BCG

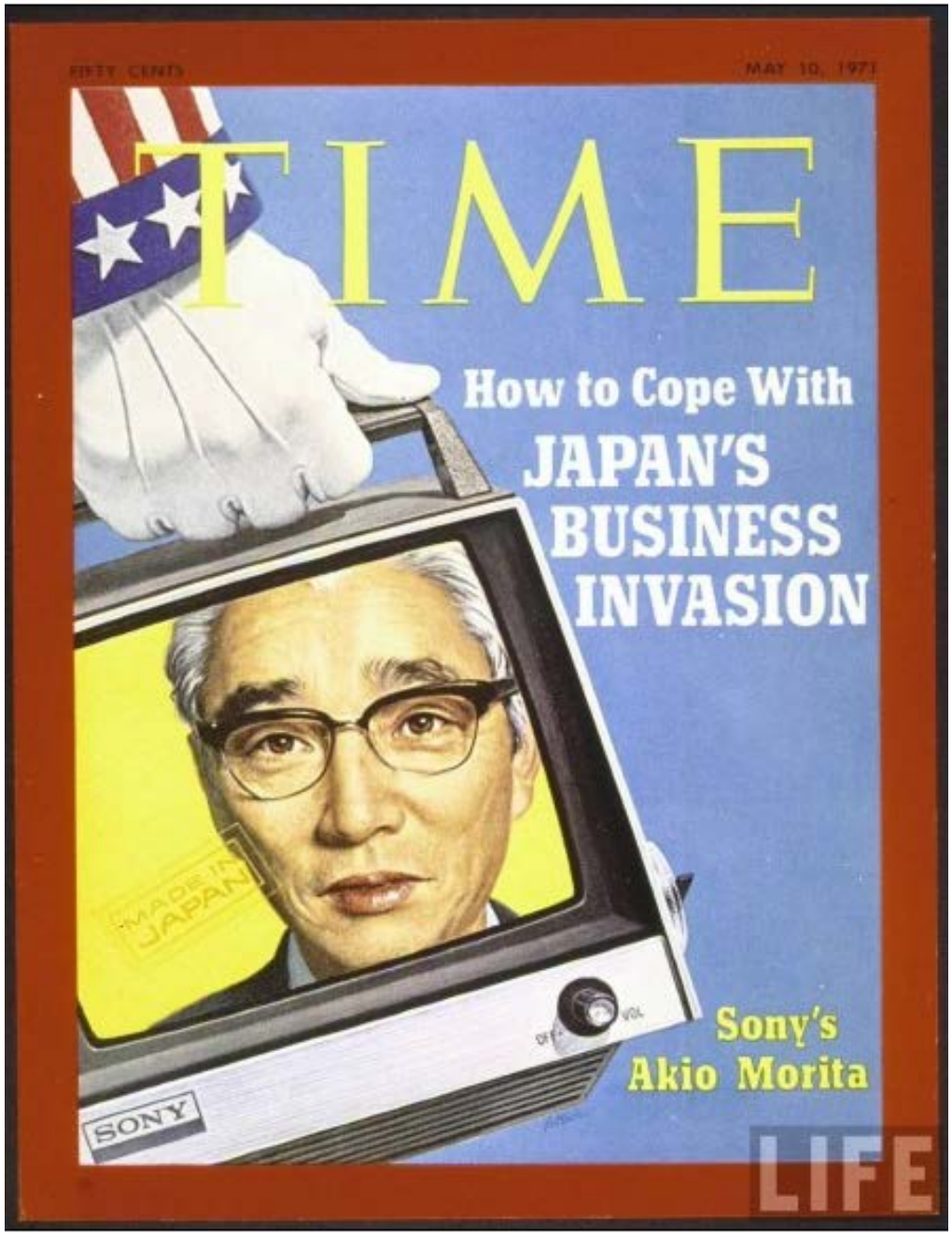
The International Trade Association of Greater Chicago

Made in America Again...

The New Economics of Global Manufacturing

January 16th, 2013

THE BOSTON CONSULTING GROUP

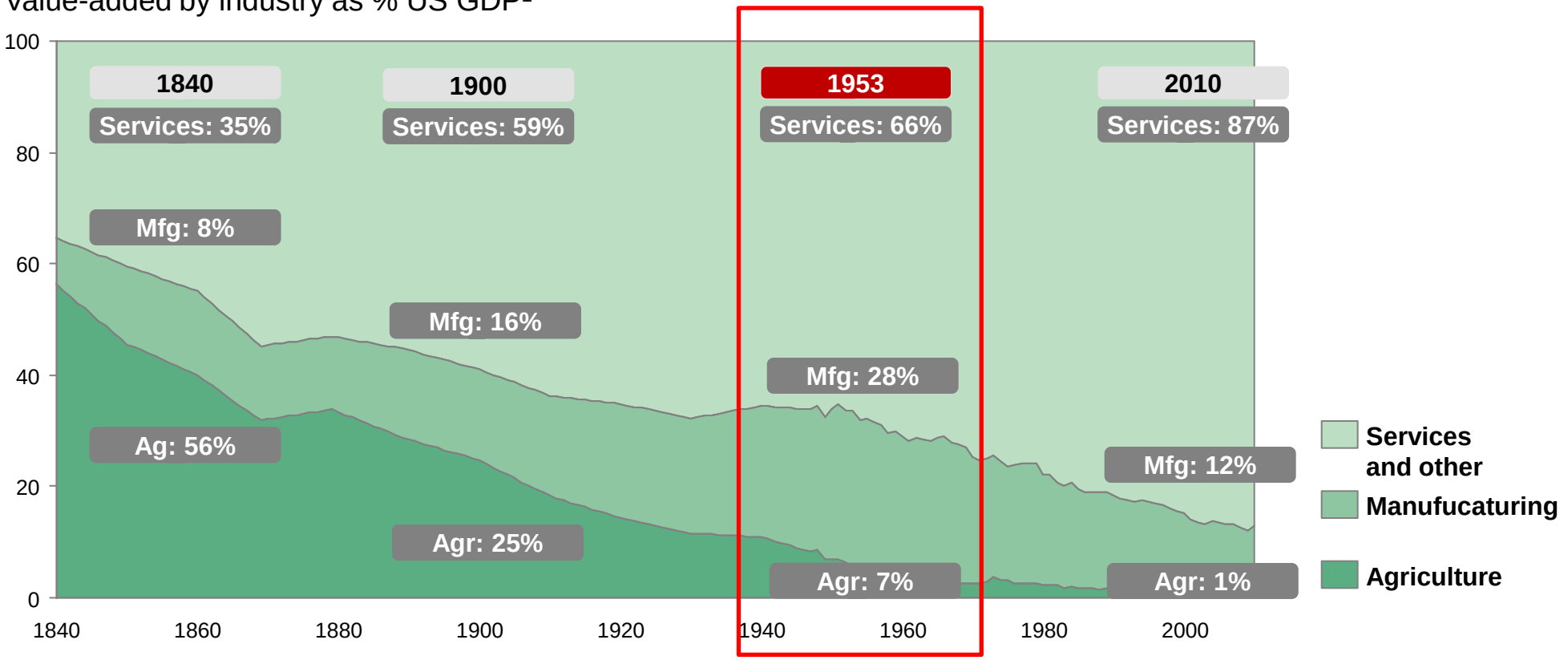

FIFTY CENTS
MAY 10, 1971
TIME
How to Cope With
JAPAN'S
BUSINESS
INVASION
MADE IN JAPAN
SONY
Sony's
Akio Morita
LIFE


RGW

Manufacturing contribution to overall GDP steadily declining

Down to ~12% today vs. 28% in the early 1950s

Value-added by industry as % US GDP[1]

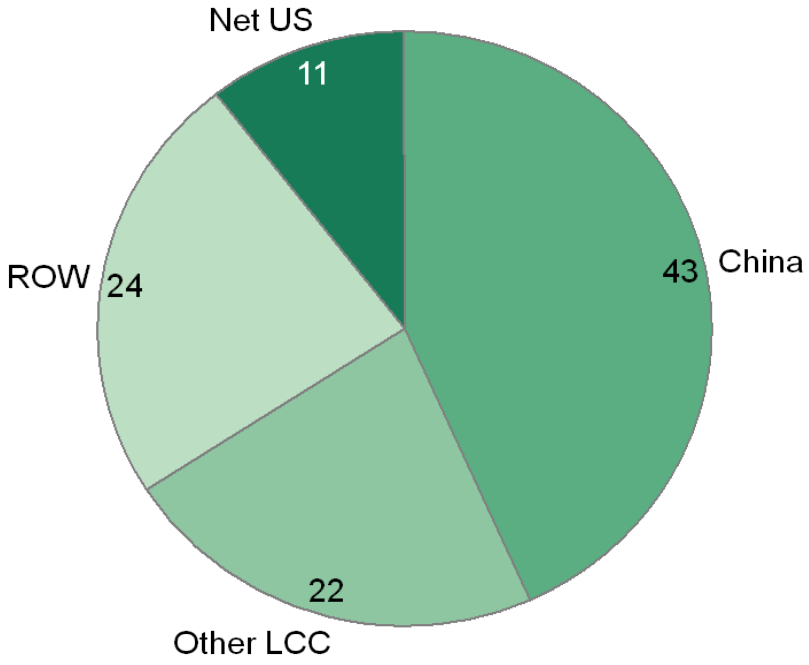


1. US data before 1947 based off of indices for mfg value-added to GNP, after is based off of contribution to GDP; data after 1947 calculated as GDP x mfg value added as % of GDP (from BEA).
Source: BEA, World Bank, A Dataset on Comparative Historical National Accounts 1870-1950: A historical Perspective, Historical Statistics of the World Economy; Statistical Abstract of the United States; BCG Analysis

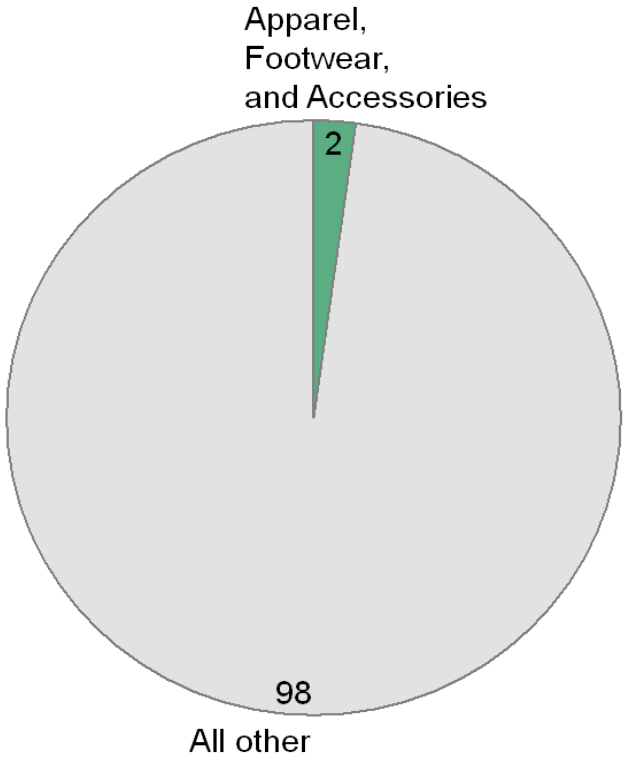
For example, US manufactures only 11% of its own apparel

However, apparel accounts for very small portion of manufactured goods

Bulk of apparel in US made in China and other LCCs...

