Globalization and Offshoring of Software

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http://www.acm.org/globalizationreport/

Foresight

Riordan and Hoddeson, Crystal Fire, 1997:

> At an annual dinner in the early 1900s, physicists working at the Cavendish Laboratory in Cambridge–who were involved in the very conception of the field of electronics–commonly gave one another the following toast: "To the electron; may it never be of any use to anybody."

No Place for Neutrality

John R. Walter, CEO, AT&T, 1997:

> "It has been said that digital technology eats everything and tramples everyone who tries to oppose it. I believe that understates the case. You do not have to oppose digital technology to be trampled; innocent by-standers will be flattened too. There is no neutrality in the Digital Revolution. You must become a digital revolutionary or risk losing everything."

2003-4: The Offshoring Scare

Thick Irony: The revolutionaries got trampled and flattened!

- Exponential growth of IT industry in India
- Alarming reports by Forrester et al. – predicting millions of jobs to be offshored
- Shrill political response ("Benedict Arnold CEOs")
- Echo of Ross Perot's "Whoosh", the sound of jobs moving south of the border with NAFTA.

Outcome: Prospective IT students voting with their feet

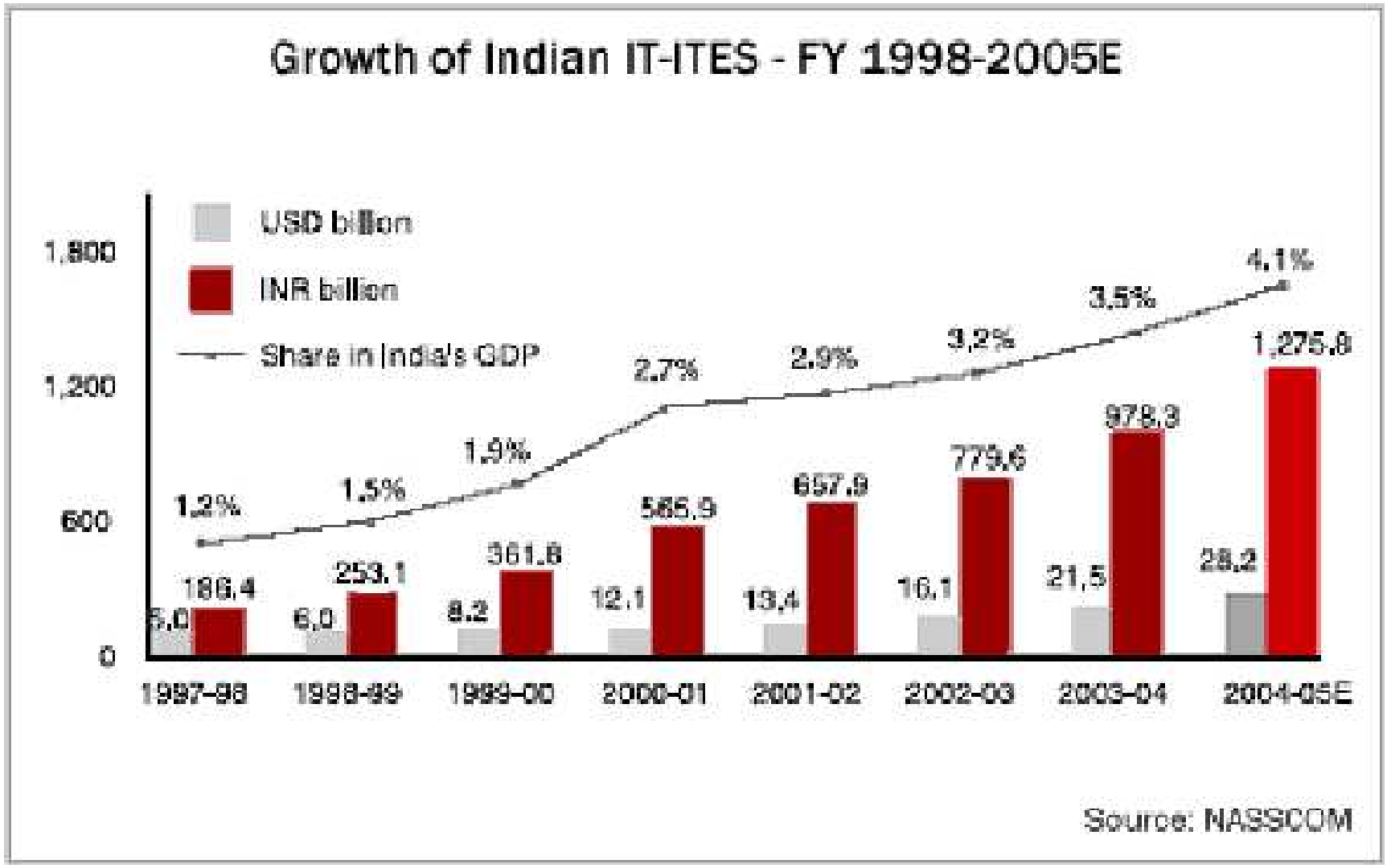
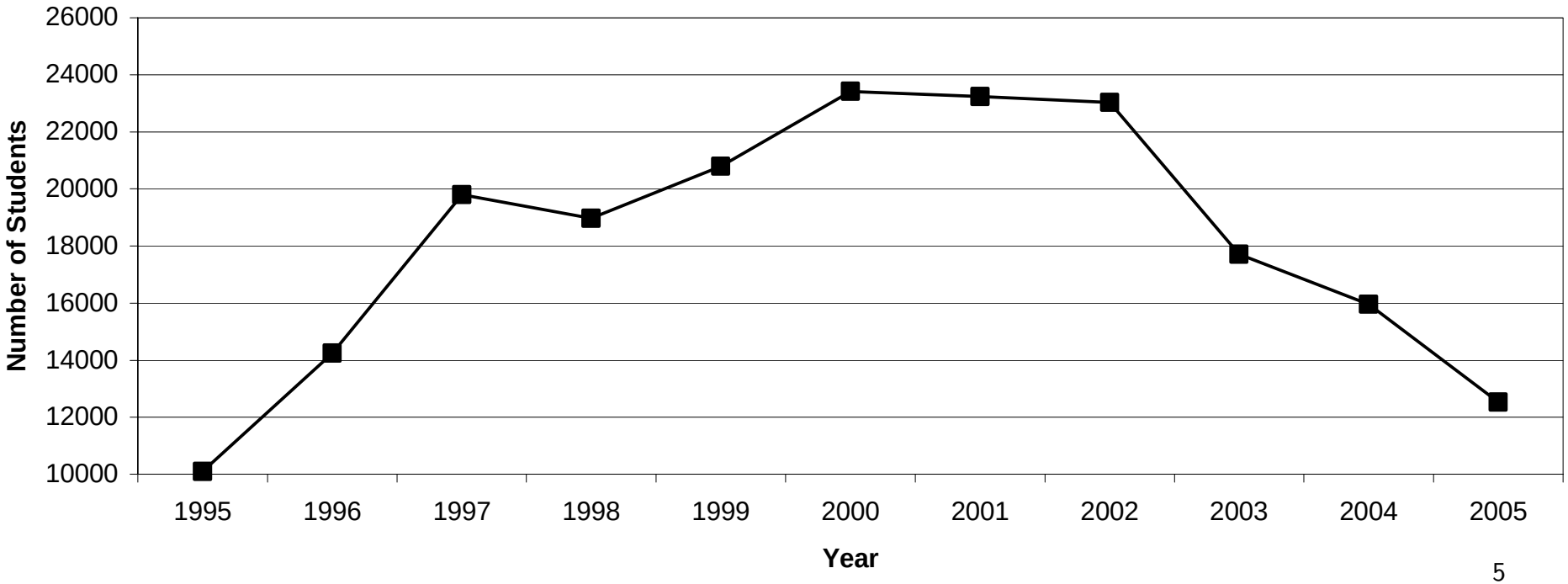
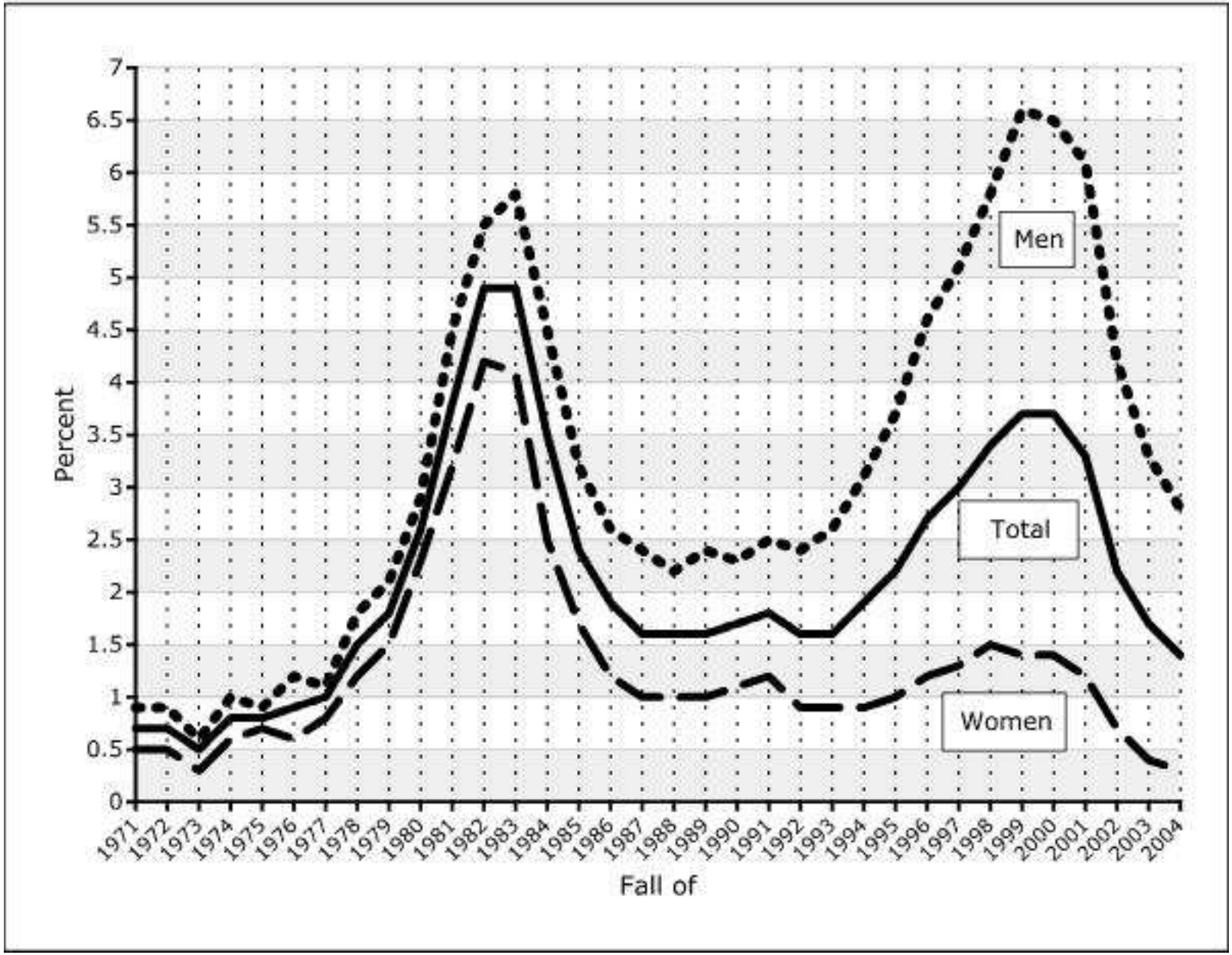

