Economic and Social Contribution of the University of Arizona

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EXECUTIVE SUMMARY

University of Arizona and University of Arizona Health Network Annual Impact on the Arizona State Economy

As a public research university serving the diverse citizens of Arizona and beyond, the mission of the University of Arizona (UA) is to provide a comprehensive, high-quality education that engages students in discovery through research and broad-based scholarship. Graduates are empowered to be leaders in solving complex societal problems. Whether in teaching, research, outreach or student engagement, access and quality are the defining attributes of the UA mission. The economic and societal impacts of the UA are far-reaching. Together, the UA, the UA Tech Park, and the UA Health Network infuse billions of dollars into the state economy each year. The impact of each is described in detail in this report.

$5.6 billion in total economic impact is generated by the UA and UA Health Network in the state of Arizona.

$271.0 million in tax revenue to state and local governments, including sales, property, and business tax payments.

UA and UA Health Network staff, faculty and students generate more than $87.2 million annually in charitable donations, volunteer services, and provision of free care.

Through its local spending, as well as direct and indirect support of jobs, the presence of the University stabilizes and strengthens the local and statewide tax base. The University is an integral part of the state’s economy — generating revenue, jobs, and spending.

The UA Sustains Jobs

49,083 UA- and UA Health Network-supported jobs generated throughout the state of Arizona.

One in every 65 jobs in the state is attributable to the UA and the UA Health Network. This represents 1.5% of all jobs in the state of Arizona.
I. EXECUTIVE REPORT

A. Introduction

The Southwest’s leading research institution, the UA was established as a land-grant institution in 1885, 27 years before Arizona became a state. The UA is headquartered 60 miles from the Mexican border in Tucson, Arizona, in the heart of the Sonoran Desert, and serves as the core of a vibrant metropolitan area exceeding one million people.

Education and Student Body

The University offers an unusually extensive and varied group of research, graduate and professional teaching programs. The University serves 40,223 students (31,565 undergraduates and 8,658 graduates) through 19 colleges offering 351 degree programs and is ranked among the leading research universities in the country. The university graduates nearly 8,800 students annually, with nearly 30% of those students receiving advanced graduate or professional degrees.

The University’s 2,554 full-time equivalent faculty and 1,318 full-time equivalent graduate teaching and research assistants and associates educate a diverse student population. The student population is 52.1% female, 19.6% Hispanic, 7.2% Asian, 3.8% African American and 2.7% Native American. Students come from all fifty states and 116 foreign countries. International students totaled 7.8% of the Fall 2012 enrollment.

The University’s branch campus in Sierra Vista, Arizona, has achieved the status of Hispanic Serving Institution, with Hispanic enrollment of 25.3%. The University is highly committed to new educational models designed to advance opportunities for underserved populations, and has developed core mission strategies to meet those ends.

Research Excellence

During the past 25 years, the University has emerged as one of the top research universities in the nation, according to the National Science Foundation (NSF), with total research expenditures exceeding $600 million, approaching nearly 36% of the University’s total budget. In 2011, the NSF ranked the University of Arizona as America’s No. 3 university for research expenditures in the physical sciences, which includes astronomy, physics and chemistry. Overall, the UA’s ranking among public research universities was 19th, and it was ranked as the nation’s 30th institution among all public and private universities and colleges.

The University was one of the original Carnegie Research I institutions. In 1985, the University was elected to membership in the Association of American Universities, a prestigious group
limited to North America’s preeminent public and private research universities. Eminent research programs provide advances in applied and basic or pure knowledge that fulfill the University’s obligation to the State and the nation. Such programs attract truly distinguished faculty who serve the University’s students through a comprehensive range of undergraduate and graduate programs.

High-quality research programs secure extensive federal and corporate funding that also enrich instructional programs by providing tremendous education and research opportunities for students, as well as helping to provide up-to-date facilities and equipment. In some colleges, more than 50% of the student body is actively engaged in substantive research projects.

The UA is committed to the modern land-grant principles of opportunity, innovation and impact, and expresses that commitment through strategic investment in deeply embedded teaching, research, and service collaborations throughout the state of Arizona.

Among the UA’s many strengths is the UA College of Medicine, the only MD degree-granting institution in Arizona, offering full research and medical education programs at its campuses in Tucson and Phoenix. The College is the critical academic component of the University of Arizona Health Network (UAHN), Arizona’s most comprehensive academic health center. Through this partnership, the UA and UAHN maintain relationships with hospitals, clinics, and other affiliates statewide for training, research and exemplary health care.

The University of Arizona’s economic impact data are presented as an annual impact figure. The report presents the 2011 annual economic impact of institution-wide\(^1\) spending and employment on the state of Arizona as a whole and on each Arizona county. Future economic impact can be higher or lower based on the number of students, capital expansion, increases in external research, and the level of state appropriations. It is important to note that the economic and employment impacts in this report represent the “fresh dollar”\(^2\) impact of the University of Arizona and the University of Arizona Health Network. The report is divided into three sections: the impact of the University of Arizona, the impact of the University of Arizona Health Network, and the combined impact of the University of Arizona and the University of Arizona Health Network.

The UA’s total impact far exceeds its 3.6 billion dollar economic impact. The UA educates, provides access to experts, arts and culture, top-tier medical care, libraries, it commercializes research, provides incubator space and fosters start-up companies, and more. It also provides a tremendous amount of community outreach activities. As a land-grant institution,

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1 Included within the analysis: University Athletic Programs and Colleges of Medicine, Pharmacy, Nursing and Public Health Academic Programs (i.e., academic, clinical, and educational).
2 Fresh dollar refers to the new dollars that enter the economy from outside of the state of Arizona to generate economic impact and jobs.
volunteerism, public service and charitable giving are institutional core values and the lives of Arizonans are enhanced by its presence.

B. Project Overview

Tripp Umbach was retained by the University of Arizona to measure the economic, employment, and government revenue impacts of all UA locations and affiliates. The goal was to quantify the fiscal year 2010-2011 annual economic impact of institutional spending and employment on the state and on each Arizona county. Specifically:

- Quantitative measure of net economic expansion to the economy;
- Direct and indirect jobs supported as a result of the University’s spending;
- Attraction of out-of-state visitors and out-of-state patients;³
- Direct and indirect local and state tax revenue generated by the University;
- Visitors to conferences, meetings, and athletic events held at the University;
- External research from applied university research;
- Social impacts provided by university employees and volunteers, including annual charitable donations, volunteerism, and community leadership; and
- The study also explores the annual economic impact of the University of Arizona alumni and graduates.