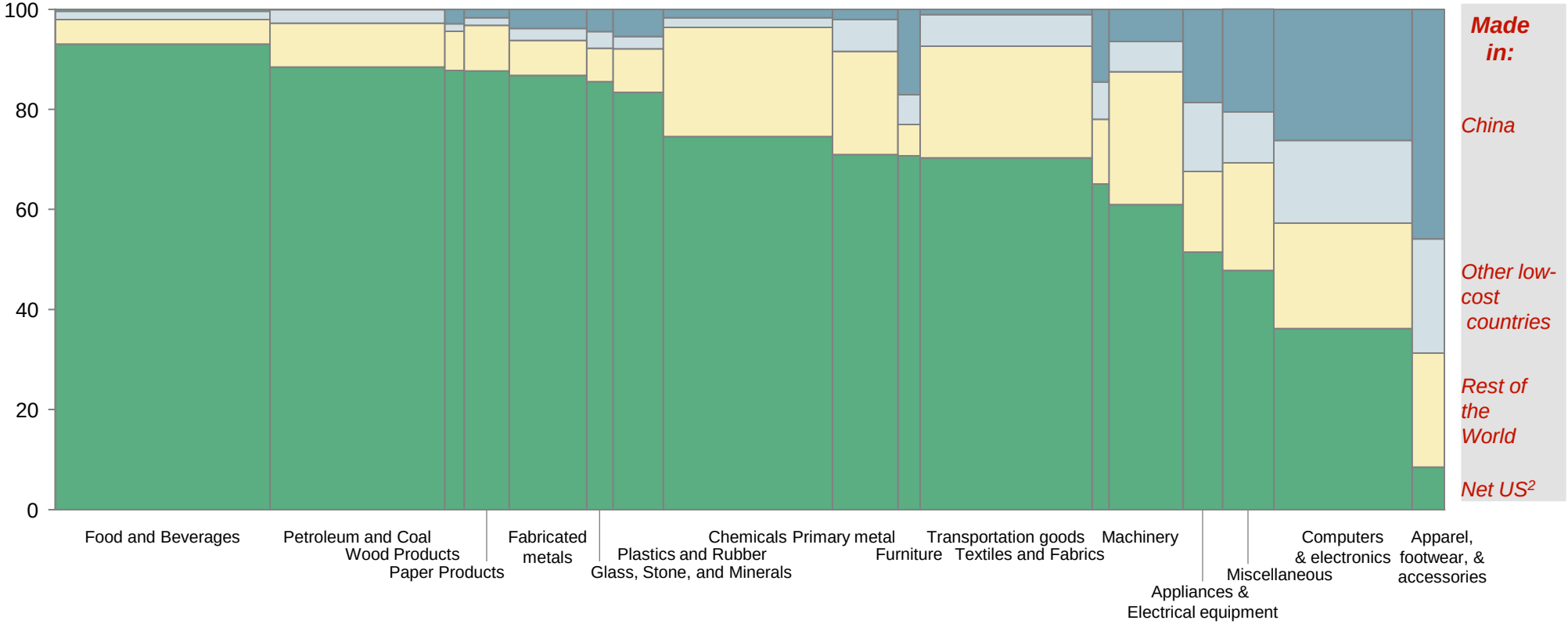


...But apparel only accounts for ~2% of US manufactured goods consumption



The US makes over 70% of what it consumes

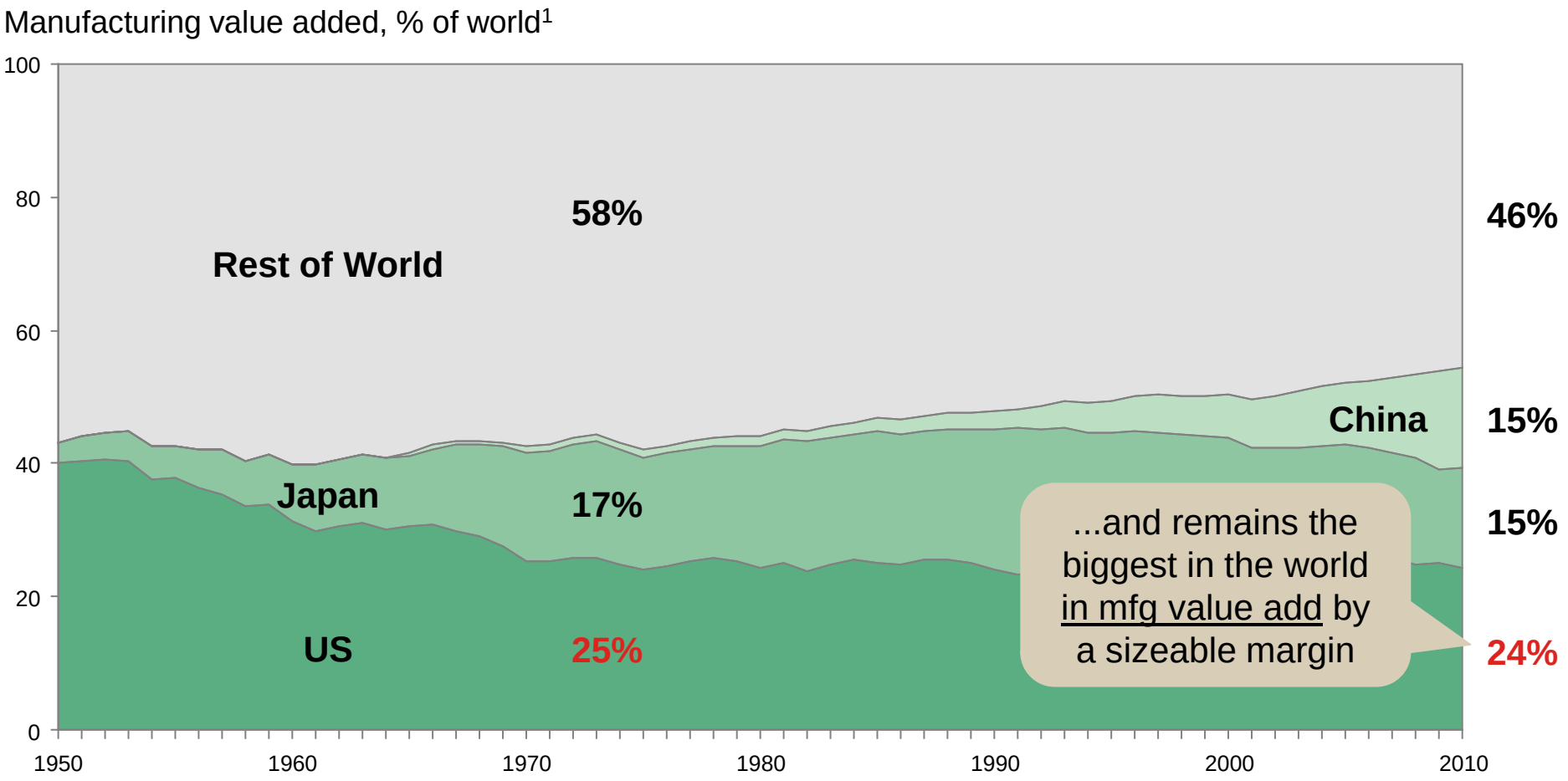
% of US manufactured goods consumed in 2010[1] by source



Value of US manufactured goods consumed by category (Billion USD)

1. Goods consumed = Production (value of final and intermediate goods) + Imports (CIF basis) – Exports (CIF basis) 2. Net US = Production (value of final and intermediate goods) - Exports
Source: National Census Bureau, BEA, BCG analysis

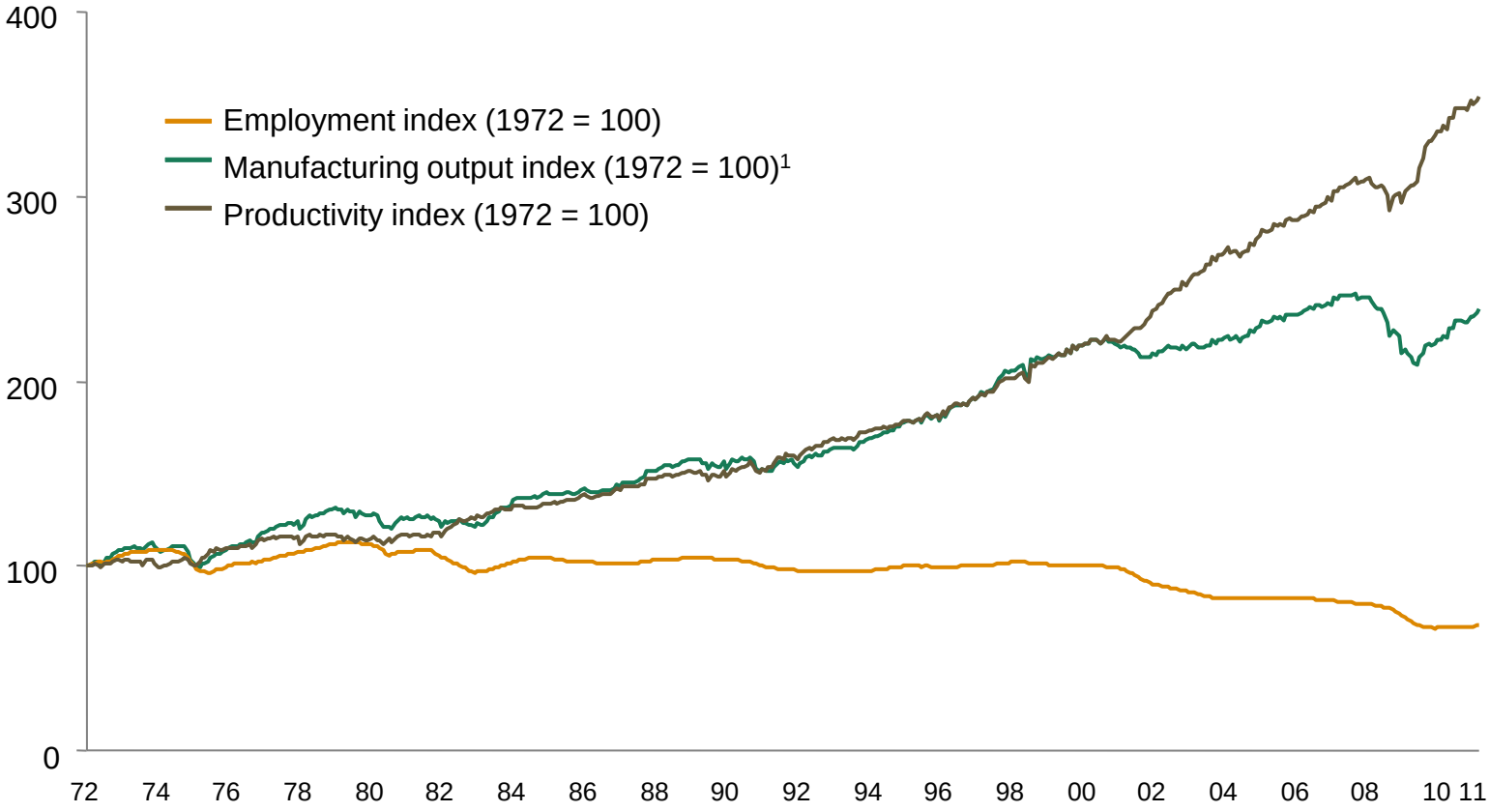
After dropping between 1950-1970, the US share of world manufacturing output has remained steady at ~25%...



