WORK AND WEALTH

Introduction

- Information technology and automation affecting workplace
  - Increases in productivity
  - Globalization of job market
  - Organization of companies
  - Telework
  - Workplace monitoring
- Impacts of information technology on society
  - Digital divide
  - Winner-take-all effects

Automation and Unemployment

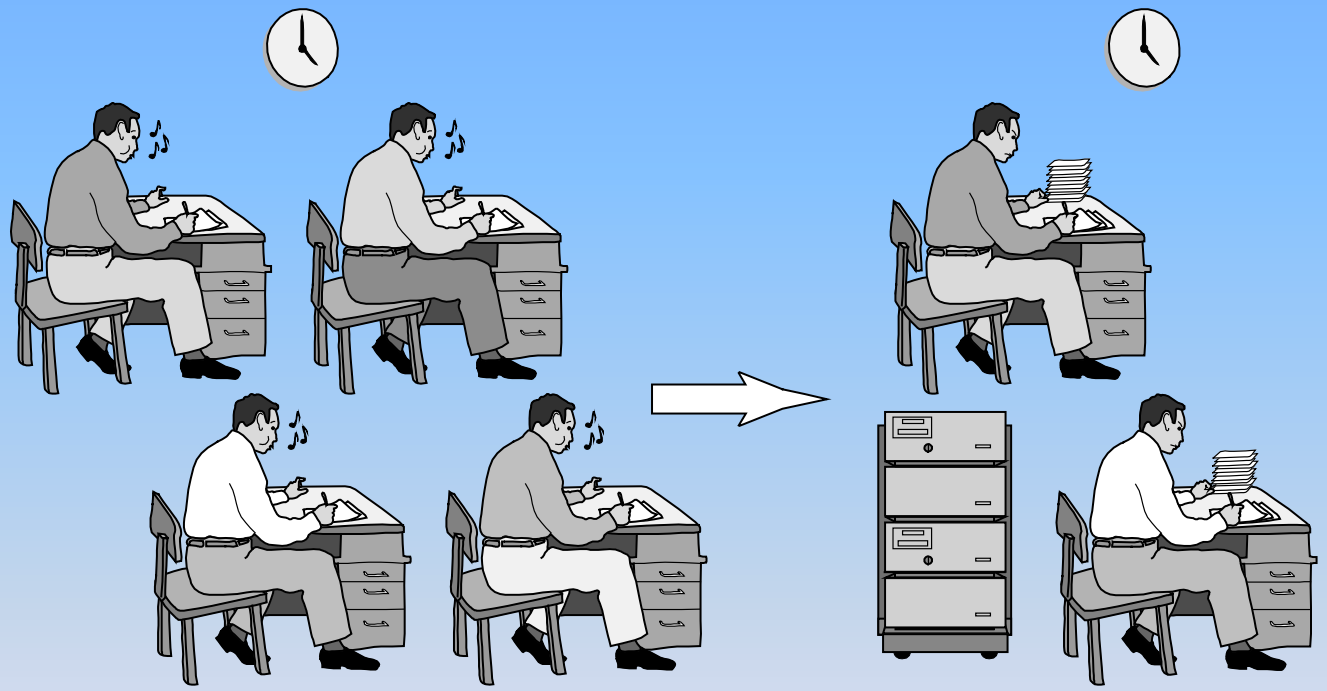
Automation and Job Destruction

- Between 1979 and 2008…
  - U.S. population increased 35%
  - Manufacturing employment dropped 31%, from 19.4 million jobs to 13.5 million jobs
- Lost white-collar jobs
  - Secretarial and clerical positions
  - Accountants and bookkeepers
  - Middle managers
- Juliet Schor: Work week got longer between 1979 and 1990