C. Methodology Employed in the Economic Impact Study

This economic impact analysis measures the effect of direct and indirect/induced business volume and government revenue impacts for all of the University of Arizona’s operations throughout the state of Arizona. The methodology employed in the calculation of these impacts is IMPLAN.⁴ Primary data utilized to conduct the analysis was collected from the University of Arizona and the University of Arizona Health Network. Data included: capital expenditures, operational expenditures, jobs, payroll and benefits, and direct taxes. The approach taken on this study was decidedly conservative. However, the impact findings compare favorably to other universities in the country. Operations are only one component of a university’s economic impact; the graphic below details what is included in this assessment and

³ Tripp Umbach does not include in-state visitors or patients in their models to avoid overestimating the economic impact.

⁴ Minnesota IMPLAN Group, Inc. (MIG) is the corporation that is responsible for the production of IMPLAN (IMpact analysis for PLANning) data and software. IMPLAN is a micro-computer-based, input-output modeling system. With IMPLAN, one can estimate Input-Output models of up to 528 sectors for any region consisting of one or more counties. IMPLAN includes procedures for generating multipliers and estimating impacts by applying final demand changes to the model.
what is not. The UA and the UA Health Network both provide additional impact beyond their day-to-day operations.

II. UA ECONOMIC IMPACT FINDINGS

From planetary science to medicine to the arts, UA research is changing the world. With Nobel and Pulitzer Prize winners, members of esteemed national academies and world-renowned experts in dozens of disciplines, UA faculty brings international attention to the University, and puts it in the ranks of the top public universities in the nation.

A. UA Economic Impact

The UA is an integral piece of Arizona’s economy, and University operations directly or indirectly impact residents of Arizona. The UA affects business volume in Arizona in two ways:

1. Direct expenditures for goods and services by the University, its employees, students, and visitors. This spending supports local businesses, which in turn employ local individuals to sell the goods and provide the services that University constituencies need.
2. Indirect or induced spending within the state of Arizona. The businesses and individuals that receive direct payments re-spend this money within the state, thus creating the need for even more jobs.

Expenditures on goods and services by the University, its employees, students, and visitors, generated an economic impact in 2011 of **$3.6 billion** ($1.5 billion direct impact and $2.1 billion indirect and induced). See Figure 2, Table 1. The economic impact of the UA represents **1.4% of the total Arizona economy. One out of every $71 dollars** in the state’s economy is attributable to the UA.

![Figure 2: Statewide Economic Impact of the University of Arizona](source)

**Table 1: Economic Impact of the University of Arizona**

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>17,590</td>
<td>$947,589,620</td>
<td>$965,939,388</td>
<td>$1,492,814,683</td>
</tr>
<tr>
<td>Indirect/Induced</td>
<td>16,546</td>
<td>$671,497,761</td>
<td>$1,318,033,357</td>
<td>$2,091,755,055</td>
</tr>
<tr>
<td><strong>Total Effect</strong></td>
<td><strong>34,136</strong></td>
<td><strong>$1,619,087,381</strong></td>
<td><strong>$2,283,942,745</strong></td>
<td><strong>$3,584,569,738</strong></td>
</tr>
</tbody>
</table>

*Source: Tripp Umbach, using IMPLAN results from data obtained through the University of Arizona.*

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The economic impact of the University of Arizona represents **1.4% of the total Arizona economy. One out of every $71 dollars** in the state’s economy is attributable to the UA.
B. UA Employment Impact

The University of Arizona supported over 34,136 jobs in the state of Arizona. One out of every 93 jobs in the state is attributable to the UA. These jobs (both full-time and part-time employees) include not only direct employment by the University, but also indirect and induced jobs created for supply and equipment vendors, contractors, and laborers for the construction and renovation of university facilities, and jobs created in the community at hotels, restaurants, and retail stores in support of the combined entities workforce and its visitors.

The University directly employed 17,590 faculty and staff during FY 10-11. The UA supports thousands of jobs annually statewide in virtually every sector of the Arizona economy, such as construction, business and professional services, restaurants and hotels, information technology, security, and temporary employment companies. These indirect/induced jobs (16,546 jobs) are in support of the more than 17,000 Arizona residents who are employed directly by the University.

The University of Arizona supported over 34,136 jobs in the state of Arizona. One out of every 93 jobs in the state is attributable to the UA.
C. UA Government Revenue Impact

It is a common misperception that public universities do not generate tax revenue. State and local government revenues attributable to the presence of UA totaled **$182.9 million** in FY 10-11 ($20.4 million direct). State and local governments throughout Arizona received tax revenues that were university-related. The tax revenue impact of the University of Arizona includes income, sales, real estate, corporate income, payroll and capital stock/franchise taxes. The total tax revenue impact includes both those taxes paid by the University of Arizona and the indirect taxes paid by employees of the University of Arizona, and those paid by vendors who are doing business with the University within the state.

**FIGURE 4:**
Government Revenue Impact of the University of Arizona

Direct and Indirect: $182.9 Million

Source: Tripp Umbach, using IMPLAN results from data obtained through the University of Arizona.
D. UA Research Enterprise Impact

The University of Arizona produces more than $530 million in annual research, is ranked as one of the top 15 public research universities in the nation, and is a member of the prestigious Association of American Universities (AAU), a group of 62 leading U.S. Universities distinguished by the breadth and quality of their programs in research and graduate education. UA has numerous world-class research groups working at the cutting edges of technology and translating research into practical applications. The UA is a research partner to businesses of all types and sizes – from technology start-ups to the most demanding global industry partners. The UA has posted consecutive annual records in total research expenditures, with FY 2011 exceeding $600 million for the first time. The UA ranks consistently among the top 20 public universities in this metric, based on the latest available National Science Foundation rankings of research expenditures.

