The U.S. Innovation Economy: Current Conditions and Future Prospects

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Today's Presentation

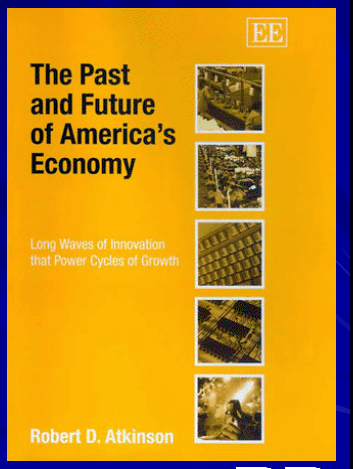
1. Structural Economic Transformations
2. Transformations Drive Growth
3. The New Competitiveness Challenge
4. Meeting the New Competitiveness Challenge

Waves of Innovation Drive Cycles of Growth & Change

Robert D. Atkinson

The Past and Future of America's Economy: Waves of Innovation that Drive Cycles of Growth

(Northampton, MA: Edward Elgar, 2005)

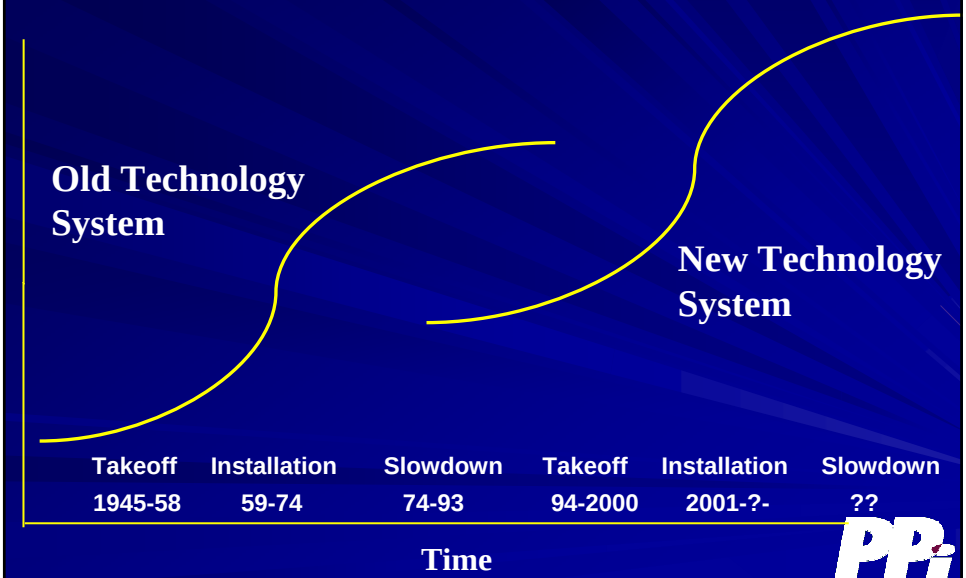


Economic Transformation Is Constant

"These revolutions periodically reshape the existing structure of industry by introducing new methods of production; new commodities, new forms of organization; new sources of supply; new trade routes and markets to sell in and so on. This process of industrial change provides the ground swell that gives the general tone to business; while these things are being initiated we have brisk expenditure and predominating prosperity – interrupted, no doubt, by the negative phases of the shorter [business] cycles that are superimposed on that ground swell.

(Joseph Schumpeter, Capitalism, Socialism and Democracy, 1942)

Technology Transformations and Growth



Periods in American Economic History

Period	Years
Mercantile/craft	1840s to 1890s
Factory-based industrial	1890s to 1940s
Corporate mass production	1940s to 1990s
Entrepreneurial, knowledge-based	1990s to – ??

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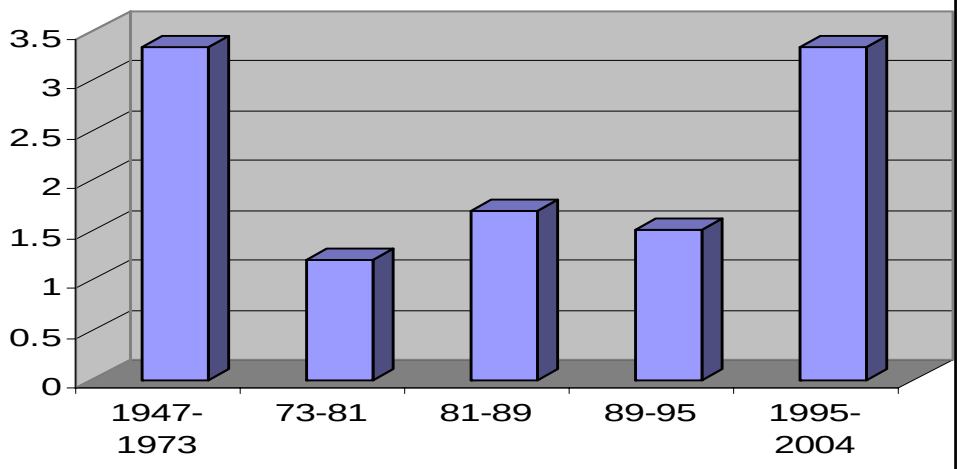
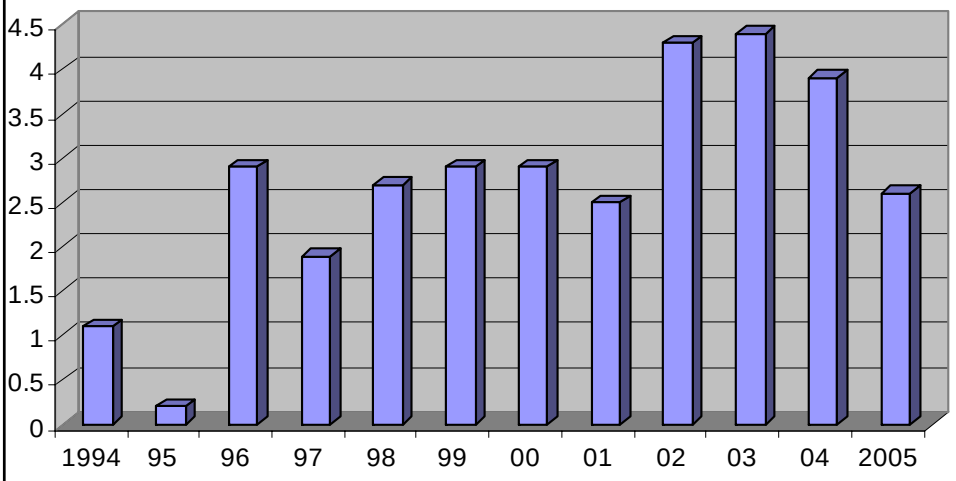
Transformations Drive Growth

