

Economic Quantification Study



**Phoenix Biomedical Campus
Final Executive Report
December 2005**

INTRODUCTION

The State of Arizona is in a unique position to become a national center for advanced healthcare research, teaching and clinical care through the development of the Phoenix Biomedical Campus. Such a campus will incorporate the existing strengths of the University of Arizona College of Medicine, Arizona State University's Bioinformatics Program, TGen and existing Phoenix-area healthcare systems. The Phoenix Biomedical Campus that will be developed over the next 20 years will become an important economic engine for the entire State of Arizona, as well as a magnet in downtown Phoenix for local, regional, national, and international healthcare research and clinical organizations. The Phoenix Biomedical campus will also foster the development of biomedical start-ups.

Arizona is the second fastest growing state in the nation; however, it has lagged behind other states in its ability to attract resources for advanced research and the culmination of this research into the formation of strong biomedical companies and start-ups. The Phoenix Biomedical Campus will do more than train the physicians Arizona needs for the future, it will attract industries that will help build economic infrastructure, develop medical research and improve the health of its citizens. The ultimate goal of the campus is to become an international destination for patients, researchers, students, and industry leaders.

Nationally, the biosciences comprise an average of 57 percent of total university research dollars. In Arizona, the figure is just 44 percent (\$229 million in 2000). From 1996 to 2000, the state's total biosciences research funding grew 27 percent, compared to a 36 percent gain for the nation. Thus, Arizona is losing its market share of the national research budget and will need to make up lost ground to become competitive. The Milken Institute's 2004 study, *America's Biotech and Life Science Clusters: San Diego's Position and Economic Contributions*, states that regional leaders across the United States are "fighting hard to lure what they believe is the economic growth industry of the 21st century – biotechnology. Arizona has a significant role to play in this emerging high-tech economy. "Hospitals and clinics are the primary sources of clinical trials and much innovation. However, there is an important race underway – the one to determine where the dominant health care centers will be located."¹

NATIONAL GROWTH IN BIOMEDICAL DEVELOPMENT

Healthcare and the life sciences comprise one of the largest sectors of the United States' \$10 trillion economy: comprising a total of 13 percent. This \$1.3 trillion slice spent on health care is only expected to grow, reaching 17 percent by 2010 and more than 20 percent by 2040. This will continue a decades-long trend; in 1945 health care spending was only 4 percent of the U.S. economy. The rising cost of health care will be one of the greatest economic challenges in our current century.

The scientific promise of biotechnology and genomics will change medicine forever, in ways that were previously inconceivable. The field's potential for early diagnosis and treatment of

¹ Ross DeVol and Rob Koepp (August 2003). *America's Healthcare Economy*, Milken Institute

diseases could reduce the suffering of patients, resulting in a significant cost savings not only in the U.S. but throughout the world. Important medical discoveries already have been made by research institutions and private business in the biotechnology sector. Annually, \$11 billion is invested in research and development, not including funds expended on higher education and other nonprofit organizations. In fact, between 1993 and 1999, the biotech industry doubled in size, producing revenues of \$20 billion directly and \$27 billion indirectly.

ECONOMIC IMPACT QUANTIFICATION STUDY OBJECTIVES

It is within this framework that Tripp Umbach was retained in May 2005 to quantify the potential range of economic impact of the Phoenix Biomedical Campus on the State of Arizona, Maricopa County and the City of Phoenix.² This report represents an Executive Summary of economic, employment and government revenue impacts of the Phoenix Biomedical Campus.

The goals of this study included:

- To estimate the economic impact of the Phoenix Biomedical Campus in 2008 (fiscal year), when the first class of medical students from the University of Arizona College of Medicine are in their newly renovated facilities on the Phoenix campus;
- To project the economic impact of the entire Phoenix Biomedical Campus in 2010, 2015 and 2025; and
- To evaluate various scenarios of the potential economic impact of the Phoenix Biomedical Campus including:
 - **SCENARIO A:** Stand-alone University of Arizona College of Medicine, ASU Bioinformatics Program and TGen
 - **SCENARIO B:** University of Arizona College of Medicine, UA Research, UA Clinical (outpatient), ASU Bioinformatics Program, TGen, and other research partners (Dispersed Model)
 - **SCENARIO C:** Fully-integrated biomedical campus including teaching, research, outpatient care, a teaching hospital and business spin-offs. University of Arizona College of Medicine, UA Research, UA Clinical (outpatient), ASU Bioinformatics Program, TGen, other research partners, teaching hospital and other commercial partners (Integrated Model)

² For the purposes of this study, the Phoenix Biomedical Campus includes the following entities: The University of Arizona College of Medicine, Arizona State University Bioinformatics Program, TGen, and other research and clinical entities yet to be defined.

SCENARIO OVERVIEW

Tripp Umbach calculated both direct and indirect employment numbers for the Phoenix Biomedical Campus for all scenarios and all benchmark years. It is projected that as the University of Arizona College of Medicine Phoenix program continues to grow and increase the number of students on campus, that staffing levels will increase incrementally. Each scenario is predicated upon specific assumptions which where necessary to project the range of possibilities for the economic, employment and government revenue impacts out into the future. All scenarios are based upon the underlying assumption that the University of Arizona College of Medicine grows its student body to capacity (150 students).

SCENARIO A assumes that the Phoenix Biomedical Campus does not become a center of research. The scenario models only three entities on the campus: The University of Arizona College of Medicine, Arizona State University Bioinformatics Program and TGen. It is the least likely of all scenarios as it projects minimal growth rates on the campus and no research or clinical services.

SCENARIO B assumes that the Phoenix Biomedical Campus will pursue a dispersed model approach and will not have an integrated teaching hospital on the campus. Scenario B includes the following entities in its models: University of Arizona Medical School, Arizona State University Bioinformatics Program, TGen, research and an outpatient clinical function.

