Estimating the Impacts of Business Assistance Programs: The Case of the Manufacturing Extension Partnership and Multi-year Estimates

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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

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

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.

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. The estimates have been created for the past 3 fiscal years.

- NIST MEP contracted with the W.E. Upjohn Institute for Employment Research.

- Data from the national FY 2018 NIST MEP client survey were 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.

Study Assumptions

- The study takes the reported outcomes of MEP clients at face value. It did not attempt to validate the reported outcomes.

- 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 FY2018 ($140 million).

Modelling the Net Impact
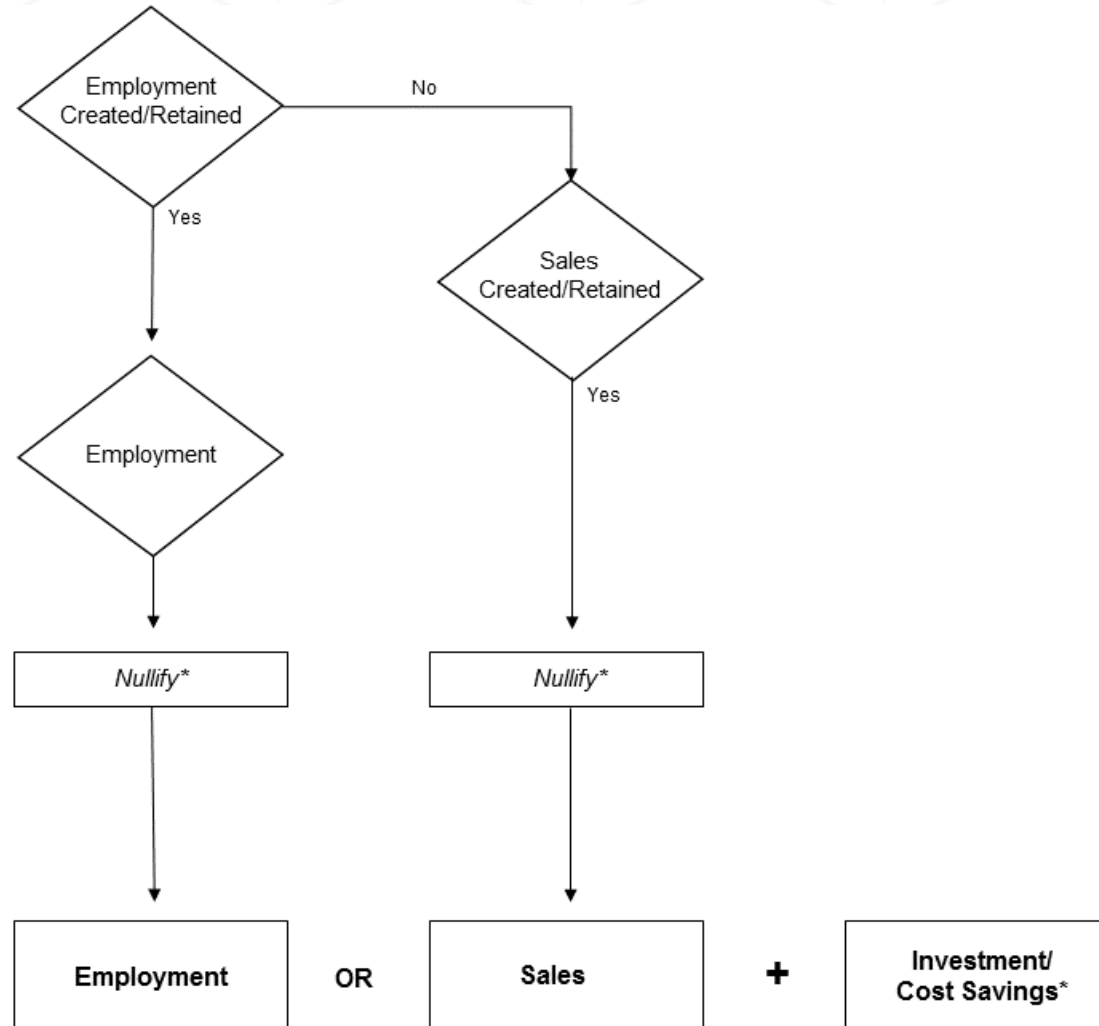
Study Overview

- 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.

Study Overview (continued)

Table 1: Differences in Survey Impacts, FY18 vs. FY 16 and FY17.