Annual Change in Labor Productivity Growth



Recent Productivity Trends



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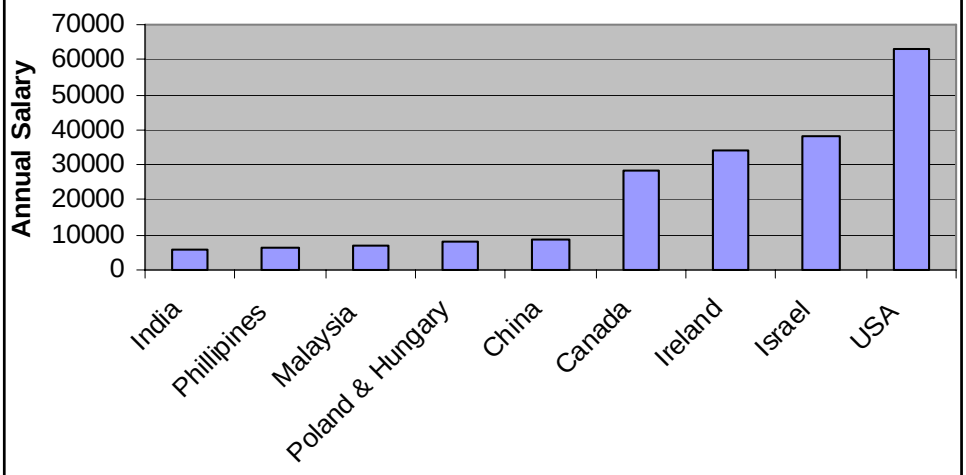
We Can No Longer Take Our Leadership in the Innovation Economy for Granted

- The United States is failing to take the steps needed to maintain our lead.
- Advanced nations are catching up as they transform to a new economy and begin to see the advantages of innovation-led growth.
- Developing nations, particularly China and India, are challenging us not just on low-tech, but advanced tech, just as the South challenged the North during the last transition to a new economy in the 1950s and 1960s.