SCENARIO C assumes that an independent teaching hospital (not owned or operated by the University of Arizona) is built on the Phoenix Biomedical Campus in 2015 and expanded by 2025. Scenario C includes the following entities in its models: University of Arizona College of Medicine, Arizona State University Bioinformatics, TGen, a teaching hospital and other research and commercial partners.

These scenarios and assumptions are based on previous reports, data collected from the collaborating partners on the Phoenix Biomedical Campus and industry research. Tripp Umbach facilitated the creation of a project development strategy for the Phoenix Biomedical Campus that provides an overview of timeframes and campus participants (See Figure 2).

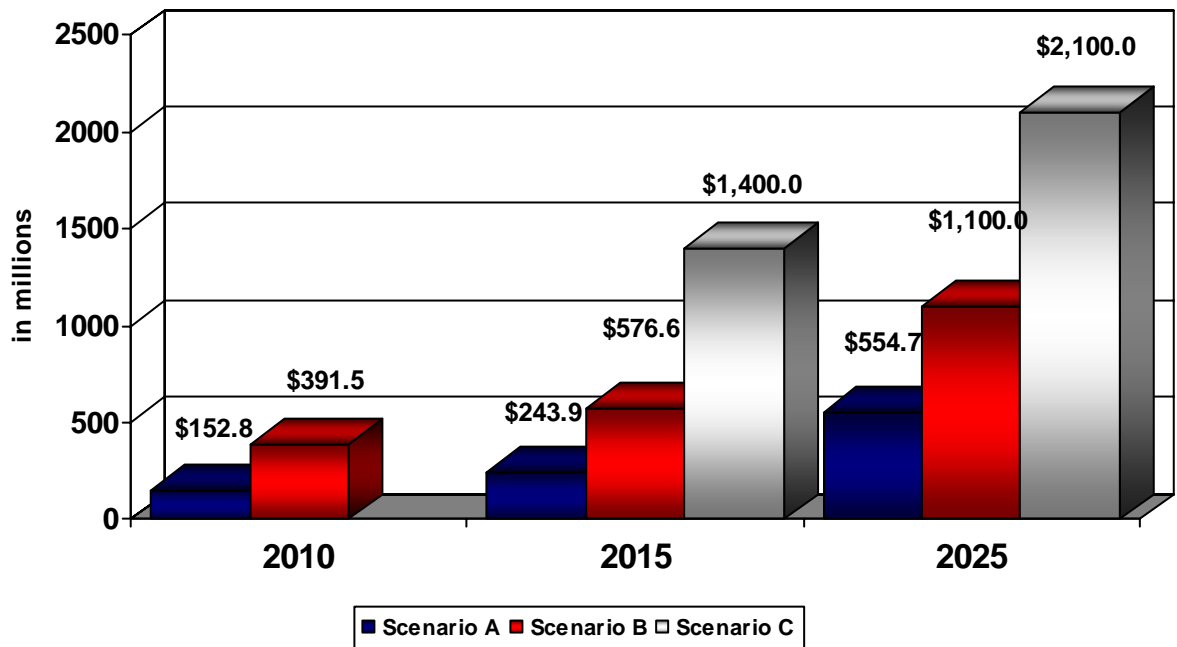
FIGURE 2: CAMPUS PARTICIPANTS AND TIMETABLE FOR THE PHOENIX BIOMEDICAL CAMPUS

	2008 – Level I	2010 – Level II	2015	2025
OPENING	<ul style="list-style-type: none"> • College of Medicine with no research or clinical component • ASU Bioinformatics • TGen 			
SCENARIO A		<ul style="list-style-type: none"> • College of Medicine • ASU Bioinformatics • TGen 	<ul style="list-style-type: none"> • College of Medicine • ASU Bioinformatics • TGen 	<ul style="list-style-type: none"> • College of Medicine • ASU Bioinformatics • TGen
SCENARIO B (DISPERSED)		<ul style="list-style-type: none"> • College of Medicine • UA Research • UA Clinical (outpatient) • ASU Bioinformatics • TGen • Other Research Partners 	<ul style="list-style-type: none"> • College of Medicine • UA Research • UA Clinical (outpatient) • ASU Bioinformatics • TGen • Other Research Partners 	<ul style="list-style-type: none"> • College of Medicine • UA Research • UA Clinical (outpatient) • ASU Bioinformatics • TGen • Other Research Partners
SCENARIO C (INTEGRATED)			<ul style="list-style-type: none"> • College of Medicine • UA Research • UA Clinical (outpatient) • ASU Bioinformatics • TGen • Other Research Partners • Other Clinical Partners (teaching hospital) • Other Commercial Partners 	<ul style="list-style-type: none"> • College of Medicine • UA Research • UA Clinical (outpatient) • ASU Bioinformatics • TGen • Other Research Partners • Other Clinical Partners (teaching hospital) • Other Commercial Partners

STATE OF ARIZONA IMPACT FINDINGS

The overall economic impact³ of the Phoenix Biomedical Campus on the state of Arizona in 2025 could range from \$554.7 million (Scenario A) to \$2.1 billion (Scenario C). By 2015, the overall impact could range from \$243.9 million (Scenario A) to \$1.4 billion (Scenario C). In 2010, the overall impact could range from \$152.8 million (Scenario A) to \$391.5 million (Scenario B). The overall economic impact of the Phoenix Biomedical Campus in 2008 is expected to equal \$77.1 million. (See Figure 3)

FIGURE 3: STATE OF ARIZONA OVERALL ECONOMIC IMPACT (DIRECT AND INDIRECT)