General Motors Exited Bankruptcy in 2009 with 30% Fewer Employees

Danny Lenman / Corbis

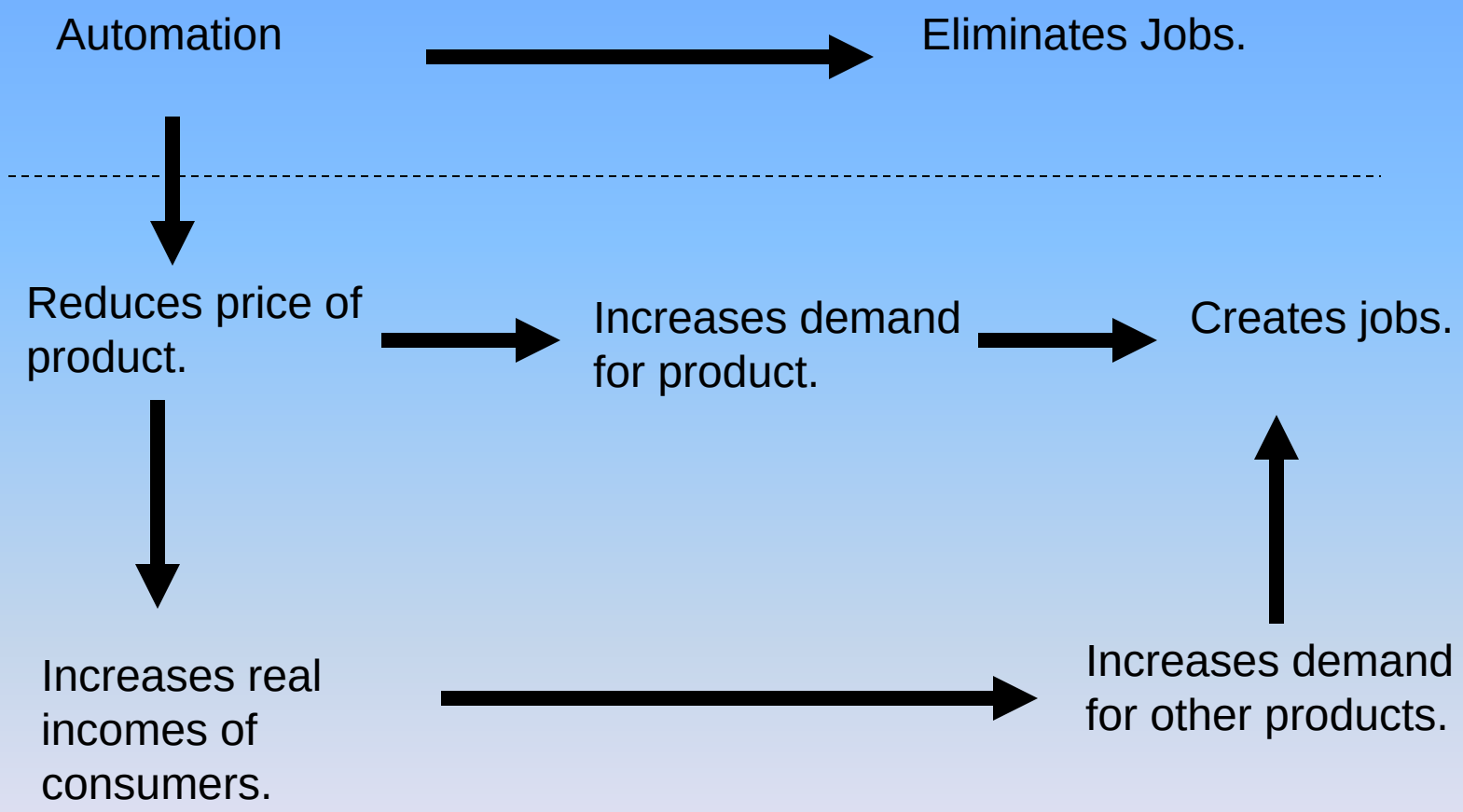
Layoffs May Increase Stress on Remaining White-Collar Workers



Automation and Job Creation

- Different perspective… ‘automation optimists
- Automation lowers prices
- That increases demand for product
- It also increases real incomes
- Increasing demand for other products
- Increased demand $\rightarrow$ more jobs
- Number of manufacturing jobs worldwide is increasing
- Martin Carnoy: Workers today work less than workers 100 years ago

Automation Stimulates Jobs



Effects of Increase in Productivity

- We have used higher productivity to achieve a higher material standard of living
- This is in contrast to medieval or ancient times (before modern capitalism)
- In medieval or ancient times
  - Low caloric intake meant pace of work was slow
  - Work was seasonal and intermittent
  - Laborers resisted working if they had enough money
  - When wages rose, laborers worked less

Rise of the Robots?

