

Global Manufacturing 2006-2014

How shall we define success?

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US in the Global Scene

- Trend of US & Global Mfg **output is up**
- Trend of US & Global Mfg **employment is down**
- Logical link between these trends is increasing output per worker—not only in US but globally

But many other factors at play
make it hard to keep eyes on ball

- US productivity is growing
- Productivity in other countries is growing
- Market liberalization brings China, India and former Soviet Union republics into global trade system—vastly increasing Mfg goods supply
- Demand is shifting from goods to services as income grows
- Rise of US capital markets as standard for the world keeps value of US\$ inflated

And US Mfg employment declines

<u>Year</u>	<u>Jobs (000)</u>
1979 (historical peak)	19,426
1985	17,819
1990	17,695
1995	17,241
2000	17,263
2001	16,441
2002	15,259
2003	14,510
2004	14,329
2005	14,258
2006 (May—Prelim)	14,230

Productivity of U.S. Mfg Labor

Mfg Output per Worker in U.S.
increased about 83% between
1990 and 2004—and accelerated
further between 2001 and 2006

In a *closed economy*, that is a recipe for job loss.

In an *open economy*, it helps the competitiveness of individual companies but does not guarantee net Mfg job retention overall.

“Old” and “New” Mfg Models

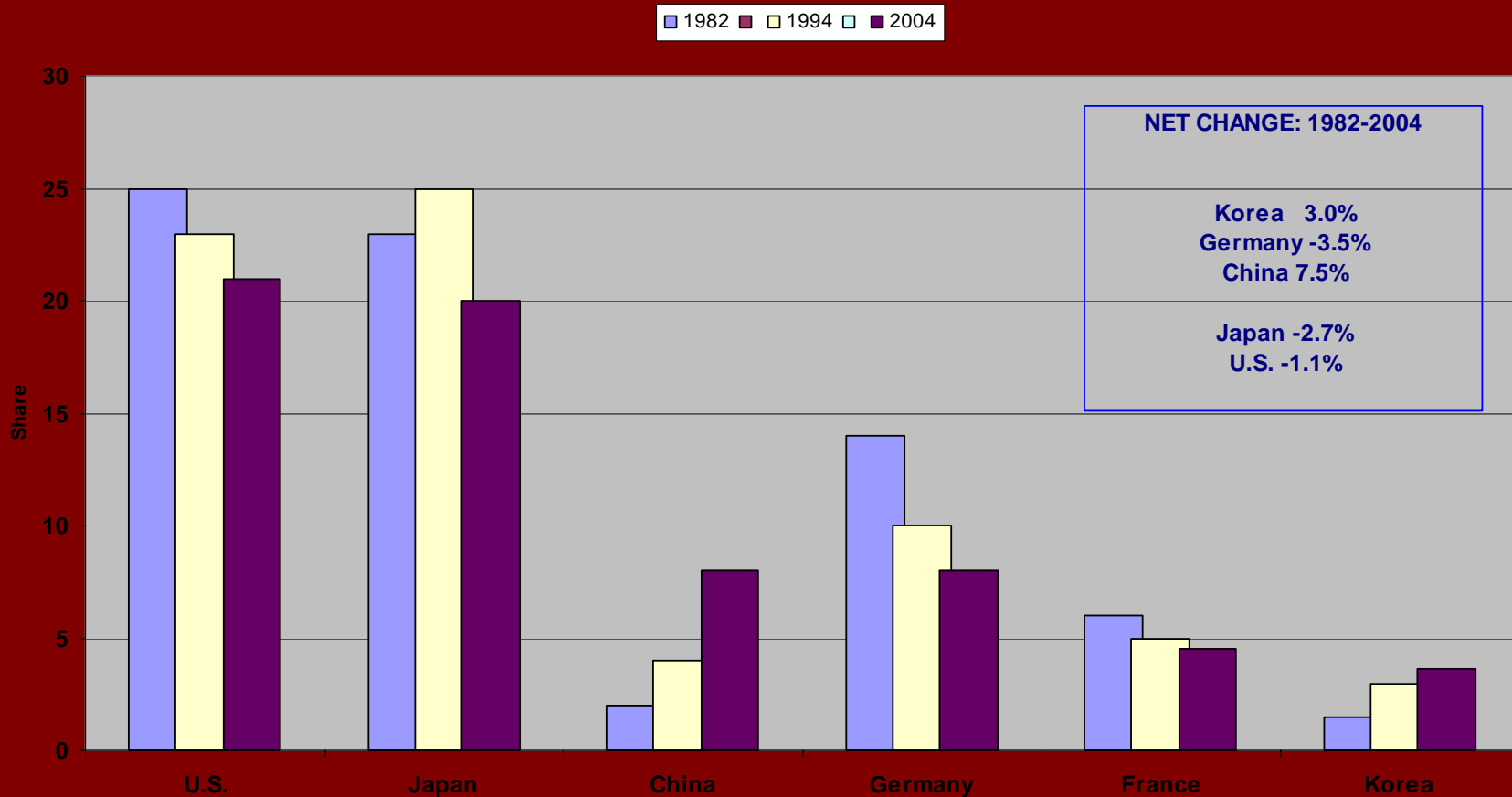
- In the old model, productivity growth created manufacturing competitiveness and led to competitive increases in employment
- In the new model, productivity growth can contribute to cost competitiveness without leading to increased employment
- The big reason is that productivity is growing elsewhere as well—maybe faster....

