

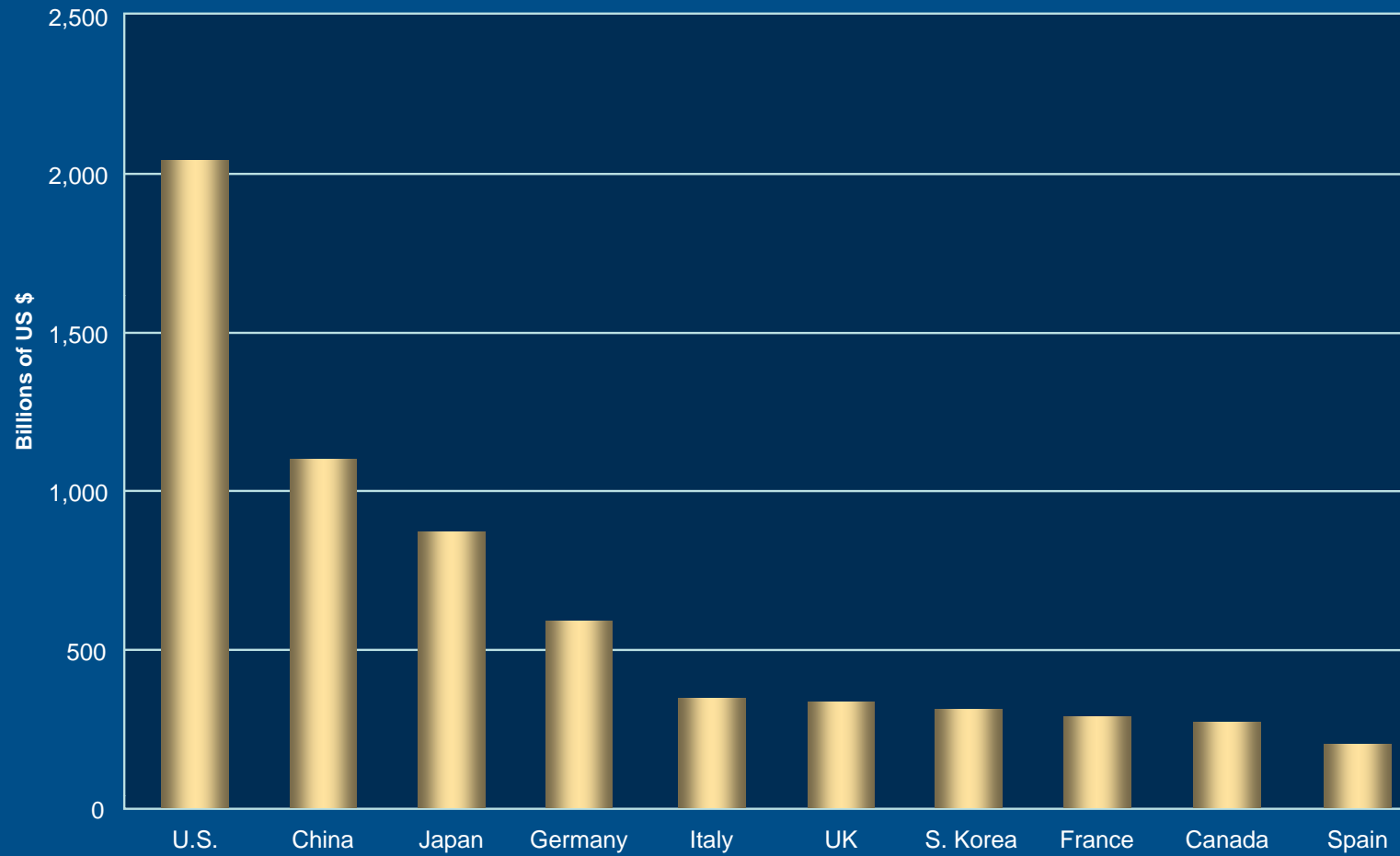
Technology Innovation Advances Manufacturing

John B. Byrd III
President

AMT - The Association For Manufacturing Technology

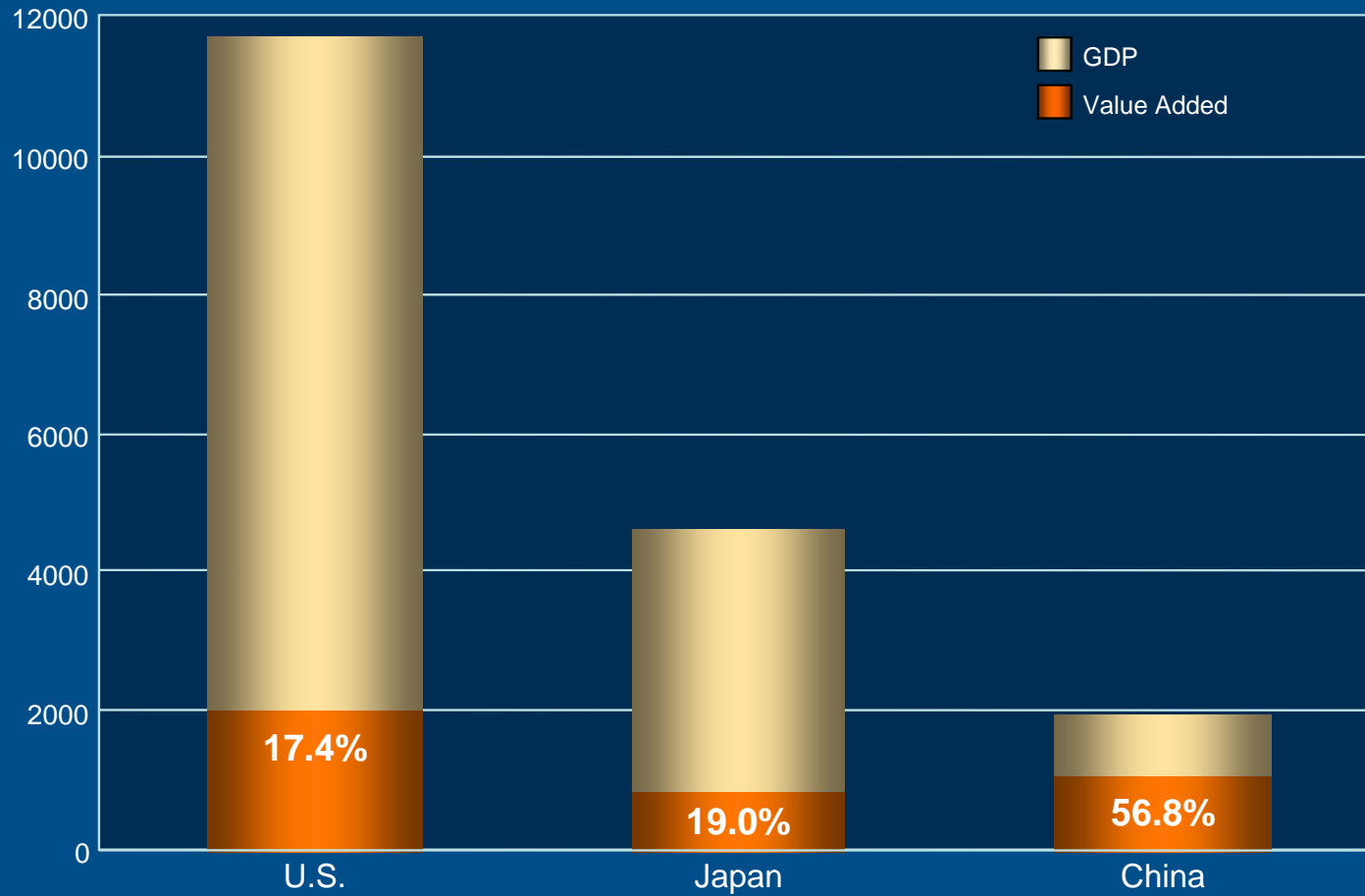
2008 NTMA Annual Convention
February 7, 2008

Value Added by Industrial Sector/2004



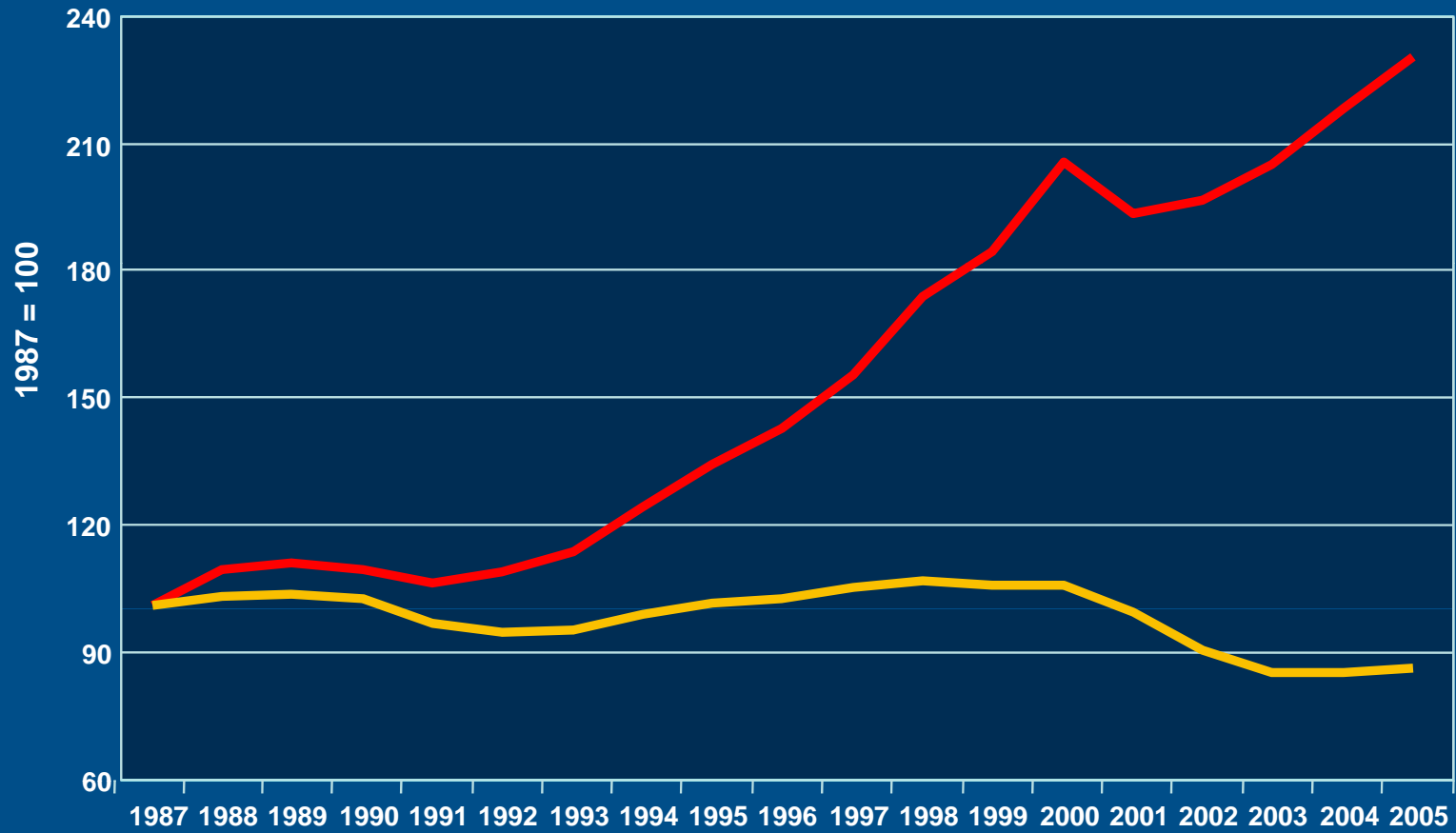
Source: OECD; National Statistics Bureau of China

GDP with Value Added by Industry



Source: OECD; National Statistics Bureau of China

U.S. Value-Added Manufacturing Output and Employment



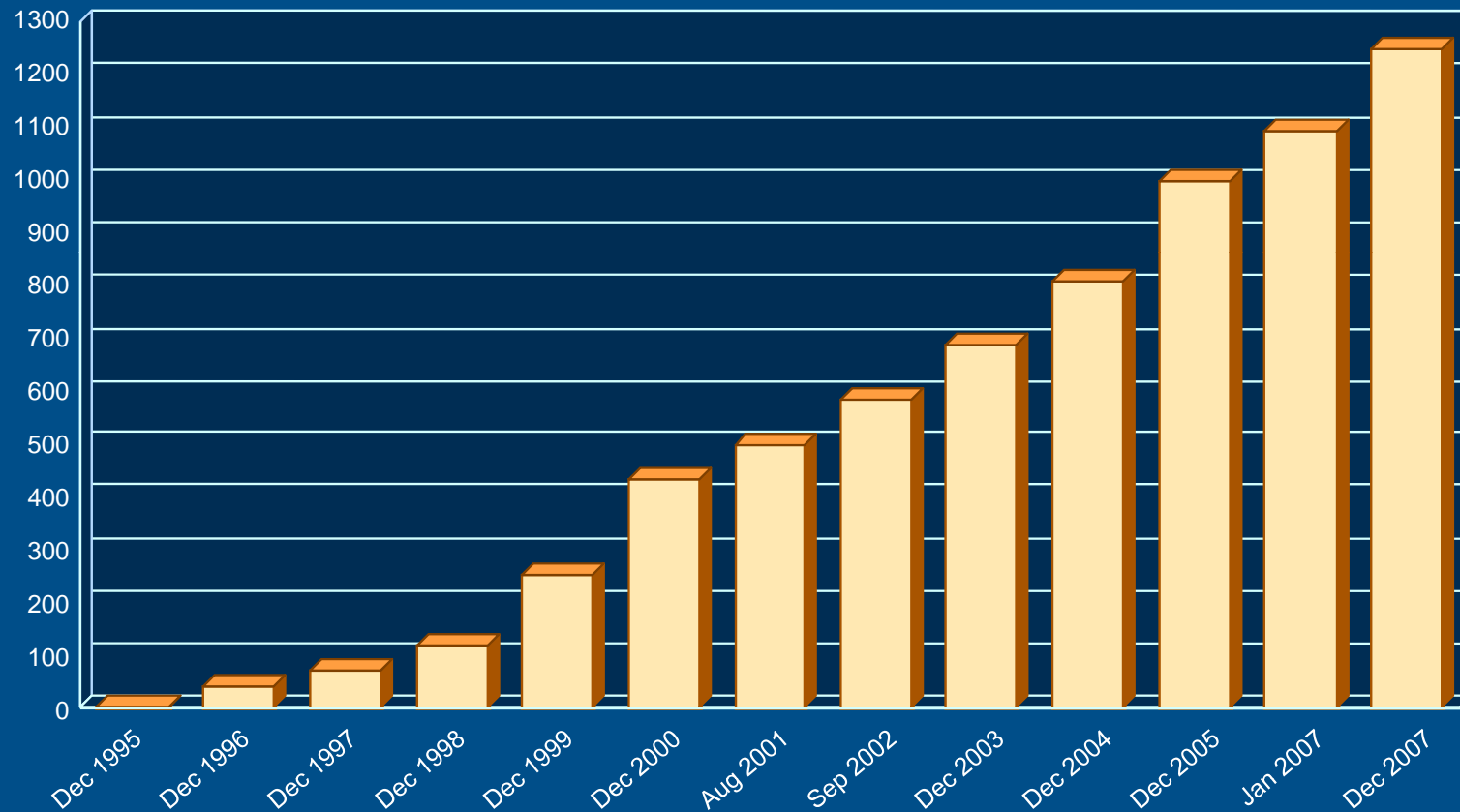
Source: Bureau of Labor Statistics and Bureau of Economic Analysis

— Real Output — Employment

**Manufacturing is
changing...**

Faster & Faster

Global Internet Users (millions)



