

The National-Level Economic Impact of the Manufacturing Extension Partnership (MEP)

REMI USERS CONFERENCE OCTOBER 2017

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce



**MEP • MANUFACTURING
EXTENSION PARTNERSHIP**

W.E.
UPJOHN INSTITUTE
FOR EMPLOYMENT RESEARCH

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W.E. Upjohn Institute for Employment Research

- The Institute is an activity of the W.E. Upjohn Unemployment Trustee Corporation, which was established in 1932 to administer a fund set aside by Dr. W.E. Upjohn, founder of the Upjohn Company.
- **MISSION:**
 - The W.E. Upjohn Institute for Employment Research is a private, nonprofit, nonpartisan, independent research organization devoted to investigating the causes and effects of unemployment, to identifying feasible methods of insuring against unemployment, and to devising ways and means of alleviating the distress and hardship caused by unemployment.

What is the Manufacturing Extension Partnership?

MEP is a public-private partnership that provides small and medium-sized manufacturers (SMMs) technology-based services needed to thrive in today's economy and create well-paying manufacturing jobs. MEP is managed by the National Institute of Standards and Technology (NIST), a U.S. Department of Commerce agency, and implemented through a network of industry-led centers located in all 50 states and Puerto Rico. MEP centers are not-for-profit corporations or state/university-based organizations that employ or partner with industry experts who work with manufacturers.





MISSION

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To enhance the productivity and technological performance of U.S. Manufacturing.

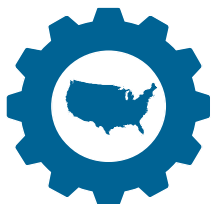
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ROLE

MEP's state and regional centers facilitate and accelerate the transfer of manufacturing technology in partnership with industry, universities and educational institutions, state governments, and NIST and other federal and research laboratories and agencies.

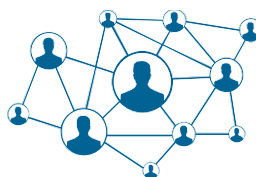


MEP Program in Short



Program Started in 1988

At least one center in all 50 states and Puerto Rico by 1996.



National Network

51 centers with nearly 600 Field Locations.
Nearly 1,300 non-federal staff nationwide, with over 2,500 partners.



Partnership Model

Federal, State, University,
and Industry



MEP System Budget

\$130 Million Federal Budget
with Cost Share
Requirements for Centers



Global Competitiveness

Program was created by the
1988 Omnibus Trade And
Competitive Act



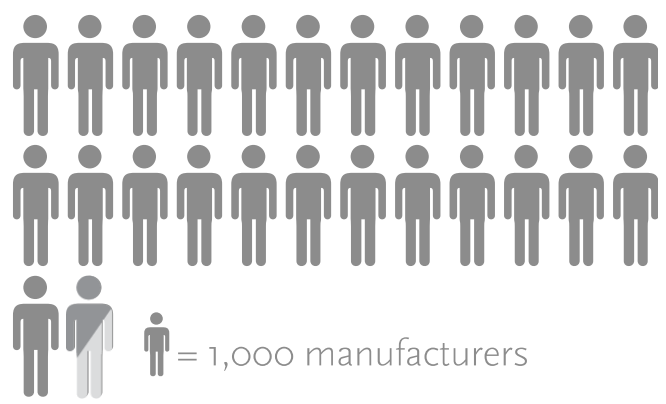
Evolving Role

Program continues to evolve in
order to support manufacturers
during changing economic
situations.



