Creating Florida's Future:

Measuring the Economic Impact of the State University System in Florida

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Prepared for

The Florida Leadership Board for
Applied Research and Public Service

April 15, 2001

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EXECUTIVE SUMMARY

The Pivotal Place of the University System in Florida's New Economy

Florida Is Creating Its Future

- Talk of that future is everywhere—new communities, new technology, and a new economy taking shape across both Florida and the nation.
- It is a future that cannot be ignored.
- The competitors are now global.
- The pace of change has accelerated.
- Florida cannot rest on what it has done. It must renew and reshape itself.
- Competitive advantage must be created. It comes together in the imaginative interaction of physical capital, human resources, and technology.
- The State University System (SUS) plays a pivotal role in the new economy and will become increasingly vital to sustaining the economic prosperity of the state.
- It trains the professionals, technicians, scientists, engineers, and other employees needed to fuel the new knowledge economy and to develop the technologies that power its growth.
- The SUS 10-university consortium is a key engine of economic productivity, innovation, education, and cutting-edge technologies.

Figure A

25 Technologies for the Next 25 Years—
The University Connection

Photonics
Laser
Holography
Virtual Reality
Genomics
Telecommunications
Optics
Computational Biology
Artificial Intelligence
Internet
Integration Technology
Biotechnology
Smart Products
Microprocessors
Computers
Nanotechnology
Recognition Technology
Wireless
Bionics
Materials Science
Noise Cancellation Technology
Microwave
Global Positioning Systems
Robotics
Micromachines

Adapted from: "The Economy at Light Speed—Technology and Growth in the Information Age and Beyond." Federal Reserve Bank of Dallas, 1996 Annual Report.

Training the Talent for the New Economy

The state's top business magazine, *Florida Trend*, reported that industry leaders say that a highly trained workforce is the single most important high-tech commodity required for our economy. Florida seriously lags behind the nation, the Southeast, and the top 10 growth states in highly trained professionals in a number of key areas.

Also mentioned was the fact that high-tech industries have noted the lack of a trained workforce when considering a move to Florida. Companies already based in Florida complain of a lack of professional workers.

On the upside, the publication noted that the state has a strong advanced education network in its 10 state-run universities and 12 off-campus centers. This indicates that the state has a strong commitment to providing a trained workforce (*Florida Trend*, January 2000).

During the 1998–99 academic year the SUS graduated 34,529 bachelor (B.S.), 10,008 master (M.S.), 1,064 doctorate (Ph.D.), 617 law, and 524 medical degrees. These graduates represent a 76% increase over the 1979–80 academic year.

- In spite of these numbers, the employment needs of the Florida economy remain unfilled. The Florida Department of Labor and Employment Security (FDLES) forecasts that the state demand for college graduates from 1997 through 2007 in just 170 selected professions will exceed 444,000.

- The current rate of SUS degree production will not provide enough highly trained graduates to satisfy Florida's future need.

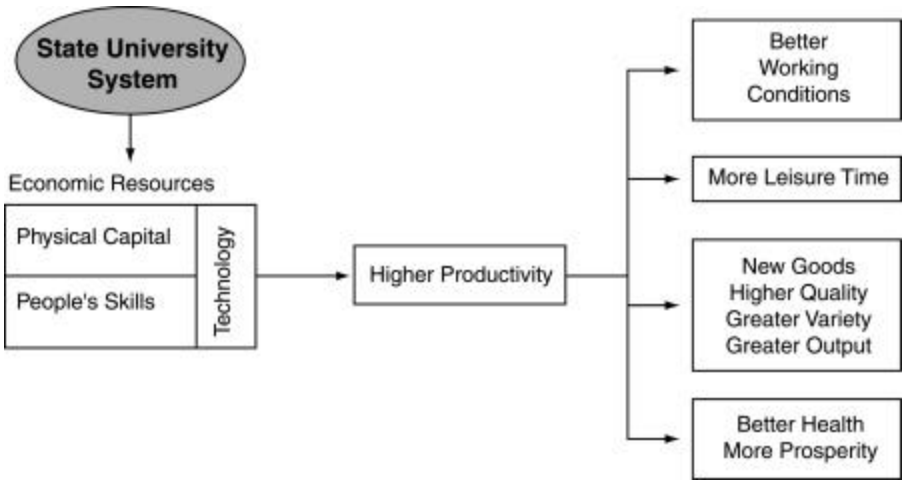
- Florida currently awards 18 percent fewer baccalaureate degrees per capita than the national average and 23 percent fewer per capita than the top 10 growth states in the United States.

The Value of the State Universities to the Florida Economy

- The 1998–99 SUS graduates will result in a direct lifetime stimulus to the Florida economy of over $6.6 billion from their wages and salaries alone.

Figure B

The SUS Generates Higher Economic Output and Quality of Life



Adapted from: "The Economy at Light Speed—Technology and Growth in the Information Age and Beyond." Federal Reserve Bank of Dallas, 1996 Annual Report.

- Overall, the value of the economic returns from these 1998–99 graduates (both direct and secondary) and of other university productivity results in $19.1 billion in economic stimulus to the Florida economy.

The State's Investment in the SUS

- During the 1998–99 academic year, the SUS received $1.5 billion in General Revenue (GR) and Florida Lottery proceeds from the state.

The Return on Each Tax Dollar Invested in the SUS

- The SUS yields a return to the Florida economy of $9.72 for every state taxpayer dollar invested.

- The annual rate of return for the public's investment is 34%.

The Need for a Sustained Commitment to the SUS

- Florida's economy with a vibrant business sector performs well. However, its development capacity depends on continued funding, education, research, and the commercialization of innovation.

- To match its competitors, Florida must increase its total university enrollment, especially in the sciences, engineering, and other technical fields, and the number of advanced degrees granted. It must also increase its commitment to research and development by state government.

The SUS is a proven investment—critical to Florida's economy. In the emerging economy, it will be even more important. The investment Florida makes now will be significant, not just for the students it trains, but for the opportunities it creates for the state. Sustained investment in the SUS is vital to the state's continued competitiveness.

INTRODUCTION

The State University System (SUS) of Florida is nationally and internationally recognized for the excellent education, training, research, and public services provided by its faculty, staff, and students. However, to date no one has systematically examined the significant contributions the SUS makes to the Florida economy and Floridians' quality of life. The focus of this study will address this shortcoming by examining these important issues and will quantify the returns the Florida economy enjoys from the state's annual investment in the SUS.[1]

Specifically, this study examines the following issues:

- Training the talent for the new economy
- The value of the state universities to the Florida economy
- The state's investment in the SUS
- The return on each tax dollar invested in the SUS

Florida Is Creating Its Future

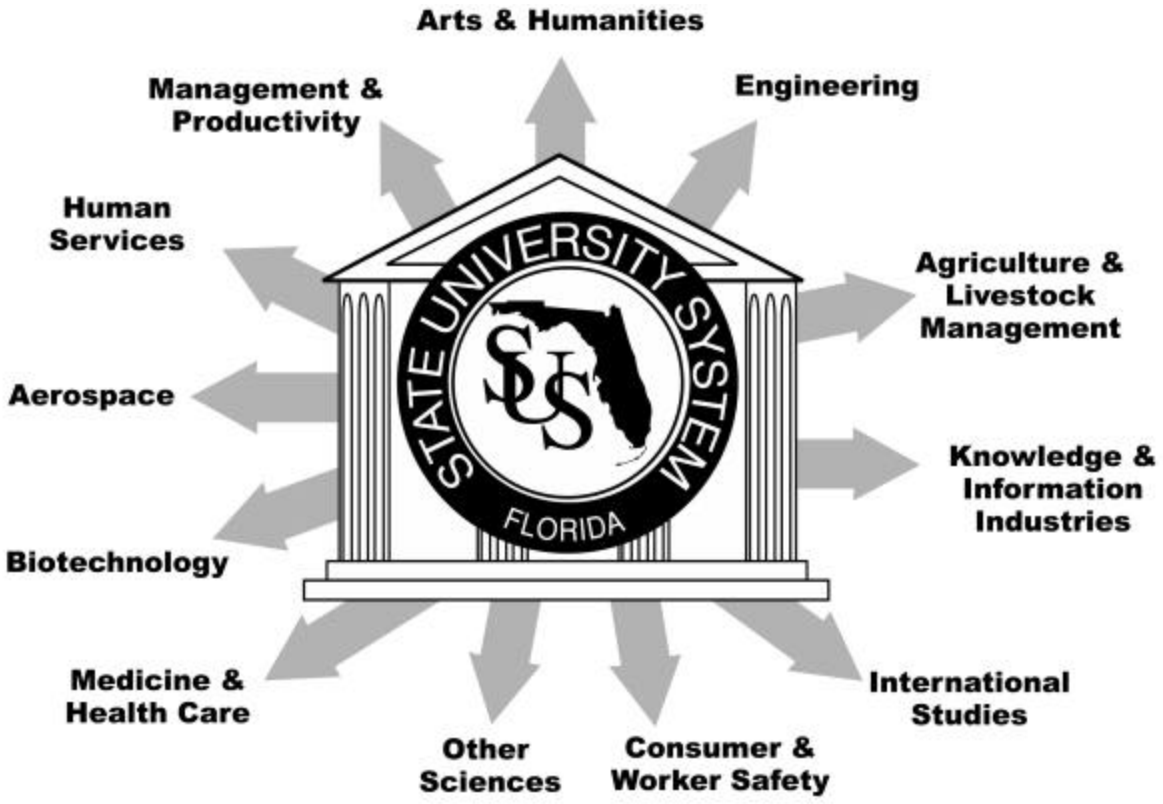
The SUS contributes to the Florida economy in a number of significant ways that have not been well examined nor fully evaluated. First, the universities provide analytical and leadership skills to the workforces of both the public and private sectors. With these skills, university graduates provide a higher level of productivity to employers across the Florida economy. In turn, the employers pass some of these productivity gains back to their employees in the form of higher real wages and enhanced benefits. Wages and other economic stimuli will be measured and summed to a statewide economic value in this analysis.

The ever-changing global market place is increasingly driven by the "knowledge industry." Universities are the pivotal link to that industry in Florida and are central to the future emergence of Florida in the global economy. The private sector shares this view of the key university-economy linkage. This perspective was recently crystallized in *Florida Trend* when they stated that every state's future workforce determines its success. Although education has traditionally been viewed as social, not economic force, it has become the cornerstone of business—and if neglected may jeopardize future prosperity.

On the upside the publication noted that the state has a strong advanced education network in its 10 state-run universities and 12 off-campus centers. This indicates that the state has a strong commitment to providing a trained workforce (*Florida Trend*, January 2000).[2]

Figure 1 displays an overview of a number of the economic sectors and private industries for which the SUS supplies skilled workforce employees. To remain viable in Florida, both private- and public-sector economic entities are significantly dependent upon highly trained SUS graduates. Graduates enter careers in engineering, computer and communications, biotech, aerospace, medical, and other high-tech industries as well as into management and teaching. Each of these career paths will contribute significantly to the success of different parts of the Florida economy. SUS training both enhances worker productivity and contributes to Floridians' quality of life.

Figure 1 THE SUS IMPROVES THE SKILLS OF GRADUATES ENTERING THE FLORIDA ECONOMY



Source: Adapted from "The Economic Impact of the California State University on the California Economy," Girling, R., Goldman, G., and Keith, S. February 1993.

The primary benefit the private sector receives from the SUS is enhanced worker productivity. Employers report that college graduates have better communication skills and are better able to use technology. This leads to higher worker productivity, higher firm profit, and in turn, higher salaries for workers. One benefit to the state resulting from these higher salaries is higher tax revenues. Although Florida residents do not pay a state income tax, the state receives higher tax revenues from the increase in consumption and associated tax revenues that result from higher spending as well as a variety of other taxes that are related to its residents' income levels.

