



Session:

Technology and the Future of Work

Speaker:

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Information Technology and Innovation Foundation

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Federal Reserve Bank of Kansas City, Kansas City, Mo.

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Technology and the Future of Work

Dr. Robert Atkinson

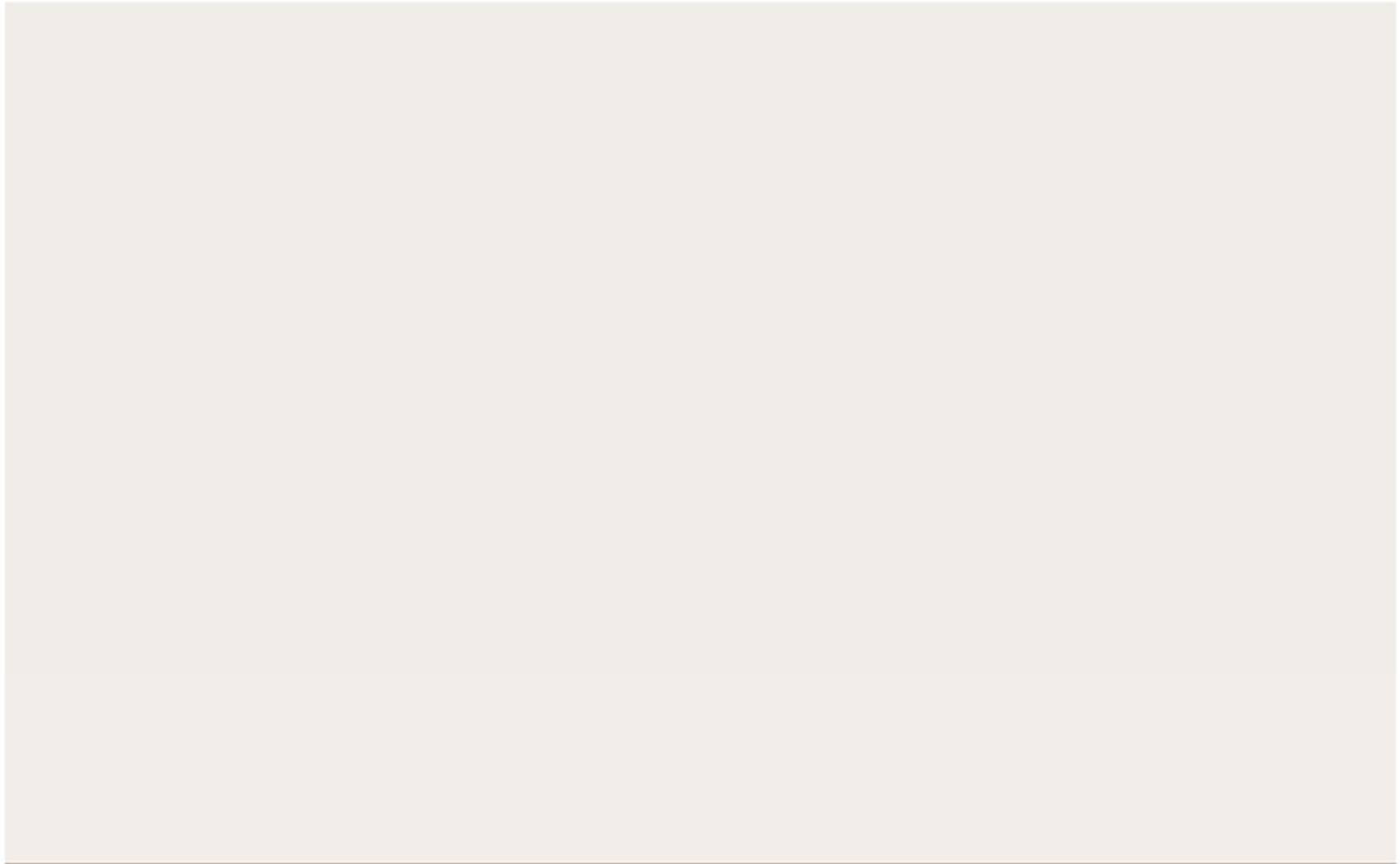
President, Information Technology and Innovation Foundation



The Information Technology and Innovation Foundation (ITIF) is a Washington, D.C.-based think tank at the cutting edge of designing innovation policies and exploring how advances in information technology will create new opportunities to boost economic growth and improve quality of life. ITIF focuses on:

- Innovation processes, policy, and metrics
- E-commerce, e-government, e-voting, e-health
- IT and economic productivity
- Science policy related to economic growth
- Innovation and trade policy

- Work and Jobs Change Over Time



■ Occupations in the Phonograph Industry (1939)

- Assembling adjuster
- Assembly adjuster
- Backer-Up
- Laborer
- Laborer-Process
- Matrix-Bath Attendant
- Matrix-Groove Roller
- Matrix-Number Stamper
- Needle Lacquerer
- Pick-Up Assembler
- Pick-Up Coil Winder
- Record Finisher
- Record Press Adjuster
- Record-Press Man
- Record Tester
- Sapphire-Stylus Grinder
- Shell Grinder
- **Sieve Gyrator**
- Sieve Operator
- Stock Breaker, Gyrator

- **Sieve Gyrator:** “A Laborer, Process. Breaks up and sifts material (basically shellac) for making phonograph records; places material in a breaker which crushes it; dumps crushed materials in sieve machine which automatically sifts it; returns pieces to breaker that do not pass through screen.”
- (“Dictionary of Occupational Titles, Part 1: Definitions of Titles”, U.S. Department of Labor, 1939).