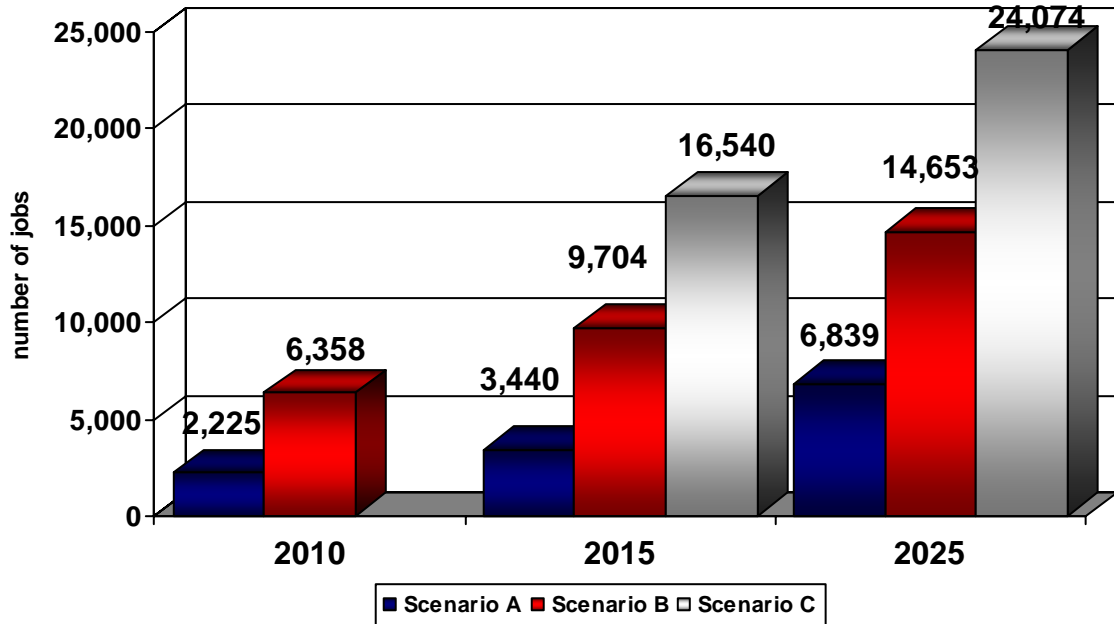


In 2025, under Scenario A, the Phoenix Biomedical Campus potentially could generate 6,839 new direct and indirect jobs, Scenario B shows the potential of 14,653 new jobs and in Scenario C, 24,074 jobs could be generated. In 2015, under Scenario A the Phoenix Biomedical Campus could create 3,440 new jobs, Scenario B has the potential to create 9,704 jobs and under Scenario C, 16,540 new jobs could be created. The overall employment generated by the Phoenix Biomedical Campus in 2010, under Scenario A is projected to be 2,225 and under

³ The overall economic impact of the Phoenix Biomedical Campus equals both direct and indirect business volume. Direct impact is defined as the sum of total expenditures for capital, goods and services, and staff spending within in the study area. It also includes out-of area spending from patients and visitors. Indirect impact is defined as the standard multiplier as recommended by American Council on Education representing the re-spending taking place in the study area.

Scenario B, 6,358 new jobs could be created. In 2008, the overall employment impact of the Phoenix Biomedical Campus will be 981 new direct and indirect jobs. (See Figure 4)

**FIGURE 4: STATE OF ARIZONA OVERALL EMPLOYMENT IMPACT
(DIRECT AND INDIRECT)**



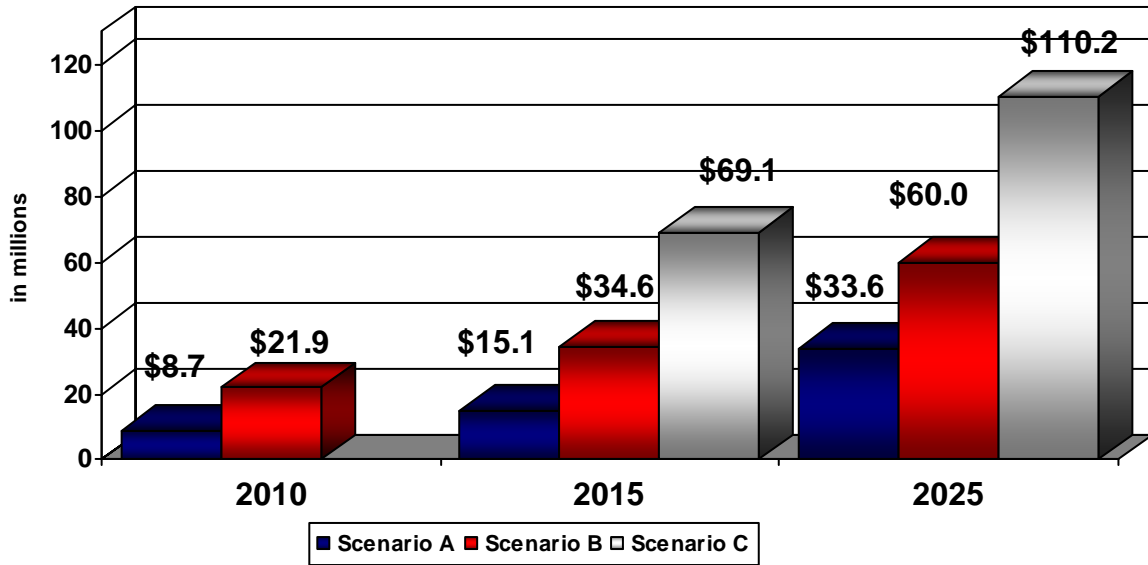
STATE OF ARIZONA GOVERNMENT REVENUE IMPACT

In order to quantify the financial returns to the state of Arizona, the models include a government revenue impact component, which calculates the indirect government revenue received by the state of Arizona from the Phoenix Biomedical Campus. In 2010, Scenario A shows that the state could receive \$8.7 million in direct and indirect revenues from the Phoenix Biomedical Campus and by 2025 could receive \$33.6 million. The Phoenix Biomedical Campus government revenue projections in Scenario B could range from \$21.9 million in 2010 to \$60.0 million in 2025. The direct and indirect government revenue impact generated by the Phoenix Biomedical Campus in Scenario C could reach as high as \$69.1 million in 2015 and by 2025 could equal \$110.2 million. In 2008, the overall indirect government revenue generated by the Phoenix Biomedical Campus is projected to be \$4.6 million.

