

# THE MANUFACTURING RENAISSANCE: WHERE DO WE STAND?

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Economic Forecasting Conference  
Georgia State University  
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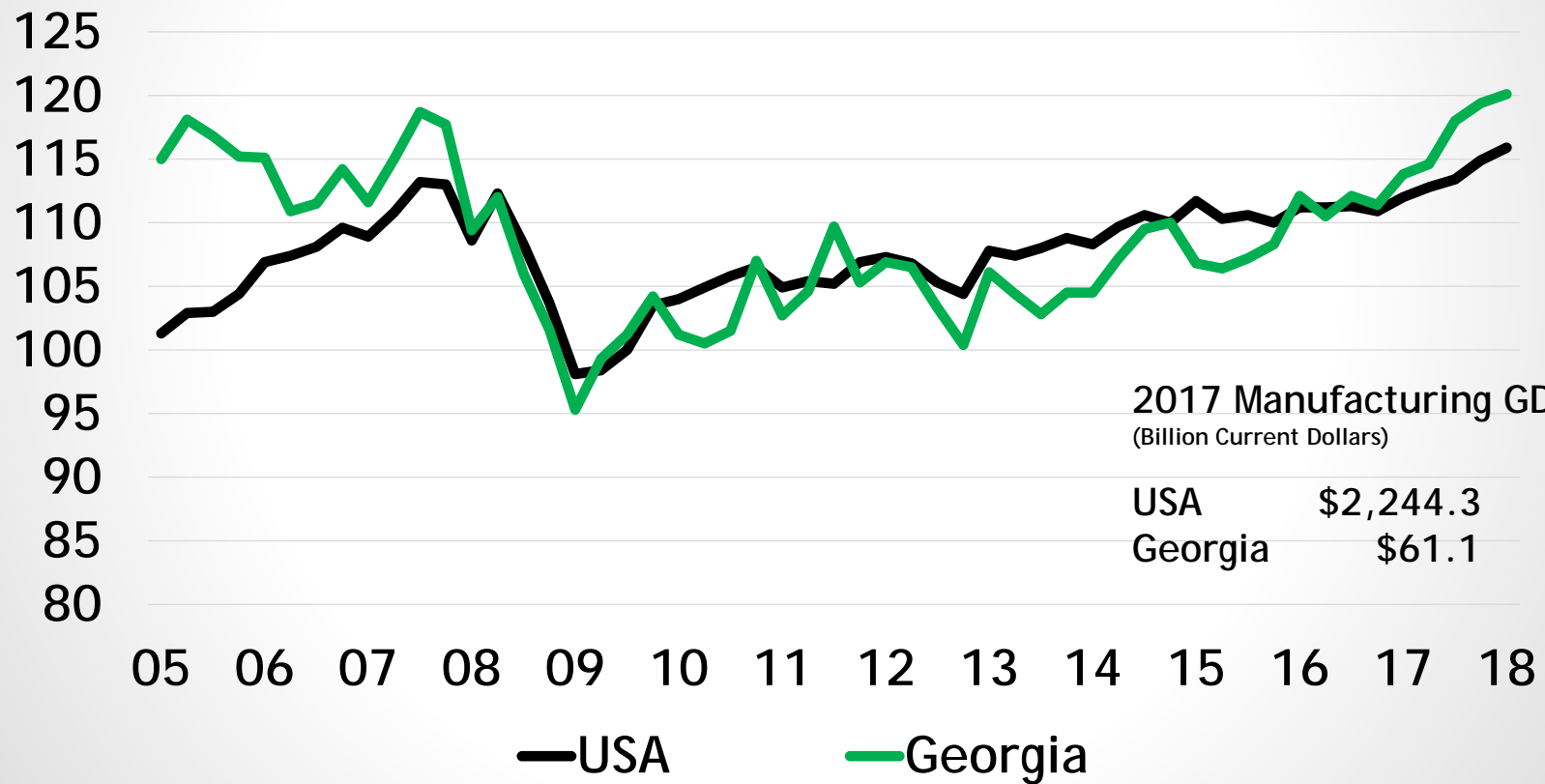


# Perspectives on Manufacturing



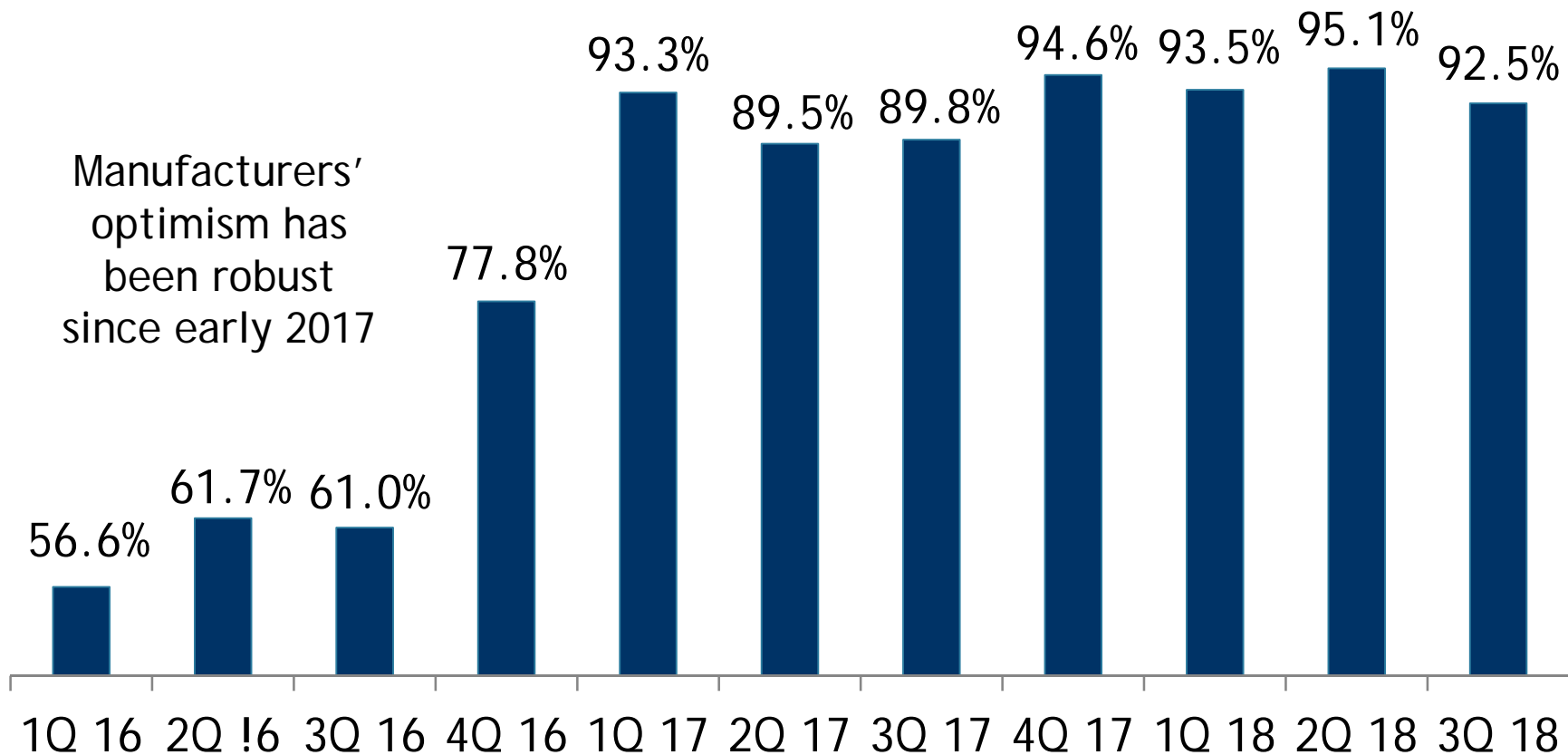
# Manufacturing Output is at an All-time High

Manufacturing Real GDP Quantity Index (2009=100)



# NAM Manufacturers' Outlook Survey by Quarter

(First Quarter 2016 - Third Quarter 2018)

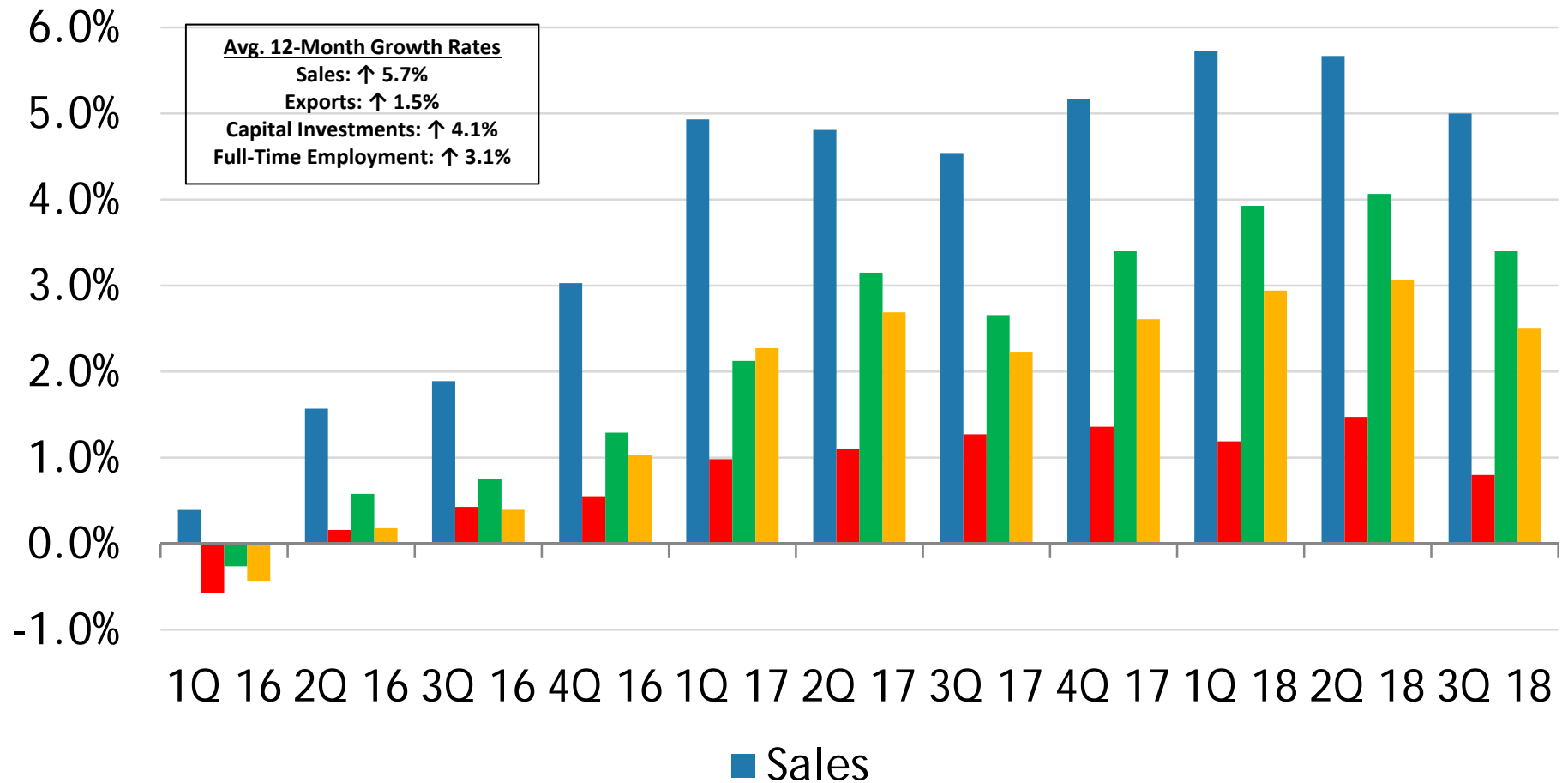


Source: NAM Manufacturers' Outlook Survey

Note: Percentage of respondents who characterized the current business outlook as somewhat or very positive.

