

DOLLARS AND SENSE

The National High Magnetic Field Laboratory and its
Forecasted Impact on the Florida Economy



A report by the Center for Economic Forecasting
and Analysis at Florida State University, Summer 2009



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The National Science Foundation (NSF) awarded the National High Magnetic Field Laboratory (Magnet Lab) to Florida State University in August 1990. The Magnet Lab is a national user laboratory that provides magnet systems for research in all areas of science, including biology, medicine, chemistry, geochemistry, engineering, materials science and physics. The Magnet Lab attracts and employs some of the top scientists in the world.

High magnetic fields are critical to understanding matter and living structures and to developing modern technologies and new and improved materials. While the Magnet Lab has greatly advanced scientific knowledge in these fields, this report focuses on the Magnet Lab's economic impact on Florida by measuring the increase in employment and economic output generated by Magnet Lab activities across the broader statewide economy.

Since 1990, the Magnet Lab has focused on establishing and improving the essential infrastructure required to conduct world class research by building the largest and highest powered magnetic field research facility in the world, and recruiting a distinguished faculty to conduct that research. The Magnet Lab has achieved this goal primarily through funding by the NSF, the state of Florida, and through a combination of individual investigator grants, work for others and royalties.

Figure 1 shows the amount of funding the Magnet Lab received between 1990 and 2008. State funding includes all funds the Magnet Lab received from any state of Florida source, whereas non-state funds indicate private and/or out-of-state funding (e.g., NSF federal funding). The bulk of state funding was spent on construction and equipment to get the facility up and running. This commitment by the state to pay for the building and contribute capital equipment was required in the original solicitation to the NSF.

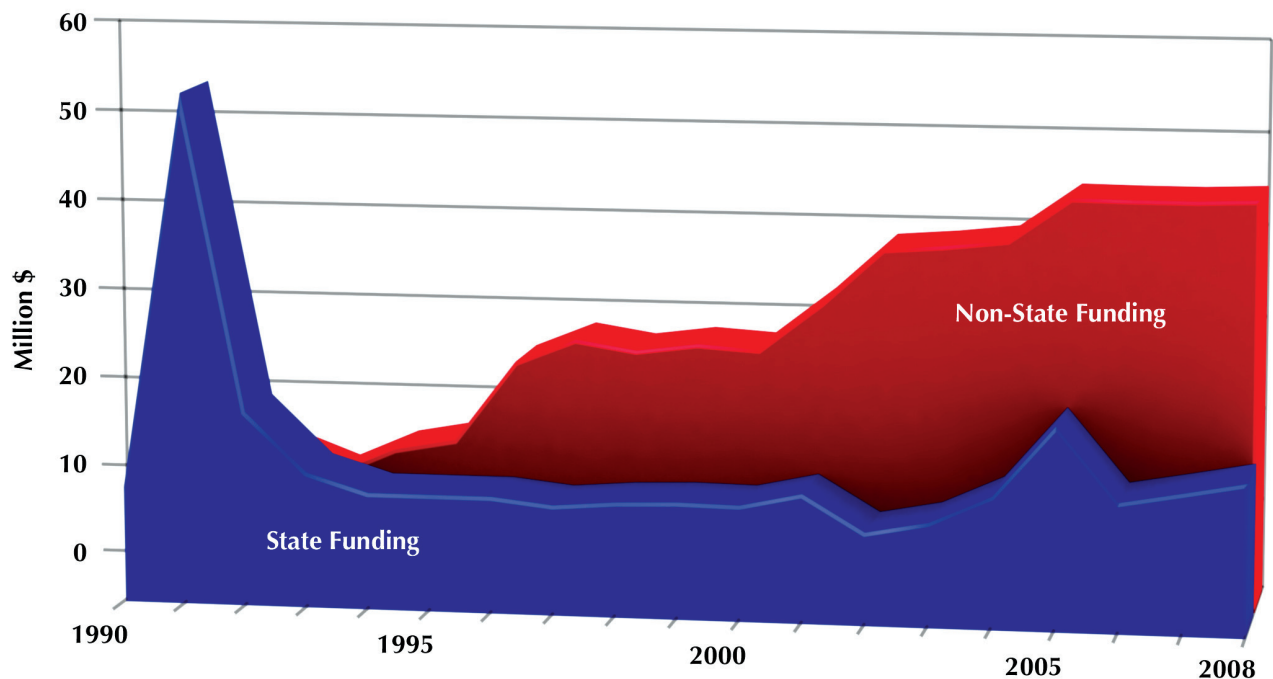


FIGURE 1. Comparison of Annual State and Non-State Magnet Lab Nominal Expenditures (1990-2008)