Tripp Umbach estimates that by 2025, assuming a fully integrated campus (Scenario C), total state government revenue generated by the Phoenix Biomedical Campus would equal \$110.2 million (See Figure 5). Therefore, the return on investment for the state of Arizona, assuming \$40 million in annual support, will be \$2.80 generated for every \$1 of state funds invested. By 2015, the state will receive nearly an even dollar for dollar return on state investment

(Scenario B) when the Phoenix Biomedical Campus will generate \$34.6 million in government revenue.

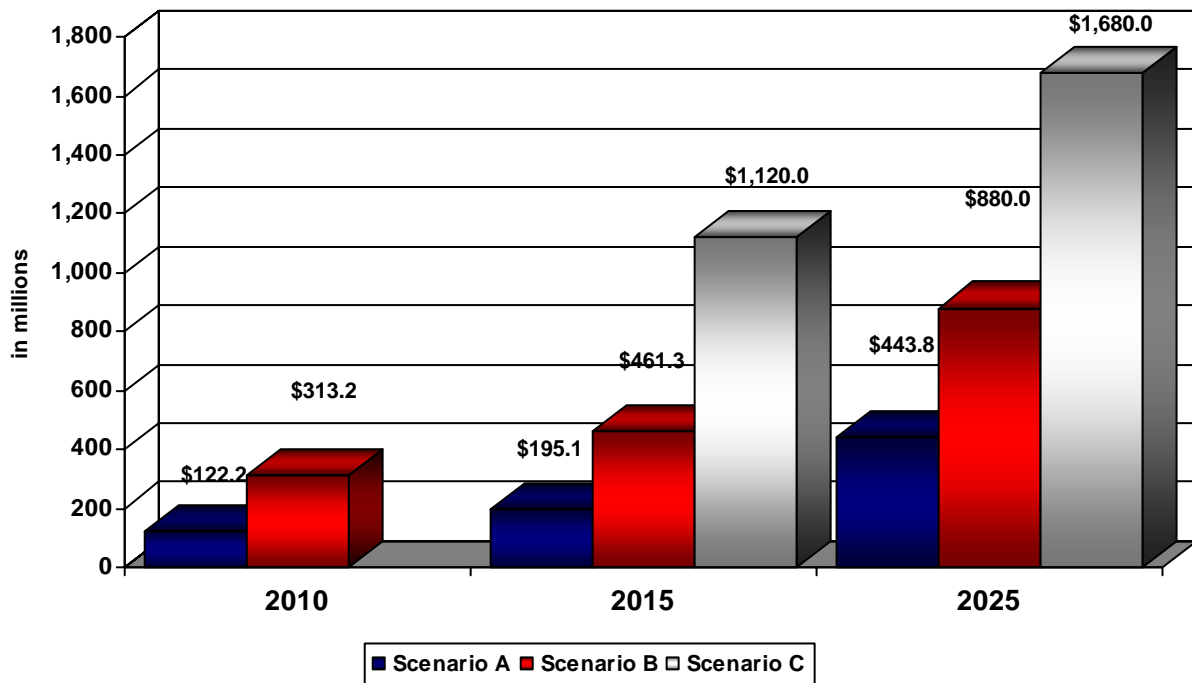
**FIGURE 5: STATE OF ARIZONA OVERALL GOVERNMENT REVENUE IMPACT
(DIRECT AND INDIRECT)**



MARICOPA COUNTY IMPACT FINDINGS

The overall economic impact⁴ of the Phoenix Biomedical Campus on Maricopa County in 2025 could range from \$443.8 million (Scenario A) to \$1.7 billion (Scenario C). By 2015, the overall impact could range from \$195.1 million (Scenario A) to \$1.1 billion (Scenario C). In 2010, the overall impact could range from \$122.2 million (Scenario A) to \$313.2 million (Scenario B). The overall economic impact of the Phoenix Biomedical Campus in 2008 is expected to equal \$61.7 million. (See Figure 6)

**FIGURE 6: MARICOPA COUNTY OVERALL ECONOMIC IMPACT
(DIRECT AND INDIRECT)**

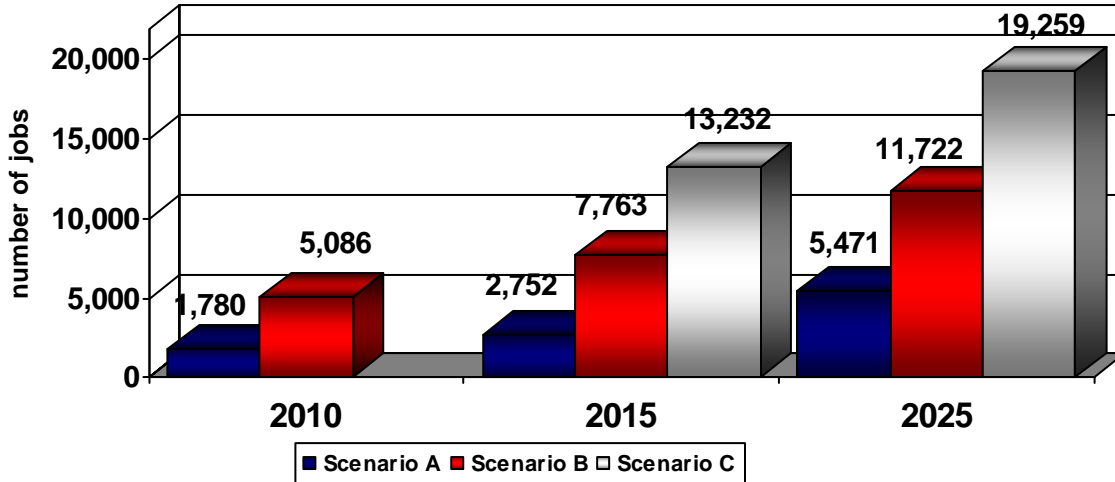


In 2025, under Scenario A, the Phoenix Biomedical Campus potentially could generate 5,471 new direct and indirect jobs for Maricopa County, Scenario B shows the potential of 11,722 new jobs and in Scenario C, 19,259 jobs could be generated. In 2015, under Scenario A the Phoenix Biomedical Campus could create 2,752 new jobs, and under Scenario C, 13,232 new jobs could be created. The overall employment generated by the Phoenix Biomedical Campus in 2010, under Scenario A is projected to be 1,780 and under Scenario B, 5,086 new jobs could be