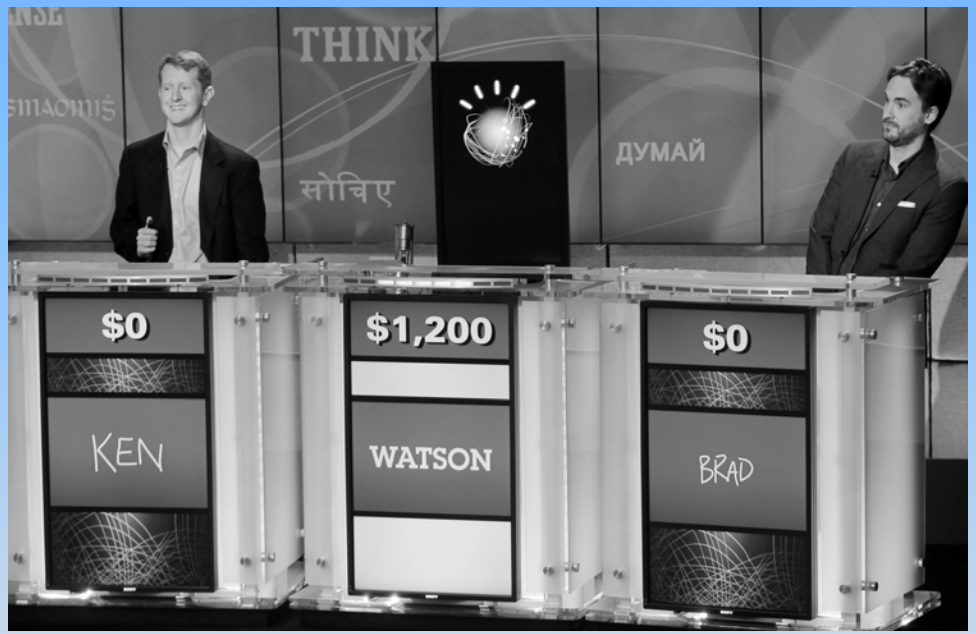
- Some experts suggest most jobs will be taken over by machines
- Artificial intelligence: Field of computer science focusing on intelligent behavior by machines
- Rapid increases in microprocessor speeds have led to various successes in AI
- What will happen as computers continue to increase in speed?

Notable Achievements in AI since 1995

- Computer-controlled minivan “drove” on freeways across USA in 1995 (Today Google drives 100s of autonomous miles everyday)
- IBM supercomputer Deep Blue defeated chess champion Gary Kasparov in 1997 (Now it wins Jeopardy)
- Honda’s ASIMO android can climb and descend stairs and respond to human gestures and postures (Looney 1/100 of the price)
- Electrolux introduced robotic vacuum cleaner in 2001 (today common place).
- Five autonomous vehicles successfully completed 128-mile course in Nevada desert in 2005 (Today hundreds could do it, a lot faster)

Stanley, the Autonomous Vehicle

Watson Wins *Jeopardy!* Challenge



Moral Question Related to Robotics

- Is it wrong to create machines capable of making human labor obsolete?
- Would intelligent robots demoralize humanity?
- Is it wrong to work on an intelligent machine if it can’t be guaranteed the machine will be benevolent toward humans?
- What if a malevolent human puts intelligent machines to an evil use?
- How would creative computers change our ideas about intellectual property?

Discussion: Ethics for Robotics

From Wired Magazine, by Dr.Jordan Pollack, January 2005

- **Should robots be humanoid?** Humanlike robots today are showbots, created for marketing purposes. They allow corporations to display technological machismo, wooing consumers to trust their cars and stereos. The risk is not humanoids running amok, but that as these electronic puppets become more lifelike, they become door-to-door spambots who trick people into buying snake oil and junk bonds.