While state of Florida funds continue to be important for ongoing operation and maintenance of the Magnet Lab, the growing source of revenue for the Magnet Lab comes from Federal and other sources outside the state. This level of external funding has been an important economic stimulus within Florida over the years, as this study will examine. **Table 1** breaks down the total funding the Magnet Lab received over the last 19 years.

TABLE 1. Breakdown of Magnet Lab Funding by Source (1990 – 2008) (Nominal Dollars)

NSF	352,509,917	42.0%
State Operating FSU	139,455,420	16.6%
State Capital	92,100,000	11.0%
UF	73,621,157	8.8%
LANL Contribution	30,067,105	3.6%
State Facility (Board of Regents utility grant)	29,400,000	3.5%
SRAD	22,920,875	2.7%
Other	98,705,349	11.8%
Total	\$838,779,823	

As shown in **Figure 1**, the Magnet Lab received a large amount of funding in its early years. This money was used to build the facility and acquire the equipment and machinery to do the world-class research that currently goes on there. In later years, funding levels are slightly lower, however, since the large infrastructure investment has already been made. Furthermore, after 1994, the year the Magnet Lab’s main complex was dedicated, non-state funding levels begin to exceed the level of state funding by an amount of almost five to two. In the last 10 years, state funding levels have ranged between \$10.5 million in 2002 and \$21.9 million in 2005, with an average of \$14 million (2005 included \$10 million for infrastructure upgrades at the FSU and University of Florida branches of the lab). Non-state funding has seen steady increases with an annual average growth rate of 2.2%, whereas state funding has maintained or shown a slower rate of growth, with annual average increases of 0.5%. This information is shown in **Table 2**.

TABLE 2. Magnet Lab State Funding (1999-2008)

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding	\$12.4	\$12.0	\$13.9	\$10.5	\$11.2	\$13.1	\$21.9	\$13.0	\$15.4	\$16.2
%	8.9%	8.6%	9.9%	7.5%	8.0%	9.4%	15.7%	9.3%	11.0%	11.6%

Figures 2 and 3 project the cumulative funding forecast through 2023. State funding is expected to continue at around \$17.3 million annually (1990-2023). Non-state funding is projected to grow by 5.7% annually between 2008 and 2023 (from \$44.7 to almost \$85.3 million). This constitutes an annual average increase of \$2.5 million per year.

