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RESEARCH EXPENDITURES AT SOUTH CAROLINA'S LEADING RESEARCH
UNIVERSITIES: CONTRIBUTIONS TO STATE ECONOMIC ACTIVITY

By

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INTRODUCTION

It is commonplace to read or hear about the “new economy” and the critical role that innovation and human capital play in fostering economic growth of nations and regions. However, few studies exist of the impact that research expenditures at South Carolina's research universities (Clemson University, the Medical University of South Carolina and the University of South Carolina in Columbia) have on the state's economy.¹ The purpose of this report is to document how the actual research expenditures at CU, MUSC and USC contribute to the generation of state economic activity – as measured by state gross output, state income, and employment of state residents. This is a limited view of the contribution of research universities to the South Carolina economy since it ignores the main function of the universities – the formation of human capital needed for long term economic growth.² This analysis also ignores the positive impacts of university research on new product development and enhanced productivity among the state's businesses.³

Nevertheless, annual spending by these public universities for faculty salaries, staff support, and the materials and supplies needed to undertake research projects does ripple through the state's economy – generating sales, income, and jobs for South Carolina businesses and residents. To the extent that the source of research expenditures are “external” to the state government's contributions to research – Federal Government, private foundations, and the private sector – the cost side of research is, for the most part, not the responsibility of South Carolina taxpayers.

METHODOLOGY

The contribution of research spending by CU, MUSC and USC to the level of economic activity in the state is estimated using a standard impact assessment model for South Carolina, the Impact Model for Planning (IMPLAN). Interindustry models are based on the work by 1973 Nobel Laureate in economics, Wassily Leontief. The model establishes the linkages between industries in the state economy by estimating the dollar value of inputs needed by each industry from all other industries in the state. IMPLAN provides estimates of these linkages and the resulting multipliers for each industry in the State of South Carolina.⁴ For the analysis of the economic impacts of university research expenditures, the focus is on IMPLAN sector 462, Colleges and Universities. For a given year, the total research spending by CU, MUSC and USC is used as an injection of

added final user (or final demand) sales to the State of South Carolina economy. This direct added spending for wages, salaries, materials, and supplies generates secondary rounds of “indirect” input purchases as businesses buy supplies from each other. The research spending also provides income (wages, salaries, rents, and profit type income) to residents of the state who in turn consume goods and services. These consumer related purchases further increase output, sales, and jobs in the local economy. These are called “household induced” rounds of new economic activity. The multiplier process adds together the direct, indirect, and induced effects from university research expenditures in the state. The resulting total economic impacts are measured along three paths: output (sales) by South Carolina industries, income accruing to South Carolina households, and added jobs in South Carolina.