⁴ The overall economic impact of the Phoenix Biomedical Campus equals both direct and indirect business volume. Direct impact is defined as the sum of total expenditures for capital, goods and services, and staff spending within in the study area. It also includes out-of area spending from patients and visitors. Indirect impact is defined as the standard multiplier as recommended by American Council on Education representing the re-spending taking place in the study area.

created. In 2008, the overall employment impact of the Phoenix Biomedical Campus will be 785 new direct and indirect jobs. (See Figure 7).

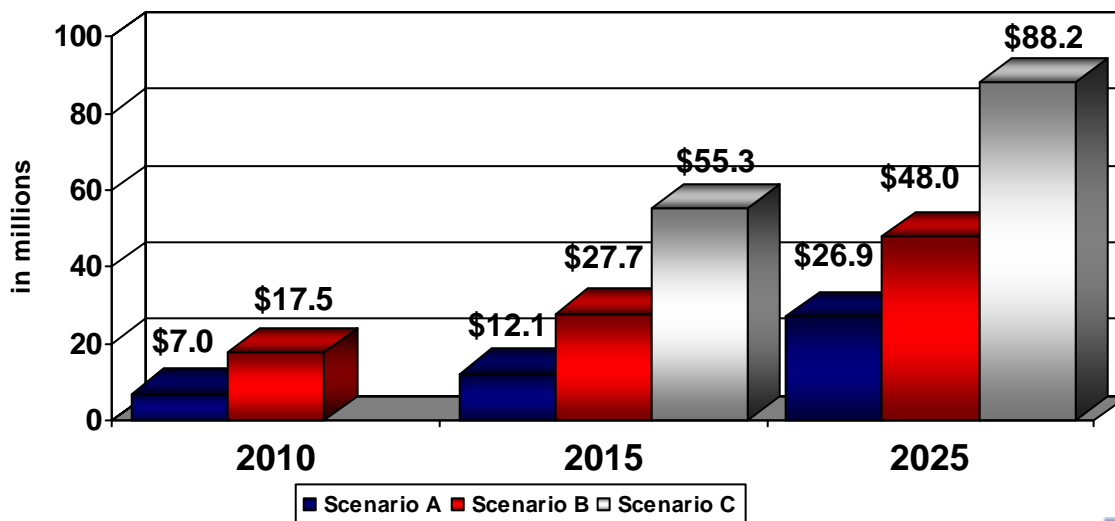
**FIGURE 7: MARICOPA COUNTY OVERALL EMPLOYMENT IMPACT
(DIRECT AND INDIRECT)**



MARICOPA COUNTY GOVERNMENT REVENUE IMPACT

In 2010, Scenario A shows that Maricopa County could receive \$7.0 million in direct and indirect revenues from the Phoenix Biomedical Campus and by 2025 could receive \$26.9 million. The Phoenix Biomedical Campus government revenue projections in Scenario B could range from \$17.5 million in 2010 to \$48.0 million in 2025. The direct and indirect government revenue impact generated by the Phoenix Biomedical Campus in Scenario C could reach as high as \$55.3 million in 2015 and by 2025 could equal \$88.2 million (See Figure 8). In 2008, the overall direct and indirect government revenue generated by the Phoenix Biomedical Campus is projected to be \$3.7 million.

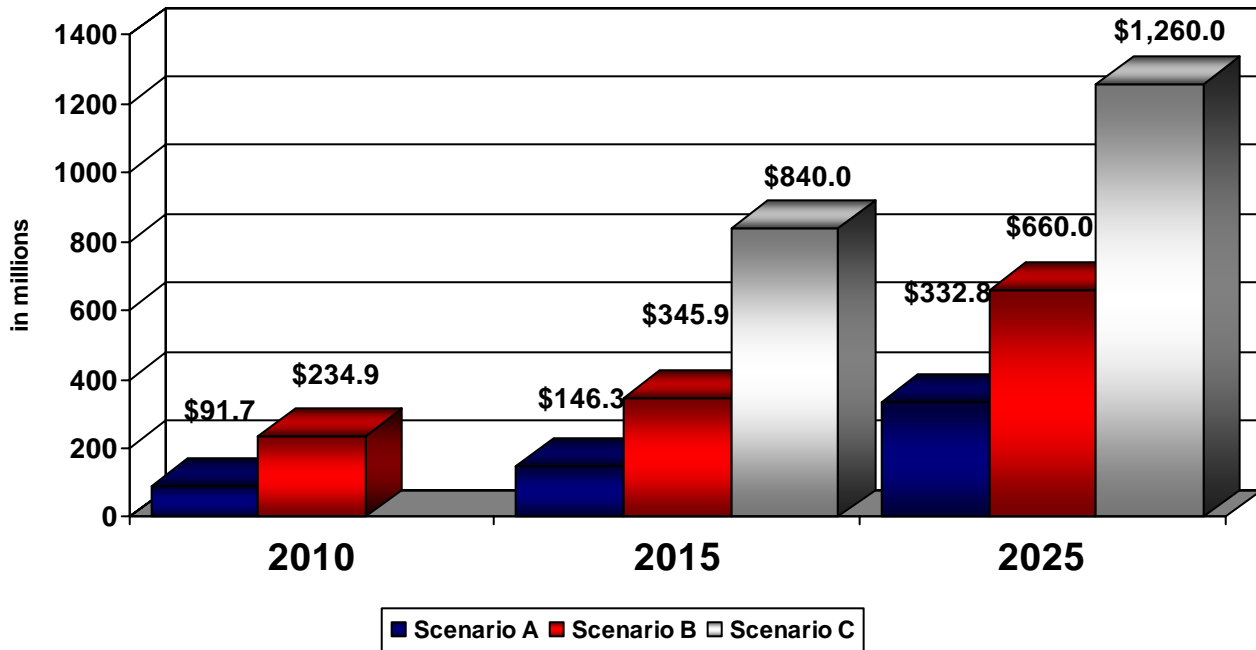
**FIGURE 8: MARICOPA COUNTY OVERALL GOVERNMENT REVENUE IMPACT
(DIRECT AND INDIRECT)**