Category	FY16	FY17	FY18	FY16 to FY17 % Change	FY17 to FY18 % Change
Total Jobs	86,541	100,721	121,412	16.4	20.5
Created	19,653	24,210	26,486	23.2	9.4
Retained	66,888	76,511	94,926	14.4	24.1
Total Sales	$9.33b	$12.6b	$15.9b	35.0	26.2
Increased sales	$2.33b	$3.5b	$3.8b	50.2	8.6
Retained sales	$7.0b	$9.1b	$12.0b	30.0	31.9
Cost Savings	$857m	$1.04b	$976m	21.4	-6.2
Investment Savings	$514m	$703m	$724M	32.8	30
Total Investment	$3.5b	$3.5b	$4.0b	0.0	14.3
Products & Process	$1.07b	$1.07b	$1.08b	0.0	0.9
Plant & Equipment	$1.83b	$1.86b	$2.32b	1.64	24.7
Systems & Software Information	$134m	$178m	$206m	32.8	5.7
Workforce Practices	$210m	$199m	$202m	-5.2	1.5
Other	$227m	$233m	$214m	2.6	-8.2

Some Things to Consider

- It is likely that not all of a firm's revenue growth, investment, and cost savings are 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 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 FY2018 budget of $140 million, the needed level of MEP attribution is about 6.9 percent. Even by claiming just under 7 percent of the reported client outcomes, MEP activities are associated with an additional 16,427 jobs and just over a $1.6 billion increase in GDP.

Study Overview: Estimates of Impacts
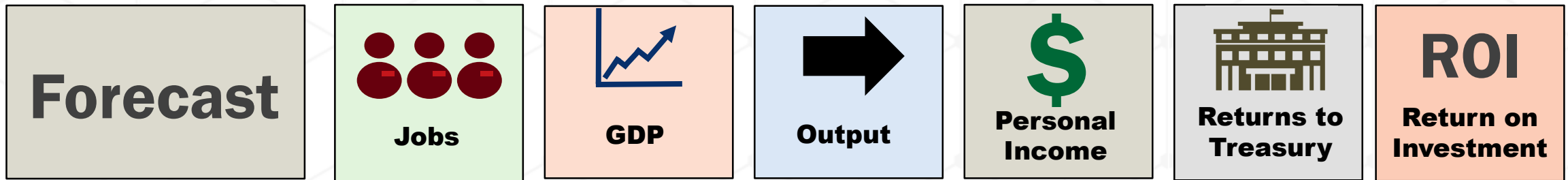
Forecast	Jobs	GDP	Output	Personal Income	Returns to Treasury	ROI Return on Investment
Unconstrained Model Using Industry Variables	843,889	$103.16*	$203.38*	$54.51*	$7.19*	51.4:1
Constrained Model Using Firm Variables	236,802	$24.9*	$46.6*	$15.0*	$2.02*	14.4:1
6.9% of Reported Impact	16,427	$1.62*	$3.04*	$1.04*	$0.140*	1:1

*Dollars in billions

MEP Economic Impact Analysis:
Estimates of Fiscal Year 2018
THE CHANGE FROM 2017 VS 2018
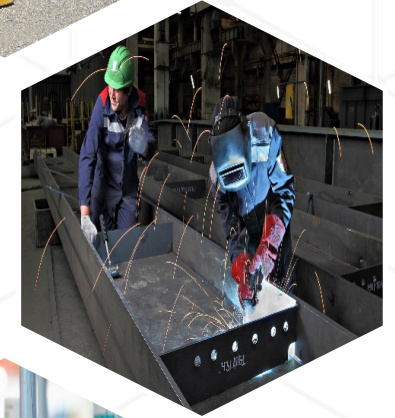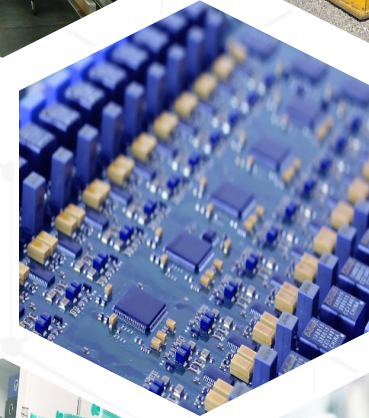
Factors affecting the economic impact

- Clients responding
  - FY 2016: 6,507
  - FY 2017: 7,228
  - FY 2018: 7,986
- Survey response rate:
  - FY 2016: 73.1%
  - FY 2017: 80.1%
  - FY 2018: 83..1%
- On-going evolution of the REMI model
- Changing baselines for the national and regional forecasts
- Updates to assumptions about factors such as productivity and growth