RESULTS

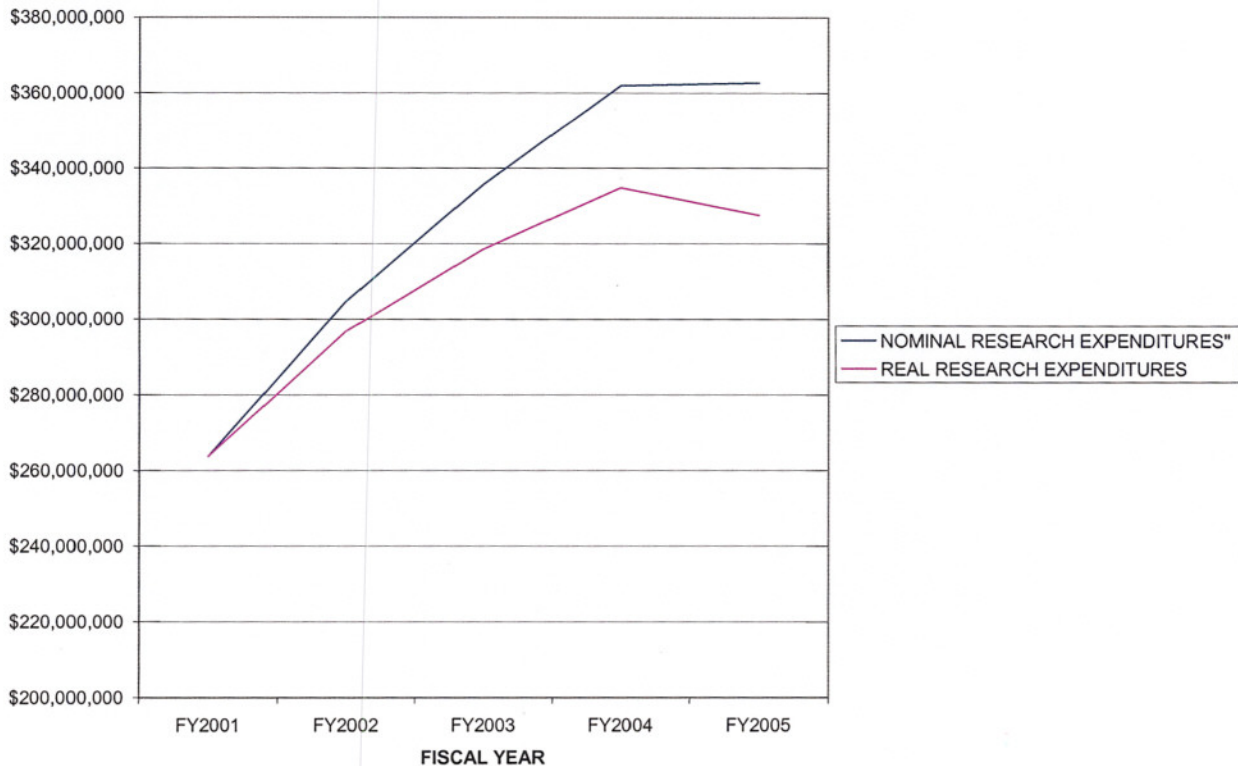
The top portion Table 1 provides an overview of the level of research expenditures by CU, MUSC and USC for Fiscal Years 2001 through 2005. The bottom part of Table 1 shows the associated contributions these expenditures made to the South Carolina economy for each of the five years.

In nominal terms, total research expenditure increased from about \$264 million in Fiscal Year 2001 to almost \$363 million in FY 2005. The total economic impact of this spending on the state’s economy increased from \$519.7 million in gross output in FY 2001 to \$714.6 million in FY 2005. The associated income impacts were \$301.2 million in FY 2001 and \$414.1 million in FY 2005. Jobs in South Carolina associated with the university research expenditures expanded from 10,421 in FY 2001 to 13,228 in FY 2004 before declining to 12,935 in FY 2005.

TABLE 1. RESEARCH EXPENDITURES BY SOUTH CAROLINA'S LEADING RESEARCH UNIVERSITIES

	FY2001	FY2002	FY2003	FY2004	FY2005
CU	\$69,455,310	\$72,379,951	\$84,273,288	\$82,871,131	\$78,583,949
MUSC	\$86,786,581	\$106,322,235	\$128,570,926	\$154,553,800	\$161,742,526
USC	\$107,557,525	\$125,991,445	\$122,876,622	\$124,471,349	\$122,382,317
Total CURRENT PRICES (NOMINAL)	\$263,799,416	\$304,693,631	\$335,720,836	\$361,896,280	\$362,708,792
Total 2001 PRICES (REAL)	\$263,799,416	\$296,702,560	\$318,561,216	\$334,841,120	\$327,433,408
IMPACTS ON THE SOUTH CAROLINA ECONOMY					
METRIC:	FY2001	FY2002	FY2003	FY2004	FY2005
OUTPUT(SALES) CURRENT PRICES	\$519,735,425	\$600,304,877	\$661,434,402	\$713,005,070	\$714,605,878
OUTPUT(SALES) 2001 PRICES	\$519,735,425	\$584,560,932	\$627,626,681	\$659,701,206	\$645,106,596
INCOME CURRENT PRICES	\$301,159,545	\$347,845,320	\$383,266,676	\$413,149,193	\$414,076,784
INCOME 2001 PRICES	\$301,159,545	\$338,722,529	\$363,676,868	\$382,262,407	\$373,805,579
EMPLOYMENT	10,421	11,721	12,584	13,228	12,935
IMPLIED MULTIPLIERS*					
OUTPUT(TOTAL/\$ RESEARCH EXP)	1.97				
INCOME (TOTAL/\$ RESEARCH EXP)	1.14				
EMPLOYMENT	39.5				
(PER MILLION \$ REAL RESEARCH EXP)					
*IMPLAN sector 462 (Universities, etc.)					

