

# Council for Education Policy, Research and Improvement

## *Review of Public Postsecondary Centers and Institutes*

### **Economic Impact of Centers and Institutes in Florida's Public Universities-DRAFT 12/02**

#### **Introduction**

This chapter describes the impact of public postsecondary centers and institutes (C&Is) on Florida's economy. It measures the increase in employment and economic output generated by C&I activities across the broader statewide economy. The net economic stimulus from C&Is is estimated by summing C&I external and internal expenditures for FY 2000-01. External expenditures include contracts and grants (government and private sponsors), auxiliary fees/services, and other external sources. Internal expenditures include all state (SUS-appropriated) expenditures. The sum of these dollars represents all C&I expenditures used for salaries, materials and equipment, travel and all other C&I expenditures (see Table 1).

These expenditures were then put into a Florida regional input-output model that includes cross linkages between every sector of the Florida economy. As C&Is expend dollars, further demand for goods and services across other sectors of the Florida economy are generated. The direct C&I spending creates a secondary "multiplier" cycle of spending that further increases income, jobs and total state economic activities referred to as state output. This analysis measures those direct and indirect economic increases flowing from C&Is based on the initial FY 2000-01 expenditure data. This study did not quantify the intangible benefits generated by the presence of C&Is to the local economy, such as teaching and instruction, quality of life enhancements, cultural opportunities, intellectual stimulation (through publications, presentations, public service), and creation of spin-off companies, among others. The intangible benefits of C&Is are discussed in other chapters of this study.

The definition of C&I economic impact is the difference between existing economic activity in Florida and the level of economic activity that would exist in the absence of university C&Is. Since the C&Is already exist, we measured their impact on the state economy by first removing them from the economy. The difference between the economy with C&Is and the economy without C&Is represents the net C&I economic impact. By using the Regional Economic Model, Inc. (REMI, 2000) analysis, we capture and present the positive net economic impacts of C&Is on the state of Florida. Measured economic impacts include increases in:

- 1) Florida Gross Regional Product (or State Output)
- 2) Personal Income (Including Wages)
- 3) Number of Jobs Created

Short-term economic impacts are the net changes in regional output, earnings, and employment that are due to new dollars entering into a region from a given enterprise or economic event. In this study, the enterprise is the state university C&Is, and the region is

Florida. The effects of expenditures external to Florida (termed leakages) are not included in the impact estimates.

**Table 1. C&I Expenditures by Funding/Expenditure Category FY 2000-01**

<b>C&amp;I Expenditures</b>	<b>SUS-Appropriated Expenditures</b>	<b>External Expenditures</b>	<b>Total Expenditures</b>
<b>Faculty Salaries</b>	\$50,870,097	\$71,219,373	\$122,089,470
<b>Special Category*</b>	\$7,237,254	\$13,722,391	\$20,959,645
<b>Electrical</b>	\$2,550,269	\$349,814	\$2,900,083
<b>Operating</b>	\$5,532,500	\$15,152,070	\$20,684,570
<b>Expenses</b>	\$14,614,511	\$69,566,575	\$84,181,086
<b>Other**</b>	\$4,855,875	\$31,422,080	\$36,277,955
<b>Graduate Salaries</b>	\$3,116,185	\$10,702,919	\$13,819,104
<b>House Staff***</b>	\$5,737	\$571,339	\$577,076
<b>Total</b>	<b>\$88,782,428</b>	<b>\$212,706,561</b>	<b>\$301,488,989</b>

\* Includes libraries and data processing

\*\* Includes primarily sub-contracts

\*\*\* Includes salaries and other for UF and USF medical staff and centers

### **The REMI Model**

REMI, 2000 is a widely accepted and used dynamic integrated input-output and econometric model. REMI is used extensively to measure proposed legislative and other program and policy economic impacts across the private and public sectors of the state by the Florida Joint Legislative Management Committee, Division of Economic & Demographic Research, the Florida Department of Labor and other state and local government agencies. In addition, it is the chosen tool to measure these impacts by a number of universities and private research groups that evaluate economic impacts across the state and nation.

The REMI model used for this analysis was specifically developed for the state of Florida, and includes 172 sectors (see technical appendix for a detailed listing of 172 sectors used in REMI analysis). REMI's principal advantage is that it can be used to forecast both direct and indirect economic effects over multiple-year time frames. Other input-output models primarily are used for a single year analysis.