■ Some Occupations Today

- Green Marketers
- Distance Learning Coordinators
- Informatics Nurse Specialists
- Geospatial Information Scientists and Technologists
- Nanosystems Engineers
- Area, Ethnic, and Cultural Studies Teachers, Postsecondary
- Cytotechnologists
- Baristas
- Solar Energy Installation Managers

- What Determines Occupational Structure?

- How we produce?

- What Determines Occupational Structure?
 - How we produce?
 - What we produce (not what we consume).

■ Determinants of How We Produce

- Scale

- Technology

■ Scale

- IT is enabling larger firms: In last 15 years, the average firm size in the U.S. has increased by 15 to 20 percent.

■ Scale

- Building Material, Garden Equipment, Supply Dealers

	<u>2000</u>	<u>2010</u>
Establishments	91,948	83,688
Employees	1,235,387	1,208,399



■ Technology

- IT is enabling entire industries and occupations to be transformed.

■ Technology

■ Computer and Software Stores

	<u>2000</u>	<u>2010</u>
Establishments	12,889	10,485
Employees	106,213	85,842

■ Technology

■ Travel Agencies

	<u>2000</u>	<u>2010</u>
Establishments	25,975	14,271
Employees	183,143	105,085

■ Technology

■ Prerecorded Tape, CD & Record Stores

	<u>2000</u>	<u>2010</u>
Establishments	7,720	2,932
Employees	75,988	21,023

■ Technology

■ Electronic Shopping and Mail-Order Houses

	<u>2000</u>	<u>2010</u>
Establishments	11,802	22,534
Employees	276,698	311,792

The logo for amazon.com, featuring the text "amazon.com" in a bold, black, sans-serif font. A curved orange arrow is positioned below the text, starting under the letter 'a' and ending under the letter 'z', pointing to the right. A registered trademark symbol (®) is located at the end of the text.