FIGURE 1. SOUTH CAROLINA UNIVERSITY RESEARCH EXPENDITURES



The time patterns of nominal and real (2001 prices) university research expenditures from FY 2001 to FY 2005 are displayed in Figure 1. While growth in nominal research expenditures was a healthy \$20 to \$30 million per year from FY 2001 through FY 2004, there was a leveling off in FY 2005 with real research expenditures experiencing a small decline from the FY 2004 level.

Figure 2 illustrates the linkage between university research spending and the total gross output (sales) impact it has on the state's economy from FY 2001 to FY 2005. Roughly, every dollar of research spending generates about two dollars of state output (sales).

FIGURE 2. TOTAL STATE OF SC OUTPUT FROM UNIVERSITY RESEARCH EXPENDITURES

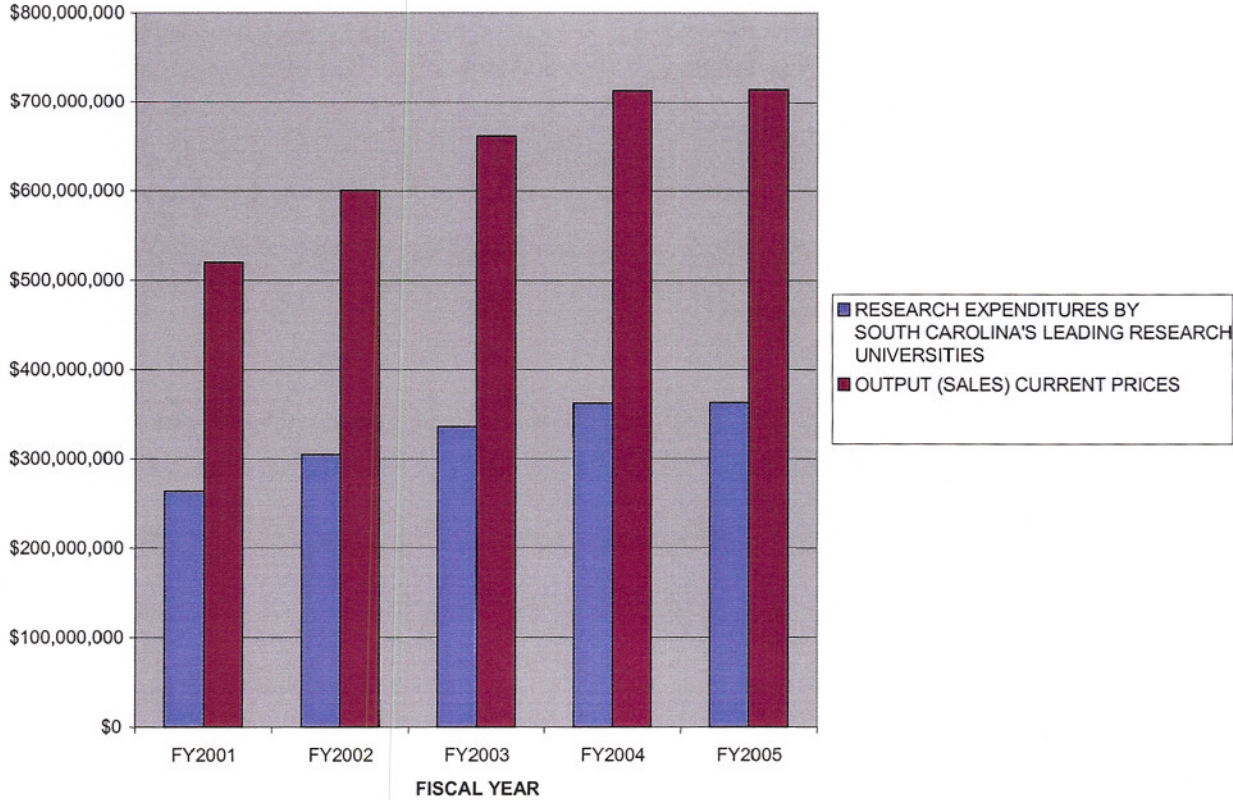
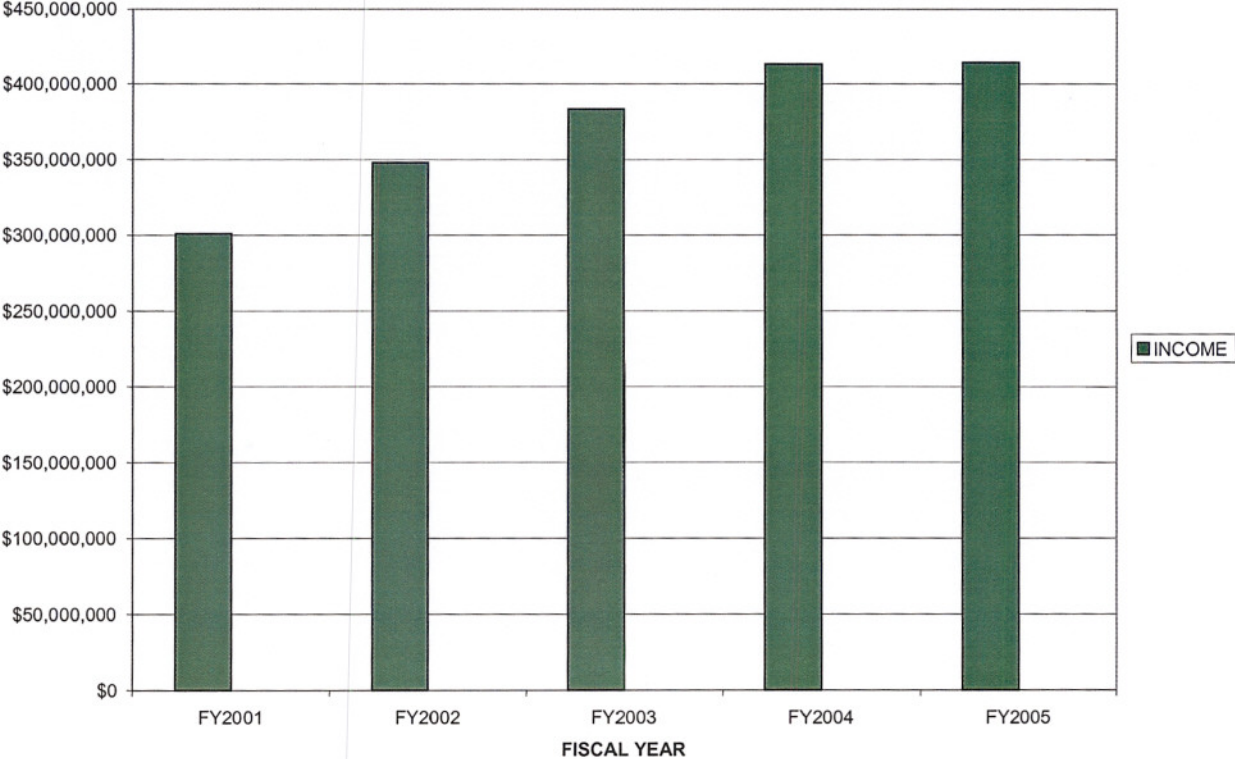