Delivering Impacts for Clients

25,445
Manufacturers
reached in FY16

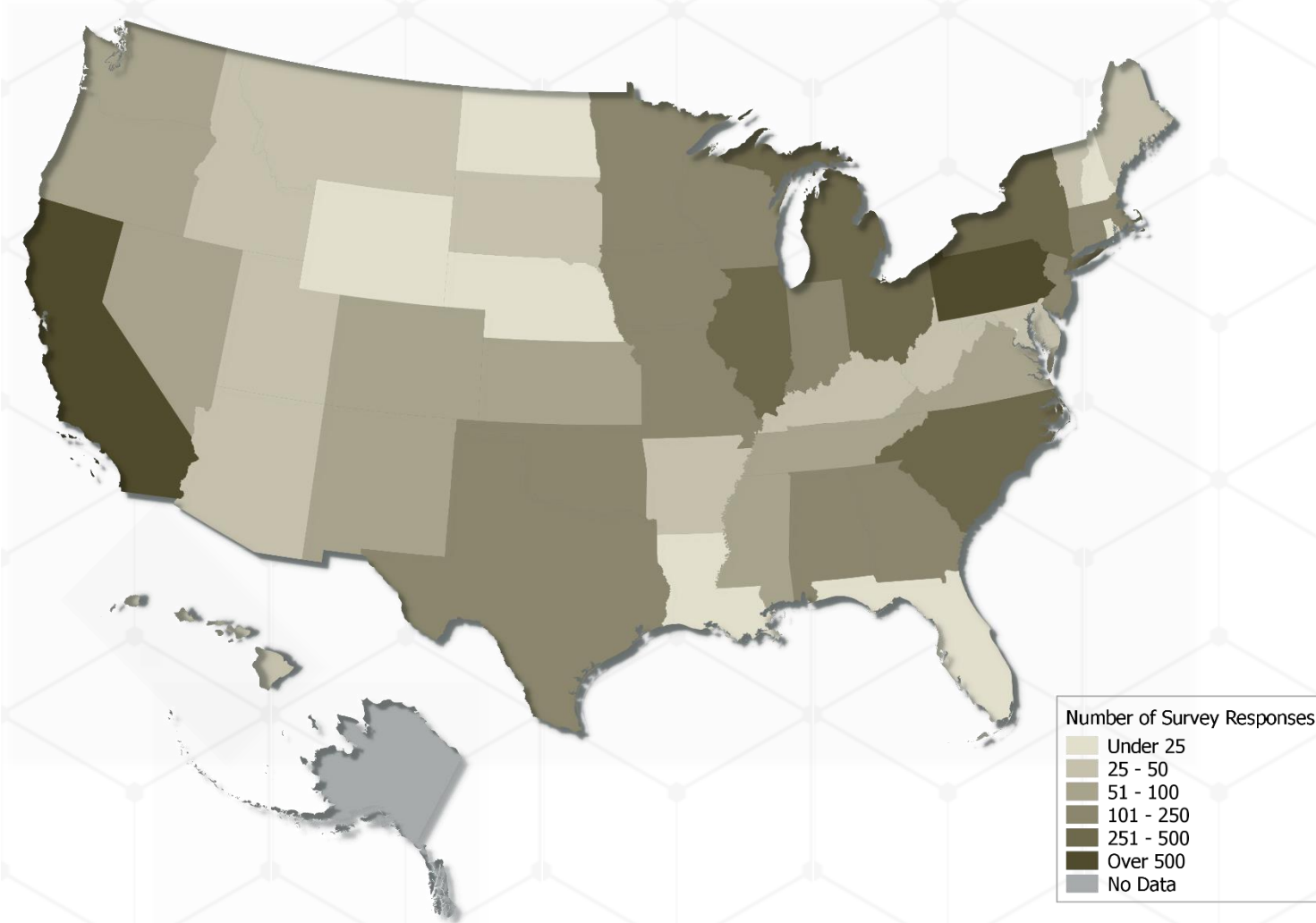


					
JOBS RETAINED	JOBS CREATED	NEW CLIENT INVESTMENTS	COST SAVINGS	RETAINED SALES	NEW SALES
66,922	19,680	\$3.5 Billion	\$1.4 Billion	\$7 Billion	\$2.3 Billion

Study Purpose/Background

- The study's goal was to use the client-reported outcomes to estimate the overall effect of MEPs on the U.S. economy.
- NIST MEP contracted with the W.E. Upjohn Institute for Employment Research. Upjohn is a private, nonprofit, nonpartisan, independent research organization established in 1932.
- Data from the national FY2016 NIST MEP client survey was provided to Upjohn. This was used to estimate the overall effect of the MEPs on the U.S. economy.
- The study used new and retained jobs, new and retained sales, new investment, and cost savings reported by clients and then aggregated.
- The study used the survey results in combination with an economic impact model developed by Regional Economic Models Inc. (REMI) to estimate the indirect and induced effects of the reported increase in jobs, sales, cost savings, and investments by MEP clients.

