic of both urbanization effects and localization effects is that they tend to be self-perpetuating. An example provided by Brookings is that of a metropolitan region with a robust international air hub attracting users of the hub, which leads to more international flights, which then in turn attracts more users of those flights to the market. Localization effects are similarly compounding, leading to the growth of sector-specific hubs around the globe, with Silicon Valley being a prime example.

Most perceived urbanization shortfalls the Greater Davis-Sacramento Region may pose for growing innovation firms, other than availability of suitable workspace, will likely not change substantially without significant growth in the region. However, the differential in urbanization effects between the Bay Area and the Greater Davis-Sacramento Region are likely not sufficient to materially impact operational viability, other than for those companies dependent on significant in-person interaction overseas.

The greatest impact to local competitiveness in the innovation sectors will likely come from expanding the agglomeration effects of biotechnology and life sciences innovation firms; however, this inevitably confronts a chicken-or-the-egg dilemma, at least in regard to attracting and retaining companies with larger workforce requirements. This suggests the key to developing the critical labor pool these innovation-sector companies need is to focus on maximizing the operational success of the smaller startup companies that form in the region, enabling them to gradually increase the area's skilled workforce until it eventually reaches a self-perpetuating critical mass capable of attracting new firms and biotechnology and life sciences workers to the region.

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[3] The Case for Growth Centers: How to Spread Tech Innovation Across America; The Metropolitan Policy Program at Brookings; Robert D. Atkinson, Mark Muro, and Jacob Whiton; 2019.

[4] ibid.

Three key areas for enhancing operational success of innovation startups include:

- Fostering an environment of collaboration.
- Skilled worker hiring and retention assistance.
- Access to facilities and equipment.

The efforts of Venture Catalyst at the UCD Office of Research and the Institute for Innovation and Entrepreneurship at the Graduate School of Management provide critical resources for fostering an environment of innovation-sector collaboration, as well as providing conduits between skilled workers and the companies that need them.

State-level programs would likely be required to make significant impacts to the cost burden of hiring and retaining innovation-sector employees by local startups. However, continued local quality-of-life enhancements, such as sports and entertainment venues, walkable neighborhoods and attractive riverfronts, and other public spaces that bolster urbanization benefits can help attract and retain a talented workforce.

Availability of suitable affordable space in the City of Davis has been a notable issue for innovation-sector companies for some time. As the regional hub of biotechnology and other innovation sectors grow out of UCD, having a location in the City of Davis has traditionally been viewed by many local innovation firms as a necessity for being in the region. While the presence of the UCD campus will always be a magnet for life sciences firms to Davis, the larger region may begin to host an increasing share of these firms as the sector expands, particularly as the Aggie Square development in the City of Sacramento comes online. Success for the region will depend on these locations collaborating with each other and with the university to ensure an environment where innovation firms can grow.

Additional success factors for the innovation sector in the City of Davis and the larger region are similar to those that have been identified for innovation districts that have emerged near research institutions around the country over the least 2 decades. In the case of Davis, the size of the city relative to the campus essentially means the city is an innovation district. **Table 4** summarizes the success factors for innovation centers.

Table 4 Success Factors for Innovation Centers

University-Related	Regional Economy	Market	Project Implementation
• University proximity • University-tenant match • University investment or commitment	• Regional economic health • Regional cluster-innovation match • Regional entrepreneurial support and tech transfer • Regional access to capital	• University as a tenant • Ability to accommodate tech companies and "gazelles" • Ability to accommodate start-ups and early stage companies • Real estate feasibility • Developer investment horizon • Public-private approach to value creation	• Diversity of space and tenants • Neighborhood amenities • Connectivity • On-site start-up support infrastructure • Supportive policy environment • Project development and management expertise • Private development opportunities

In conclusion, UCD demonstrates it is a powerful regional economic driver in Davis, the Sacramento Region, and the State of California. Over time, it is expected that the percentage of UCD economic activity benefitting the Sacramento Region will increase as the region continues to grow and diversify its economy, creating additional "receptors" capturing various expenditures.

Locally, the City of Davis has opportunities to more fully leverage public investments made by UCD, for example in facilitating additional inventories of office, R&D, and tech-based manufacturing space. However, the City of Davis and its inhabitants are also very cognizant of the unintended consequences of growth of any type, implying that continued growth in the UCD-related innovation ecosystem will also continue to flow to its neighbors in the Sacramento Region and Northern California.