In addition, trained university graduates influence Floridians' quality of life through their employment in both the private and the public sectors. They enhance public health, education, safety, environmental protection, productivity and efficiency and consumer protection. In addition, they contribute to the arts and literature, and other vitally important lifestyle issues. Figure 2 shows how graduates of the SUS affect both the government and the private sector.

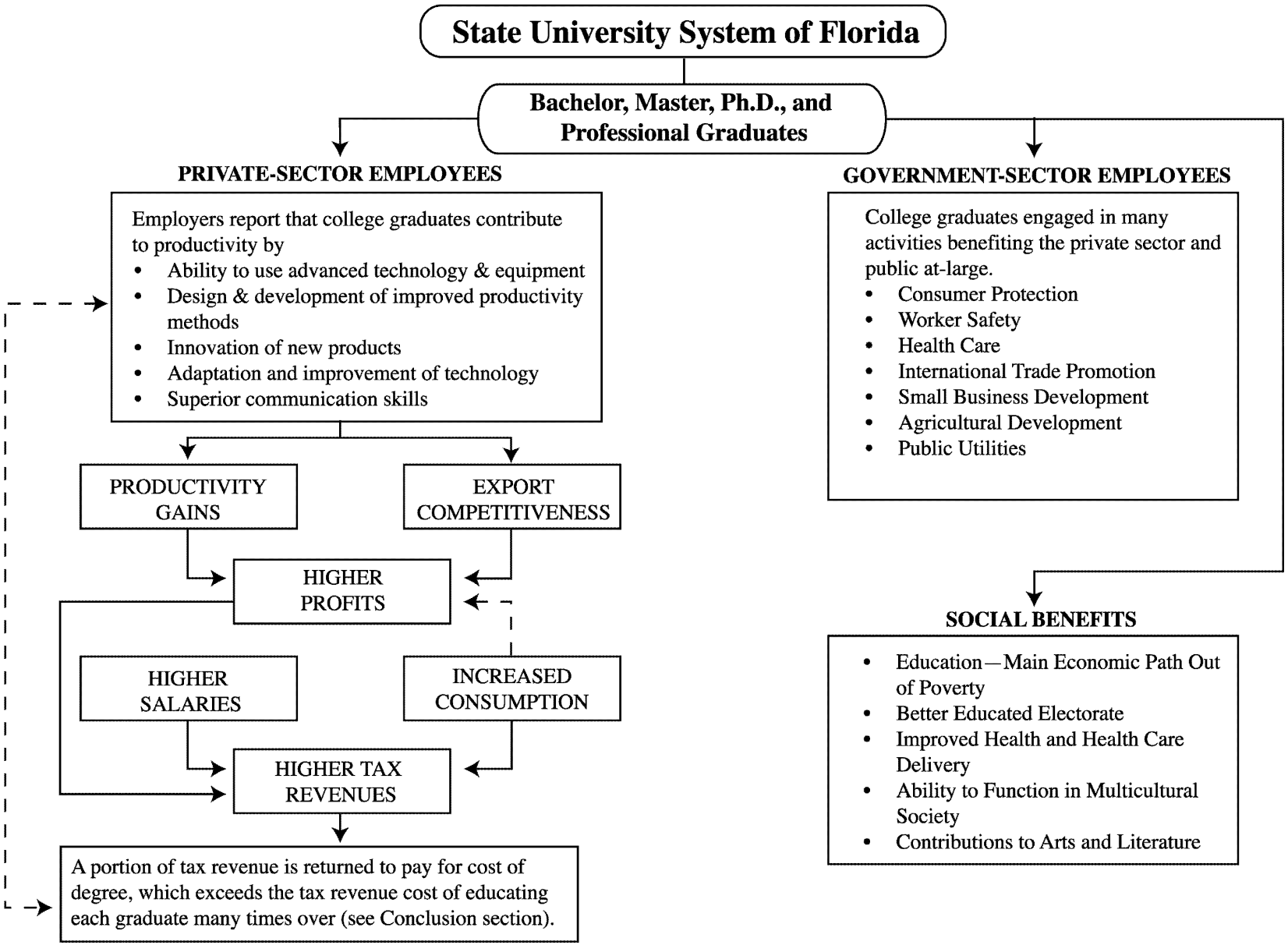
There are also considerable economic effects that result from the mere existence of the universities. A university generates income and spending, such as research grants and awards, net of state General Revenue (GR) and Lottery funds that would not otherwise occur. This research activity, often done in cooperation with the private sector, leads to the development of new technologies and products that generate discoveries and spin off entire new industries, employment, and income.

Also, considerable spending activity results each year from events that are not related to GR and Lottery expenditures. These include athletic and artistic events, sponsored research activity, and conferences. In addition, off-campus spending for food, lodging, and shopping also generates considerable amounts of revenue. Each of these activities directly affects the economy, and they also result in secondary economic effects that generate even greater output, employment, and wage impacts from the existence of the SUS.

Wage and salary increases for all SUS graduates were based on FY 1997–98 estimates provided by the Florida Education and Training Placement Information Program (FETPIP). These initial earnings estimates are available in Table 3 on page 22 of this report. All estimates of secondary economic impacts are derived from IMPLAN,[3] an input-output based computer model developed to complete economic impact analysis. An input-output model is a set of equations describing the relationships that link the output of one industry with all other industries in an economy. In this report, the IMPLAN model characterized the economy into 528 separate industries and included data at the county level that was combined to calculate a state of Florida and SUS total impact.

While vital university-economy and quality-of-life growth relationships are acknowledged, they have not been sufficiently examined nor widely understood. This study will qualitatively examine those linkages and describe the SUS economic impacts generated by them.

Figure 2[4] **EFFECTS OF SUS GRADUATES**



Source: Adapted from "The Economic Impact of the California State University on the California Economy," Girling, R., Goldman, G., and Keith, S., February 1993.

Training the Talent for the New Economy

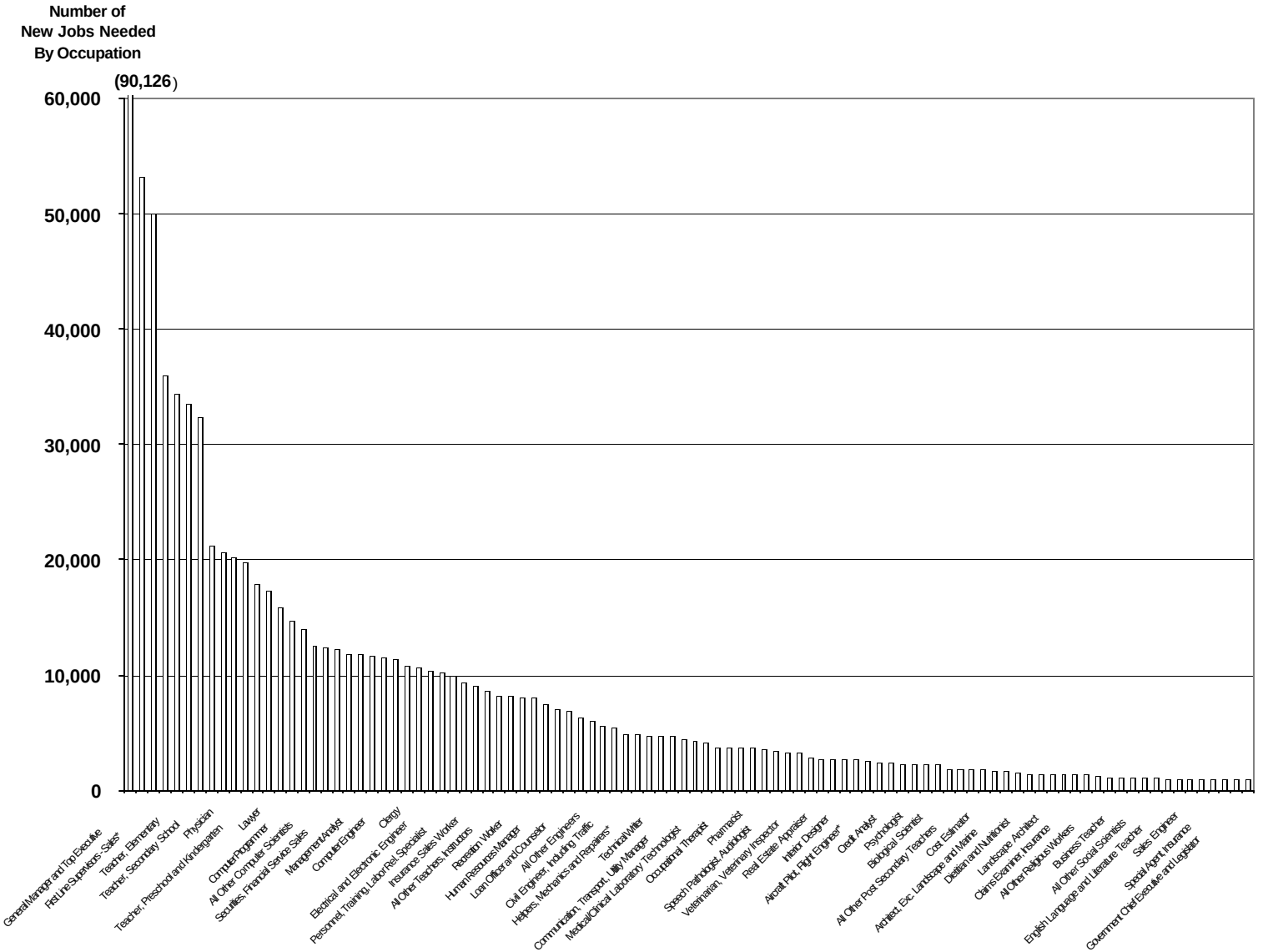
Growth in the Florida economy in the 21st century is highly dependent upon the availability and quality of the college graduates our universities and colleges can produce. Existing shortages in key areas of engineering, health care, physical and social sciences, computer engineering, and other critical fields already hamper existing state economic expansion.

Florida seriously lags behind the nation, the Southeast, and the top 10 growth states in highly trained professionals in a number of key areas.

The state's top business magazine, *Florida Trend*, reported that industry leaders say that a highly trained workforce is the single most important high-tech commodity required for our economy. Florida seriously lags behind the nation, the Southeast, and the top 10 growth states in highly trained professionals in a number of key areas.