# Expected Manufacturing Growth Over Next 12 Months

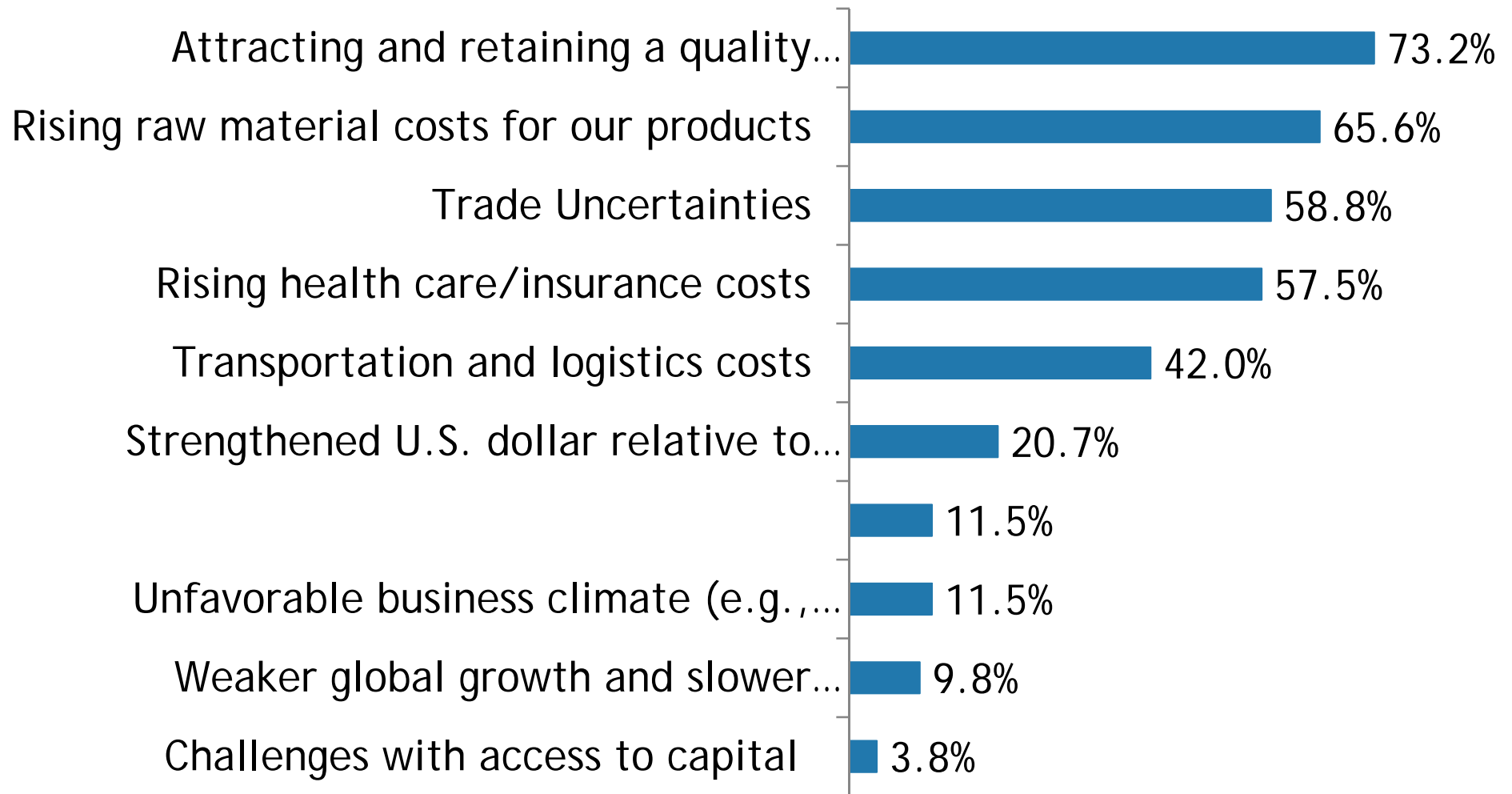
(First Quarter 2016 - Third Quarter 2018)



Source: NAM Manufacturers' Outlook Survey  
 Note: Expected growth rates are annual averages.

# Primary Current Business Challenges

(Third Quarter 2018)



Source: NAM Manufacturers' Outlook Survey

Note: Respondents were able to check all that apply. Therefore, responses exceed 100 percent.

# US Industrial and Commercial Gross Output Recovers from Soft Oil & Gas Soft Patch

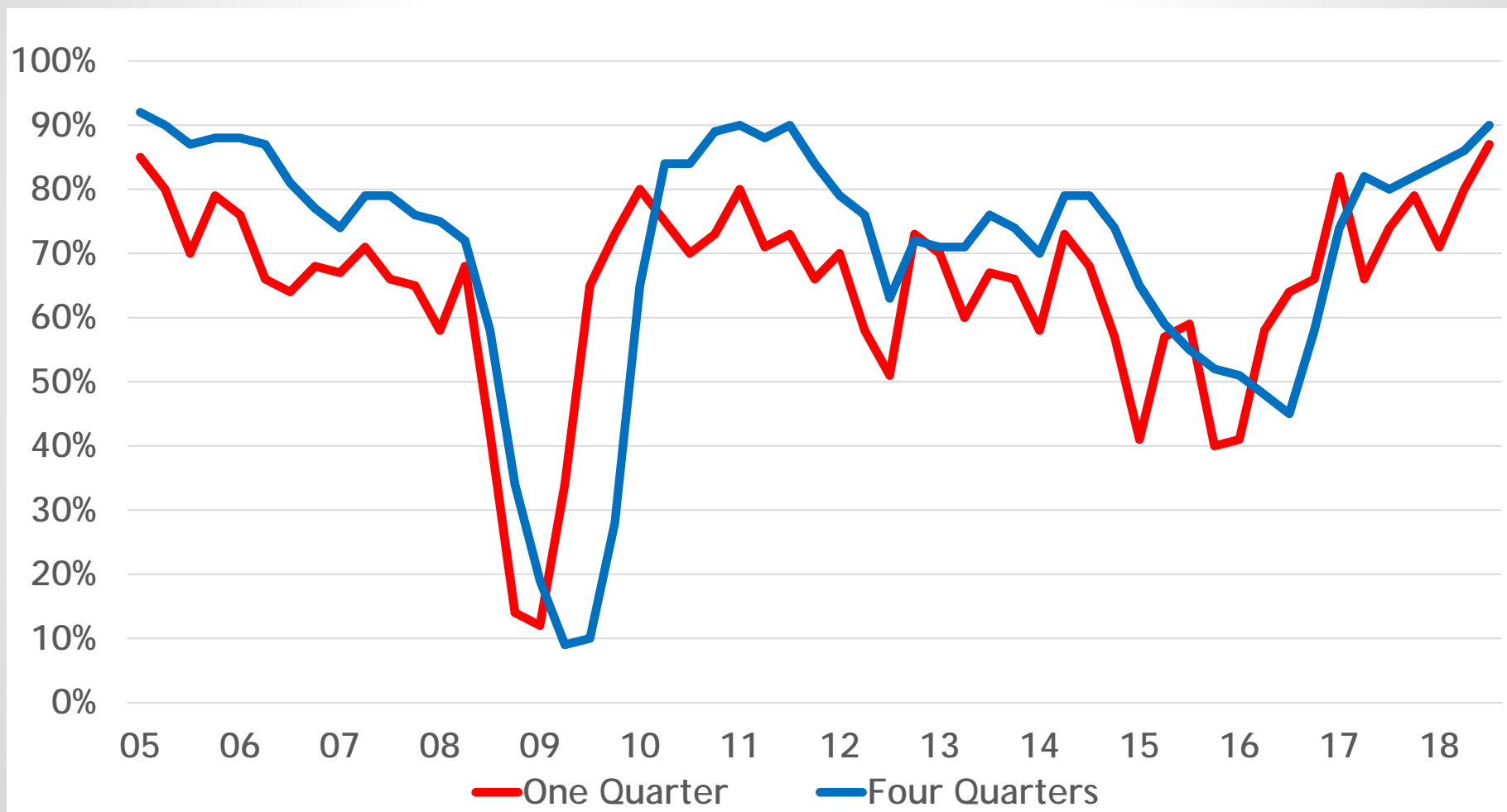
US Economic Sector Heat Map (Y/Y Growth)