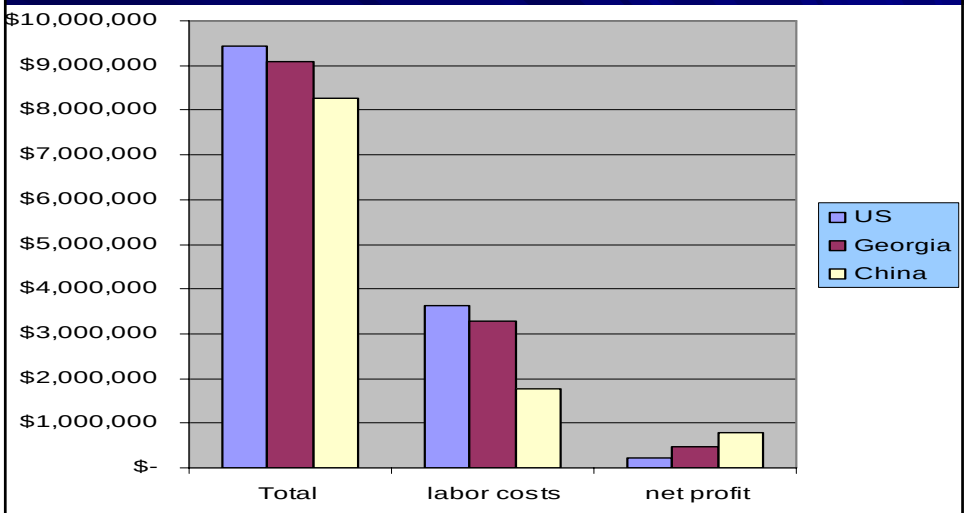
Low Costs Drive Offshoring

Annual Salaries for Programmers



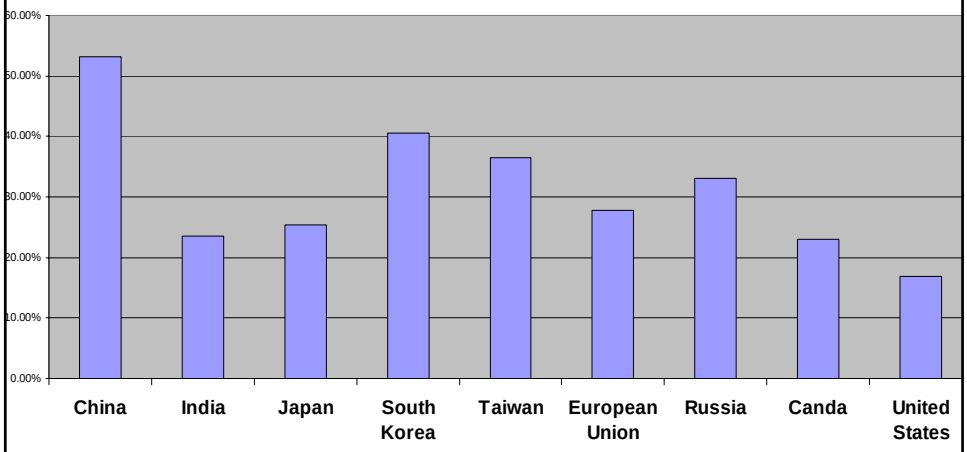
Source: Computerworld, April 28, 2003

Costs for an Average $10 Million Manufacturing Plant



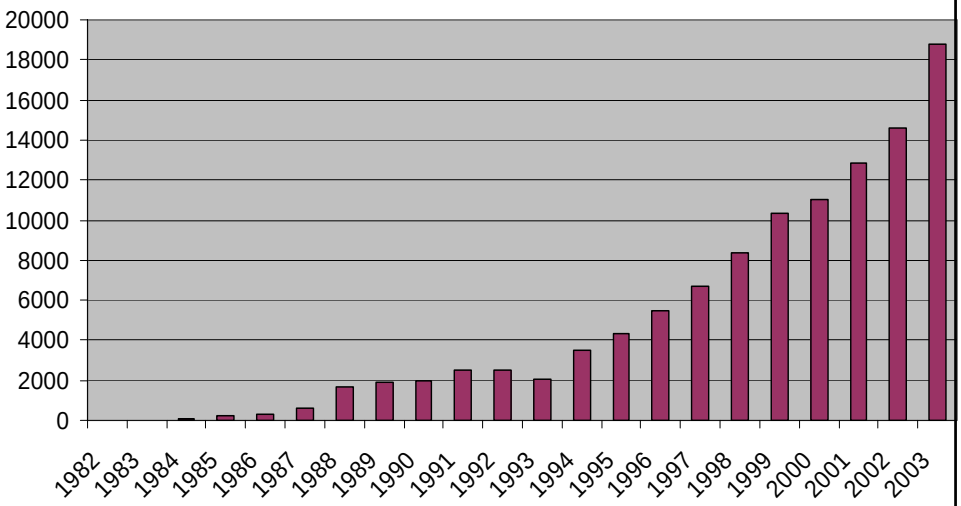
Based on analysis by Dan Luria, Industrial Technology Institute

Percentage of First Degree University Students Receiving Degrees in S&E



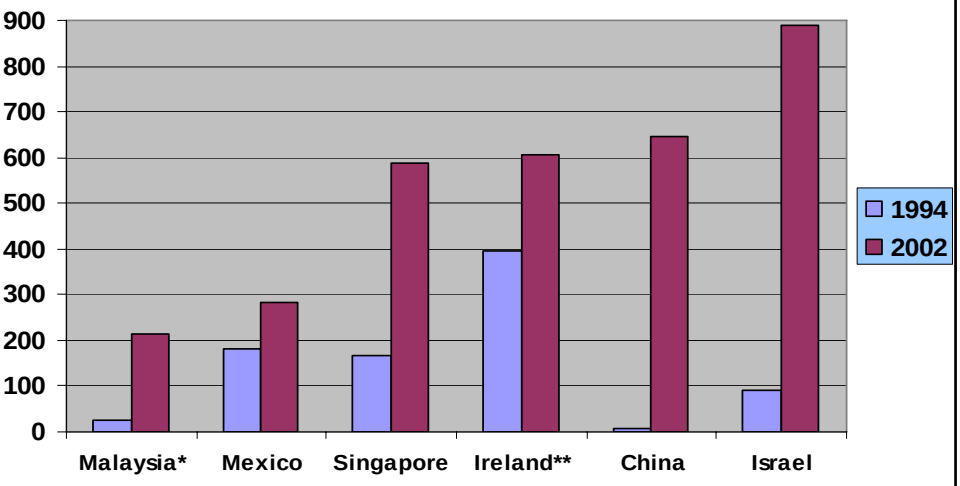
Source: National Science Foundation, Science and Engineering Indicators 2004

Doctoral Degrees Awarded in China



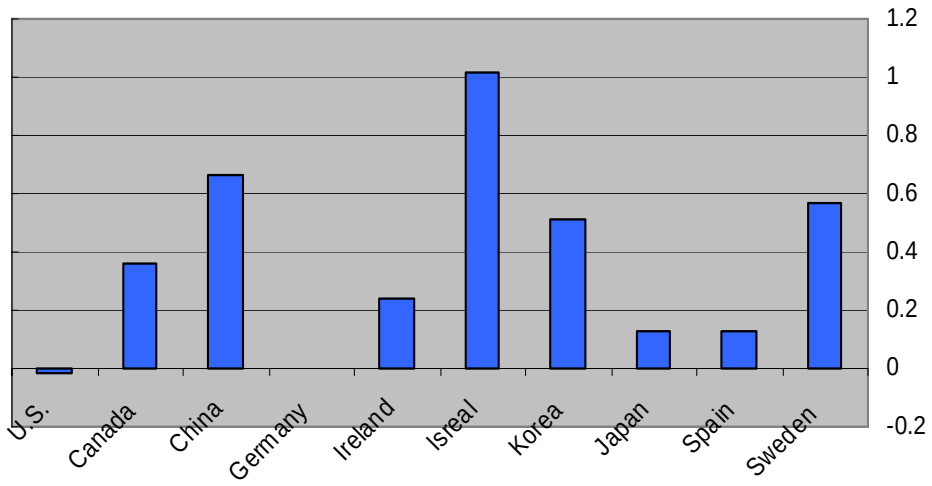
Source: "Preliminary Analysis of China's Doctor Education," Song Weiguo and Xuan Zhaohui, 2004 (Data: Ministry of Education, PRC)

R&D Performed Overseas by Majority-Owned Foreign Affiliates of U.S. Companies, 1994 & 2002 ($millions)