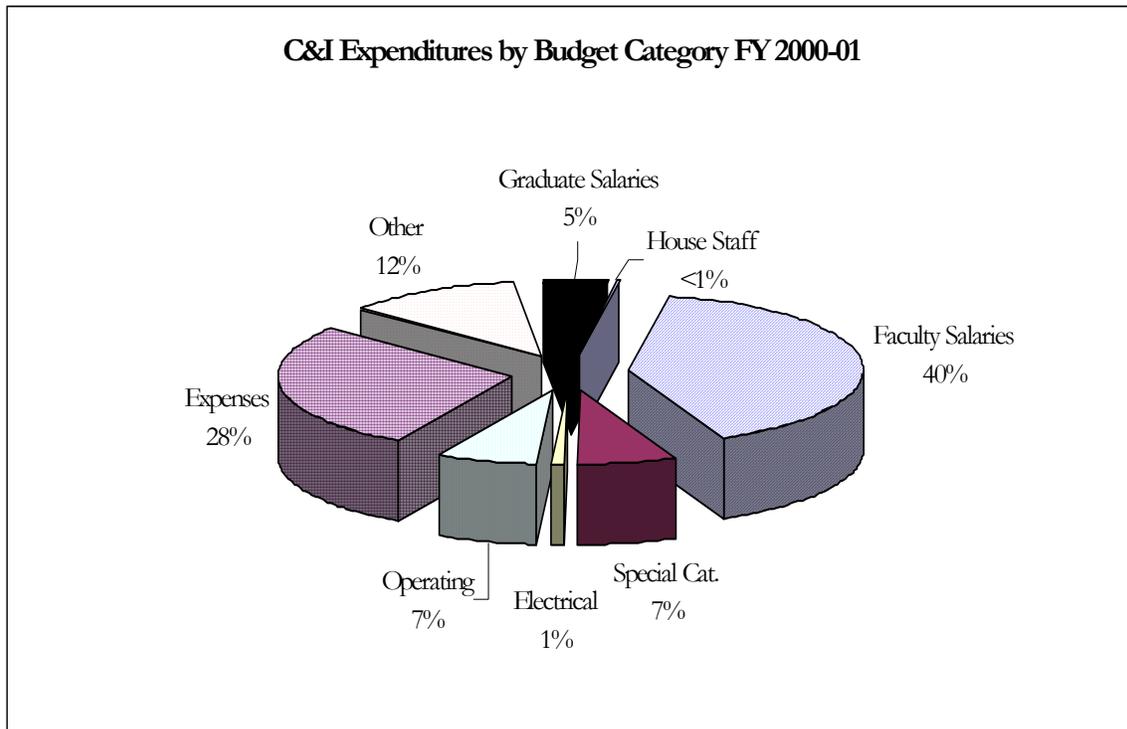
## Methodology

As a part of our modeling strategy, we examined both the revenue and the expenditure approach regarding the impact of C&Is on the Florida economy. The revenue approach allows the REMI model to redistribute the expenditures according to sectors (based on actual historical data). For the expenditure approach, C&Is' actual FY 2000-01 expenditures were used to calculate the economic impact. This approach allowed us to achieve a greater level of detail by capturing the detailed economic impacts of the system via the specific expenditure path using actual data rather than the estimated paths provided by the REMI model. Thus, the expenditure approach was the selected method for this analysis.

Staff evaluated the economic impact of C&Is across the Florida economy from the expenditure approach perspective. The expenditure approach disaggregates the various C&Is direct expenditures (e.g., salaries, equipment purchases, travel, etc.) by specific economic sector to calculate the economic impacts. The data on FY 2000-01 C&I expenditures were collected from each SUS institution and from the annual C&I expenditure reports submitted to the Division of Colleges and Universities (DCU).

Table 1 presents the C&I expenditures and the breakdowns for FY 2000-01 by funding/expenditure category. Figure 1 provides a percentage breakdown of the budget categories in terms of total expenditures. For the purpose of this analysis, the funding/expenditure categories used were SUS appropriated expenditures and (all) external expenditures.