Growth in Productivity Abroad, 1990-2003

Taiwan	284 %
Korea	247 %
Sweden	179 %
France	164 %
Japan	145 %
Belgium	134 %
United Kingdom	132 %
Australia	109 %
Canada	79 %
Germany	77 %
Denmark	73 %
Italy	45 %
Norway	43 %

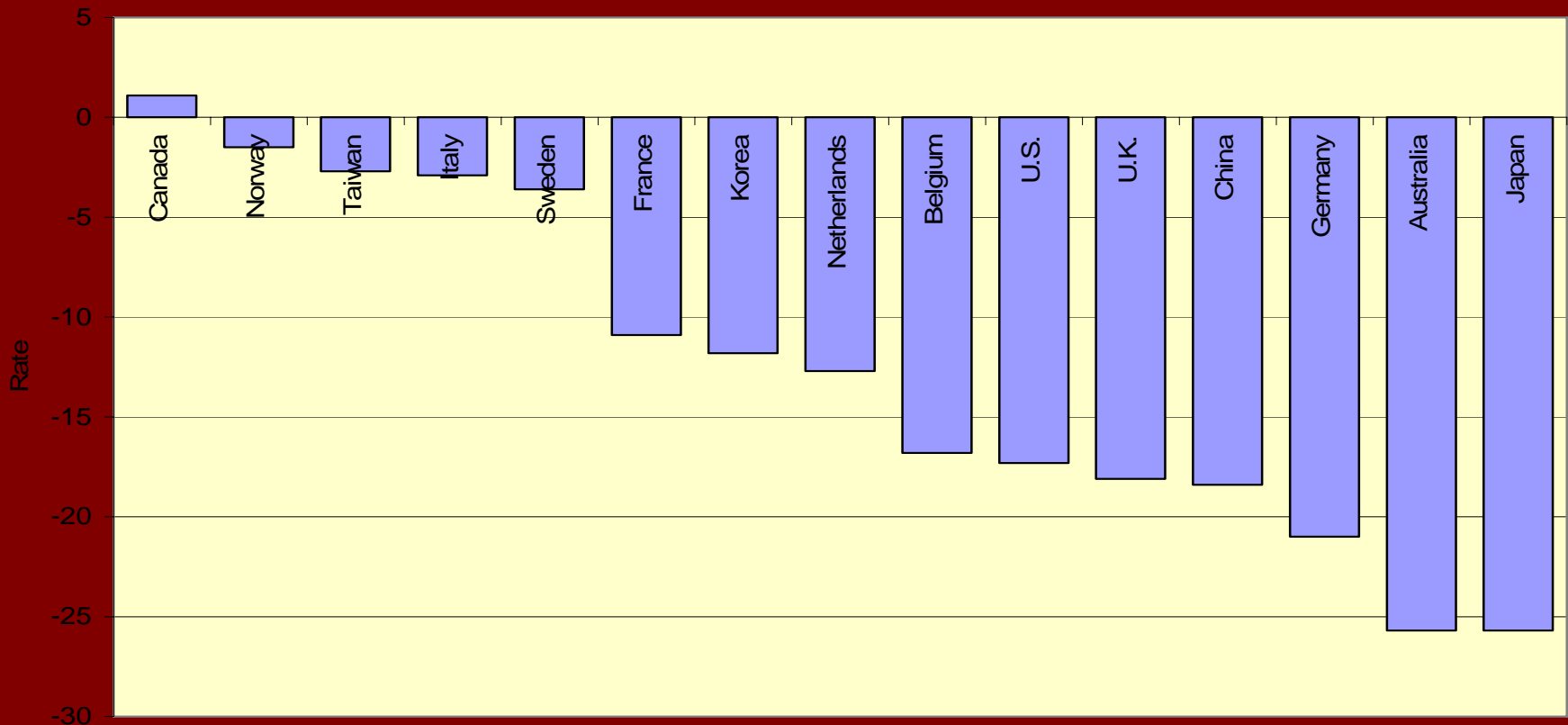
With Major Productivity Growth, Korea's Share of Global Mfg Output Grew 1982-2004