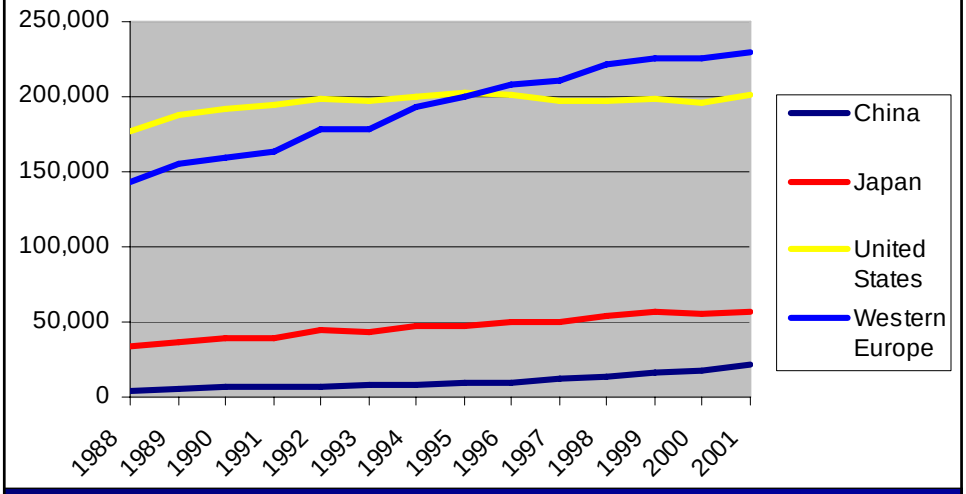
**2000 **2001; Source: U.S. Bureau of Economic Analysis*

Change in R&D/GDP Ratio, 1991-2003



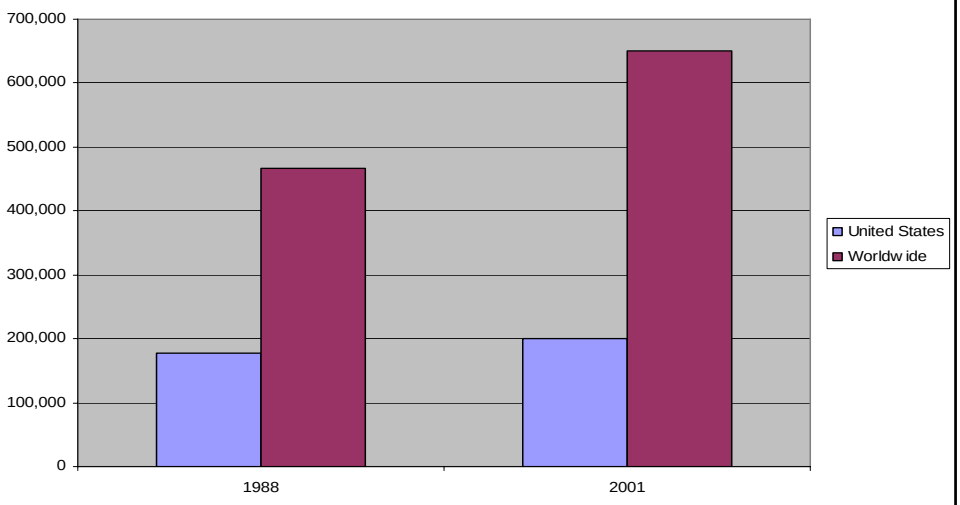
Source: OECD

Number of S&E Articles



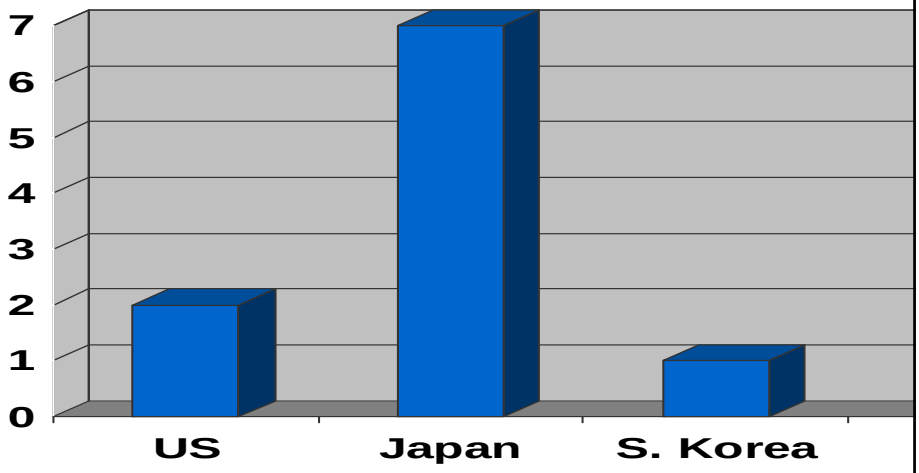
Source: NSF, Science and Engineering Indicators 2004

S&E Articles Published

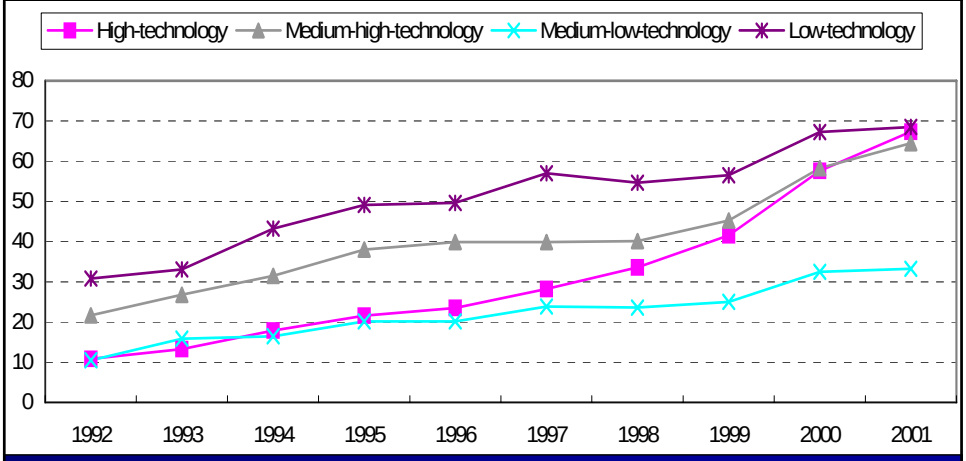


Source: National Science Foundation, Science and Engineering Indicators 2004

Top 10 Patenting Companies in U.S.