■ Determinants of What We Produce

- Demographics/Culture
- Trade
- Technology

■ Demographics/Culture

■ Child Care Workers

2000

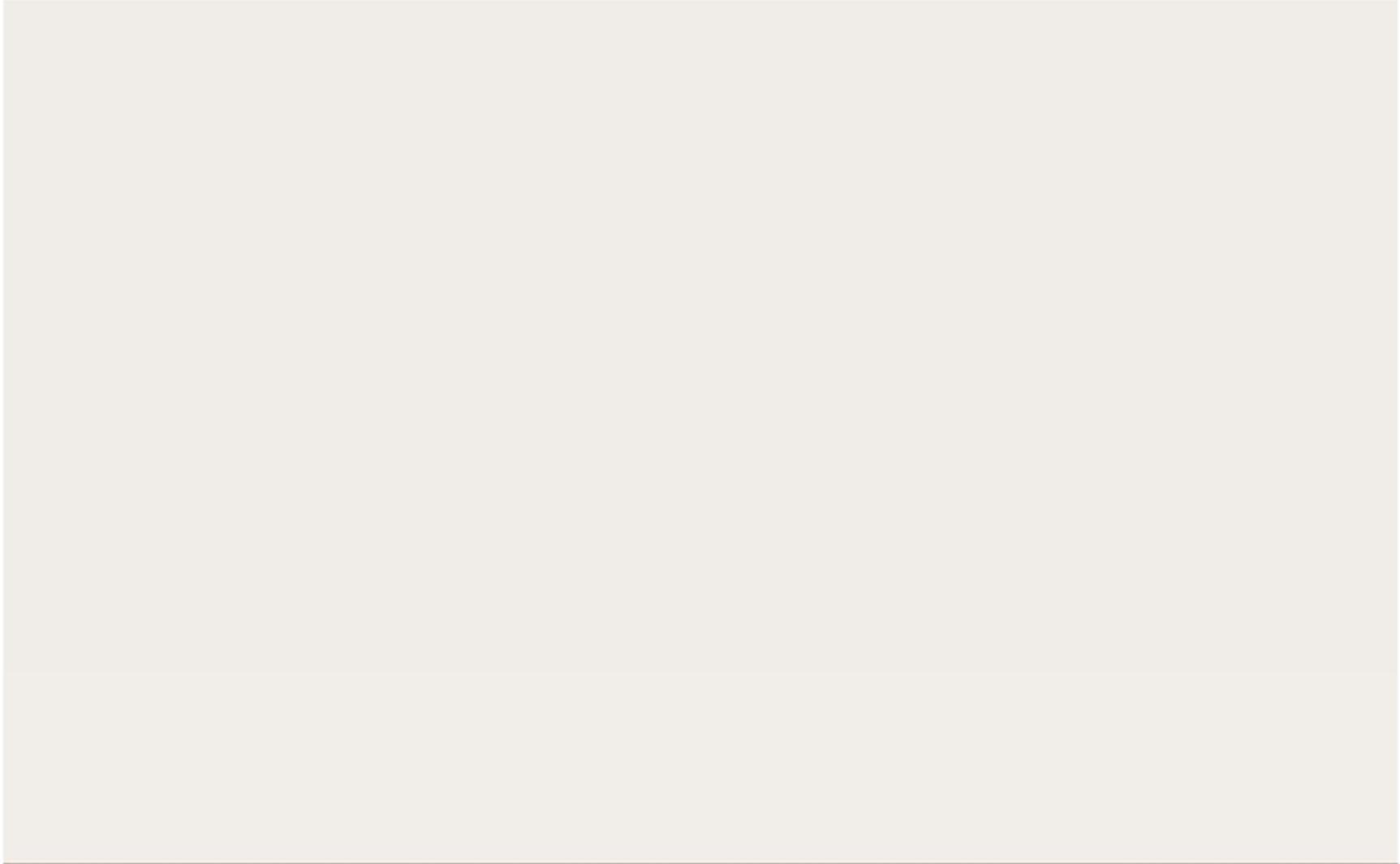