1. World calculated as adjusted sum of US, Australia, Belgium, Canada, China, Czech Republic, Denmark, Finland, France, Italy, Germany, Japan, South Korea, Netherlands, Norway, Spain, Sweden, and UK. To calculate the size, we compared the sum of the above countries with the world aggregate from World Data Bank for the years 1998 to 2010. On average, the sum of the 18 countries above was 78% of the World Data Bank world aggregate, so we divided the sum of the 18 countries above by 78% to calculate the size of the world. Assumes 18 countries mentioned above account for constant portion of world's manufacturing output. % calculated as mfg value-added in 2000$ for each country divided by calculated world. Mfg value-added calculated as mfg in 2000$ from World Data Bank in 2008 x index to the year 2008 from the BLS. 2. Data not available for 1950 and 1960

Source: BLS, World Bank, BCG Analysis

Output up 2.5x since 1972, productivity up 3.5x



Productivity skyrocketing: up ~3.5X since 1972

Output up ~2.5X since 1972

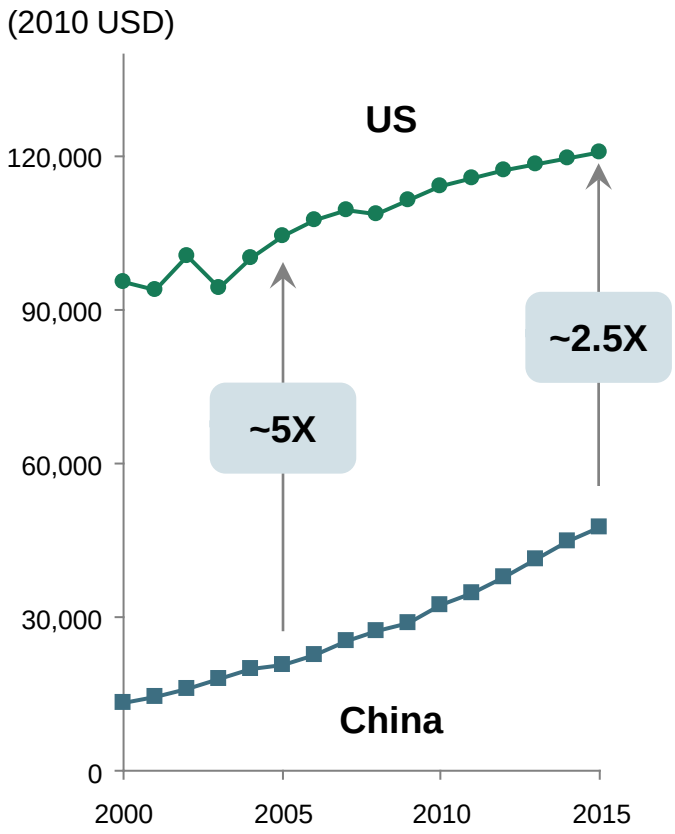
Labor down to 0.7X 1972 levels

1. Gross value of Final Products, measured in 2005 US$ prices, Federal Reserve data
Source: Federal Reserve, US Bureau of Labor Statistics

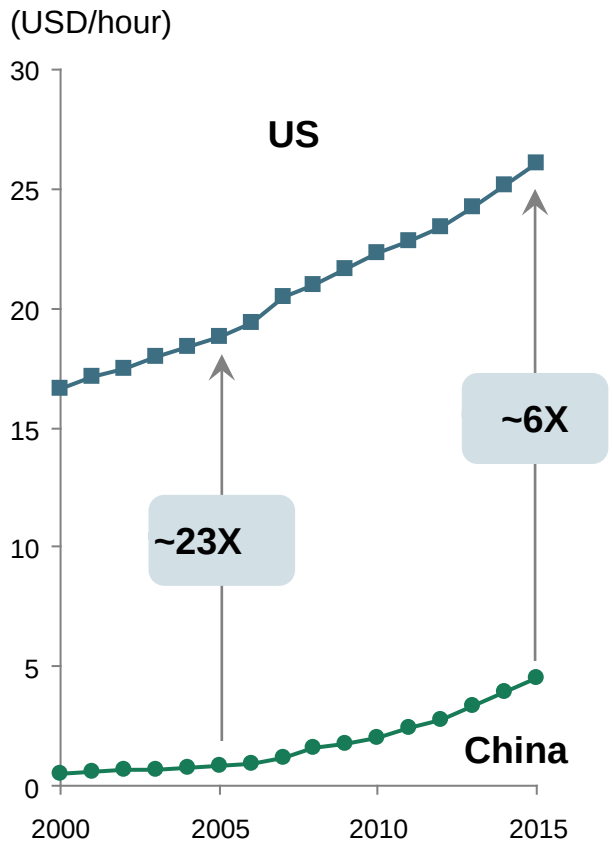
So, what does the future hold?