**Figure 1. Percent of C&I Expenditures for FY 2000-01**



## Model Assumptions

This report provides estimates of only the direct, pecuniary/financial benefits (or “return”) generated for the state (income, employment, taxes) as a result of the “investments” that the state makes in C&Is via SUS-appropriated funds through the Florida Legislature. The “returns” that are estimated using this analysis are exclusively associated with external contracts, grants and other awards brought into the universities by C&Is during fiscal year 2000-01. This analysis *excludes* “returns” to the state that are not financial benefits (these are known as “*non-pecuniary/non-market*” or “*intangible*” benefits). These intangible benefits include those associated with the teaching, research and public service activities of C&Is. Therefore, the assumptions used to estimate the economic return to the state through its investments in C&Is in this report can be characterized as conservative.

It is important, however, to recognize that the benefits to the state of Florida associated with these C&I intangible benefits (e.g., value of new medications or high tech products produced and commercialized, quality of life enhancements, teaching, research, publications, presentations, public service, and a host of other cultural and amenity values) are significant. The amenity values or benefits to the community by having a research university present (and enhanced by the multi-faceted activities of C&Is) can also be significant.

The model assumptions are:

- 1) The base model assumes a constant rate of growth for the economy;
- 2) The expenditure approach model used actual FY 2000-01 C&I expenditures (by category: salaries, expenses, etc.) for Type 1, 2, 3 C&Is and Type 1, 2 C&Is;
- 3) Total SUS state investment (expenditures) in FY 2000-01 was \$88.8 million;
- 4) This state investment leverages an additional \$212.71 million in additional external contracts and grants, fees and private expenditures yielding a total of \$301.49 million in FY 2000-01 for all expenditures made by C&Is statewide.
- 5) We assumed that, in the absence of C&Is, the SUS investment (\$88.8 million) would be reallocated to other Florida higher educational activities; and;
- 6) REMI results were expressed in terms of impacts on GRP, employment, personal (disposable) income, and state tax revenues.

## Results of the REMI Analysis

Staff assumed that in the absence of C&Is, the initial state investment (\$88.8 million) would be reallocated to other higher education activities. As our modeling strategy, we used the university C&Is’ expenditures to calculate the economic impact via specific expenditure paths. Two scenarios were run, the first including Type 1, 2, 3 C&Is, and the second including Type 1 and 2 C&Is, only. The results were expressed in fixed 1992 dollars. To update the results to a FY 2000-01 base year, the dollars were inflated using a REMI-generated Consumer Price Index. Based on the results of the expenditures data input in the REMI model, discounting analysis (using a discount rate of 3%) was used to present the economic impacts from FY 2000-01 to FY 2034-35 (See technical appendix for a description of discounting methodology). The following results present the positive net economic impact of C&Is on the State of Florida economy.

Table 2 summarizes the total economic impact of C&Is on the Florida economy. The table shows the economic impacts (for Type 1, 2, 3 and Type 1, 2 C&Is) on employment, gross regional product (GRP), real disposable income (Wages), and taxes from the C&I external expenditures for FY 2000-01. Gross Regional Product (GRP or state output) is the dollar value of final goods and services produced across the Florida economy over the FY 2000-01 time period.

**Table 2. Results of REMI Analyses: Employment, Output (GRP), Disposable Income (Wages) and State Taxes Attributable to C&Is Expenditures**

<b>Summary of REMI-Generated Expenditure</b>	
<b>Approach Results For Types 1, 2 &amp; 3 C&amp;Is (2001-2035)</b>	
<b>Net Present Value of GRP</b>	<b>\$269,416,041</b>
<b>Net Present Value of Taxes</b>	<b>\$18,162,728</b>
<b>Net Present Value of Wages</b>	<b>\$243,924,273</b>
<b>Number of Jobs*</b>	<b>6,955</b>

<b>Summary of REMI-Generated Expenditure</b>	
<b>Approach Results For Type 1 &amp; 2 C&amp;Is (2001-2035)</b>	
<b>Net Present Value of GRP</b>	<b>\$158,819,204</b>
<b>Net Present Value of Taxes</b>	<b>\$10,706,824</b>
<b>Net Present Value of Wages</b>	<b>\$145,233,082</b>
<b>Number of Jobs*</b>	<b>4,112</b>

