

The Impact of Digitalization and Robotization on Employment

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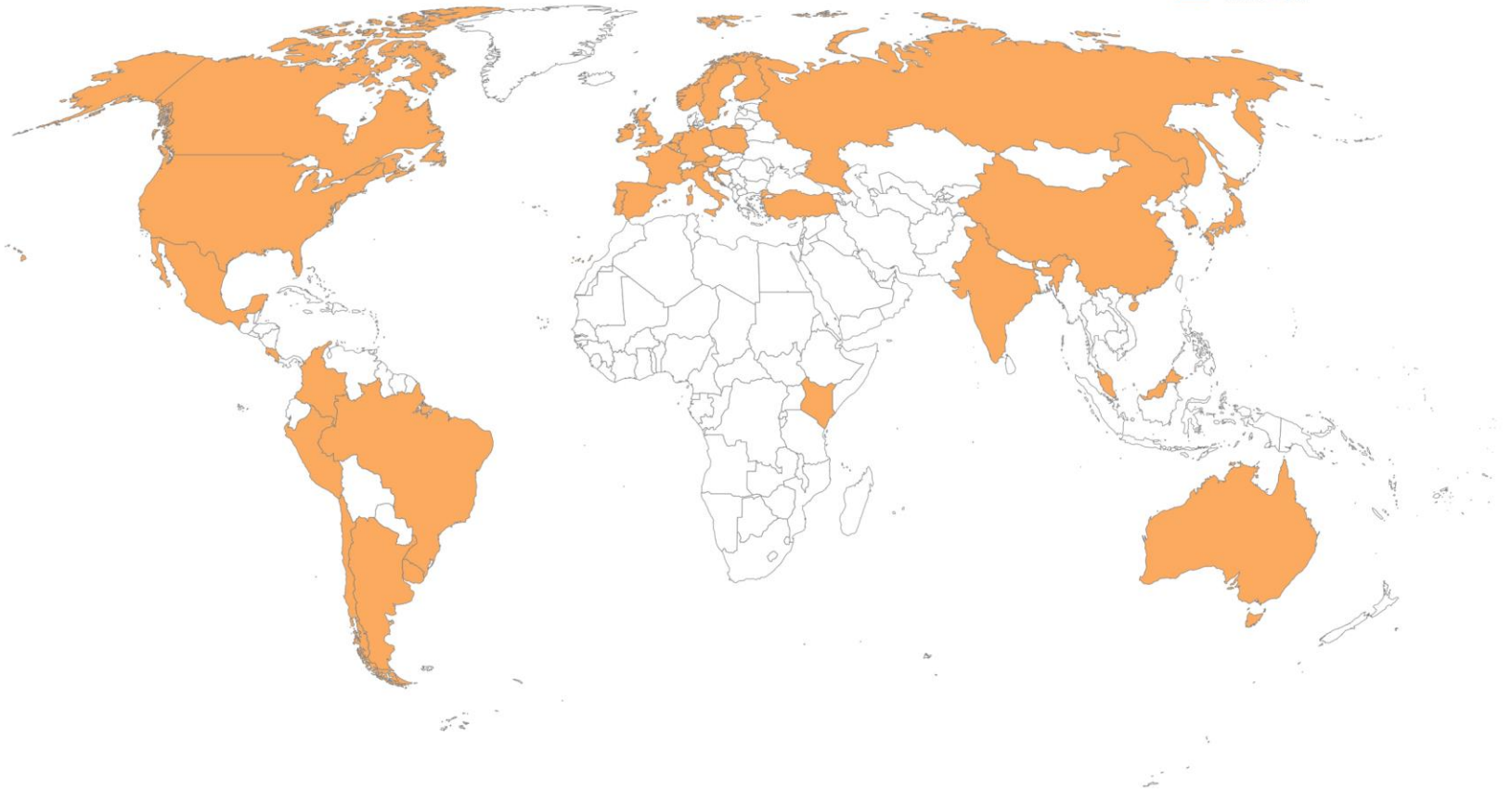
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About ITIF

- Independent, nonpartisan research and education institute focusing on intersection of technological innovation and public policy, including:
 - Innovation and competitiveness
 - IT and data
 - Telecommunications
 - Trade and globalization
 - Life sciences, agricultural biotech, and energy
- Mission to formulate and promote policy solutions that accelerate innovation and boost productivity
- Ranked by University of Pennsylvania as top science and technology think tank in United States and number two in world

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Robots' Impact on Productivity and GDP Growth

- A study of 17 manufacturing industries across 13 countries from 1993 to 2007 found **robots increased the annual growth of labor productivity and GDP by 0.36 and 0.37 percent per year.**
- **Robots accounted for 10% of GDP growth** in studied countries.
- **Productivity in robot-enabled industries increased by 13.6%.**

Robots at Work*

Georg Graetz
Uppsala University[†]
Guy Michaels
London School of Economics[‡]