Survey Responses



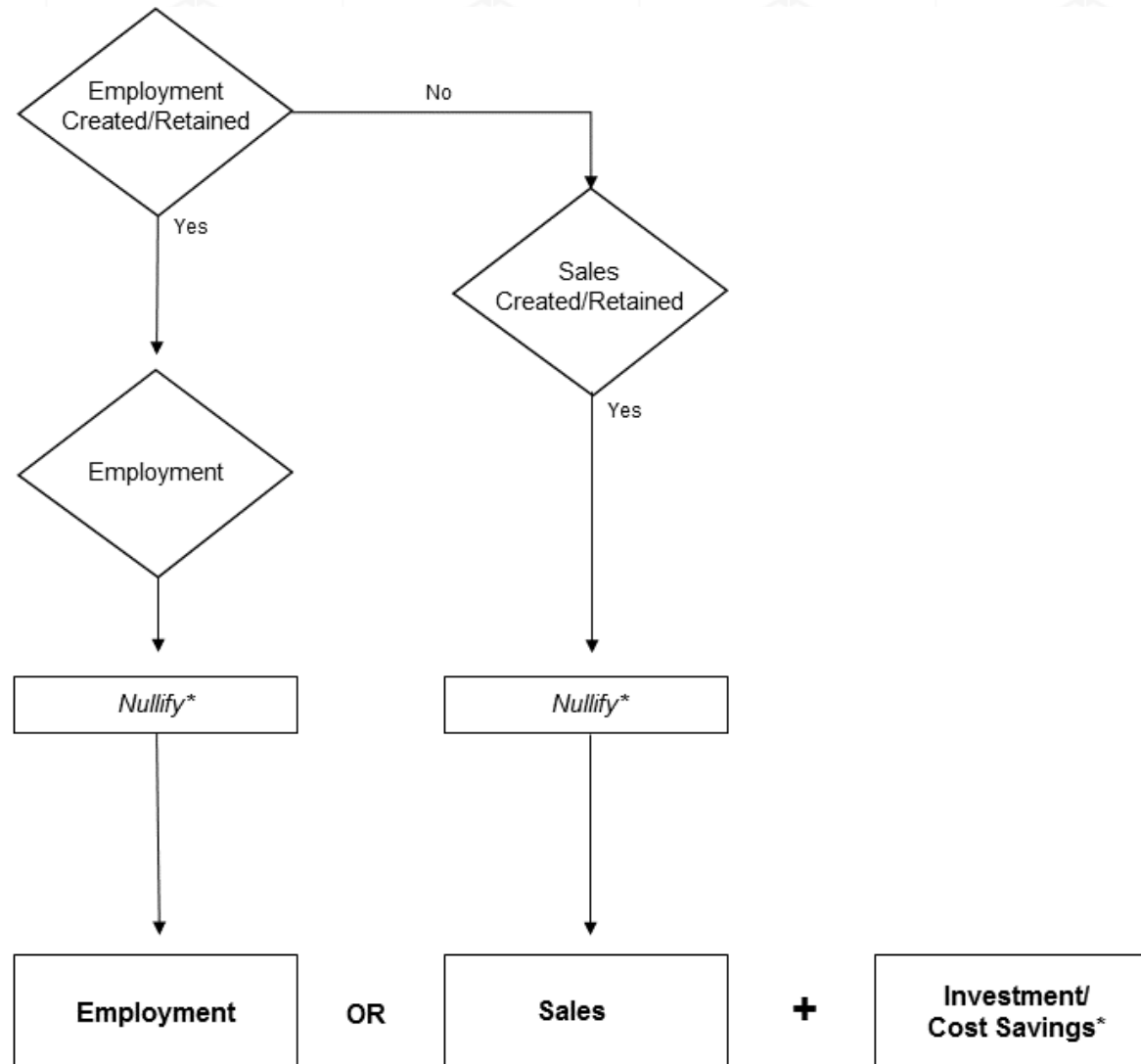
Study Assumptions

- The study takes the reported outcomes of MEP clients at face value. It did not attempt to validate the reported outcomes.
- This study is based on the *MACRO* economy, which presents its own issues.
- It considers how the results would vary if only a fraction of the reported outcomes represented the actual effects of MEP activities.
- Recognizing that one use of this study is to determine whether the cost of the MEP program is justified by the benefits it generates, the study estimates the fraction of reported outcomes required for the program to break even, as measured by the projected personal income tax increases covering the annual cost of the program for FY2016 (\$130 million).

Study Overview

- **The study presents three scenarios.**
- **Scenario One: The unconstrained approach in which it is assumed that an increase in sales of one firm does not effect or reduce the sales of another firm. This assumption is not entirely realistic, since it does not take into account competition among firms and the displacement effects that occur from the competition across firms. This scenario is included to serve as an upper bound on the results.**
- **Scenario Two: A more accurate, yet conservative, scenario assumes that competition among firms reduces the outcomes as a result of competition.**
- **Scenario Three: A third model was run to examine how much the overall survey impacts used in the model must be discounted to generate enough federal personal tax revenue to equal federal funding. This is intended to serve as a lower bound on the results.**

Modelling the Net Impact



National MEP Client-Reported Outcomes Resulting from MEP Center Activities, FY 2016