China's cost advantage over the US is quickly eroding

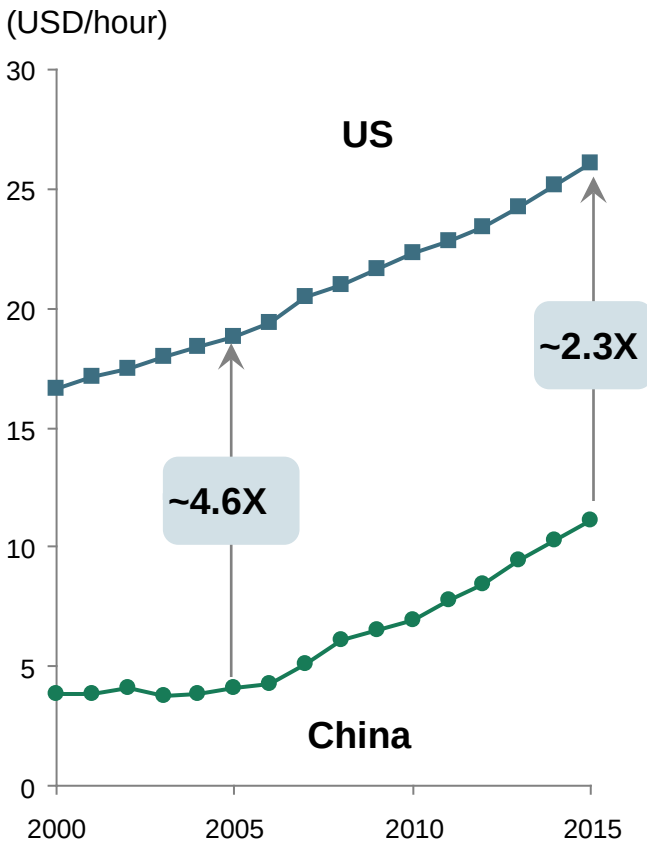
Productivity



Wage rates

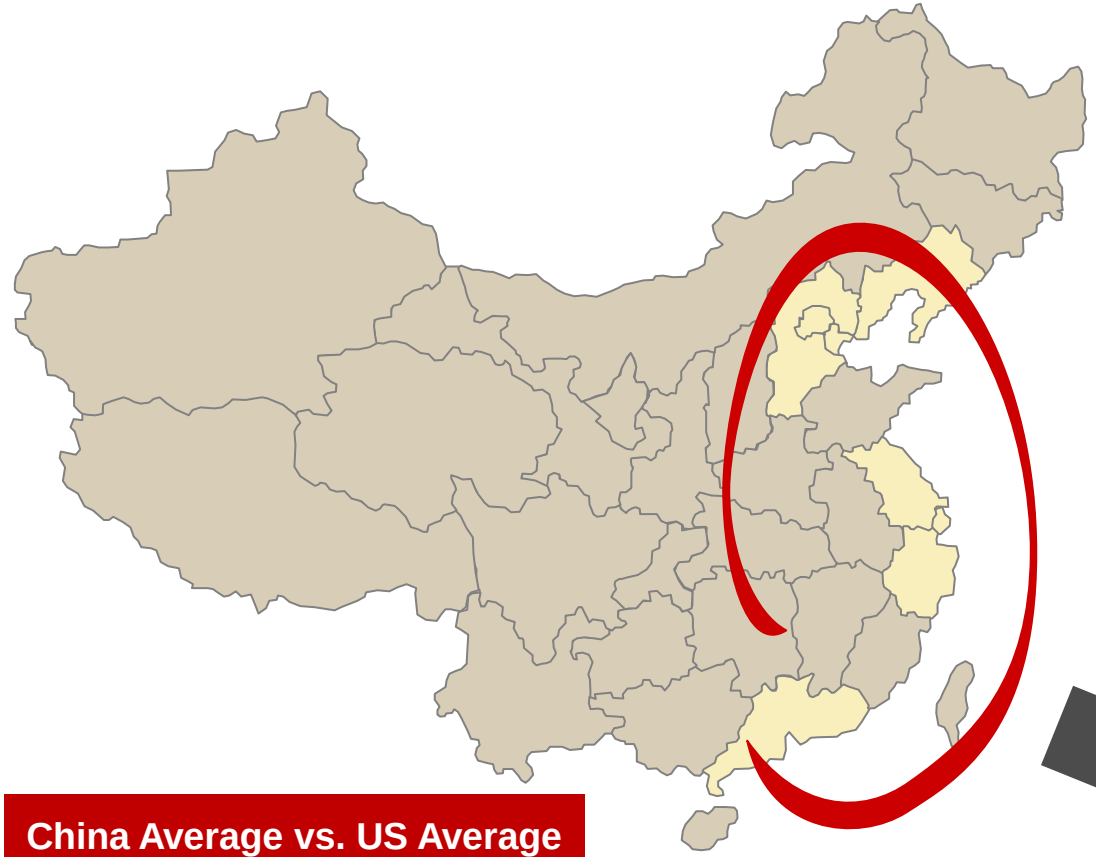


Productivity-adjusted wage rate



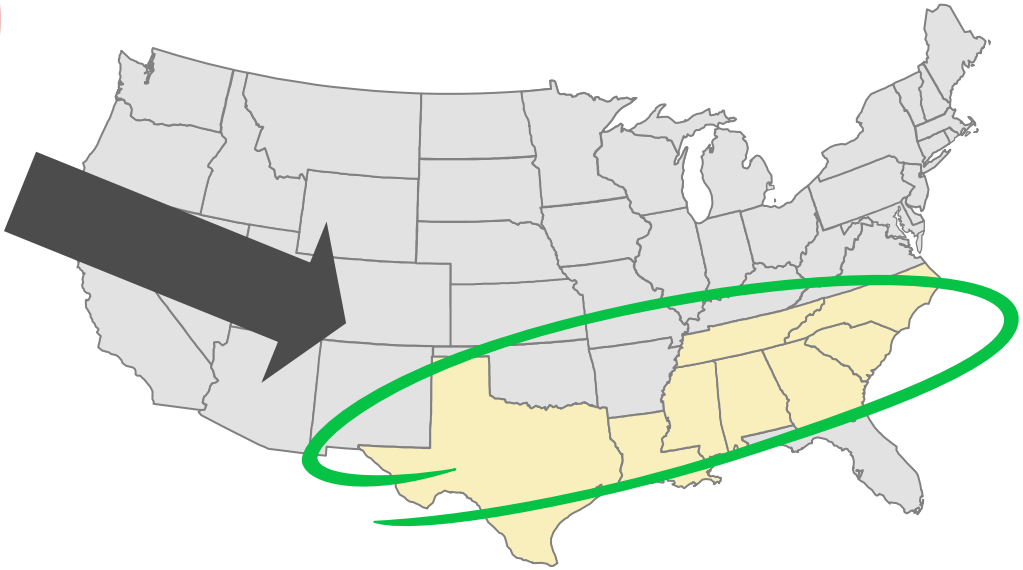
1. Europe includes Germany, France, UK, Italy, Czech Republic, and Poland
Source: EIU, BLS, ILO, BCG analysis

Specific decisions may be even more significantly impacted



China industrialized vs. US low-cost
(productivity adjusted wages)

	2005	2010	2015
US / China	4.2X	2.4X	1.7X



China Average vs. US Average
(productivity adjusted wages)

	2005	2010	2015
US / China	4.6X	3.2X	2.3X

Economics will drive reinvestment in US

Imagine a company...

- US-based auto parts supplier
- Most customers are US OEMs that manufacture in the US
- Parts take 8 minutes of labor on average in the US
- Labor represents 1/4 of the total cost of the part

...with the following location choices...

US, selected low cost states

- Flexible unions/workers
- Minimal wage growth
- High worker productivity

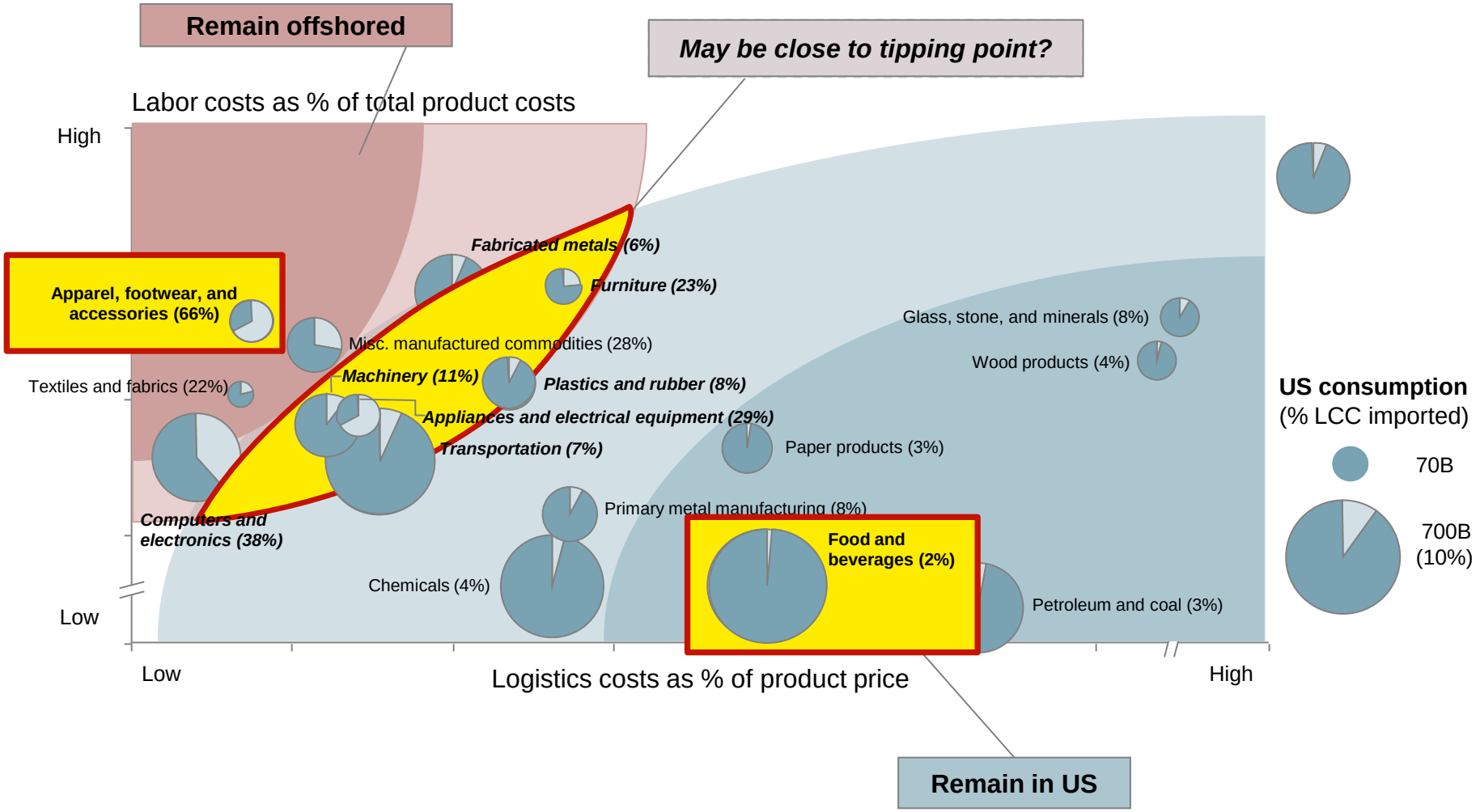
China, Yangtze River Delta region

- Scarce labor
- Rapidly rising wages
- Low productivity relative to the US

	2000	2015F
Wage rate ($/hr)	15.81	24.81
Productivity (%)	100%	100%
Labor cost/part ($)	2.11	3.31
Wage rate ($/hr)	0.72	6.31
Productivity (%)	13%[1]	42%[2]
Labor cost/part ($)	0.74	2.00
Labor cost savings (%)	**65%**	**39%**
Total cost savings (before transportation, duties, and other costs)	**16%**	**10%**

1. Based on average overall Chinese productivity. 2. Average productivity difference between US and China's YRD Region. YRD productivity assumed to grow at ~7% CAGR over 2009 baseline, slightly slower than overall Chinese manufacturing productivity (~8.5%) as other regions adopt more advanced manufacturing practices.
Source: BCG analysis, BLS, EIU

Labor and logistics drive the sourcing decisions: seven industry clusters may be close to "tipping point"

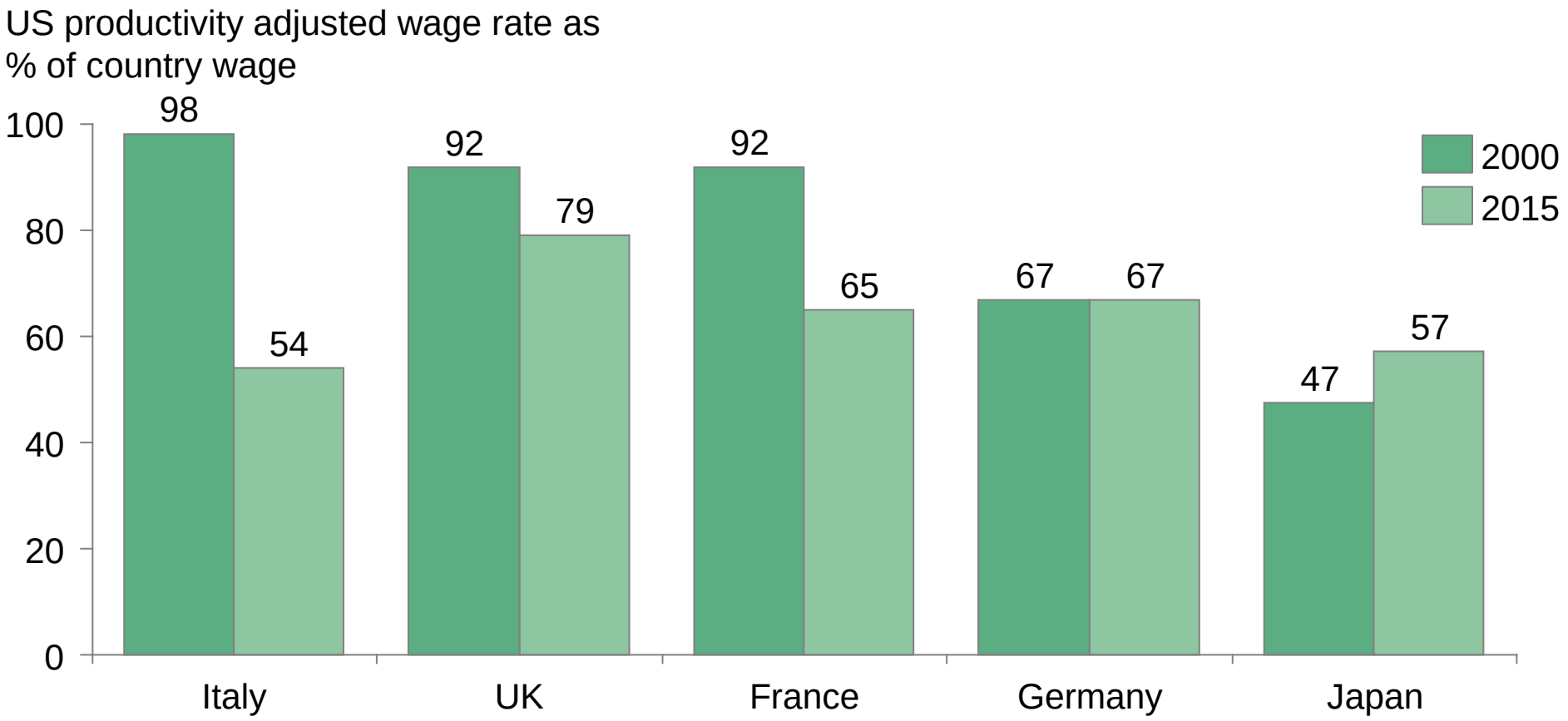


Note: Included total of 17 NAICS industries. LCC sample comprises13 countries (Brazil, Cambodia, China, Czech Republic, Hungary, India, Indonesia, Malaysia, Mexico, Poland, Russia, Thailand, and Vietnam). Based on 2009 numbers
Note: Consumption defined as Total Production + Imports – Exports; $1.5T value is nominal for 2009
Source: US Department of Transportation, US Census Bureau, Bureau of Economic Analysis; BCG analysis