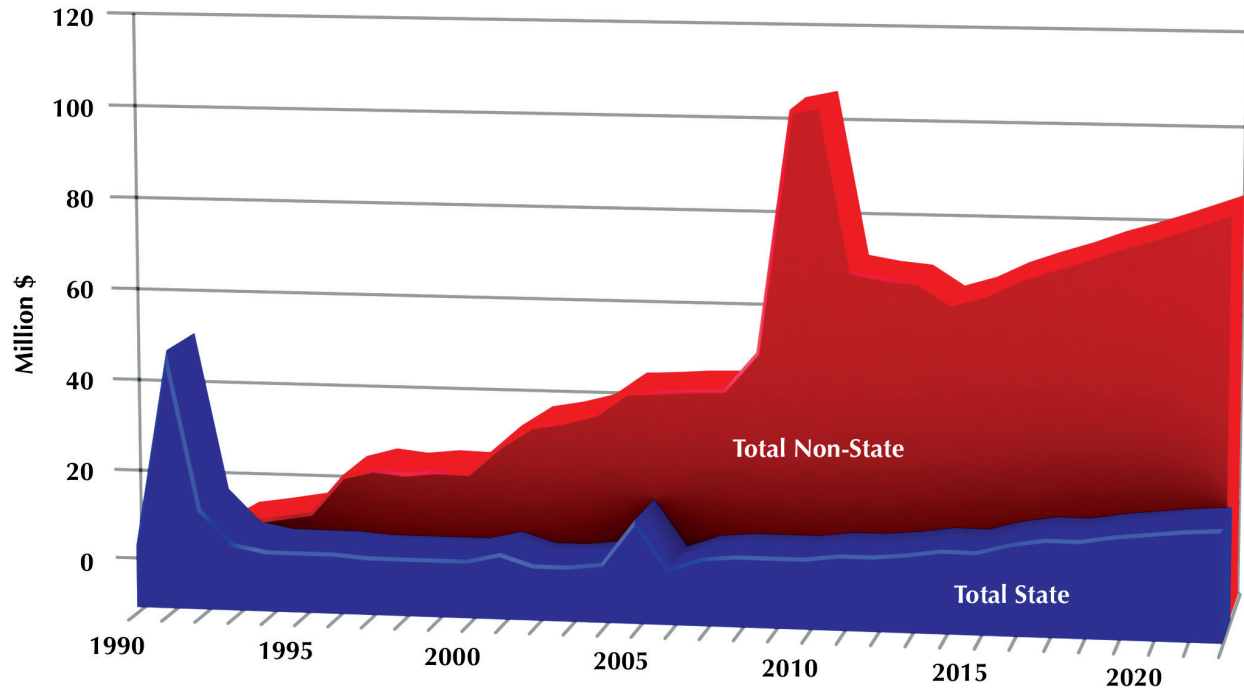


FIGURE 2. Comparison of Historic and Forecasted Annual State and Non-State Magnet Lab Nominal Expenditures (1990-2023)

The leveraging of state of Florida funding alone is quite high over the projected 2006 to 2016 time frame. This forecast suggests that for every dollar the state of Florida invests in the Magnet Lab (an 11-year projected investment of \$179 million), Federal and other sources will leverage an additional \$4.13, for a total of \$739 million in non-state spending at the Magnet Lab over the 11 years.