The impact of research spending is already included in the $3.6 billion economic impact of the University of Arizona. It is critical to note that the majority of the research dollars that UA brings into the state are “fresh” dollars for the state of Arizona – meaning that because of the quality of its faculty and strength of its programs,

- UA is ranked #18 nationally in R&D expenditures among all public universities, and #26 including all private and public institutions.
- UA is ranked #1 in the nation for R&D expenditures in Astronomy and Planetary Sciences, and has held that position since 1998.
- NASA has selected the University of Arizona to lead the OSIRIS-Rex mission to return samples of pristine organic material from a near-Earth asteroid.
- ABOR approved plans for a University of Arizona Cancer Center clinic at the Phoenix Biomedical Campus. The $135 million, 250,000-square-foot, six-story outpatient clinic and research building will be financed through gifts and university-issued bonds and is scheduled to be open for patient care by 2014.
- The National Science Foundation awarded a grant of $9.9 million to develop ‘Super Rice’, which will support the development of rice varieties more tolerant to drought, diseases, and poor soil conditions across the world.
- The U.S. Department of Defense awarded a $6M grant to the UA to evaluate childcare and youth programs for military families.
- The AI Lab Dark Web project is a long-term scientific research program that aims to study and understand the international terrorism (Jihadist) phenomena via a computational, data-centric approach.
- A U.S. Department of Defense award supports a $7.5M project to study how long-distance lasers, such as those used for special detection systems, pass through the earth’s atmosphere.
$610.6 million dollars in research expenditures translates into a significant economic impact for Arizona. As a result of its strong research programs and expenditures on research, the economic impact of the UA research enterprise is **$1.19 billion** ($0.54 billion direct impact and $0.65 billion indirect/induced impact). As the UA’s research expenditures grow as a result of increased research funding, the impact of research spending will also continue to grow. (See Figure 5)

The University’s research operations make tangible and quantifiable economic contributions. Along with creating jobs for research staff and support personnel, UA scientists are contributing to new product development and technology commercialization. Knowledge and technology transfers have helped to start commercial ventures that promote entrepreneurship, economic development, and job creation. In FY 10-11, the University of Arizona received $150.6 million in Department of Health and Human Services (HHS) funding, and $84.9 million in National Science Foundation (NSF) funding.

In FY 10-11, the operational and capital expenditures that the University made for sponsored research and other sponsored programs, supported 8,728 jobs. These research employment numbers represent 25.5 percent of the total UA job impact.

These jobs include not only direct employment by the University of research professionals, but also indirect jobs created for supply and equipment vendors, contractors, and laborers for the construction and renovation of laboratory facilities, administrators and managers who support the research infrastructure, and jobs created in the community by the disposable income of the scientific workforce.

If the University can maintain and grow its strong faculty base, it will continue to attract, and

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollar Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>$531.8 Million</td>
</tr>
<tr>
<td>2008</td>
<td>$545.9 Million</td>
</tr>
<tr>
<td>2009</td>
<td>$565.3 Million</td>
</tr>
<tr>
<td>2010</td>
<td>$586.6 Million</td>
</tr>
<tr>
<td>2011</td>
<td>$610.6 Million</td>
</tr>
</tbody>
</table>

consequently spend, increasingly higher levels of research dollars, and the number of jobs supported will continue to grow. With continued high levels of research funding and consequent expenditures, the University will remain a source of support for thousands of local jobs based on its research funding alone.

**Research Commercialization and Tech Transfer**

Discovery and scholarly activities also lead to real-life solutions. Many of the impacts of university research are not easy to count, such as improved public health or better agricultural methods. But, those involving new technology can be quantified in the form of inventions and patents. The UA has made significant strides in improving its metrics and infrastructure to harness the potential of research commercialization and tech transfer, leading to an even stronger economic impact of research. In FY 2011, the UA Office of Technology Transfer further built on the notable achievements of FY 2010. Among many accomplishments, in FY 2011, the UA

- Achieved a record 80 licensing and option deals;
- Continued strong outreach and service to the faculty to maintain the significant increases in key metrics, including 150 invention disclosures (15% increase) and 19 patents issued (46% increase), that fuel the technology transfer process;
- Created a record eight new Arizona companies based on UA technology in one of the toughest economic climates in decades (30 total start-ups over the past five fiscal years); and
- Demonstrated a 34% increase in license and option revenues by emphasizing effective deal making and value.

Contributing to economic development and creating a strong entrepreneurial culture through new venture growth remains a major goal of the UA. Initiatives such as Tech Launch Arizona (TLA), a new entity focused on creating greater cohesion among the community, business sector, and institutional inventors, as well as the offices promoting the transfer of ideas and technology to market. Technology transfer statistics for the last five years are shown in Table 3, and a comparison of activity is shown in Figure 6.
Table 3: University of Arizona Research Activity

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invention Disclosures</td>
<td>104</td>
<td>101</td>
<td>125</td>
<td>131</td>
<td>150</td>
</tr>
<tr>
<td>U.S. Patents Issued</td>
<td>18</td>
<td>19</td>
<td>11</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>Intellectual Property Income</td>
<td>$1.5 Million</td>
<td>$1.1 Million</td>
<td>$1.0 Million</td>
<td>$1.3 Million</td>
<td>$1.4 Million</td>
</tr>
<tr>
<td>Startup Companies</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Doctoral Degrees Conferred</td>
<td>924</td>
<td>957</td>
<td>1,169</td>
<td>1,052</td>
<td>1,085</td>
</tr>
</tbody>
</table>


FIGURE 6:
University of Arizona
Research activity of years
2010 and 2011 for all categories

Invention Disclosures

2010: 131
2011: 150

U.S. Patents Issued

2010: 13
2011: 19

Intellectual Property Income

2010: $1.3 Million
2011: $1.4 Million

Startup Companies

2010: 6
2011: 8

Doctoral Degrees Conferred

2010: 1,052
2011: 1,085
In addition to its contribution to the overall economy, UA’s faculty knowledge and expertise are leveraged throughout the state to grow the economy and create jobs. Some specific examples are:

- **UA Tech Park:** With 7,000 employees, it is one of the region’s largest employment centers. It houses 38 business and educational organizations, including four Fortune 500 companies. The Tech Park is nationally recognized as one of the premier university research parks in North America. (See Appendix H)