Many examples of companies already re-shoring to the US

Source: Press search; company websites

U.S. labor market is the most attractive of all major developed-world manufacturers



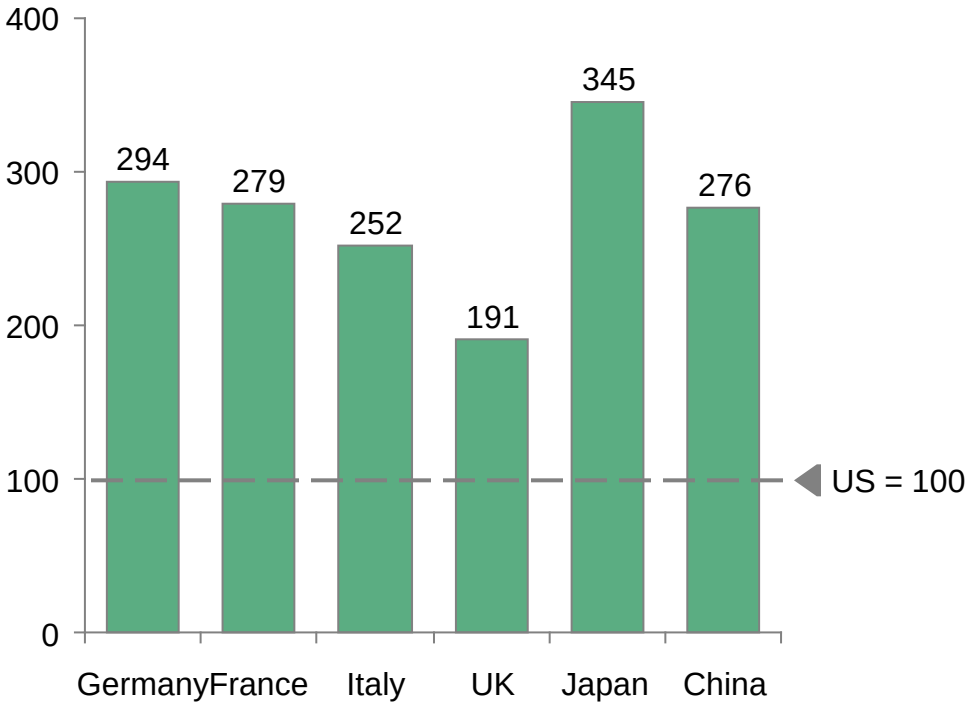
Example: Toyota on record as planning to use US as a major export base in the future

Note: Fully loaded wages from EIU; US wages are average for Southern states
Source: ILO; EIU; BCG analysis, 2009 economic freedom ratings, Fraser Institute, based on data from the World Economic Forum and World Bank

Abundant natural gas in U.S. has led to a large energy cost advantage for domestic manufacturers

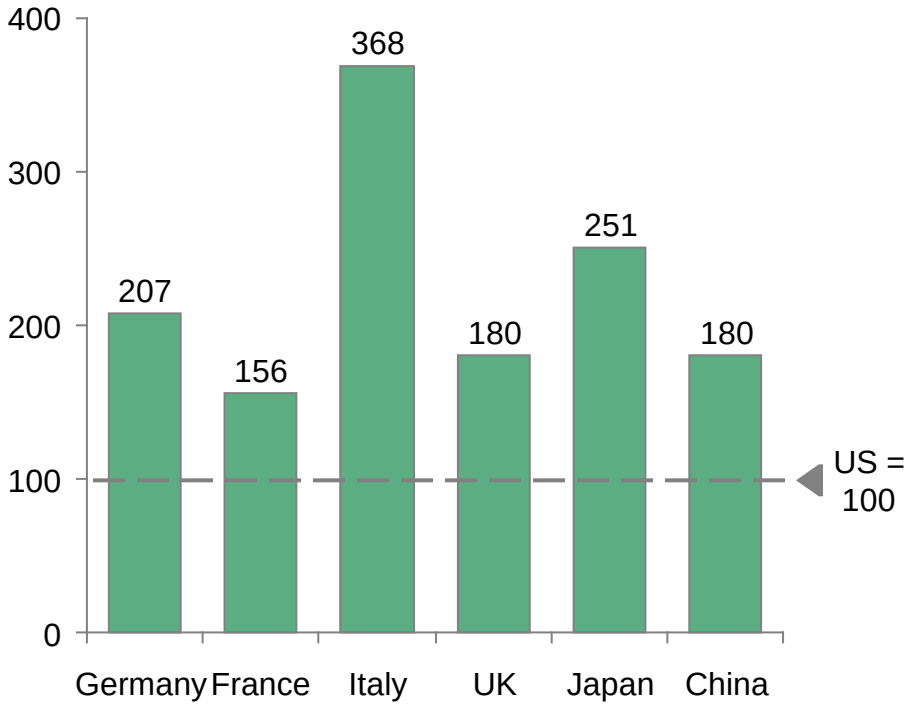
Natural gas prices in other major manufacturing economies are around 2-3.5 times higher than in the U.S....

Natural gas prices (Index, US = 100)



...and industrial electricity prices are around 1.6-3.7 times higher

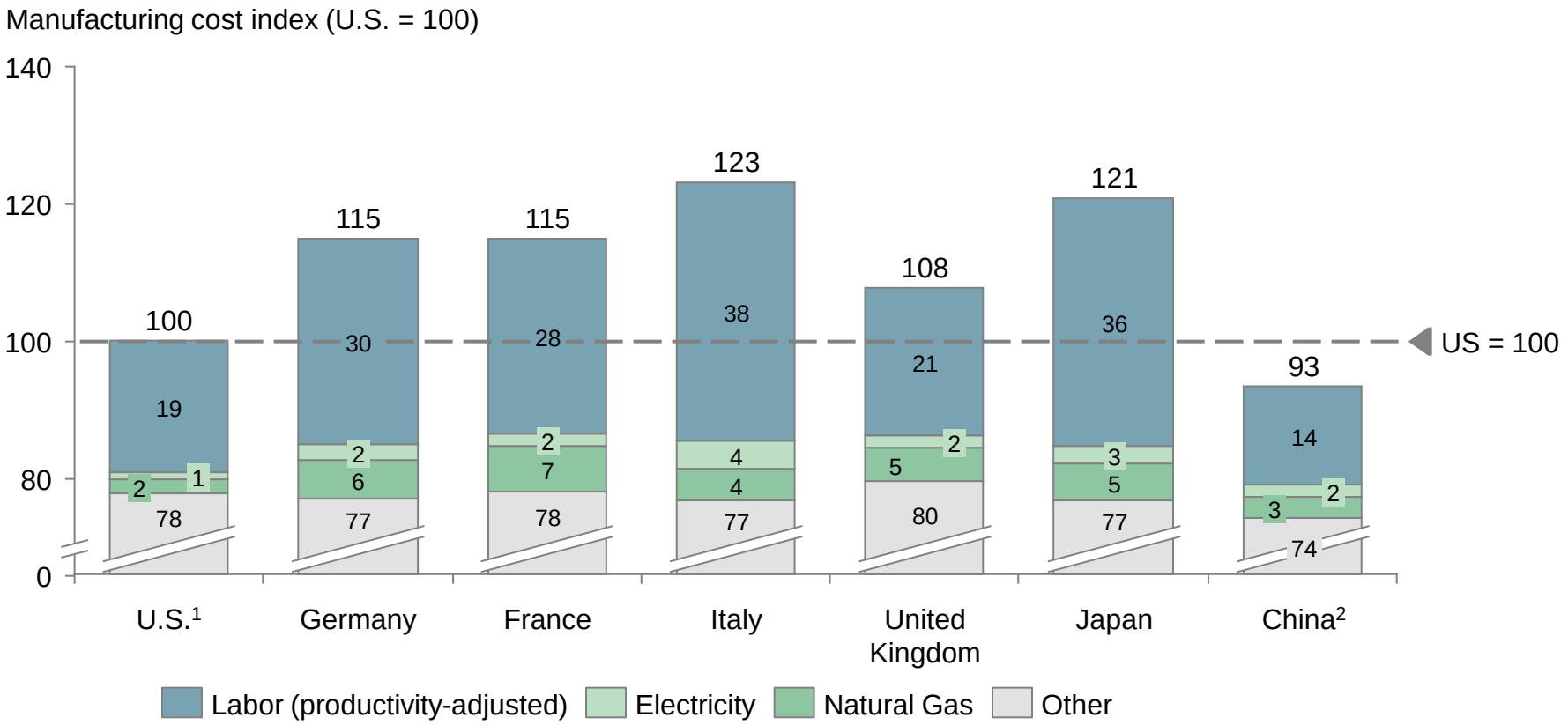
2011 Industrial electricity prices (Index, US = 100)



Note: Energy prices based on 2011 averages
Source: IEA quarterly energy price and tax statistics, BCG analysis

The U.S. is one of the developed world's lowest-cost countries

Major exporting nation average manufacturing cost structures relative to U.S. (2015 projections)

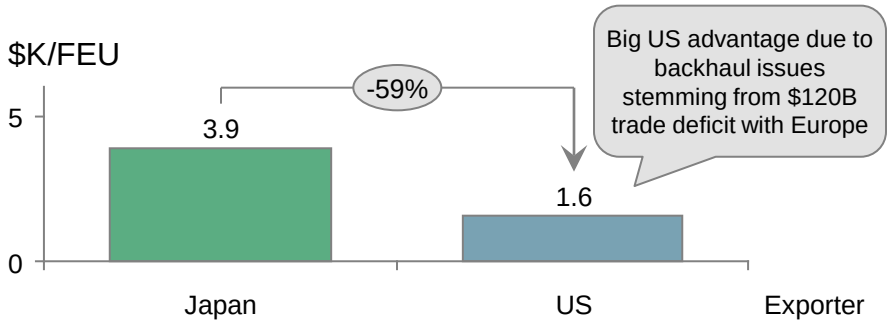


Note: No difference assumed in "other" costs (e.g., raw materials inputs, machine and tool depreciation, etc). Differences in values a function of the industry mix of each
Note: Cost structures calculated as a weighted average across all industries
1. US figures represent costs in a set of select southern states as defined in prior publications
2. Chinese figures represent Yangtze River Delta region
Source: US Economic Census, BLS, BEA, ILO