Also mentioned was the fact that high-tech industries have noted the lack of a trained workforce when considering a move to Florida. Companies already based in Florida complain of a lack of professional workers.[5] Future constraints could pose serious limits on the economy's growth and the quality of life Floridians hope to enjoy. Figure 3 provides a profile of the 10-year projection by the Florida Department of Labor and Employment Security (FDLES) of job demands in Florida for 49 of the top occupations requiring a B.S. degree or higher over the period 1997—2007.[6]

Figure 3 FORECAST OF GROWTH IN SELECTED OCCUPATIONS IN FLORIDA REQUIRING A BACHELOR'S DEGREE OR HIGHER EDUCATION (1997–2007)

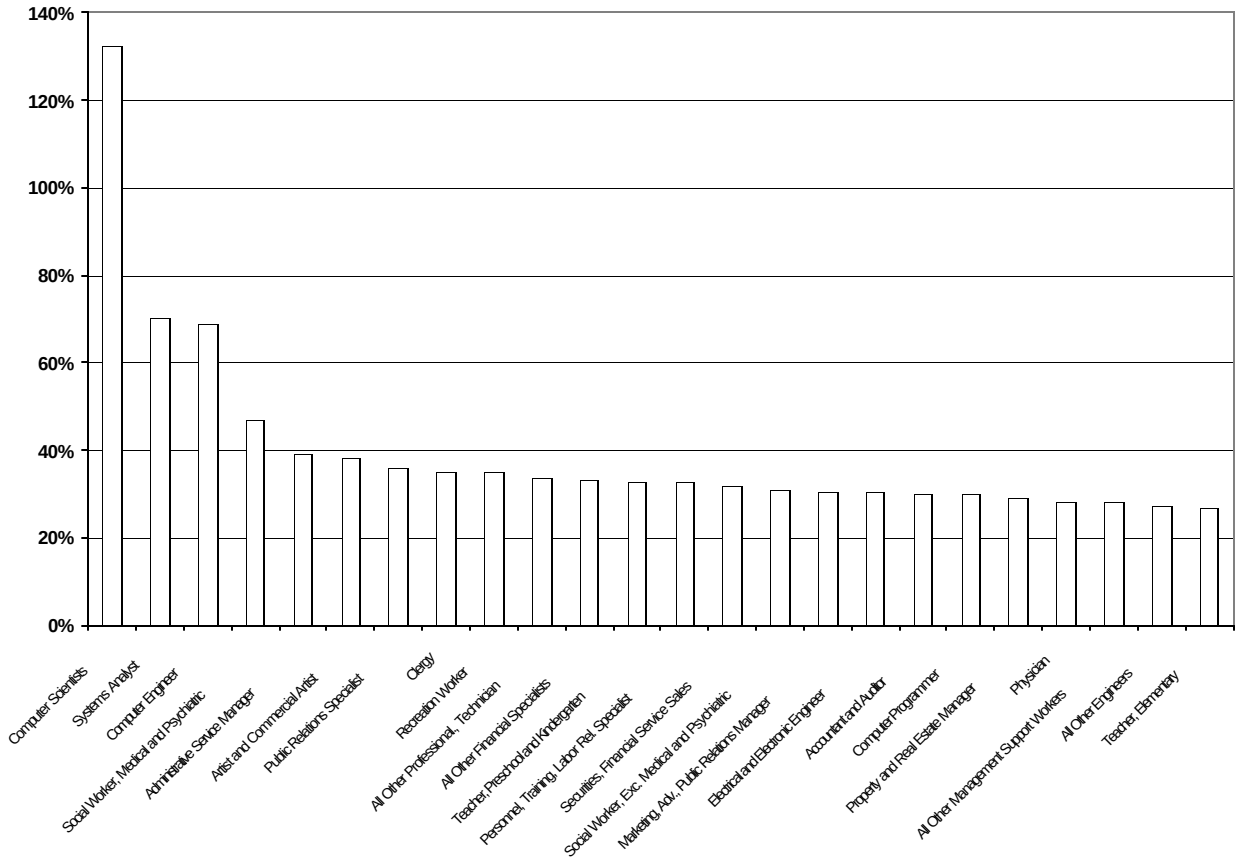


Source: Florida Department of Labor and Employment Security, 1998.

The FDLES analysis indicates that in just the top 170 professions, over 444,329 new college graduates will be required across the Florida economy over a 10-year period. Figure 4 profiles the expected top growth careers identified by the study.[7] It provides a forecast of the percentage increase in demand for the top 24 occupations requiring a college education across the Florida economy. Notice that the top three careers are related to critically needed computer science and engineering fields that will experience demand increases between 60% and 130%. Additional high-tech, management, science, medicine, and other critical high-skill areas will experience demand increases of 25% or greater over this relatively short period.

These figures underscore the considerable degree to which the future strength and vitality of the Florida economy is dependent upon the availability and quality of SUS graduates. The very foundation of Florida's successful expansion into the global knowledge age economy is dependent upon the availability of fully trained computer experts, scientists, engineers, researchers, teachers, and other professionals that the SUS provides each year.

Figure 4 PERCENT CHANGE IN SELECT OCCUPATIONS REQUIRING A BACHELOR'S DEGREE OR HIGHER (1997–2007)

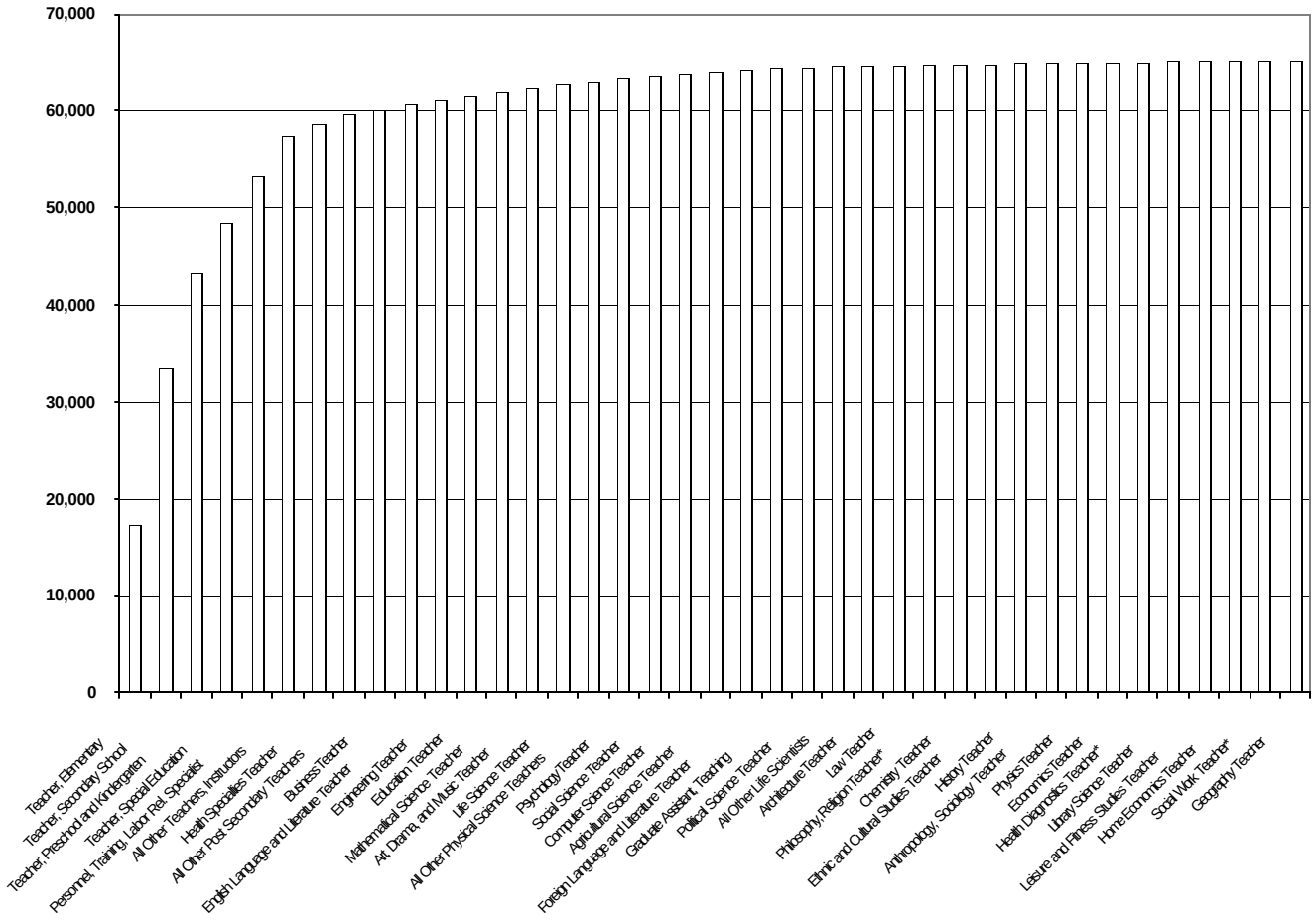


Source: Florida Department of Labor and Employment Security, 1998.

Who will prepare future generations for the Florida economy?

The field of education will continue to demand large numbers of new Florida college graduates—almost 65,000 new teachers will be needed in Florida from 1997–2007. Figure 5 provides a profile of the number demanded in the top 39 teaching careers. The need for teachers will increase even more as the number of students in K–12 continues to expand. Teachers for grades K–12 and special education account for 48,334 new positions while math, science, computer science, engineering, English, and other important areas of study will also continue to grow.

Figure 5 CUMULATIVE NUMBER OF NEW TEACHERS DEMANDED IN FLORIDA, 1997–2007



Source: Florida Department of Labor and Employment Security, 1998.

SUS Degree Production

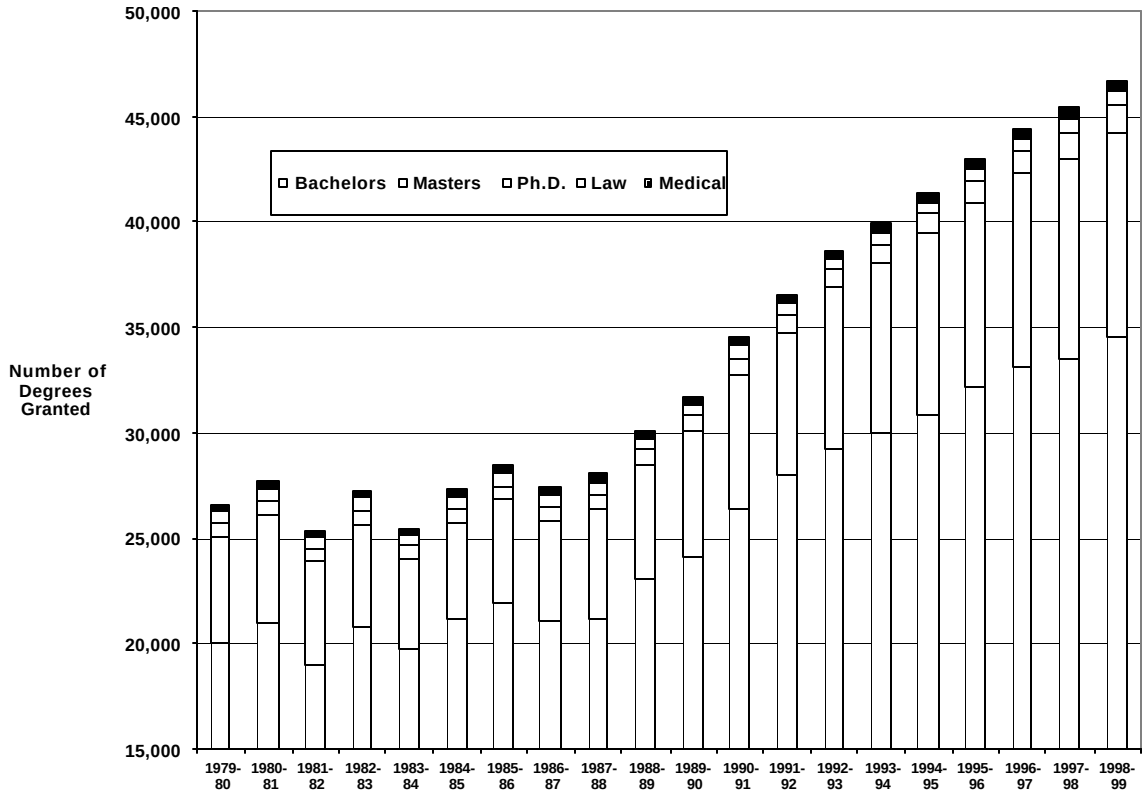
In the 1998–99 academic year, total Florida SUS graduates increased to 46,742 from the 1979–80 level of 26,633. This is a 76% increase over the past two decades, which reflects a 102% increase in M.S. degrees, a 52% increase in Ph.D.s, and a 72% increase in B.S. degrees. Table 1 summarizes these increases over the time period 1979–80 to 1998–99. Over this same period the number of medical degrees granted increased by 62% and law degrees by 13%. Meanwhile, the state's population experienced a 51% increase and grew from 9.7 million to 14.7 million. This means that the increasing demands of a technologically advancing Florida economy required a surge in SUS graduates that is 25 percentage points higher than general population increases. Figure 6 shows the total number of SUS degrees awarded annually by degree type covering this 20-year period. While these numbers are impressive, they still fall far short of the future needs of the state economy.