Factor: Industry Mix
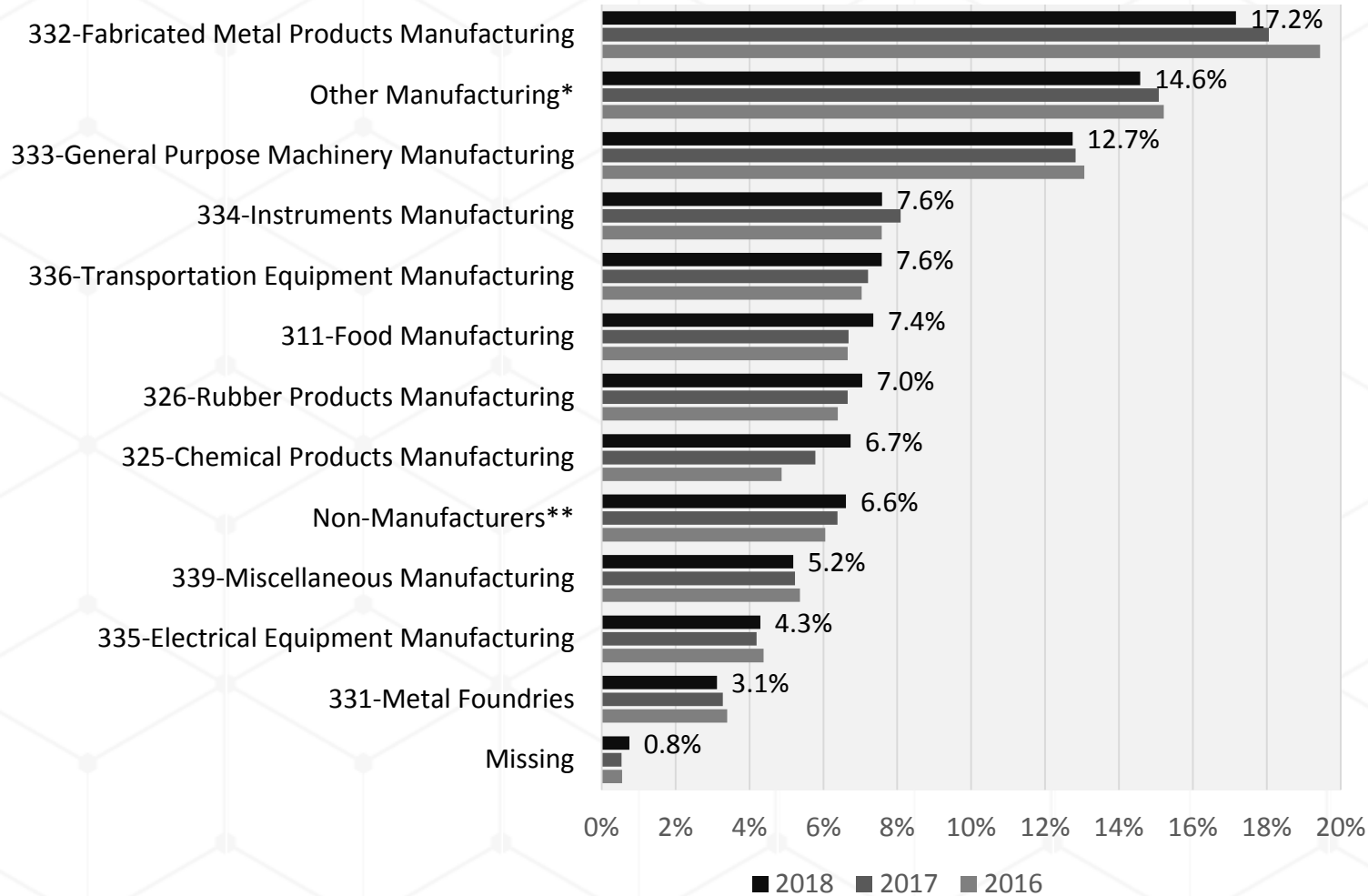
Industry	2016	2017	2017
332-Fabricated Metal Products Manufacturing	1,265	1,305	1,371
Other Manufacturing*	990	1090	1164
333-General Purpose Machinery Manufacturing	850	927	1,018
334-Instruments Manufacturing	493	585	606
336-Transportation Equipment Manufacturing	458	521	605
311-Food Manufacturing	433	483	587
326-Rubber Products Manufacturing	416	481	563
325-Chemical Products Manufacturing	394	461	528
Non-Manufacturers**	317	418	538
339-Miscellaneous Manufacturing	349	378	414
335-Electrical Equipment Manufacturing	285	303	343
331-Metal Foundries	221	237	249
Missing	36	39	60