398,090

2010

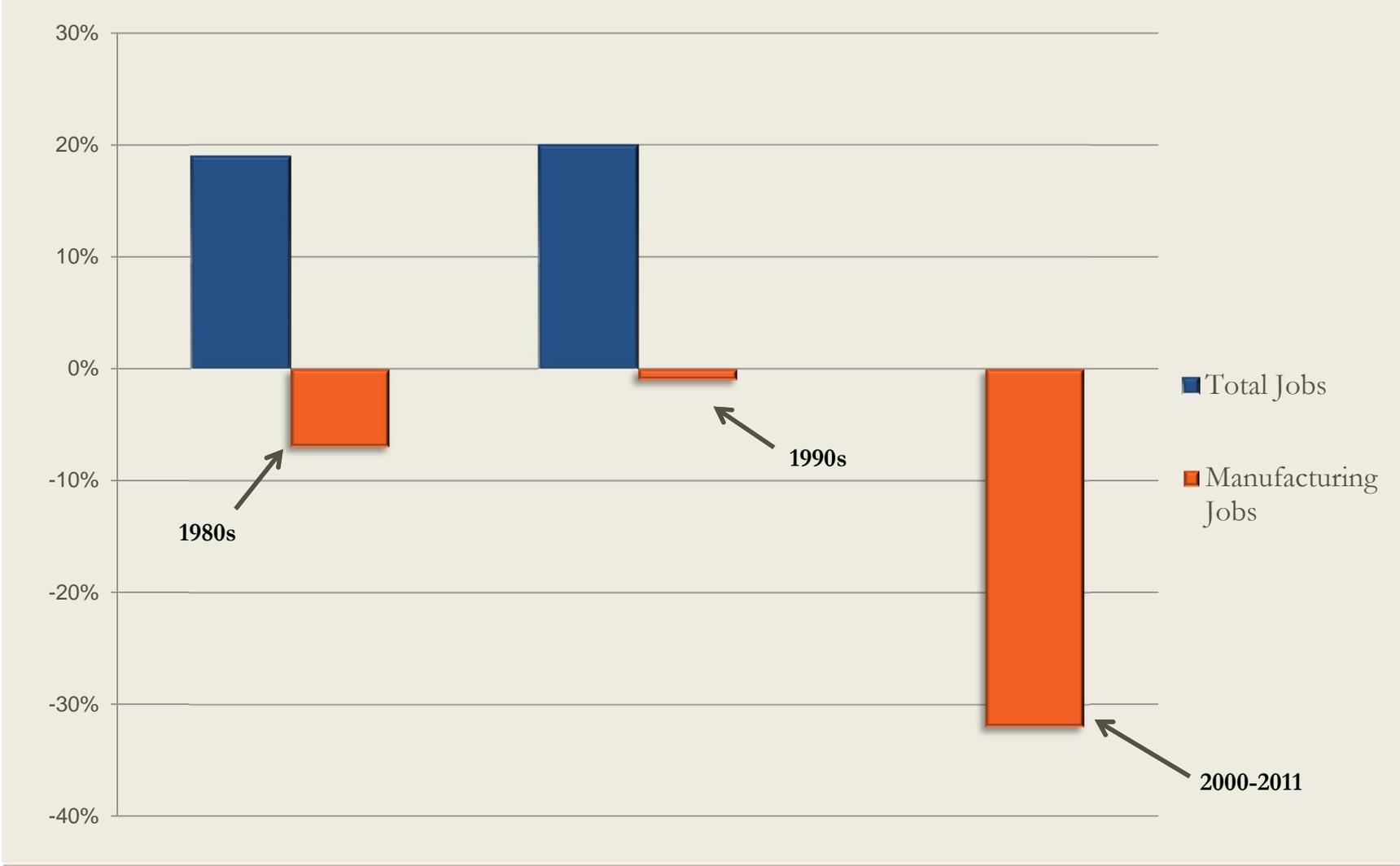
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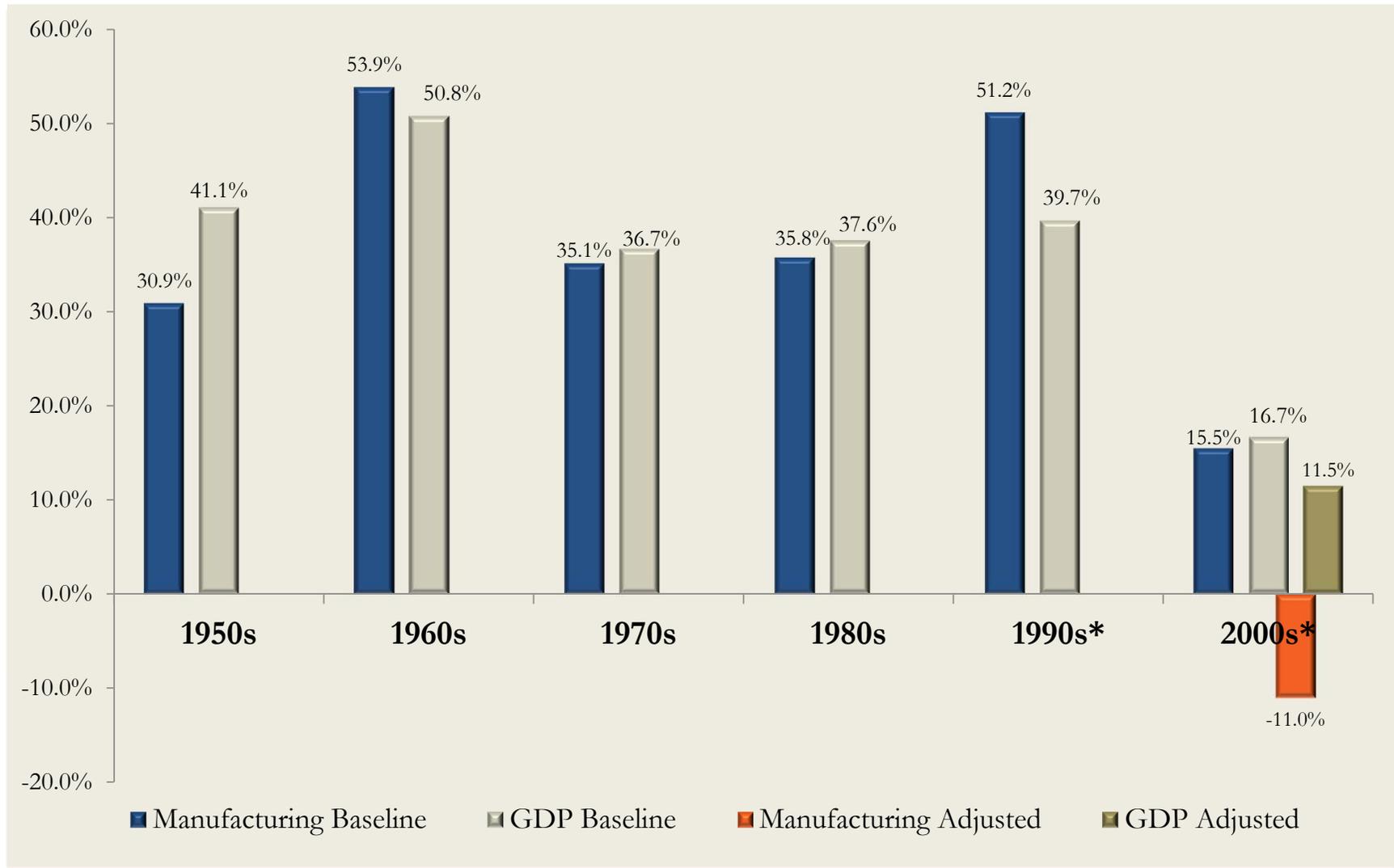
■ Trade