Sales: **+\$9.33b**

- Increased: \$2.33b
- Retained: \$ 7b

Jobs: **+86,541**

- Created: 19,653
- Retained: 66,888

Cost Savings: **+\$857m**

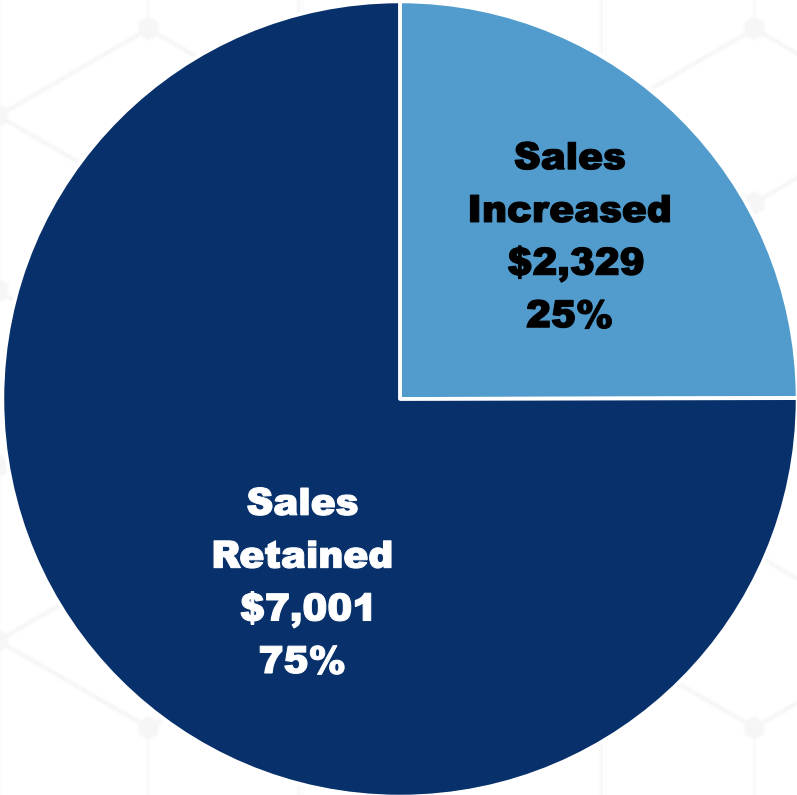
Investment Savings: **+\$514m**

Total Investment: **+\$3.5b**

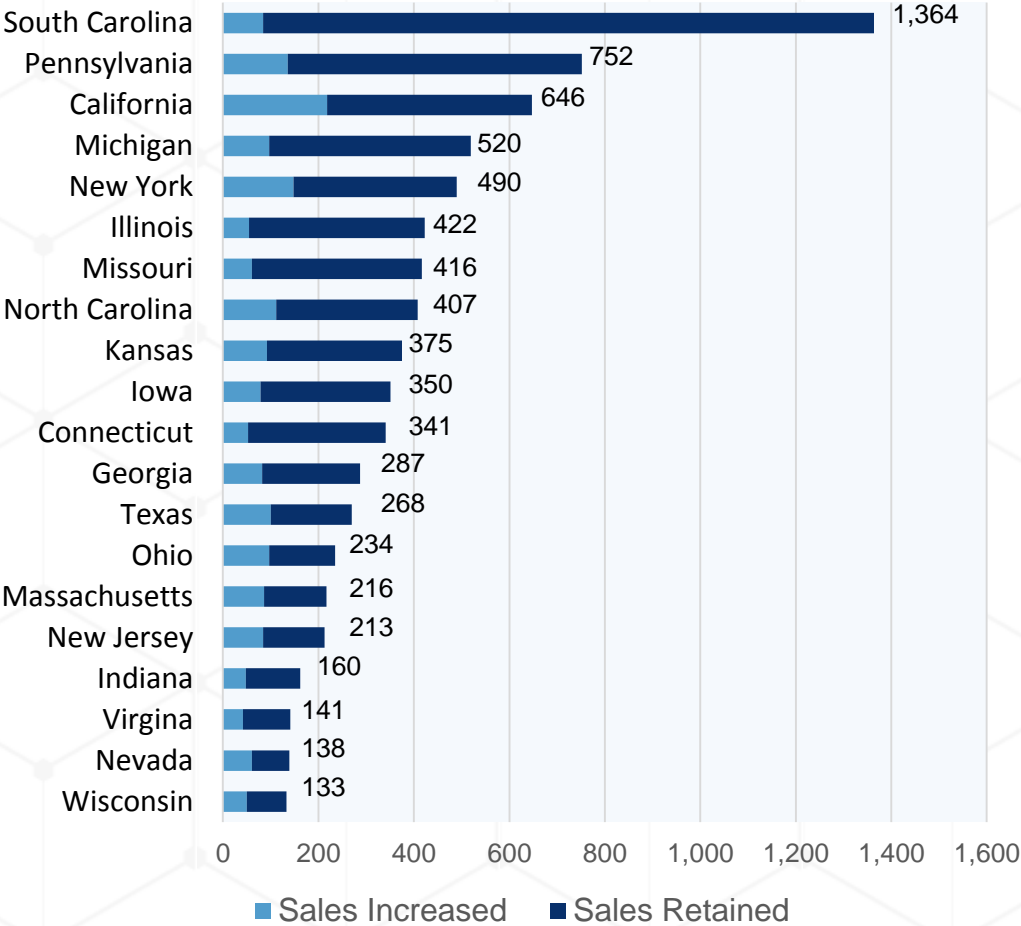
- Products & Process: \$1.07b
- Plant & Equipment: \$1.83b
- Systems & Software: \$134m
- Workforce Practices & Employee Skills: \$210m
- Other Areas of Business: \$227m

Overview of Total Sales

Total Sales Increased vs. Total Sales Retained
(in millions)

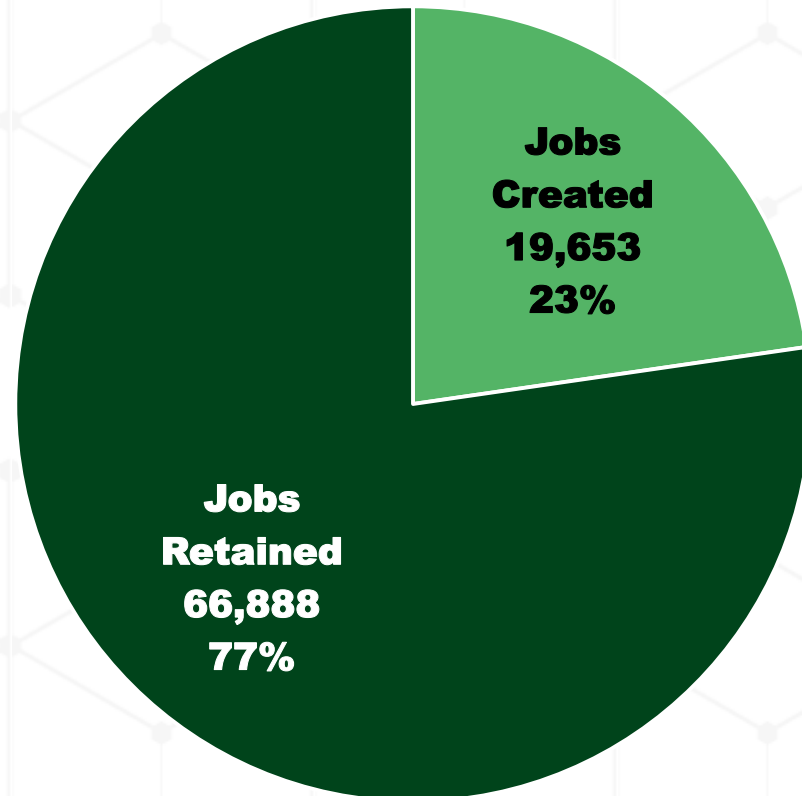


Top States and Territories for Total Sales
(in millions)