- **Should humans become robots?** We are nearing an age in which humans and computers may be connected via direct neural interfaces, technology indistinguishable from telepathy and telekinesis. In the input direction, computers might use electrodes to format information for our brains to understand. In the output direction, humans might be trained to think in distinct ways so that sensors and software could classify thoughts into signals to control equipment. While potentially beneficial for paraplegics, there's the frightening opportunity for using animals as cheap, disposable robot bodies.

- **Should robots excrete byproducts?** When cars were invented, no one imagined that hundreds of millions of them would spew carbon monoxide into the atmosphere. But they do, and yet we still feel entitled to drive them. Imagine the pollution levels if we add hundreds of millions of robots powered by internal combustion engines.

- **Should robots eat?** There are proposals to allow robots to gain energy by combusting biological matter, either food or waste items. If this mode of fuel becomes popular, will we really want to compete for resources against our own technological progeny?

- **Should telerobotic labor be regulated?** A telerobot is an electronic puppet controlled across a wire by a human using a PC and devices like joysticks and gloves. Consider replacing the on-site operator with a $10-per-day handler in an overseas call center. Instead of outsourcing jobs, we could import brains over broadband to manage machinery in factories, to teach in schools, or to clean houses. Should local labor laws apply to overseas workers who telecommute?

- **Should robots carry weapons?** We must distinguish autonomous robot weapons from remote control armaments - unmanned telerobots supervised by humans. The ethical difference between the two: Who's responsible for pulling the trigger?

- **Should machines be awarded patents?** Evolutionary software has already designed simple circuits, as well as physical mechanisms like the ratchet and cantilever. As these automatic design systems improve and progress from simple geometric forms to novel integrated systems, intellectual property laws must change. If a robot invents, does the patent go to its owner or the patent holder of its artificial intelligence?

Reflection: Singularity, Cyborgs and the Future

- Ray Kurzweil: Singularity and the Future
  - 10 Questions for Ray Kurzweil
- Are We Cyborgs Now?
  - Amber Case: Cyborg Anthropologist

Reflection: Robots and Humans

- **Robots and the Elderly**
  - **Will There Be a Robot Helper in Your Future?**
- **Robots and Human Emotion**
  - Abuse and S*x

Workplace Changes

Winners, Losers in the Workplace of the Future

Higher Demand	*Lower Demand*
Computer engineers	Bank clerks
Computer support specialists	Procurement specialists
Systems analysts	Financial records processing staff
Database administrators	Secretaries, stenographers, and typists
Desktop publishing specialists	Communications equipment operators
	Computer operators

Telework

- Employees work away from traditional place of work
- Examples
  - Home office
  - Commuting to a telecenter
  - Salespersons with no office
- About 20% of Americans do some telework

Advantages of Telework

- Increases productivity
- Reduces absenteeism
- Improves morale
- Helps recruitment and retention of top employees
- Saves overhead
- Improves company resilience
- Helps environment
- Saves employees money

Disadvantages of Telework

- Threatens managers' control and authority
- Makes face-to-face meetings impossible
- Sensitive information less secure
- Team meetings more difficult
- Teleworkers less visible
- Teleworkers "out of the loop"
- Isolation of teleworkers
- Teleworkers work longer hours for same pay

Monitoring

- 82% of companies monitor employees in some way
  - Purpose: Identify inappropriate use of company resources
  - Can also detect illegal activities
- Other uses of monitoring
  - Gauge productivity (10% of firms)
  - Improve productivity
  - Improve security