■ Massive Manufacturing Job Loss



When Measured Properly, Real Manufacturing Value-Added is Down



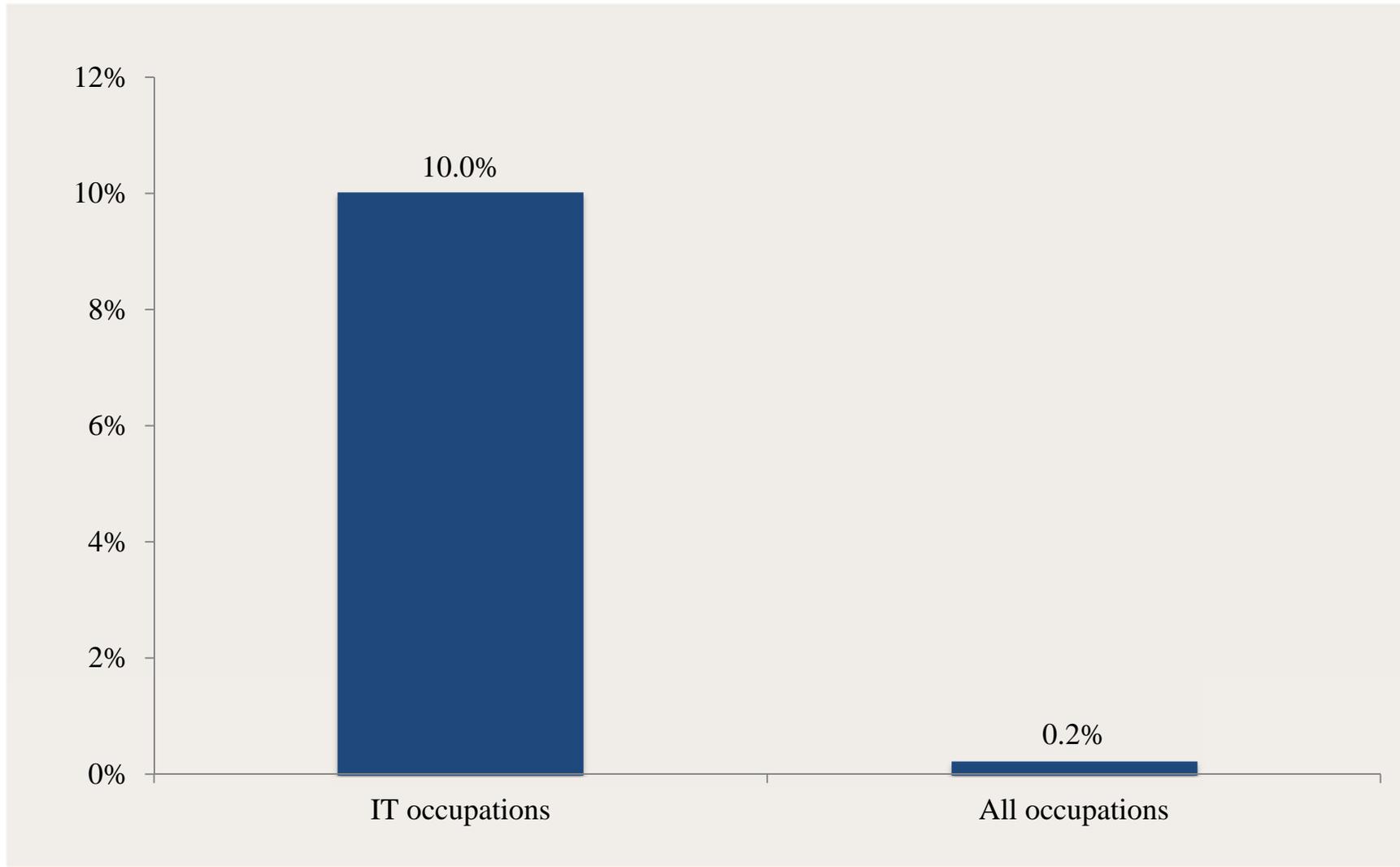
■ Industries Particularly Impacted by Trade

- Furniture Finishers
 - **-59.7%**
- Textile Cutting Machine Setters, Operators, and Tenders
 - **-59.8%**
- Sewing Machine Operators
 - **-60.5%**
- Foundry Mold and Coremakers
 - **-65.8%**
- Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders
 - **-66.7%**
- Textile Knitting and Weaving Machine Setters, Operators, and Tenders
 - **-69.4%**
- Sewers, Hand
 - **-77.5%**