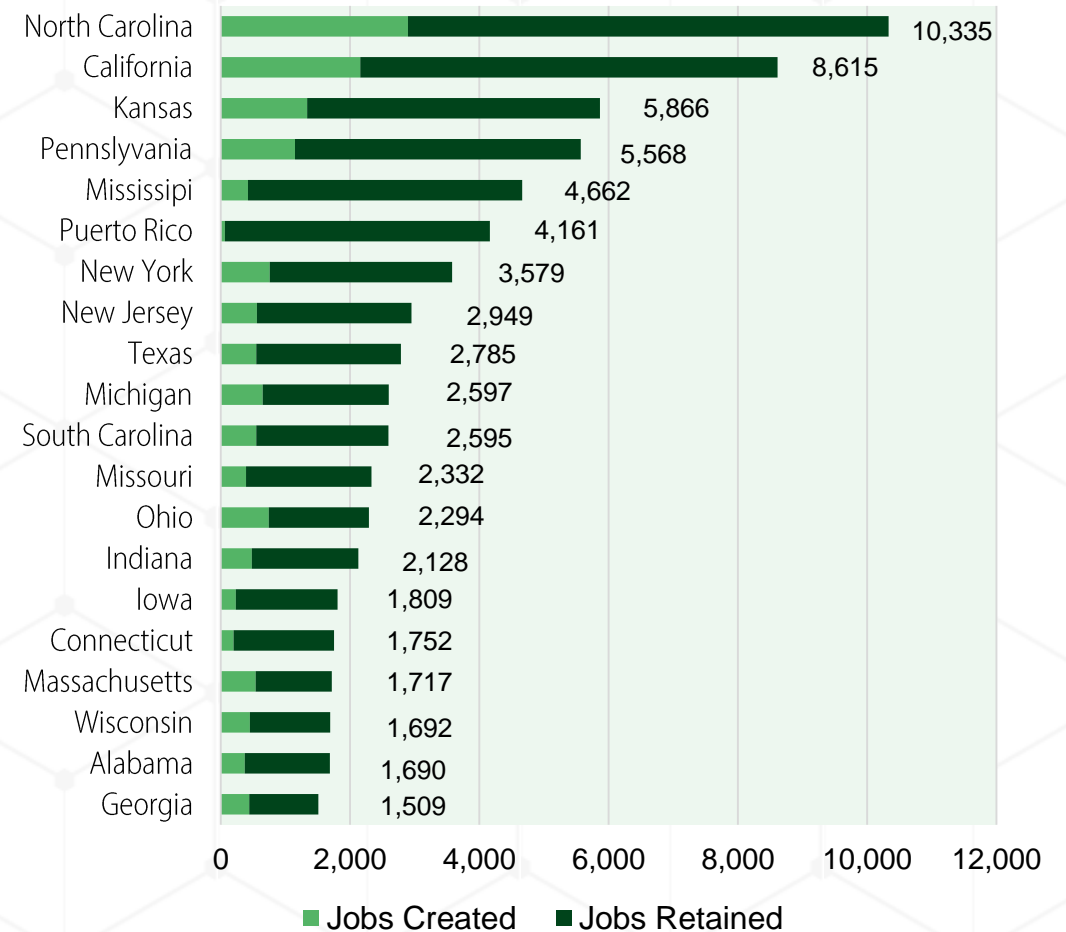


Overview of Total Jobs

Total Jobs Created vs. Total Jobs Retained

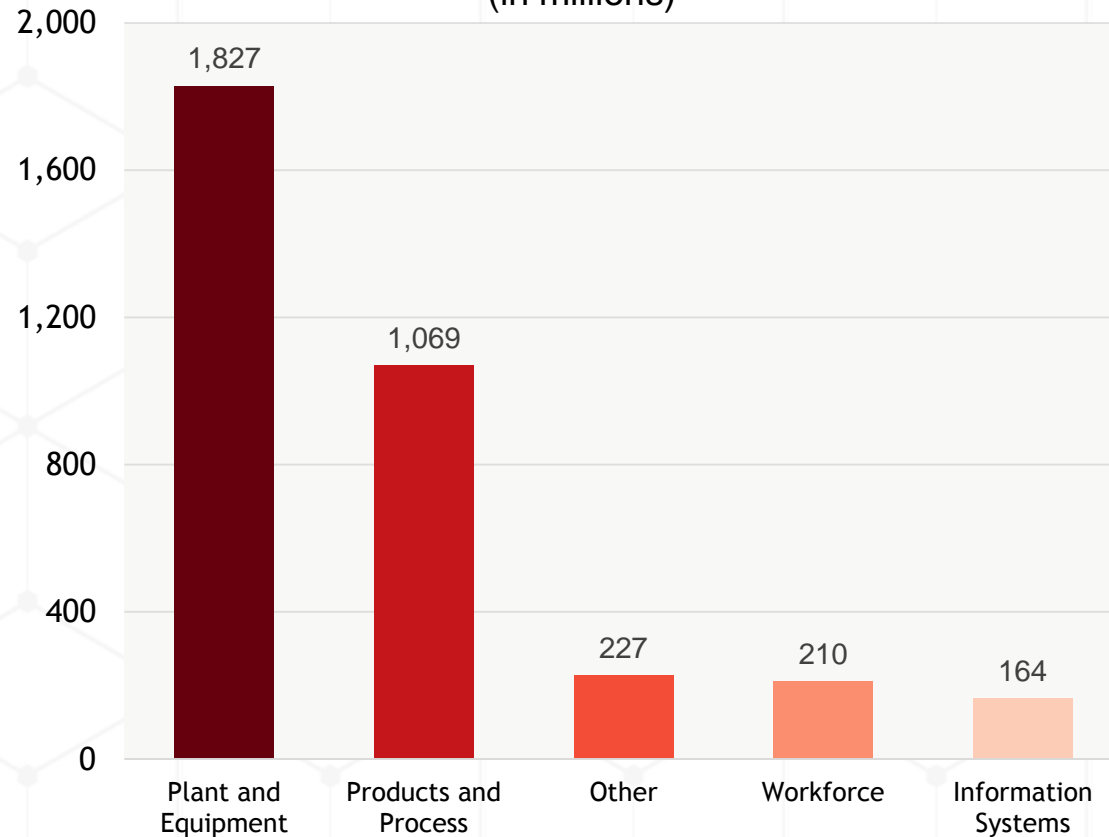


Top States and Territories for Total Jobs Created and Retained