APPENDIX

Appendix Table A-1: Economic Impact from Campus Operations (excluding Veterinary Medicine)

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Academic Operations [2]			
Output			
Direct	$579,317,127	$677,186,530	$1,092,721,062
Indirect	$43,510,963	$209,119,224	$318,936,174
Induced	$14,132,604	$471,109,770	$978,219,472
Total	**$636,960,694**	**$1,357,415,524**	**$2,389,876,709**
Employment [3]			
Direct	7,787	10,394	17,063
Indirect	225	1,090	1,415
Induced	94	2,904	5,362
Total	**8,106**	**14,388**	**23,840**
Labor Income [3]			
Direct	$467,643,672	$620,446,913	$1,010,251,700
Indirect	$10,689,981	$55,314,784	$94,748,207
Induced	$4,540,303	$152,744,966	$329,843,642
Total	**$482,873,956**	**$828,506,664**	**$1,434,843,548**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Including related administrative support; excluding Health System.
[3] Employment and Labor Income according to the geography of employee residence.

Appendix Table A-2: Economic Impact from Campus Research

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Academic Research [2]			
Output			
Direct	$176,882,861	$268,761,801	$340,885,537
Indirect	$25,850,752	$112,153,132	$153,930,164
Induced	$5,229,848	$203,041,373	$304,820,416
Total	**$207,963,461**	**$583,956,306**	**$799,636,117**
Employment [3]			
Direct	1,157	1,695	1,906
Indirect	144	639	732
Induced	35	1,252	1,671
Total	**1,336**	**3,586**	**4,309**
Labor Income [3]			
Direct	$171,221,453	$249,244,855	$280,987,851
Indirect	$8,977,607	$42,100,630	$63,522,606
Induced	$1,680,063	$65,830,891	$102,792,727
Total	**$181,879,124**	**$357,176,376**	**$447,303,184**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Excluding Health System.
[3] Employment and Labor Income according to the geography of employee residence.

Appendix Table A-3: Economic Impact from Campus Building/Construction

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Academic Building/Construction [2]			
Output			
Direct	$4,594,218	$143,535,631	$215,018,061
Indirect	$63,682	$30,641,150	$68,457,544
Induced	$114,555	$56,905,742	$113,234,714
Total	**$4,772,455**	**$231,082,523**	**$396,710,319**
Employment [3]			
Direct	28	909	1,360
Indirect	0	149	282
Induced	1	351	622
Total	**29**	**1,410**	**2,263**
Labor Income [3]			
Direct	$2,353,370	$71,456,941	$107,118,760
Indirect	$21,906	$9,916,302	$22,254,826
Induced	$36,852	$18,459,999	$38,232,967
Total	**$2,412,128**	**$99,833,242**	**$167,606,553**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Excluding Health System.
[3] Employment and Labor Income according to the geography of employee residence.

Appendix Table A-4: Sector Impacts from All Campus Activity (excluding Veterinary Medicine)

Rank [3]	Sector Description	Total Output
1	Junior colleges, colleges, universities, and professional schools	$679,809,725
2	Scientific research and development services	$293,913,639
3	Other real estate	$152,732,785
4	Construction of new educational and vocational structures	$143,535,631
5	Owner-occupied dwellings	$119,975,412
6	Hospitals	$39,310,916
7	Insurance carriers, except direct life	$32,060,978
8	Other local government enterprises	$27,485,299
9	Limited-service restaurants	$22,512,861
10	Monetary authorities and depository credit intermediation	$20,799,989
11	Offices of physicians	$20,524,214
12	Full-service restaurants	$20,140,111
13	Employment services	$19,492,551
14	Legal services	$18,938,606
15	Insurance agencies, brokerages, and related activities	$17,086,215
	All Other Sectors	$640,317,118
	Total Economic Impact	**$2,172,454,353**
		Campus Sectors

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] All Academic Operations includes instructional and administrative/support, as well as non-health system academic research and capital improvements.
[3] Rank is based on dollar output impact on the individual sectors.