- **Phoenix Biomedical Campus:** The City of Phoenix-owned Phoenix Biomedical Campus (PBC) is a 28-acre urban medical and bioscience campus planned for more than six million square feet of biomedical-related research, academic, and clinical facilities. (See Appendix I)

### Table 4: University of Arizona Research Awards and Gifts by Colleges Fiscal Year 2011

<table>
<thead>
<tr>
<th>College</th>
<th>Research Awards and Gifts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Life Sciences</td>
<td>$37,437,227</td>
</tr>
<tr>
<td>Architecture, Planning and Landscape Architecture</td>
<td>$484,701</td>
</tr>
<tr>
<td>Education</td>
<td>$9,386,132</td>
</tr>
<tr>
<td>Eller College of Management</td>
<td>$6,509,793</td>
</tr>
<tr>
<td>Engineering</td>
<td>$25,323,855</td>
</tr>
<tr>
<td>Fine Arts</td>
<td>$57,980</td>
</tr>
<tr>
<td>Graduate College</td>
<td>$3,247,660</td>
</tr>
<tr>
<td>Humanities</td>
<td>$420,612</td>
</tr>
<tr>
<td>James E. Rogers College of Law</td>
<td>$169,971</td>
</tr>
<tr>
<td>Medicine</td>
<td>$120,401,927</td>
</tr>
<tr>
<td>Mel and Enid Zuckerman College of Public Health</td>
<td>$9,160,863</td>
</tr>
<tr>
<td>Nursing</td>
<td>$3,398,647</td>
</tr>
<tr>
<td>Optical Science</td>
<td>$25,105,999</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>$13,090,028</td>
</tr>
<tr>
<td>Science</td>
<td>$169,922,274</td>
</tr>
<tr>
<td>Social and Behavioral Sciences</td>
<td>$8,133,877</td>
</tr>
<tr>
<td>Vice President of Research</td>
<td>$25,288,295</td>
</tr>
</tbody>
</table>

**E. Benefiting the State Beyond Operations**

The UA’s total impact on the state of Arizona goes beyond its annual operational impacts. The economic impact study often only captures the impact that can be assigned an actual number, but the value and impact of UA goes far beyond its annual $3.6 billion in economic impact. The UA educates children, citizens, scholars, future employees, leaders, and innovators. The UA provides access to expert faculty, arts and cultural activities, top-tier medical care and education, research libraries, commercializes research, provides incubator space and expertise to start-up companies and educates the future workforce. It is challenging to assign a dollar amount to the outreach and community activities of a major research university such as the UA; but on a daily basis, the lives of Arizonians are enhanced by their presence.
UA Alumni Play a Vital Role in the Arizona Economy

The UA educates the workforce that Arizona needs to succeed in the 21st Century. The nearly 8,000 students who graduate every year from the UA are providing essential contributions to the state’s human capital and workforce needs. About 50% of those graduates will stay in Arizona and contribute to the state economy.

UA graduate contributions are critically important to the economic vitality of the state. There are nearly 250,000 University of Arizona alumni living in 162 countries, with nearly half of UA alumni living in Arizona. UA is a global talent magnet, attracting top students in a wide range of disciplines.

By educating students, the UA adds to the talent pool of human capital in the state of Arizona. Thus, the students are able to earn more in the job market because they are more valuable and productive. Based on data on median annual earnings for university graduates in 2008 from the U.S. Department of Commerce’s Bureau of Economic Analysis, a bachelor’s degree earned at a university increases a graduate's salary compared with a high school diploma by an average of about $20,748 a year (from $32,552 to $53,300), while a graduate degree earned at a university increases a graduate's salary compared to a bachelor’s degree by an average of about $15,756 a year (from $53,300 to $69,056). Considering the average individual’s work life is roughly 40 years, the benefit of earning a college degree provides about $829,920 more in total lifetime wages over only receiving a high school diploma.

The 5,827 baccalaureate degrees the University of Arizona awarded in academic year 2010-2011 equates to the creation of $4.8 billion of future value over 40 years (only counting the graduates from a single year). Even if the total is adjusted by 80% to allow for the forgone income while attending the University, future periods of unemployment, time out of the labor force for child rearing, and other life events, the future value creation is still nearly $3.8 billion. A similar analysis applied to the 2,161 advanced degrees (i.e., Masters, Doctorate, First Prof.) for academic year 2010-2011 indicates another $3.2 billion of value created. So, the University is creating $7.0 billion ($3.8 billion + $3.2 billion) of incremental lifetime earnings for members...
of each graduating class. This impact is above and beyond the impact of the University’s operations.

To calculate the economic impact of the University’s alumni on a continuing basis in the state of Arizona, Tripp Umbach assembled figures on the distribution of the alumni for whom the University has current address information and used this distribution for the body of nearly 125,000 alumni who have graduated in the past 30 years and are living in the state of Arizona. Based on an average of $8,532 in additional salary per graduate of the University of Arizona, it is estimated that the University of Arizona working graduates since 1980 support $746.6 million in additional income in the state’s economy annually (assuming that 70% are in the workforce).

**UA Community and Societal Benefits**

As the Arizona’s land-grant university, the UA honors their three-fold commitment to education, research, and community service. UA faculty and students share their knowledge, their time, and their resources throughout the state and around the world. Cooperative Extension, an outreach arm of the University of Arizona, is “Improving Lives and Communities” by serving as a statewide network of knowledgeable faculty and staff that provides lifelong educational programs for all Arizonians. The UA’s Cooperative Extension is part of a nationwide educational network of scientists and educators who help people solve problems and put knowledge to use. Arizona Cooperative Extension provides a link between the university and the citizens of this state.

In addition to its programs provided by Cooperative Extension, volunteerism and charitable giving among students, staff, faculty, physicians, and alumni exemplify the University’s tradition of giving back to residents of the state of Arizona. The UA ranks 13th among all large U.S. universities in the number of alumni currently serving as volunteers in the Peace Corps. The University of Arizona was the top producer of Peace Corps Fellows/USA program participants in 2011, with 58 students involved in the program. At 25 years and counting, the UA’s Astronomy Camp is Arizona’s longest running science camp and it also has pioneered a unique research-based approach to STEM – science, technology, engineering, and math – education.