	10 13	20 13	3Q 13	4Q 13	10 14	2Q 14	3Q 14	4Q 14	10 15	2Q 15	3Q 15	4Q 15	10 16	2Q 16	3Q 16	4Q 16	10 17	2Q 17	3Q 17	4Q 17	10 18	2Q 18	3Q 18
Gross Output - All industries	2.7%	3.3%	3.5%	3.5%	4.0%	5.2%	5.0%	3.8%	1.2%	0.5%	-0.1%	-0.6%	0.4%	0.7%	1.5%	3.1%	5.3%	4.9%	4.9%	6.1%	5.6%	6.3%	6.6%
Private Industries	3.0%	3.7%	4.0%	3.9%	4.3%	5.5%	5.3%	3.9%	1.1%	0.3%	-0.3%	-0.9%	0.2%	0.5%	1.4%	3.2%	5.6%	5.1%	5.2%	6.3%	5.8%	6.5%	6.8%
Agriculture, Forestry, Fishing & Hunting	11.2%	8.3%	8.7%	2.3%	-2.1%	5.7%	1.8%	5.4%	-5.5%	-12.2%	-8.3%	-11.1%	-4.0%	-2.7%	-6.6%	-4.3%	-2.3%	-3.3%	-1.2%	0.5%	-0.6%	2.0%	4.0%
Mining	-0.5%	10.6%	17.0%	8.2%	14.9%	16.6%	7.6%	2.1%	-25.0%	-31.4%	-36.9%	-38.8%	-35.6%	-29.4%	-16.8%	1.0%	36.2%	30.1%	24.7%	31.2%	18.6%	21.9%	23.5%
Utilities	5.8%	9.1%	4.3%	9.2%	18.8%	9.1%	6.4%	3.7%	-4.3%	-6.3%	-2.5%	-9.0%	-11.7%	-4.9%	0.1%	3.0%	3.8%	7.0%	-0.2%	4.2%	7.6%	2.7%	6.0%
Construction	4.8%	6.8%	10.0%	9.2%	10.4%	10.1%	8.4%	9.7%	10.0%	12.6%	12.1%	8.3%	10.3%	6.2%	5.5%	8.4%	6.0%	3.8%	2.3%	2.8%	3.6%	5.1%	6.8%
Manufacturing	2.2%	1.8%	2.3%	2.5%	2.1%	3.3%	2.4%	-1.4%	-5.5%	-5.9%	-6.8%	-6.7%	-5.3%	-4.6%	-3.5%	0.1%	4.1%	4.2%	5.5%	7.8%	7.6%	8.3%	7.5%
Durable Goods	2.5%	2.1%	3.7%	4.4%	3.0%	3.3%	6.4%	3.3%	1.9%	0.3%	-1.9%	-3.3%	-2.9%	-3.3%	-3.3%	-0.5%	2.1%	4.1%	5.3%	7.4%	7.5%	7.6%	6.6%
Non-Durable Goods	2.0%	1.6%	1.1%	0.9%	1.4%	3.2%	-1.0%	-5.6%	-11.9%	-11.3%	-11.5%	-10.0%	-7.7%	-5.9%	-3.7%	0.8%	6.2%	4.4%	5.7%	8.1%	7.6%	9.1%	8.3%
Wholesale Trade	3.3%	2.5%	2.9%	3.6%	2.5%	5.2%	4.9%	1.5%	-3.2%	-4.5%	-5.3%	-5.5%	-3.7%	-2.8%	-1.0%	2.5%	8.0%	6.0%	7.0%	8.5%	6.6%	10.0%	8.8%
Retail Trade	3.7%	4.0%	3.3%	3.2%	2.2%	4.8%	4.6%	4.1%	2.4%	1.6%	1.9%	1.6%	2.5%	2.1%	2.1%	3.5%	5.0%	4.3%	4.5%	5.9%	4.7%	5.7%	5.4%
Transportation and Warehousing	3.1%	3.2%	3.9%	3.2%	4.4%	6.3%	6.9%	8.1%	3.9%	1.3%	0.6%	-2.8%	-1.8%	-2.1%	-1.6%	0.8%	3.2%	5.5%	3.6%	3.7%	4.9%	4.8%	7.6%
Information	3.9%	3.3%	4.6%	3.6%	5.5%	5.9%	4.8%	4.8%	3.9%	4.5%	4.0%	4.9%	5.4%	3.6%	4.7%	3.1%	3.2%	4.6%	4.6%	5.7%	6.1%	6.3%	5.8%
Finance and Insurance	4.0%	6.7%	4.3%	5.9%	5.5%	7.0%	8.0%	6.2%	6.6%	6.8%	5.0%	4.4%	2.4%	2.4%	5.2%	3.8%	6.9%	7.1%	5.8%	7.2%	8.9%	6.9%	7.9%
Real estate and Rental & Leasing	3.9%	4.8%	5.4%	4.6%	6.9%	6.9%	7.0%	6.8%	5.0%	3.9%	3.2%	3.1%	4.0%	4.9%	5.3%	5.3%	5.5%	4.9%	4.5%	5.1%	4.9%	2.7%	5.9%
Professional and Business Services	0.1%	3.7%	4.1%	3.9%	7.0%	5.4%	6.3%	6.9%	6.4%	5.6%	4.6%	2.9%	3.1%	3.8%	3.7%	4.2%	4.5%	4.1%	3.8%	4.7%	4.3%	5.1%	6.4%
Professional, Scientific & Technical Services	-1.1%	1.3%	3.5%	4.3%	4.2%	4.8%	6.1%	6.2%	5.9%	4.7%	3.8%	2.2%	4.3%	3.6%	2.7%	4.5%	2.7%	3.1%	2.6%	2.9%	3.7%	4.3%	5.9%
Management of Companies and Enterprises	4.1%	9.3%	7.0%	0.5%	10.9%	4.1%	4.9%	6.9%	6.9%	7.7%	4.7%	3.8%	-1.4%	2.5%	3.2%	-1.2%	3.3%	0.8%	1.4%	5.7%	4.5%	5.8%	7.2%
Administrative and Waste Management Services	0.3%	5.6%	3.4%	5.6%	10.7%	7.8%	7.7%	8.4%	7.1%	6.1%	6.6%	3.8%	3.8%	5.1%	6.3%	7.3%	9.4%	8.7%	8.2%	8.1%	5.7%	6.3%	6.8%
Educational Services	1.0%	2.7%	3.3%	3.6%	3.4%	3.3%	3.3%	3.5%	3.5%	3.7%	3.5%	4.0%	3.8%	3.9%	2.8%	2.3%	3.1%	3.3%	6.2%	5.8%	5.0%	5.0%	4.0%
Health Care and Social Assistance	1.6%	2.8%	3.0%	3.4%	2.3%	3.2%	5.0%	5.5%	7.1%	6.5%	6.2%	4.9%	5.1%	5.5%	4.0%	5.1%	5.9%	4.8%	5.8%	5.3%	4.5%	5.4%	5.5%
Arts, Entertainment & Recreation	4.5%	2.7%	3.9%	5.3%	7.5%	5.9%	5.0%	3.5%	5.4%	7.9%	6.4%	5.6%	3.4%	2.4%	5.4%	8.1%	6.8%	9.4%	9.9%	4.0%	3.0%	1.7%	-0.5%
Food and Hospitality	5.1%	3.5%	3.5%	4.4%	3.4%	7.0%	8.1%	8.7%	9.2%	8.3%	6.9%	5.9%	5.2%	5.1%	4.4%	4.9%	3.2%	2.3%	1.5%	1.1%	3.7%	5.2%	
Other Services	2.7%	2.3%	2.7%	1.7%	5.2%	6.1%	7.4%	7.8%	4.6%	4.5%	2.1%	1.2%	4.7%	3.2%	5.5%	6.0%	5.3%	6.3%	6.5%	7.3%	5.7%	5.4%	5.1%
Government	-0.2%	-0.1%	-0.4%	-0.2%	1.0%	1.7%	2.8%	2.5%	1.9%	2.3%	1.8%	2.4%	2.1%	2.0%	2.2%	1.8%	2.8%	2.6%	2.8%	3.8%	3.8%	4.2%	4.7%
Federal	-3.6%	-4.3%	-5.7%	-5.0%	-1.8%	-0.8%	1.5%	0.2%	0.4%	0.9%	-0.7%	1.2%	0.3%	0.3%	1.1%	0.4%	0.6%	0.8%	1.1%	2.6%	3.4%	4.8%	6.5%
State and Local	1.6%	2.1%	2.3%	2.2%	2.4%	3.0%	3.4%	3.6%	2.7%	3.0%	2.9%	3.0%	2.9%	2.8%	2.8%	2.5%	3.8%	3.4%	3.5%	4.3%	4.0%	3.9%	3.9%
Addenda:																							
Business-to-Business (B2) Spending	3.3%	4.5%	4.7%	4.3%	4.8%	6.1%	5.5%	3.5%	-0.5%	-1.6%	-2.5%	-3.1%	-1.6%	-1.1%	0.2%	2.6%	6.0%	5.5%	5.8%	7.3%	6.5%	7.4%	7.8%
Non-Goods (Services) Sectors	2.7%	3.4%	3.5%	3.6%	4.2%	5.3%	5.5%	4.8%	3.2%	2.7%	2.1%	1.4%	2.0%	2.1%	2.8%	3.7%	5.3%	4.8%	4.7%	5.6%	5.2%	5.8%	6.3%
Goods Sectors	2.6%	3.0%	3.9%	3.0%	2.9%	4.6%	2.9%	-0.6%	-7.4%	-8.9%	-9.9%	-9.9%	-7.6%	-6.3%	-4.6%	-0.2%	5.4%	5.2%	6.2%	8.7%	7.8%	8.9%	8.4%
Goods & Construction Sectors	2.9%	3.5%	4.7%	3.8%	3.9%	5.4%	3.6%	0.8%	-4.9%	-5.8%	-6.7%	-7.2%	-4.7%	-4.2%	-2.9%	1.4%	5.5%	4.9%	5.5%	7.6%	7.0%	8.2%	8.1%
Gross Output Less Mining	2.6%	3.3%	3.5%	3.5%	4.1%	5.2%	5.1%	3.8%	1.3%	0.7%	0.0%	-0.5%	0.4%	0.7%	1.6%	3.2%	5.4%	4.9%	5.0%	6.1%	5.7%	6.3%	6.7%
Gross Output Less Mining & Manufacturing	2.6%	3.5%	3.7%	3.7%	4.4%	5.5%	5.6%	4.7%	2.6%	1.9%	1.2%	0.6%	1.4%	1.6%	2.5%	3.7%	5.6%	5.1%	4.9%	5.9%	5.3%	6.0%	6.5%

Sources: BEA, Census, EIA, various trade associations and ACC analysis

# Gross Output Diffusion Indexes

(% of 128 Industries/Sectors Expanding)



Sources: BEA, Census, EIA, various trade associations and ACC analysis



# US Non-Durables Industrial Activity

US Non-Durable Goods Gross Output Heat Map (Y/Y Growth)

	1Q 13	2Q 13	3Q 13	4Q 13	1Q 14	2Q 14	3Q 14	4Q 14	1Q 15	2Q 15	3Q 15	4Q 15	1Q 16	2Q 16	3Q 16	4Q 16	1Q 17	2Q 17	3Q 17	4Q 17	1Q 18	2Q 18	3Q 18	4Q 18
Food Products	4.5%	3.6%	2.9%	2.2%	4.9%	5.1%	3.5%	3.1%	-1.4%	-3.1%	-2.1%	-3.5%	-2.6%	-1.6%	-1.6%	0.1%	3.0%	5.4%	5.7%	4.2%	2.8%	1.7%	2.0%	
Grain & Oilseed Milling	12.1%	2.5%	-1.9%	-2.4%	-4.0%	-2.8%	-4.9%	-10.5%	-10.1%	-7.5%	-6.6%	-4.0%	-5.3%	-4.3%	-3.7%	-2.8%	2.0%	1.9%	3.3%	5.3%	5.8%	8.3%	8.7%	
Dairy Products	-0.3%	5.8%	7.3%	3.7%	17.1%	13.9%	7.1%	8.4%	-10.1%	-12.4%	-9.9%	-9.1%	-1.8%	-2.6%	0.0%	1.2%	6.1%	7.6%	3.6%	1.1%	-2.4%	-1.4%	0.2%	
Meat, Poultry, and Seafood Products	1.8%	1.9%	4.7%	6.0%	7.5%	8.5%	7.5%	6.4%	3.1%	-1.3%	-2.7%	-6.9%	-6.1%	-3.6%	-4.4%	-0.9%	2.2%	5.4%	7.0%	3.8%	2.0%	1.2%	1.5%	
Other Food Products	5.7%	4.2%	1.7%	0.8%	2.2%	2.4%	2.1%	3.3%	1.4%	0.4%	2.4%	1.1%	0.2%	0.8%	0.3%	1.2%	2.8%	5.6%	6.2%	5.1%	4.3%	1.3%	1.2%	
Beverages	4.6%	4.0%	6.7%	4.7%	3.5%	3.0%	1.5%	3.2%	3.9%	3.3%	3.8%	1.4%	-0.2%	-0.8%	0.4%	-3.5%	-4.2%	-6.8%	-12.3%	-8.8%	-5.6%	-0.1%	3.1%	
Tobacco	-1.1%	2.8%	-0.5%	-1.6%	-9.4%	-13.2%	-7.5%	1.3%	14.3%	16.2%	5.7%	8.9%	1.0%	-2.9%	6.4%	6.8%	12.9%	9.6%	7.4%	-2.9%	3.9%	-4.6%	-6.9%	
Textile Mills	1.1%	4.7%	6.4%	6.9%	1.5%	1.0%	-0.8%	-5.1%	-5.0%	-7.2%	-6.7%	-5.5%	-6.5%	-5.0%	-5.0%	-1.4%	3.9%	3.8%	4.9%	3.6%	1.3%	3.1%	2.6%	
Textile Products	-2.7%	0.8%	5.5%	12.4%	9.2%	13.0%	12.1%	5.9%	6.6%	-2.3%	-3.4%	-5.8%	-4.7%	-0.1%	-0.8%	2.4%	2.4%	2.2%	1.8%	3.7%	5.0%	7.4%	6.9%	
Apparel	0.0%	2.5%	-3.0%	-4.8%	-8.7%	-6.3%	-6.2%	1.6%	-0.2%	-6.7%	-2.7%	-7.4%	-7.3%	-0.9%	-4.0%	-4.7%	2.2%	2.1%	2.7%	5.5%	6.2%	6.3%	5.0%	
Leather & Allied Products	1.2%	-0.9%	4.1%	5.8%	-0.8%	0.4%	-0.1%	2.6%	1.2%	-0.4%	-1.7%	-9.9%	-6.2%	-4.4%	-1.7%	6.3%	4.8%	1.5%	0.5%	-3.0%	-4.6%	2.7%	2.1%	
Paper & Products	4.2%	3.4%	3.2%	1.3%	-2.1%	1.1%	1.1%	2.1%	1.7%	-0.9%	-2.0%	-1.9%	-1.3%	-2.2%	-3.0%	-2.2%	-0.6%	-0.3%	2.3%	5.6%	5.4%	6.5%	5.2%	
Pulp, Paper & Paperboard Mills	2.5%	2.9%	3.5%	0.8%	0.0%	1.3%	-1.4%	-1.3%	-1.0%	-0.5%	-3.2%	-4.3%	-3.4%	-6.0%	-5.8%	-4.3%	-1.7%	-0.1%	2.2%	3.0%	2.6%	3.5%	2.5%	
Paperboard Containers	8.6%	10.1%	8.3%	4.4%	-2.8%	2.8%	7.6%	8.9%	5.7%	0.9%	-2.3%	-1.5%	5.1%	1.6%	-0.6%	0.7%	3.1%	2.7%	4.5%	6.6%	4.5%	5.7%	4.2%	
Other Paper Products	2.3%	-3.4%	-3.4%	-1.6%	-5.2%	-1.4%	-2.9%	-0.5%	1.0%	1.0%	2.6%	0.3%	-1.1%	-0.7%	-3.2%	-2.6%	-3.8%	-4.9%	-0.7%	8.8%	11.9%	13.1%	11.6%	
Printing	4.1%	0.5%	-2.1%	-2.5%	-2.6%	-0.7%	0.2%	-0.7%	-1.9%	-1.5%	-0.7%	1.2%	2.1%	2.6%	2.6%	0.0%	-3.2%	-6.5%	-7.3%	-5.2%	-2.0%	1.8%	1.9%	
Petroleum and coal products	1.9%	0.1%	-2.2%	-2.0%	-3.6%	1.9%	-7.8%	-22.2%	-36.9%	-32.0%	-38.0%	-34.9%	-31.9%	-23.7%	-11.1%	11.1%	40.4%	15.7%	22.1%	25.4%	22.4%	32.3%	23.0%	
Petroleum Refineries	2.3%	0.7%	-2.2%	-1.7%	-3.2%	2.3%	-8.1%	-23.5%	-38.8%	-33.8%	-40.0%	-37.1%	-34.3%	-25.6%	-11.5%	12.4%	44.5%	17.3%	23.4%	26.9%	24.1%	34.7%	24.5%	
Paving, Roofing & Other products	-3.1%	-7.9%	-1.7%	-7.3%	-10.1%	-4.7%	-1.7%	1.0%	-2.7%	0.3%	-5.6%	-4.8%	-4.2%	-1.7%	-7.3%	-0.5%	8.0%	1.6%	9.3%	10.7%	4.8%	7.0%	5.9%	
Pharmaceuticals	-8.7%	-5.1%	3.3%	6.8%	8.5%	12.1%	5.6%	2.4%	4.2%	2.7%	13.6%	13.0%	8.9%	5.3%	-4.4%	-2.0%	1.2%	4.5%	10.7%	13.8%	10.6%	8.7%	6.8%	
Chemicals (excluding pharmaceuticals)	1.1%	1.6%	0.8%	-0.1%	3.9%	1.9%	-2.1%	-5.5%	-12.1%	-13.1%	-11.3%	-9.7%	-5.9%	-4.3%	-4.2%	-3.8%	-2.4%	1.7%	0.7%	7.2%	7.5%	7.2%	11.1%	
Basic Chemicals	1.5%	0.9%	0.5%	-0.3%	1.9%	-1.0%	-4.5%	-7.7%	-15.8%	-16.4%	-15.2%	-12.9%	-8.2%	-6.9%	-7.1%	-6.8%	-2.8%	3.3%	1.0%	9.7%	5.4%	4.2%	10.9%	
Inorganics	-4.6%	-6.0%	-5.6%	-4.2%	-4.1%	-3.0%	-2.4%	-2.4%	0.0%	-0.8%	-1.9%	-3.5%	-6.2%	-5.6%	-7.9%	-7.5%	-7.1%	-7.9%	-3.2%	-3.7%	1.7%	5.5%	5.1%	
Petrochemicals & Organics	2.7%	2.1%	1.0%	-0.7%	0.7%	-2.8%	-6.6%	-10.0%	-19.7%	-20.1%	-18.3%	-15.9%	-10.6%	-9.1%	-9.7%	-9.5%	-2.5%	6.8%	2.7%	13.6%	5.8%	1.2%	10.4%	
Synthetic Materials	2.2%	2.1%	2.5%	2.4%	7.1%	3.5%	-1.1%	-5.7%	-15.3%	-16.5%	-15.5%	-11.9%	-4.7%	-3.7%	-1.9%	-1.4%	-1.3%	3.0%	0.3%	9.6%	6.4%	9.1%	14.4%	
Specialty Chemicals	0.8%	1.5%	4.3%	4.9%	3.6%	5.0%	3.1%	2.9%	1.2%	-1.1%	-0.2%	-2.3%	-1.1%	-0.8%	-2.2%	-0.8%	0.7%	3.7%	7.3%	8.8%	11.4%	11.1%	9.9%	
Coatings & Adhesives	0.5%	1.6%	7.8%	9.2%	4.3%	8.3%	5.3%	6.1%	4.3%	-0.2%	2.3%	-2.0%	1.4%	1.8%	-1.2%	1.7%	0.8%	4.1%	6.8%	7.2%	8.8%	8.1%	7.9%	
Other Specialty Chemicals	0.9%	1.4%	1.6%	1.6%	3.1%	2.3%	1.3%	0.3%	-1.2%	-1.9%	-2.3%	-2.4%	-3.1%	-3.1%	-3.0%	-3.0%	0.6%	3.4%	7.8%	10.2%	13.7%	13.8%	11.6%	
Agricultural Chemicals	22.7%	25.6%	-0.8%	-11.8%	-3.3%	-3.8%	-14.0%	-20.8%	-19.8%	-20.7%	-10.3%	-12.4%	-11.2%	-5.6%	-2.7%	-2.6%	-13.0%	-14.7%	-18.8%	-8.6%	-0.7%	9.4%	14.2%	
Consumer Chemistry	-10.2%	-5.9%	-0.7%	3.5%	19.2%	16.2%	10.6%	4.6%	-4.7%	-6.7%	-6.2%	-3.1%	0.2%	2.7%	4.1%	3.4%	-0.3%	0.4%	0.7%	3.0%	13.7%	12.9%	12.3%	
Plastics & Rubber Products	3.8%	3.4%	3.1%	3.6%	2.2%	4.2%	4.2%	4.6%	3.4%	1.1%	1.1%	-2.0%	-1.3%	-0.7%	-0.5%	0.3%	-0.4%	-1.4%	-2.0%	0.0%	1.4%	2.3%	3.5%	