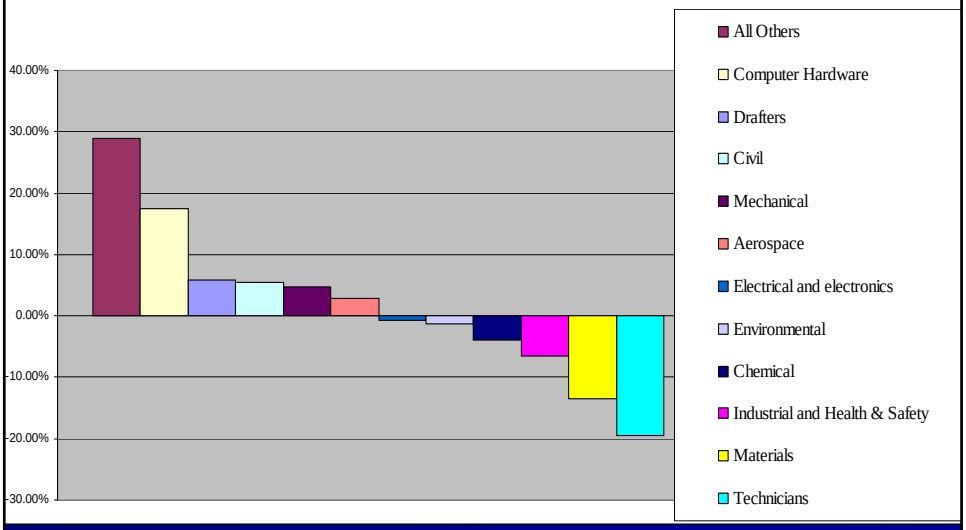
Chinese Trade by Technological Intensity



Source: Andy Wyckoff: OECD

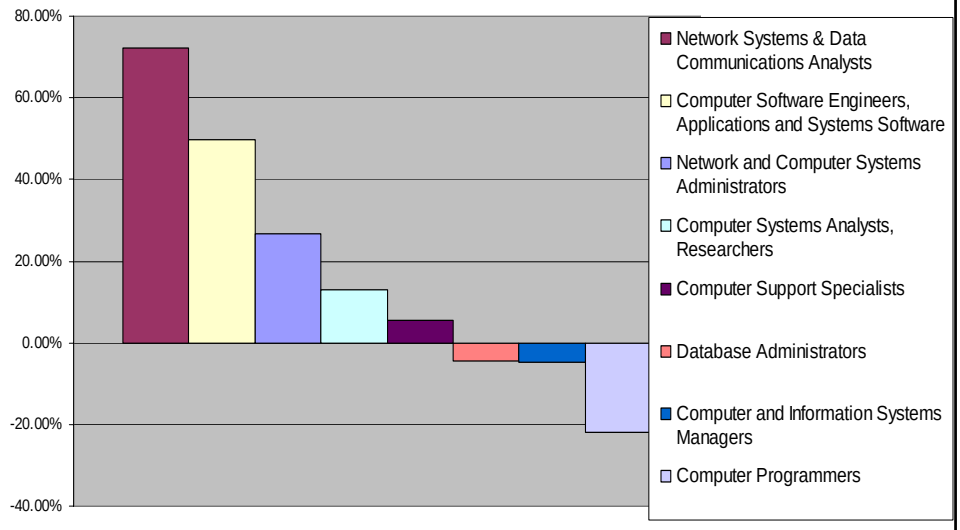
How is the U.S. Faring?

U.S. Engineering Job Growth 1999 to 2004



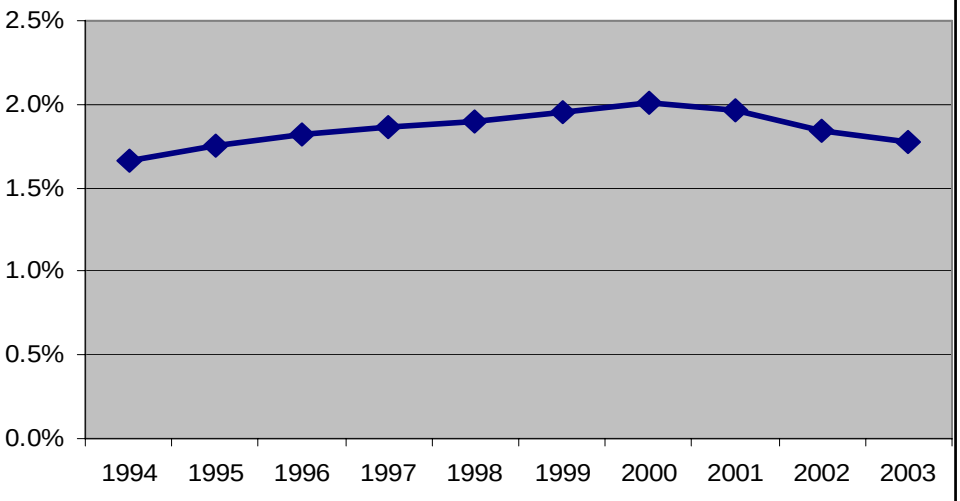
Source: Bureau of Labor Statistics, OES 2004