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5 This number is the average amount of additional income that a graduate of a school with a similar profile to the University of Arizona earns over the average college graduate. It is based upon an average of the studies that Tripp Umbach has completed for peer universities in which primary survey analysis was conducted.

6 Land-grant universities are institutions of higher education in the United States designated by each state to receive the benefits of the Morrill Acts of 1862 and 1890. The mission of these institutions is to focus on the teaching of practical agriculture, science and engineering as a response to the industrial revolution and changing social class.
Tripp Umbach estimates that the UA staff, faculty, physicians, and students generate more than $50.9 million annually in charitable donations, volunteer services, and provision of charitable care. These benefits (in addition to the $3.6 billion annual economic impact) include the following:

- **$11.3 million** donated to local charitable organizations by the UA faculty, staff, and students.
- Nearly **$39.6 million** in value of volunteer time provided to area communities by the UA students, faculty and staff.

### III. COMBINED UA AND UA HEALTH NETWORK ECONOMIC IMPACT

#### A. Introduction

The economic analysis presented below shows the combined economic impact of the University of Arizona and the University of Arizona Health Network. When combined, these two entities represent a significant part of the Arizona economy.

#### B. UA and UA Health Network Combined Economic Impact

The combined economic impact of the UA and the UA Health Network’s operations on the state of Arizona in 2011 was **$5.6 billion** ($2.5 billion direct impact and $3.1 billion indirect and induced). One in every $45 in the state is attributable to UA and the UA Health Network. As a result of this combined impact, 2.2% of the state of Arizona’s economy is attributable to the UA and the UA Health Network. (See Figure 8, Table 5)

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*Source: Tripp Umbach, using MEJAN economic analysis methods through the University of Arizona.*

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7 Source: Tripp Umbach has conducted survey research where students (primary), staff and faculty (primary) provide estimates on spending patterns, including information on the number of volunteer hours and charitable donations which they provide. Tripp Umbach used a conservative assumption of $20.10 per hour to calculate the value of volunteer services. This amount was originally calculated independently by the Points of Light Foundation.
C. UA and UA Health Network Combined Employment Impact

The total employment impact of the UA Health Network’s operations in the state of Arizona is **49,073** (23,997 direct jobs). One in every 65 jobs in the state is attributable to the UA and the UA Health Network. This represents 1.5% of all jobs in the state of Arizona. (See Figure 9)
D. UA and UA Health Network Combined Government Revenue Impact

The UA Health Network’s operations in the state of Arizona generate $271.0 million per year in direct and indirect state and local tax revenue.

- UA generates $182.9 Million per year in state and local tax revenue.
- UA Health Network generates $88.1 Million per year in state and local tax revenue.

E. UA and UA Health Network Combined Community Benefits

Tripp Umbach estimates that the UA and UAHN staff, faculty, physicians, and students generate more than $87.2 million annually in charitable donations, volunteer services, and provision of charitable care. These benefits (in addition to the $5.6 billion annual economic impact) include the following:

- $25.5 million in charitable care provided by the University of Arizona and the University of Arizona Health Network.
- $17.6 million donated to local charitable organizations by the UA and UA Health Network faculty, staff, and students.
- Nearly $44.1 million in value of volunteer time provided to area communities by the UA and UA Health Network students, faculty, and staff.

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8 Source: Tripp Umbach has conducted survey research at peer universities throughout the U.S. where students (primary), staff and faculty (primary) provide estimates on spending patterns, including information on the number of volunteer hours and charitable donations in which they provide. These same donation and volunteer patterns were utilized in this study. Tripp Umbach used a conservative assumption of $20.10 per hour to calculate the value of volunteer services. This amount was originally calculated independently by the Points of Light Foundation.
## Appendix A: Definition of Terms

<table>
<thead>
<tr>
<th>Study Year</th>
<th>Fiscal Year 2010-2011 (FY 10-11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Economic Impact</td>
<td>The total economic impact of an institution includes both the direct impact and the indirect impact generated in the economy as a result of the institution.</td>
</tr>
<tr>
<td>Direct Economic Impact</td>
<td>Direct impact includes items such as institutional spending, employee spending and spending by visitors to the institution.</td>
</tr>
<tr>
<td>Indirect Economic Impact</td>
<td>Indirect impact, also known as the multiplier effect, includes the re-spending of dollars within the local economy by vendors/suppliers and households.</td>
</tr>
<tr>
<td>Multiplier Effect</td>
<td>The multiplier effect is the additional economic impact created as a result of the institution’s direct economic impact. Local companies that provide goods and services to an institution increase their purchasing by creating a multiplier.</td>
</tr>
<tr>
<td>Direct Tax Payments</td>
<td>Direct tax payments made by an institution to a unit of government.</td>
</tr>
<tr>
<td>Indirect Tax Payments</td>
<td>Government revenue that is collected by governmental units in addition to those paid directly by an institution, including taxes paid directly by employees of the institution, visitors to the institution and vendors who sell products to the institution.</td>
</tr>
<tr>
<td>Direct Employment</td>
<td>Total employees based on total jobs.</td>
</tr>
<tr>
<td>Indirect Employment</td>
<td>Indirect employment is the additional jobs created as a result of the institution’s economic impact. Local companies that provide goods and services to an institution increase their number of employees as purchasing increases, thus creating an employment multiplier.</td>
</tr>
</tbody>
</table>
APPENDIX B: METHODOLOGY

METHODOLOGY AND DATA UTILIZED FOR THE ESTIMATION OF THE ECONOMIC IMPACT OF UNIVERSITY OF ARIZONA

The economic impact of University of Arizona was estimated using IMPLAN (IMpact Analysis for PLANing), an econometric modeling system developed by applied economists at the University of Minnesota and the U.S. Forest Service. The IMPLAN modeling system has been in use since 1979, and is currently used by over 500 private consulting firms, university research centers, and government agencies. The IMPLAN modeling system combines the U.S. Bureau of Economic Analysis’ Input-Output Benchmarks with other data to construct quantitative models of trade flow relationships between businesses and between businesses and final consumers. From this data, one can examine the effects of a change in one or several economic activities to predict its effect on a specific state, regional, or local economy (impact analysis). The IMPLAN input-output accounts capture all monetary market transactions for consumption in a given time period. The IMPLAN input-output accounts are based on industry survey data collected periodically by the U.S. Bureau of Economic Analysis and follow a balanced account format recommended by the United Nations.