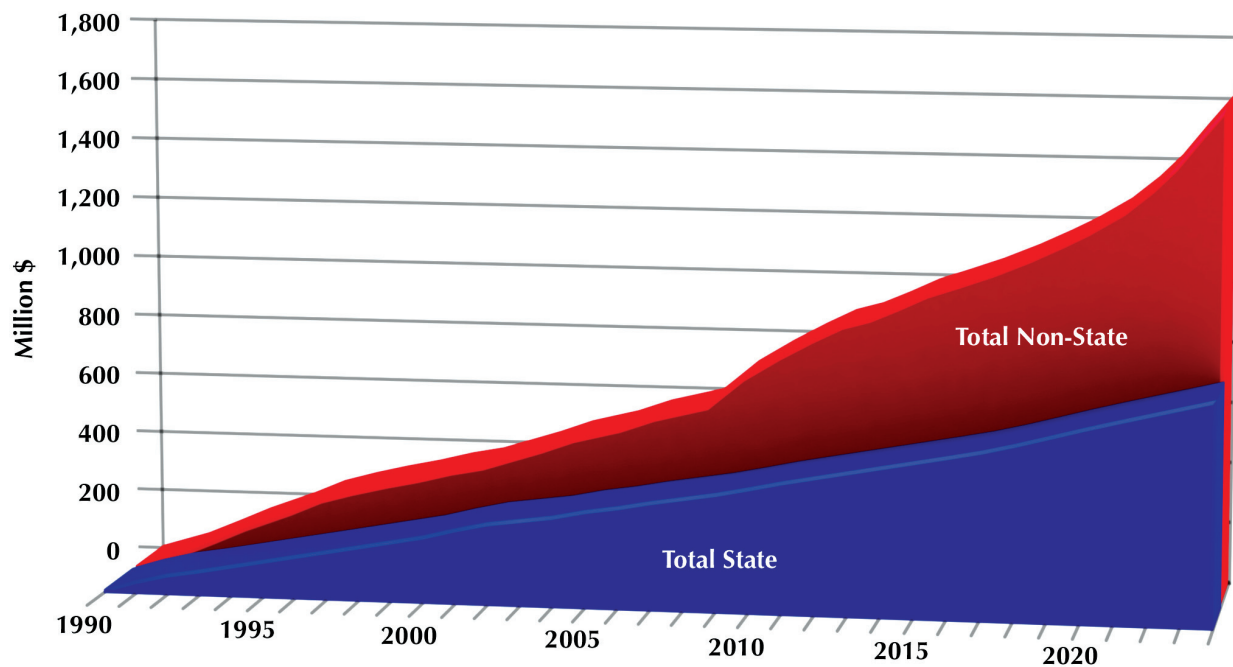


FIGURE 3. Comparison of Cumulative Historic and Forecasted Annual State and Non-State Magnet Lab Nominal Expenditures (1990-2023)



To measure the impact of the Magnet Lab, expenditures on salaries, capital, and direct and indirect expenses were determined. These funds were then put into a Florida regional input-output model, which includes cross linkages between every sector of the full Florida economy. This study did not quantify the intangible benefits generated by the presence of the Magnet Lab to the local economy, such as quality of life enhancements, intellectual stimulation (through publications, presentations, public service), and creation of spin-off ventures, among others.

The specific breakdown of Magnet Lab funding over the 1990 to 2008 period can be observed in **Figure 4**. The NSF was the biggest single financial supporter of the Magnet Lab over these years providing 42% of total revenues. State of Florida operation funds follow next, at 16.6%, and state capital at 11%. The University of Florida, Los Alamos National Laboratory (LANL), State facility and SRAD have contributed 8.8%, 3.6%, 3.5% and 2.7%, respectively. Other grant support 11.8% of total Magnet Lab funding.