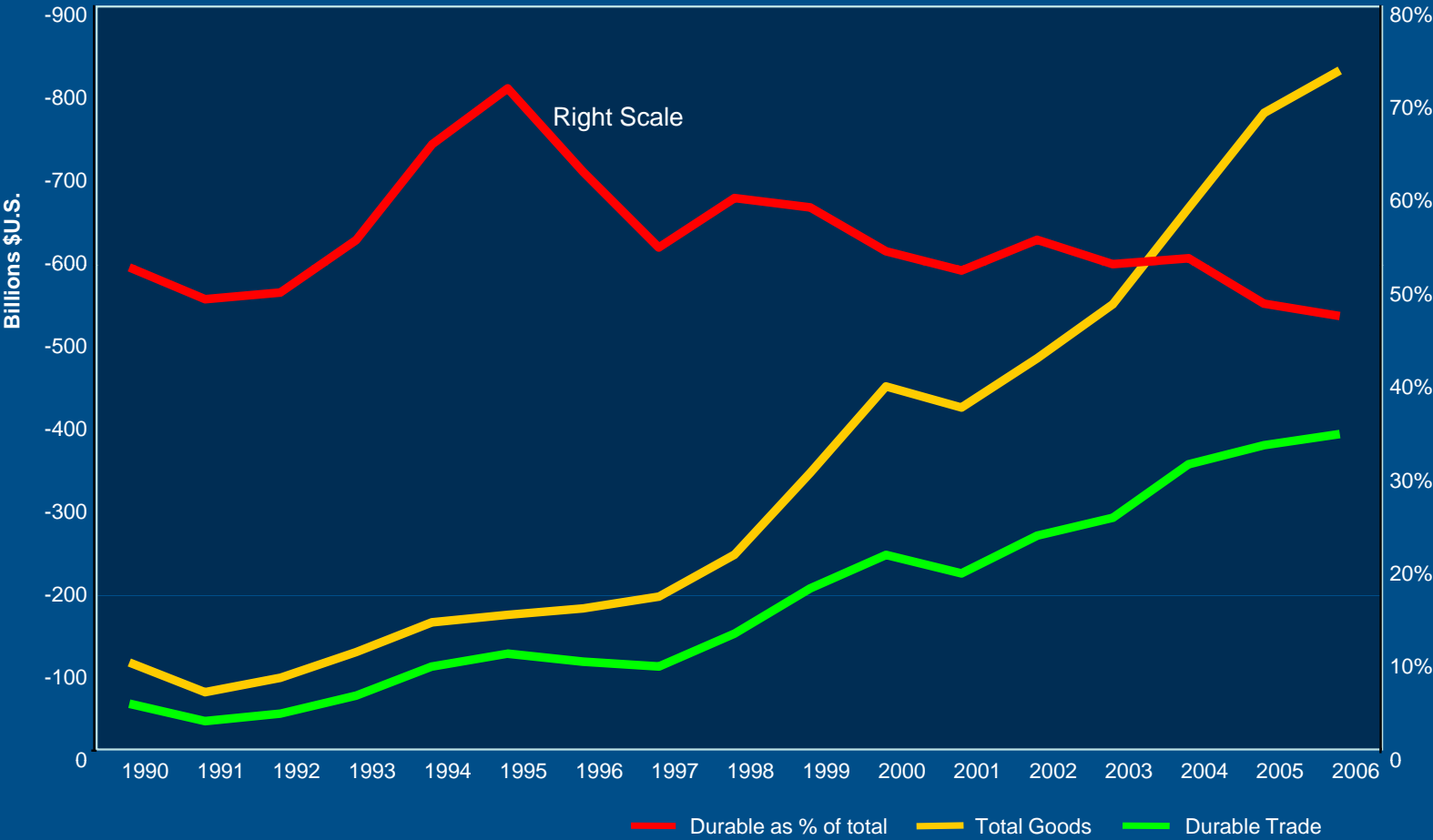
Source: InternetWorldStats.com

Global Internet Usage

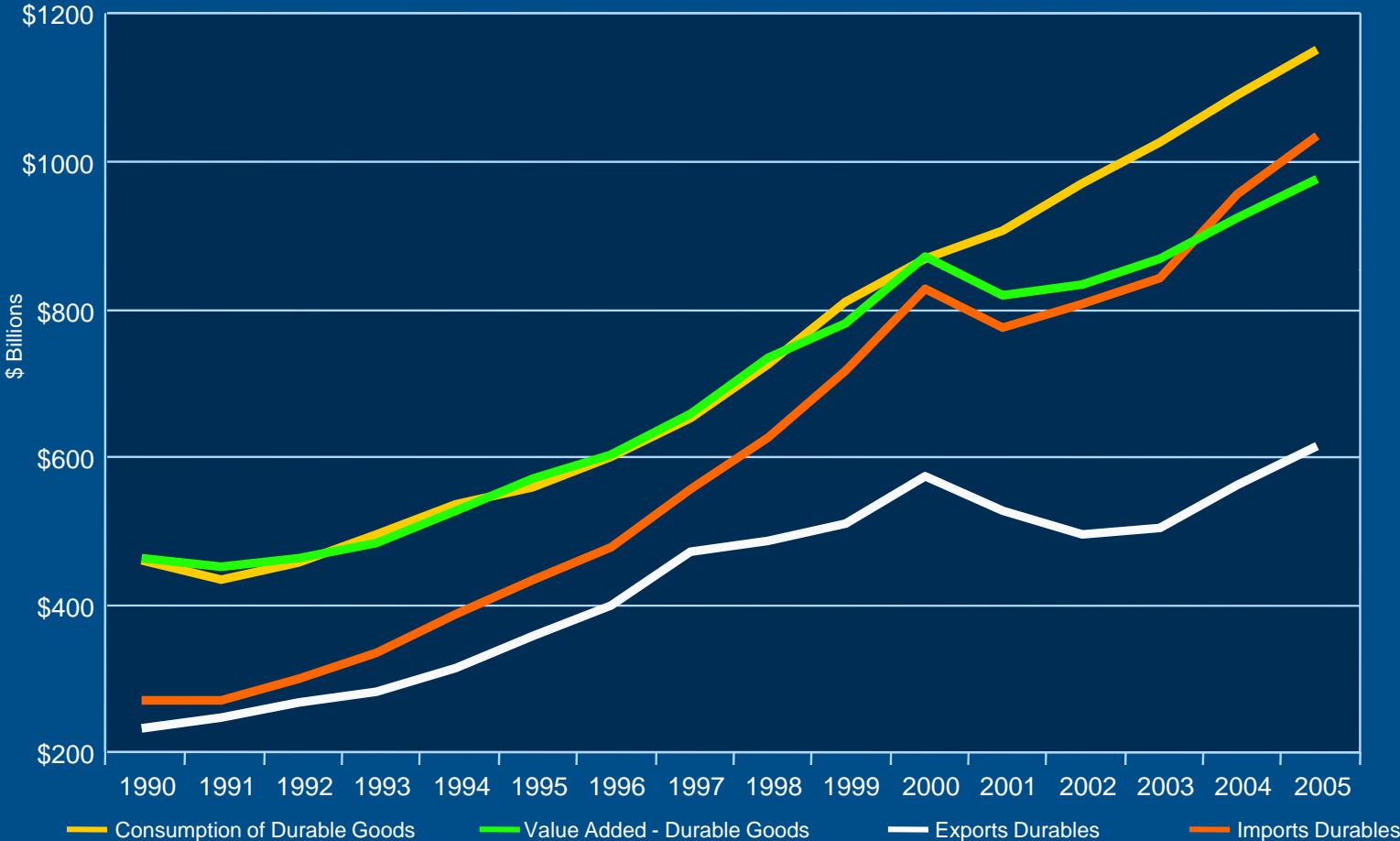
	# Internet Users	Penetration	Percent of Global Use
Asia	459 million	12.4%	36.9%
Europe	338 million	41.7%	27.2%
North America	235 million	70.2%	18.9%
Latin America	116 million	20.8%	9.3%

Source: InternetWorldStats.com

U.S. Trade Deficit in Goods



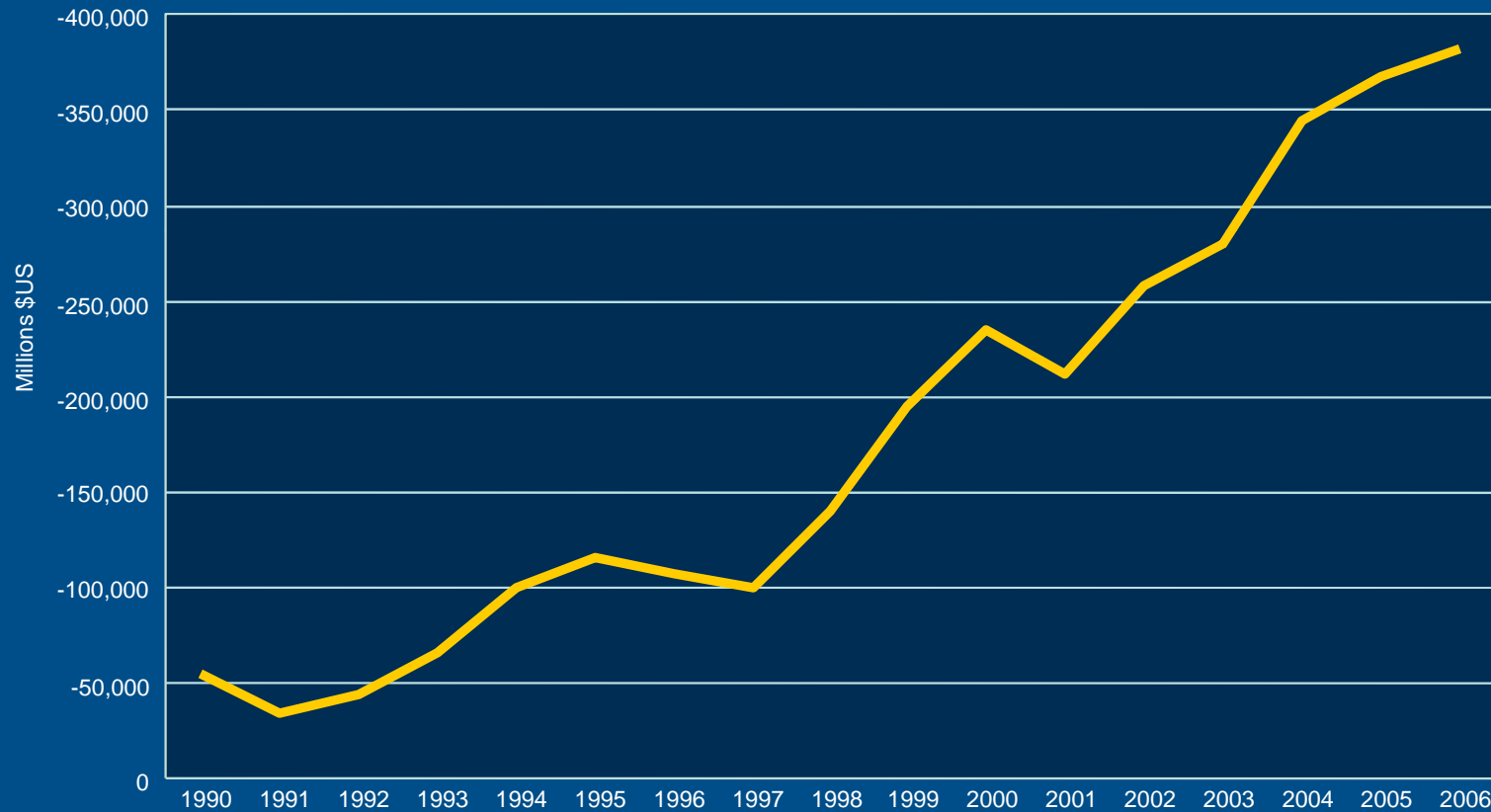
U.S. Durable Manufacturing Output & Consumption



Source: Bureau of Economic Analysis

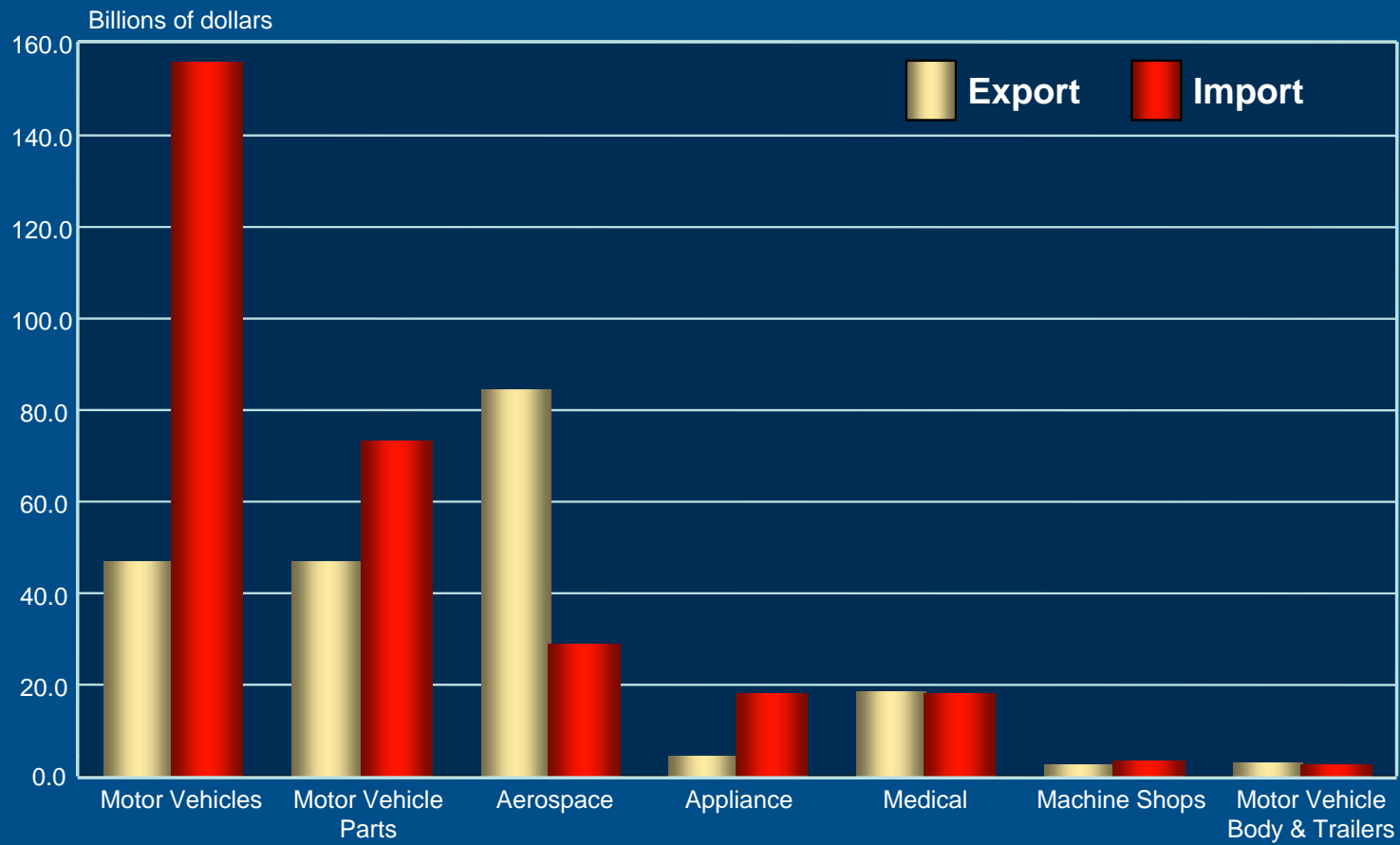
U.S. Durable Goods Trade Deficit

1990 - 2006



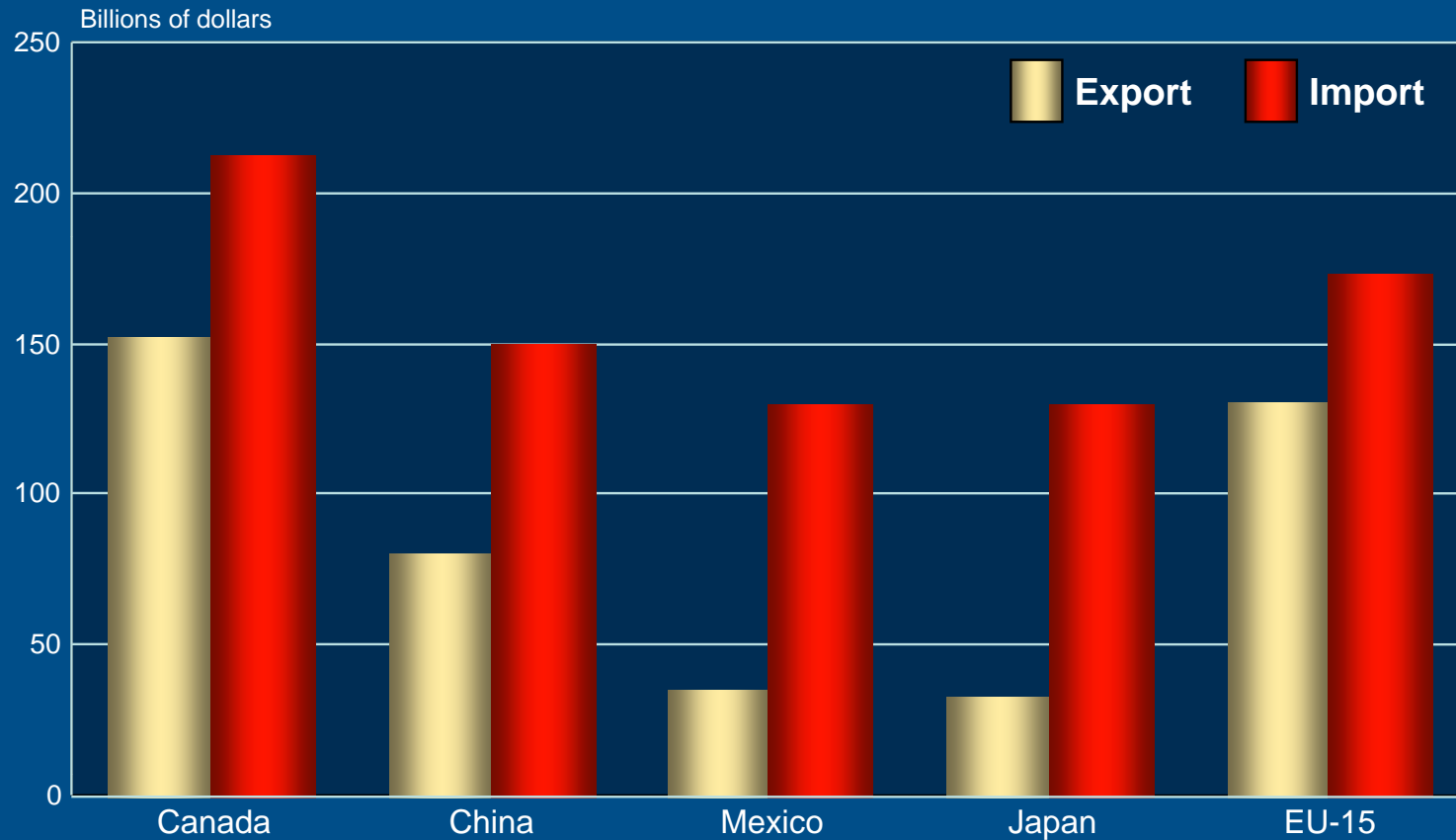
U.S. Durable Goods Trade - 2006

(Major Manufacturing Technology Customers)