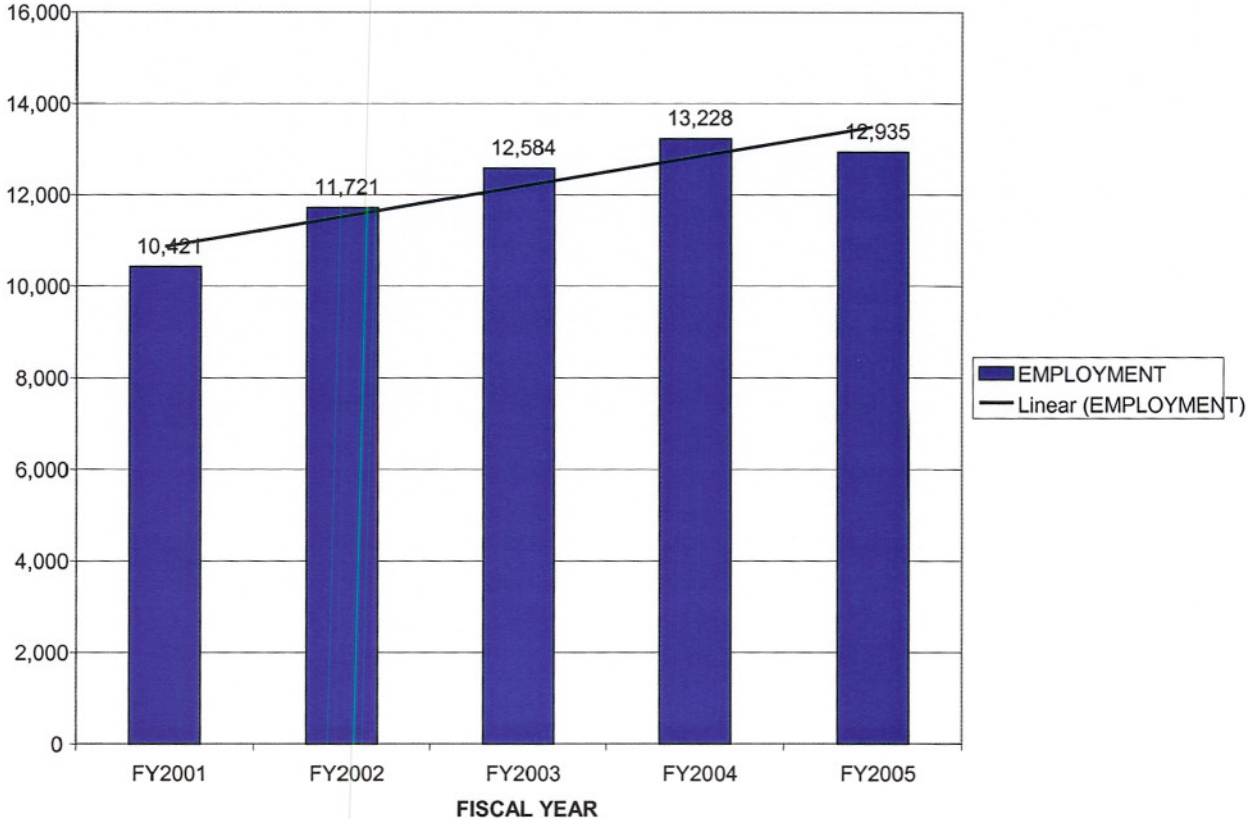
Figure 3 shows a steady increase in nominal income from about \$300 million in FY 2001 to over \$400 million in FY 2005 accruing to South Carolina residents that is a result of research expenditures by the leading research universities in South Carolina.