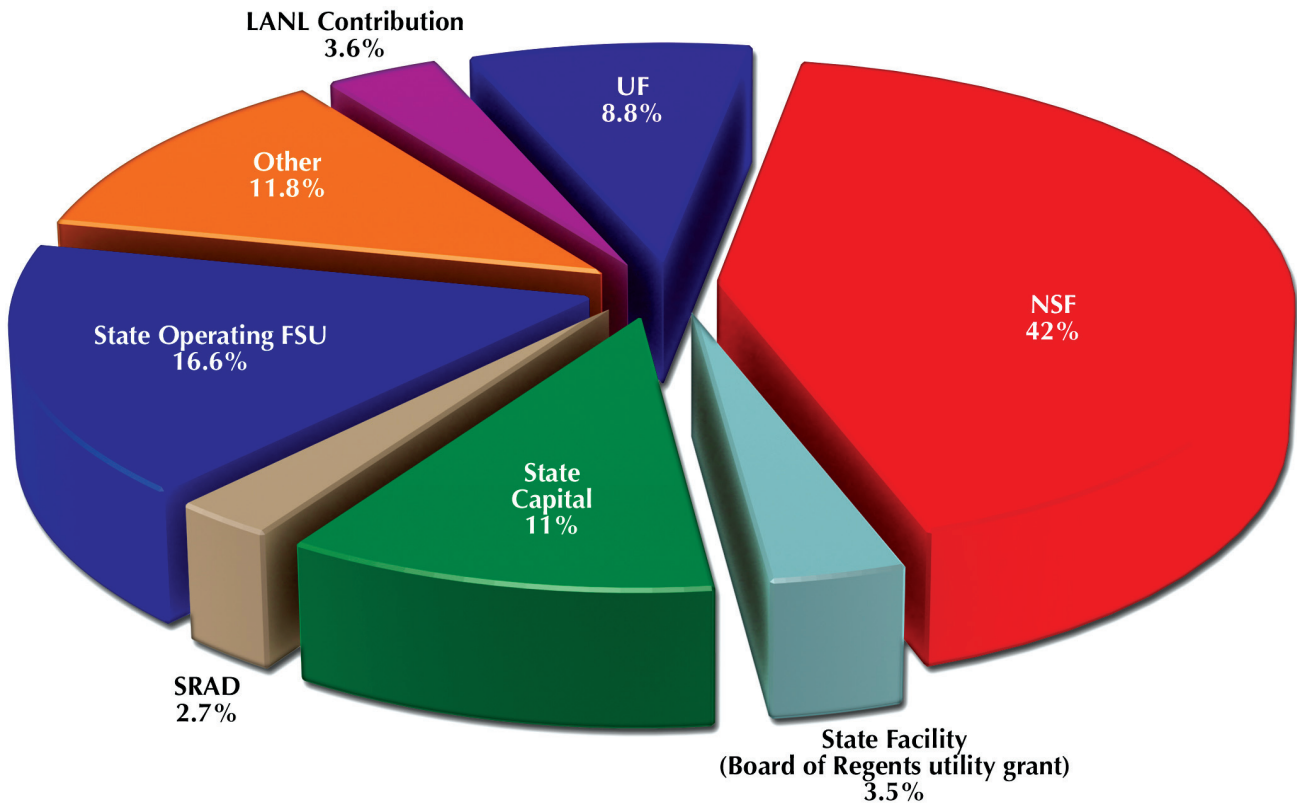


FIGURE 4. Percentage of Magnet Lab Funding by Source (1990-2008)



For this study, Center for Economic Forecasting and Analysis (CEFA) staff used the state of Florida Impact Analysis for Planning, or IMPLAN, model, a widely accepted and used integrated input-output model. IMPLAN is used extensively by state and local government agencies to measure proposed legislative and other program and policy economic impacts across the private and public sectors. In addition, it is the tool of choice to measure these impacts by a number of universities and private research groups that evaluate economic impacts across the state and nation. There are several advantages to using IMPLAN:

- It is calibrated to local conditions using a relatively large amount of local county level and state of Florida specific data;
- It is based on a strong theoretical foundation; and
- It uses a well-researched and accepted applied economics impact assessment methodology supported by many years of use across all regions of the U.S.

The IMPLAN model used for this analysis was specifically developed for the state of Florida, and includes 509 sectors. Staff used the most current version of Florida data – year 2007 data. IMPLAN’s principal advantage is that it may be used to forecast direct, indirect and induced economic effects for an initial economic stimulus, in this case Magnet Lab spending.

Methodology and Assumptions

Expenditures on salaries, capital, direct and indirect expenses for the Magnet Lab, for the years 2006 to 2016, were provided by Magnet Lab financial staff. An assumption was made that there would be fairly consistent percentage levels spent on each category (salaries, capital, etc.) and that it would not vary much over the time frame. We think this is a safe assumption as spending on broad categories such as these within institutions don’t vary widely over such a short time frame. **Figures 5 and 6** provide a breakdown of the Magnet Lab’s allocation of spending for 2008, and from 1990 to 2023.