Sources: BEA and ACC analysis

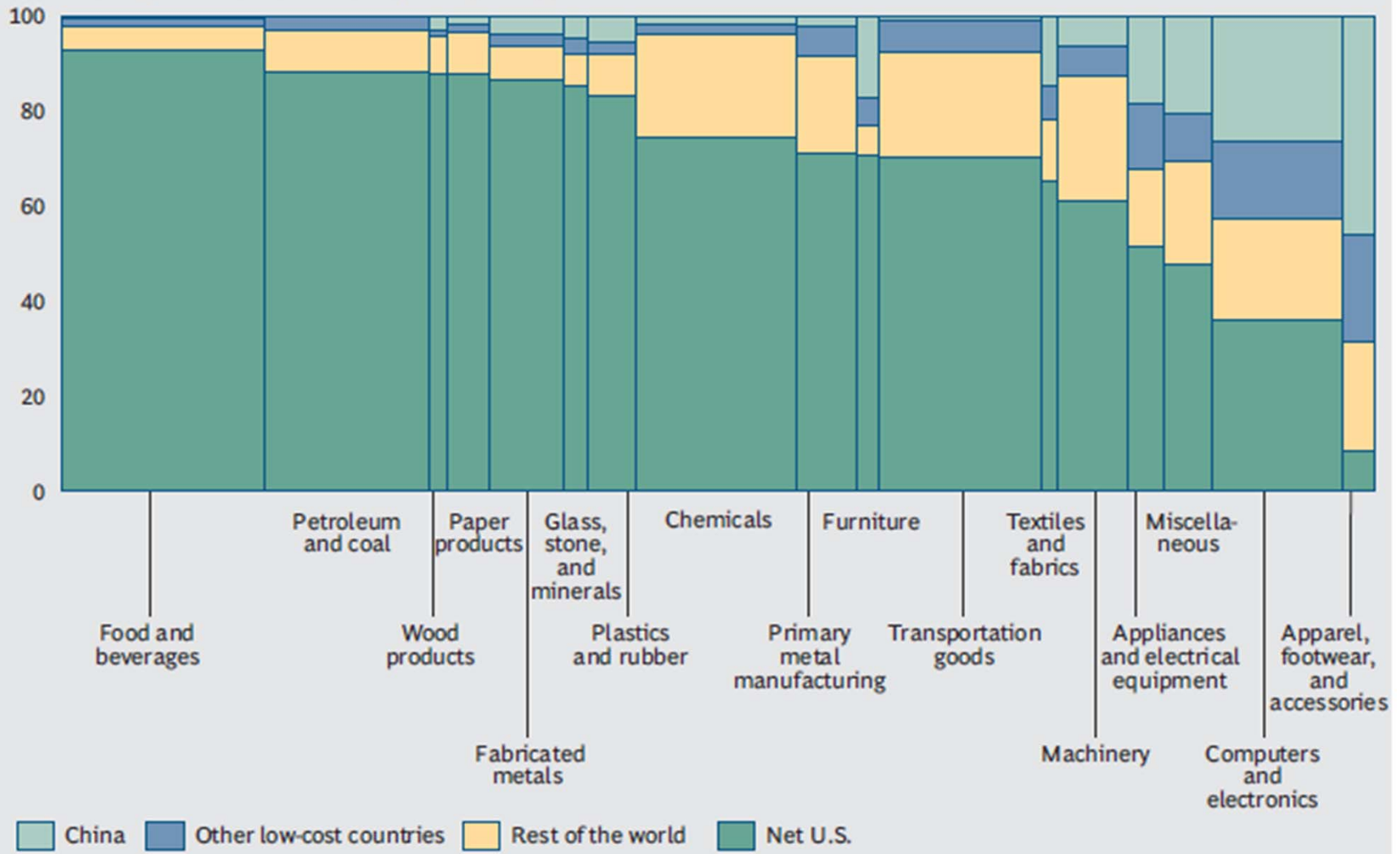
# US Durables Industrial Activity

US Durable Goods Gross Output Heat Map (Y/Y Growth)