Table 1 TOTAL FLORIDA SUS DEGREES GRANTED 1979–80 TO 1998–99

Degree	1979–80	1998–99	Percent Increase 1979–99
Bachelors	20,105	34,529	72%
Masters	4,957	10,008	102%
Doctorates	699	1,064	52%
Law	548	617	13%
Medical	324	524	62%
All Degrees	26,633	46,742	76%

Source: Data and information from Florida Board of Regents; forecasts, estimates, and other adjustments calculated by CEFA.

Figure 6 SUS NUMBER OF B.S., M.S., PH.D., LAW, AND MEDICAL DEGREES GRANTED ACROSS FLORIDA FROM 1979–1980 TO 1998–1999



Source: Data and information from Florida Board of Regents; forecasts, estimates, and other adjustments calculated by CEFA.

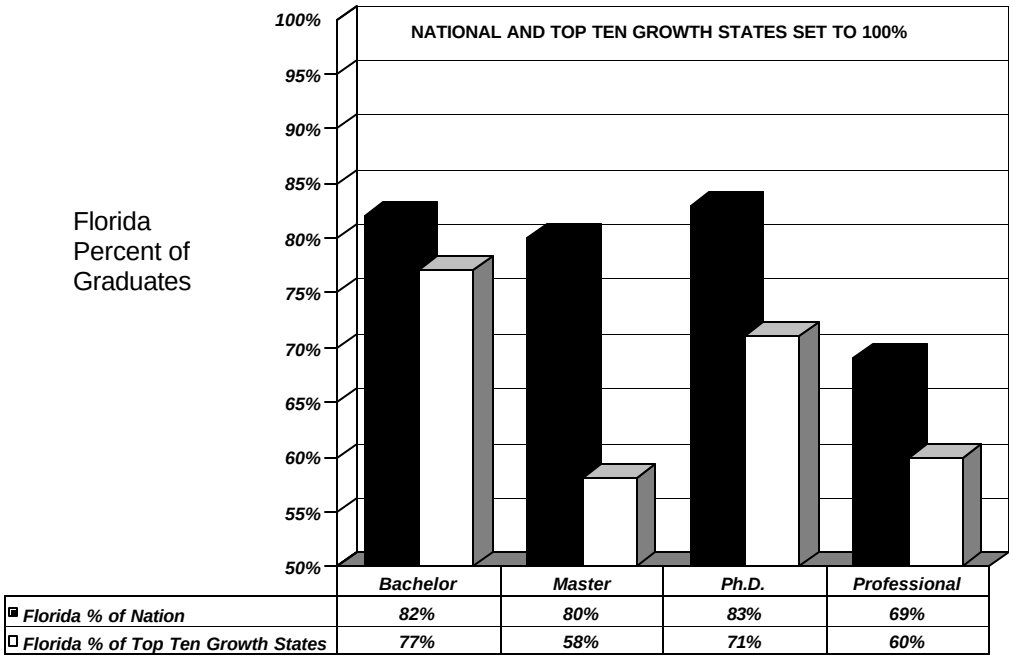
Florida's Production of College Graduates Is Well Under the Average and Future Needs of the U.S. and Top 10 Growth States

Florida produces only a fraction of the national and top 10 growth states' B.S., M.S., Ph.D., and professional degrees.

As Figure 7 shows, Florida graduates only 82% of the national average (per 100,000 population) of B.S. degrees, 80% of the average of M.S. degrees, 83% of the average of Ph.D.s, and 69% of the average of professional degrees.

Florida compares even less favorably to the nation's top 10 growth states. Florida graduates only 77% of those states' B.S., 58% of their M.S., 71% of their Ph.D., and 60% of their professional degrees per 100,000 population. As mentioned earlier, these shortfalls of qualified graduates pose an even more serious concern for the Florida private sector where industry leaders complain bitterly about the state's lack of professional workers.[8]

Figure 7 COMPARISON OF FLORIDA UNIVERSITIES DEGREE PRODUCTION TO NATIONAL AND TOP 10 GROWTH STATE AVERAGE



	Bachelor	Master	Ph.D.	Professional
Florida % of Nation	82%	80%	83%	69%
Florida % of Top Ten Growth States	77%	58%	71%	60%

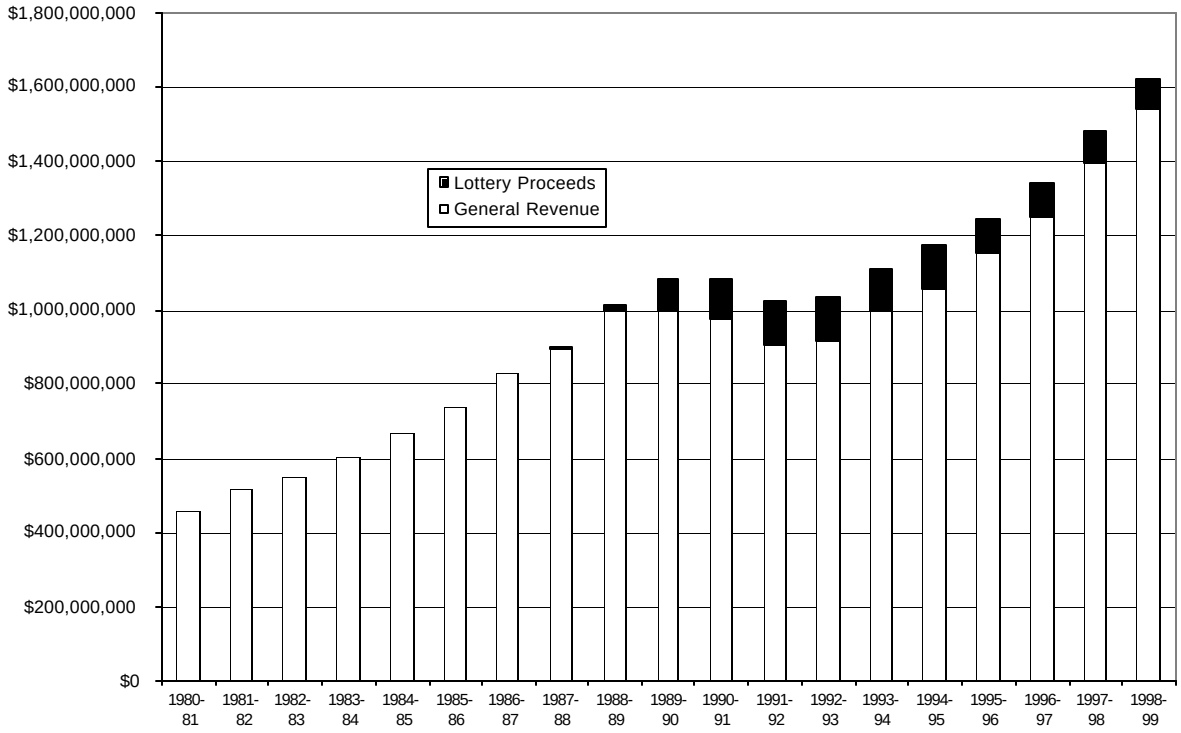
Source: Data and information from Florida Board of Regents; forecasts, estimates, and other adjustments calculated by CEFA.

The State's Investment in the SUS

Each year the Florida legislature appropriates both GR and Florida Lottery funds to the SUS to cover needs not paid for by tuition and other fees and revenues. Figure 8 provides a 19-year profile of the nominal (including inflation) growth in both GR and Lottery proceeds granted to the SUS beginning in the 1980–81 academic year. In nominal terms, the total SUS funding has grown from $458.8 million to $1,620 million over this period. With the exception of a slight

decline over the recessionary 1990–93 years, nominal SUS funding has generally increased. However, in constant spending power per student, these funds have declined since the late 1980s.

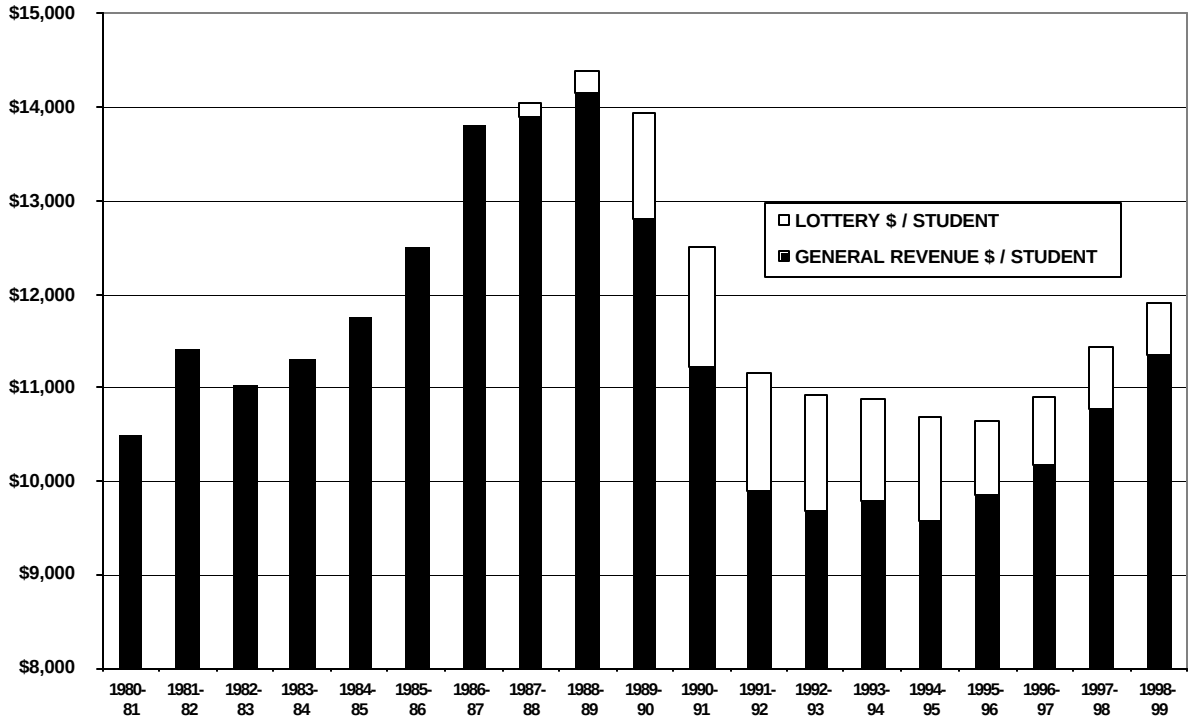
Figure 8 SUS ANNUAL GENERAL REVENUE AND LOTTERY ALLOCATIONS (1980–81 TO 1998–99 IN NOMINAL DOLLARS)



Source: Data and information from Florida Board of Regents; forecasts, estimates, and other adjustments calculated by CEFA.