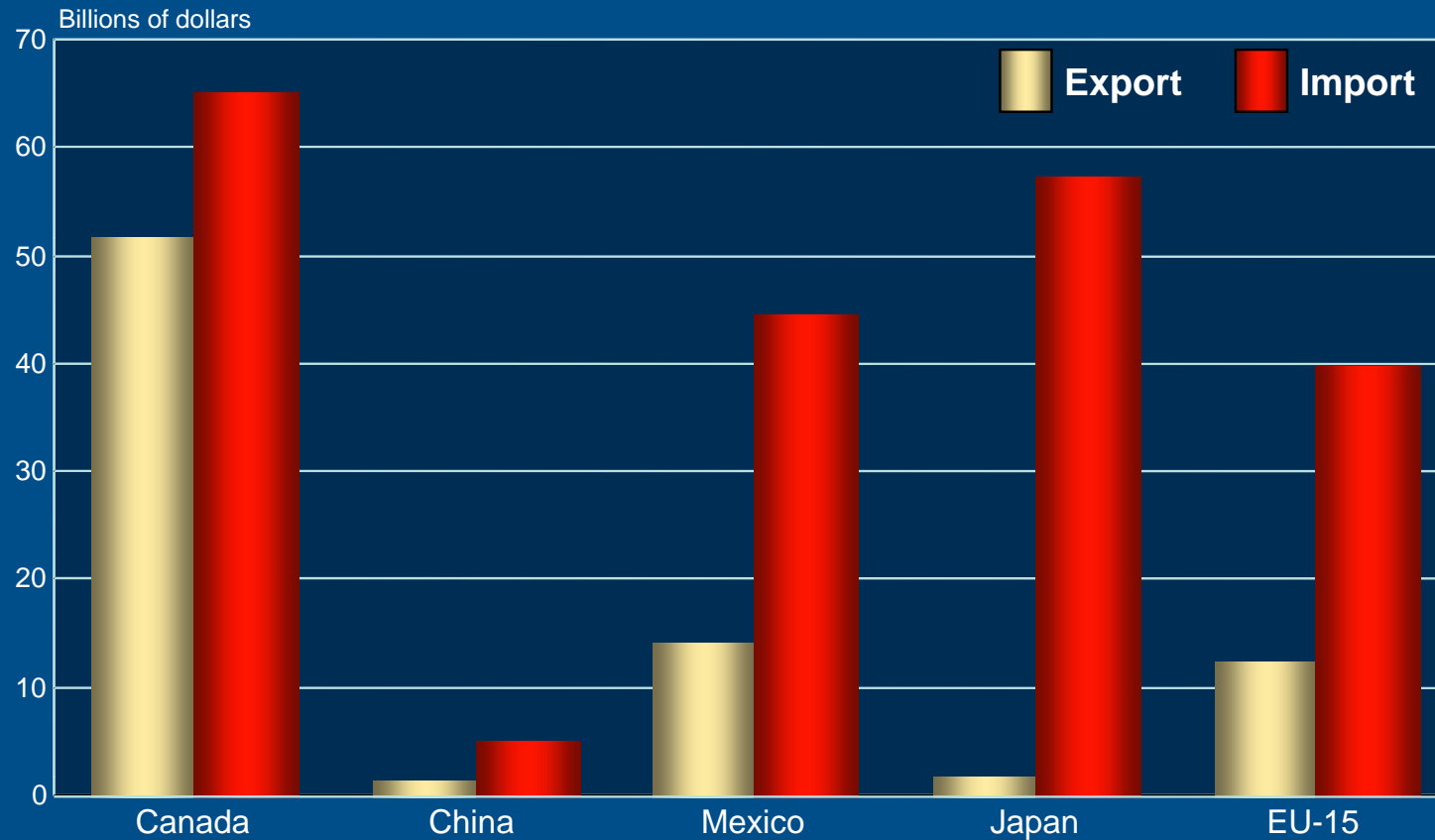


U.S. Durable Goods Trade - 2006

(Largest Trading Partners)

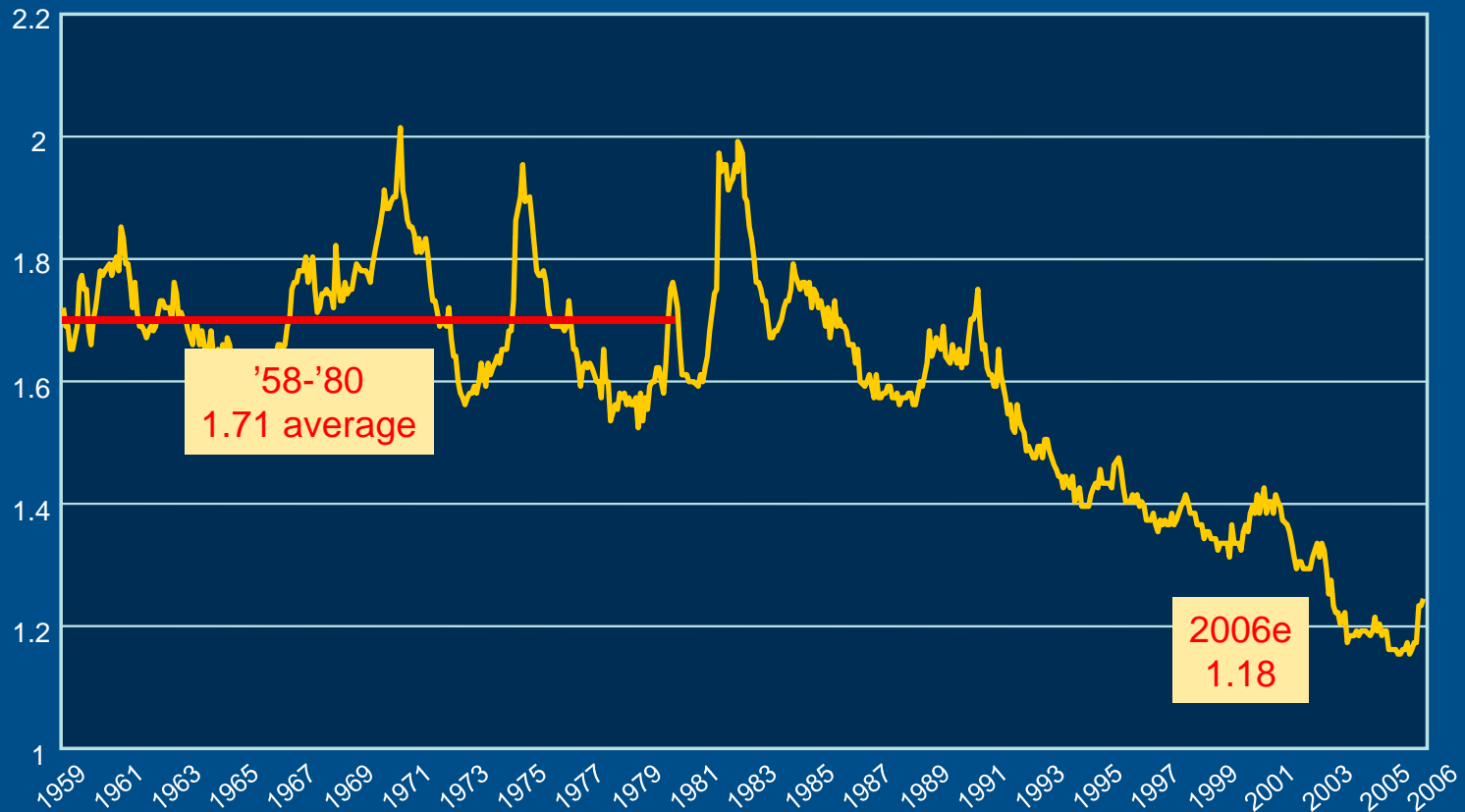


Trade in Automotive Sectors - 2006



The Manufacturing Supply Chain is Evolving

Inventory to Sales Ratio for Manufacturing



Source: Census Bureau

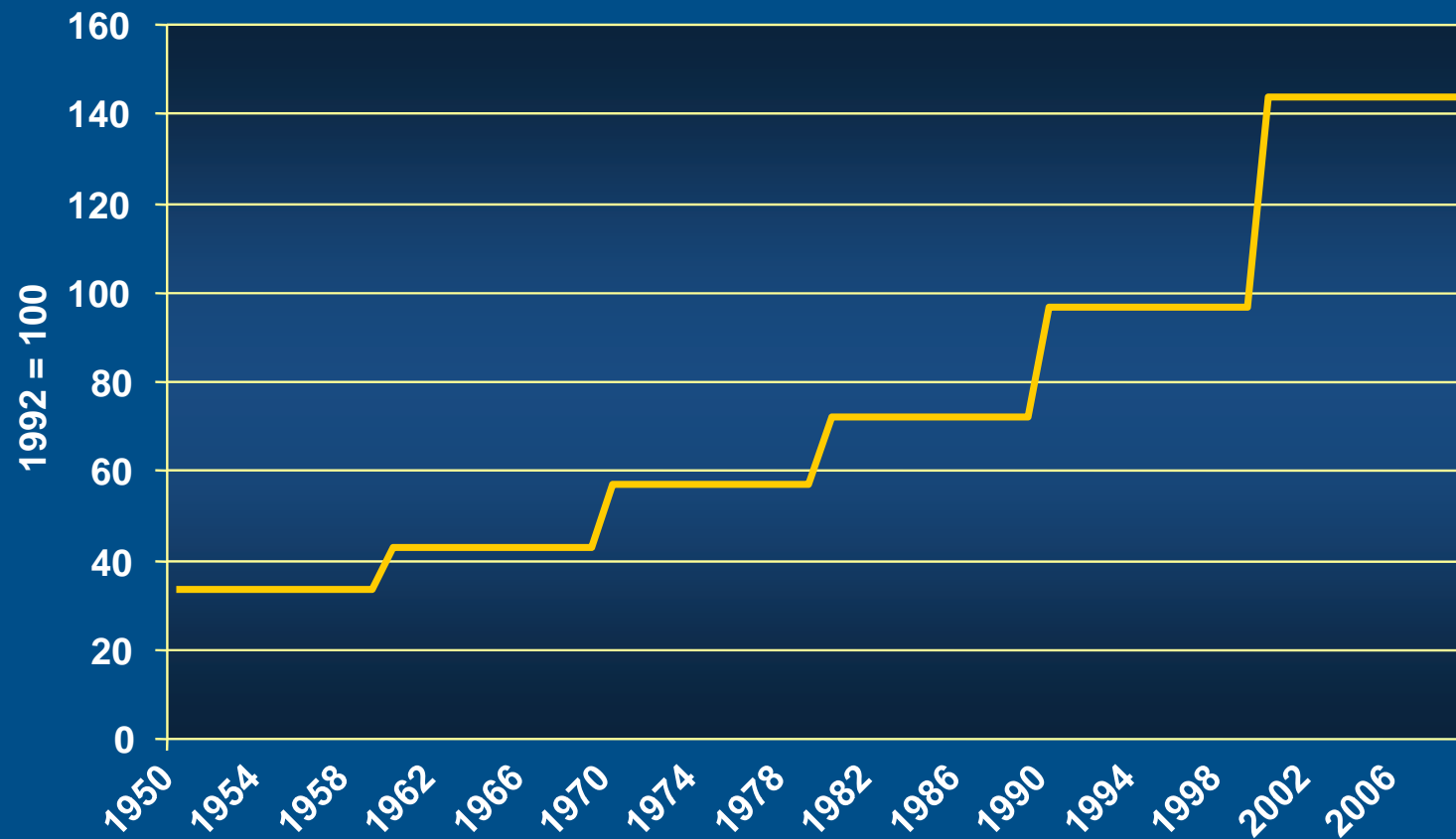
To compete in the supply chain of tomorrow...

- Lead time is critical
- Technology is essential
- Business environment must be flexible
- Productivity is a competitive advantage

U.S. Manufacturing has two strengths

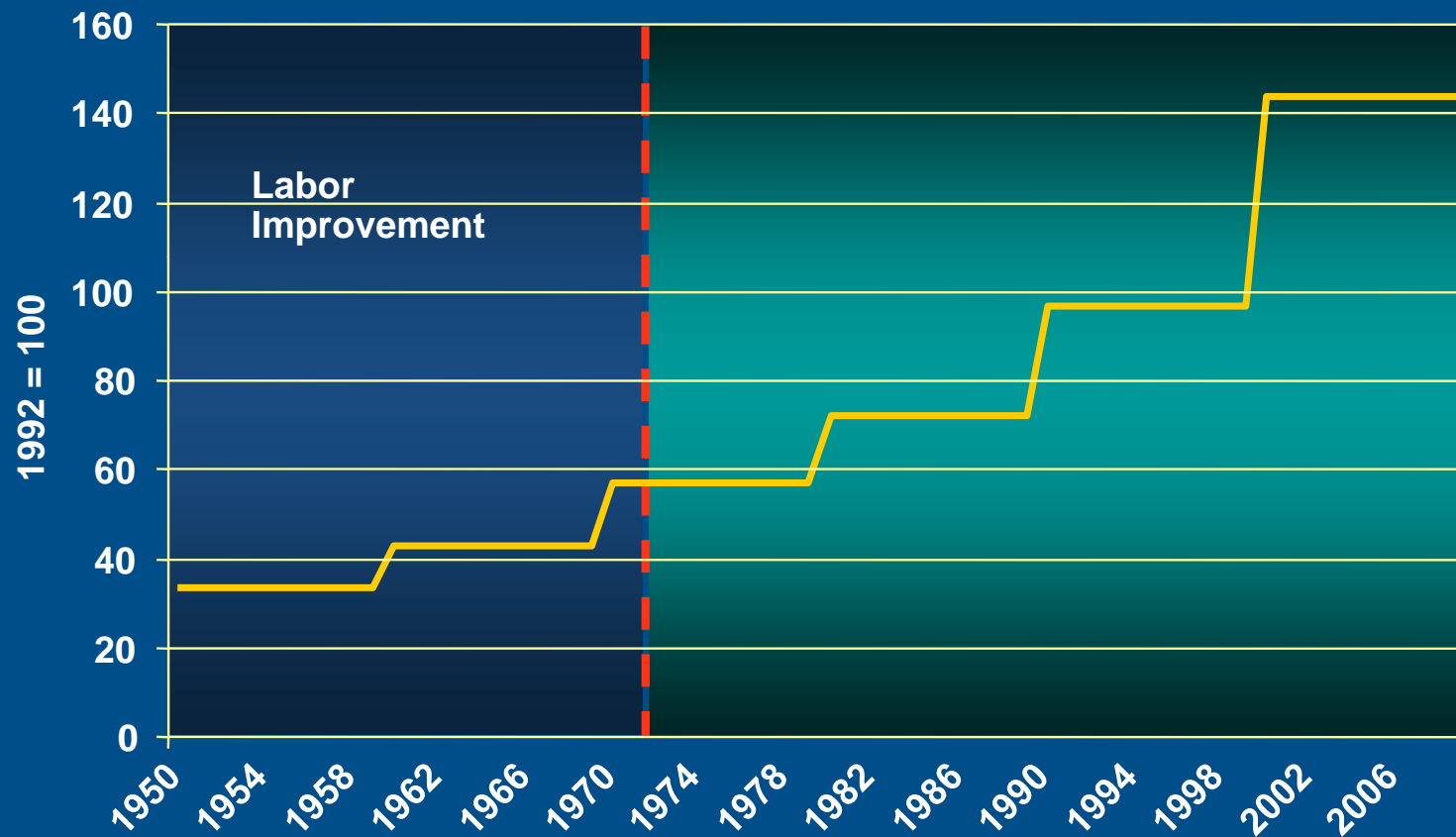
- Productivity
- Low Inflation

Productivity in Manufacturing (Output Per Hour)



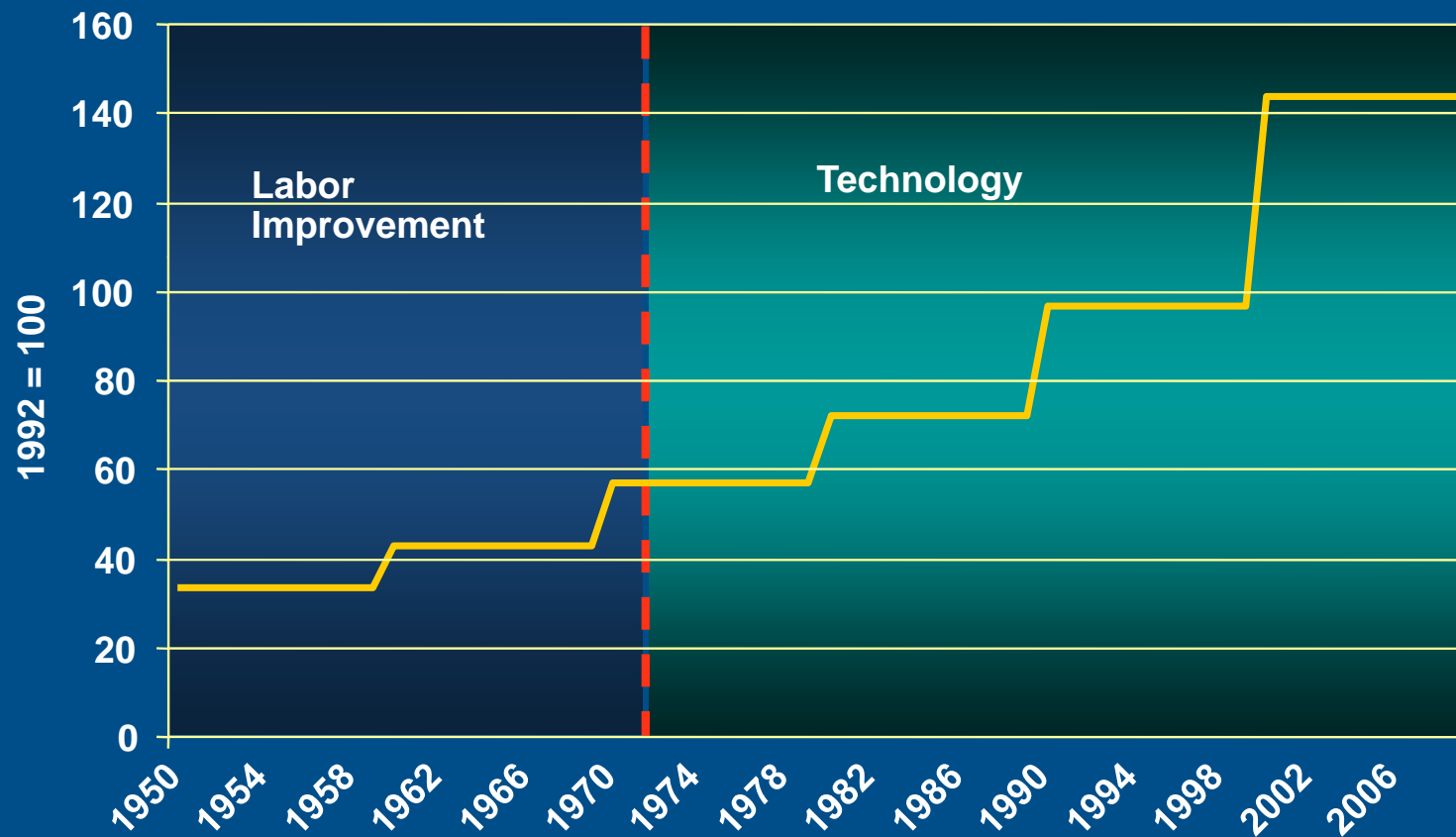
Source: Bureau of Labor Statistics

Productivity in Manufacturing (Output Per Hour)