	1Q 13	2Q 13	3Q 13	4Q 13	1Q 14	2Q 14	3Q 14	4Q 14	1Q 15	2Q 15	3Q 15	4Q 15	1Q 16	2Q 16	3Q 16	4Q 16	1Q 17	2Q 17	3Q 17	4Q 17	1Q 18	2Q 18	3Q 18
Wood Products	17.1%	15.4%	10.5%	10.4%	-0.8%	9.6%	10.8%	7.5%	10.0%	-0.6%	1.2%	2.8%	4.1%	4.1%	3.0%	5.8%	8.4%	7.8%	6.3%	6.6%	2.8%	4.4%	4.6%
Non-Metallic Mineral Products	6.8%	8.1%	8.2%	5.3%	5.4%	6.1%	6.7%	8.4%	6.5%	3.2%	4.4%	4.1%	6.3%	5.5%	2.1%	2.7%	1.9%	2.2%	2.8%	4.7%	2.7%	4.2%	4.9%
Primary Metals	-6.8%	-4.3%	2.3%	2.0%	-1.1%	1.9%	2.8%	0.0%	-4.8%	-12.5%	-17.7%	-20.4%	-17.7%	-11.6%	-7.2%	-0.4%	6.9%	7.1%	7.4%	10.2%	11.6%	16.8%	16.6%
Iron and Steel Mills	-8.1%	-8.3%	-0.4%	2.2%	0.8%	3.0%	2.9%	-0.4%	-9.9%	-16.9%	-21.6%	-25.6%	-19.0%	-12.5%	-8.2%	-0.2%	9.1%	11.4%	10.8%	13.6%	12.2%	18.0%	18.9%
Ferrous Foundries	-2.5%	-2.9%	-1.1%	0.9%	0.6%	8.0%	11.2%	5.9%	-2.6%	-11.1%	-10.6%	-10.8%	-11.6%	-9.8%	-11.8%	-11.9%	-4.4%	-2.4%	-0.7%	4.1%	3.7%	3.6%	4.7%
Aluminum & Other Nonferrous Metals	-6.0%	0.6%	6.3%	2.0%	-3.6%	-0.4%	1.2%	-0.6%	1.1%	-7.5%	-14.4%	-15.9%	-17.3%	-11.1%	-5.2%	1.5%	6.5%	4.2%	5.2%	7.6%	12.3%	17.6%	16.1%
Fabricated Metal Products	0.8%	2.8%	2.5%	3.0%	1.9%	2.2%	4.2%	3.5%	1.8%	-0.8%	-3.9%	-6.4%	-6.4%	-5.5%	-3.9%	0.0%	4.1%	6.9%	9.3%	10.6%	9.8%	10.4%	9.2%
Machinery	1.9%	-3.0%	-3.9%	-0.8%	-0.8%	1.6%	9.4%	0.1%	-3.7%	-4.5%	-9.4%	-8.8%	-8.0%	-9.4%	-9.0%	-4.8%	0.6%	5.7%	8.5%	10.7%	8.6%	6.9%	7.4%
Farm Machinery	14.0%	2.1%	1.1%	38.0%	1.0%	-7.3%	39.7%	-19.2%	-17.0%	-7.1%	-30.1%	-33.8%	-29.2%	-24.3%	-24.0%	-10.2%	1.1%	5.4%	15.3%	22.0%	21.0%	24.2%	23.5%
Construction Machinery	5.0%	-8.3%	-32.3%	-26.6%	-8.6%	5.7%	17.3%	5.8%	-5.6%	-16.9%	-19.7%	-17.5%	-17.9%	-6.0%	-8.8%	0.2%	11.3%	9.4%	19.6%	17.5%	13.3%	13.2%	21.7%
Mining & Oilfield Machinery	4.9%	-5.4%	-2.9%	-0.3%	-0.1%	9.6%	4.0%	-10.6%	-20.9%	-35.8%	-39.2%	-34.2%	-32.3%	-36.5%	-25.2%	-27.9%	-4.0%	23.8%	28.6%	44.0%	11.0%	7.8%	1.9%
Industrial Machinery	7.6%	-4.4%	3.7%	-2.0%	1.3%	3.9%	3.5%	-12.5%	-21.2%	-1.0%	-5.4%	18.5%	22.9%	-3.1%	-7.8%	-8.9%	-2.2%	1.4%	4.2%	1.6%	-1.8%	-1.0%	-0.1%
Photographic Equipment	-9.5%	-3.3%	1.8%	-5.8%	-11.3%	-19.2%	-15.7%	-3.3%	-4.0%	10.4%	8.0%	8.7%	12.4%	5.2%	4.5%	-4.1%	-3.1%	1.8%	-8.6%	-7.9%	-1.2%	-3.1%	6.2%
HVAC & Refrigeration equipment	5.2%	3.5%	3.6%	0.9%	0.3%	-2.7%	-2.8%	-1.2%	0.8%	3.4%	6.6%	4.9%	2.9%	-4.5%	-3.5%	-3.7%	-0.1%	5.6%	1.2%	4.0%	2.4%	5.3%	7.6%
Metalworking Machinery	2.2%	-1.9%	5.5%	4.8%	2.8%	3.2%	1.3%	5.7%	1.8%	0.0%	3.9%	-2.8%	-1.7%	-5.1%	-8.9%	-2.7%	-0.5%	6.3%	7.6%	8.6%	12.9%	6.1%	7.0%
Turbines, Generators & Other Power Equipment	-11.1%	-11.7%	-7.6%	-11.3%	-11.6%	-5.7%	21.7%	23.1%	19.6%	7.8%	-8.6%	-20.6%	-17.1%	-14.9%	-16.3%	-0.7%	-3.3%	4.6%	15.2%	13.3%	14.1%	4.8%	1.4%
Material Handling Equipment	-5.0%	-9.8%	-7.3%	-4.7%	2.2%	6.7%	6.2%	0.4%	-8.1%	-5.6%	-4.2%	0.8%	7.5%	1.9%	-1.1%	-0.6%	0.8%	4.0%	5.2%	6.6%	8.2%	9.1%	11.0%
Other Machinery	3.2%	2.6%	1.9%	1.9%	4.4%	5.3%	6.0%	3.9%	0.6%	-0.8%	-2.4%	-1.5%	-6.5%	-6.6%	-3.5%	-3.2%	2.0%	4.4%	4.9%	8.9%	6.7%	4.8%	4.2%
Computers & Electronics	-1.5%	-2.0%	5.3%	4.0%	1.8%	0.9%	0.1%	-2.3%	-0.5%	0.1%	-0.2%	-0.6%	-5.2%	-4.8%	-2.9%	-0.6%	5.9%	7.7%	11.3%	15.9%	13.4%	12.4%	6.7%
Computers, Storage Devices & Peripherals	-9.3%	-8.6%	5.1%	5.9%	1.5%	6.8%	-9.2%	-18.3%	-9.2%	-12.3%	1.5%	4.3%	-4.5%	-6.1%	-9.6%	-6.9%	-0.6%	-1.2%	-0.6%	-11.0%	-16.5%	-13.2%	-10.4%
Communications Equipment	5.6%	5.0%	1.5%	-5.3%	-8.8%	-12.5%	-11.4%	-14.3%	-8.6%	-5.0%	-4.5%	1.0%	-8.2%	-5.2%	-1.5%	-2.7%	3.9%	2.4%	2.2%	12.0%	10.3%	12.9%	11.1%
Audio and Video Equipment	-2.6%	-11.3%	6.6%	2.9%	15.3%	20.6%	-0.9%	-24.9%	-38.5%	-17.6%	20.3%	47.4%	60.1%	15.6%	-24.8%	-18.8%	-5.2%	-2.7%	15.2%	7.4%	-13.9%	-9.8%	-10.2%
Electronic Components	0.5%	1.7%	10.5%	12.1%	10.3%	6.2%	7.2%	4.3%	9.2%	8.6%	-0.1%	-3.9%	-12.6%	-11.9%	-5.9%	1.2%	11.0%	17.8%	24.9%	29.5%	26.8%	21.4%	7.8%
Search and Navigation Equipment	-3.5%	-4.1%	-2.8%	-1.4%	-4.6%	-2.4%	-2.4%	-3.9%	-6.0%	-1.9%	0.4%	1.8%	5.3%	3.9%	5.4%	4.5%	10.2%	10.4%	7.7%	11.0%	7.1%	3.9%	4.3%
Electromedical, Measuring, and Control Instruments	-2.5%	-4.7%	6.5%	2.3%	1.1%	0.8%	1.0%	0.9%	-2.6%	-2.8%	-0.9%	-1.4%	-1.5%	-0.4%	-1.0%	-1.8%	1.5%	0.9%	5.1%	11.2%	11.5%	13.6%	9.8%
Other Electronics	-14.9%	-13.6%	-9.6%	-2.9%	-0.3%	8.5%	16.1%	19.4%	43.7%	34.9%	23.8%	14.0%	-1.8%	-3.7%	-3.0%	-0.7%	2.2%	2.5%	1.6%	-0.4%	-1.3%	-1.6%	-0.9%
Electrical Equipment, Appliances & Components	0.6%	0.2%	0.6%	-0.4%	-0.6%	0.2%	4.9%	4.9%	2.4%	0.2%	-2.3%	-3.3%	-4.7%	-1.8%	-0.2%	2.2%	5.2%	4.5%	2.2%	2.8%	4.4%	5.2%	6.4%
Electric Lighting Equipment	-11.4%	-9.9%	9.8%	16.9%	8.6%	6.9%	-0.9%	-5.0%	-5.9%	-3.0%	2.6%	4.0%	8.3%	8.6%	5.8%	2.2%	3.1%	3.8%	-3.1%	-3.3%	-3.6%	-1.5%	3.1%
Household Appliances	2.0%	-1.8%	-3.4%	-4.5%	-3.0%	2.2%	9.0%	12.5%	8.9%	7.0%	2.4%	2.6%	4.2%	2.1%	3.8%	3.9%	-0.3%	-1.8%	-5.0%	-6.8%	-5.1%	-3.8%	-1.7%
Electrical Equipment	-0.5%	-0.3%	2.6%	3.6%	4.0%	1.0%	3.2%	2.2%	-2.5%	-5.3%	-6.5%	-7.9%	-8.2%	-3.5%	-3.6%	-0.9%	0.6%	-1.5%	-4.4%	-3.2%	1.4%	3.1%	6.5%
Batteries	-5.4%	-1.6%	-5.4%	-3.7%	6.3%	6.0%	19.5%	12.6%	5.4%	4.2%	-5.4%	-1.5%	-3.6%	-5.3%	-4.0%	-7.5%	-3.9%	-1.8%	2.7%	4.1%	1.9%	4.8%	3.7%
Other Electrical	6.3%	5.0%	-0.2%	-5.7%	-7.6%	-4.4%	2.7%	5.3%	5.7%	1.9%	-1.1%	-4.4%	-9.7%	-4.2%	0.1%	6.8%	15.7%	14.9%	13.0%	14.2%	14.3%	12.8%	11.3%
Transportation equipment	6.7%	6.0%	6.9%	8.7%	8.5%	6.9%	11.6%	7.7%	6.1%	6.0%	4.0%	1.0%	2.3%	-0.9%	-2.5%	-0.3%	-0.8%	1.4%	1.2%	2.9%	5.4%	4.7%	3.9%
Light Vehicles	13.2%	3.6%	10.0%	17.9%	7.7%	11.6%	17.3%	8.6%	7.2%	8.9%	7.2%	5.3%	11.5%	2.3%	0.6%	3.0%	-1.4%	1.3%	-1.7%	1.5%	6.3%	6.0%	4.9%
Medium- and Heavy-Duty Trucks	-9.4%	-2.4%	7.0%	3.0%	0.2%	-5.9%	6.3%	12.9%	17.3%	19.1%	8.4%	-1.6%	-10.2%	-18.1%	-24.8%	-21.6%	-13.3%	1.4%	21.1%	27.7%	23.9%	9.7%	2.6%
Motor Vehicle Parts	5.9%	6.9%	4.1%	6.0%	9.9%	7.4%	12.2%	9.6%	6.8%	6.1%	4.7%	1.1%	2.1%	0.1%	-1.7%	1.3%	0.7%	2.4%	1.3%	1.9%	3.0%	4.2%	4.5%
Aerospace	2.2%	9.7%	9.4%	4.8%	12.4%	5.4%	8.2%	3.4%	2.7%	2.8%	-1.1%	-1.8%	-3.3%	-1.4%	-1.2%	-1.7%	-1.2%	-1.0%	2.0%	1.1%	4.9%	-0.4%	-2.1%
Ships and Boats	6.4%	10.1%	1.6%	1.6%	5.8%	-6.9%	-2.0%	2.3%	-5.6%	7.0%	7.6%	0.8%	6.0%	-7.0%	-4.6%	-5.1%	-6.5%	1.2%	-3.7%	-0.5%	2.5%	6.0%	7.1%
Other Transportation	9.2%	3.9%	2.2%	4.2%	0.0%	4.2%	6.6%	9.9%	10.2%	-1.9%	-0.2%	-8.0%	-13.1%	-6.7%	-13.1%	-6.5%	4.9%	5.2%	8.4%	13.3%	7.9%	14.8%	15.6%
Furniture & Related Products	1.7%	2.7%	2.8%	2.4%	0.9%	0.2%	1.8%	5.7%	4.7%	7.6%	8.3%	3.7%	4.7%	0.7%	-1.9%	-0.3%	1.0%	1.1%	2.8%	3.5%	3.3%	4.7%	4.0%
Miscellaneous Durable Goods	4.4%	4.8%	5.2%	3.7%	-0.1%	-3.2%	-4.4%	-3.0%	-0.6%	0.2%	1.3%	3.3%	1.5%	4.3%	0.6%	-2.1%	0.3%	0.1%	3.9%	7.6%	6.1%	5.2%	4.6%

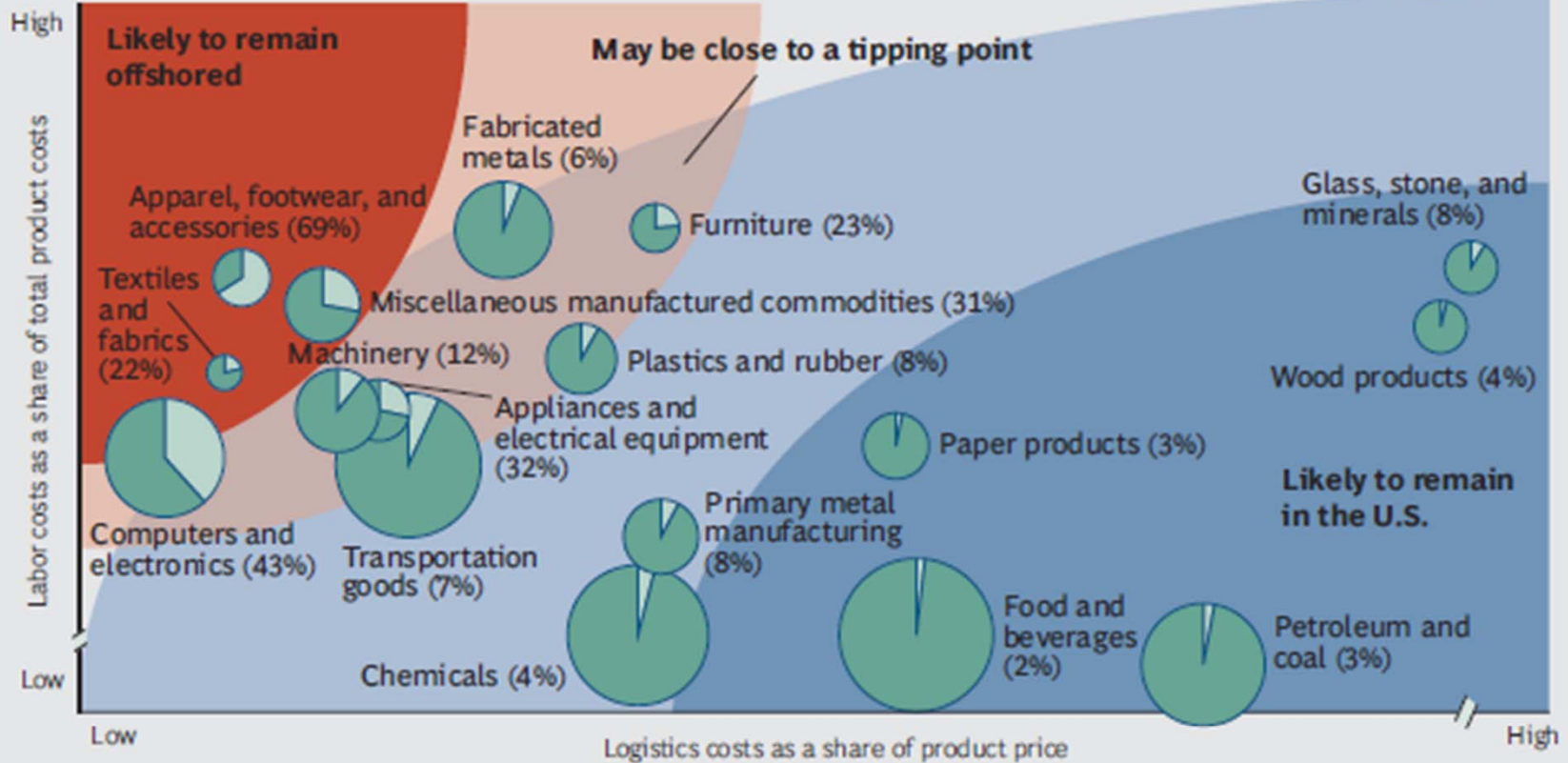
# The US Manufactures 75% of what it Consumes