Multinational Teams

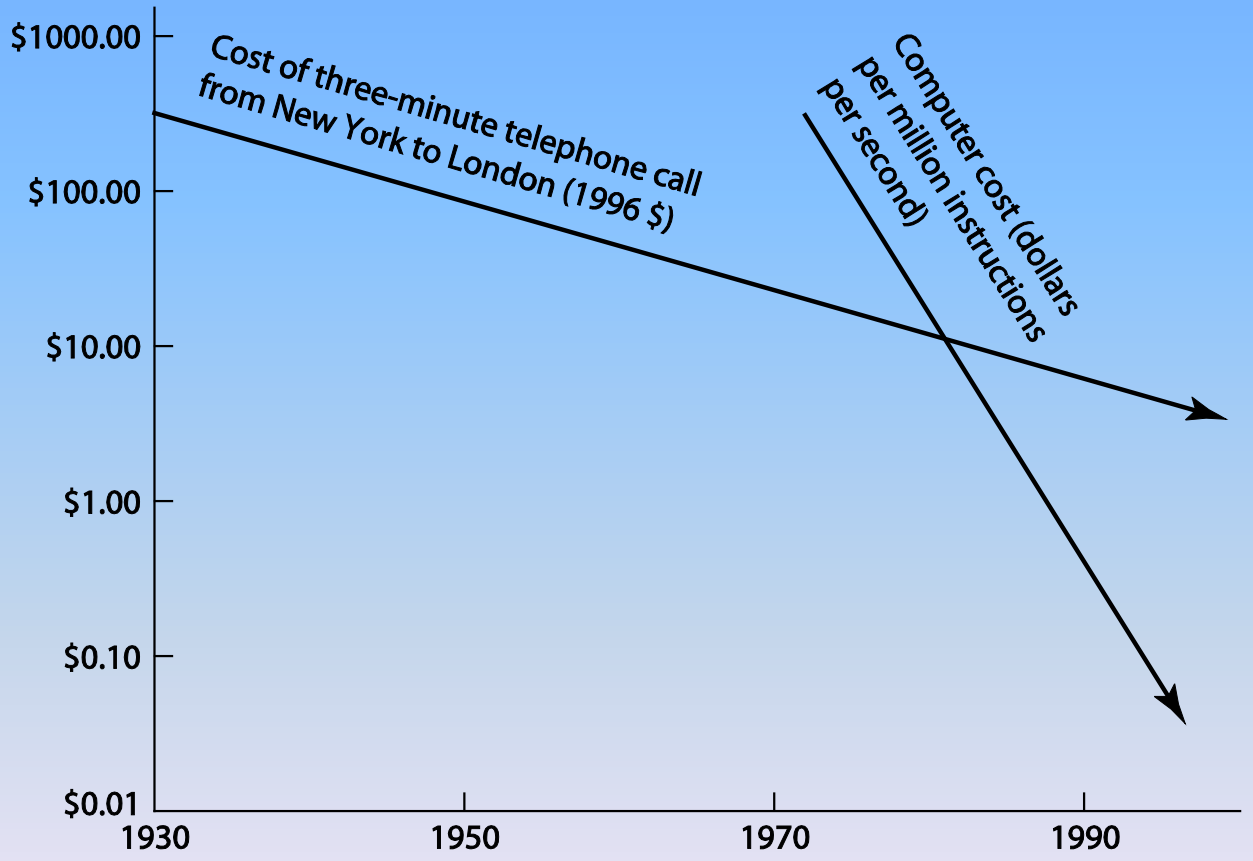
- Software development teams in India since 1980s
- Advantages of multinational teams
  - Company has people on duty more hours per day
  - Cost savings
- Disadvantage of multinational teams
  - Poorer infrastructure in less developed countries

Globalization

Globalization Basics

- Globalization: Process of creating a worldwide network of businesses and markets
- Globalization causes a greater mobility of goods, services, and capital around the world
- Globalization made possible through rapidly decreasing cost of information technology
- Minimizing cost, maximizing scale….