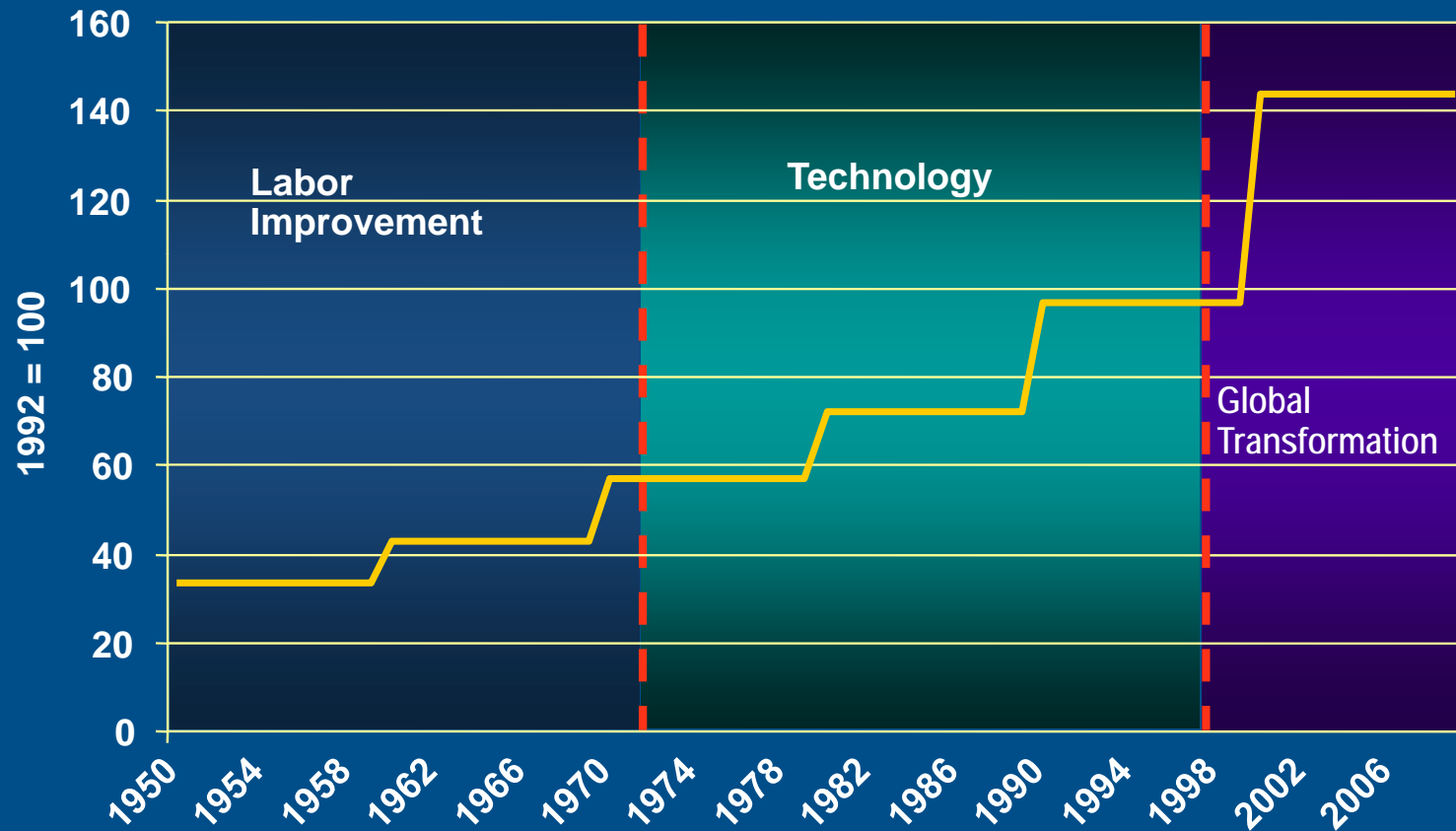
Source: Bureau of Labor Statistics

Productivity in Manufacturing (Output Per Hour)



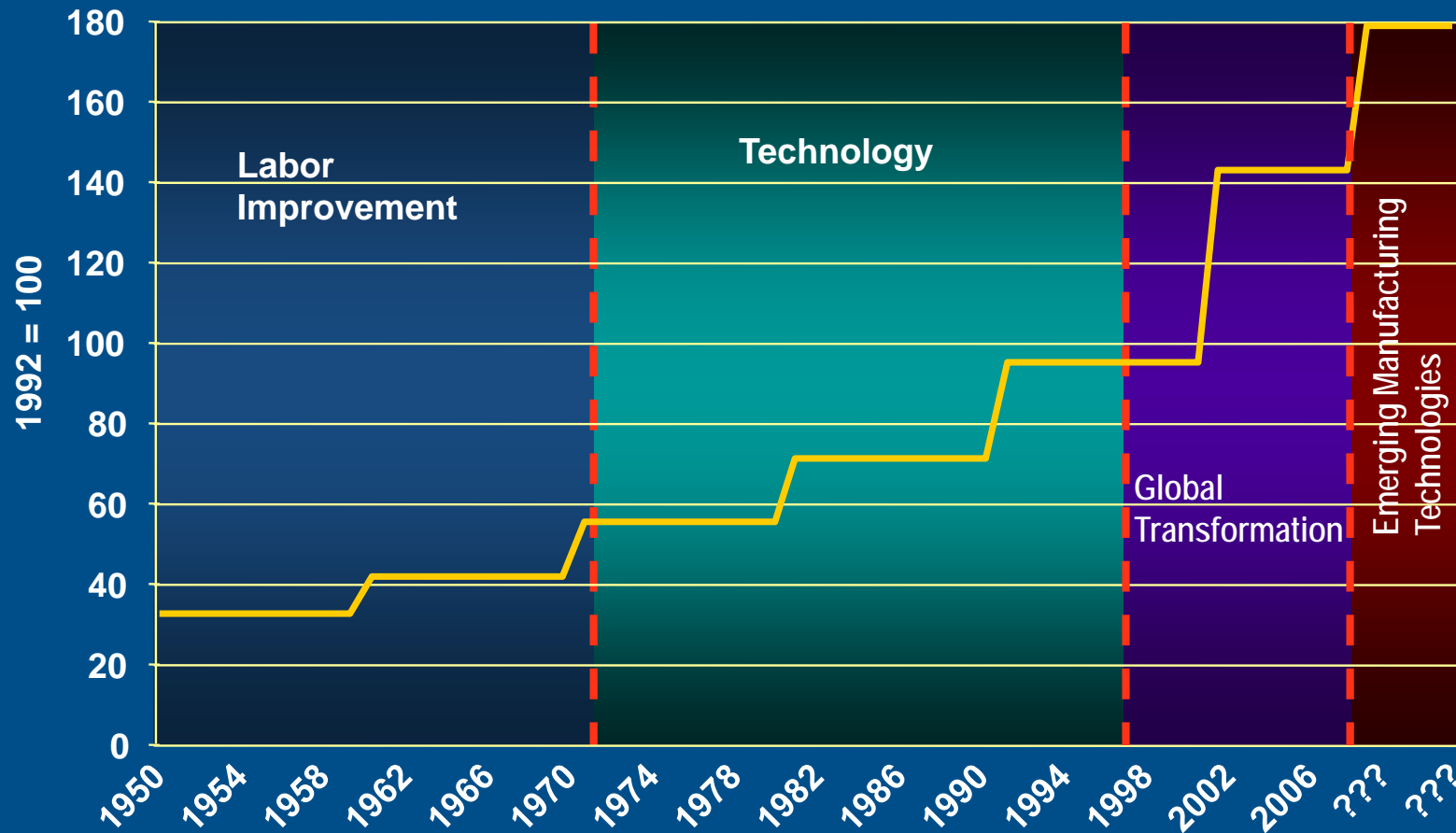
Source: Bureau of Labor Statistics

Productivity in Manufacturing (Output Per Hour)



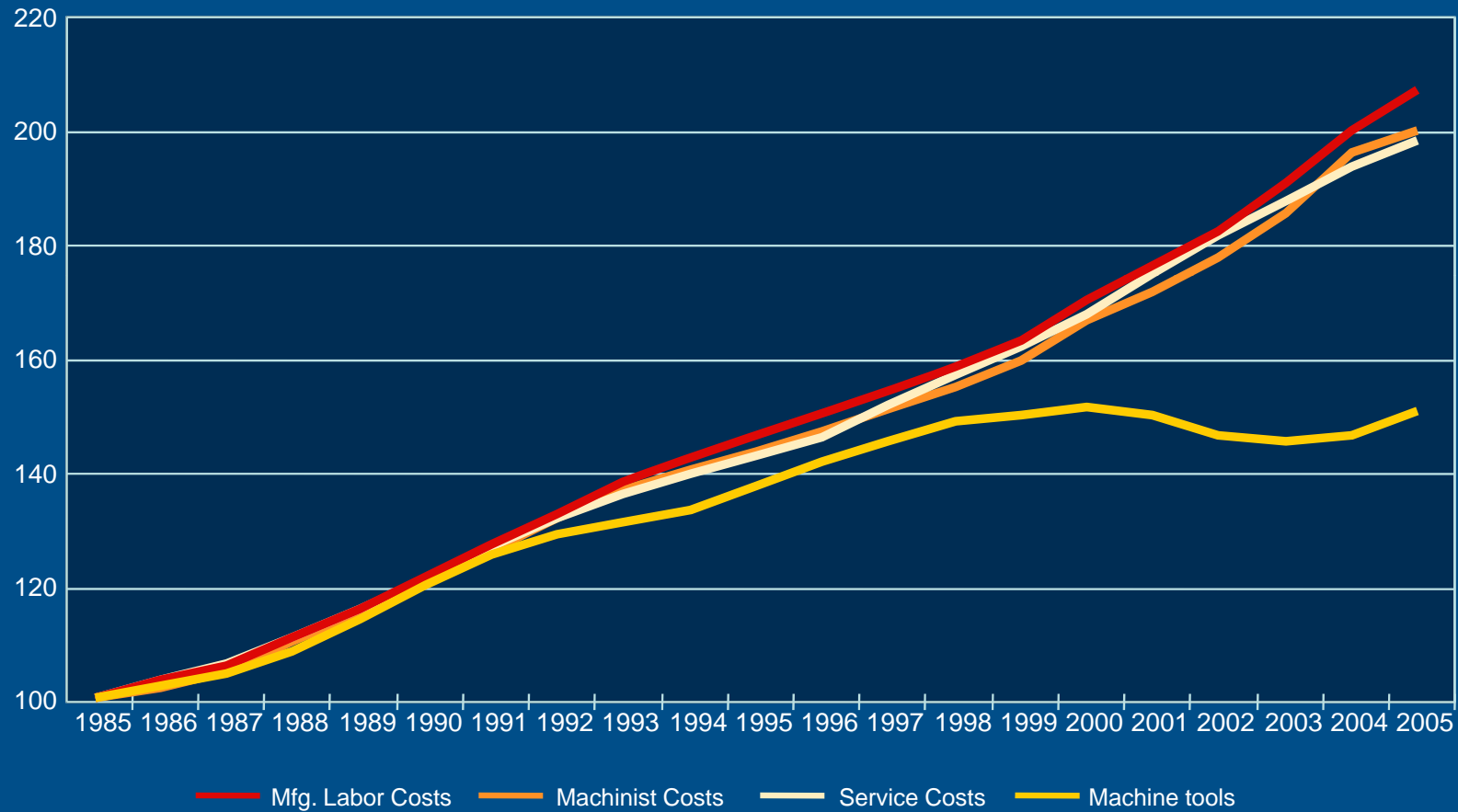
Source: Bureau of Labor Statistics

Productivity in Manufacturing (Output Per Hour)



Source: Bureau of Labor Statistics

Labor Costs Outpace Equipment Prices



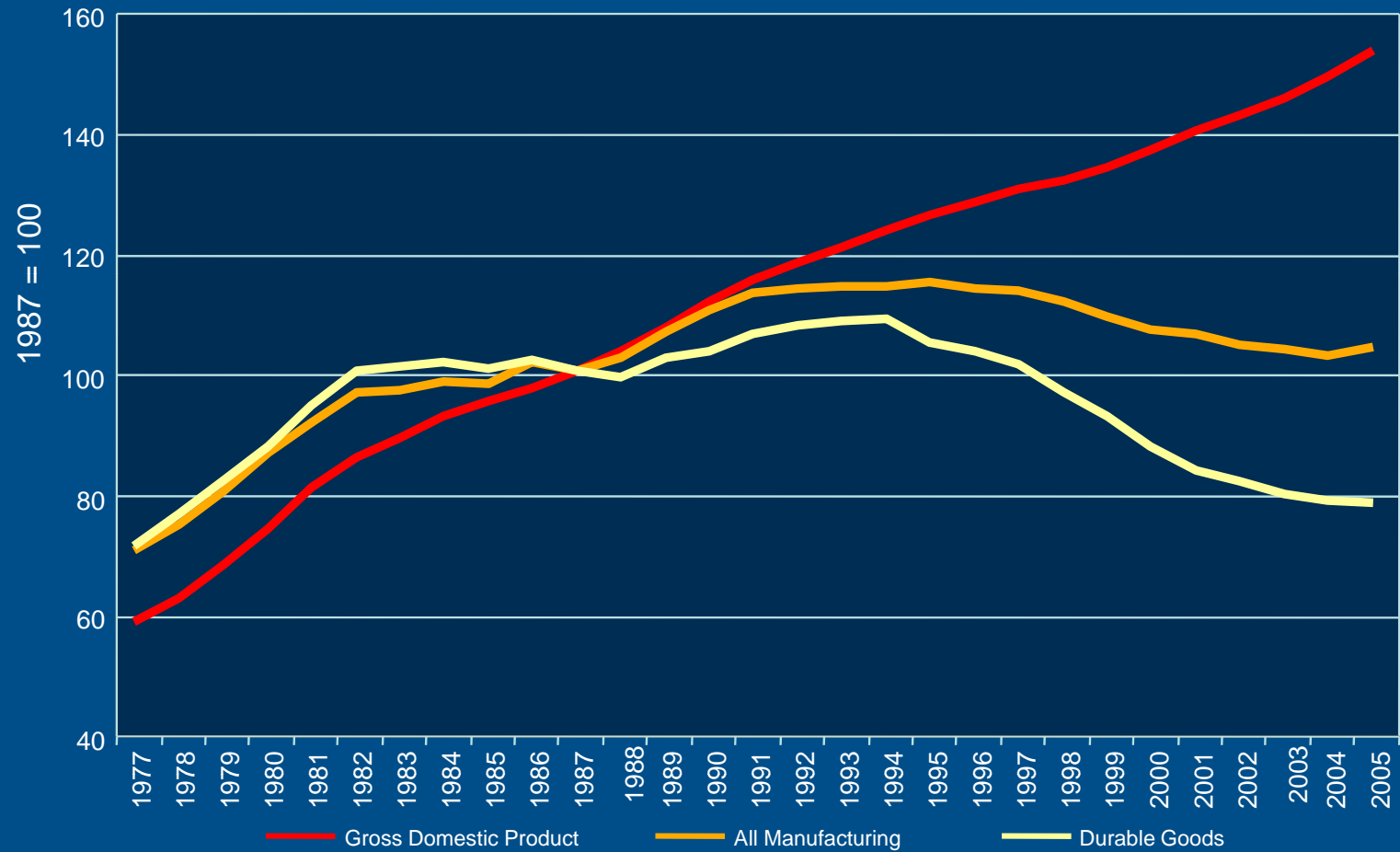
Source: Bureau of Labor Statistics

Total wages & benefits per person

Index - 1985 = 100

Price Increases

Total Economy vs. Manufacturing



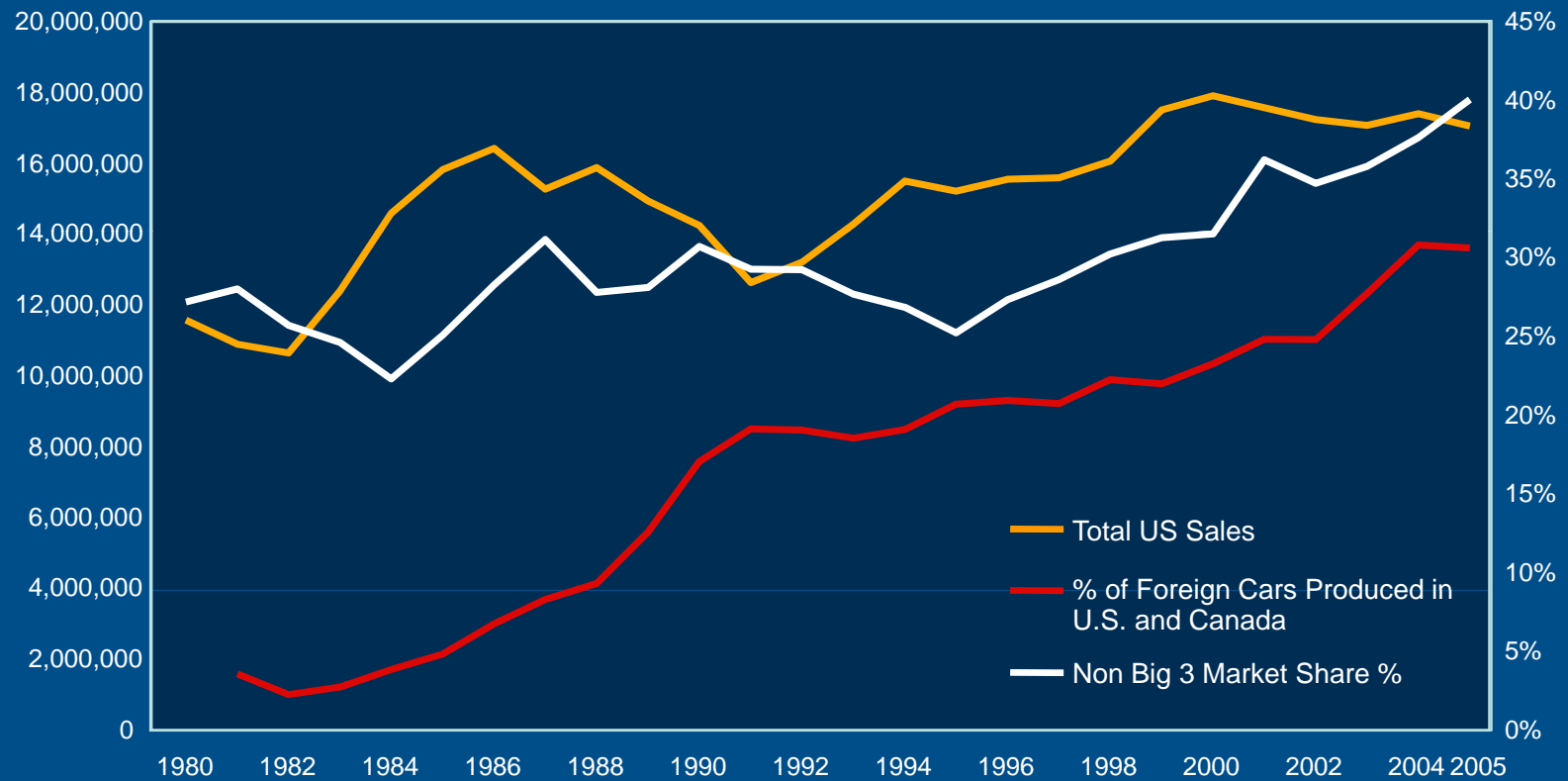
Source: Bureau of Economic Analysis

A transition is occurring in the U.S. Industrial Base

- Consolidation
- A migration of manufacturing to Tier 1 and Tier 2 suppliers
- Outsourcing of low skill jobs to overseas producers
- A geographic migration of manufacturing facilities within the U.S.