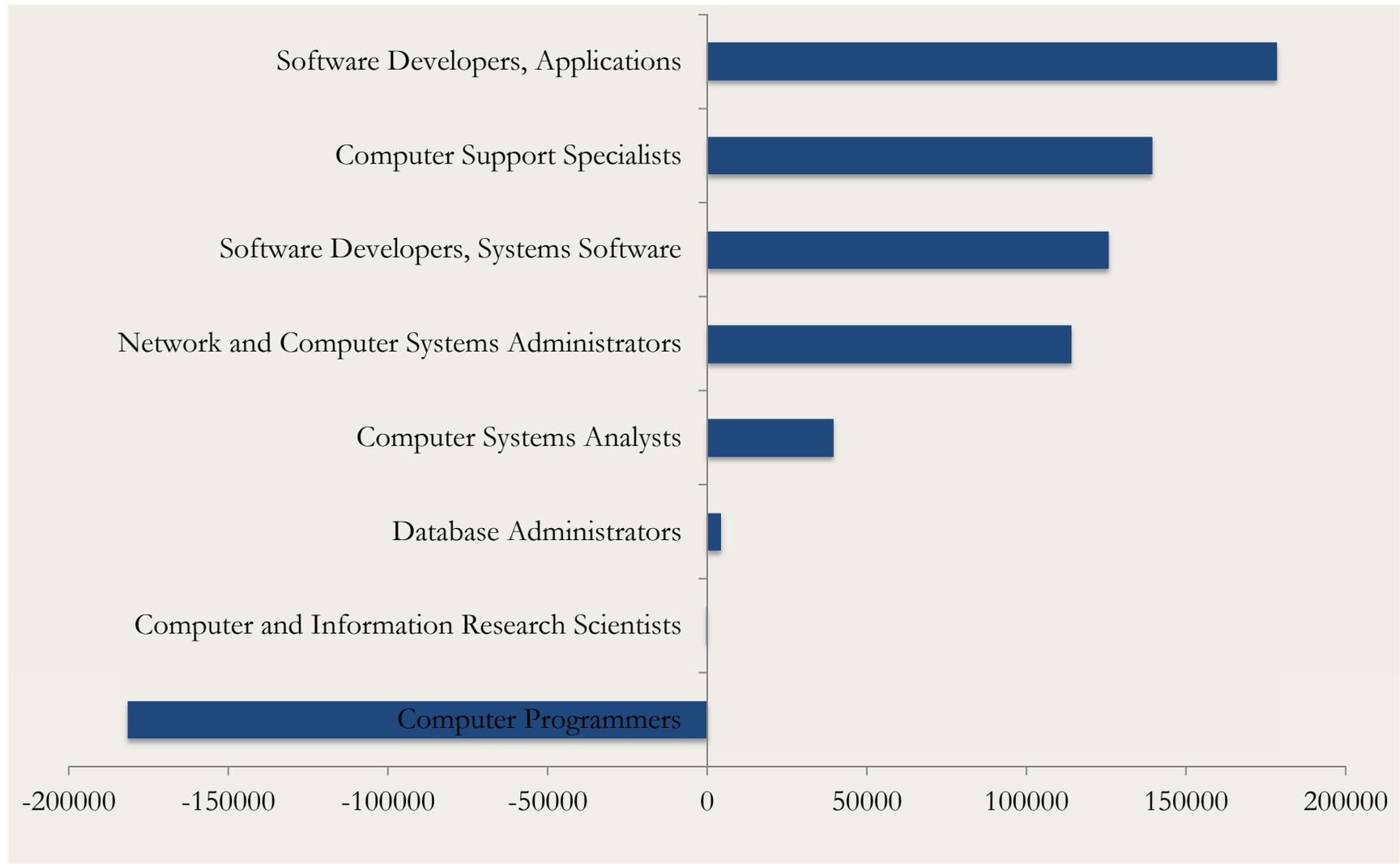
■ Product Technology



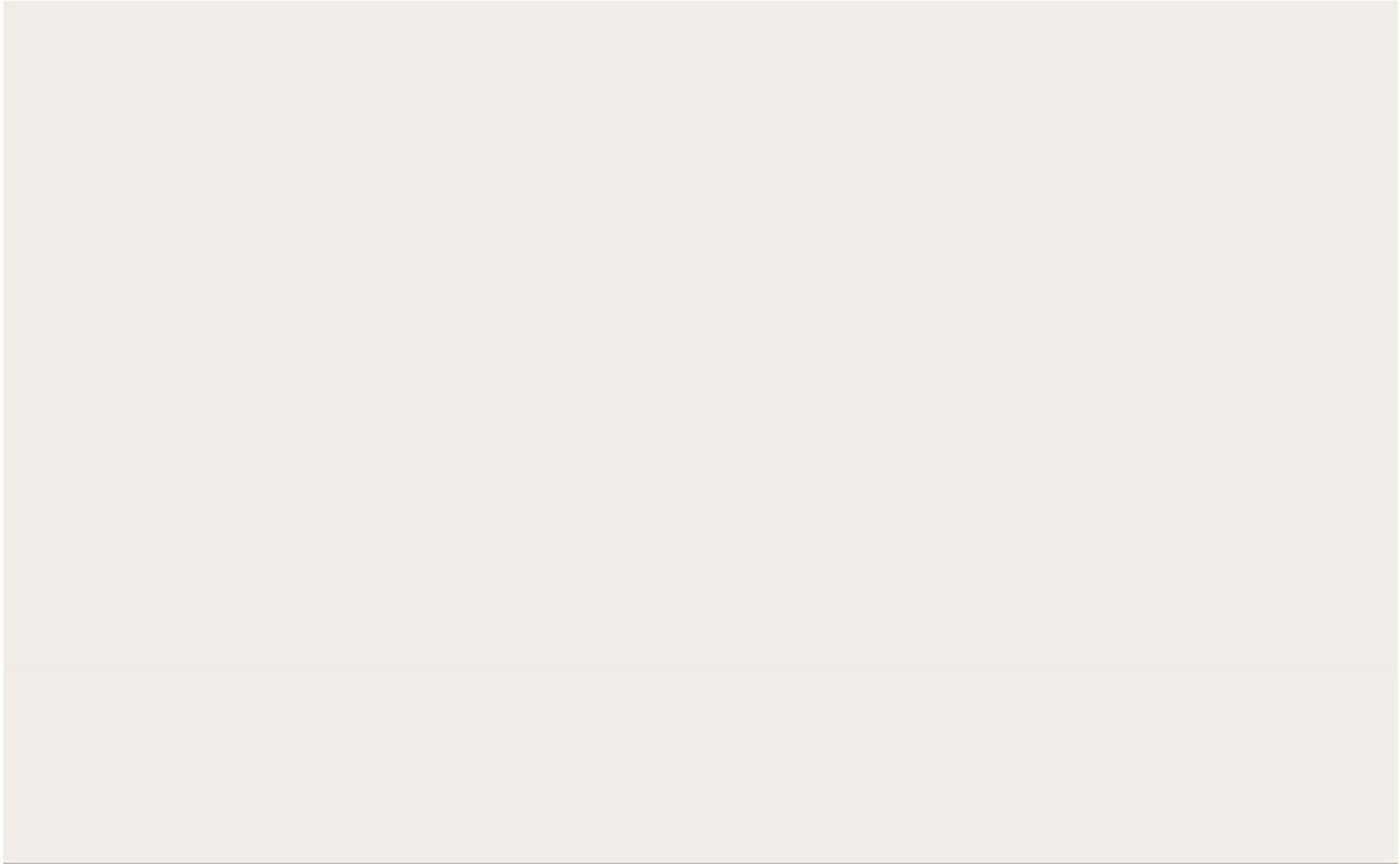
Growth in IT Occupation Employment Versus Employment in All Occupations, 2001-2011



■ Change in Selected IT Occupation Jobs, 2001-2011



- So Where is Technology Taking Us?