Declines in Computing & Communication Costs Spurred Globalization



Arguments for Globalization

- Increases competition
- People in poorer countries deserve jobs, too
- It is a tried-and-true route for a poor country to become prosperous
- Global jobs reduce unrest and increase stability

Arguments against Globalization

- Makes the United States subordinate to the World Trade Organization
- Forces American workers to compete with foreigners who do not get decent wages and benefits
- Accelerates exodus of manufacturing and white-collar jobs from United States
- Hurts workers in foreign countries

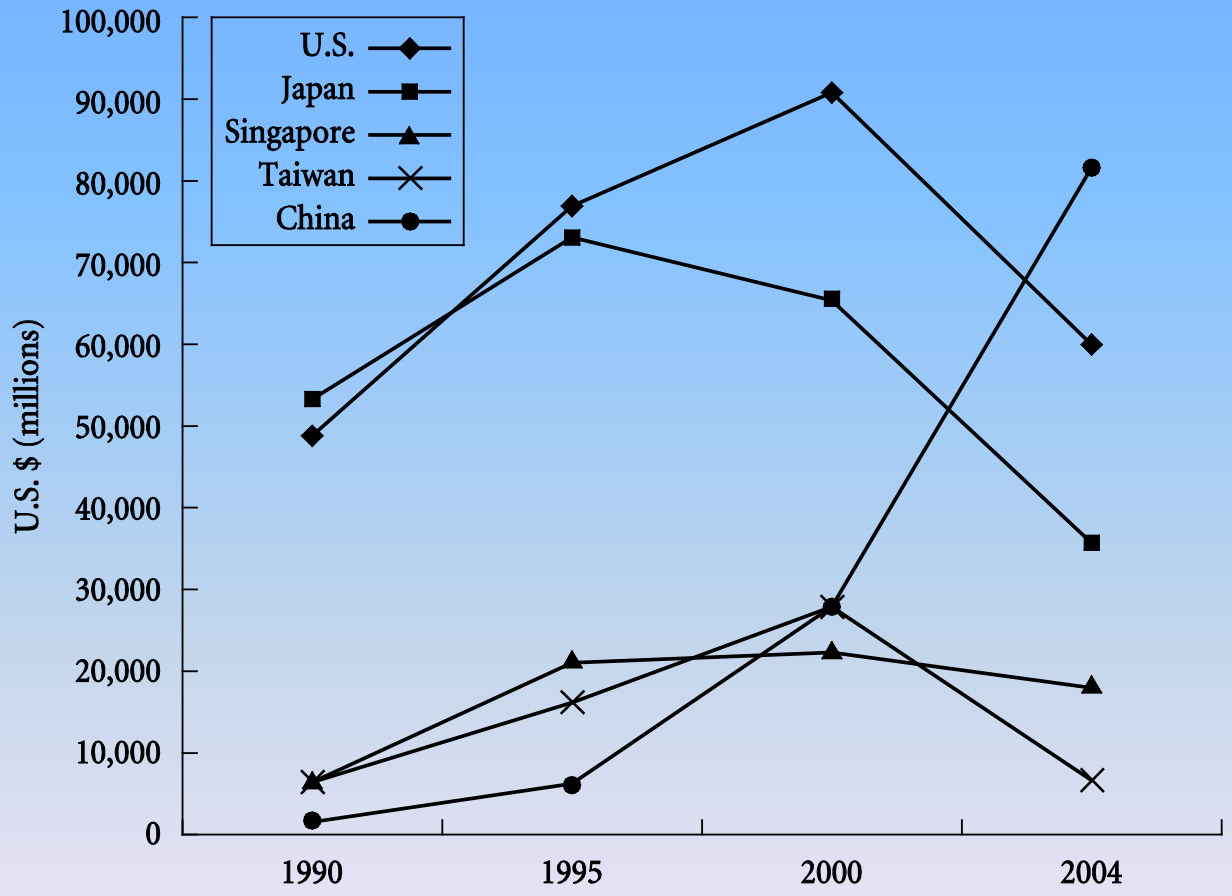
Foreign Workers in the IT Industry

- Visas allow foreigners to work inside U.S.
- H1-B
  - Right to work up in United States to six years
  - Company must show no qualified Americans available
  - Congress still authorizes 65,000 H1-B visas per year, plus 20,000 more for foreigners with advanced degrees
  - Quota not filled in 2009 due to economic downturn
- L-1
  - Allows a company to transfer a worker from an overseas facility to the United States
  - Workers do not need to be paid the prevailing wage
  - In 2006 about 50,000 foreigners in U.S. under L-1 visa