While the number of students attending SUS institutions since 1980 has increased by 76% from 128,612 to an estimated 226,000 during the 1999–2000 academic year, *average funding per full-time equivalent (FTE) student has declined*. Figure 9 provides a profile of the *real* spending value (adjusted for inflation) of combined GR and Lottery SUS revenues over the past two decades divided between those sources of funding. Funding per FTE student has declined since the $14,377 peak level experienced in FY 1988–89. Part of the decline is attributable to the 1990–93 recessionary period. Since that time, real per FTE student spending has grown three out of the last four budget cycles to end FY 1998–99 at the $11,914 per FTE student level with per FTE student spending levels almost $2,500 below the 1988–89 peak.[9]

Figure 9 FLORIDA SUS AVERAGE STUDENT GENERAL REVENUE AND LOTTERY DOLLAR ALLOCATION (CONSTANT 1999 DOLLARS)



Source: Data and information from Florida Board of Regents; forecasts, estimates, and other adjustments calculated by CEFA.

For purposes of this analysis, the GR and Lottery proceeds provided to the SUS from the most recent academic year, FY 1998–99, will be used as the cost basis for the development of the SUS economic impact profile. The profile will include generation of an SUS Benefit/Cost (B/C) ratio analysis, system return on investment (ROI), net present value (NPV) and other financial and economic impact analyses. Definitions of these terms are available in the Definitions Appendix of this study.

The Value of the State Universities to the Florida Economy

The evaluation of SUS economic impacts can be divided between the increases in productivity and earnings associated with SUS graduates remaining in Florida and other economic activities generated by universities such as grants, patents, and university-related functions. To properly evaluate the economic gains from SUS graduates on the Florida economy only, researchers relied on the Florida Education and Training Placement Information Program (FETPIP)[10] employment data. As described earlier, the earnings and productivity of college graduates is well documented in the labor economics literature.[11] SUS sources were used to evaluate other university-specific economic stimuli such as the impact of faculty research grants

and awards and other university-specific spending that would not have occurred if the SUS did not exist. We will explore

- The Economic Value of the SUS Faculty Secured Grants and Awards
- Student Expenditures—Non-GR or Lottery Economic Stimulation Attributable to the SUS Members
- Higher Productivity and Annual Earnings for SUS Graduates

• The Economic Value of the SUS Faculty Secured Grants and Awards

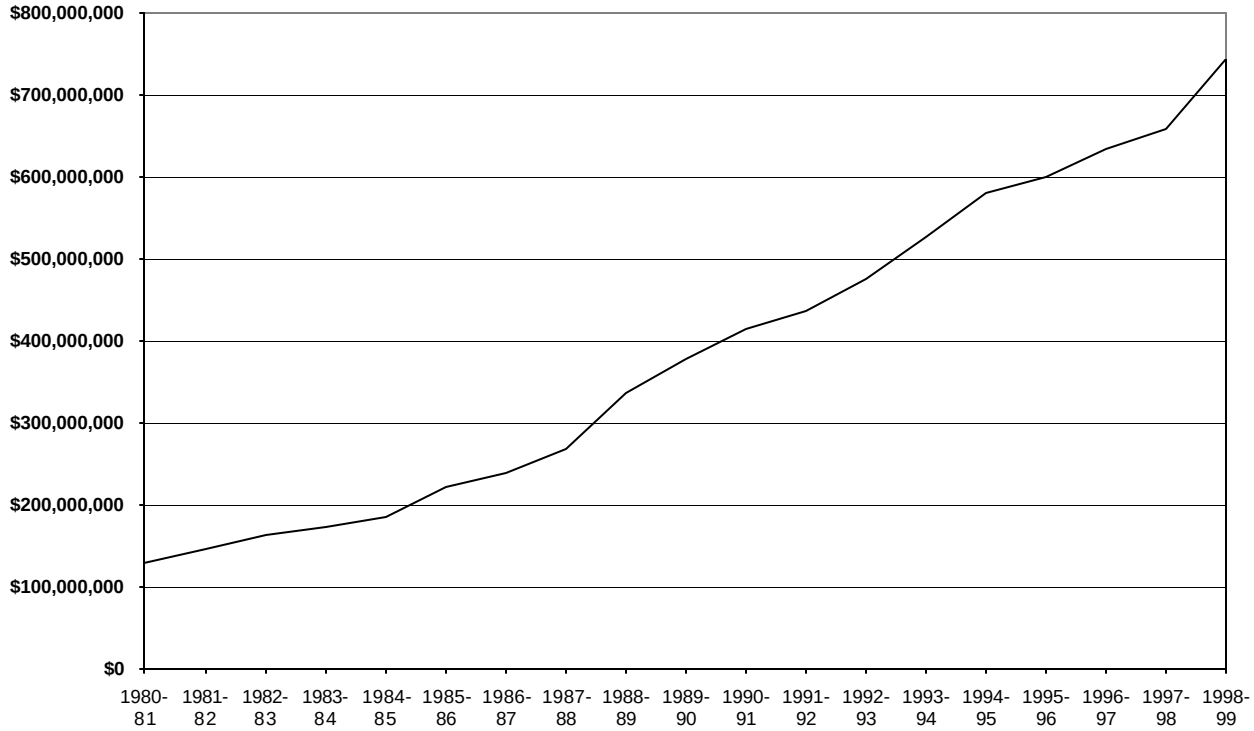
Every year SUS faculty members secure larger grants and awards. Each university's grants generate additional jobs and wages and enhance productivity across the Florida economy. Over the past 20 years, these grants have increased by almost 600% to a record $743 million in the 1998–99 school year. Figure 10 provides a profile of these grant awards over the 1980 to 1999 time frame.

As reported in the Florida *Strategic Partnership between Education and Business,* the business community recognizes the importance of this vital university/private-sector linkage. They state that the numerous partnerships between Florida industry and Florida education mirror the long-term vision of Florida's educational system. University-sponsored research works closely with industry to create new technology and bring in over $743 million a year in grants and awards.[12]

A number of these research grants have generated important findings that enhance the quality of private and public life in Florida. Among others, these include discoveries that provide important technological advances, gains in economic productivity, and life-saving breakthroughs in medicine. SUS researchers also contribute to improvements in the quality of the environment, public policy decision making, and the performing and visual arts world; all of which generally enhance the quality of life for every Floridian.

The $743 million received in grants and awards across the SUS in the most recently completed academic year, 1998–99, will serve as the basis for the fiscal analysis completed later in this report.

Figure 10 GROWTH IN THE FLORIDA SUS FACULTY-GENERATED CONTRACTS AND GRANTS



Source: Data and information from Florida Board of Regents; forecasts, estimates, and other adjustments calculated by CEFA.

- **Student Expenditures—Non-GR or Lottery Economic Stimulation Attributable to the SUS Members**

As described earlier, additional direct non-GR or Lottery supported economic activity occurs on or near each SUS member campus. These activities include athletic contests, artistic events, conferences, and other campus events. Tuition, books and supplies, food and lodging, and other related spending also generate considerable direct economic stimulus to the state. As with the other categories of spending, these also generate secondary indirect and induced economic spin-off impacts. Both will be measured in this analysis.

Table 2 provides an overview of the categories and levels of spending for the average student attending each of the SUS member university estimated for FY 1998–99. These data combined with the number of students attending each SUS university are used in the analysis in this report to estimate SUS total student levels of spending for FY 1998–99.[13]

Table 2 STATE UNIVERSITY SYSTEM ESTIMATED STUDENT EXPENDITURES, 1997–98*

		SUS Average
Tuition & Fees	Tuition—In State	$2,016
	Tuition—Out of State	$7,933
	Books & Supplies	$713
On Campus	On Campus—Room & Board	$4,602
	On Campus—Other Expenses	$2,537
Off Campus	Off Campus—Room & Board	$5,520
	Off Campus—Other Expenses	$2,817
With Family	With Family—Other Expenses	$3,071

Source: IPEDS Student Finance Survey, 1999–2000. Prepared by Office of Planning, Budgeting, and Policy Analysis.

- **Higher Productivity and Annual Earnings for SUS Graduates**

The single largest contribution the SUS provides to the Florida economy is the increased productivity and enhanced value of the educational and skill level of graduating students. The technological revolution that has overtaken our global economy demands a highly skilled workforce. Our future high-tech economy will require highly trained engineers to design, computer scientists to program, educators to teach, artists to inspire and entertain, and other experts to power the post-information age.

Each year, the SUS provides research and educational advancements in every critical field. In addition, the SUS provides well-trained graduates to the workforce. As described earlier, the future demand for these graduates is increasing across the Florida economy, as is the gap between need and supply. The number and quality of these highly trained SUS graduates fulfill much of Florida's skilled workforce requirements but will not match the entire need. Shortages of trained expertise will slow the advancement of the Florida economy, reduce its value, and hamper the state's advances into global markets.

How are the productivity and value of these graduates entering the Florida economy measured? The single clearest measure of the health of the Florida economy is the size of the gross state product (GSP). The GSP is the sum of value of all goods and services, including the wages provided to workers produced within the state in a single year.

This study will first measure the contribution these SUS graduates make to Florida's GSP. The second most accurate measure of the value of the state's workforce is the sum of all wages provided to Florida employees in a given year. The best measure of the value of the highly skilled workforce emerging from the SUS is to sum the net present value of the wages paid to this workforce.[14]

FETPIP[15] provides a number of important data sources for former SUS graduates working in Florida for this analysis. These include

- The number and average annual income of individuals completing B.S., M.S., and Ph.D. degrees by separate SUS member institutions.[16]
- A profile of annual income for average SUS graduates by level of degree granted (B.S., M.S., and Ph.D.) for the first quarter after graduation[17] and then for five years after graduation.[18]
- The average Florida worker's income based on minimum wage, the poverty threshold, and education level including B.S., M.S., and Ph.D., medical, dental, all other specialty degrees, high school graduates, and various levels of vocational education.

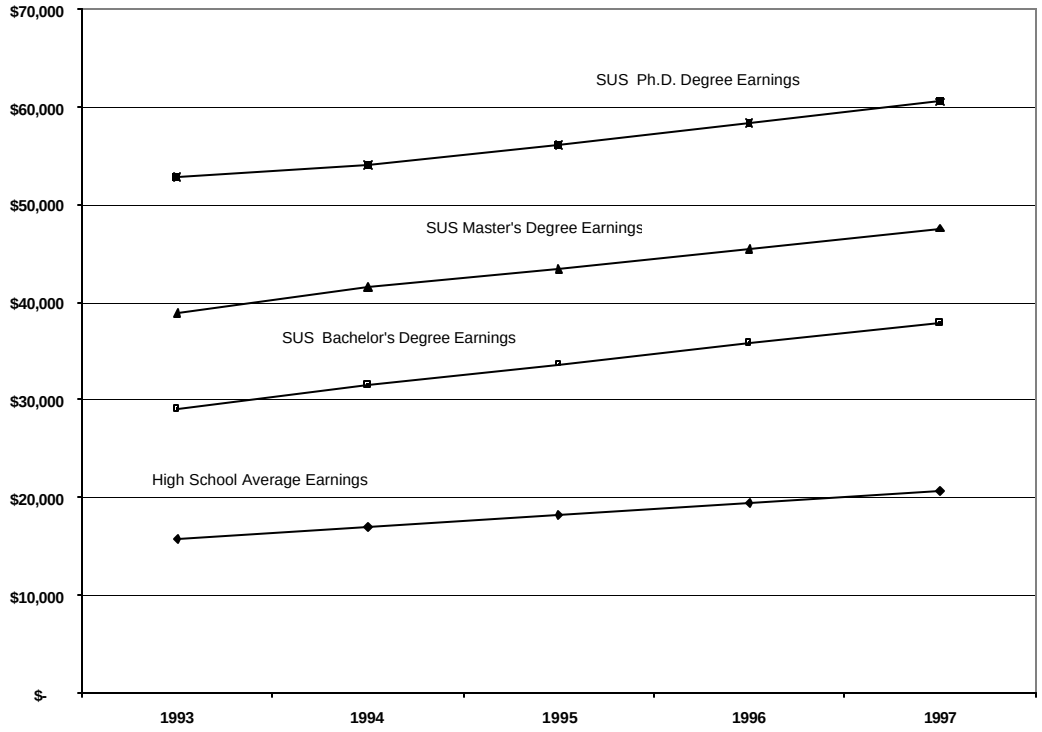
The first step in the analysis is to estimate the average five-year annual increase in Florida workers' income whose highest level of educational attainment is a high school degree. The second step is to estimate the average annual income for those Florida workers with an SUS graduate degree for each of the five years after graduation with either a B.S., M.S., Ph.D., or a specialty degree.