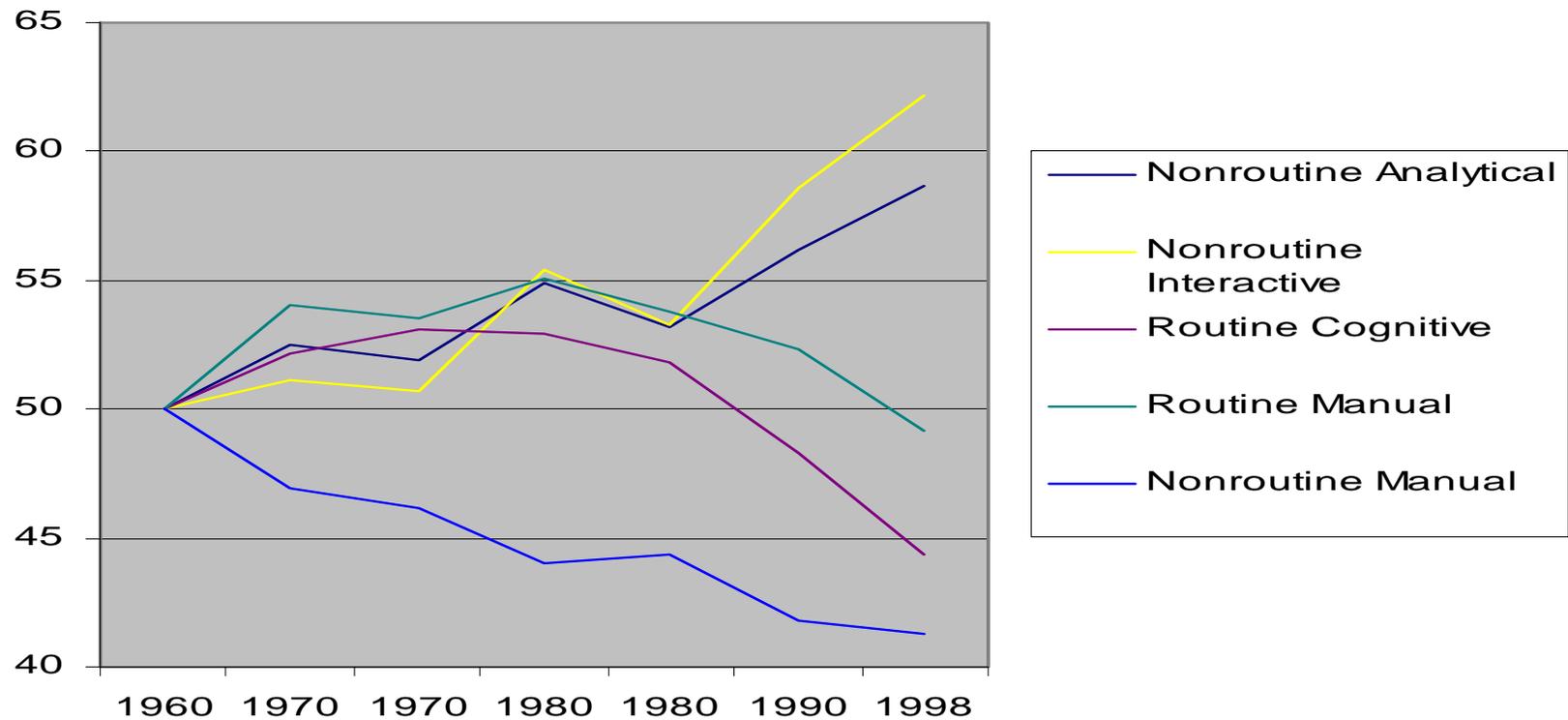


■ Change in Postal Service Industry

Postal Service Mail Carriers	-11.2%
Meter Readers, Utilities	-17.0%
Travel Agents	-45.6%
Data Entry Keyers	-54.0%
Telephone Operators	-71.4%