Foreign Competition

- China is world's number one producer of computer hardware
- IT outsourcing to India is growing rapidly
- Number of college students in China increasing rapidly
- ACM Collegiate Programming Contest provides evidence of global competition

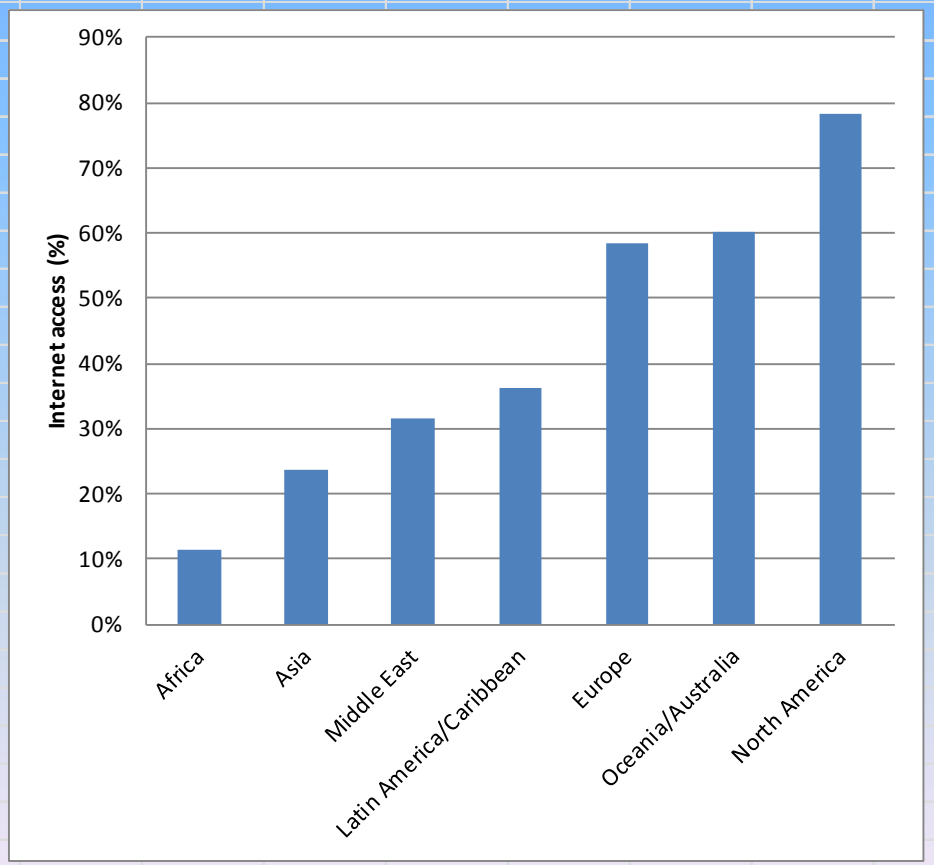
Growth of China's Computer-Hardware Industry



Percentage of People with Internet Access, by World Region

Internet Usage Statistics, March 31, 2011
http://www.internetworldstats.com/stats.htm

Africa	11.40%
Asia	23.80%
Middle East	31.70%
Latin America/Caribbean	36.20%
Europe	58.30%
Oceania/Australia	60.10%
North America	78.30%



Critiques of the Digital Divide

- DD talk suggests the difference between “haves” and “have nots” is simply about access
- DD talk puts everyone in two categories, but reality is a continuum
- DD implies lack of access leads to less advantaged social position, but maybe it is the other way around
- Internet is not the pinnacle of information technology

Street Scene in Ennis, Ireland

Jim Furyk Earned 99 Times More Than Brian Bateman in 2009; Is He 99 Times Better?

Metric	*Brian Bateman*	*Jim Furyk*
Driving distance (yards)	289.1	278.1
Driving accuracy (%)	56.23	70.24
Greens in regulation (%)	63.95	64.67
Putts/round	29.42	28.17
Scoring average	71.89	70.24
Tournaments entered	21	21
Winnings	$35,379	$3,514,215