Share of Value Added in Manufacturing



But—just like the rest—Korea's overall mfg employment declined

(Also, don't overlook China's job losses—the fourth bar from the right....)



Data for The Netherlands and China are for 1990-2002.

Source: W.A. Ward, Manufacturing Productivity and the Shifting U.S., China, and Global Job Scenes, 1990-2005. Center for International Trade, Clemson University, Clemson, SC

International Manufacturing Competitiveness factors tracked by BLS—The cost-based approach to competition

These three factors taken together

- Productivity
- Wage Rate
- Exchange Rate

Give you

“Dollars of labor cost per unit of output”

2 out of 3 involve controlling workers' purchasing power

- Low wage rates
- Low value of Dollar

The third competitiveness factor

- Productivity
 - Increases competitiveness of U.S. companies, but
 - Decreases the number of jobs if
 - Global demand does not grow even faster, and/or
 - U.S. does not gain increasing share of global market

Competitiveness & Thy Neighbor

- In the cost-competitiveness game, someone must be the loser
- When companies of all nations are driven to achieve productivity gains, ALL parties can lose when the measure of success is job growth.....

Global Loss of Mfg Jobs 1995-2002

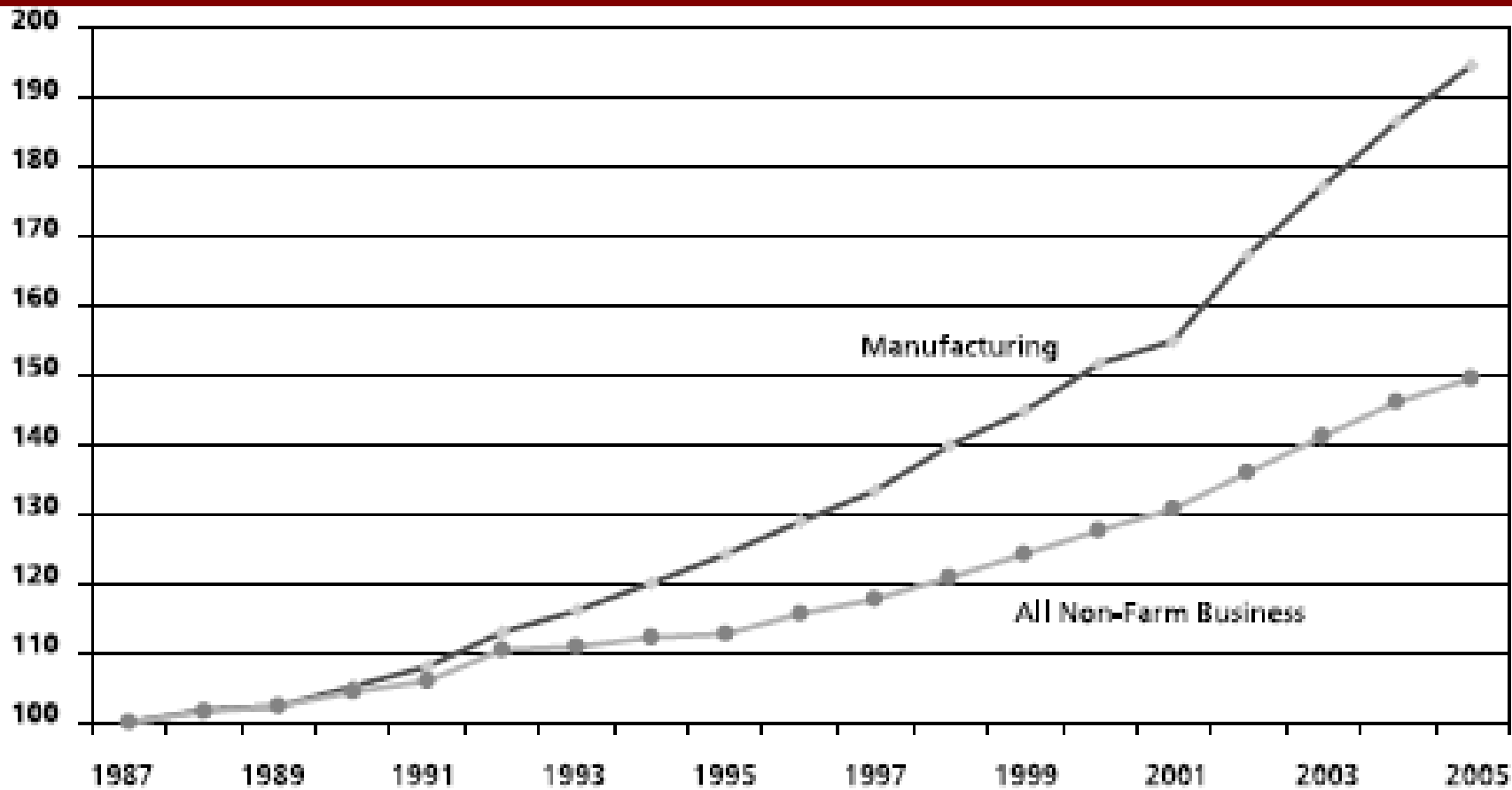
Region	Mfg Jobs 1995 (000)	Mfg Jobs 2002* (000)	Change (000)
Africa	4,242	3,926	- 317
Americas	31,944	31,691	- 253
Asia	76,594	58,395	- 18,199
Europe	58,319	55,657	- 2,662
Oceania	1,321	1,395	+ 74
Globally	172,421	151,066	- 21,355

*Note: Global data not available beyond 2002.

Changing Productivity Growth Patterns

- Rapid productivity growth during 1991-97 recovery
- Even more rapid productivity growth—accompanied by large decreases in employment—during 2001-2006 recovery