Growth of Indian IT-ITES - FY 1998-2005E
USD billion
INR billion
Share in India's GDP
1,800
1,200
600
0
1.2%
1.5%
1.9%
2.7%
2.9%
3.2%
3.5%
4.1%
6.0
186.4
6.0
253.1
8.2
361.8
12.1
565.9
13.4
657.9
16.1
779.6
21.5
978.3
28.2
1,275.8
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05E
Source: NASSCOM

Figure 7. Newly Declared CS/CE Undergraduate Majors



From: Taulbee Survey, Computing Research Association, www.cra.org

Figure 1. Computer Science Listed as Probable Major Among Incoming Freshmen
Source: HERI at UCLA



Association for Computing Machinery (ACM)

- Premier international society for computing
- Over 80,000 members
- Over 150 journals and conferences

Sept. 2004: "In early 2004, ACM members began expressing concern about the future of computing as a viable field of study and work. There were daily stories in national and international media describing major shifts in employment that were occurring largely as a result of offshoring. Combined with the impact of the end of the dot.com boom, these reports raised more questions than they answered in the minds of many ACM members. Given these concerns, ACM Council commissioned a Task Force to look at the facts behind the rapid globalization of IT and the migration of jobs resulting from outsourcing and offshoring.

Step 1: Assemble Task Force

June - December, 2004:

- Intended size: 15
- Actual size: 30

Why? Diversity!

- Academia, industry, computer scientists, economists, social scientists, international (Europe, India, Israel, Japan)
- Special effort: Risks experts, Europeans

Early Decisions

- Co-chairs: Mayadas+Vardi. Editor: Aspray
- Global perspective
- Focus on software (exclude hardware)
- Secondary research
  - Rich website
  - Rich bibliography (100 pages!)

Process

Four Meetings:

- Chicago, October 2004: Task force only – agree on report structure and committees
- Washington, DC, December 2004: DC experts
- Palo Alto, March 2005: Silicon Valley experts
- New York, May 2005: Task force only – committee presentations

Report Structure

- Executive Summary
- Overview
- Big picture
- Economics and data
- Country perspective
- Firm perspective
- Research
- Risks
- Education
- Political issues

Prescriptive chapters: Education, Risks.

Report Production

- June 2005: Committees submit chapters to editor
- September 2005: Editor submits chapters to reviewers
- October-November 2005: Chapters reviewed by JMTF co-chairs and finalized
- December 2005 - January 2006: Overview and Executive Summary finalized
- February 23, 2006: Report released

Difficult chapters: Education, Risks (three versions!).

Take-Home Points

- Offshoring is just a symptom, the issue is globalization.
- We enabled it. Now we have to live with it.
- It's like winter; you cannot stop it, but you can dress warmly.
- It is easy to measure offshoring, but it is difficult to measure and explain job losses. Most published data are suspect.
- Employment and wage data show complete recovery from the dot-com and telecomm crashes. No discernible effect of offshoring.
- We do know that competition is globalizing and moving up the skill ladder. No reason for complacency.
- Offshoring is good for the world, but there are winners and losers. No reason for complacency.

Globalization

S. Berger, How We Compete, 2005:

The fundamental forces driving globalization:

"a great freeing up of trade and capital flows; deregulation; *the shrinking cost of communication* and transportation; *a revolution that makes it possible to digitize the boundaries between design, manufacturing and marketing and to locate these functions in different places*; and the availability of large numbers of workers and engineers in low-wage countries."

We Enabled It

Key Point: **Information technology is now a truly global field, business, and industry.**

Major Factors:

- *Technology*: low-cost, high-bandwidth telecommunications; standardization of software platforms and business software applications

- *Work processes*: digitization of work; and the modularization of work processes

- Education: standardization of computing curricula; availability of low-cost hardware and software; vendor certification programs

Is It Good or Bad?

Question: Is offshoring good or bad?

Answer: This is not a meaningful question!

- Trade contributes to economic growth and greater wealth.
- Some individuals gain and some lose.
- Some localities gain and some localities lose.

Question: What about countries?