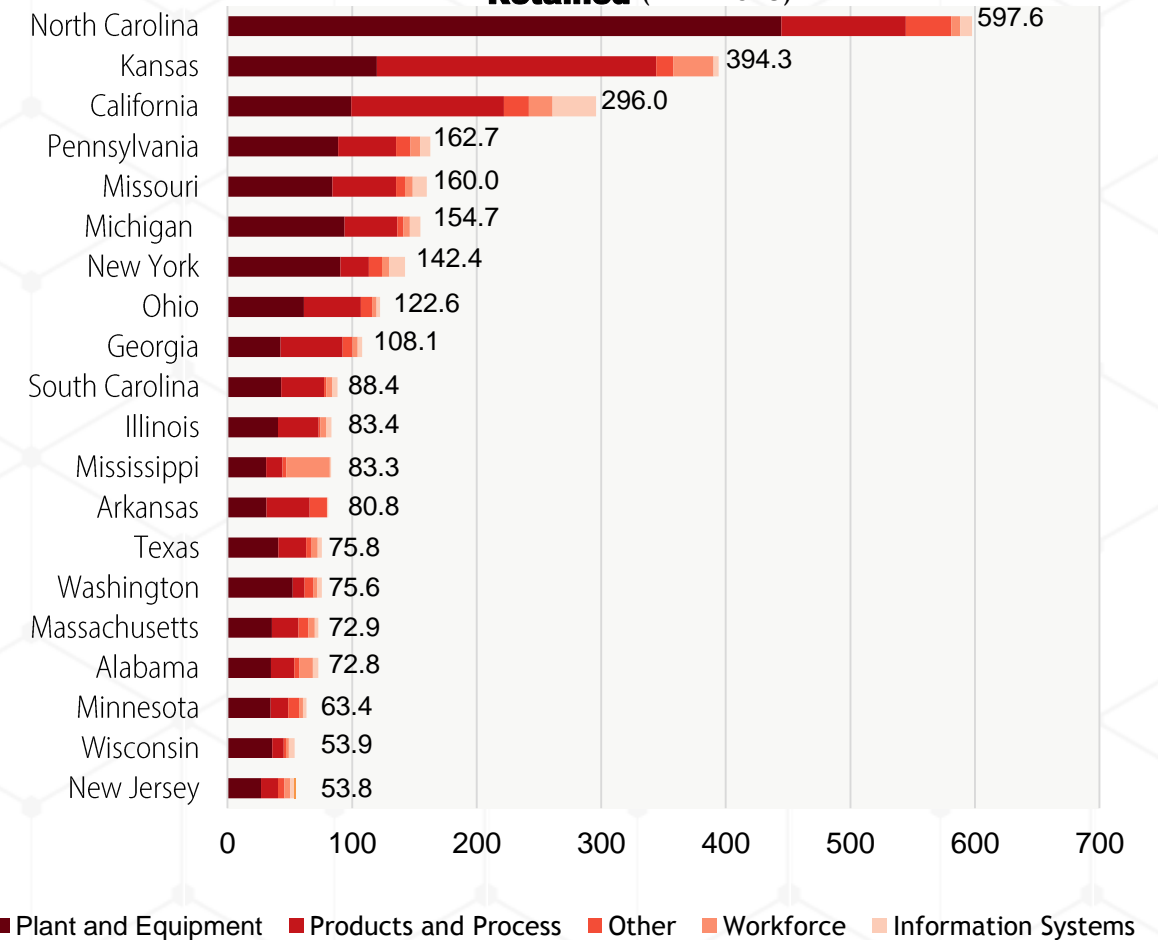


Overview of Total Investments

Breakdown of Total Investments
(in millions)

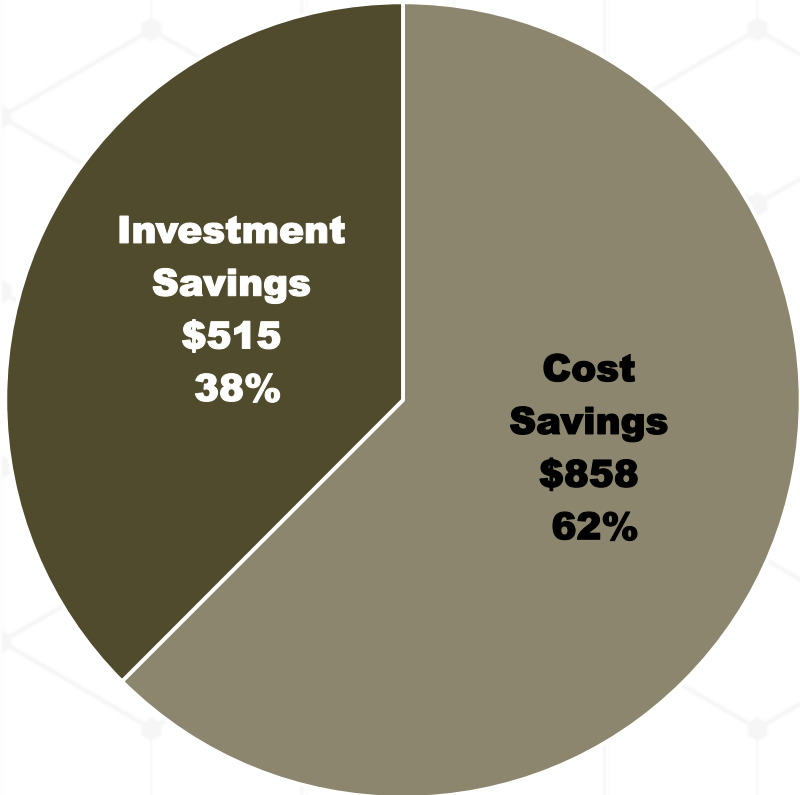


Top States and Territories for Total Jobs Created and Retained
(in millions)