US IT Job Growth 99-04

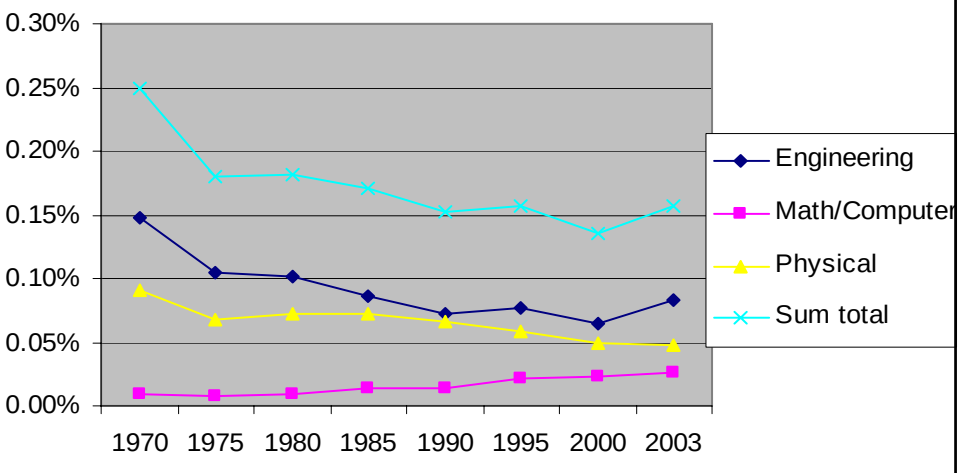


Source: Bureau of Labor Statistics, OES 2004

Industry R&D as a Share of GDP

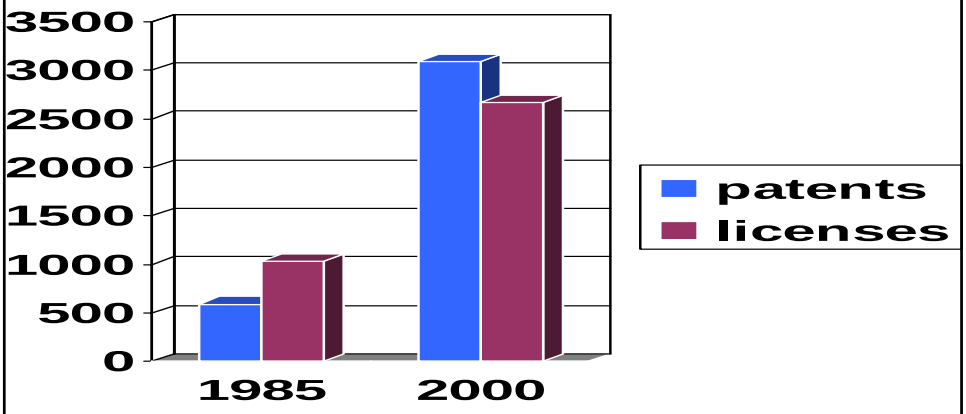


Federal Obligations for Research as % of GDP

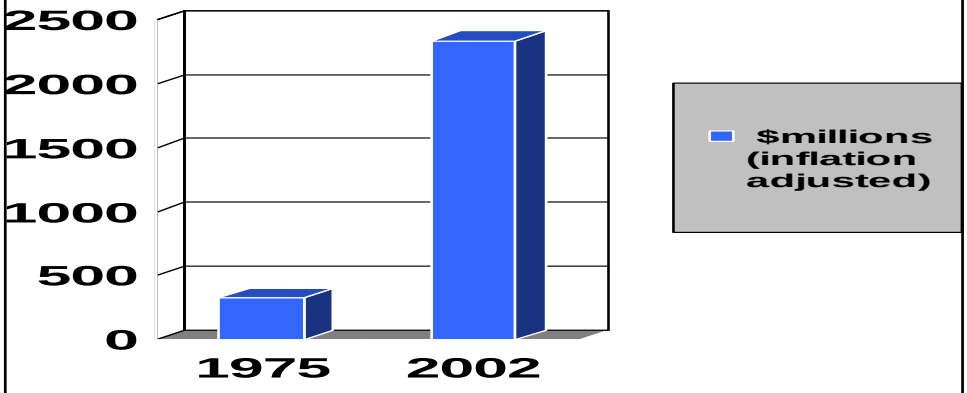


Source: NSF

University Patenting and Licensing Are Growing

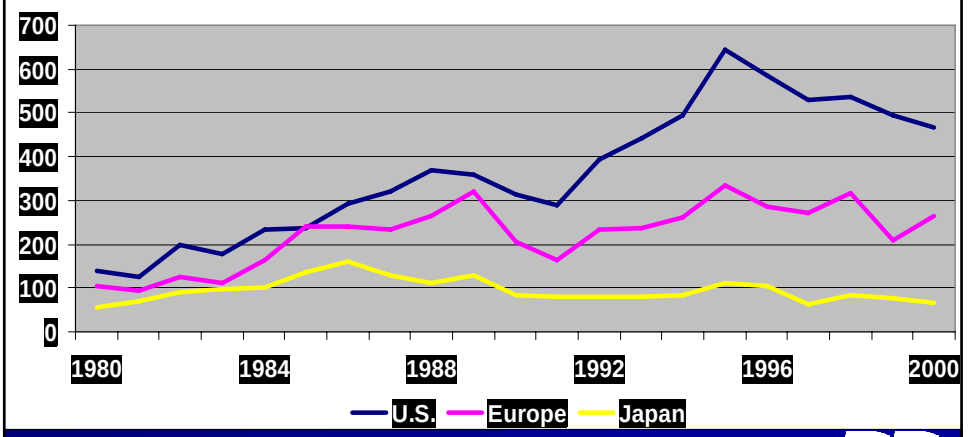


Industry Funding For Academic R&D Has Skyrocketed

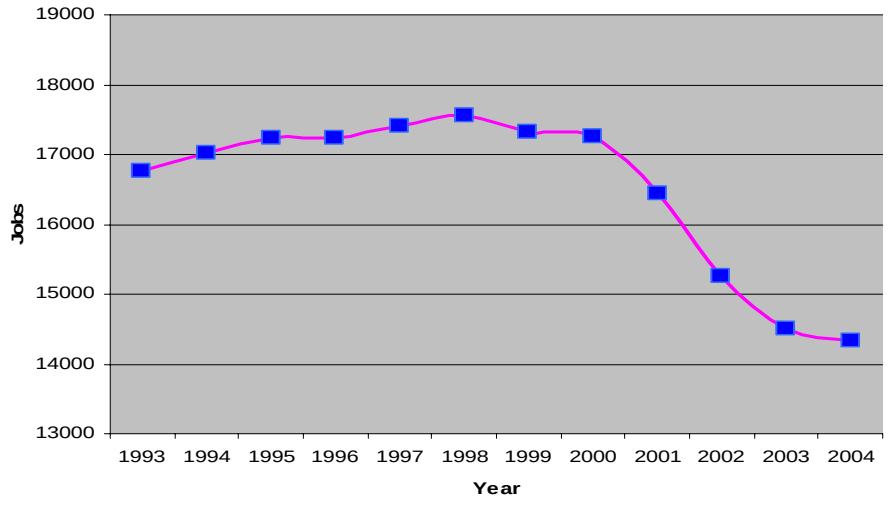


Source: David Roessner and Andrew Reamer, "Technology Transfer and Commercialization: The Role of Economic Development, EDA, March 2003