Manufactured goods consumed in the U.S. by source, 2010 (%)



Sources: U.S. National Census Bureau; U.S. Bureau of Economic Analysis; BCG analysis.

# Seven US Clusters Near a Tipping Point

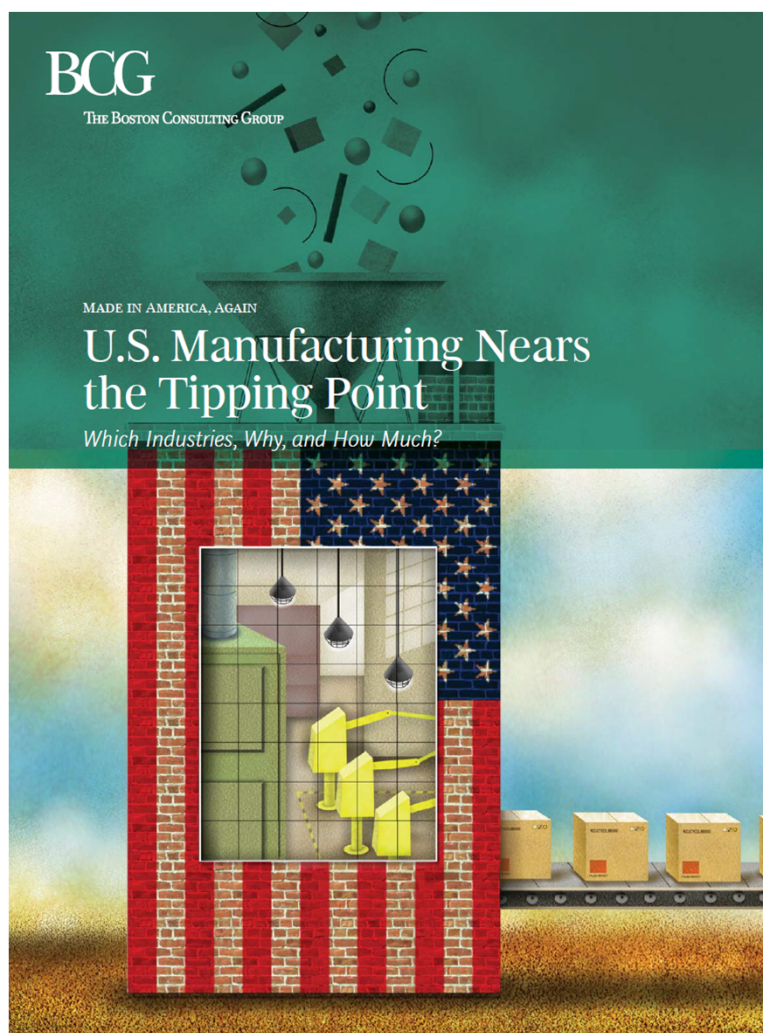


U.S. consumption (percentage imported from low-cost countries)



Sources: U.S. Department of Transportation; U.S. Census Bureau; U.S. Bureau of Economic Analysis; BCG analysis.

# Boston Consulting Group “Tipping Point” Study



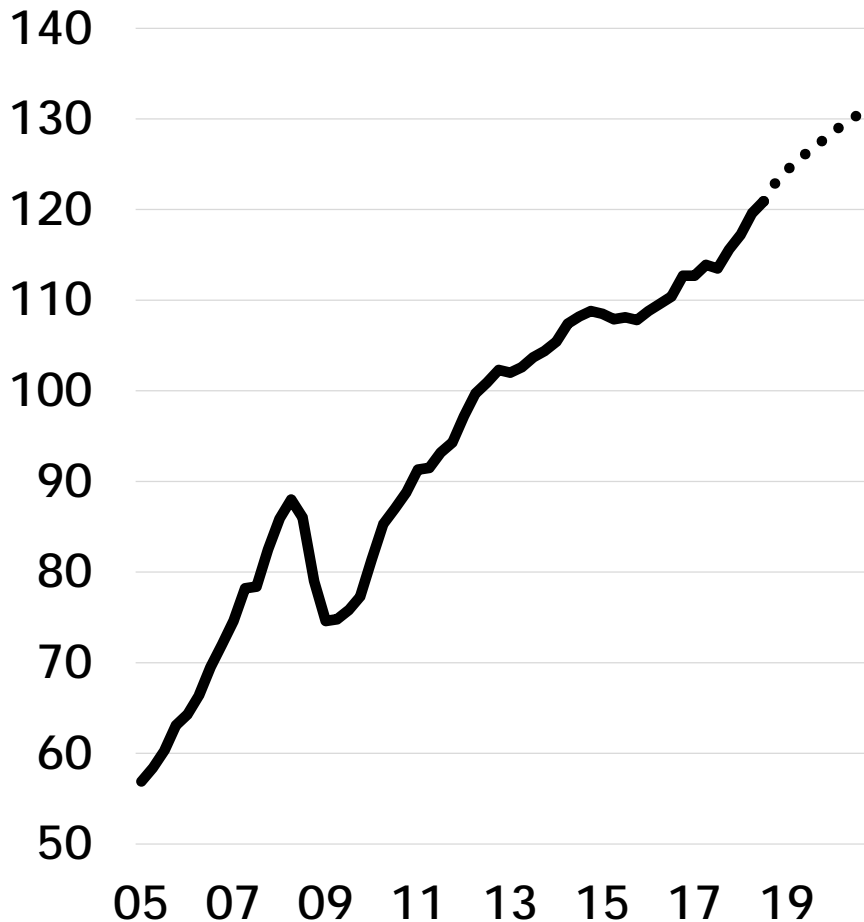
A Boston Consulting Group study examined labor content and logistics costs along with projected productivity differences (falling from 4.6X to 2.3X), challenge of extended supply chains, and high risk of cost volatility in China...and uncovered a “tipping point” in cost-risk among seven key industries:

- Computers and electronics
- Appliances and electrical equipment
- Machinery
- Furniture
- Fabricated metal products
- Plastic & rubber products
- Transportation goods

...and that as these industries “re-shore” to the USA, the USA will gain \$80 billion to \$120 billion in added annual output and 2.0 million to 3.0 million jobs

# US Computers & Electronics

Production Index (2012=100)

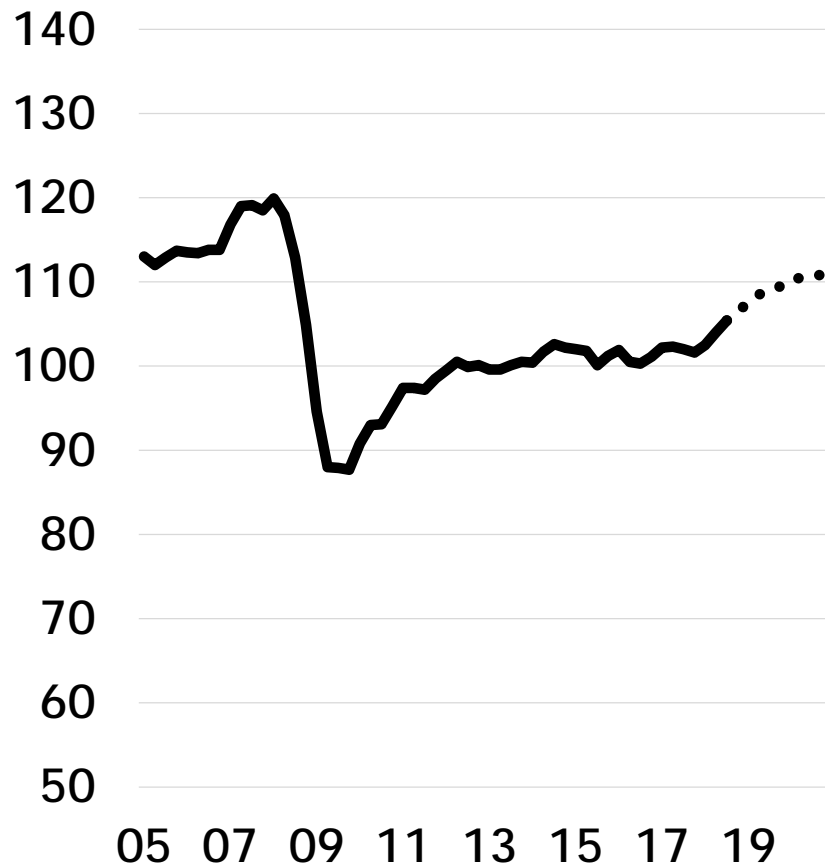


% Change in Output Volume Year-over-Year

	16	17	18	19	20
<b>Total</b>	<b>2.1</b>	<b>3.2</b>	<b>5½</b>	<b>5</b>	<b>3</b>
Computers	-0.1	18.9	8¾	3½	3¼
Communications Equipment	3.3	-0.6	-1¾	2	2¾
Consumer Electronics	-3.0	-9.1	-3	5¼	1
Electronic Components	8.2	2.2	8¾	7	4¼
Instrumentation	-0.7	3.0	5	5½	3

# US Appliances & Electrical Equipment

Production Index (2012=100)

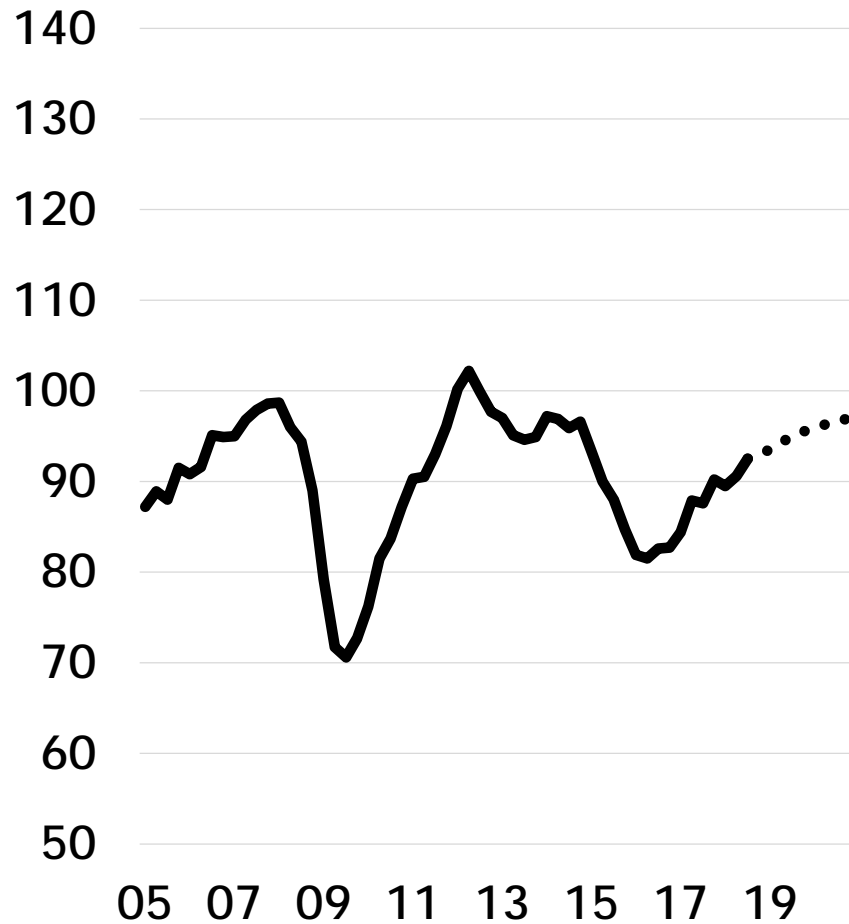


% Change in Output Volume Year-over-Year

	16	17	18	19	20
<b>Total</b>	<b>-0.3</b>	<b>1.1</b>	<b>2½</b>	<b>3¾</b>	<b>1¾</b>
Household Appliances	3.9	0.9	-1	½	2¼
Lighting Equipment	5.5	2.2	1¼	1½	1¼
Electrical Equipment	-4.0	-5.6	1¼	4¼	1¼
Other	-0.8	5.2	4¾	5¼	2¼