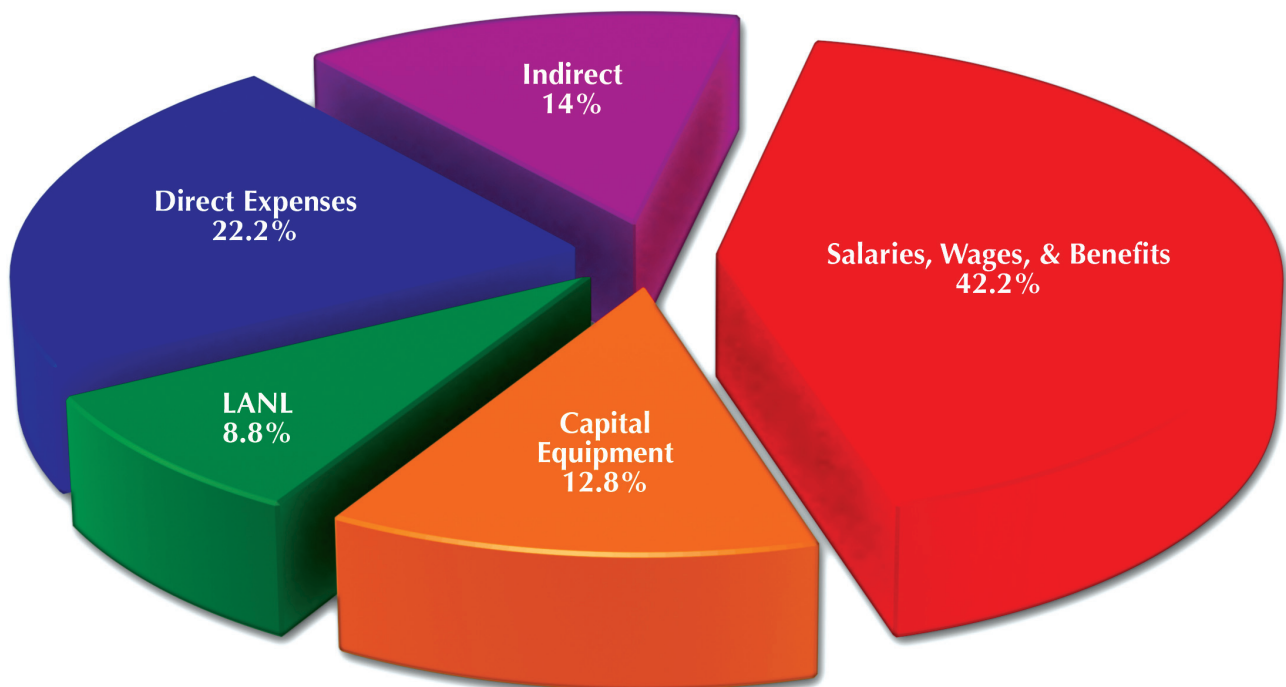


FIGURE 5. Allocation of Magnet Lab Spending for 2008



TABLE 3. Allocation of Magnet Lab Spending 2008 (Nominal Dollars)

Salaries, Wages, & Benefits	\$25,672,848
Capital Equipment	\$7,804,669
LANL	\$5,363,940
Direct Expenses	\$13,496,961
Indirect	\$8,554,657
Total	60,893,075

With this assumption and knowledge of past funding levels, we determined the dollar value that likely would be spent on each category by the Magnet Lab. Expenditures on salaries, capital and direct and indirect expenses by the Magnet Lab were then used as inputs in the IMPLAN model to calculate the lab's economic impact on the Florida economy.