IMPLAN’s Regional Economic Accounts and the Social Accounting Matrices were used to construct state-level multipliers, which describe the response of the state economy to a change in demand or production as a result of the activities and expenditures of the University of Arizona system. Each industry that produces goods or services generates demand for other goods and services; and this demand is multiplied through a particular economy until it dissipates through “leakage” to economies outside the specified area. IMPLAN models discern and calculate leakage from local, regional and state economic areas based on workforce configuration, the inputs required by specific types of businesses, and the availability of both inputs in the economic area. Consequently, economic impacts that accrue to other regions or states as a consequence of a change in demand are not counted as impacts within the economic area.

The model accounts for substitution and displacement effects by deflating industry-specific multipliers to levels well below those recommended by the U.S. Bureau of Economic Analysis. In addition, multipliers are applied only to personal disposable income to obtain a more realistic estimate of the multiplier effects from increased demand. Importantly, IMPLAN’s Regional Economic Accounts exclude imports to an economic area, so the calculation of economic impacts identifies only those impacts specific to the economic impact area, in this case the State of Arizona. IMPLAN calculates this distinction by applying Regional Purchase Coefficients (RPC) to predict regional purchases based on an economic area’s particular characteristics. The
Regional Purchase Coefficient represents the proportion of goods and services that will be purchased regionally under normal circumstances, based on the area’s economic characteristics described in terms of actual trade flows within the area.

**Model Inputs and Data Sources**

Model inputs included actual FY 10-11 expenditures provided by the University of Arizona and the University of Arizona Health Network.
APPENDIX C: FAQ’S REGARDING ECONOMIC IMPACT ASSESSMENT

What is economic impact?

Economic impact begins when an organization spends money. Economic impact studies measure the direct economic impact of an organization’s spending, plus additional indirect spending in the economy as a result of direct spending. Economic impact has nothing to do with dollars collected by institutions, their profitability or even their sustainability, since all operating organizations have a positive economic impact when they spend money and attract spending from outside sources.

The university is a major employer in the state and, as such, a major generator of personal income for state residents. Businesses operating within Arizona in the wholesale, retail, service, and manufacturing sectors benefit from the direct expenditures of the institutions and their faculty, staff, students, and visitors on goods and services. Additionally, many of these “direct” expenditures are re-circulated in the economy as recipients of the first-round of income re-spend a portion of this income with other businesses and individuals within Arizona.

Direct economic impact measures the dollars that are generated within the state of Arizona due to the presence of the University of Arizona. This includes not only spending on goods and services with a variety of vendors within the state, and the spending of its staff and visitors, but also the business volume generated by businesses within Arizona that benefit from the UA’s spending. It is important to remember that not all dollars spent by a university remain in its home state. Dollars that “leak” out of the state in the form of purchases from out-of-state vendors are not included in the university’s economic impact on the state.

What is the multiplier effect?

The total economic impact includes the “multiplier” of spending from companies that do business with the UA. Support businesses may include lodging establishments, restaurants, construction firms, vendors, temporary agencies, etc. Spending multipliers attempt to estimate the ripple effect in the state economy where the spending occurs. For example: Spending by the UA with local vendors provides these vendors with additional dollars that they re-spend in the local economy, causing a “multiplier effect.”

Multipliers are a numeric way of describing the secondary impacts stemming from the operations of an organization. For example, an employment multiplier of 1.8 would suggest that for every 10 employees hired in the given industry, eight additional jobs would be created in other industries, such that 18 total jobs would be added to the given economic region. The multipliers used in this study range from 1.8 to 2.0.
The Multiplier Model is derived mathematically using the input-output model and Social Accounting formats. The Social Accounting System provides the framework for the predictive Multiplier Model used in economic impact studies. Purchases for final use drive the model. Industries that produce goods and services for consumer consumption must purchase products, raw materials and services from other companies to create their product. These vendors must also procure goods and services. This cycle continues until all the money is leaked from the region’s economy. There are three types of effects measured with a multiplier: the direct, the indirect and the induced effects. The direct effect is the known or predicted change in the local economy that is to be studied. The indirect effect is the business-to-business transactions required to satisfy the direct effect. Finally, the induced effect is derived from local spending on goods and services by people working to satisfy the direct and indirect effects.

- **Direct effects** take place only in the industry immediately being studied.
- **Indirect effects** concern inter-industry transactions: because the UA is in business, they have a demand for locally produced materials needed to operate.
- **Induced effects** measure the effects of the changes in household income: employees of UA and suppliers purchase from local retailers and restaurants.
- **Total Economic Impacts** the total changes to the original economy as the result of the UA’s operations. i.e., Direct effects + Indirect effects + Induced effects = Total Economic Impacts

**What methodology was used in this study?**

IMPLAN (IMpact analysis for PLANning) data and software: Using classic input-output analysis in combination with regional specific Social Accounting Matrices and Multiplier Models, IMPLAN provides a highly accurate and adaptable model for its users. The IMPLAN database contains county, state, zip code, and federal economic statistics which are specialized by region, not estimated from national averages and can be used to measure the effect on a regional or local economy of a given change or event in the economy’s activity.

**What is employment impact?**

Employment impact measures the direct employment (staff, faculty, administration) plus additional employment created in the economy as a result of the operations of the UA.

Indirect and Induced employment impact refers to other employees throughout the region that exist because of the UA’s economic impact. In other words, jobs related to the population – city services (police, fire), employees at local hotels and restaurants, clerks at local retail establishments, residents employed by vendors used by the UA.
What is the difference between direct and indirect taxes?

Direct tax dollars include sales taxes and net corporate income taxes paid directly by the institution to the state, while indirect taxes include taxes paid to the state by vendors that do business with the University of Arizona and individuals.

Is this a one-time impact or does the impact repeat each year?

The results presented in the UA economic impact study are generated on an annual basis. The economic impact in future years can either be higher or lower based on number of students, capital expansion, increases in external research, and state appropriations.

Is the UA Tech Park included in this impact study?