Labor productivity growth since 1987 in US



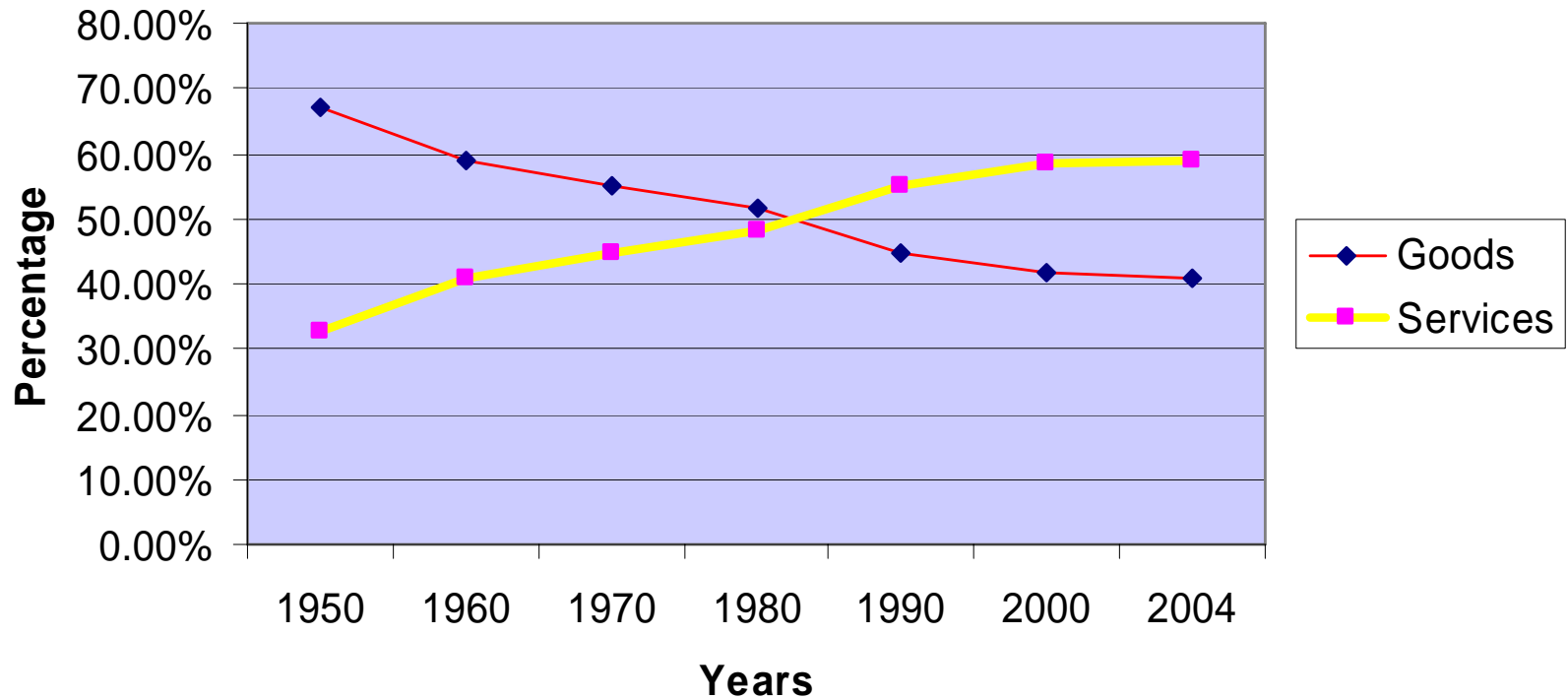
Source: U.S. Department of Labor

But productivity at home and abroad is not the only factor...

- Changing ratio of demand for goods versus demand for services
- Huge workforce abroad brought into global production system
- Value of Dollar remains high

Shifting Demand for Goods *versus* Services within U.S. GDP

PCE for Goods versus Services (1950-2004)



The Global Supply Shock

- Doubling the Workforce—Market liberalization of large LDCs and FPEs
 - China (20% of global workforce)
 - India (15% of global workforce)
 - Rest of East Asia + FPEs push totals to more than 50% of global workforce
- Doubling the output per worker globally (previous slides)
- $2 \times 2 = 4 =$ YIKES! A four-fold increase in global capacity to produce tradable manufactured goods!

The Strong-Dollar Shock

- Development of Modern Portfolio Theory
- Financial markets' growing role in risk mgt
- Conscious development of world's leading market-based financial system by US government & financial community
- Fed and Treasury focus on stability and reliability of US \$ after 1970s
- US financial instruments become *numeraire* for company and Central Bank risk managers

US Dollar in Risk Management

- Of global Central Bank reserves totaling more than \$5 trillion, 70% are in US \$
- Central Bank reserves in \$ as % of total reserves is multiples of the US share in global trade, whereas Euro and Yen shares in global reserves still tend to parallel their shares in global trade
- 60% of US currency in circulation is held abroad—equal to \$2,000 per US citizen

US & Global Equity Mkts

(UN data 2000)

- **\$50 trillion** Estimated total value of world stocks, bonds, securities and other financial assets
- **\$37 trillion** Total global equity mkt capitalization
- **40 per cent cap** US mkt share of global equity mkt cap
- **20 per cent** Share in continental Europe
- **10 per cent** Share in the emerging economies

Risk Management Instruments

Total Contracts Outstanding at end of 2005
(Survey by International Swaps and
Derivatives Association)

- Total of Interest rate swaps, Cross-currency swaps, and Interest rate options: **US\$ 213 trillion**
- Total of Credit Default Swaps: **US\$ 17.1 trillion**
- Total Equity Derivatives: **US\$ 5.6 trillion**

Global Role of the US....