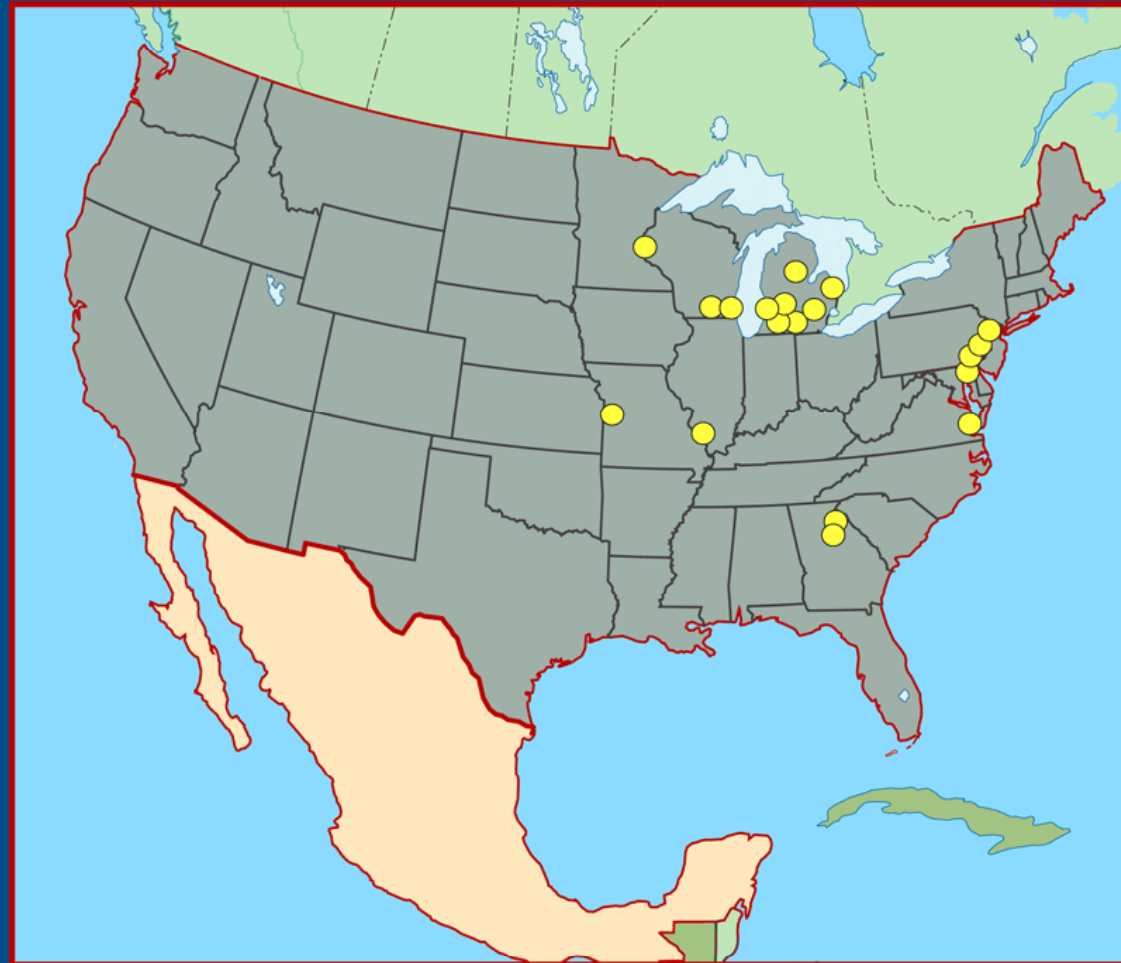
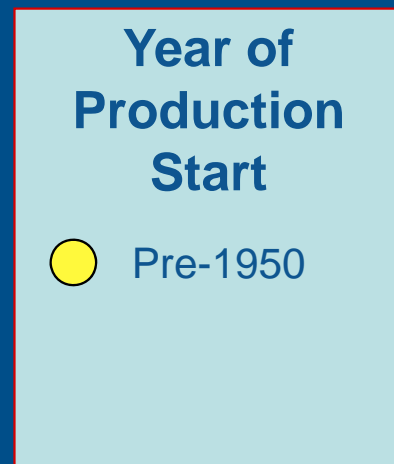
**Automotive employment is
leaving the Great Lakes Region**

U.S. & Canada Auto Production & Sales



Auto Plant Startups

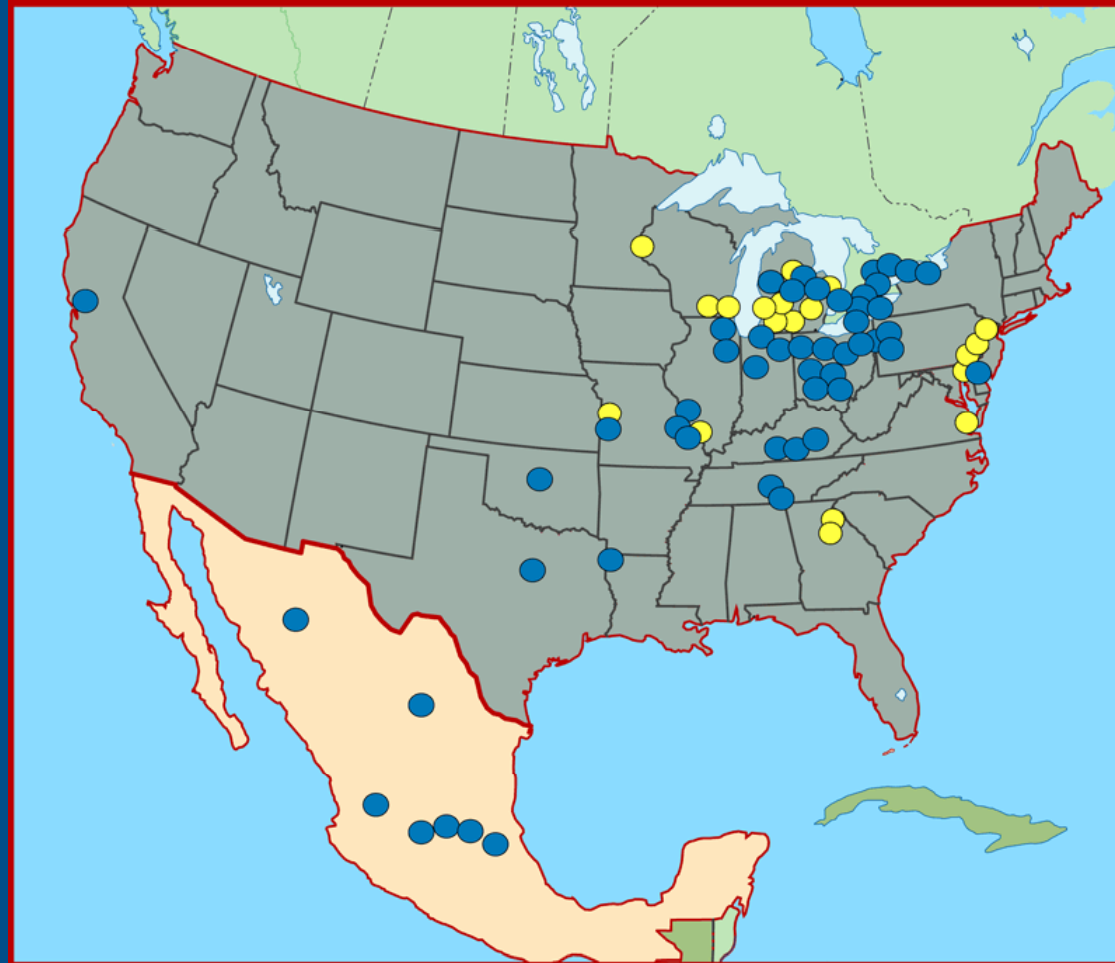
U.S. & Mexico



Sources: Automotive News Data Center, auto companies, TP Strategies

Auto Plant Startups

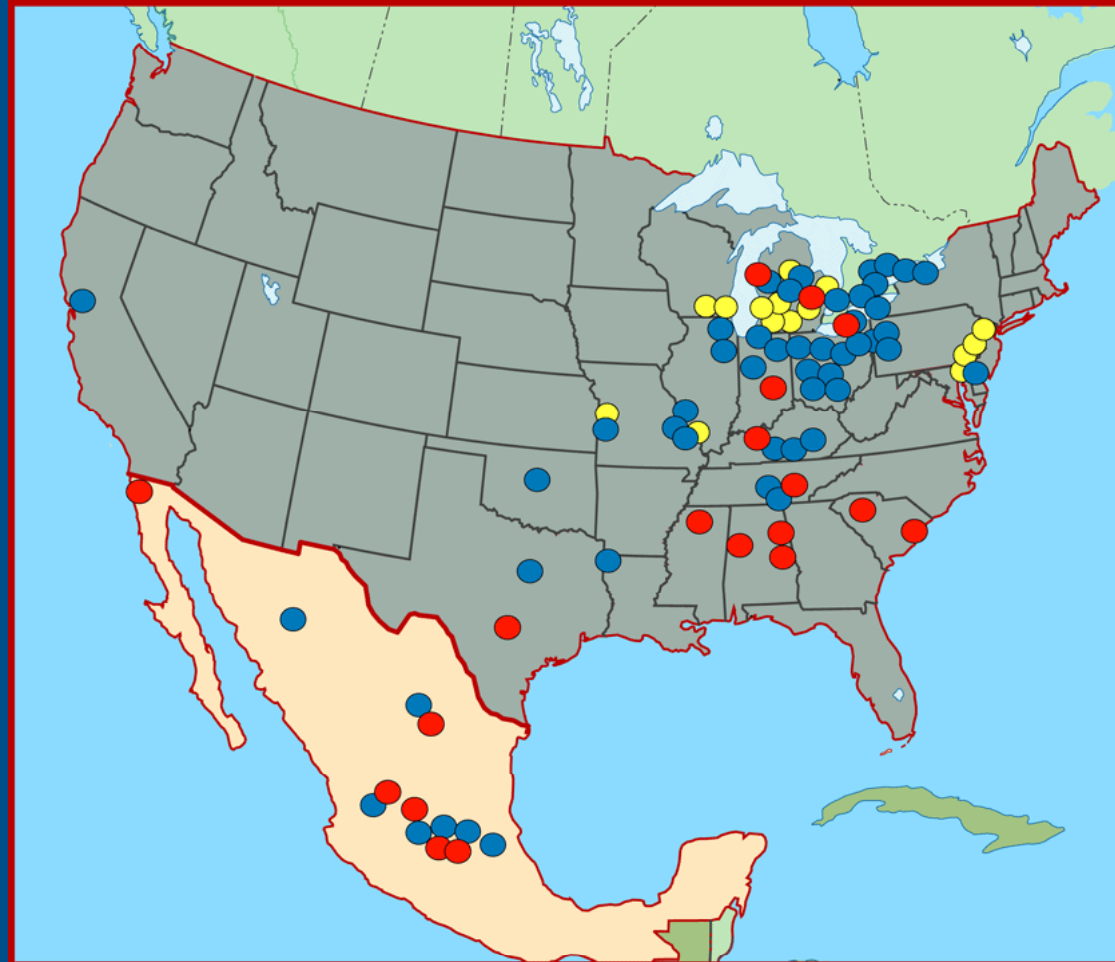
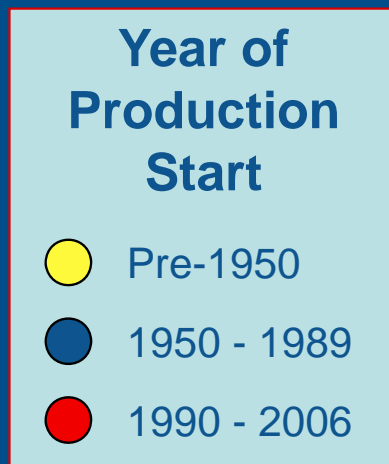
U.S. & Mexico



Sources: Automotive News Data Center, auto companies, TP Strategies
28

Auto Plant Startups

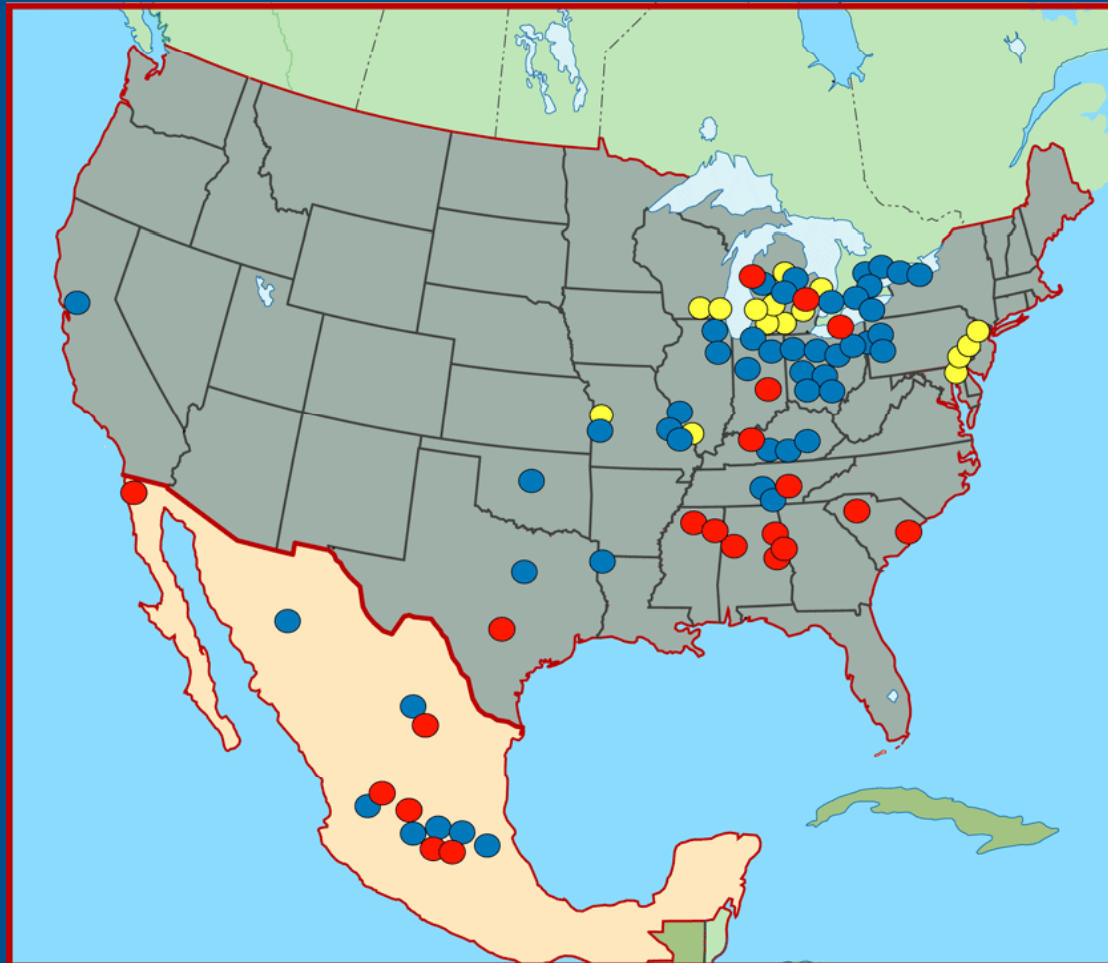
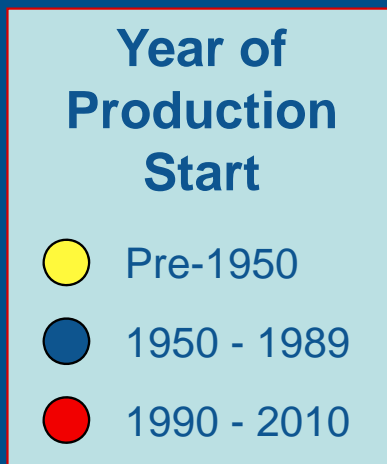
U.S. & Mexico