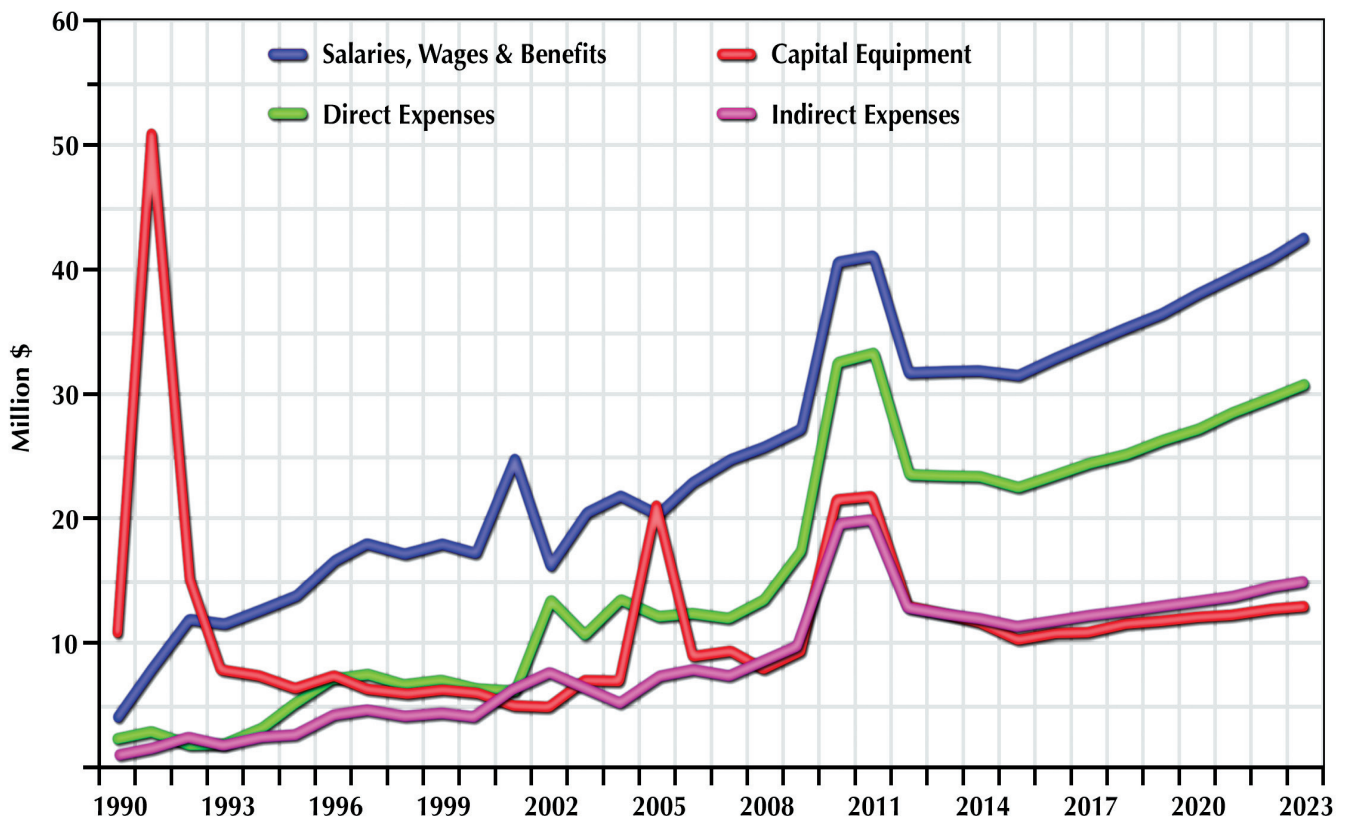


FIGURE 6. Magnet Lab Spending (1990-2023) (Nominal Dollars)



After these policy variables were selected and the data entered, the IMPLAN model was used to determine the economic impact of the Magnet Lab on the statewide economy. The top row of Table 4 summarizes the *average* annual economic impact of state of Florida funds supporting the Magnet Lab if those funds were spent elsewhere. (See Table 2, year 2008, value of state funding of \$16.2 million.) This is referred to as the “alternatives analysis.”

The average annual expenditure of \$16.2 million input into IMPLAN would generate \$29.2 million (in \$2009) in state economic output and \$12.1 million in income (in \$2009) while generating 358 jobs annually.

The second row of the table examines how much additional economic stimulus the actual state funding of the Magnet Lab generates by attracting non-state, Federal, and other funds that otherwise would be attracted elsewhere. This part of the table indicates that the state funding will leverage an annual average economic stimulus to the Florida economy more than five times as large as the alternative investment. This table shows the economic impacts on output, employment and labor income. The Magnet Lab’s annual stimulus in terms of output will exceed \$150 million dollars. This represents the value of final goods and services produced across the Florida economy as a result of state and non-state spending at the Magnet Lab. The annual average value of income generated by Magnet Lab spending over the 2006-2016 period is almost \$62.5 million across the state. Finally, the Magnet Lab generates 1,414 jobs across the Florida economy — jobs that are directly and indirectly stimulated by the spending projected over that period.

TABLE 4. Economic Impact of Magnet Lab State and Non-State Funding (2006-2016)

Annual Average Economic Impact for Years 2006-2016			
	Output*	Employment	Income*
State of Florida to Alternative Investment	\$29,215,039	358	\$12,106,775
Total State and Non-State Magnet Lab Spending	\$150,899,364	1,414	\$62,441,087
Benefit to Cost Ratio	5.17	3.95	5.16