% Change in Selected Occupations, 2000- 2011

■ Tech is Reducing Routine Jobs



Source: The New Division of Labor, Frank Levy and Richard J. Murnane

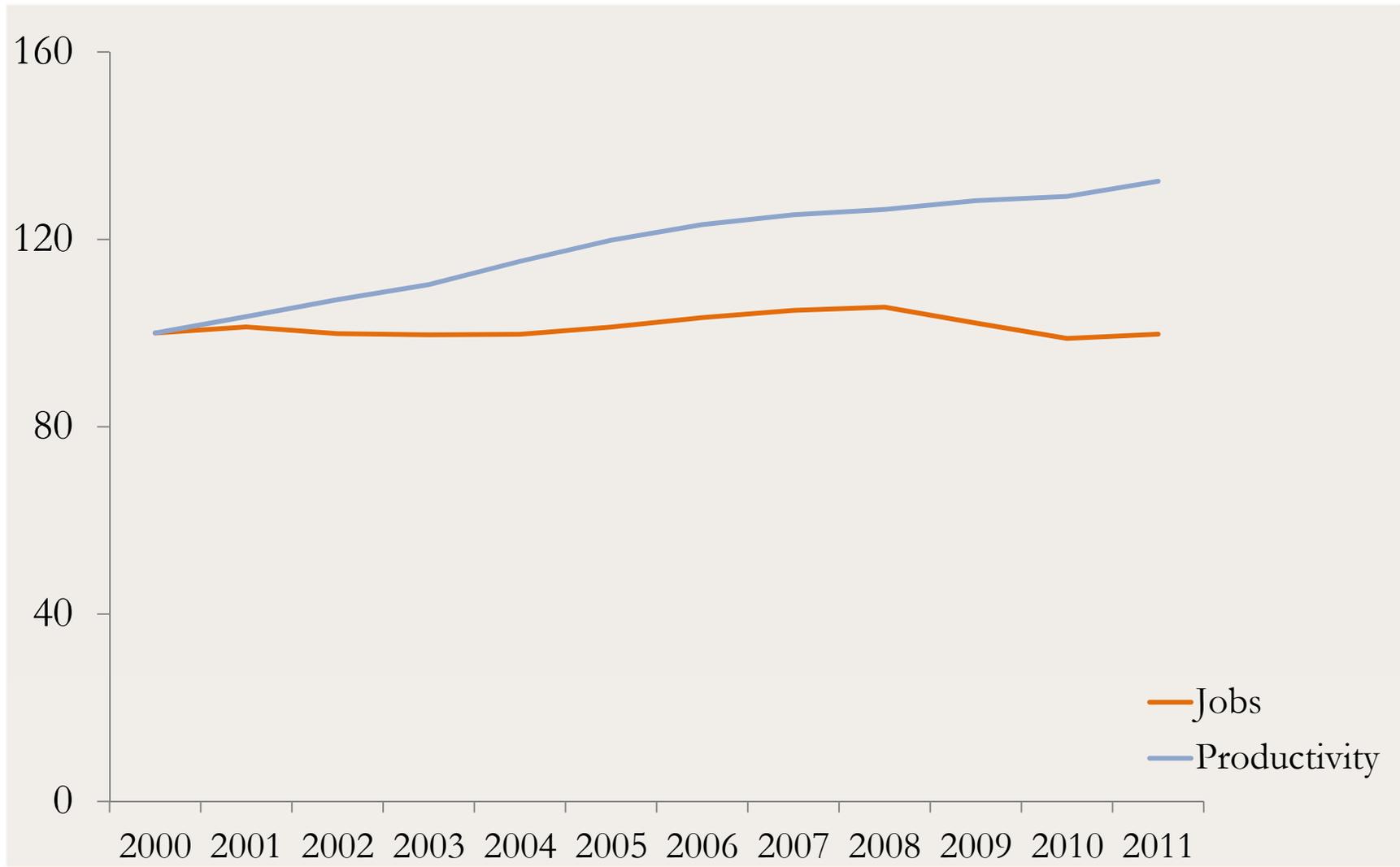
■ Are the “Robots” Taking Our Jobs?

“Workers are, “losing the race against the machine, a fact reflected in today’s employment statistics.”

-Erik Brynjolfsson and Andrew McAfee, *Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*, 2011)



■ Is the Link Between Productivity and Jobs Broken?



■ Reality: Internet Creates Jobs

■ OECD estimates that of the top 250 ICT firms, Internet firms accounted for \$18.3 billion in revenue in 2000, growing to \$56 billion in 2006, with employment growing from 47,539 to 93,380.



- Reality:

- Productivity is not negatively related to job growth

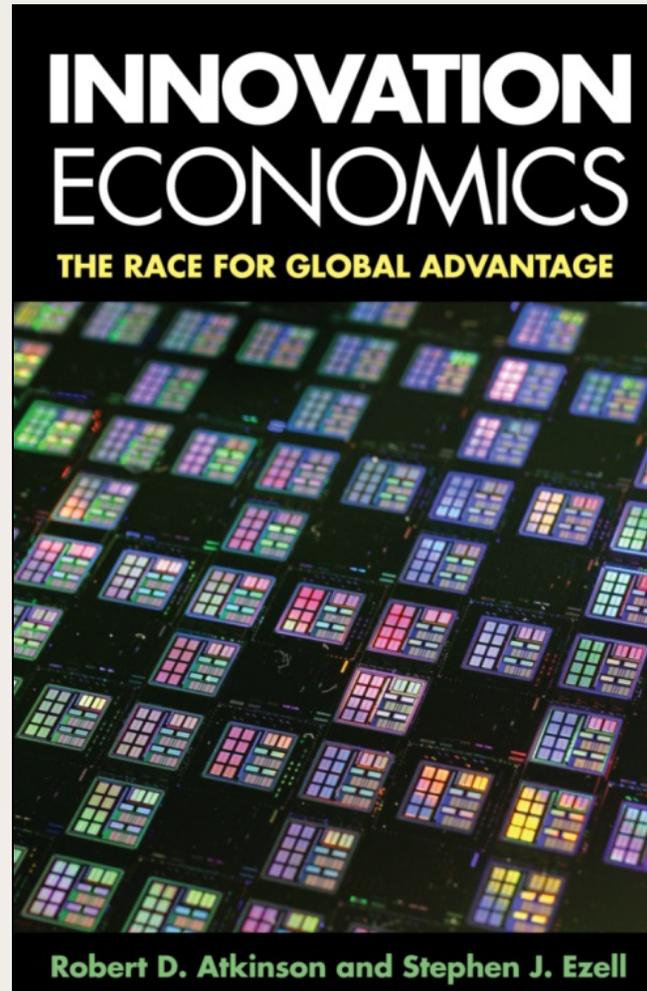
- What to do:

- Give Employers More Incentives to Invest in Workforce Training

- Create stronger ties between employers and the workforce training system (e.g., Regional Skills Alliances)

- Focus on replacing bad jobs with good technology

- *Innovation Economics*



Thank You

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