Sources: Automotive News Data Center, auto companies, TP Strategies
29

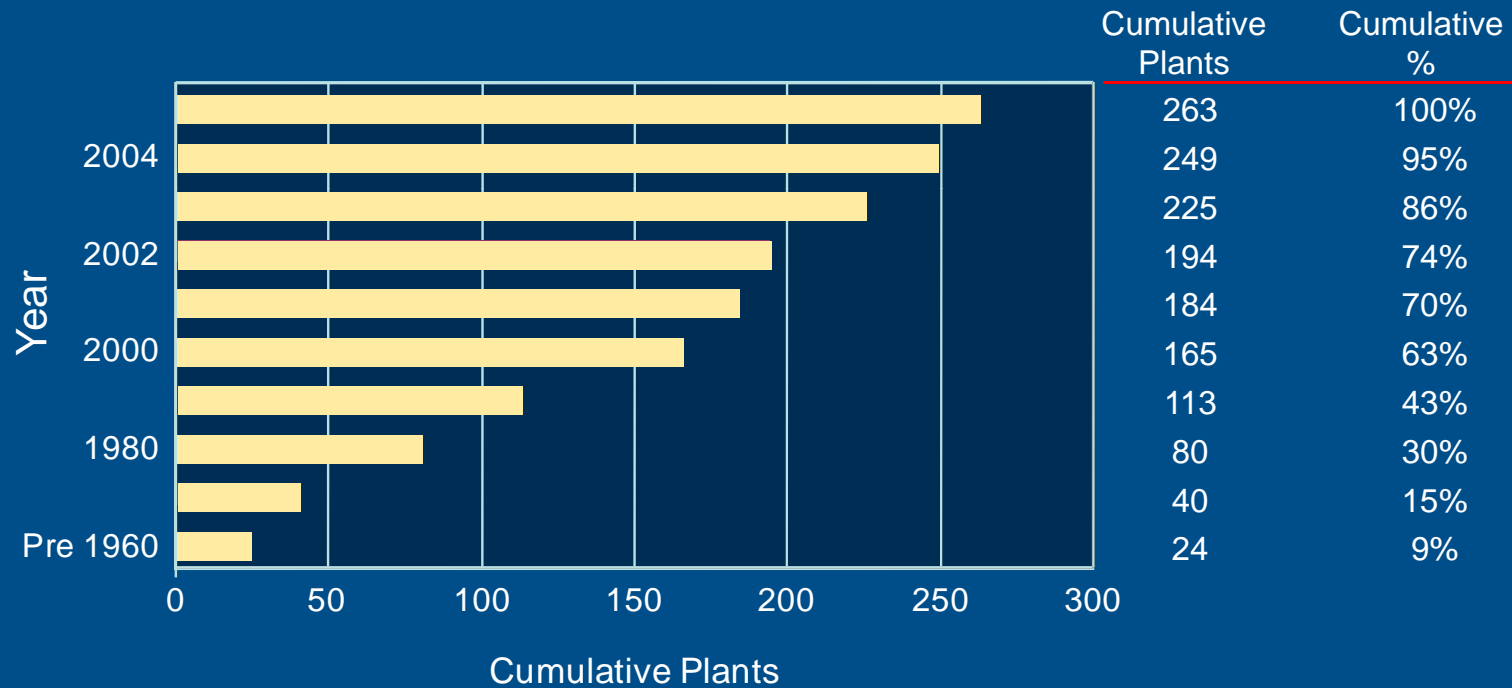
Auto Plants Remaining

- after announced closings



Sources: Automotive News Data Center, auto companies, TP Strategies, IRN Inc.

Automotive-related plants opened in Alabama



Source: Alabama Automotive Manufacturers Association 31

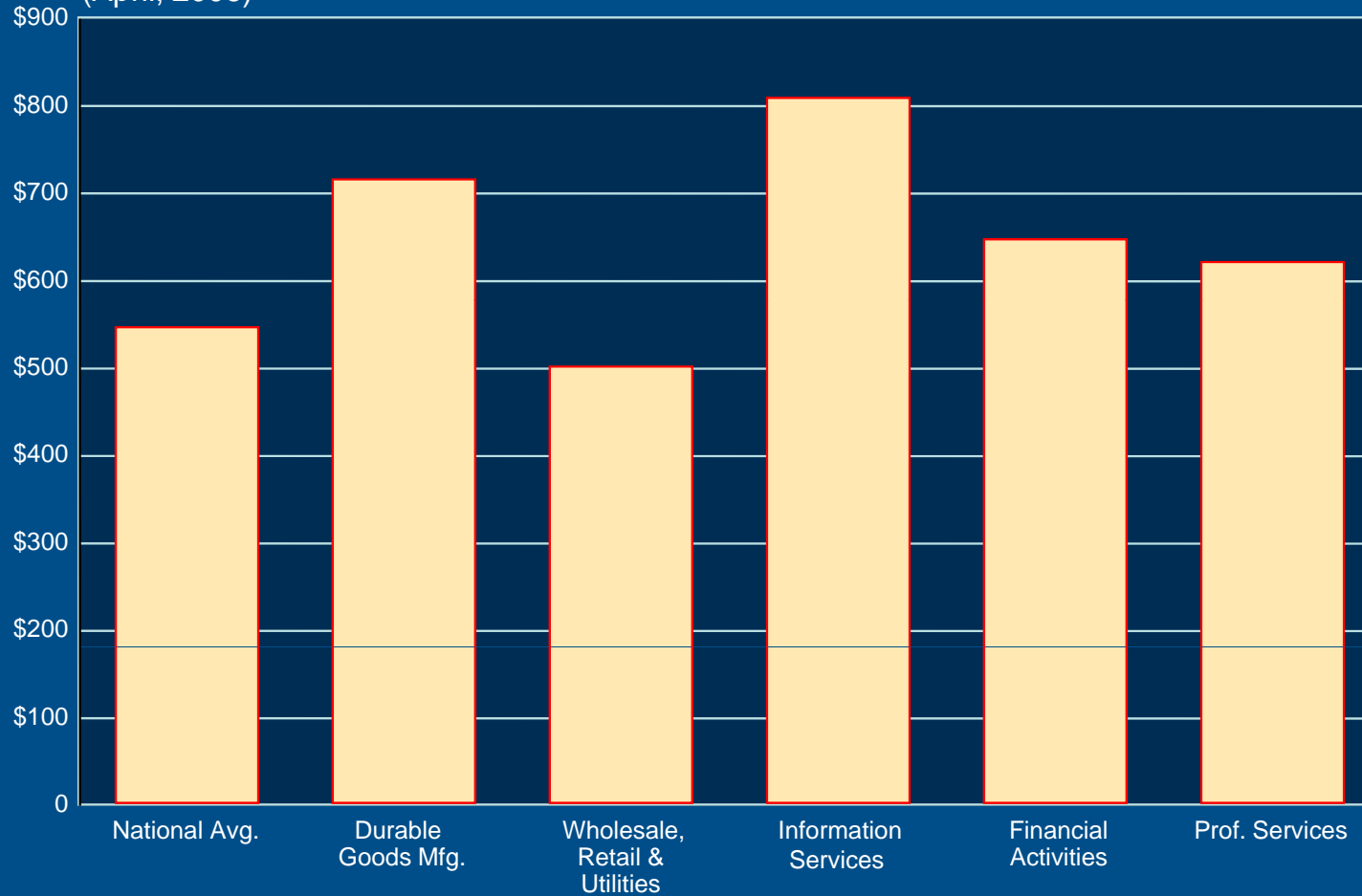
A transition is occurring in the U.S. Industrial Base

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- A geographic migration of manufacturing facilities within the U.S.
- A change in the makeup of the U.S. labor force

**Why are
manufacturing jobs
important?**

Weekly Wages – Non-Supervisory Employees

(April, 2006)

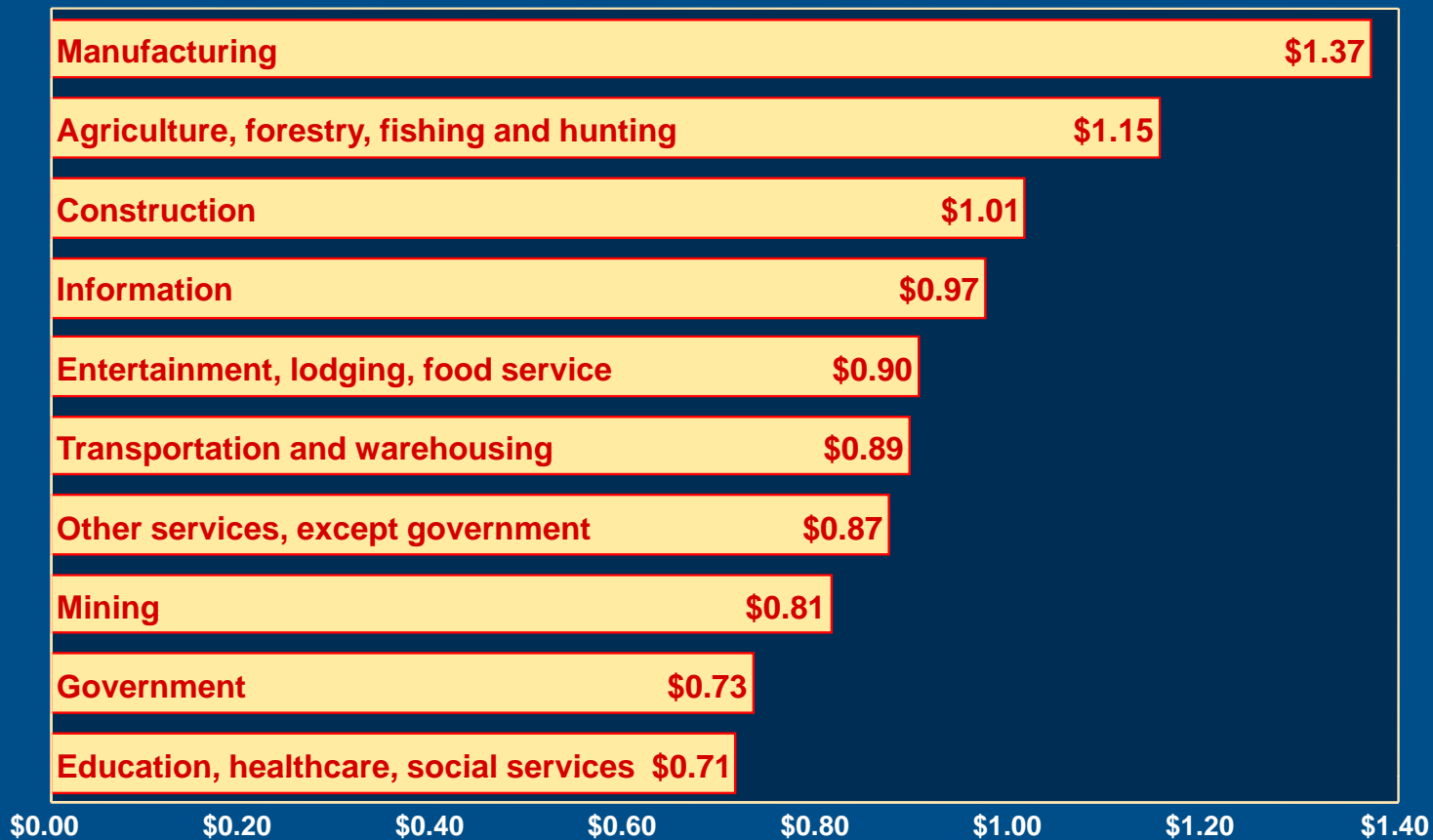


Source: Bureau of Labor Statistics

Health Insurance Coverage

- 56% of U.S. workers have health coverage through their jobs
 - 30% in recreation, hotel, and food sectors
 - 52% in retail and wholesale sector
 - 70% in manufacturing

Manufacturing jobs lead economic contributions



Source: U.S. Dept. of Commerce (2004)

Cost Pressures on U.S. Manufacturing Competitiveness

Cost Pressure	Foreign Nation's Advantage (%)	
	(2003)	(2006)
Corporate Tax Rates	-5.6	-7.6
Employee Benefits	-5.5	-6.8
Litigation Costs	-3.2	-3.7
Pollution Abatement	-3.5	-5.2
Natural Gas Prices	-0.5	-0.7
Total Cost Advantage	-18.3	-24.1
U.S. Net Cost Burden	22.4	31.7

Source: NAM & Manufacturers Alliance/MAPI

Global Manufacturing is in transition

U.S. Real and Nominal Effective Exchange Rates

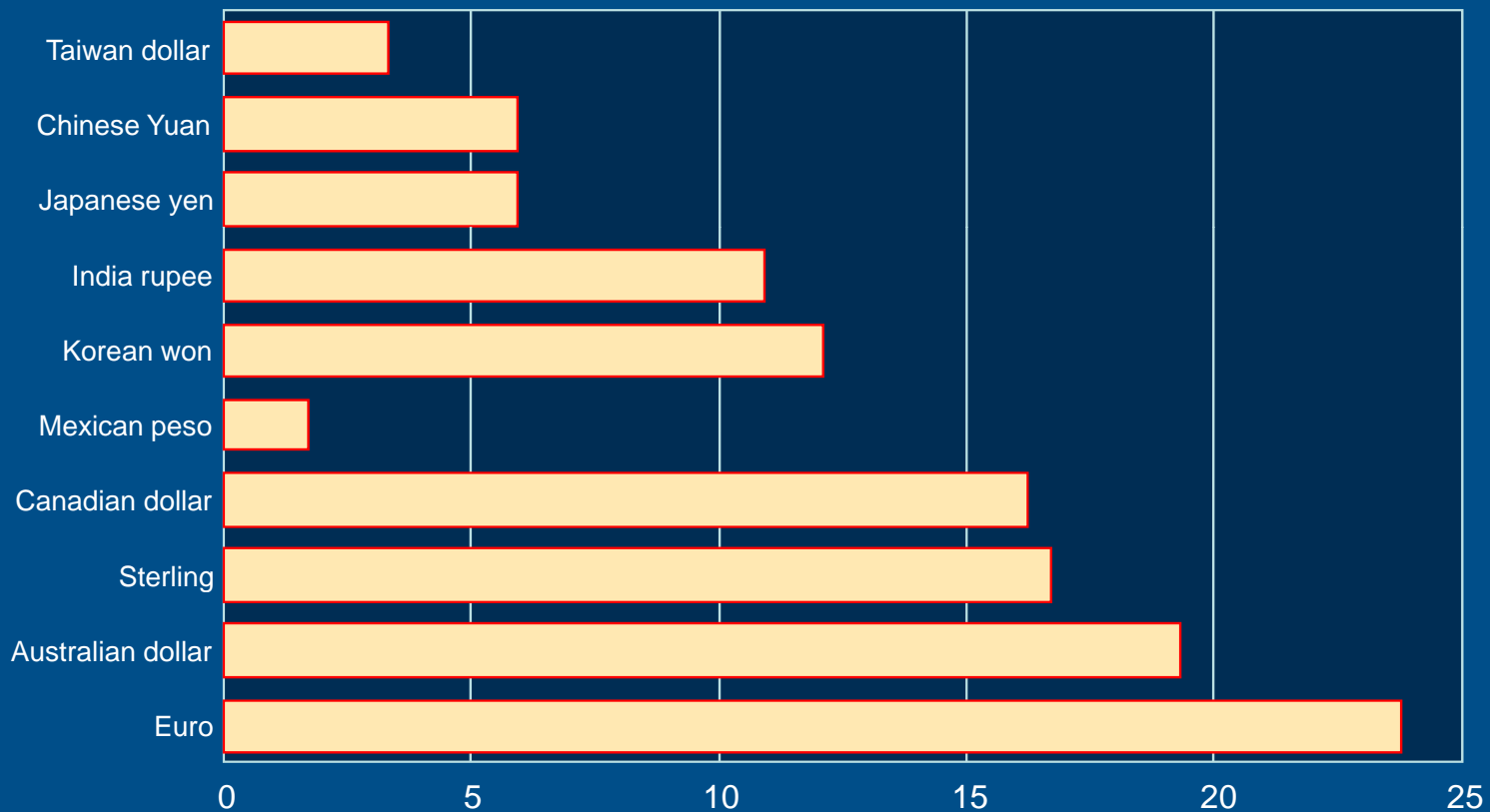


Source: Oxford Economics/Haver Analytics

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U.S.\$ Depreciation against various currencies