The entire economic impact of the UA Tech Park is not included in this study. Only those expenditures and direct employees of the University of Arizona for the operations of the Tech Park are included in this study. The true impact of the UA Tech Park is much greater than the amount included in this study. The economic detail of the Tech Park is included in Appendix H.

What are Tripp Umbach’s qualifications to perform an Economic Impact Study for the University of Arizona?

Tripp Umbach is the national leader in providing economic impact analysis to leading healthcare organizations, universities, and academic medical centers. The firm has completed more than 150 economic impact studies over the past 20 years for clients such as: The Pennsylvania State University, The Ohio State University, University of Washington, The University of Iowa, UAB, Cleveland Clinic, University of Florida Shands HealthCare, the University of North Carolina Hospitals, the University of Pennsylvania Medical Center, the University of Pittsburgh Medical Center, and the Ohio State University Medical Center.
**APPENDIX D: ECONOMIC IMPACT BY ARIZONA COUNTY**

The table below details the economic impact of the University of Arizona by county.

**Economic Impact of the University of Arizona by County**

<table>
<thead>
<tr>
<th>County</th>
<th>Total Economic Impact</th>
<th>Total Jobs in County</th>
<th>Total State &amp; Local Taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache</td>
<td>$80,232,002</td>
<td>764</td>
<td>$4,091,832</td>
</tr>
<tr>
<td>Cochise</td>
<td>$28,124,784</td>
<td>268</td>
<td>$1,434,364</td>
</tr>
<tr>
<td>Coconino</td>
<td>$154,113,547</td>
<td>1,468</td>
<td>$7,859,791</td>
</tr>
<tr>
<td>Gila</td>
<td>$59,611,071</td>
<td>568</td>
<td>$3,040,165</td>
</tr>
<tr>
<td>Graham</td>
<td>$39,862,625</td>
<td>380</td>
<td>$2,032,994</td>
</tr>
<tr>
<td>Greenlee</td>
<td>$8,889,954</td>
<td>85</td>
<td>$453,398</td>
</tr>
<tr>
<td>La Paz</td>
<td>$23,127,179</td>
<td>220</td>
<td>$1,179,486</td>
</tr>
<tr>
<td>Maricopa</td>
<td>$377,660,829</td>
<td>8,358</td>
<td>$44,760,702</td>
</tr>
<tr>
<td>Mohave</td>
<td>$223,503,108</td>
<td>2,128</td>
<td>$11,398,658</td>
</tr>
<tr>
<td>Navajo</td>
<td>$127,574,387</td>
<td>1,215</td>
<td>$6,506,294</td>
</tr>
<tr>
<td>Pima</td>
<td>$1,792,284,679</td>
<td>17,068</td>
<td>$91,496,133</td>
</tr>
<tr>
<td>Pinal</td>
<td>$71,477,063</td>
<td>681</td>
<td>$3,645,330</td>
</tr>
<tr>
<td>Santa Cruz</td>
<td>$9,423,978</td>
<td>90</td>
<td>$480,623</td>
</tr>
<tr>
<td>Yavapai</td>
<td>$46,770,162</td>
<td>445</td>
<td>$2,385,278</td>
</tr>
<tr>
<td>Yuma</td>
<td>$41,913,992</td>
<td>399</td>
<td>$2,137,614</td>
</tr>
</tbody>
</table>
APPENDIX E. ARIZONA ECONOMY OVERVIEW

The composition of the state's economy is moderately diverse; although health care, transportation and the government remain the largest sectors. In the agricultural sector, the state's principal crops are cotton, lettuce, cauliflower, broccoli, and sorghum. Cattle, calves, and dairy goods are, however, the most valuable Arizona farm products. Manufacturing is the leading economic activity, with electronics, printing and publishing, processed foods, and aerospace and transportation leading sectors. High-technology research and development, communications, and service industries are also important, as are construction and tourism. Military facilities contributing to Arizona's economy include Fort Huachuca, Luke and Davis-Monthan Air Force Bases, and the Yuma Proving Grounds. Early in its history, Arizona’s economy relied on the "five C's": copper, cotton, cattle, citrus, and climate (tourism). The state government is Arizona’s largest employer, while Wal-Mart is the state’s largest private employer, and Banner Health is the third largest employer. As of December 2011, the state's unemployment rate was 8.7%.

The 2011 total gross state product in Arizona was $252.0 billion. This figure gives Arizona a larger economy than such countries as Ireland, Finland, and New Zealand. The state's per capita income is $25,680, ranking 26th in the U.S. The state had a median household income of $46,709, making it 30th in the country and below the U.S. national median.9

Arizona Labor force Statistics, 2011

<table>
<thead>
<tr>
<th></th>
<th>Labor Force</th>
<th>Employment</th>
<th>Unemployment</th>
<th>Unemployment Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2011</td>
<td>3,039,308</td>
<td>2,773,375</td>
<td>265,933</td>
<td>8.7</td>
</tr>
</tbody>
</table>

APPENDIX F. COMPARISONS TO OTHER INDUSTRY SEGMENTS IN ARIZONA

According to analysis compiled by IMPLAN which includes the Bureau of Economic Analysis, the top three employment clusters in the state of Arizona are: 1) service, 2) trade, and 3) government.

Pie Graph 1:
State of Arizona Employment by Industry Sector

- Agriculture
- Mining
- Construction
- Manufacturing
- Transportation, Information and Public Utilities
- Government
- Trade
- Service
According to analysis compiled by IMPLAN which includes the Bureau of Economic Analysis, the top three clusters in terms of economic output in the state of Arizona are: 1) service, 2) manufacturing, and 3) trade.

**Pie Graph 2:**

*State of Arizona Economic Output by Industry Sector*

- Trade
- Service
- Manufacturing
- Transportation, Information and Public Utilities
- Government
- Agriculture
- Mining
- Construction
APPENDIX G. UA HEALTH NETWORK ECONOMIC IMPACT

A. Introduction

The University of Arizona Health Network includes two hospitals, the University of Arizona Medical Center – University Campus and The University of Arizona Medical Center – South Campus, and their affiliates, as well as a health plan division and the practice plan for physicians from the University of Arizona College of Medicine. The UA College of Medicine has two campuses in Arizona – one in Tucson and one in Phoenix.