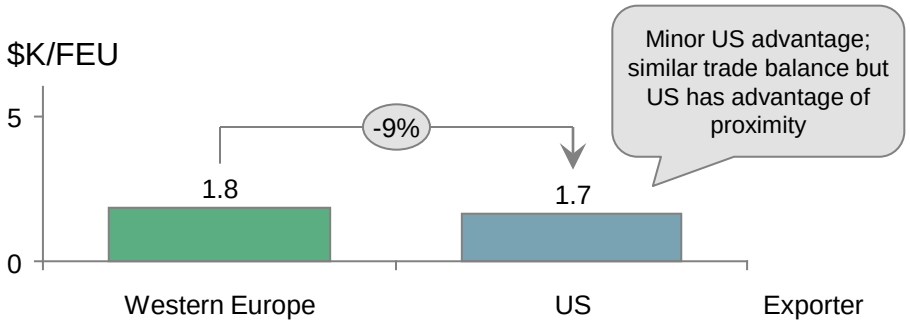
Low port utilization, geographical proximity allow for cheap shipping from U.S. within major trade lanes

Cost to ship...

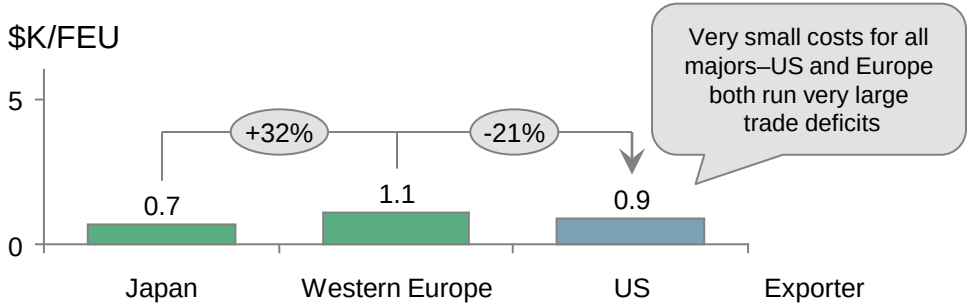
...to Western Europe ($K)[1]



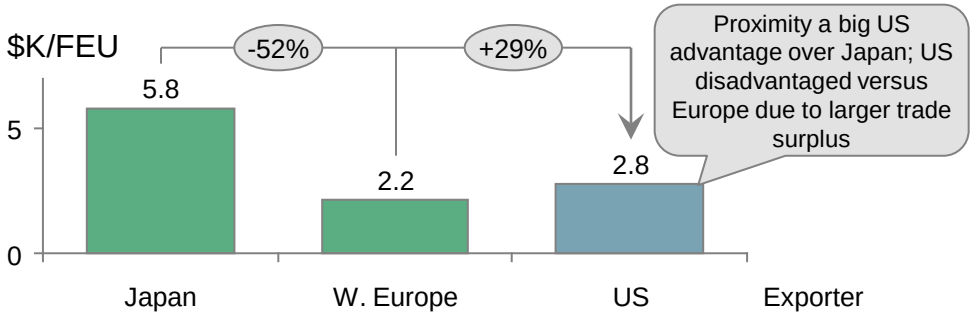
...to Japan ($K)[2]



...to China ($K)[3]



...to Brazil ($K) [4]

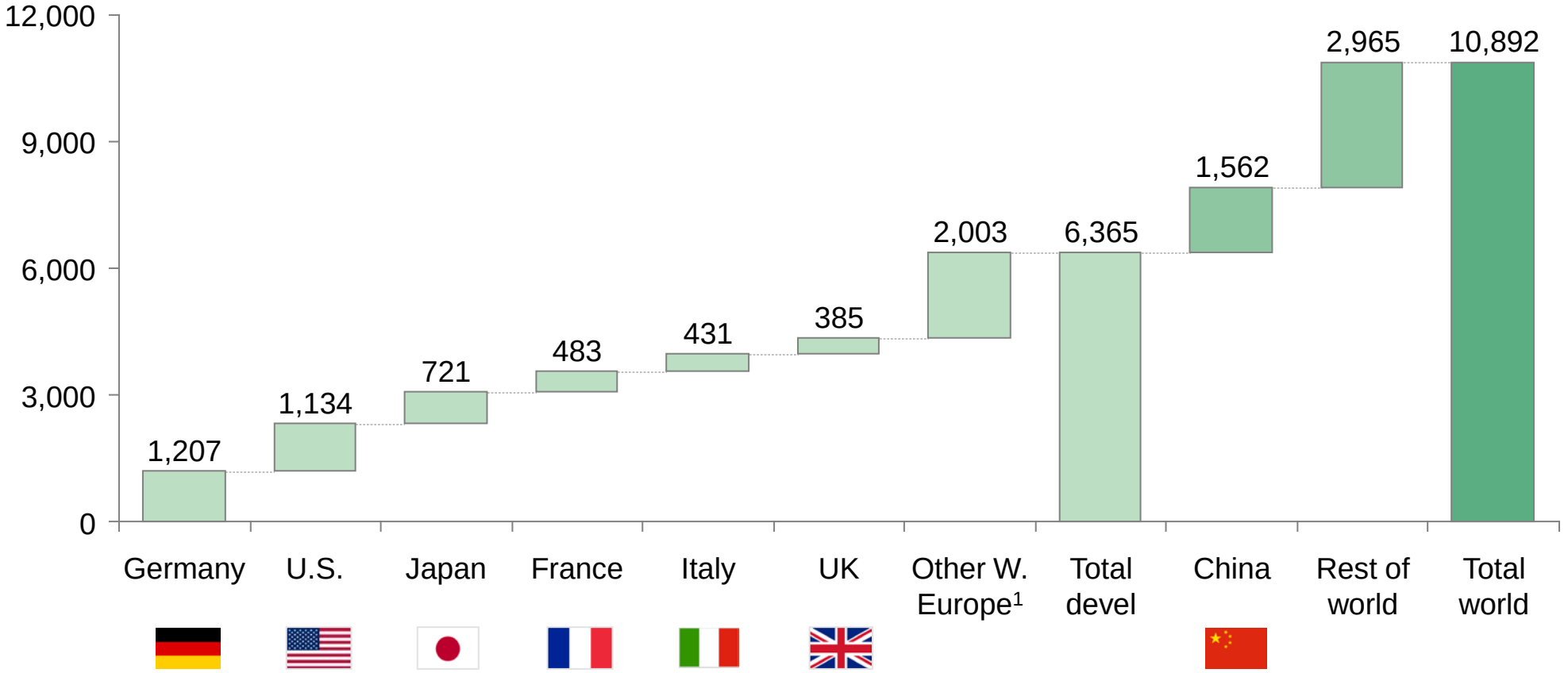


1. Yokohama- Rotterdam, Halifax- Felixstowe (UK), Shanghai- Rotterdam, New York- Rotterdam. 2. *Estimated using shipping rate from Canada to China (Vancouver- Shanghai), Rotterdam-Yokohama, LA- Yokohama, Yantian -Yokohama. 3. Vancouver- Shanghai, Felixstowe (UK)-Yantian, LA- Yantian, Yokohama- Shanghai. 4. Yokohama-Santos, Halifax- Santos, Rotterdam- Santos, Houston- Santos. Note: Rates are 2011 Q3, Q4, and 2012 Q1 averaged benchmark rate
Source: Drewry Maritime Research benchmark rates

Implications for you

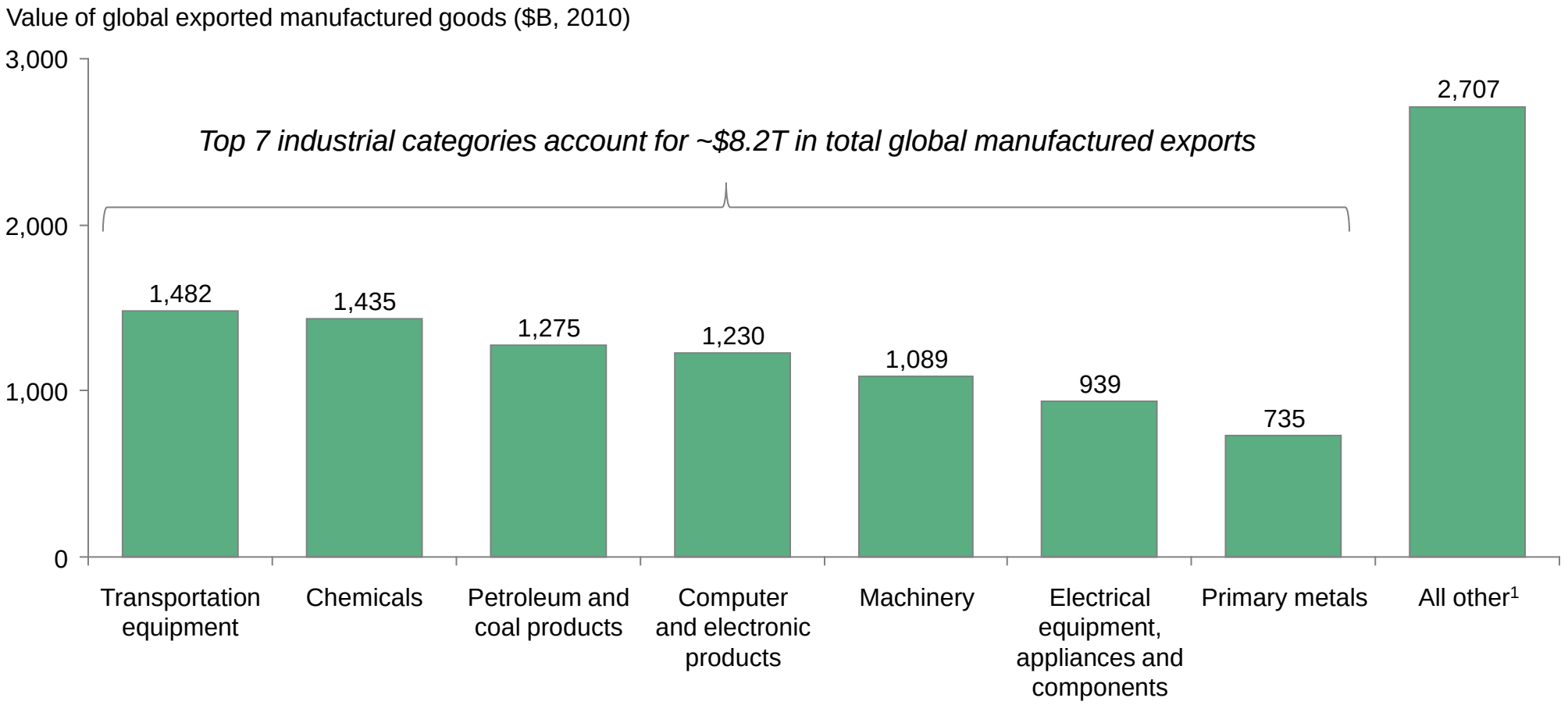
US, Western Europe, Japan and China account for 75% of global manufactured exports...