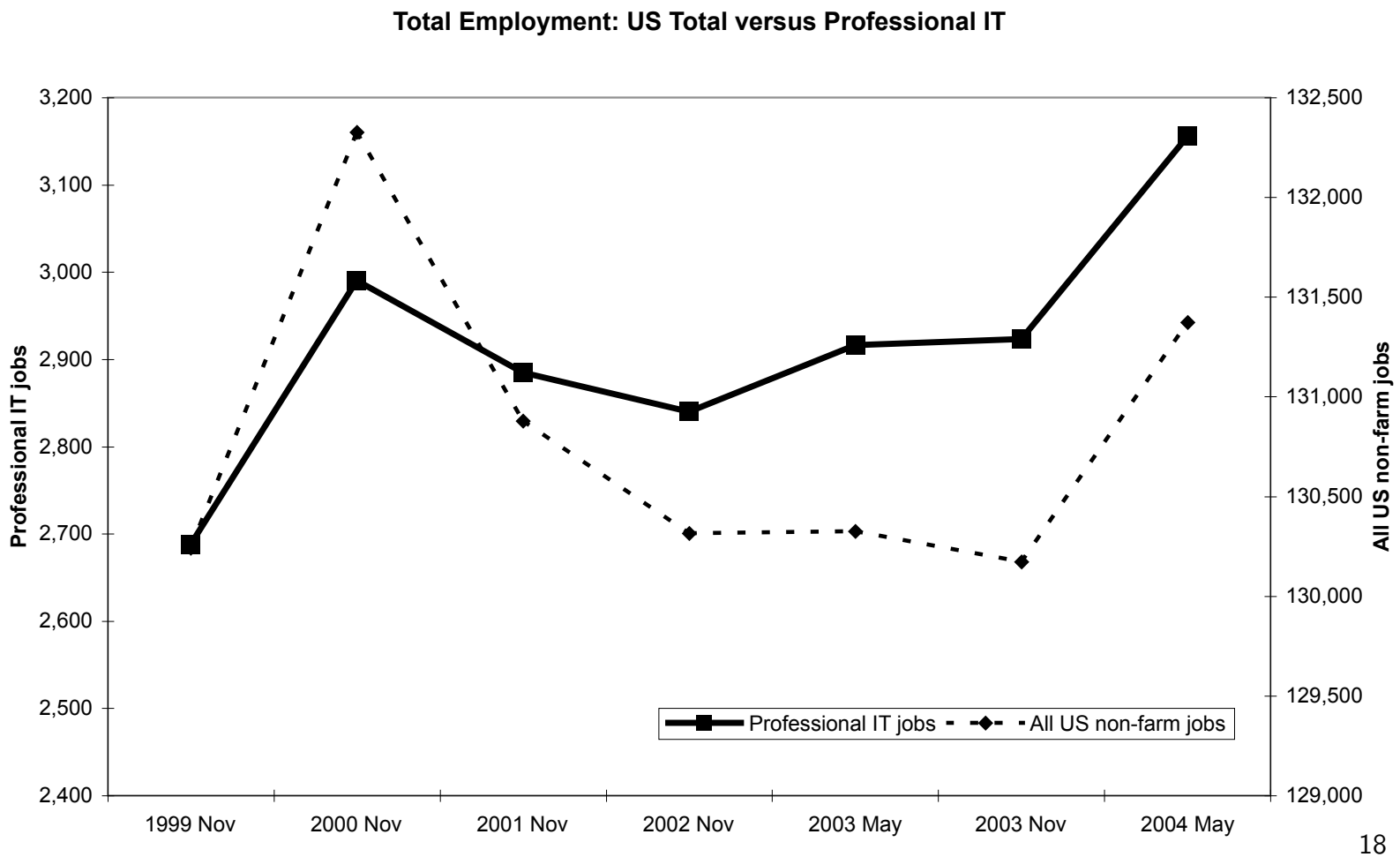
Answer: Conventional economic theory suggests that all countries gain, but some economists argue that globalization may lead to technology leaders' losing their current dominant position.

Job Loss

Are Jobs Migrating?

- Some jobs clearly migrated, e.g., call centers.
- Measuring offshoring volume is possible, e.g., extensive NASSCOM data, but measuring offshore *insourcing* is not easy.
- Attributing job loss to offshoring is difficult. Jobs are lost due to many factors and new jobs are created. Lower IT costs create jobs.
- US Government data on offshoring are not useful; consultant reports are not reliable.

Bottom Line: US Bureau of Labor Statistics – more IT jobs in 2005 than at the height of the dot-com boom!