Total Respondents

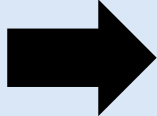*-Includes NAICS: 312-316, 321-324, 327 & 337
**-Includes NAICS: 423, 488, 541, 561, & 811
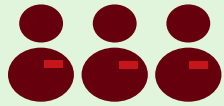
Factor: Total inputs such as jobs per Industry
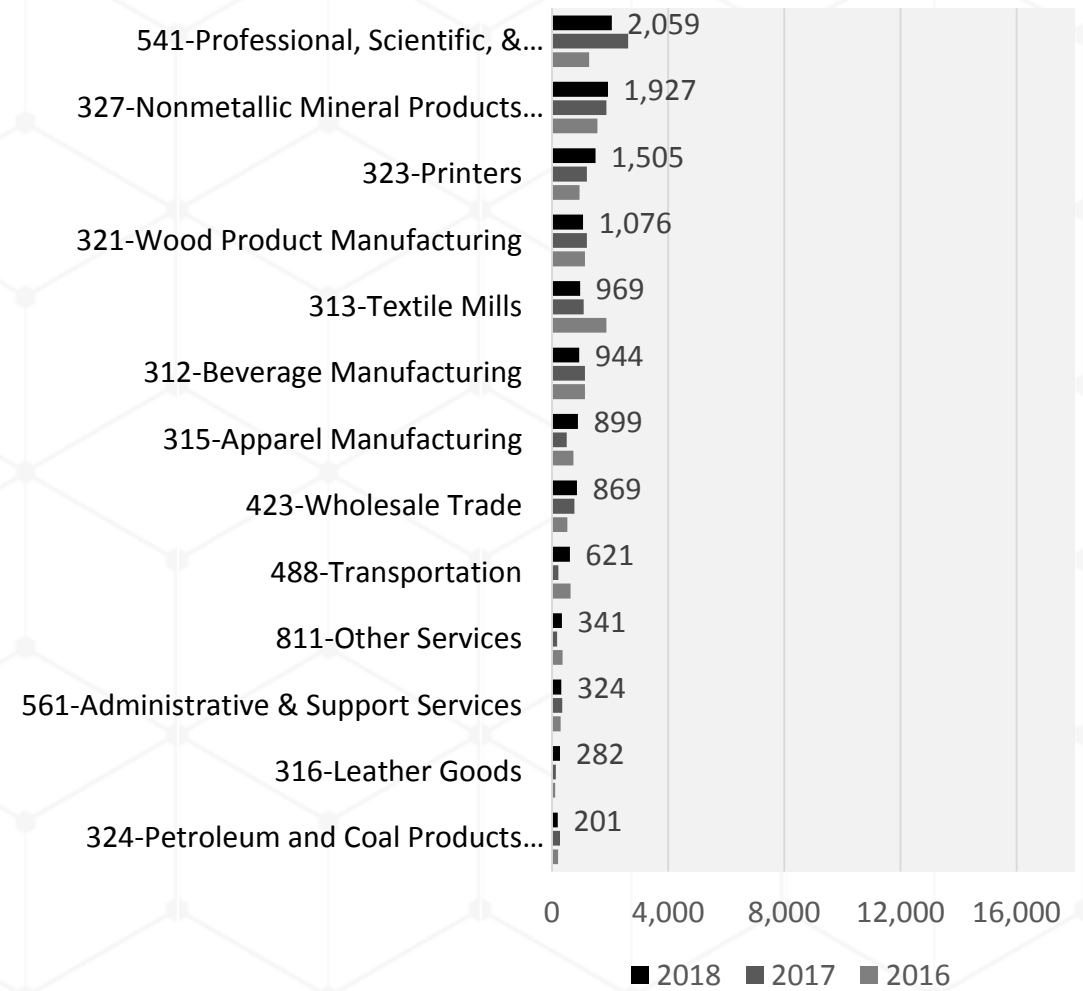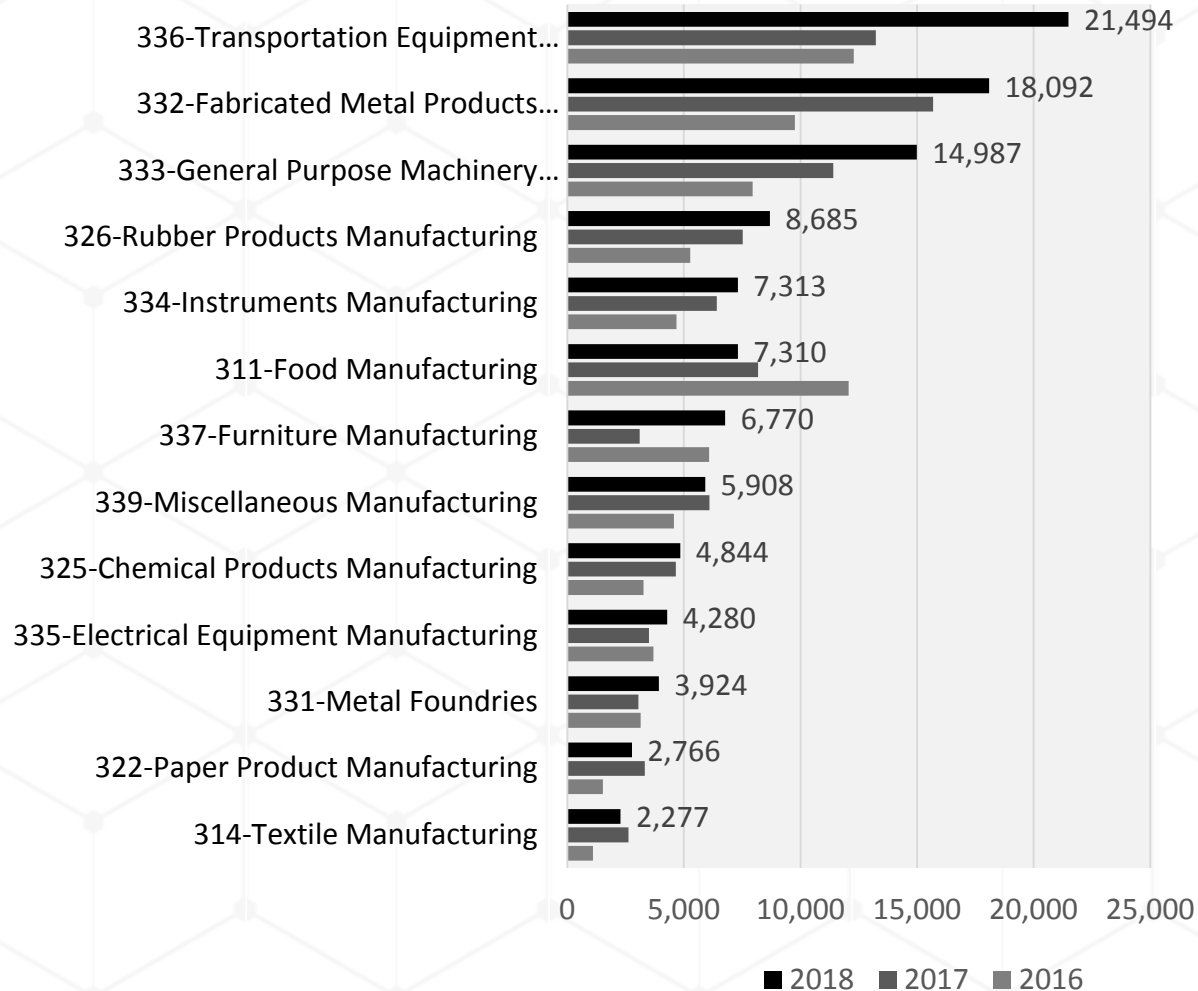
Controlling for the change

FY17 Study Findings, Controlling for Change in Response Rates

Forecast	Jobs	GDP	Output	Personal Income	Returns to Treasury	ROI Return on Investment
FY17 Findings Using Firm Variables	219,148	$22.01*	$40.34*	$13.76*	$1.86*	14.5:1
FY18 All Responses Using Firm Variables	236,802	$24.9*	$46.6*	$15.04*	$2.01*	14.4:1
FY18 with FY17 Response Rates Using Firm Variables	220,231	$23.17*	$43.35*	$13.99*	$1.88*	13.4:1

The Study Team

The team contributing to this report are:

- Upjohn:
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  - Randall Eberts, Ph.D.
  - Brian Pittelko
  - Claudette Robey
- Ken Voytek, NIST/MEP
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