Value of global exported manufactured goods ($B, 2010)



1. Other Western Europe includes: Austria, Belgium, Denmark, Estonia, Finland, Greece, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
Note: Excludes South Korea, Hong Kong, Singapore, Malaysia due to insufficient data
Source: OECD

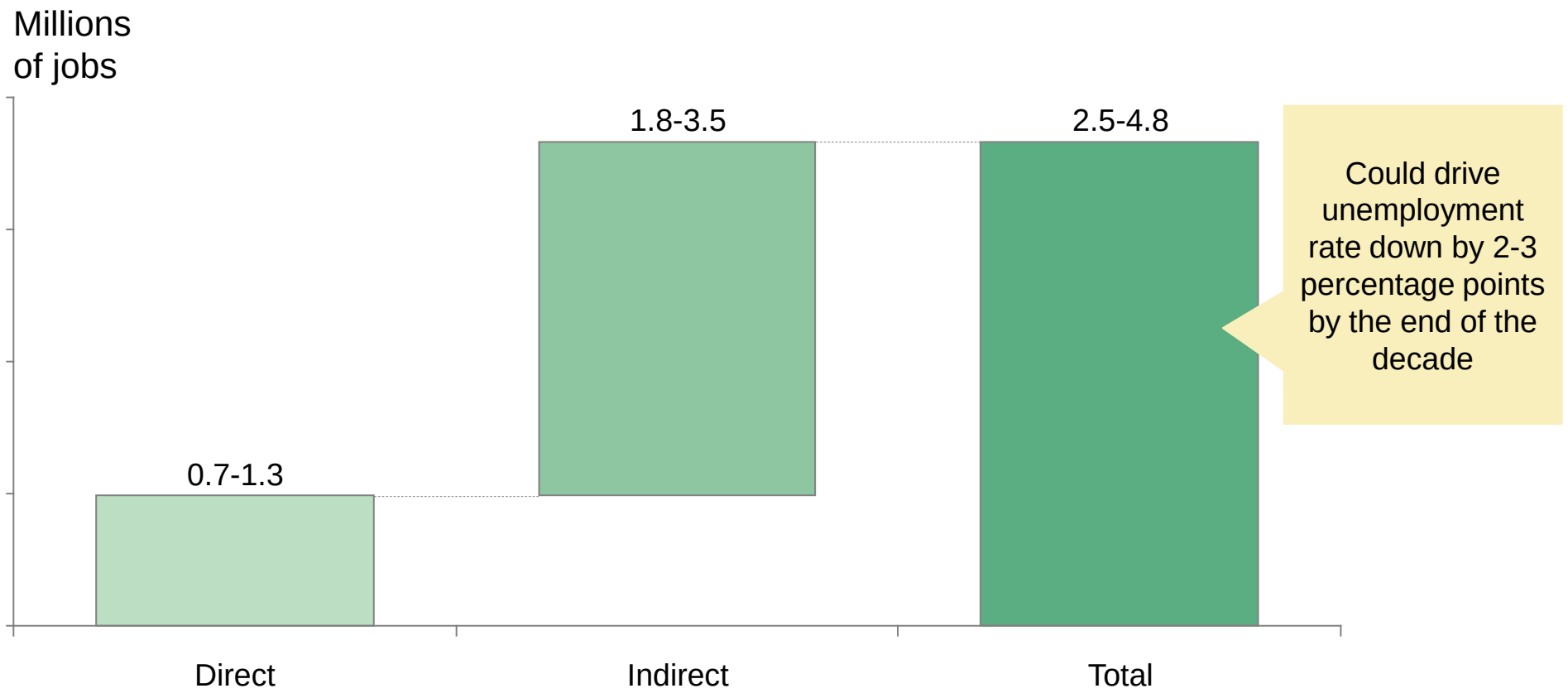
...and 75% of international trade is in seven industrial categories



Note: Nominal USD. Excludes countries where industry level export data not available (major countries South Korea, Hong Kong, Singapore, Malaysia.)
1. All other includes food products, textile product mills, miscellaneous, plastic and rubber products, fabricated metal products, paper, nonmetallic mineral products, wood products
Source: OECD, BCG analysis

Implication: could create ~2.5-5M incremental U.S. jobs

Revised upward from earlier estimate of 2-3M jobs from both re-shoring and exports

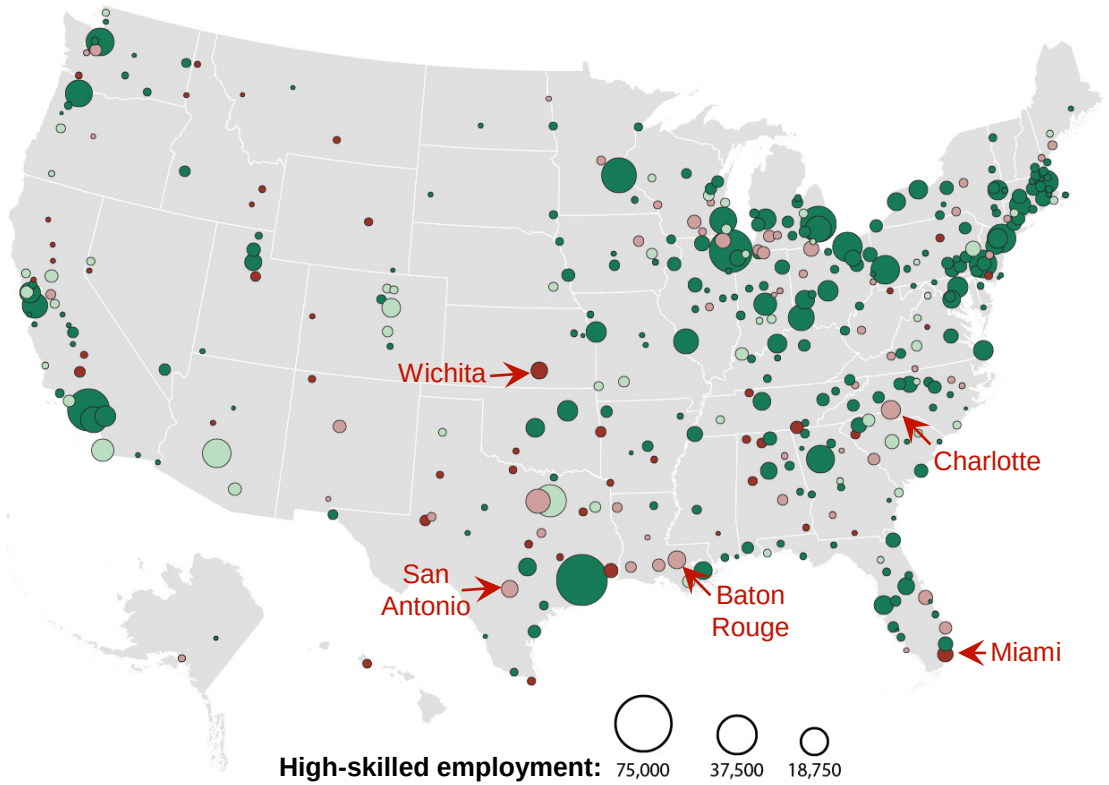


But what about...

Source: BLS, BEA, CIA World Factbook, BCG analysis

Yes, the US has skills gaps... but they aren't as big as some might think and they are quite localized

102 of 389 Metropolitan Statistical Areas (MSAs) have indications of significant or severe skills gaps[1]...



...but only 5 of the 50 largest MSAs show significant or severe gaps[1]

Skills gap severity[1]	# of MSAs in category
Low	234
Moderate	53
Significant	55
Severe	47
	389

Of 50 biggest manufacturing MSAs, only Miami, Wichita, Baton Rouge, San Antonio and Charlotte appear to have significant or severe skills gaps

1. Low skills gaps are defined as areas where <10% of high-skilled workers have wages rising at a compound rate of >3% per year for five years; moderate gaps are defined as 10-20% of high-skilled workers experiencing high wage growth; significant gaps are defined as 20-40% of high-skilled workers experiencing high wage growth; severe gaps are defined as >40% of high-skilled workers experiencing high wage growth

Source: BLS, BEA, BCG analysis

Diverse group of stakeholders working to close skill gaps

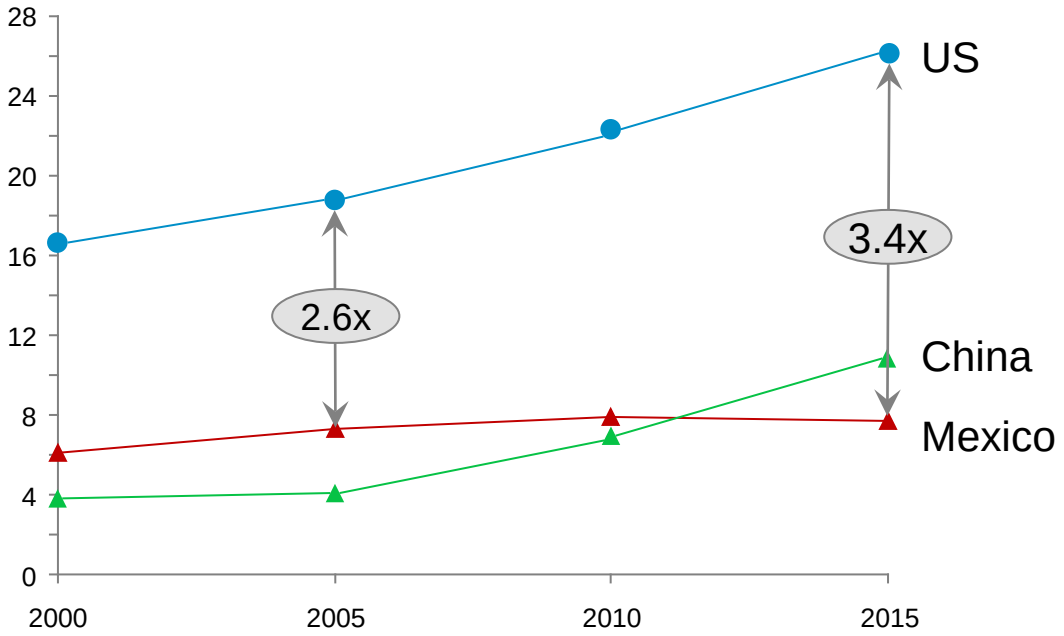
Mix of state and local governments, non-profits and companies

Type of program	Description	Examples
Building manufacturing topics into high-school curriculum	**Reemphasis of manufacturing education** • An addition to other vital portions of curriculum (e.g., math, reading, writing, etc)	CHICAGO PUBLIC SCHOOLS CPS APA Austin Polytechnical Academy
Developing general public training programs	**State and municipal programs that work with employers to fill high-skill jobs** • Pre-employment assessment and (Re)training **Partnerships with vocational schools to provide in-classroom training**	QUICKSTART TECHNICAL COLLEGE SYSTEM OF GEORGIA MANUFACTURINGWORKS chicago workforce center
Building company coalitions to develop targeted skill set	**Consortiums that share financial costs to teach post-secondary students manufacturing skills** **Recommitment to on-the-job training**	CCAM COMMONWEALTH CENTER FOR ADVANCED MANUFACTURING

Mexico stands to be a winner as the trends play out

Mexico becoming cheaper than China and more attractive relative to US ...