CITY OF PHOENIX IMPACT FINDINGS

The overall economic impact⁵ of the Phoenix Biomedical Campus on the City of Phoenix in 2025 could range from \$332.8 million (Scenario A) to \$1.3 billion (Scenario C). By 2015, the overall impact could range from \$146.3 million (Scenario A) to \$840.0 million (Scenario C). In 2010, the overall impact could range from \$91.7 million (Scenario A) to \$234.9 million (Scenario B). The overall economic impact of the Phoenix Biomedical Campus in 2008 is expected to equal \$46.3 million. (See Figure 9)

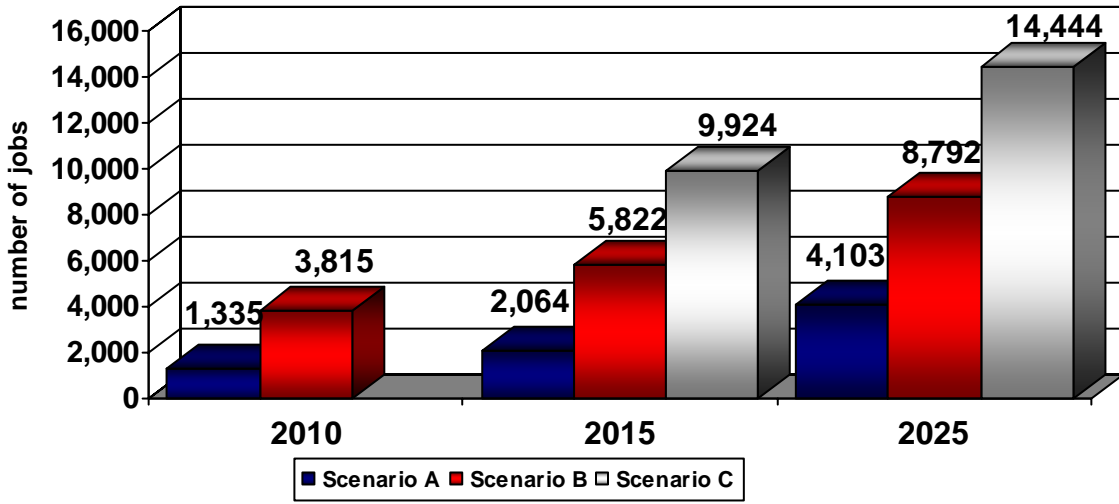
**FIGURE 9: CITY OF PHOENIX OVERALL ECONOMIC IMPACT
(DIRECT AND INDIRECT)**



In 2025, under Scenario A, the Phoenix Biomedical Campus potentially could generate 4,103 new direct and indirect jobs, Scenario B shows the potential of 8,792 new jobs and in Scenario C, 14,444 jobs could be generated. In 2015, under Scenario A the Phoenix Biomedical Campus could create 2,064 new jobs, and under Scenario C, 9,924 new jobs could be created. The overall employment generated by the Phoenix Biomedical Campus in 2010, under Scenario A is projected to be 1,335 and under Scenario B, 3,815 new jobs could be created. In 2008, the overall employment impact of the Phoenix Biomedical Campus will be 589 new direct and indirect jobs. (See Figure 10)

⁵ The overall economic impact of the Phoenix Biomedical Campus equals both direct and indirect business volume. Direct impact is defined as the sum of total expenditures for capital, goods and services, and staff spending within in the study area. It also includes out-of area spending from patients and visitors. Indirect impact is defined as the standard multiplier as recommended by American Council on Education representing the re-spending taking place in the study area.