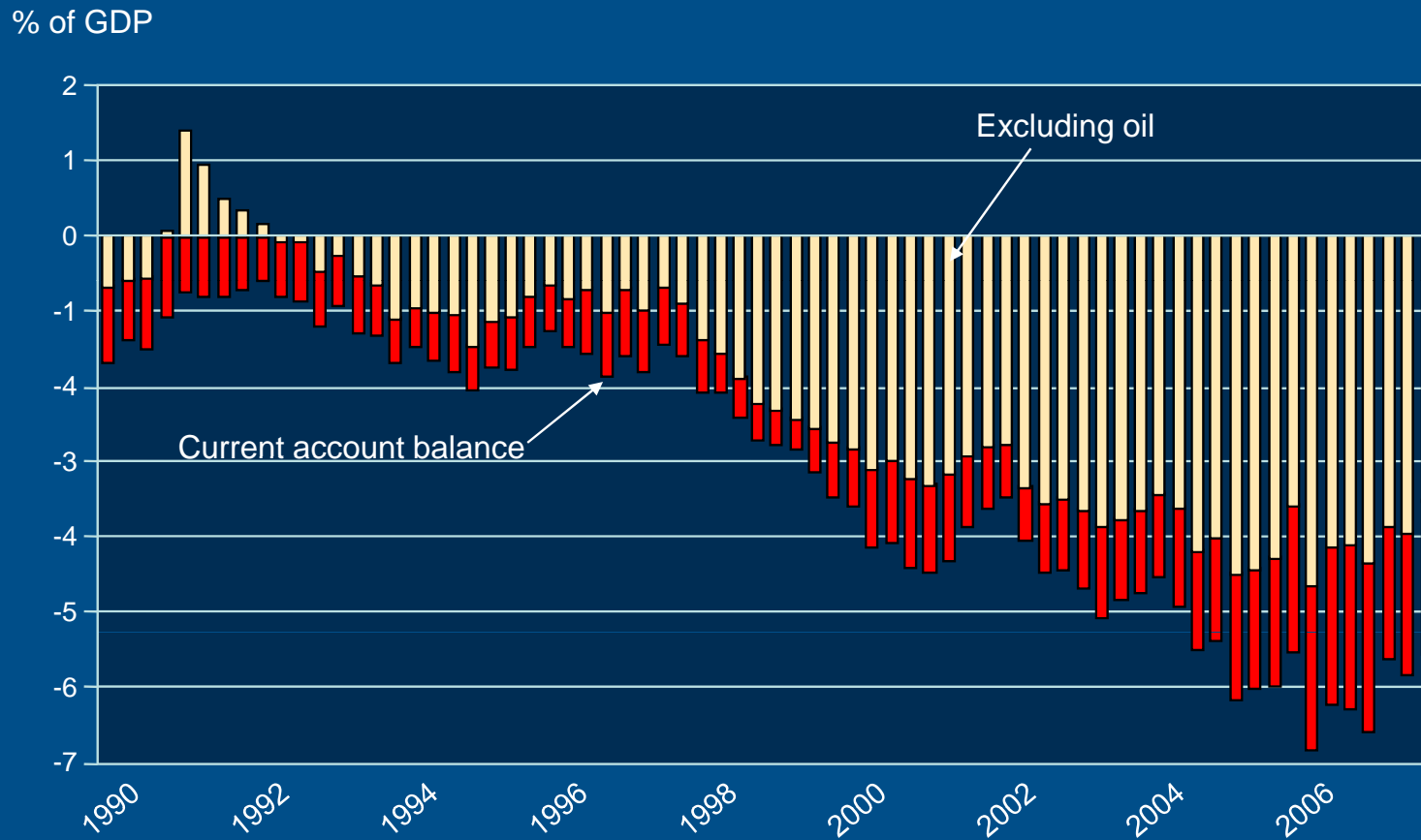
% depreciation from end-2005



Source: Oxford Economics/Haver Analytics

40

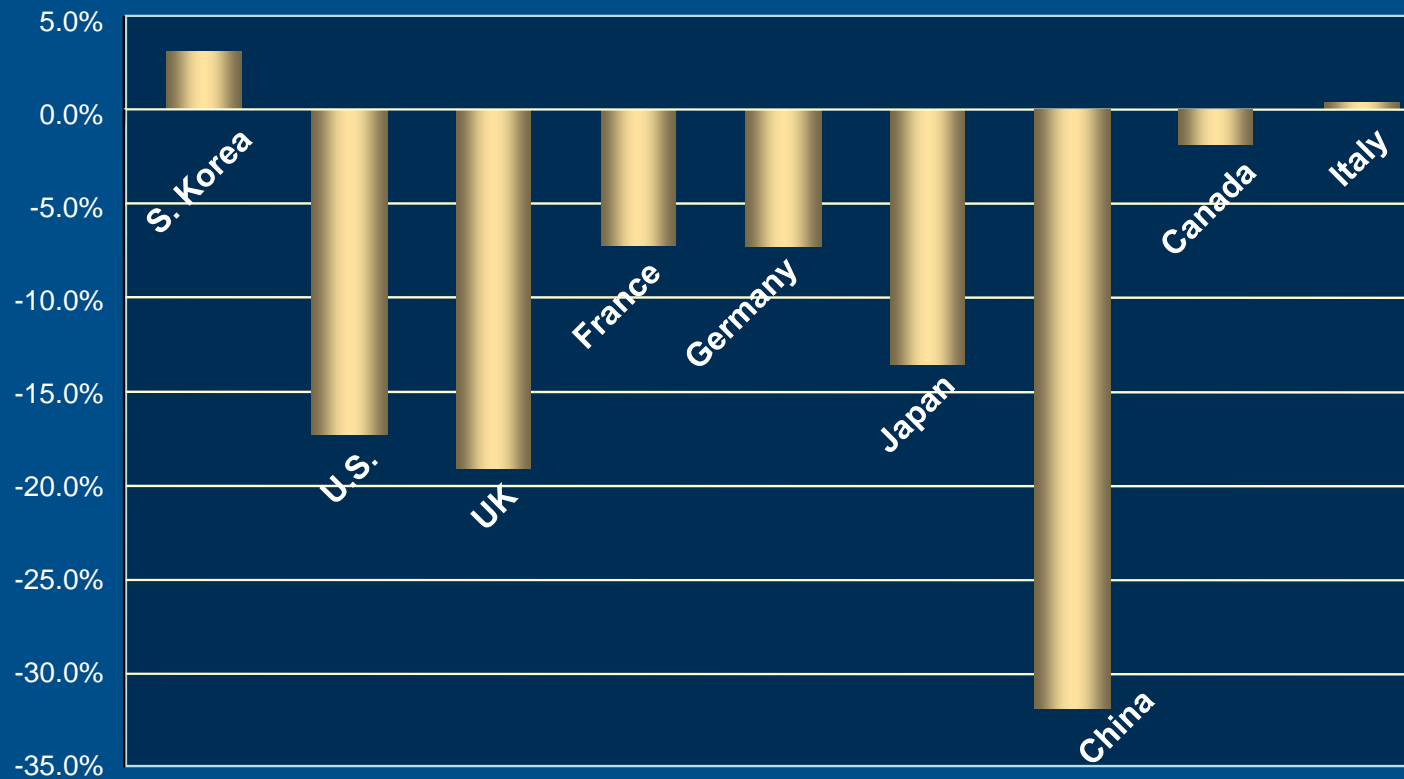
U.S. Current Account with and without oil



Source: Oxford Economics/Haver Analytics

41

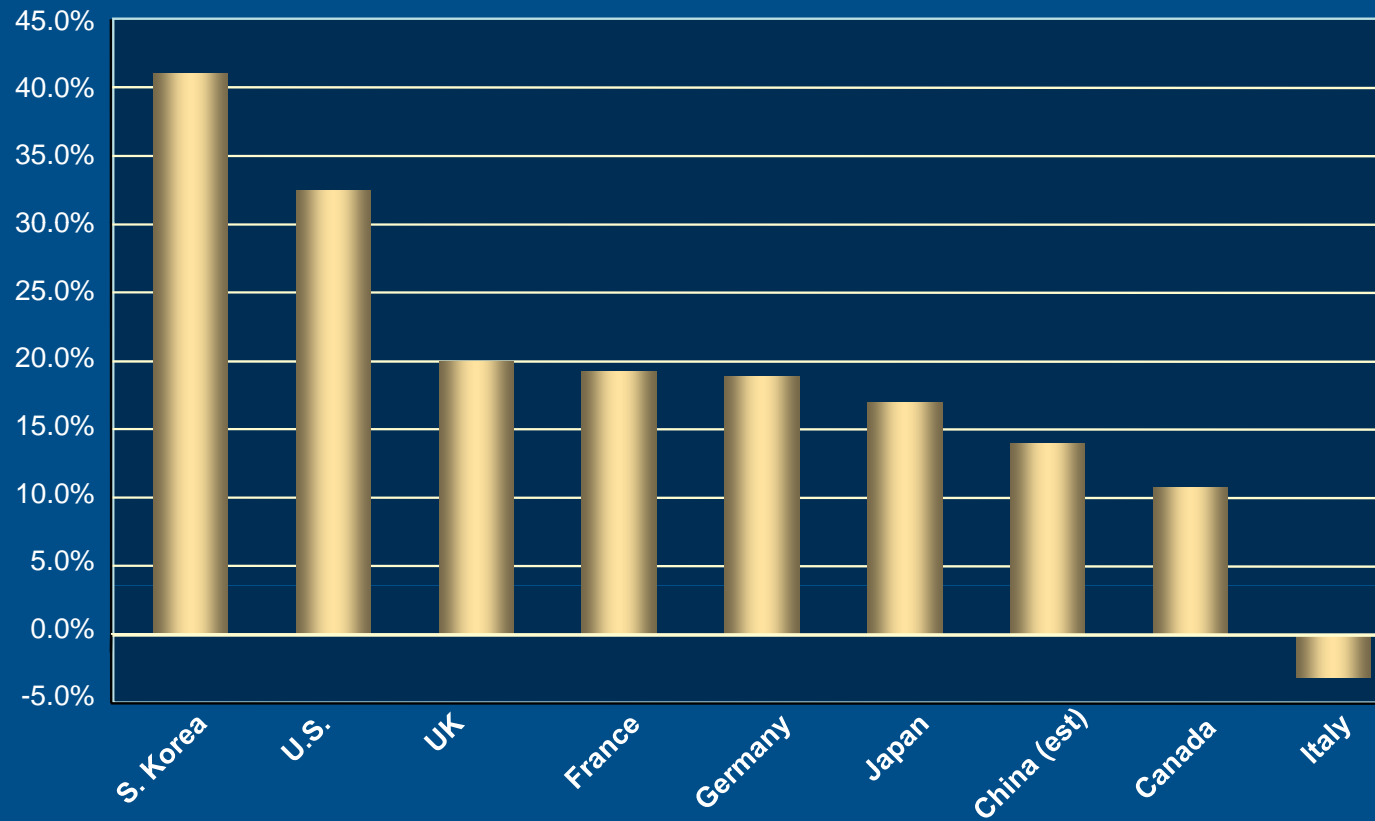
Change in Manufacturing Employment (% change - last five years)



Sources: U.S. Bureau of Labor Statistics; OECD

Growth in Productivity in Manufacturing

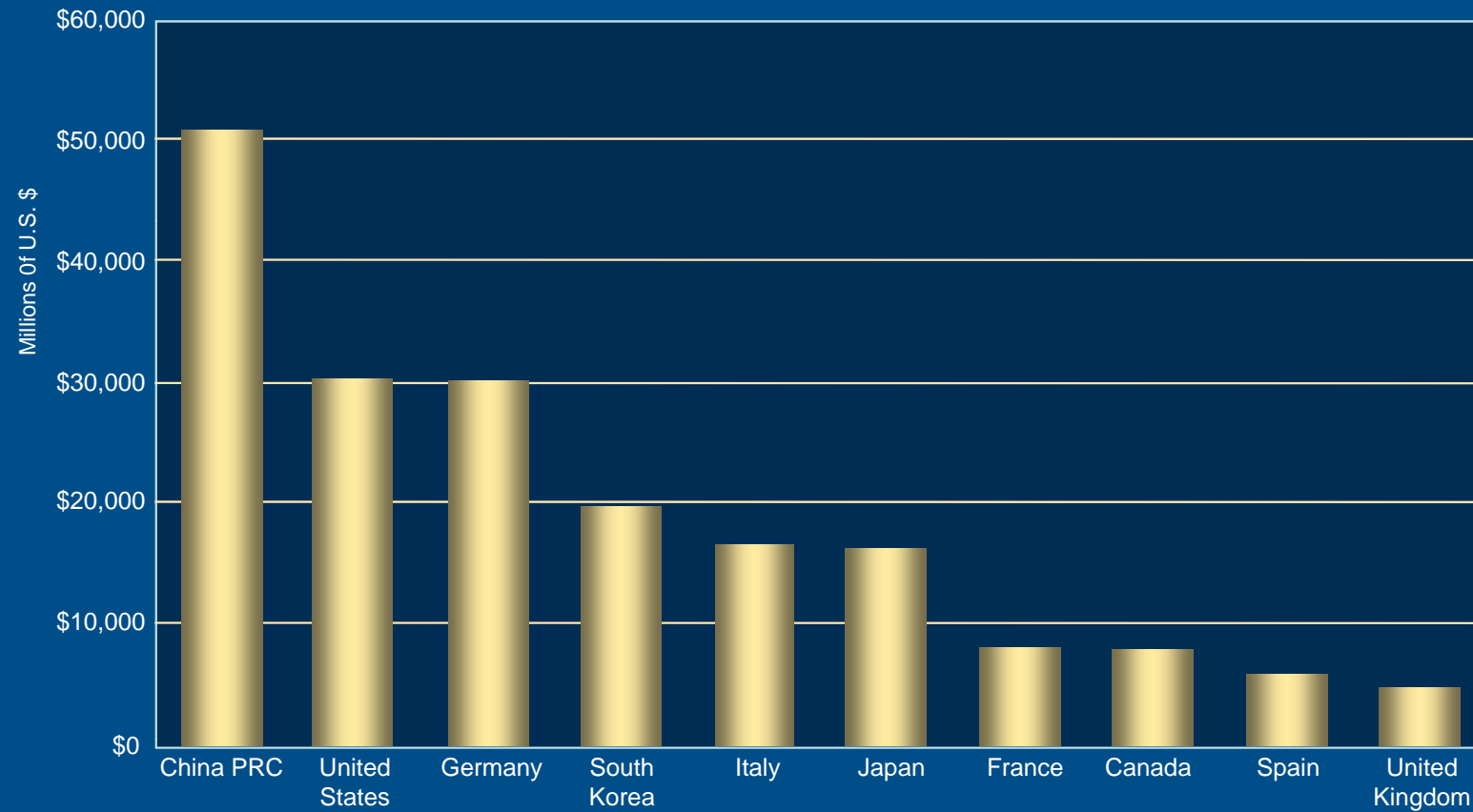
Net Change between 2000 - 2005



Source: U.S. Bureau of Labor Statistics: estimates

Consumption of Machine Tools by 10 Largest Economies

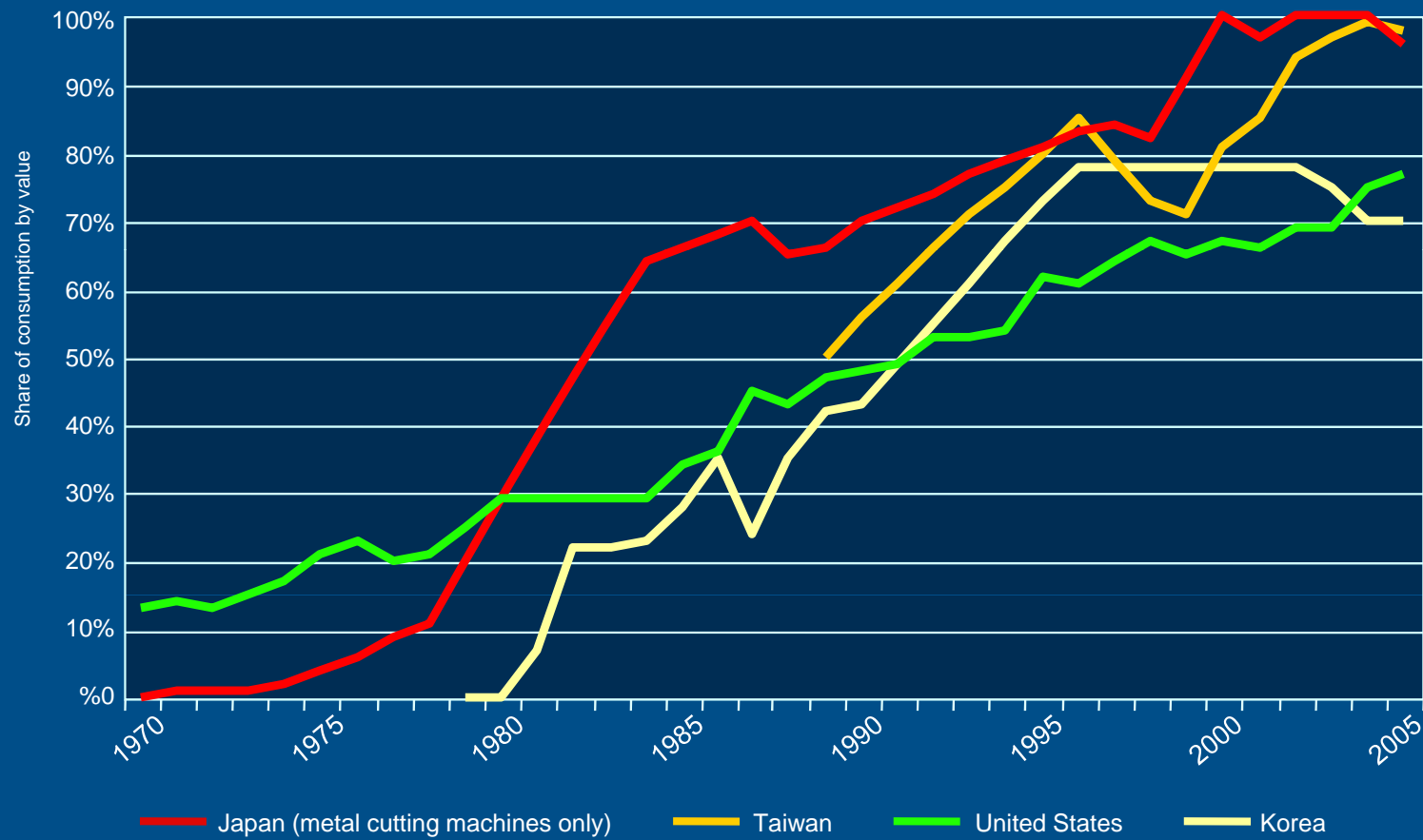
2001-2006



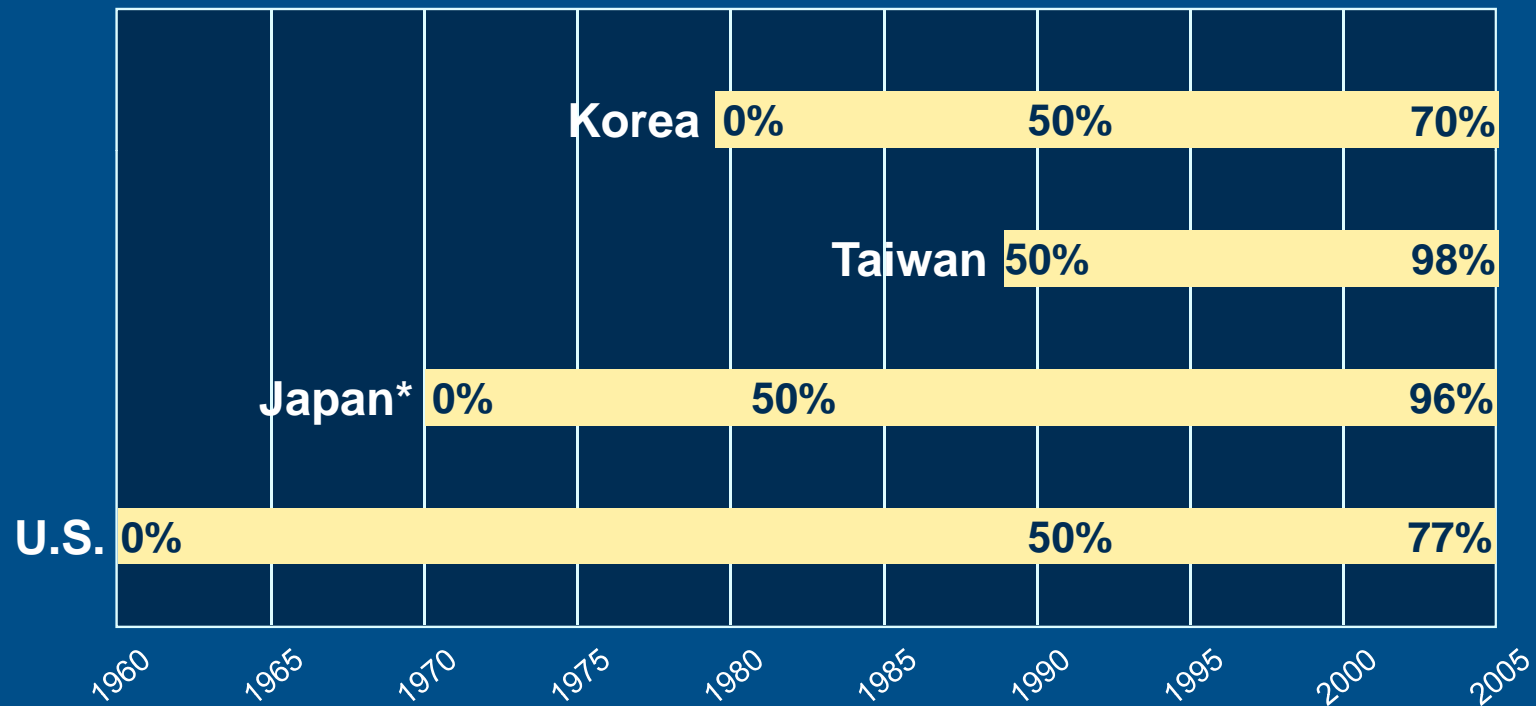
Source: National Machine Tool Trade Associations