\* Note: REMI output results for employment are in terms of job years (one job/year)

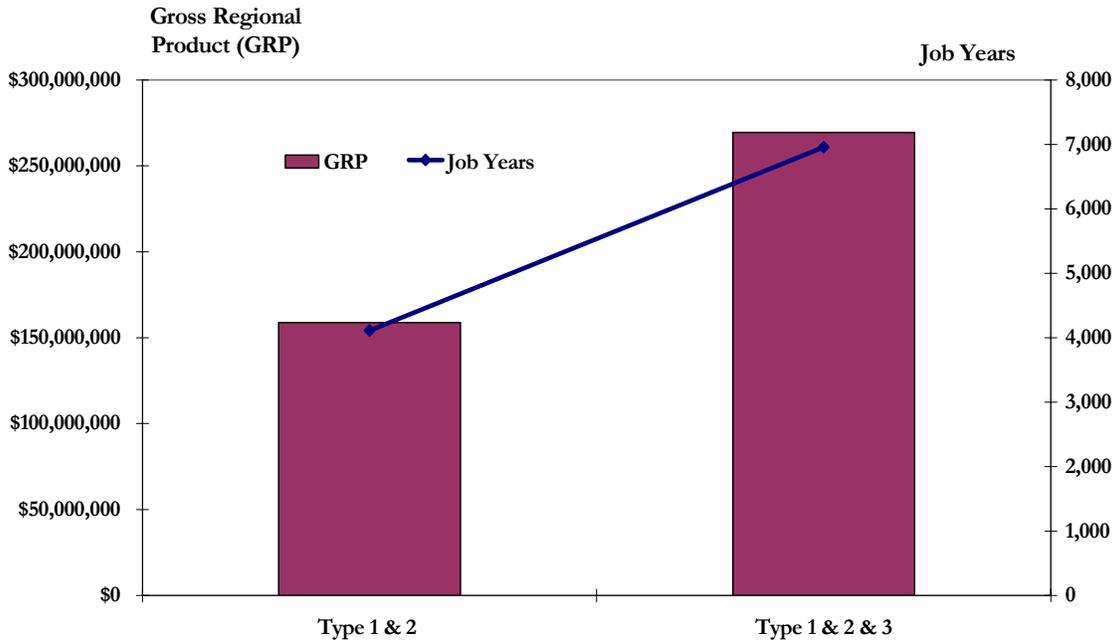
As also depicted in Figure 2, for Type 1, 2, 3 C&Is, GRP was estimated to increase by \$269 million from C&I expenditures from external funding sources. This C&I-generated rise in state output created considerable direct and indirect increases in employment across the state. Table 2 indicates that 6,955 jobs were created from these spending increases. In turn, this employment increase also generated higher wage and salary earnings. Table 2 illustrates that direct and indirect personal (or disposable) incomes increased by \$244 million from these C&I externally funded research grants and awards.

For Type 1, 2 C&Is, as also shown in Figure 2, GRP was estimated to increase by \$159 million from C&I externally funded spending. This C&I-generated rise in state output created considerable direct and indirect increases in employment across the state. Table 2 indicates that 4,112 jobs were created from these spending increases. In turn, this employment increase also generates higher wage and salary earnings. Table 2 illustrates that direct and indirect personal (or disposable) incomes increased by \$145 million from these C&I externally funded research grants and awards.

Finally, these increases in state output also resulted in higher state tax yields. On average, for each \$1,000 of GRP generated in 2000-01, the Florida Department of Revenue (DOR) estimates that it collected \$67.42 across all taxes (State, Local and Other). Based on the results of the REMI model, and using existing tax coefficients, the impact on tax revenues was calculated. These estimates provide a numerical basis for calculating the potential

statewide average taxes generated as a result of SUS C&Is direct and indirect expenditures throughout the Florida economy.

**Figure 2. FY 2000-2001 C&I Economic (GRP) and Employment Results**



**Return on Investment and Benefit/Cost Ratio Calculations: An Explanatory Note**

The calculations of the Return on Investment (ROI) and the Benefit/Cost Ratio utilize the same initial numerical data for the numerator and the denominator – however, the B/C ratio is expressed as a ratio of two numbers, while the ROI is most commonly expressed as a percentage by multiplying the ratio by 100. The B/C ratio is an expression most commonly used for economic evaluations (i.e., by economists), while the Return on Investment is more commonly used for financial evaluations (i.e., by business-oriented professionals). However, both are equivalent ways to express the relationship between cost (initial investment) and benefit (or return).