# US Machinery

Production Index (2012=100)



% Change in Output Volume Year-over-Year

	16	17	18	19	20
<b>Total</b>	<b>-7.7</b>	<b>6.5</b>	<b>6</b>	<b>2</b>	<b>2</b>
Agricultural	-21.1	11.5	3¾	½	1½
Construction	-9.1	28.0	1½	1	1½
Mining/Oil & Gas	-30.2	28.8	23½	12½	7¾
Industrial	-2.8	5.7	3	½	4
HVAC	-3.4	1.5	3¾	2¾	1¼
Metalworking	-4.4	0.8	4	1	2½
Engines, Turbines & Power	-11.5	1.0	9¼	3¼	0
Other	-3.4	4.7	6¼	2	1¾

Sources: FRB and ACC analysis based on IHS Markit and Oxford Economics



# US Furniture

Production Index (2012=100)

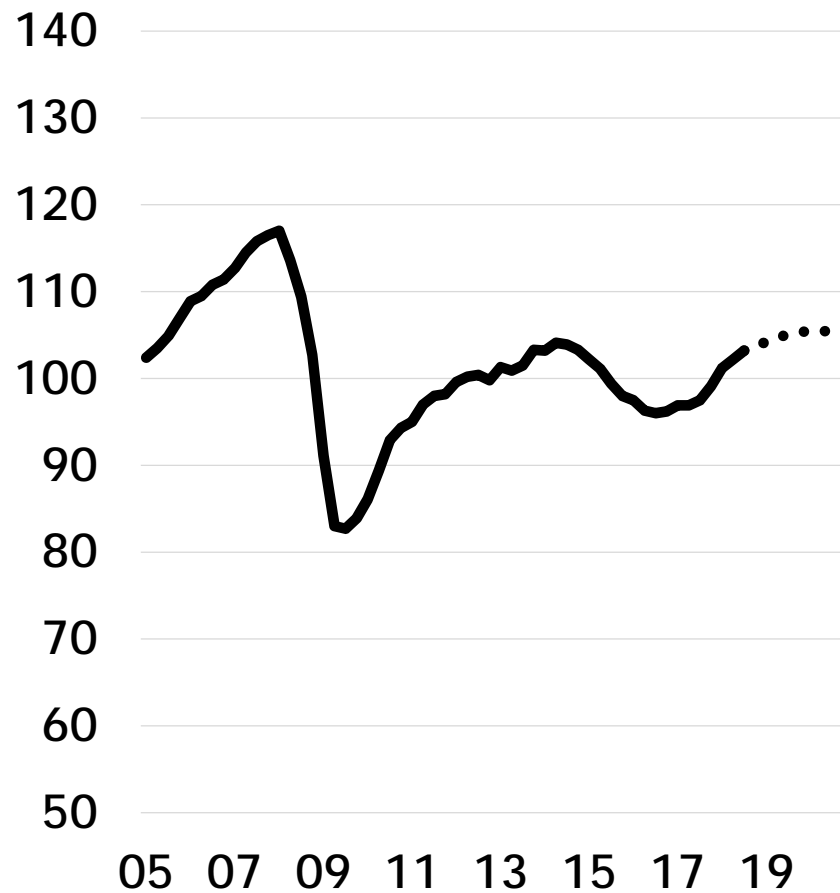


% Change in Output Volume Year-over-Year

	16	17	18	19	20
<b>Total</b>	<b>0.3</b>	<b>-1.8</b>	<b>0</b>	<b>1¾</b>	<b>1½</b>
Household/ Institutional	1.5	0.0	2¾	2½	1¼
Office & Other	-1.1	-3.6	-2½	¾	1½

# US Fabricated Metal Products

Production Index (2012=100)



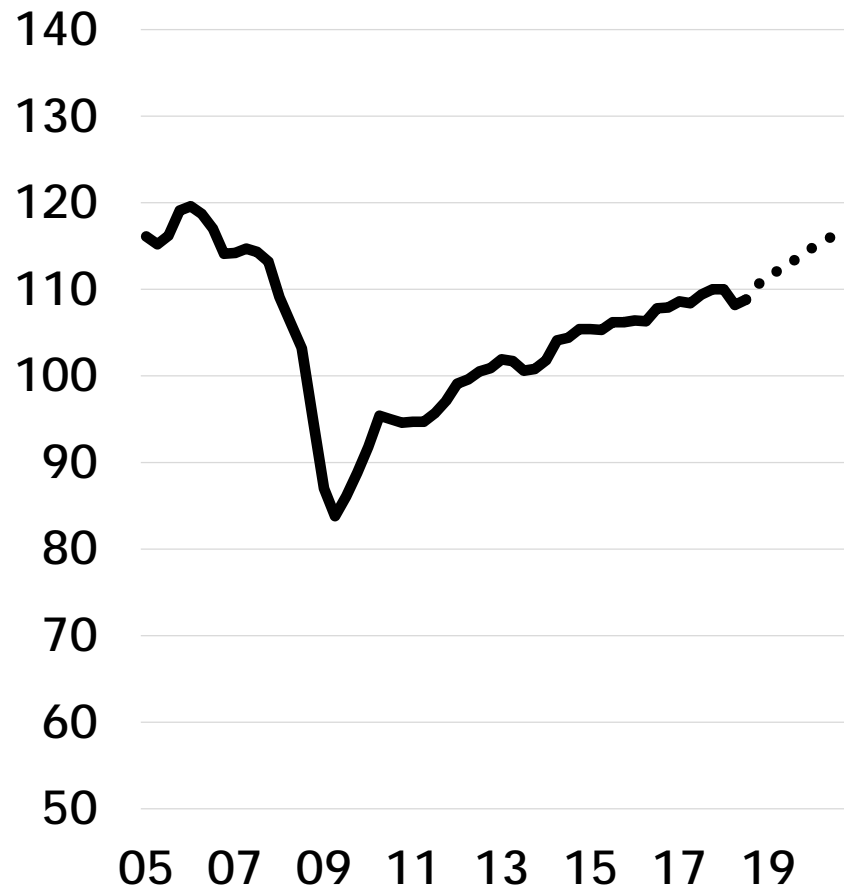
% Change in Output Volume Year-over-Year

	16	17	18	19	20
<b>Total</b>	<b>-3.7</b>	<b>1.2</b>	<b>5</b>	<b>2¼</b>	<b>½</b>
Forging/ Stamping	-5.7	2.8	7½	2½	0
Cutlery/ Handtools	-5.6	2.7	15	-1½	-¼
Architectural/ Structural Metals	0.2	-1.6	3¼	3	1
Hardware	1.5	0.2	6	3¼	¾
Spring/Wire	-0.3	1.0	6¼	3	¼
Fasteners, etc.	-5.7	2.4	6	2½	0
Coating, Heat Treating, etc.	-5.1	3.0	7½	3½	0
Other	-4.5	1.5	2	1¼	¾

Sources: FRB and ACC analysis based on IHS Markit and Oxford Economics

# US Plastic & Rubber Products

Production Index (2012=100)

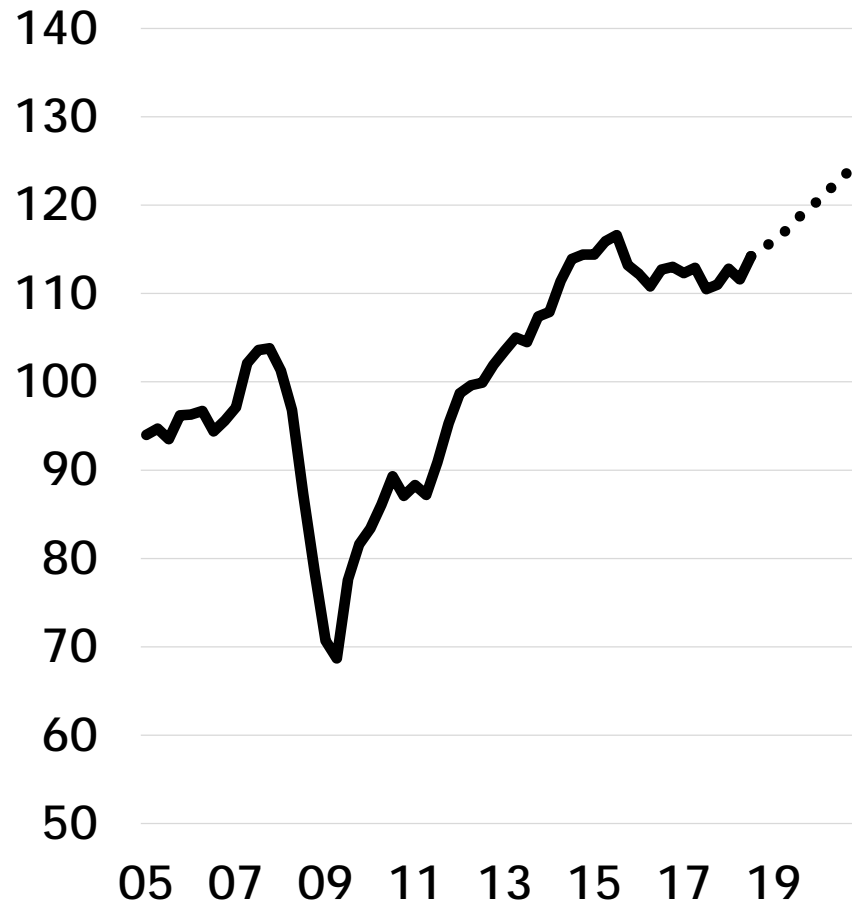


% Change in Output Volume Year-over-Year

	16	17	18	19	20
<b>Total</b>	<b>1.3</b>	<b>1.9</b>	<b>¼</b>	<b>3</b>	<b>2¾</b>
Plastic Products	2.4	2.7	¼	3	3
Tires	-7.0	-2.3	-½	1¼	1½
Other Rubber Products	-1.4	-2.0	-¾	2¾	2¼

# US Transportation Goods

Production Index (2012=100)



% Change in Output Volume Year-over-Year

	16	17	18	19	20
<b>Total</b>	<b>-2.5</b>	<b>-0.4</b>	<b>1½</b>	<b>3¾</b>	<b>4</b>
Motor Vehicles & Parts	1.3	-0.9	3½	2½	2¼
Aerospace	-6.9	0.2	-2¼	6½	8
Ships & Boatbuilding	-3.9	1.5	4¾	-1	-2¼
Other	-10.9	-2.1	2½	4	1