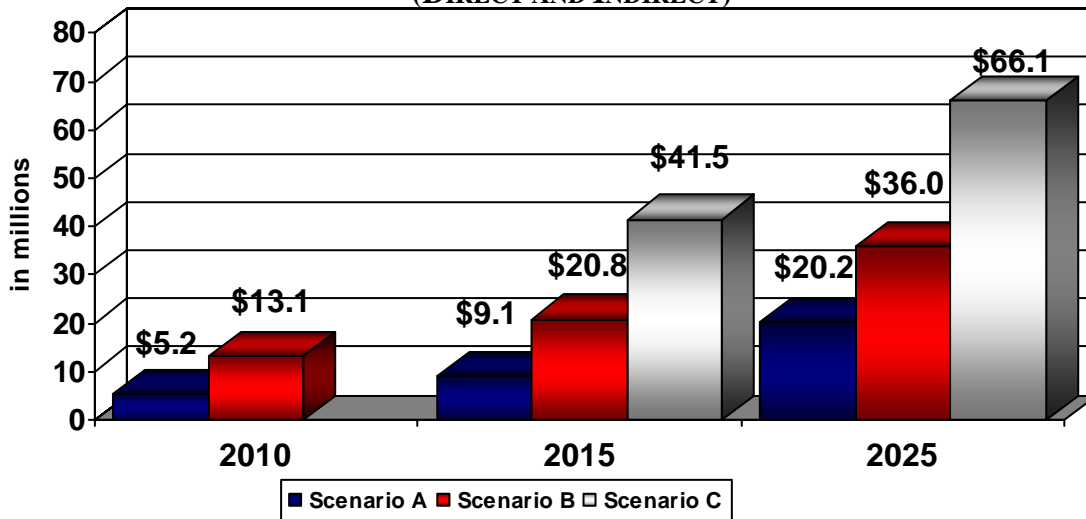
**FIGURE 10: CITY OF PHOENIX OVERALL EMPLOYMENT IMPACT
(DIRECT AND INDIRECT)**



CITY OF PHOENIX GOVERNMENT REVENUE IMPACT

In 2010, Scenario A shows that the city of Phoenix could receive \$5.2 million in direct and indirect revenues from the Phoenix Biomedical Campus and by 2025 could receive \$20.2 million. The Phoenix Biomedical Campus government revenue projections in Scenario B could range from \$13.1 million in 2010 to \$36.0 million in 2025. The direct and indirect government revenue impact generated by the Phoenix Biomedical Campus in Scenario C could reach as high as \$41.5 million in 2015 and by 2025 could equal \$66.1 million (See Figure 11). In 2008, the overall direct and indirect government revenue generated by the Phoenix Biomedical Campus is projected to be \$2.8 million.

**FIGURE 11: CITY OF PHOENIX OVERALL GOVERNMENT REVENUE IMPACT
(DIRECT AND INDIRECT)**



CONCLUSIONS

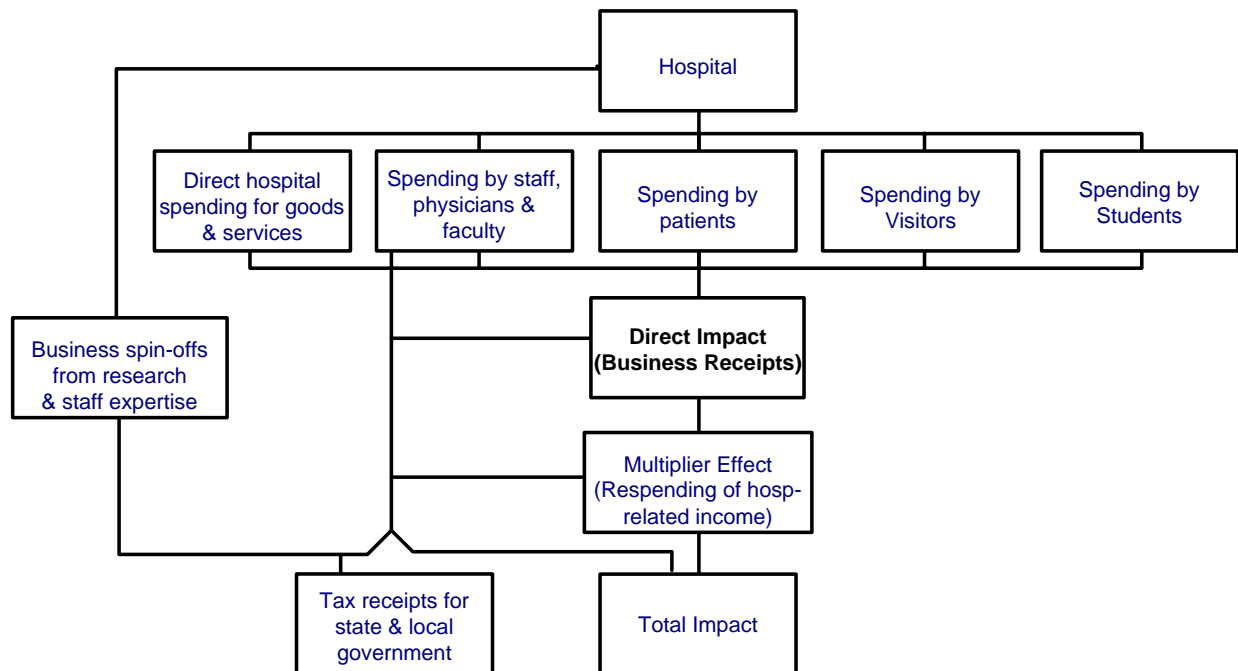
- Tripp Umbach estimates that the Phoenix Biomedical Campus will rank among Arizona's leading economic engines by 2025; the campus has the potential to generate between \$1.1 billion (Scenario B) and \$2.1 billion (Scenario C) in annual economic impact for the State of Arizona.
- The Phoenix Biomedical Campus has the potential to generate between 14,653 jobs (Scenario B) and 24,074 jobs for Arizona residents (Scenario C).
- The campus has the opportunity to generate between \$60 million (Scenario B) and \$110.2 million (Scenario C) annually in state government revenue by 2025 (direct and indirect). Further, the campus has the opportunity to generate more than \$85 million annually in government revenue providing the state of Arizona with \$2 in government revenue for every \$1 invested.
- 80 percent of the overall economic, employment and government revenue impact generated by the Phoenix Biomedical Campus will remain in Maricopa County.
- 60 percent of the overall economic, employment and government revenue impact generated by the Phoenix Biomedical Campus will remain in the City of Phoenix.

APPENDIX A: METHODOLOGY EMPLOYED IN THE ECONOMIC QUANTIFICATION STUDY

Tripp Umbach has performed more than 100 economic impact studies for both academic institutions and large health care systems, including the Mayo Clinic Rochester, Mayo Clinic – Arizona entities, UPMC Health System, and North Mississippi Health System. The methodology generally employed in these studies was originally derived from a set of research tools and techniques developed for the American Council on Education (ACE).⁶ The ACE-based methodology employs linear cash flow modeling to track the flow of institution-originated funds through a delineated spatial area. While this methodology is generally well suited to evaluate a hospital's impact on its local service area, it tends to be too limiting for a project with the complexity of a medical school with integrated systems.

Based on previous economic impact studies performed for academic health centers in Pennsylvania and Virginia, Tripp Umbach recommended that the traditional model of economic impact for hospitals (see Figure 1), based on the ACE model, be modified for the purposes of this research.