**Return on Investment Analysis**

Section 240.706 of the Florida Statutes (FS) directs the Council for Education Policy, Research and Improvement (CEPRI) to assess the “return on the state’s investment in research conducted by public postsecondary institutions”. A focus of this assessment is on “research” centers and institutes (C&Is) in Florida’s public universities. A classic text- book approach for calculating return on investment (ROI) involves an arithmetic comparison of the initial investment with the value of the net benefits or returns resulting from that investment.

## **Annualized Return on Investment Using the Initial FY 2000-01 Expenditure Input Data: A Preliminary Estimate**

Using the initial year (FY 2000-01) data as input for calculating a preliminary ROI, staff initially estimated the ROI to be approximately 240%. The C&I ROI calculation utilized all externally funded research expenditures (regardless of source) during FY 2000-01 as the return to the state (\$212,706,561) from its investment (of \$88.8 million). This ROI implies that for each dollar the state invested in C&Is in FY 2000-01, the state realized a return of \$2.40 (using only the total expenditures from external sources that were “leveraged” as a result of the state’s initial investment).

The amenity value that C&Is add to the state – through services such as education, research, public education, and fine arts, among others, makes Florida more attractive to encourage in-migration. In addition, employment opportunities and other economic factors affected by Florida’s C&Is also encourage in-migration. These effects increase population by 1,511 (for 2000-01) in Florida (see technical appendix).

## **Return on Investment Using REMI-Generated Input Data: A More Comprehensive Estimate**

The REMI model, however, allows for a more robust estimate of the ROI using discounted data, present valued over a 35-year period. Given the known dynamic nature of the REMI model, the calculated value of the 35-year ROI estimate was less than the FY 2000-01 annualized ROI estimate as was anticipated ( $ROI_{REMI} = 217\%$  for Types 1, 2 and 3 C&Is;  $ROI_{REMI} = 128\%$  for Types 1 and 2 C&Is). This ROI estimate implies that for each state dollar invested in C&Is (multiplied and discounted over a 35-year period), the state realizes a return of \$2.17.

## **Benefit Cost Analysis**

The “benefits” to the state of Florida from a conservative perspective were defined as the amount leveraged by the state’s investment (i.e, all external expenditures). The “costs” to the state of Florida were defined as the initial state investment (\$88.8m) assumed to be redistributed to alternative higher education spending (i.e., a measure of the opportunity cost). The REMI model calculated the 35-year, multiplied net present value of the opportunity cost of the initial state investment of \$88.8 million to be \$124 million. In summary, if funding for C&Is were reallocated across Florida’s higher education system, the state economy, according to REMI output results (See Table 2), would result in a decline of \$269.4 million (with an overall net decline of \$145 million in GRP and 4,502 in jobs).

- Benefit to the state = \$269.4 million;
- Cost to the state (opportunity cost of \$88.8 million) = \$124 million;
- $B/C_{REMI} = 2.17$  (Type 1, 2 and 3)

## Conclusions

The results of the economic analysis using the REMI model indicated that C&Is contribute significantly to the Florida economy. The economic benefits extend to job creation; generation of GRP, personal income and state taxes, from the expenditures made by all types of C&Is. The following are the primary contributions that are attributable to C&I expenditures from all funding sources in Florida:

- For every \$17,829 spent by the state of Florida on C&Is, one job is created; in addition, the external funds generated by these C&Is leverage an additional 6,955 jobs.
- For every dollar of state support spent on C&Is, GRP increases by \$2.17;
- For every dollar of state support spent on C&Is, income increases by \$1.96;
- Given the FY2000-01 state investment, C&Is expenditures results in additional \$18 million in tax revenues;
- The  $ROI_{REMI}$  for Types 1, 2 and 3 C&Is is 217%; the  $ROI_{REMI}$  for Types 1 and 2 C&Is is 128%.
- The  $B/C_{REMI}$  for SUS C&Is is 2.17.
- The benefits of SUS Centers and Institutes are substantially greater than the state of Florida investment cost.