* in February, 2009 \$

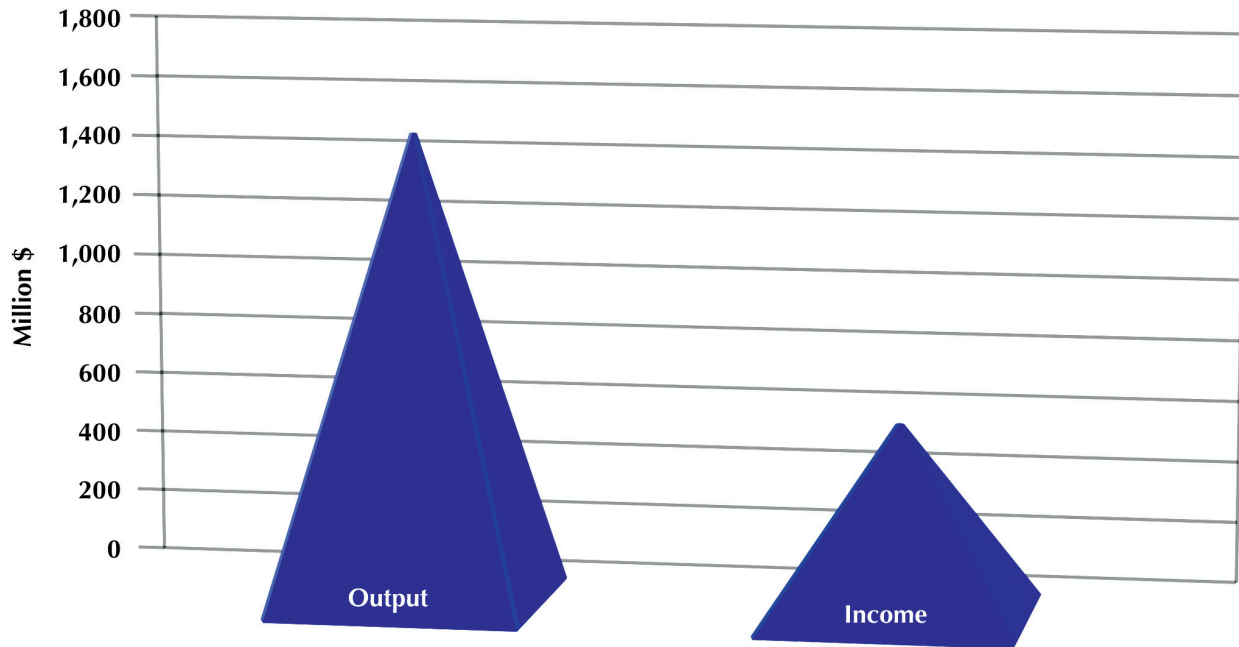


FIGURE 7. Cumulative Economic Impact of Total State and Non-State Magnet Lab Funding (2006-2016)

Figure 7 shows the 11-year 2006 to 2016 estimated total economic stimulation of Magnet Lab state and non-state spending (cumulative) across the Florida economy. If the Magnet Lab was not located in Florida, the Federal and other grants, royalties and other non-state funding would benefit another state. The state and non-state investment across Florida over the next 11 years will generate about \$1.66 billion in state of Florida output and \$687 million in income while generating 15,554 jobs across the state economy.



Cost-Benefit Analysis

The benefits to the state of Florida were defined as the economic impact resulting from the initial state investment and the amount leveraged by the state investment (contracts and grants, government and private sponsors, auxiliary fees/services, and other external sources). The costs to the state of Florida were defined as the opportunity cost of the initial state investment redistributed to higher education spending. As described above, the IMPLAN model estimated the following:

- Benefit to the state = \$151 million
- Cost to the state (opportunity cost, or alternatives investment, of average annual input of \$16.2 million) = \$29.2 million
- Final benefit to cost ratio: 5.17

This B/C ratio implies that for each dollar that the state invests in the Magnet Lab between 2006 and 2016, the state will realize a return of \$5.17.

Key Findings

- For each dollar the state invests in the Magnet Lab between 2006 and 2016, the state will realize a return of \$5.17.
- From 2006 to 2016, for every dollar invested by the state of Florida, the Magnet Lab is expected to attract \$4.13 in federal and other sources of money. Over the 11-year time frame, the state's total projected investment of \$179 million will net \$739 million in non-state spending.
- The state of Florida investment in the Magnet Lab over the 11-year time frame will generate \$1.66 billion in output (value of goods and services produced in \$2009) and \$689 million in income (\$2009), while generating 15,554 jobs across the state economy.
- State funding in the Magnet Lab will leverage an annual average economic stimulus to the Florida economy more than five times as large as if that investment had been spent elsewhere in Florida.