Appendix Table A-5: Economic Impact from Heath System Operations

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Health System Academic Operations [2]			
Output			
Direct	$102,583,963	$2,099,704,900	$3,978,027,594
Indirect	$4,479,847	$764,154,106	$1,865,415,006
Induced	$2,905,101	$1,512,769,046	$2,446,106,247
Total	**$109,968,911**	**$4,376,628,053**	**$8,289,548,847**
Employment [3]			
Direct	511	9,475	10,086
Indirect	33	4,621	9,805
Induced	19	9,325	13,411
Total	**564**	**23,421**	**33,302**
Labor Income [3]			
Direct	$101,494,416	$1,880,129,250	$2,020,123,816
Indirect	$1,641,366	$277,951,418	$730,242,923
Induced	$933,128	$490,469,659	$824,987,871
Total	**$104,068,911**	**$2,648,550,326**	**$3,575,354,609**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Including related administrative support.
[3] Employment and Labor Income according to the geography of employee residence.

Appendix Table A-6: Economic Impact from Health System Research

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Health System Research			
Output			
Direct	$7,762,475	$73,628,332	$217,150,595
Indirect	$1,134,456	$30,724,783	$98,056,453
Induced	$207,769	$57,313,529	$118,418,224
Total	**$9,104,700**	**$161,666,644**	**$433,625,272**
Employment [2]			
Direct	176	1,875	2,452
Indirect	6	175	466
Induced	1	353	649
Total	**184**	**2,403**	**3,568**
Labor Income [2]			
Direct	$6,691,009	$70,711,873	$93,416,222
Indirect	$393,981	$11,533,630	$40,465,113
Induced	$66,747	$18,582,366	$39,941,836
Total	**$7,151,737**	**$100,827,869**	**$173,823,170**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Employment and Labor Income according to the geography of employee residence.

Appendix Table A-7: Economic Impact from Health System Building/Construction

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Health System Building/Construction			
Output			
Direct	-	$40,402,038	$71,423,313
Indirect	-	$9,501,195	$25,208,551
Induced	-	$14,408,226	$34,177,812
Total	**-**	**$64,311,459**	**$130,809,676**
Employment [2]			
Direct	-	228	406
Indirect	-	48	105
Induced	-	89	188
Total	**-**	**365**	**699**
Labor Income [2]			
Direct	-	$17,431,556	$30,817,030
Indirect	-	$3,105,754	$8,237,612
Induced	-	$4,674,535	$11,543,779
Total	**-**	**$25,211,845**	**$50,598,421**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Employment and Labor Income according to the geography of employee residence.

Appendix Table A-8: Sector Impacts from All Health System Activity

Rank [3]	Sector Description	Total Output
1	Hospitals	$2,185,157,039
2	Owner-occupied dwellings	$259,938,809
3	Other real estate	$168,983,691
4	Insurance carriers, except direct life	$158,677,992
5	Scientific research and development services	$94,514,246
6	Employment services	$89,378,956
7	Insurance agencies, brokerages, and related activities	$77,200,137
8	Legal services	$53,134,884
9	Full-service restaurants	$53,120,551
10	Limited-service restaurants	$50,152,806
11	Offices of physicians	$44,485,985
12	Monetary authorities and depository credit intermediation	$41,245,403
13	Construction of new health care structures	$40,402,038
14	Management of companies and enterprises	$39,139,459
15	Other local government enterprises	$35,092,178
	All Other Sectors	$1,412,347,044
	Total Economic Impact	**$4,602,606,156**

Health Sectors

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] All Health Services Operations includes health system instructional and administrative/support, as well as health system academic research and capital improvements.
[3] Rank is based on dollar output impact on the individual sectors.

Appendix Table A-9: Economic Impact from Veterinary Medicine Operations

Sector Description	City of Davis	Greater Davis-Sacramento Region [1]	State of California
Veterinary Medicine Operations			
Output			
Direct	$18,369,129	$37,222,445	$66,434,731
Indirect	$120,939	$3,077,617	$13,548,021
Induced	$575,765	$26,554,251	$45,424,262
Total	**$19,065,833**	**$66,854,312**	**$125,407,014**
Employment [2]			
Direct	256	504	633
Indirect	1	15	41
Induced	4	164	249
Total	**261**	**683**	**923**
Labor Income [2]			
Direct	$19,048,518	$37,388,079	$48,190,351
Indirect	$34,963	$974,457	$3,522,517
Induced	$184,991	$8,609,677	$15,320,966
Total	**$19,268,472**	**$46,972,213**	**$67,033,834**

Source: UC Davis; Implan; EPS.

[1] Greater Davis-Sacramento region includes Yolo, Sacramento, Placer, Eldorado, Sutter, Yuba and Solano counties.
[2] Employment and Labor Income according to the geography of employee residence.