After the average SUS annual growth rate is calculated, those annual percentage increases are applied to the income of every graduate of each SUS member by degree level over the surveyed five-year period. These levels can then be summed into an annual average SUS system-wide rate over the first five years of employment. (See Figure 11). Income gains of SUS graduates are only estimated for those individuals who remain in the Florida economy to work. Those who work outside the state are not included since their productivity does not enhance Florida productivity.[19]

According to this evaluation, state employment records indicate that the average SUS B.S. degree recipient one year out of college received $13,342 more than a Florida high school graduate during FY 1999. Meanwhile, a first-year M.S. or Ph.D. recipient received a $23,222 and $37,067, respectively, higher annual wages than a high school graduate one year out of school.

Figure 11 profiles the 1999 constant dollar differences (adjusted for inflation) between the average high school graduate and the average SUS B.S., M.S., and Ph.D. recipients over the first five years of employment. The differences increase at independent levels based on actual salaries paid in Florida during the last quarter of 1997. Lifetime earnings[20] thereafter are calculated for all individuals based on the real growth in average labor earnings applied against each university's unique earnings through the end of an average worker's life expectancy. These surveyed state of Florida average wage differences adjusted to the 1998–99 SUS graduating class will provide the basis for all future SUS graduate wages benefits used in this report.

Figure 11 AVERAGE SALARY FOR FLORIDA HIGH SCHOOL AND SUS BACHELOR'S, MASTER'S, AND PH.D. GRADUATES, 1993–1997



Source: FETPIP, 1999.

Table 3, entitled "Average SUS Member Graduate Earnings and Employment Level—Years 1–5 after Graduation," provides a profile of the number, percentage, and earnings of SUS graduates still working in Florida after graduation based on attainment of B.S., M.S., and Ph.D. degrees, respectively. This table compares the number of graduates reported by university and degree by the SUS to the employment records of individuals reported working in Florida during 1999. While the actual 1999 profiles and employment rates are for SUS graduates from years 1991 through 1997, the rates of employment are assumed to be constant for recent 1999 graduates. Wage levels for each university-degree level are adjusted to 1999 values using the Consumer Price Index. The SUS provides FETPIP with a listing of recent graduates each year, which is used to generate earnings and salary increases by different SUS degree types for each university member. These records also provide their industry of employment and full- or part-time employment levels.[21] Only full time employed graduates were used in this analysis.

The 1997–98 data from FETPIP regarding the number of 1991–1995 SUS graduates who remained employed in the state of Florida postgraduation was analyzed and used in order to estimate the number of 1999 SUS graduates who would be employed in the state post-graduation. We forecasted that on average, 64% or 21,989 of 34,315 1999 SUS B.S. degree recipients were employed in the Florida economy in the last quarter of 1999. Of those, 18,237, or 54% of the total, were fully employed during that quarter. Similarly, on average 64% or 6,183 of the 8,838 1999 SUS M.S. degree recipients were employed in the Florida economy in the last

quarter of 1999 with 5,750, or 31.67%, employed full time. Finally, on average, 34.7% or 357 of the 1,034 1999 SUS Ph.D. degree recipients were employed in the Florida economy in the last quarter of 1999 and 327, or 29%, were employed full time. This comprehensive profile of SUS graduates provides the foundation for the analysis completed in this report.[22]

Table 3 AVERAGE SUS MEMBER GRADUATE EARNINGS AND EMPLOYMENT LEVEL—YEARS 1–5 AFTER GRADUATION

B.S. DEGREES

University Degree Reported	Any Employment	% Any Employment	Number of University Degrees Full-Time Employees in Florida	% of With Full-Time Employment	% Full QTR of ALL Employed	Annual Salary Through Year 5				
						Year 1	Year 2	Year 3	Year 4	Year 5
34,315	21,989	64%	18,237	54.3%	83%	$ 29,022	$ 31,510	$ 33,644	$ 35,769	$ 37,893

M.S. DEGREES

University Degree Reported	Any Employment	% Any Employment	Number of University Degrees Full-Time Employees in Florida	% of With Full-Time Employment	% Full QTR of ALL Employed	Annual Salary Through Year 5				
						Year 1	Year 2	Year 3	Year 4	Year 5
8,838	6,183	64%	5,750	59.9%	93%	$ 38,895	$ 41,525	$ 43,404	$ 45,487	$ 47,570

PH.D. DEGREES

University Degree Reported	Any Employment	% Any Employment	Number of University Degrees Full-Time Employees in Florida	% of With Full-Time Employment	% Full QTR of ALL Employed	Annual Salary Through Year 5				
						Year 1	Year 2	Year 3	Year 4	Year 5
1,034	359	34.7%	327	31.6%	94%	$ 52,731	$ 54,032	$ 56,035	$ 58,250	$ 60,466

Source: 1996–97 Bachelors, Masters, and Professional Degree Outcomes (FETPIP).

Economic Impacts by Category

Total direct spending for all categories for SUS campuses is provided in Table 4. The net present value of estimated disposable income is calculated as 80% of total projected FY 1998–99 SUS graduate earnings. The IMPLAN technical staff guidance indicates that use of total projected earnings would overstate the value of the impact since approximately 20% of earnings is consumed directly by taxes, FICA, and other fees that preclude them from being used as disposable income by consumers.

Table 4 SUS TOTAL DIRECT EXPENDITURE

Spending Categories and IMPLAN Variables	SUS Statewide Total Economic Stimulus
Contracts & Grants	$ 735,393,916
Misc. University Spending	$ 481,443,590
Tuition & Fees	$ 738,641,832
Books & Supplies	$ 168,944,617
Room & Board	$ 1,290,988,798
Other Expenses	$ 267,997,897
NPV of Disposable Income (80% of Income)**	$ 8,745,186,807
Total SUS-Related Direct State Economic Activity	$12,428,597,457

**IMPLAN Model specification direct researchers to use 80% of total wages and salaries (deductions for taxes and other nonconsumable expenses) as to generate disposable earnings for model use.

Source: IMPLAN Staff Guidance, December 1998.

The Return on Each Tax Dollar Invested in the SUS

SUS Income Economic Impacts Only

Table 5 provides the final analysis of the net present value of estimated direct lifetime earnings for FY 1998–99 graduates of the SUS compared to the annual SUS costs. The SUS graduates surveyed in this analysis were drawn from all corners of Florida. Table 5, therefore, evaluates the system's statewide direct earnings net present value (NPV) impact only and combines this with costs to generate the income only B/C ratio and return on investment (ROI) calculations.

This final analysis indicates that the Florida SUS pays back to the Florida economy $9.72 for every dollar invested in it during FY 1998-99. By any measure, these SUS returns provide very robust returns.

Table 5 INCOME VALUE ADDED BY SUS TO FLORIDA ONLY

Net Present Value of 1998–99 SUS Lifetime Florida Earnings Impacts	SUS 1998–99 Revenue and Lottery Expenditure (Costs)	Benefit/ Cost Ratio	ROI
$ 10,931,483,509	$1,528,419,799	7.2	21%

Statewide GR and Lottery proceeds allocated to operate the SUS for FY 1998–99 are also identified and are designated as state of Florida "costs" of SUS operation. These categories of costs compared to all categories of estimated discounted benefits allow researchers to evaluate the B/C, ROI, and net present value of the state's SUS investment. The B/C ratio is found by dividing the SUS 1998–99 GR and Lottery revenue "costs" of operating the SUS into the NPV of the sum of the lifetime future earnings of the system's 1998–99 graduates.

Table 6 FY 1997–98 GRADUATES

BACHELOR, MASTER, AND PH.D. DEGREES				SPECIALTY DEGREES				ALL DEGREES	ALL DEGREES
University Degree Reported	Any Employment	Full-Time Employees in Florida	Percent of Total B.S.-M.S.-Ph.D. Degrees Staying in Florida	Degrees Granted	Any Employment in Florida	Full-Time Specialty Degrees Staying in Florida	Percent of Total Specialty Degrees Staying in Florida	Percent Staying in Florida	Total Graduates B.S., M.S., Ph.D., & Specialties
43,153	28,172	23,987	56%	1,346	772	720		56%	44,499

Source: Florida Board of Regents and FETPIP.

SUS Combined Direct and Secondary Economic Impacts by Category

When the direct and secondary economic impacts of the NPV of higher lifetime earnings and other direct university-based economic activity (reported in Table 7) are evaluated, a similar but somewhat different set of conclusions emerge. Direct economic activities generated by the SUS stimulate secondary (indirect and induced) economic effects on many other industrial sectors of the Florida economy. For example, every direct dollar expenditure from either SUS-based research, student or faculty expenditures, or postgraduate higher disposable income generates additional demands in the economy for more goods and services.[23] This results in secondary cycles of employment, earnings, and output where the spending exists. These additional indirect or secondary cycles of economic activity are referred to respectively as indirect and induced economic stimulation. These secondary economic impacts are measured through a powerful economic input-output model named IMPLAN. [24]

Direct Economic Effects. These effects are the changes in local business activity occurring as a direct consequence of public or private business decisions, or public policies and programs. These occur as a result of investment and spending decisions because these decisions directly affect the flow of spending, income, and jobs associated with economic activities.

Indirect and Induced Effects. There are also broader indirect and induced economic effects (they may be positive or negative) that follow from the direct effects. These additional effects include ***(1) indirect impacts*** ¾ business growth/decline for suppliers to the businesses directly affected by SUS-related activities and ***(2) induced impacts*** ¾ further shifts in spending on food, clothing, shelter, and other consumer goods and services, as a consequence of the change in workers and payroll of directly and indirectly affected businesses. This leads to further business growth/decline throughout the local economy.

Table 7 compares total direct, indirect, and induced economic impacts associated with all SUS economic activities, described earlier in Table 4, compared to the ***opportunity cost of alternative investments*** the GR and Lottery funds would have yielded to the Florida economy if they had been expended for other state of Florida needs.[25]

Table 7 SUS Net Present Value, Return on Investment, and Benefit/Cost Ratio Compared to Alternative Investments

Discounted Net Present Value of Economic Output	1998–99 GR & Alternatively Invested	Benefit/Cost Ratio	ROI
$ 19,088,784,707	$ 1,962,941,370	9.72	34%

Overall, the SUS 1998–99 academic year activities generated $19.09 billion in direct and indirect economic activities across Florida. These impacts, compared to the $1.96 billion alternative impact the SUS-combined $1.5 billion GR and Lottery funds would have generated elsewhere, yield a final SUS B/C ratio of 9.72 that year. Finally, given these costs, the SUS activities generate a ROI of 34% for FY 1998–99.

SUS–Generated Direct and Secondary Economic Impact in Employment and Income Increases

The SUS is an engine of economic development in Florida. The generation of grants and other university-specific economic activity and the higher spending of a better-educated workforce spurs a tremendous surge in both direct and indirect employment and wages. This section evaluates the direct and indirect levels of employment and wages generated by the existence of the SUS across Florida as a single entity. Higher levels of employment and wages across all of Florida are also a direct and indirect result of the existence of the SUS. Like the earlier discussion of total economic impacts, overall the SUS 1998–99 graduate lifetime earnings and academic year activities generated $10.7 billion in direct and indirect income across Florida with resulting 283,546 jobs, or 6,594 jobs on average annually over the 43 years examined. These jobs are created by the direct and indirect cycle of spending and investment stemming from SUS faculty, students, and the higher productivity and earnings of former 1998–99 students now employed across the Florida economy (see Table 8).