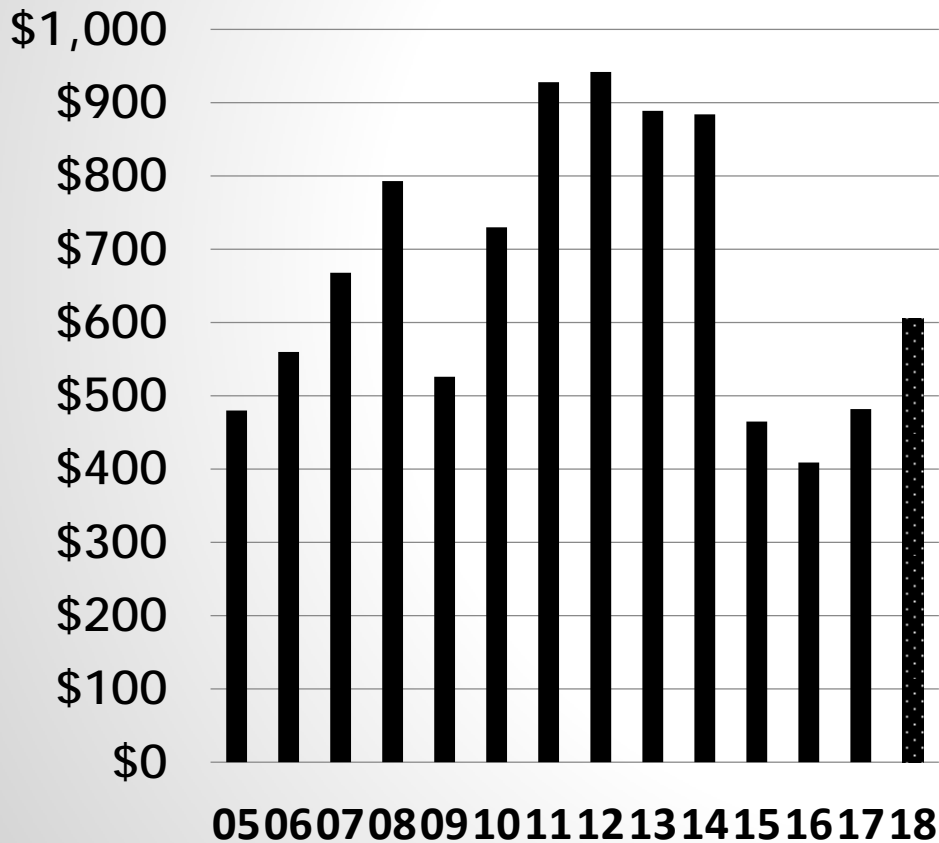
Sources: FRB and ACC analysis based on IHS Markit and Oxford Economics



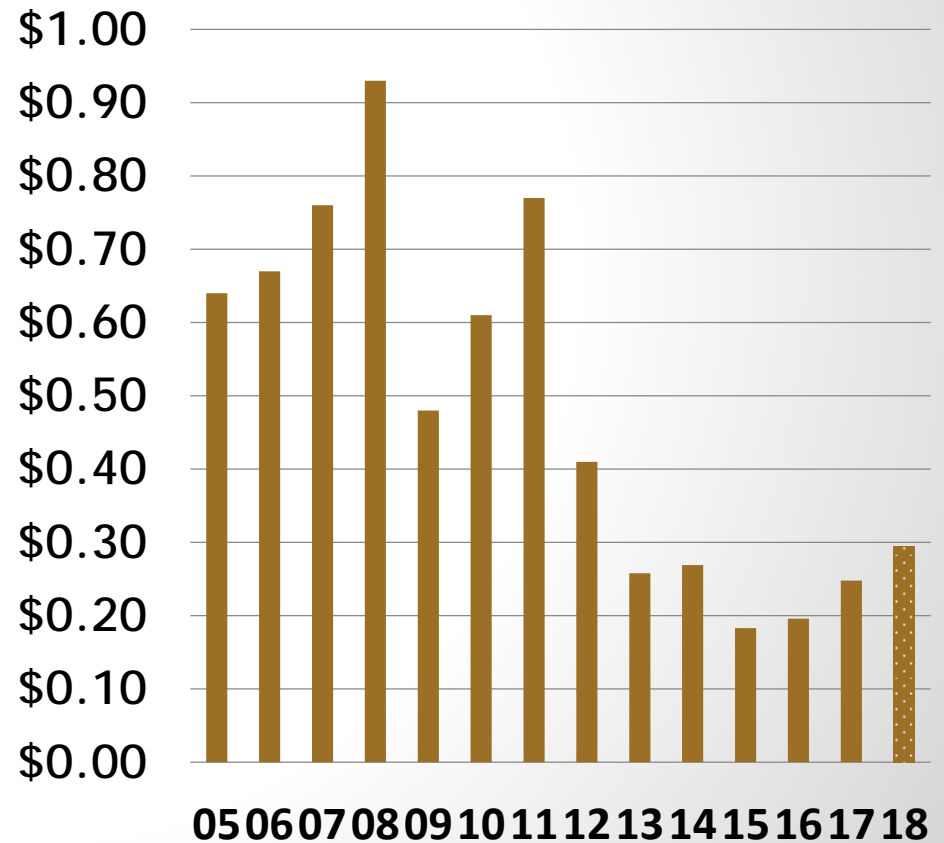
# Perspectives on Chemistry

# US Feedstock Costs Remain Advantaged

## Western European Naphtha (\$/metric ton)



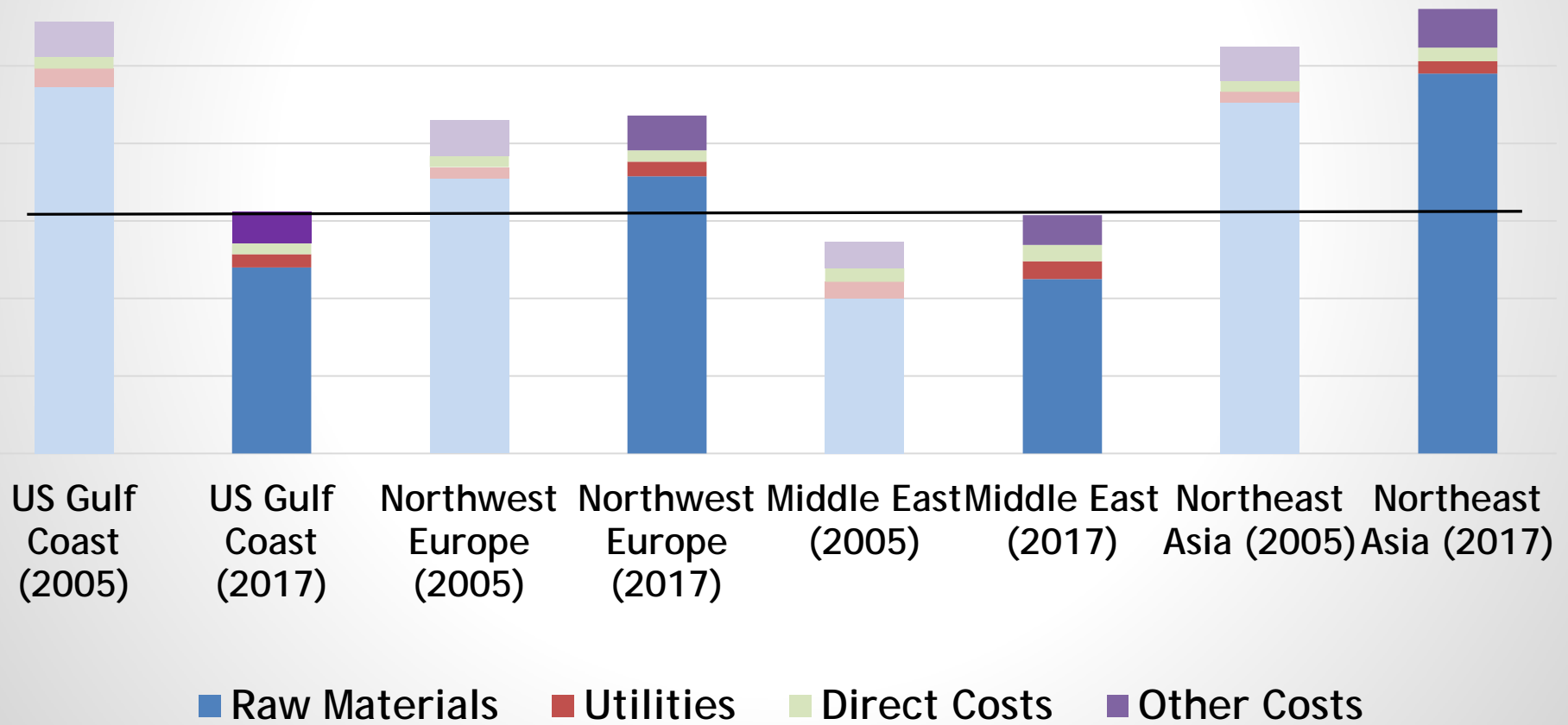
## US Ethane (\$/gallon)



# Lower US Manufacturing Costs: Case of High Density Polyethylene (HDPE)

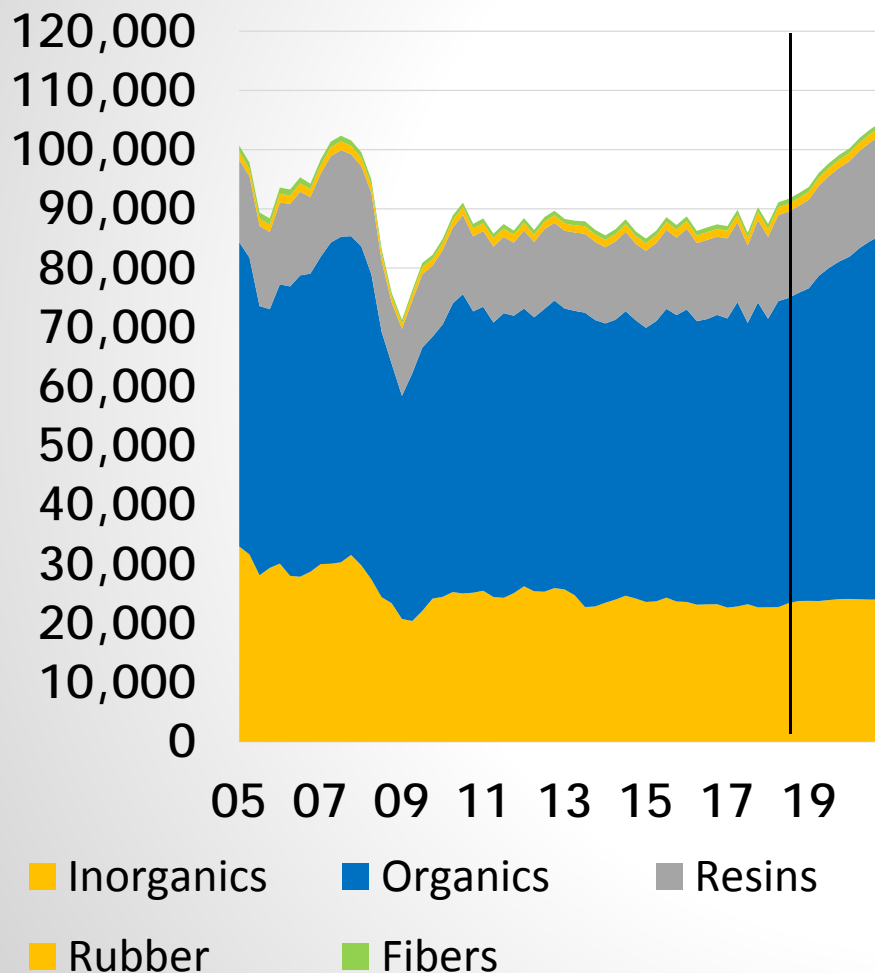
\$ per Metric Ton

By 2017, US among the low cost producers globally, but because of lower falling oil and naphtha prices...a shallower (less steep) cost curve



# US Basic Chemical and Synthetic Materials Production Outlook by Segment

Quarterly Production (000 MT)



Year	Total	Inorganics	Organics	Resins	Rubber	Fiber
2014	-1.2%	0.3%	-2.1%	-1.0%	3.5%	-1.3%
2015	0.2%	-1.0%	0.7%	0.4%	3.5%	0.7%
2016	0.6%	-2.2%	1.9%	1.5%	-2.0%	-0.7%
2017	1.1%	-1.9%	2.6%	1.1%	1.4%	1.5%
2018	1½%	1½%	2½%	6½%	1½%	2¼%
2019	5½%	3¼%	8¼%	7%	2¼%	-2%
2020	6¼%	½%	8¼%	7½%	2¼%	-2¼%



# Positive US Manufacturing Outlook Depends On...

Access to Abundant and Affordable Energy

Strong U.S. Manufacturing Base

Regulatory Environment

State of the U.S. and Global Economy

Access to Global Supply Chains

Access to Export Markets

# For Further Information



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