MX:US productivity-adjusted wages[2]



... but other factors will limit near-term impact

- **Experience Gap**
- **Labor constraints**
- **Crime / Security**

1. Fully loaded wages; Based on average productivity/wages in US versus average in Mexico and China

Source: US Census Bureau, US Bureau of Economics, United States International Trade Commission, BCG analysis

Shifting production from China to other LCCs limited by weak infrastructure, small labor pools, and other risks

Country	Vs. China, many offer superior productivity-adjusted labor...	...but have weak infrastructure...	...small mfg. labor pools...	...and other disadvantages
Vietnam	+ +	− −	−	High level of corruption and market volatility (inflation, strikes) −
India	+ +	− −	−	Rampant corruption, internal borders and tariffs [1] −
Indonesia (Java-focused)	+ +	−	+	Substantial corruption and unfriendly business climate − −
Thailand	+	−	+	Political instability and civil unrest prevalent [2] −

+ Advantaged vs. China

− Disadvantage vs. China

1. India ranks 122 out of 181 countries for "ease of doing business." 2. Ranked 84 out of 180 countries for corruption by Transparency International
Source: MAPI Issue in Brief, September1, 2009, "The Manufacturing Sector in India: Recent Performance and Emerging Issues."

What companies should be thinking about

1. **Don't automatically choose China**
   - Understand the true costs of producing in China for U.S. domestic consumption – it is about more than labor costs

2. **Take a long-term perspective to account for long-term fixed costs**
   - Focus on what the world will look like in 2020 given overall trends
   - Build flexibility into your supply chain – create options to deal with uncertainty

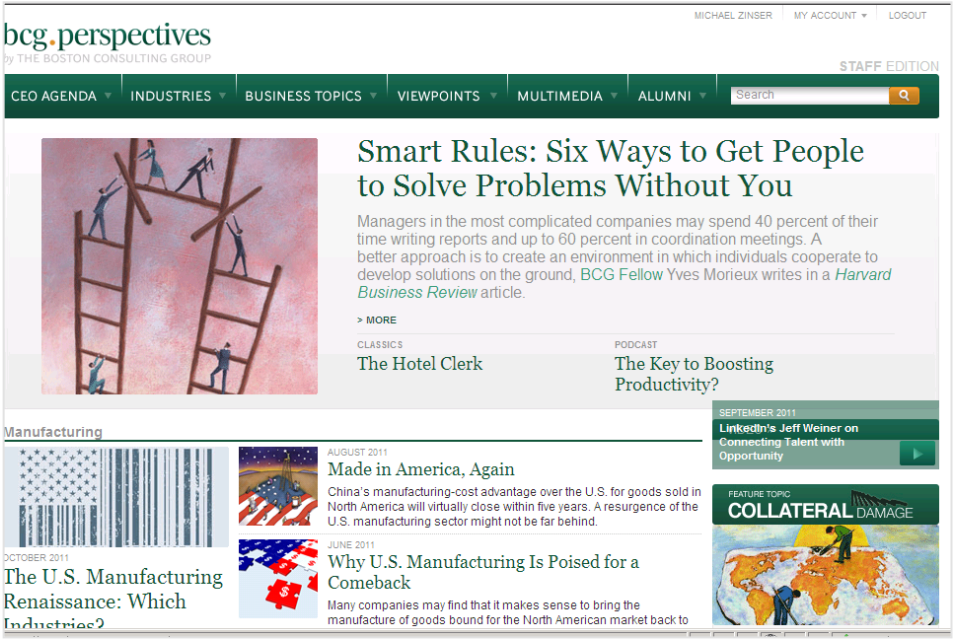
3. **Look at the whole picture—the total cost of ownership**
   - Not just manufacturing and transportation costs, but a complex array of costs

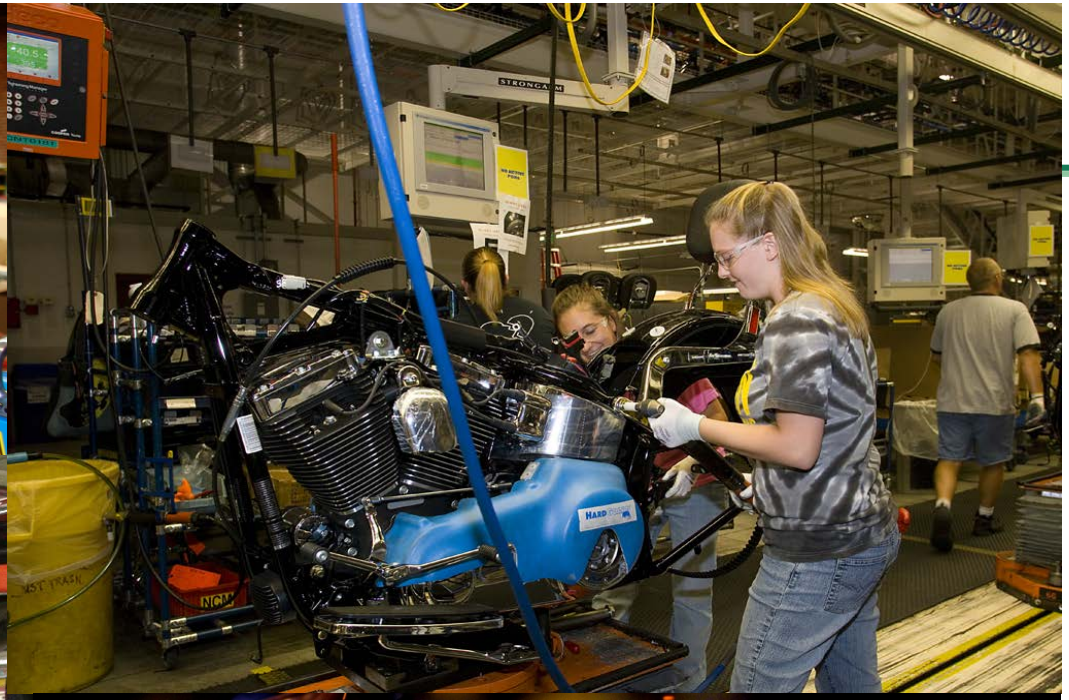
4. **Manufacturers, governments and educational organizations need to take action to ensure there will be sufficient skilled workers to meet long term needs**
   - Reinvest in internal training programs and collaborating with education partners and governments
   - Fund (re-)training programs to produce skilled workers for companies investing in their locale and leading the development of clusters in key advanced manufacturing industries
   - Create hybrid educational systems to teach technical skills in addition to critical thinking

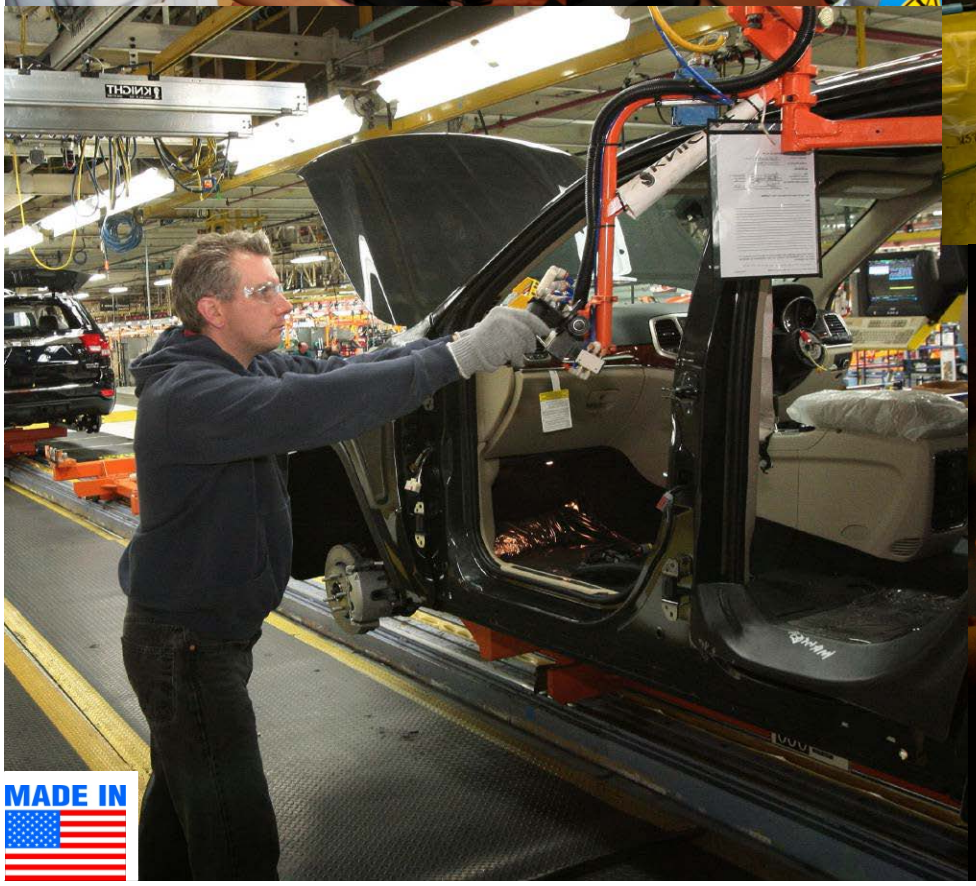
How can you learn more?

Download our reports on *BCG.com*

Look for our articles and podcasts on *BCGperspectives.com*







MADE IN