- From 1945-2000, US sought to create a multilateral world order (political and economic) with the US at the hub
- In that system, the US was not “just another country”—it was the hub country and the hub economy
- In that system, the way the US—and US organizations—competed was therefore different from the way that others did

Benefits at the Hub

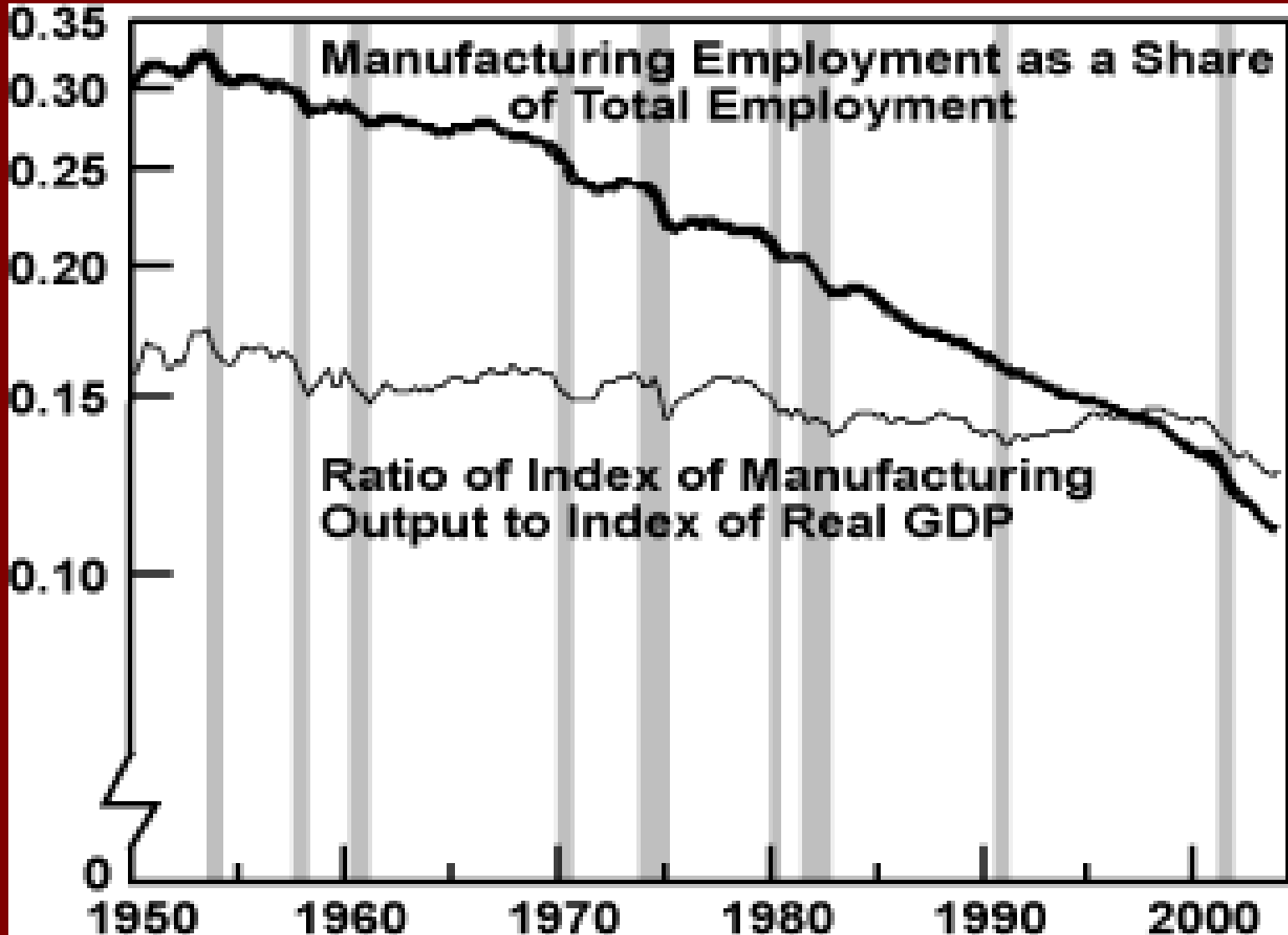
- The US reaps huge seignorage benefits from being at the economic hub
- Old role played by Pound Sterling before WW II
- Reaction by France from the 1960s
- New role hoped for by Euro from 1990s