Overall the SUS 1998-99 academic year activities generated $10.7 billion in direct and indirect income across Florida with resulting 283,546 jobs (or 6,594 jobs on average annually over the 43 years examined).

Table 8 SUMMARY OF FINAL STATEWIDE 1998–99 SUS INCOME AND EMPLOYMENT IMPACTS

1998–99 SUS Income Impacts	1998–99 SUS Employment Impacts
$10,748,748,144	283,545.6

CONCLUSION

Florida Is Creating Its Future

Over the next two decades, the SUS will principally be responsible for providing the Florida economy with technologically advanced college graduates who will carry Florida into the new century. The SUS 10-university consortium is one of Florida's pivotal engines of economic productivity, innovation, and cutting edge technologies. The SUS serves private and public sectors of the economy in every region of the state as the primary innovative partner providing highly skilled workforce and cutting edge research and scientific advances.

Training the Talent for the New Economy

The state's top business magazine, *Florida Trend*, reported that industry leaders say that a highly trained workforce is the single most important high-tech commodity required for our economy. Florida seriously lags behind the nation, the Southeast, and the top 10 growth states in highly trained professionals in a number of key areas.

Also mentioned was the fact that high-tech industries have noted the lack of a trained workforce when considering a move to Florida. Companies already based in Florida complain of a lack of professional workers. Additionally, *Florida Trend* recognized the state's commitment to providing a trained workforce by noting that there is a strong statewide advanced education network of 10 state-run universities with 12 off-campus centers.

However, although the state has invested in the development of a skilled workforce and the SUS is graduating an increasing number of students, the employment needs of the economy remain unfulfilled. The Florida Department of Labor and Employment Security has forecasted that between 1997–2007 the demand for college graduates in the top 170 professions in Florida will be more than 444,329. This includes increases of

- 132% in computer scientists
- 70% in systems analysts
- 70% in computer engineers
- 25%+ in a cadre of other professionally trained managers, educators, and professionals who will be required for the state to compete in the rapidly emerging global economy.

During the 1998–99 academic year, the SUS awarded 34,529 bachelor, 10,008 master, 1,064 doctorate, 617 law, and 524 medical degrees. These graduates represent a 76% increase over the 1979–80 academic year.

Since a number of SUS graduates migrate to out-of-state career opportunities, the current rate of SUS graduation will not create enough well trained graduates to satisfy Florida's future need. The lag between need and supply is growing while support funding for the university system continues to decline.

The State's Investment in the SUS

During the 1998–99 academic year, the SUS received $1.5 billion in GR and Florida Lottery proceeds to operate and maintain the expanding 10-member university system across the state. While enrollment continues to increase at every SUS institution, inflation has caused the real spending value of state of Florida revenues provided to the SUS annually to be $351 million lower over the past decade with resulting revenue shortfalls of $3.5 billion over that period. Despite this, the SUS continues to make a substantial contribution to the Florida economy, although far less than the potential impact if sufficient funding were restored.

The Value of the State Universities to the Florida Economy

The 1998–99 direct stimulus from SUS graduates' lifetime wages and salaries to the Florida economy is over $6.6 billion. These lifetime earnings and the 1998–99 direct and secondary SUS economic stimulus to the Florida economy is $19.1 billion, including generation of a $10.7 billion increase in wages and creation of 283,546 Florida jobs across the state over the 43 year working lifetime of the graduates (or 6,954 jobs annually on average over the 43 years examined).

The Return on Each Tax Dollar Invested in the SUS

The benefit/cost ratio for this year indicates that for every GR and Lottery dollar provided to support the SUS, $9.72 of economic value is returned to the Florida economy. The annual SUS rate of return for this public investment is 34%. An average tax cost paid to educate a Floridian to complete a B.S. degree is $18,458 while the average B.S. graduate will generate an additional $44,814 in state tax over a lifetime. This results in an average tax revenue B/C ratio of $2.43 for the average SUS Floridian. Recipients of M.S. and Ph.D. degrees, respectively, will generate $65,814 and $101,179 in higher state taxes over their lifetime with cost to taxpayers of $13,105 and $29,487, respectively, to educate them in SUS institutions. The resulting tax revenue B/C ratio for the M.S. and Ph.D. graduate then is 5.02 and 3.43, respectively.

Summary

The SUS has generated a substantial 34% annual return on the $1.5 billion 1998–99 GR and Lottery investment provided to support its operation. This translates into a return to the Florida economy from the SUS of $9.72 for every dollar invested during that year.

The lifetime earnings of the 1998–99 SUS graduating class combined with the SUS-related activities from that single year would generate almost 285,000 jobs for Floridians over the working lifetime of that graduating class. Further, the SUS contributes a considerable amount to the quality of life that Floridians enjoy. SUS researchers generate enhancements in medicine and environmental quality, public service, and performing arts achievements that better the lives of citizens across the state.

Despite this substantial infusion of SUS-generated economic stimulation to the Florida economy, the private sector recognizes that insufficient numbers of college-trained graduates are being

produced by the SUS to service the future needs of the Florida economy. Florida graduates 18% fewer B.S. degrees (per 100,000 persons) than the nation and 23% fewer than the top 10 growth states in the United States. These shortfalls in the number of trained graduates may prevent high-tech industry from settling in Florida and drive others out of the state, thus depriving the state and its citizens of important economic advances. Florida could lose its competitive edge.

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LITERATURE REVIEW

Averch, Harvey A. "Economic Approaches to the Evaluation of Research." ***Evaluation Review,*** **Vol. 18, No. 1, February 1994.**

- This article reviews the principal methods economists and cost benefit analysts use in evaluating research. Two common approaches are surplus measures (combinations of consumer and producer surpluses) and productivity measures. Technical difficulties and political and organizational constraints are discussed for these measures. This paper has two purposes: (1) to review the assumptions and style of the two approaches (production function method and the consumers' surplus approach) and to note some of the major analytical and statistical difficulties in applying them and (2) to define their relevance for research evaluators, a basic economic approach to evaluating the impact of research.

Bleaney, Michael F., Martin R. Binks, David Greenway, Geoffrey V. Reed, and David K. Whynes. "What Does a University Add to Its Local Economy?" ***Applied Economic,*** **Vol. 24, 1992.**

- Various methods of computing income multipliers. Data from the University of Nottingham, England.

Booth, G. Geoffrey, and Jeffrey E. Jarrett. "The Identification and Estimation of a University's Economic Impact." ***Journal of Higher Education,*** **Vol. XLVII, No. 5 (September/October), 1976.**

- A group of economic models are developed to estimate the economic impacts of a university on business firms, state and municipal governments, and individuals. The results indicate that the University of Rhode Island is associated with both negative and positive economic impacts. This is an extension of the John Caffrey and Herbert Isaacs models by considering more variables and improving the estimation process for business, government, and individual sectors.

Brown, Kenneth H., and Michael T. Heaney. "A Note on Measuring the Economic Impact of Institutions of Higher Education."

- Examines a new approach to university economic impact research that views institutional expenditures as a means to increase the state's skill base, and finds that while the approach yields favorable results for higher education it fails to consider fully the effects of migration. Advice is to avoid the skill-based approach and utilize the traditional economic-based approach.

Caffrey, John, and Herbert H. Isaacs. "Estimating the Impact of a College or University on the Local Economy." U.S. Department of Education.

- Models to assess the impact of a college on the local economy are examined. A primary objective was to derive equations for which data could be obtained from normal records kept by colleges, local governments, and businesses. The models, which are designed to be used by college presidents and their staffs, are linear cash-flow formulas, including only quantitative data. A few qualitative issues are discussed, but no specific methods are suggested for handling them. The models cover economic impacts on local business, government, and individuals. In addition to tracing the rationale of the economic impact models, procedures for making the calculations are suggested. Data on student rental and housing expenditures by geographic regions and cities are included, along with data on faculty and staff expenditures.

Elliot, Donald S., Stanford L. Levin, and John B. Meisel. "Measuring the Economic Impact of Institutions of Higher Education." *Research in Higher Education*, Vol. 28, No. 1.

- Identifies and discusses several of the methodological considerations that arise in the design and use of economic impact studies, as well as presents new evidence regarding the effectiveness of alternative survey methods for collecting the personal expenditure data frequently used in such studies. Points out increasing pressures to integrate studies of short-term economic impacts with analysis of long-term regional economic development.

Goldstein, Harvey A. "Estimating the Regional Economic Impact of Universities: An Application of Input-Output Analysis." *Planning for Higher Education*, Vol. 18, No. 1, 1989–90.

- Review of input-output analysis, which estimates particular types of economic impacts generated by higher education institutions. Computation of multipliers, a case example, and limitations of model are discussed. Indirect and direct effects discussed. Good breakdown (graphic) of output multiplier and earnings multiplier.

Smith, Tim R., Mark Drabenstott, and Lynn Gibson. "The Role of Universities in Economic Development." *Federal Reserve Bank of Kansas City Economic Review*, November 1987.

- Universities in the Tenth District are taking steps toward economic development initiatives, but a bank-conducted survey of major state-supported universities in the seven states of the Tenth Federal Reserve District shows that these initiatives stand a better chance of succeeding with closer cooperation between universities and state governments.

DEFINITIONS APPENDIX

Benefit/Cost and Cost Effectiveness and Policy Analysis Definitions

Financial Definitions

Benefits: The measure or value of the gain or (public and private) "profit" resulting from the goals of the proposal under review. Some benefits are the flip side of costs and can sometimes be viewed as negative costs (cost savings). Benefit measures must include direct and indirect, tangible or not, monetized and not, and long- and short-run gains.

Benefit to Cost Analysis: A tool for measuring the relative efficiency of a range of alternatives where the discounted benefits of a project are divided by the discounted costs resulting in a benefit to cost ratio (B/C).

Benefit to Cost Ratio: The ratio of discounted benefits to discounted costs. A B/C ratio greater than one means that the benefits are larger than the costs. A B/C ratio less than one means that the costs are larger than the benefits.

Compounding: The process of the increasing value of a deposit or deposits growing over time based on interest being earned at a predetermined (interest) rate over a specified time. The growth of value of the deposit or deposits is not only due to the increasing size of the interest accumulating on the principal but also the increase of the growth in value of the interest compounding upon itself.

Costs: Generally costs are defined as the value or level of the resources employed. Cost measures must include direct and indirect, tangible or not, monetized and not, and long- and short-run resource commitments.

Cost Effectiveness: A tool for finding the alternative, which accomplishes a specified task at a minimum project cost. Where it may not be easy or possible to measure the benefits of a project, cost-effectiveness analysis seeks to identify the alternative, which achieves the objective but minimizes cost. In this analysis only costs need to be monetized. Cost effectiveness (or CE) analysis differs from cost/benefit analysis, which may be used to compare alternatives, which have very different goals and where the benefits can be monetized.

Cost Revenue Analysis: Cost revenue analysis, sometimes called a fiscal impact analysis, is a tool for evaluating the profitability of a proposed action. Only monetized revenues and costs to the entity undertaking the action are considered.

Direct Costs Resources: These must be committed to implement the policy or program. This includes borrowing costs, one-time fixed costs, and operation and maintenance costs.

Discounting: The simple reverse of compounding. Suppose that someone will be paid a given sum of money at some future time. The process of discounting estimates the real value of that future (nominal) amount of money in today's equivalent worth.