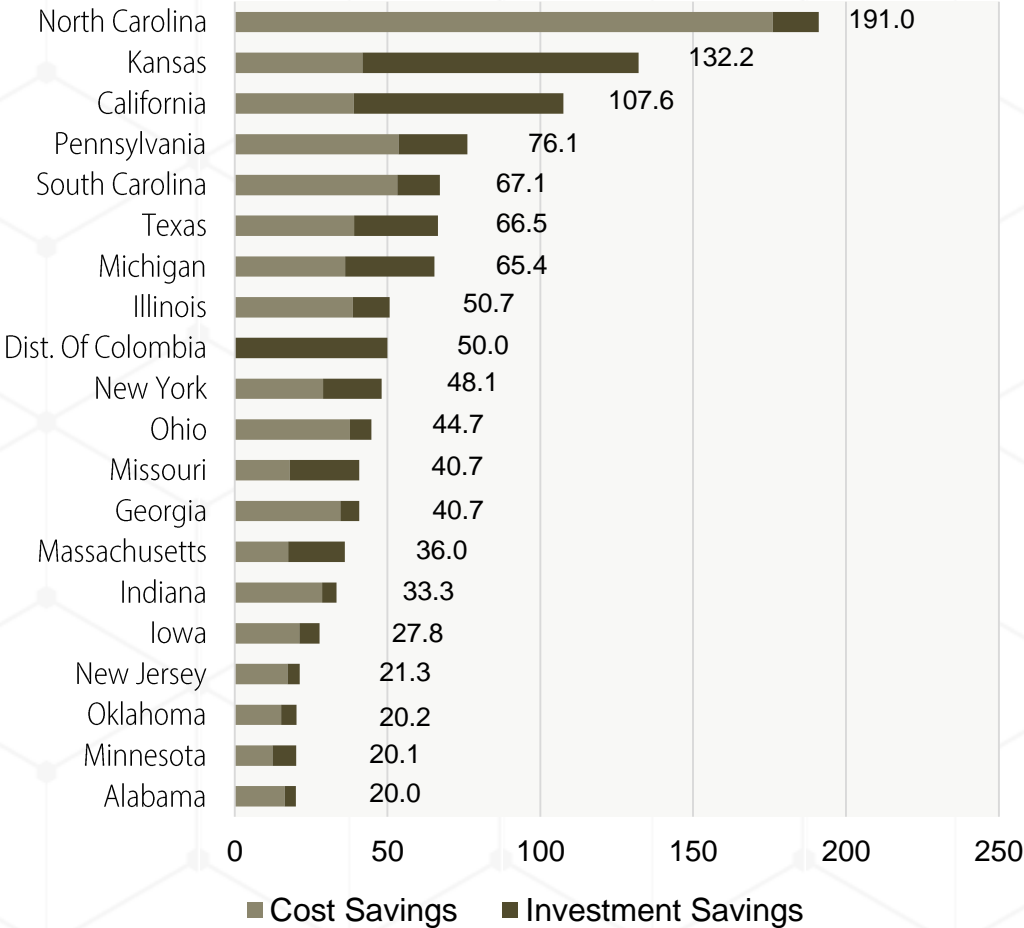


Cost Savings vs. Investment Savings

Total Cost Savings vs. Total Investment Savings
(in millions)



Top States and Territories for Total Savings
(in millions)





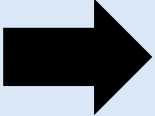


The Findings in Brief

- This study finds that the effects of MEP projects on the U.S. economy and the \$130 million invested in MEP during FY2016 generated nearly a nine-fold increase in federal personal income tax – a 8.7:1 return.
- The study takes into account the competitive interactions among businesses and uses the client-reported effects of MEP projects, and are included in the model compared to when they are not.
- The W.E. Upjohn Institute for Employment Research conducted the national impact analysis based on results from the MEP Client Survey conducted by Fors Marsh using the REMI model, which forecasts the following outcomes in FY2016:
 - 142,000 additional jobs
 - Additional economic output of just under \$29.9B, and
 - A \$15.4 billion increase in GDP

Some Things to Consider

- **It is likely that all of a firm's growth and savings are not fully attributable to MEP center activities.**
- **The final forecast tests the sensitivity to this consideration. It asks, "How much of the changes to the firms must be attributable to MEP activities in order for the annual cost of MEP to equal its benefits?"**
- **By setting the return on investment (ROI) at 1:1, with personal income tax collection equal to MEP's FY2016 budget of \$130 million, the needed level of MEP attribution is about 11.5 percent. Even by claiming slightly over a tenth of the reported client outcomes, MEP activities are associated with an additional 16,532 jobs and nearly a \$1.8 billion increase in GDP.**

The Results

Forecast	 Jobs	 GDP	 Output	 Personal Income	 Returns to Treasury	ROI Return on Investment
Unconstrained Model Using Industry Variables	575,870	\$63.04*	\$130.15*	\$34.64*	\$4.66*	35.8:1
Constrained Model Using Firm Variables	142,381	\$15.40*	\$29.89*	\$8.44*	\$1.13*	8.7:1
11.5% Solution Using Firm Variables	16,532	\$1.79*	\$3.46*	\$.98*	\$.132*	1:1

*Dollars in billions

Detailed Sector Analysis

Jobs Created or Retained by Industry	
Sector	2016
Forestry, Fishing, and Related Activities	388
Mining	1,652
Utilities	385
Construction	15,812
Manufacturing	27,468
Wholesale Trade	5,741
Retail Trade	15,291
Transportation and Warehousing	5,170
Information	2,124
Finance and Insurance	7,158
Real Estate and Rental and Leasing	4,973
Professional, Scientific, and Technical Services	8,524
Management of Companies and Enterprises	2,933
Administrative and Waste Management Services	8,973
Educational Services (private)	2,409
Health Care and Social Assistance	10,679
Arts, Entertainment, and Recreation	3,243
Accommodation and Food Services	6,453
Other Services, except Public Administration	8,745

Less than 20%

The 142,000 jobs created or retained in the U.S. economy due to MEP activities are distributed widely across the various industries. The initial inclination may be to think that most of the jobs would be generated within manufacturing, since MEP Centers focus their services on manufacturing businesses and most of the direct employment effects are primarily in manufacturing. Ninety-five percent of the respondents to the survey are manufacturing firms. Yet, only 20 percent of the total number of jobs created or retained are in manufacturing. Thirty percent of MEP's impact on employment is in three non-manufacturing sectors: construction, retail trade, and health care and social assistance. This makes sense when one thinks of the indirect and induced effects of direct job creation or retention on worker purchases in retail and health care. The other 50 percent of MEP's impact on employment is spread among the remaining industries.