"Coopetition" in the New Economy
Strategic Technology Alliances

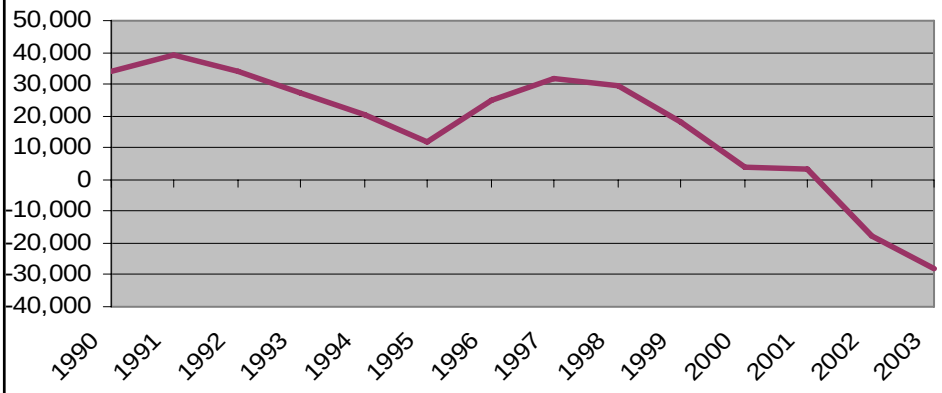


Manufacturing Jobs - Precipitous Decline



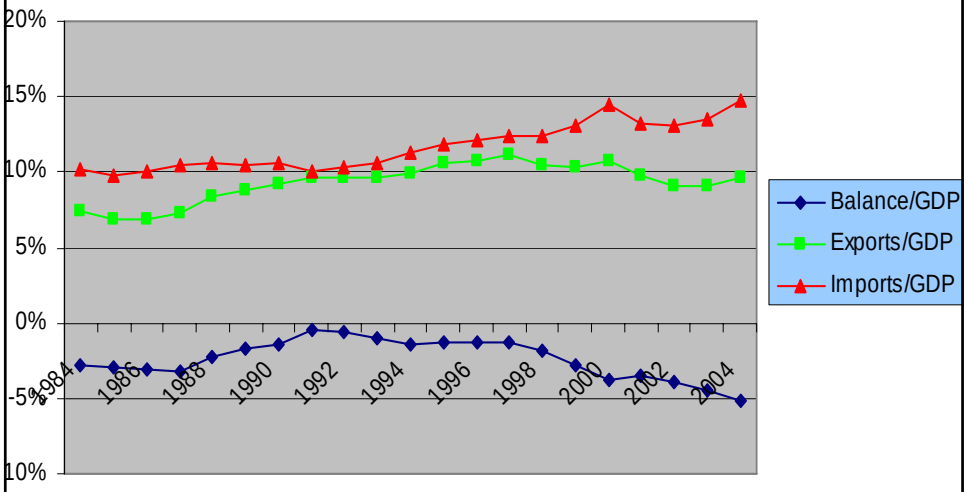
Source: Bureau of Labor Statistics

U.S. Trade Balance in High-Tech Products, 1990-2003



Source: U.S. Census Bureau Foreign Trade Statistics, U.S. International Trade in Goods and Services.

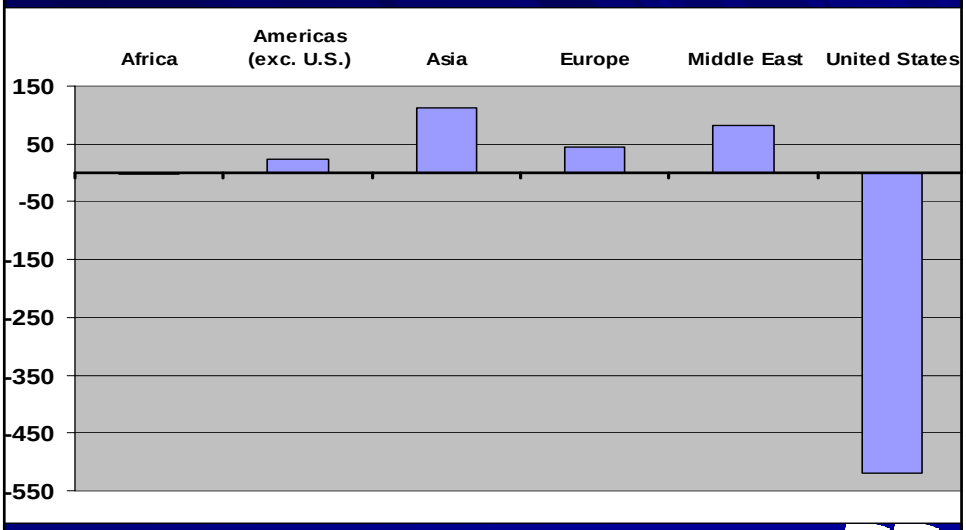
Trade Deficit At Record Levels Share of (% of GDP)