The UA College of Medicine has six basic science departments and 14 clinical science departments. The College also houses 10 Centers of Excellence – the University of Arizona Arthritis Center, the Arizona Center on Aging, the Arizona Center for Integrative Medicine, the Arizona Emergency Medicine Research Center, the Arizona Hispanic Center of Excellence, the Arizona Respiratory Center, the UA Steele Children’s Research Center, the University of Arizona Cancer Center, the UA Sarver Heart Center, and the Valley Fever Center for Excellence. The VIPER Institute (Venom Immunochemistry, Pharmacology and Emergency Response) also is under the College of Medicine umbrella.

The UA College of Medicine is a cornerstone of the Arizona Health Sciences Center at the University of Arizona in Tucson. AHSC is situated on approximately 45 acres of the UA campus. It includes the UA Colleges of Medicine (Tucson and Phoenix), Nursing, Pharmacy, and the Mel and Enid Zuckerman College of Public Health, as well as the University of Arizona Medical Center — University Campus, the primary teaching hospital for the College, and the second teaching hospital, the University of Arizona Medical Center — South Campus. Students at the Tucson campus also train at the Southern Arizona Veterans Administration Health Care System. In

- The University of Arizona Cancer Center website, azcc.arizona.edu, earned a score of 8.4, to place No. 1 in a study in the Journal of Healthcare Management.

- The University of Arizona is ranked No. 23 in research and development expenditures among public and private universities and colleges by the National Science Foundation.

- The UA College of Medicine is the 9th best medical school in the nation for Hispanic students, according to Hispanic Business Magazine's annual ranking of graduate schools in 2009.

- The UA's University Medical Center was named one of the 50 best hospitals in America by Becker's Hospital Review.
addition, a variety of clinics throughout the city and the state provide clinical experiences for medical students.

The College of Medicine — Tucson program has 19 departments and 10 centers of excellence, dedicated to specific areas of research, clinical care, and teaching. The College of Medicine – Phoenix is a collaborative effort among the City of Phoenix, TGen, Valley hospitals, community physicians, foundations and other organizations to bring research and biomedical engineering to Maricopa County and further strengthen health care for Arizona.¹⁰

Research conducted by University of Arizona College of Medicine faculty gives the UA Health Network physicians and patients access to the most cutting-edge and comprehensive treatment options. The COM faculty was awarded 674 research grants totaling approximately $189 million.

¹⁰ The University of Arizona College of Medicine – Phoenix became the 138th medical school in the country in July 2012. The College received preliminary approval as an accredited allopathic medical school from the accrediting body for medical colleges. The UA College of Medicine – Phoenix pursued the separate accreditation to better reflect the clinical education model used by the medical school in Phoenix. In the absence of a traditional teaching hospital on campus, the College of Medicine – Phoenix has developed relationships with several health-care entities in the Greater Phoenix area.
B. UA Health Network Economic Impact

The overall economic impact of The UA Health Network’s operations on the state of Arizona in 2011 was **$2.0 billion** ($1.0 billion direct impact and $1.0 billion indirect and induced). One in every $126 in the state is attributable to The UA Health Network, and .8% of the state’s economy is attributable to The UA Health Network.

Elements included in this impact are as follows:

1) Direct expenditures for goods and services by The UA Health Network, its employees, and out-of-state patients and visitors.

2) Induced or indirect spending with state of Arizona. The businesses and individuals that receive direct expenditures re-spend this money within the state.

### Economic Impact of the University of Arizona Health Network

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>6,407</td>
<td>$474,982,433</td>
<td>$521,632,388</td>
<td>$988,961,176</td>
</tr>
<tr>
<td>Indirect/Induced</td>
<td>8,530</td>
<td>$349,051,645</td>
<td>$667,974,532</td>
<td>$1,027,677,043</td>
</tr>
<tr>
<td><strong>Total Effect</strong></td>
<td><strong>14,937</strong></td>
<td><strong>$824,034,078</strong></td>
<td><strong>$1,189,606,920</strong></td>
<td><strong>$2,016,638,219</strong></td>
</tr>
</tbody>
</table>

Source: Tripp Umbaugh, using IMPLAN results from data obtained through the University of Arizona.
C. UA Health Network Employment Impact

The total employment impact of The UA Health Network’s operations in the state of Arizona is **14,937** (6,407 direct jobs). One in every 213 jobs in the state is attributable to The UA Health Network, and .5% of all jobs in the state are attributable to The UA Health Network.

D. UA Health Network Government Revenue Impact

The UA Health Network’s operations in state of Arizona generate **$88.1 million** per year in direct and indirect state and local tax revenue.
APPENDIX H: ECONOMIC IMPACT OF THE UA TECH PARK

The UA Tech Park is one specific example of how the UA partners with the area corporations and people to advance the research mission. In 2009, the University of Arizona Tech Park (Pima County) had a statewide impact of $2.7 billion and supported 16,514 jobs.\(^\text{11}\) This impact is in addition to the UA’s operational impact. These types of business incubator spaces provide both small and large companies with the opportunity to partner with researchers at the UA, while at the same time advancing their own research goals. With 7,000 employees, it is one of the region’s largest employment centers. It houses 38 business and educational organizations, including four Fortune 500 companies. The Tech Park is nationally recognized as one of the premier university research parks in North America.

APPENDIX I: ECONOMIC IMPACT OF THE PHOENIX BIOMEDICAL CAMPUS

Phoenix Biomedical Campus: The City of Phoenix-owned Phoenix Biomedical Campus (PBC) is a 28-acre urban medical and bioscience campus planned for more than six million square feet of biomedical-related research, academic, and clinical facilities. The University of Arizona at the Phoenix Biomedical Campus (Maricopa County) is projected to have a statewide impact of $3.0 billion ($1.6 billion direct and $1.4 billion indirect), supporting 19,586 jobs by 2024-25.12

12 Source for Phoenix Biomedical Campus: Data provided by UACOM-Phoenix. Includes UACOM Phoenix, expansion of Public Health and Pharmacy Programs, the Arizona Cancer Center, Maricopa County Hospital, TGen, and out-of-state visitor spending. Economic analysis completed by Tripp Umbach.