The implication of these results is that even though MEP focuses on the manufacturing effects, its overall effects benefit all sectors of the economy.

Employment Outcomes of Detailed Manufacturing Industries

Manufacturing	2016
Wood product manufacturing	707
Nonmetallic mineral product manufacturing	657
Primary metal manufacturing	1,293
Fabricated metal product manufacturing	3,241
Machinery manufacturing	3,144
Computer and electronic product manufacturing	2,343
Electrical equipment and appliance manufacturing	1,448
Motor vehicles, bodies and trailers, and parts manufacturing	1,469
Other transportation equipment manufacturing	3,365
Furniture and related product manufacturing	898
Miscellaneous manufacturing	1,414
Food manufacturing	1,826
Beverage and tobacco product manufacturing	151
Textile mills; Textile product mills	956
Apparel, leather and allied product manufacturing	549
Paper manufacturing	483
Printing and related support activities	389
Petroleum and coal products manufacturing	104
Chemical manufacturing	1,448
Plastics and rubber product manufacturing	1,581

As with the overall economy, the employment effects of MEP activities are spread throughout the manufacturing sector. While 30 percent of the respondents were in two manufacturing sectors—fabricated metals and machinery manufacturing – only 20 percent of the total employment effects on manufacturing were estimated to impact those two industries. In fact, the largest single industrial sector impacted by MEP activities was the food industry, with an estimated 14 percent of the total manufacturing employment impact. Consider that only 7 percent of the survey respondents identified their businesses as being in the food manufacturing industry. These results highlight the importance and widespread nature of supply chains and the overall impact of MEP activities on workers, as exhibited in higher consumer purchases.

Summary Occupations

Summary Occupations	2016
Management, business, and financial occupations	16,195
Computer, mathematical, architecture, and engineering occupations	7,750
Life, physical, and social science occupations	900
Community and social service occupations	1,134
Legal occupations	922
Education, training, and library occupations	3,253
Arts, design, entertainment, sports, and media occupations	2,170
Healthcare occupations	7,058
Protective service occupations	1,766
Food preparation and serving related occupations	6,638
Building and grounds cleaning and maintenance, personal care and service occupations	9,912
Sales and related, office and administrative support occupations	37,919
Farming, fishing, and forestry occupations	321
Construction and extraction occupations	11,637
Installation, maintenance, and repair occupations	7,244
Production occupations	16,965
Transportation and material moving occupations	10,596

Using the national industry-occupation matrix, it is possible to transform the industry employment effects into occupation effects. The primary occupations in the manufacturing sector are production and transportation and material handling, which account for 27,000 or 19 percent of the total overall employment effect. The single occupation group with the largest estimated employment impact is sales and related office and administrative support. This occupation group accounts for 27 percent of the total effect. Management, business, and financial occupations rival the largest impacted manufacturing occupation, which attests to the widespread effects of MEP-generated activities.

Less Than 20%

Top 20 Detailed Occupations

The table to the left lists more detailed occupations than what was displayed in the previous slide. In this table, the top 20 occupations are shown with respect to MEP-generated employment impacts.

While some of these occupations are in the goods producing sector, they are also across a range of skills from retail and food service workers to executives and financial specialists.

This suggests that MEP impacts stretch across a spectrum of workers that demand a range of skills and offer a range of incomes. This portfolio creates an opportunity for a range of workers, including a first job as well as the potential for permanent employment in jobs with career ladders.

Detailed Occupations	
Construction trades workers	9,185
Retail sales workers	8,703
Information and record clerks	5,426
Material moving workers	5,078
Business operations specialists	4,835
Metal workers and plastic workers	4,617
Motor vehicle operators	4,331
Other installation, maintenance, and repair occupations	4,196
Other production occupations	4,191
Other office and administrative support workers	4,174
Computer occupations	3,937
Secretaries and administrative assistants	3,873
Assemblers and fabricators	3,847
Material recording, scheduling, dispatching, and distributing workers	3,834
Food and beverage serving workers	3,738
Financial clerks	3,519
Building cleaning and pest control workers	3,457
Financial specialists	3,249
Top executives	2,958
Health diagnosing and treating practitioners	2,639

Production Occupations & Materials Handling Occupations

Production & Materials Handling Occupations	2016
Supervisors of production workers	1,164
Assemblers and fabricators	3,847
Food processing workers	847
Metal workers and plastic workers	4,617
Printing workers	244
Textile, apparel, and furnishings workers	1,288
Woodworkers	499
Plant and system operators	270
Other production occupations	4,191
Supervisors of transportation and material moving workers	430
Air transportation workers	164
Motor vehicle operators	4,331
Rail transportation workers	113
Water transportation workers	58
Other transportation workers	421
Material moving workers	5,078

Slightly more than 60 percent of jobs in this combined group of production occupations and materials handling occupations are in more detailed production occupations. Occupations accounting for most of the jobs among production workers include assemblers and fabricators, metal and plastic workers, and “other” production workers.

Among the materials handling occupations, motor vehicle operators and material moving workers represent most of the employment. For these occupations, the former tend to be offsite moving goods and people while the latter tend to be onsite.

The Study Team

The team contributing to this report are:

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