Figure 1
Hospital Economic Impact
(A Traditional Model)

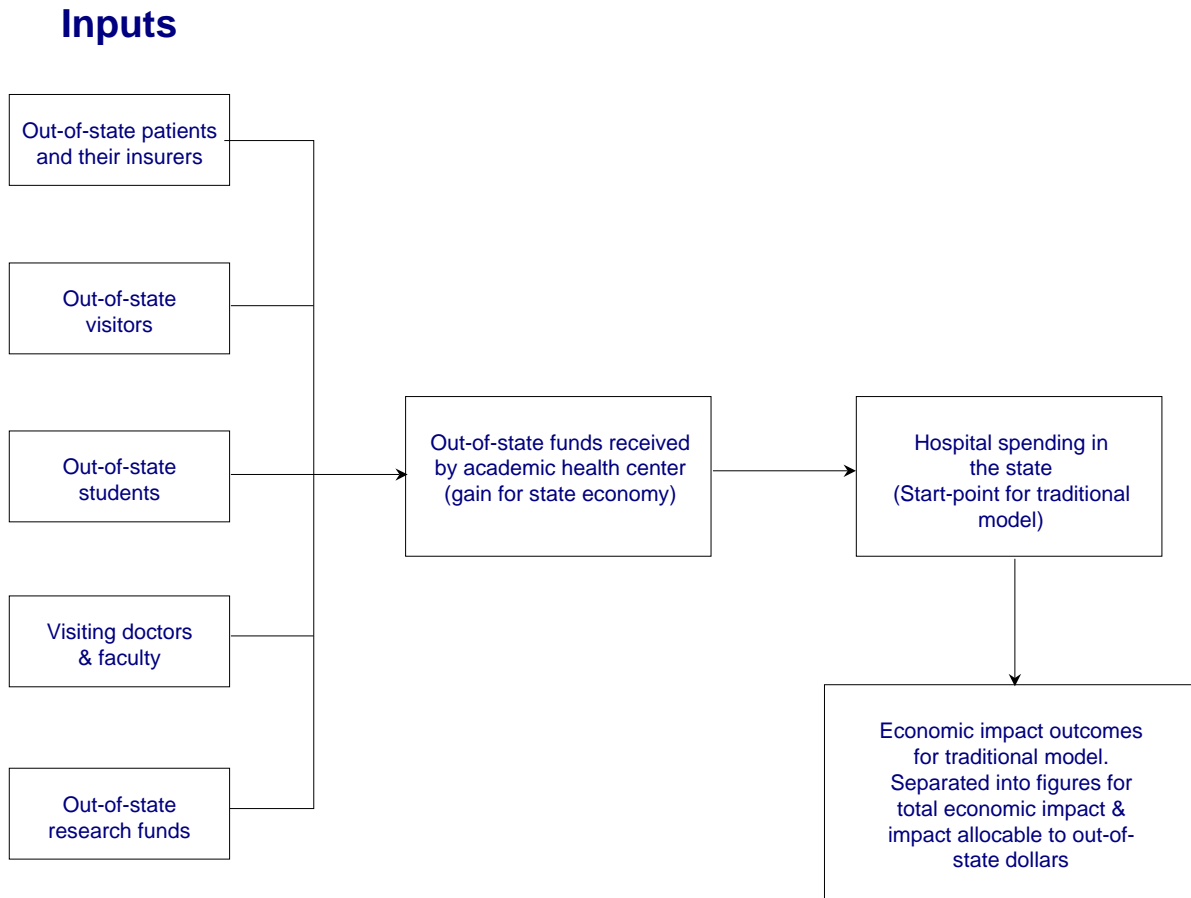


⁶ Caffrey, John and Isaacs, Herbert, "Estimating the Impact of a College or University on the Local Economy," American Council on Education, 1971.

The "traditional" model of hospital economic impact provides a good measure of the impact of hospital expenditures and their flow within an economy. However, the model does not account for the origination of hospital revenues, and thus counts the spending of revenues received by the hospital from in-state sources. The traditional model counts some of the spending of dollars that already existed in the Arizona economy.

The Tripp Umbach research team felt it important to distinguish the economic impact of the individual entities who will occupy the Phoenix Biomedical Campus that are attributable to funds brought into the state from out-of-state sources. The application of this "fresh dollar" model provides a first-line measure of the initial direct expansion in the state economy caused by the Phoenix Biomedical Campus. The final model concept evolved into a hybrid model including a fresh-dollar approach feeding into a traditional model which tracks in-state spending. Thus the final model used for this research (See Figure 2) measures funds brought into the state together with the ultimate flow of these funds through the Arizona economy and the effect on economic expansion, job growth and enterprise development. The final methodology closely matches the impact study methodology recommended for individual medical schools by the Association of American Medical Colleges.

Figure 2: Phoenix Biomedical Campus Economic Impact Model



Tripp Umbach Healthcare researchers worked closely with representatives from the University of Arizona College of Medicine, Arizona State University Bioinformatics and TGen to acquire the primary data utilized in this study.

APPENDIX B: DEFINITION OF TERMS

TOTAL ECONOMIC IMPACT	The total economic impact of an institution includes both the direct economic impact and the indirect economic impact, generated in the economy as a result of the direct impact. Direct impact includes items such as institutional spending, employee spending, and spending by out-of-area visitors to the institution. Indirect economic impact, also known as the multiplier effect, includes the re-spending of dollars within the local economy.
TOTAL STATE BUSINESS VOLUME	Total sales receipts generated within a given geographic area (State of Arizona, Maricopa County and City of Phoenix). Business volume includes wholesale, retail, service sector spending as well as value added in the manufacturing process.
MULTIPLIER EFFECT	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, creating a multiplier.
DIRECT TAX PAYMENTS	Direct tax payments made by an institution to a unit of government.
INDIRECT TAX PAYMENTS	Government revenue that is collected by governmental units in addition to those paid direct by an institution, including taxes paid directly by employees of the institution, visitors to the institution, and vendors who sell products to the institution.
DIRECT EMPLOYMENT	Total Employees based on Full-Time Equivalent (FTEs)
INDIRECT EMPLOYMENT	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, creating an employment multiplier.