FIGURE 3. STATE OF SC INCOME FROM UNIVERSITY RESEARCH EXPENDITURES



Finally, Figure 4 shows the trend in added employment of South Carolina residents from research spending by South Carolina's three leading research universities. Starting from a base of 10,421 research based jobs in FY 2001, research spending resulted in almost 3000 added employees by FY 2004 to a total of 13,228, before falling off by about 300 jobs in FY 2005. The black line reveals a steady upward linear trend in jobs associated with university research spending.

FIGURE 4. SC EMPLOYMENT FROM UNIVERSITY RESEARCH EXPENDITURES



ENDNOTES

¹ Recent analysis finds a positive impact of university R&D on per capita income levels. See Woodward (2005) *Innovation, Creative Capacity, and Per Capita Income: Implications for South Carolina*. ***A Conversation About the South Carolina Economy***--sponsored by the South Carolina Council on Competitiveness, Greenville, SC, October 21, 2005. Available at <http://cherokee.agecon.clemson.edu/redrl.htm>

² Recent analyses by Simon and Tamura examine the role of human capital in long term economic growth. *City Growth and Adjustment: The Role of Human Capital*, PowerPoint® presentation by Curtis Simon, Associate Professor, John E. Walker Department of Economics, Clemson University; and *Income, Income Growth and Schooling: Views of the State, Region and Nation*. PDF presentation by Robert Tamura, Associate Professor, John E. Walker Department of Economics, Clemson University. ***A Conversation About the South Carolina Economy***--sponsored by the South Carolina Council on Competitiveness, Greenville, SC, October 21, 2005. Available at <http://cherokee.agecon.clemson.edu/redrl.htm>

³ A recent study by Barkley and Henry finds a strong correlation between innovative activity in metropolitan areas and growth in employment and population. *Innovative Metropolitan Areas in the South: How Competitive are South Carolina's Cities*. ***A Conversation About the South Carolina Economy***--sponsored by the South Carolina Council on Competitiveness, Greenville, SC, October 21, 2005. Available at <http://cherokee.agecon.clemson.edu/redrl.htm>

⁴ The multipliers are derived from a system of linear equations that relate input requirements by an industry to the sales by that industry to final users (consumers, exports, investment and government). In the case of research expenditures, the final user is the public university. See Hefner, 1999, for details.

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