Sources:
IT Jobs: John Sargent, Office of Technology Assesment, US Department of Commerce
All US Jobs: Bureau of Labor Statistics (Seasonally adjusted non-farm payroll figures)

Global Competition Is Increasing

Myth: Only low-skill jobs are offshored.

Reality: Competition is moving up the skill ladder.

- Companies, including start-ups, are learning how to access and use higher skill levels in developing countries

- New research labs and increasing national research investment in India and China

- Increase in the total worldwide investment in research and a wider distribution of research activities around the world

- Global competition for talent; US dominance challenged

Business Week Online, May 1, 2006: America's dismal showing in a contest of college programmers highlights how China, India, and Eastern Europe are closing the tech talent gap

Ben Mickle, Matt Edwards, and Kshipra Bhawalkar looked as though they had just emerged from a minor auto wreck. The members of Duke University's computer programming team had solved only one problem in the world finals of the ACM International Collegiate Programming Contest in San Antonio on Apr. 12, 2006. The winning team, from Saratov State University in Russia, solved six puzzles over the course of the grueling five-hour contest. Afterward, Duke coach Owen Astrachan tried to cheer up his team by pointing out that they were among "the best of the best" student programmers in the world. Edwards, 20, still distraught, couldn't resist a self-deprecating dig: "We're the worst of the best of the best."

Risky Business

Key Point: Offshoring magnifies existing risks and creates new and often poorly understood or addressed threats to national security, individuals' privacy, and business property and processes.

- *Business risks*: intellectual-property theft, failures in longer supply chains, complexity arising from conflicting legal environments

- *National risks*: commercial off-the-shelf components in military and infrastructure systems, remote management of critical infrastructure, loss of technology base.

- *Individual risks*: Increased exposure to loss of privacy or identity theft due to longer supply chains and privacy-laws differentials.

Innovate or Die

Key Point: To stay competitive in a global IT environment and industry, countries must adopt policies that foster innovation. To this end, policies that improve a country's ability to attract, educate, and retain the best IT talent are critical. Educational policy and investment is at the core.

Building a foundation to foster the next generation of innovation and invention requires:

- Sustaining or strengthening technical training and education systems
- Sustaining or increasing investment in research and development, and
- Establishing governmental policies that eliminate barriers to the free flow of talent.

Challenge: Reaping benefits from innovation!

The Educational Challenge

Key Point: Education is one of the primary means for both developed and developing countries to mount a response to offshoring so their workforces can compete globally for IT jobs.

Huge Challenge:

- *India*: Poor quality outside top tier; doctorate level almost non-existent
- *China*: Traditional emphasis on rote learning; central planning
- *US*: Fast-moving marketplace vs. slow-moving educational systems; lack of data about career outcome of education
- *Europe*: Internal pre-occupation (Bologna Process)

Summary

Key Point: IT has driven itself global in a process whose outcome no one can predict.

- *Broadening*: Currently small number of large players (US and India biggest); will other major players emerge?
- *Deepening*: Will India get into packaged software?
- *Workforce*: Will students come back?

S. Berger: "Succeeding in a world of global competition is a matter of choices, not a matter of searching for the one best way–we discovered no misconception about globalization more dangerous than this illusion of certainty."

Postscript: Media Reaction

Don Marquis, 1878-1937 "Publishing a volume of verse is like dropping a rose petal down the Grand Canyon and waiting for the echo."

- "Study plays down export of computer jobs", NY Times, Feb. 23
- "Report offers tips to protect your job from offshoring", Computerworld, February 24
- "Tech jobs still plentiful in U.S. Optimistic report calls offshoring's effects overstated", San Francisco Chronicle, February 24
- "Offshoring booms jobs in US", Financial Express, February 27
- "Offshoring isn't all bad. It spurs new job creation, study finds", InformationWeek, March 6

"Computing Error", NYT Editorial, March 6: "The outsourcing of computing work to other countries may not be as bad as many Americans think. In fact, it probably isn't bad at all.

...

Information technology jobs won't go away unless America lets them. In the next few years, jobs won't just land in Americans' laps. We have nothing to fear but the fear of competing itself."