Source: Foreign Trade Statistics, U.S. Census Bureau

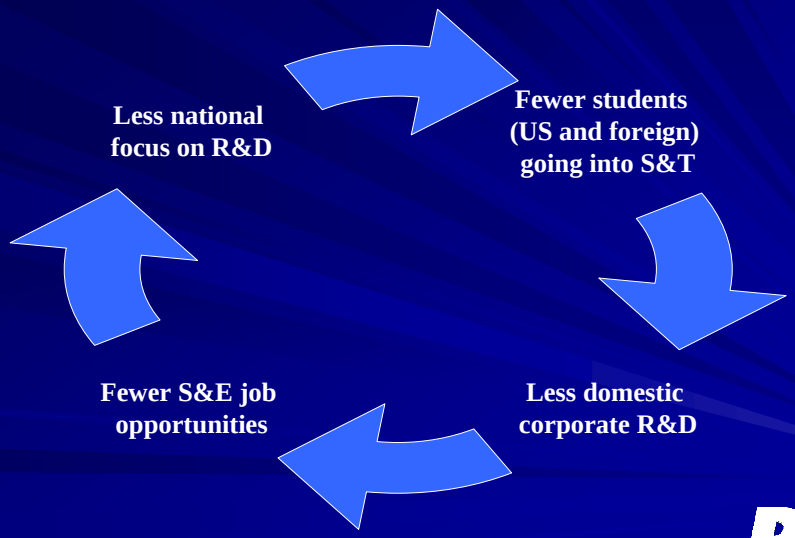
U.S. As Importer of Last Resort

Global Trade Balances, 2003 Billions of US$



Source: World Trade Organization, International Trade Statistics

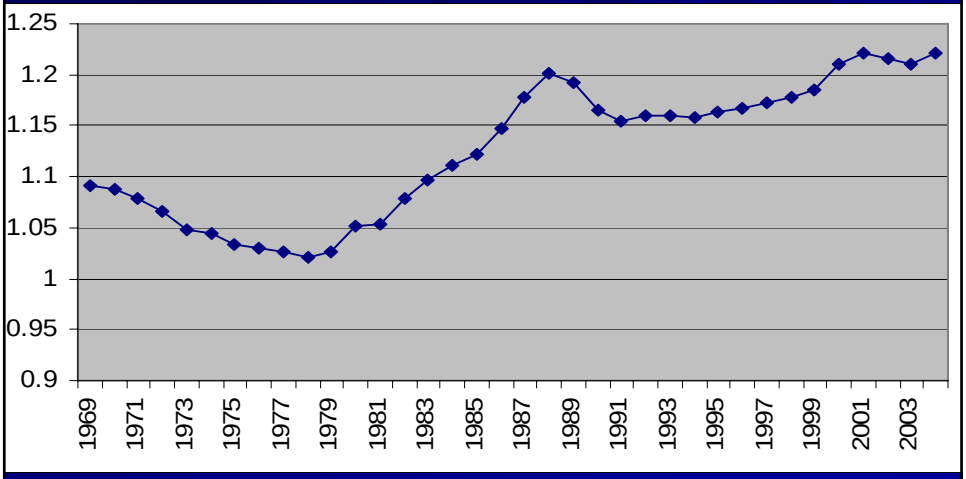
A Downward Innovation Cycle?



Which Future For America?

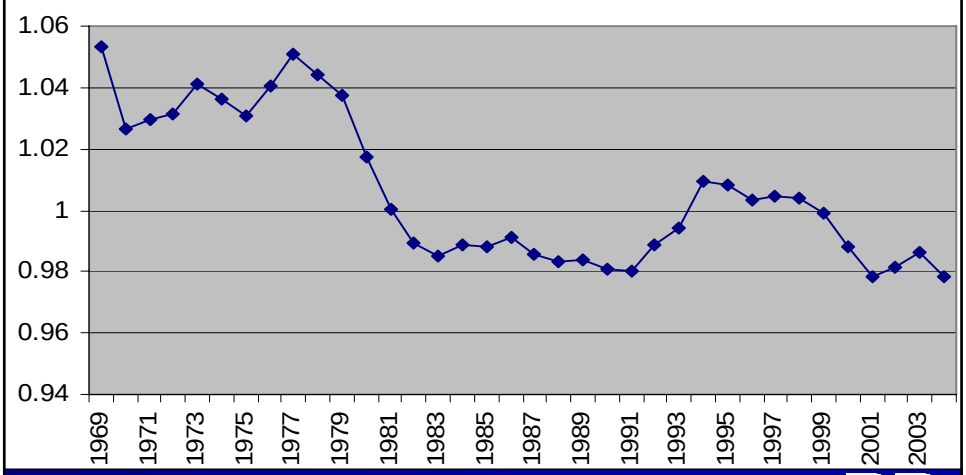
Renewal Through Innovation

New England



Relative Decline?

Great Lakes



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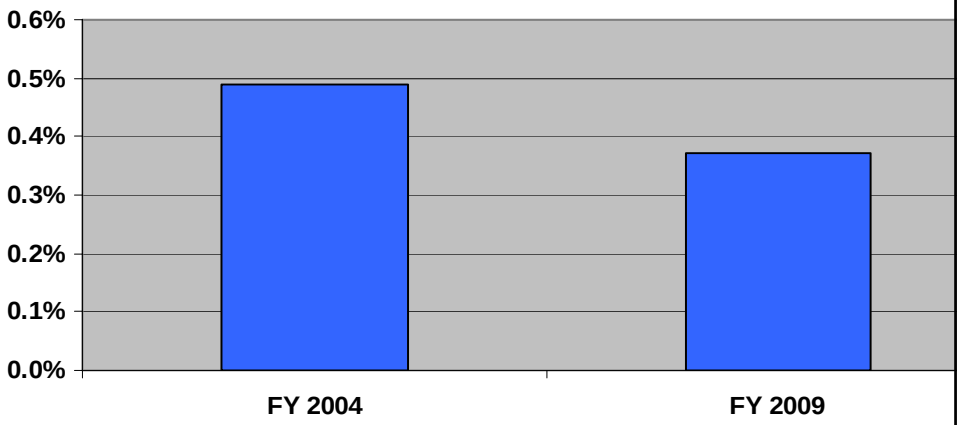
The Decline of the Federal Role?

Projected Nondef. R&D (except DHS & NASA) and DOD S&T as share of GDP



Source: AAAS and CBO

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