Responsibilities & Costs at the Hub

- Be magnanimous—give back part of the hub-gained premiums
- Set the standard for outward-focus
- Owning the big stick is enough—When waving it, smile; but never use it
- Dangers at the Hub:
 - Hub responsibilities outgrow hub benefits
 - Somebody else always wants to be the hub

US Mfg Output versus Employment

(Source: US Bureau of Labor Statistics)



Manufacturing Employment in Early-21st Century Mirrors Agricultural Employment in 20th Century

<u>Year</u>	<u>Farm Workers As % of Total US Employment</u>
<u>1919</u>	<u>32.8%</u>
<u>1930</u>	<u>29.8%</u>
<u>1940</u>	<u>25.3%</u>
<u>1950</u>	<u>18.0%</u>
<u>1960</u>	<u>11.5%</u>
<u>1970</u>	<u>6.0%</u>
<u>1980</u>	<u>3.9%</u>
<u>1990</u>	<u>2.6%</u>
<u>1999</u>	<u>1.3%</u>

The future of Mfg jobs

- BLS projects Mfg employment of about 13 million in 2014 (vs. 14.4 m now)
- In “production” jobs as a whole, job growth of only 3.2% is projected over next 10 years, compared to 14.8% growth in overall job demand

Raising the question—is “jobs” a good metric for Mfg success?

- Mfg jobs are decreasing but average Mfg wage is increasing faster than US average wage
- Composition of workforce in Mfg plants operating in US is changing—more experienced, more educated workers retained

Manufacturing & the educated

- Mfg employs 10% of US workforce (down from 33% in 1945), and declining....but
- Mfg employs 40% of US engineers
- Mfg employs 25% of scientists and related technicians

Mfg and Science

- US is still world leader in \$ spent on R&D
- US spends 40% of all OECD R&D
- 42% of the world's 1,000 highest-spending companies on R&D are US companies
- Business spent 70% of US R&D
- US Mfg spent 42% of US R&D

The New Mfg Competitiveness

- Focused on new products and new processes
- Intellectual property content which can either be protected for the long-term or treated as expendable
- Operating in an efficient locale
- Access to educated workforce
- Access to R&D capacity

Reality and US Location

- NAM expects shortfall of 13 million qualified workers overall in US by 2020
- Doctoral degrees in science and engineering in US dropped 5% between 1990 and 2004—and by 20% for US CITIZENS
- R&D expenditures abroad by US companies grew 73% between 1999 and 2003

Universities abroad

- Growth of world-class research universities in China and India
- Diversion of foreign students from US to EU and Australian universities
- High percentage and growing numbers of math, science and engineering graduates in China and India universities

New realities for competing from the US

- It is not just about “jobs”—we cannot give up the “production”
- K-12 education reform is critical
- Public investment in efficient R&D must be maintained
- Industry-university programs (e.g., ICAR) become increasingly important
- Clusters of innovation involving groups of companies and public-private partnerships

The location of production and jobs

- De-integration of manufacturing divides up “tasks” and locates them in “networks” rather than in vertical plants
- Increases in transport & communication efficiency and reductions in tariff barriers widen the scope for where these tasks can be located within evolving networks

Reduction in spatial friction

- Real-value declines of communication costs: 98% between 1960 & 1999
- Decline in rail freight rates: 58%
- Decline in inland waterway rates: 42%
- Decline in port handling costs: 90%
- Decline in import duties: 67%

Production and Jobs in 2010

- Output per worker will continue upwards. Competition will force it.
- Continuing shift towards product-based productivity growth—producing for value.
- “Pull” part of lean becomes more important—if that is possible!
- Mfg output will continue upwards.
- Job growth will continue downwards.
- US Mfg wages are likely to continue increasing.