Direct Impact: An intended effect of a policy or program, which addresses a stated objective of that policy or program.

Economic Efficiency: Economic efficiency is the concept that the benefits to be gained in the use of resources (costs) be maximized—the result being the maximization of satisfaction by society. Efficiency is measured in dollars (costs) per unit output (benefit), for example, cost per unit of energy produced or cost per gallon of sewage treated.

Economic Externalities: Those secondary or unintended economic impacts that result from a project that affect individuals or entities other than the primary effects on the producer or consumer intended to result directly from the project. While the market may place no value on these effects, they frequently result in measurable societal costs and benefits. Externalities can be either negative or positive and are termed consumer or producer externalities.

Economic and Financial Feasibility: Economic feasibility examines the program costs and benefits and the projects magnitudes including revenues and expenditures and determine if the proposal outcomes (benefits or revenues) are sufficient (exceed costs or expenditures) to warrant implementation.

Fixed Costs: Those costs that do not vary with the level of output—typically capital costs such as land and equipment.

Future Value: The value of a principal or series of payments at a precise future point in time compounding at a specific interest rate. The principal or payment is known, but the future value is not. Example of the future value of a single $1.00 payment compounding over seven years at an interest rate of 6%:

$$FV = Pmt \times (one+int)^{n}$$
$$FV = \$1.00 \times (1.06)^{7}$$
$$FV = \$1.50$$

Where FV = Future Value
int = periodic interest
n = number of periods
Pmt = payment

Indirect Costs: The costs associated with impacts or consequences of a policy or program (loss of tax revenue, for example, when a commercial building is bought by the city for public purposes).

Indirect Impact: An unintended effect of a policy or program, which is not associated with one of its stated objectives.

Intangible Costs or Benefits: Costs or benefits that cannot be measured in recognized units (pain and suffering, inconvenience, loss of confidence, etc).

Internal Rate of Return IRR: The internal rate of return is the discount rate at which the net present value of a project is zero. It may be viewed as approximating the periodic (annual for example) rate of return of project or investment benefits over project costs. For example, a project resulting in $108,000 benefits a year from today with today's project investment costs of $100,000 would result in an IRR of 8%. Generally the greater the IRR the more attractive the project or investment.

Marginal Analysis: A comparison of the cost incurred by the production of one additional unit of output at different levels of production (100 1 units instead of 1000 or 5001 instead of 5000) with the benefits derived from producing one additional unit at each different level of production. The result is a best scale (level of production) for the policy or program, defined as that level at which marginal costs equal marginal benefits.

Monetizable Costs or Benefits: Costs or benefits that can be expressed in dollars.

Net Present Value: Discounted benefits minus discounted costs.

Opportunity Costs: The resources diverted from other uses to make a given policy or program possible. These include those resources that can be expressed in dollars (monetizable costs), non-monetizable but tangible costs (such as increased numbers of accidents), and intangible costs (such as delays in delivering regular services due to staff having additional responsibilities under the new program).

Present Value: The Present Value (PV) (or Net Present Worth-NPW) uses discounting to determine the spot cash equivalent of a future value. Here the future value is known and the present value is not. Example is to calculate the present value of a single $1.00 (Future Value) received seven years from today discounted at 6%.

$$PV = \frac{FV}{(1+int)^n} = \frac{\$1.00}{(1.06)^7} = \frac{\$1.00}{1.50} = \$.665$$

Where FV = Future Value
PV = Present Value
int = periodic interest
n = number of periods

Principal: The amount of money invested at a specific point in time.

Return on Investment (Interchangeable with IRR): The internal rate of return is the discount rate at which the net present value of a project is zero. It may be viewed as approximating the periodic (annual for example) rate of return of project or investment benefits over project costs.

For example, a project resulting in $108,000 benefits a year from today with today's project investment costs of $100,000 would result in an IRR of 8%. Generally the greater the IRR the more attractive the project or investment.

Sunk Costs: Resources that have already been committed before the decision on the new policy or program is made. These can be ignored in computing the cost of the policy, as they have already been spent and there is no way to take them back. However if these sunk costs will result in additional costs (or benefits) in the future as a result of the proposed "new" program actions, these additional consequences must be factored into the analysis.

Tangible Costs or Benefits: Costs or benefits that can be measured in some type of recognized units. These are contrasted with intangible costs.

Time Value of Money: Money, if properly invested, will earn interest and thus grow in magnitude over time. Also there is a cost associated with the use of borrowed money. Both the interest earned and the interest paid are a reflection of the value money has over time, or the time value of money.

Principal: The amount of money invested at a specific point in time.

Variable Costs: Costs that vary with the level of output—typically categories such as labor, operation and maintenance, and energy costs.

End Notes

[1] Many thanks to the staff of the Board of Regents, especially Dr. Judy Hample, vice chancellor, Debi Gallay, and George Perkins, for their data, support, and technical guidance. Also many thanks to Ed Montanaro and his staff for their review and suggestions.

[2] "Degrees of Success—Education," Business 2000 Florida: An Official Publication of Enterprise Florida and the Florida Economy Development Council, January 2000, *Florida Trend.*

[3] Version 1.1 of IMPLAN Professional was used for this analysis. IMPLAN (Impact Analysis for PLANning) was originally developed by the U.S. Department of Agriculture's Forest Service in cooperation with the Federal Emergency Management Agency and the U.S. Department of Interior's Bureau of Land Management to assist the Forest Service in land and resource management planning. The software has been upgraded and is presently sold and maintained by the Minnesota IMPLAN Group, Inc.

[4] This graphic is adapted from a similar figure appearing in "The Economic Impact of the California State University on the California Economy," Girling, R., Goldman, G., and Keith, S., February 1993.

[5] Ibid., *Florida Trend*, January 2000.

[6] Occupational Employment Estimates for Jobs Requiring Bachelor's Degree or Higher—1997 Base Year and 2007 Projected Employment, DLES, Tallahassee, FL 1998.

[7] Ibid., DLES, 1998.

[8] Ibid., *Florida Trend*, January 2000.

[9] FY 2000 data were not available at the time the study was completed.

[10] Many thanks to Duane L. Whitfield, Program Director II, and his staff at the FETPIP Florida Department of Education, for the substantial support and data provided on SUS graduates. This study would not have been possible without their assistance.

[11] 1996–97 Ph.D., M.S. and B.S. Degrees Outcome. See for example, the Literature Review Appendix and specifically "The Economic Impact of the California State University on the California Economy," Girling, R., Goldman, G., and Keith, S., February 1993.

[12] Ibid., *Florida Trend*, January 2000.

[13] The direct impacts were distributed as recommended by IMPLAN staff as follows: contracts and grants (522: State and local government--education), miscellaneous university spending (522), tuition and fees (522), books and supplies (522), room and board (463: hotel and lodging places), other retail expenses (455: miscellaneous retail), NPV of disposable income (10002: medium household income).

[14] The disposable income measure used is the net present value of the discounted lifetime earnings. The lifetime earnings profiles were discounted based on the 30 year T-bill rate of 6.032%. The staff at IMPLAN suggested that we take 80% of these discounted earnings differentials and run it valued as 1997 dollars in order to measure the future value impact at a single point in time.

[15] Ibid., FETPIP, 2000.

[16] 1996–97 Ph.D., M.S. and B.S. Degrees Outcomes.

[17] 1996–97 SUS B.S., M.S. and Ph.D. – Fall 1997, 1996-97 SUS B.S., M.S. and Ph.D. Fall 1997 Findings.

[18] 1990–91 SUS B.S., M.S. and Ph.D. – Fall 1997 Findings.

[19] The SUS of Florida ranks almost dead last in the nation for tuition. It is unlikely that the private sector would be able to establish universities in the state at such low cost. The private sector would not be able to accommodate all of the students who are currently able to attend college because of the low cost. Although a number of students may choose to attend college out of state (as 10%+ currently do anyway), it would increase the probability that these students would not be employed in the state of Florida after graduation. The SUS impact study only examines the economic impact of students who attend an SUS institution in the state of Florida and who then remain employed in the state at least five years after graduation.

The state does benefit from students who do not remain in the state post graduation. These students still engage in economic activity while in school; however, the state does not receive the benefit of having those students stay in the state and continue spending their income over their lifetime. Thus, the state does not receive as much benefit from educating students who, as a result of their SUS education, receive higher wages and spend their income in another state. Most of the economic benefits derived in the study are due to the fact that the students educated by the SUS are then employed in the state of Florida after graduation.

[20] U.S. Bureau of Labor Statistics provided 1999 average weekly earnings by age and by educational level; lifetime earnings profiles were extrapolated from these statistics. These projections are conservative since it is likely that lifetime earnings profiles for more highly educated individuals tend to increase more rapidly than lesser-educated individuals.

[21] FETPIP1997–98 SUS Graduate Employment Survey data.

[22] In accordance with the agreements reached with staff of the Board of Regents, the researchers examined the earnings differential between the highest degree attained by the student and the earnings he or she would have received with only a high school diploma. Only full time Florida employees were examined; so, if they went to work right after getting a B.S., or from high school to get a B.S., then M.S., then to work, they were captured in our evaluation (in each case) only once. In other words we would not count the B.S. degree person continuing on for an M.S. as an "employed in Florida" beneficiary after the B.S. was awarded. The terminal degree and its associated actual earnings were the only values included. Due to the limitation of the data available, it is unknown what other, if any, post-baccalaureate degrees a student may hold other than the highest degree awarded and from which university or state those prior degrees were awarded. Thus, it is unknown whether a Ph.D. recipient also holds a master's degree (though most probably do) or, even if they do, whether that degree was awarded by a member of the SUS of Florida. If the other degree were not from an SUS member, then it would make it more unlikely that the student would have his or her job in the state of Florida. Therefore, the researchers could only measure the impact of the earnings differential over the expected high school earnings.

The complexity of attempting to sort through all of this for the many thousands of SUS graduates precludes meaningfully sorting through this morass. This simpler specification, while not perfect, does allow us to measure SUS outputs for graduates of a single year without double counting. We also did not include many thousands of SUS graduates working in part time employment or the obvious economic value of SUS graduates elsewhere across the U.S. and global economy. We believe this makes this analysis conservative. In addition the real wage rate increase for lifetime earnings (beyond the 5 year timeline) is only 1.3% in real terms. As you can see for the included table the annual average change is roughly 2.3% for HS, 3.5% for B.S., and 5.4% for Graduate or

Professional. These data are for 1989 and we believe that the differential between male and female college graduates is shrinking (since that time) as well and will continue to in the future. This will *increase* the annual differential of B.S. and M.S. or Ph.D. graduates even higher over the high school graduates. Clearly by treating all of them equally with a conservative 1.3% we believe we are very conservative with our projections. We are assuming values to the economy for the individual degree increments (HS to B.S., M.S., Ph.D.) only awarded by the SUS and remove years of potential earnings (relative to high school employed individuals) when SUS degree earners are in school. The data provided by FTPNEA is much more specific to each year for each university degree type and individuals and therefore more appropriate to use than a generalized 1990 occupation and earnings report and therefore superior to use in a study of this sort.

[23] This analysis assumes that these students would attend college out-of-state and generate those expenditures elsewhere if the SUS did not exist in Florida.

[24] IMPLAN Professional, Minnesota IMPLAN Group, Inc., 1999.

[25] The comparison of the NVP of the alternative investments is important because these GR and Lottery funds could be used for other general government purposes such as construction and operation of a general government, transportation, or prison facility. These alternative region impacts were generated by combined GR and Lottery funds provided to the SUS for each region and were then run in each IMPLAN regional model as general government-noneducation expenditures to estimate these alternative impacts.