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NC Growth in Selected Markets

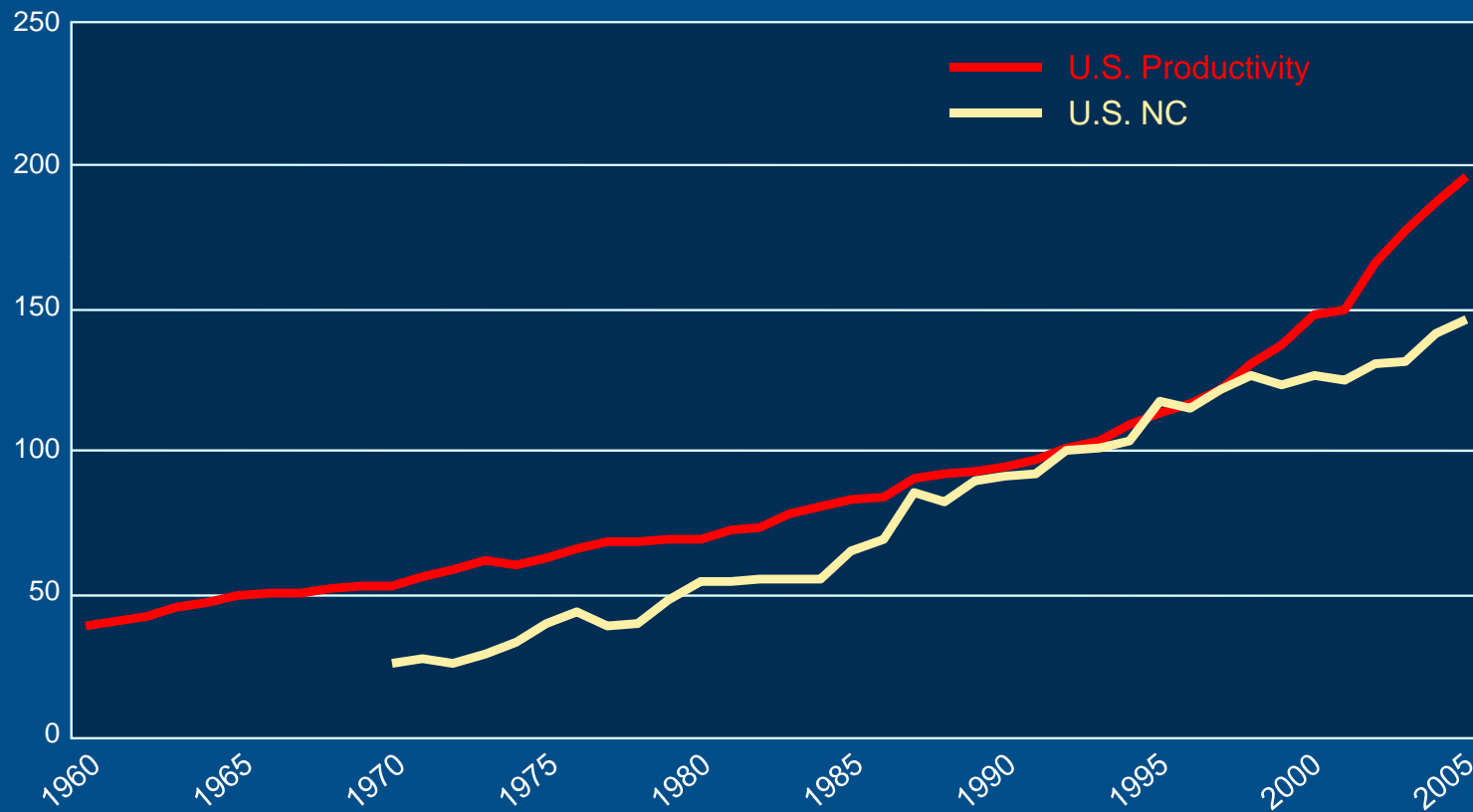


Rate of NC Penetration (Selected Markets)

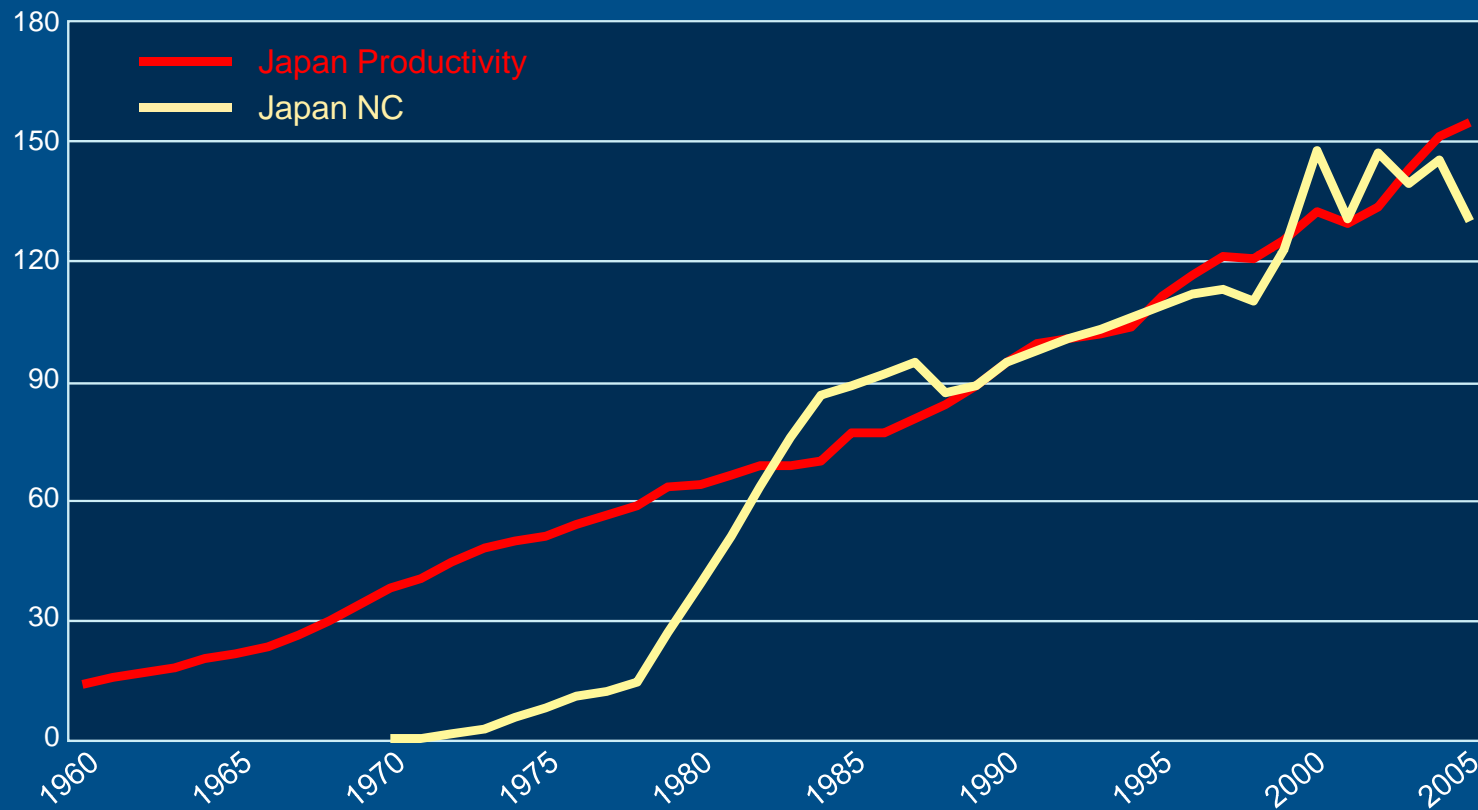


* Metal Cutting Machines Only

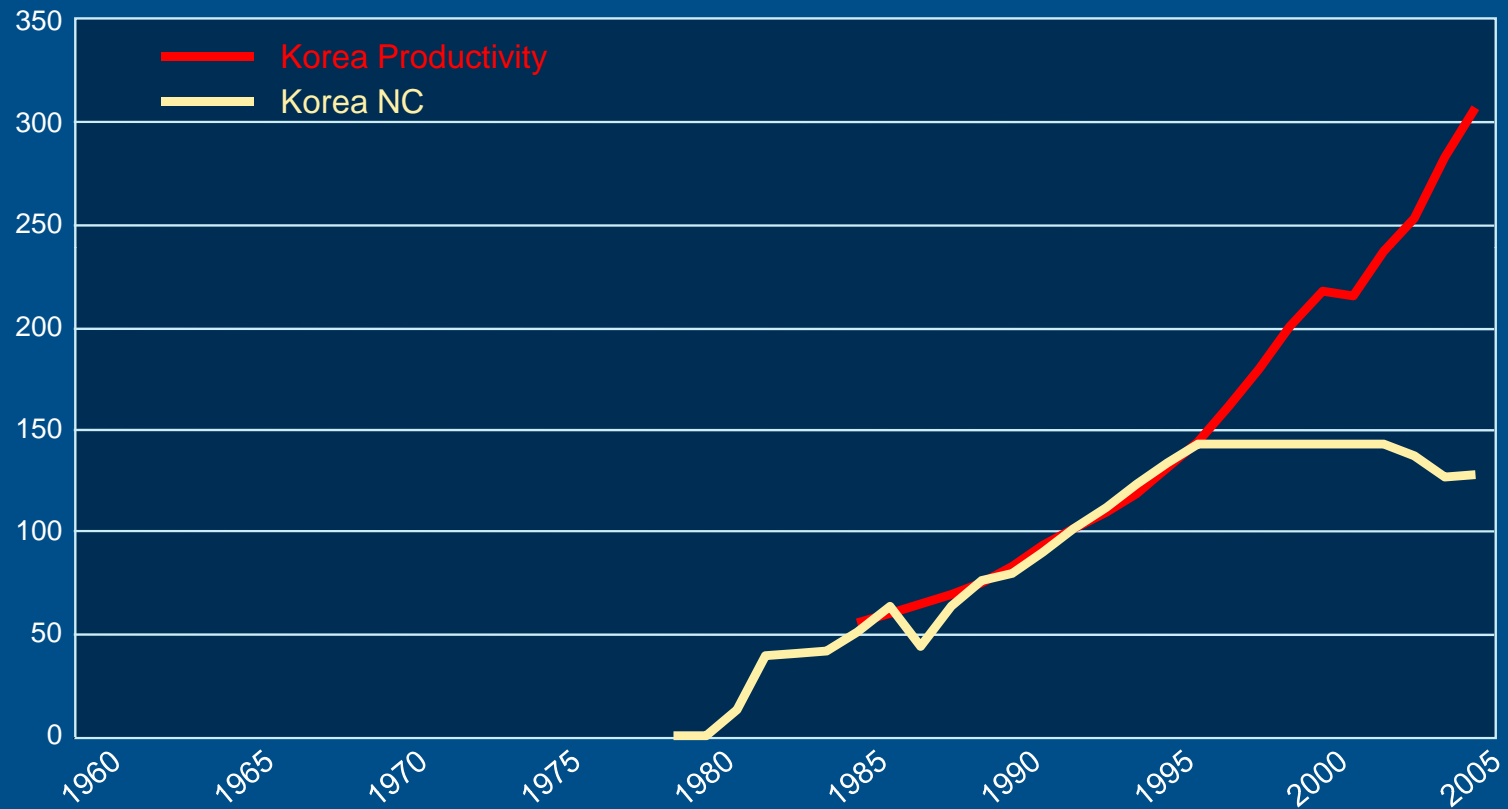
U.S. Productivity and NC Machines



Japan Productivity and NC Machines



Korea Productivity and NC Machines



The manufacturing technology sector is also in transition

2000

- Metalworking Equipment
- Incremental Technology Steps

2015

Material Working Solutions
Technological Leaps

Transitions in Manufacturing Technology

- Evolutionary
- Revolutionary

Evolutionary Manufacturing Technology Transitions

(Production Driven)

- Multi-tasking
- Hard turning
- Improved tooling
technology

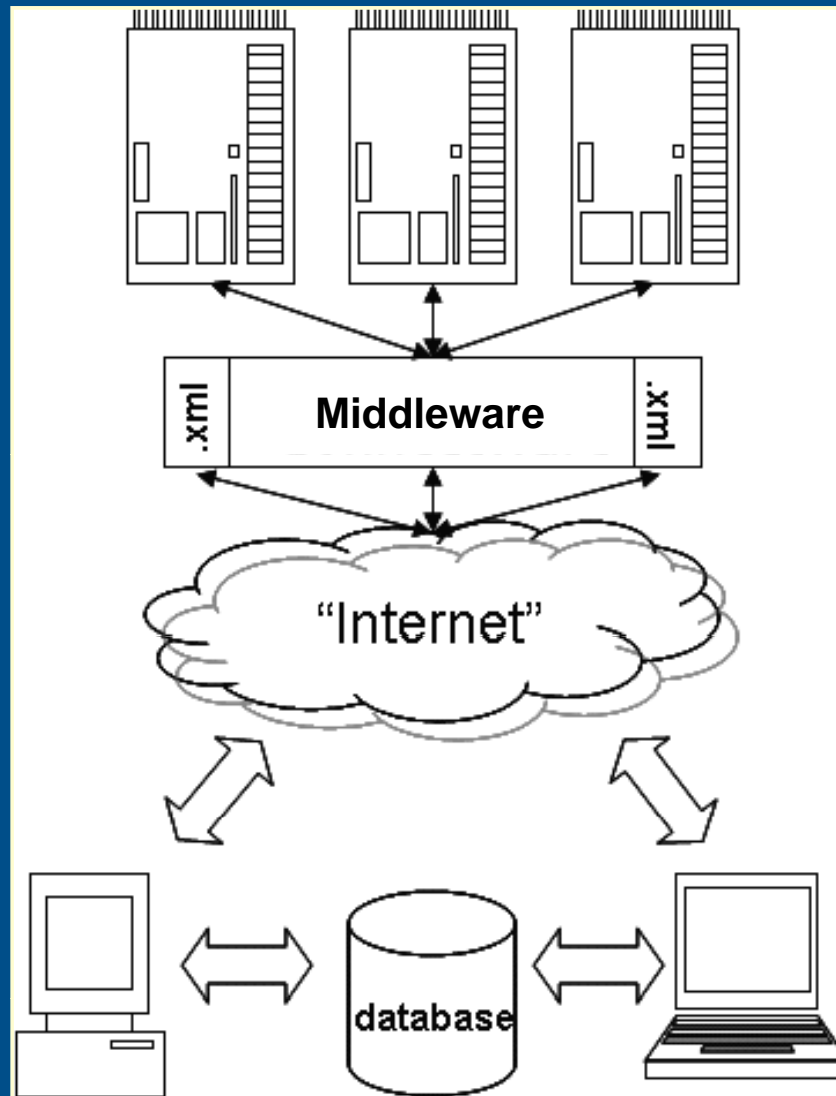
Revolutionary Manufacturing Technology Transitions

(Disruptive Discovery)

- Water jet cutting
- Predictive manufacturing

AMT Inter-Operability Initiative

- AMT has allocated \$1 million to lead an effort to create a research program to develop an open standard addressing manufacturing Inter-Operability.



Dr. Armando Fox

Phased Approach

Phase I  Pipeline

- Visualization
- Limited Capability
- Few Examples
- Read Only
- Visualization/Control
- Expansive Capability
- Commercialized Use
- Read/Write

MTConnect Participants

ATW

Bosch Rexroth

CNC Engineering

Drake Manufacturing Services

GE Fanuc Automation Americas

Georgia Tech (MARC)

Gibbs and Associates

The Gleason Works

Hardinge

Haas Automation

Huffman Corp.

Igear

MAG Cincinnati

Mazak

Mori Seiki

Okuma

Parlec

Remmele Engineering

TechSolve

Thinc Partners

UC Berkeley