February 27, 2015

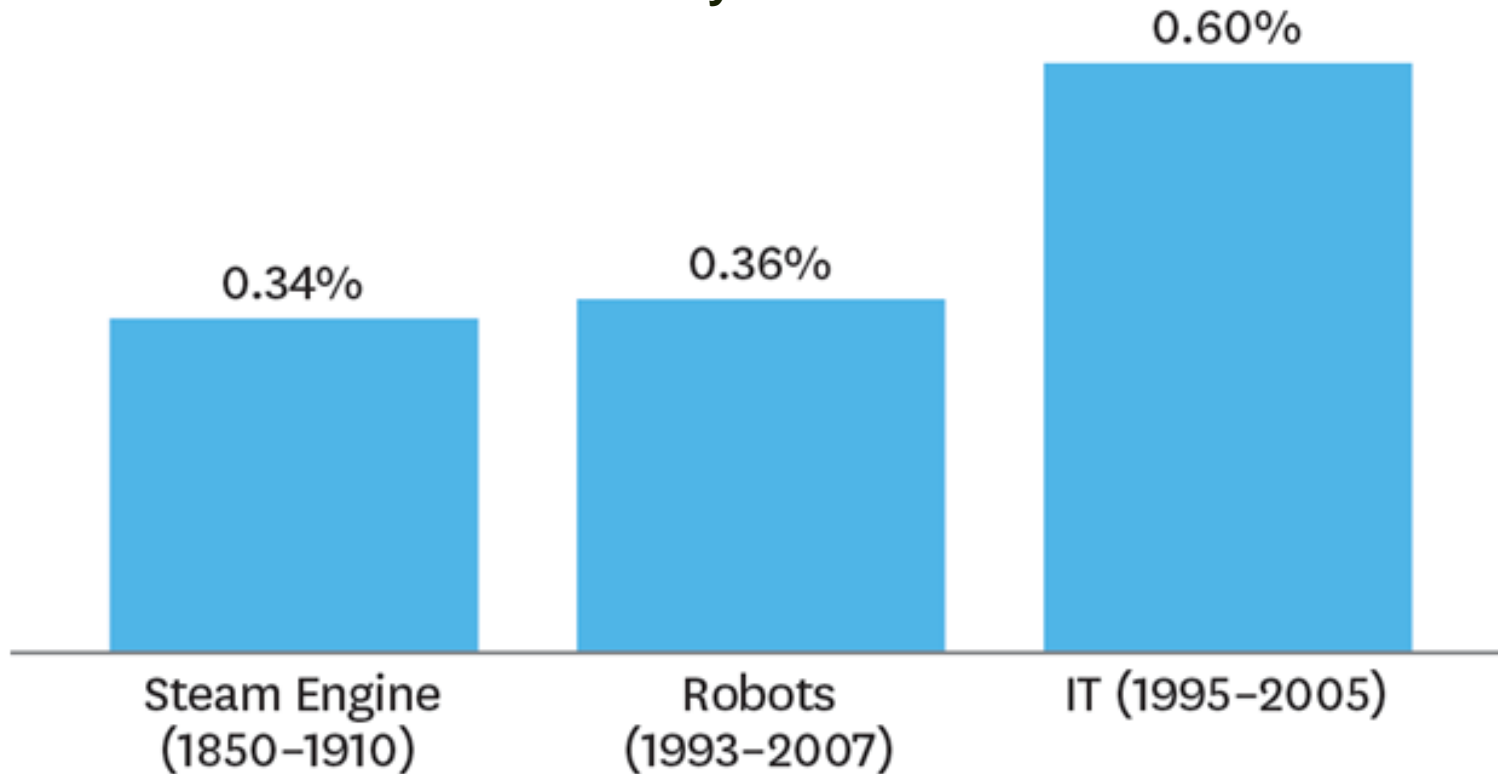
Abstract

Despite ubiquitous discussions of robots' potential impact, there is almost no systematic empirical evidence on their economic effects. In this paper we analyze for the first time the economic impact of industrial robots, using new data on a panel of industries in 17 countries from 1993-2007. We find that industrial robots increased both labor productivity and value added. Our panel identification is robust to numerous controls, and we find similar results instrumenting increased robot use with a measure of workers' replaceability by robots, which is based on the tasks prevalent in industries before robots were widely employed. We calculate that the increased use of robots raised countries' average growth rates by about 0.37 percentage points. We also find that robots increased both wages and total factor productivity. While robots had no significant effect on total hours worked, there is some evidence that they reduced the hours of both low-skilled and middle-skilled workers.



Robots' Impact on Productivity Growth Immense

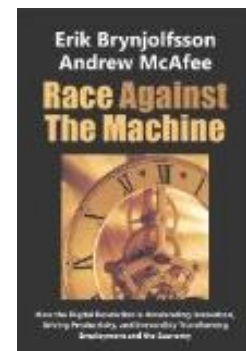
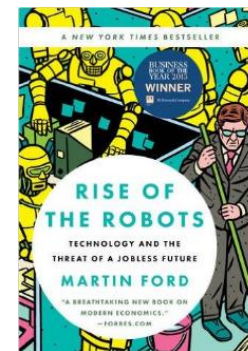
Total Percentage Contribution to Annual Labor Productivity Growth Rates



Source: Nicholas Crafts, "Steam as a GPT"; George Graetz and Guy Michaels, "Robots at Work"; Muro and Andes, "Robots Seem to Be Improving Productivity, Not Costing Jobs"

But Won't Greater Automation Cost Jobs?

- *Mother Jones*: “The robots will probably decide not to kill us, but they’ll be taking our jobs—and sooner than you think.”
- Martin Ford: “Expect 75 percent unemployment by the end of this century.”
- Brynjolfsson & McAfee: “It may seem paradoxical that faster progress can hurt wages and jobs for millions of people, but we argue that’s what’s been happening.”



Doomsdayers have been warning us for decades that robots will destroy jobs

- With robots and AI “perhaps as much as **20%** of the work force will be **out of work** in a generation.”

– Gail Garfield Schwartz, 1982

- “We are beginning a gradual process whereby over the next 30-40 years many people will be displaced, creating **massive problems of unemployment** and dislocation.”

– Wasily Leontief, 1983

- “We must convince our leaders that they should **give up the notion of full employment**. The pace of technical change is accelerating.”

– Nils Nilson, 1984

Actually, more robots = lower unemployment and more exports

-0.34

correlation between robot adoption and unemployment rate

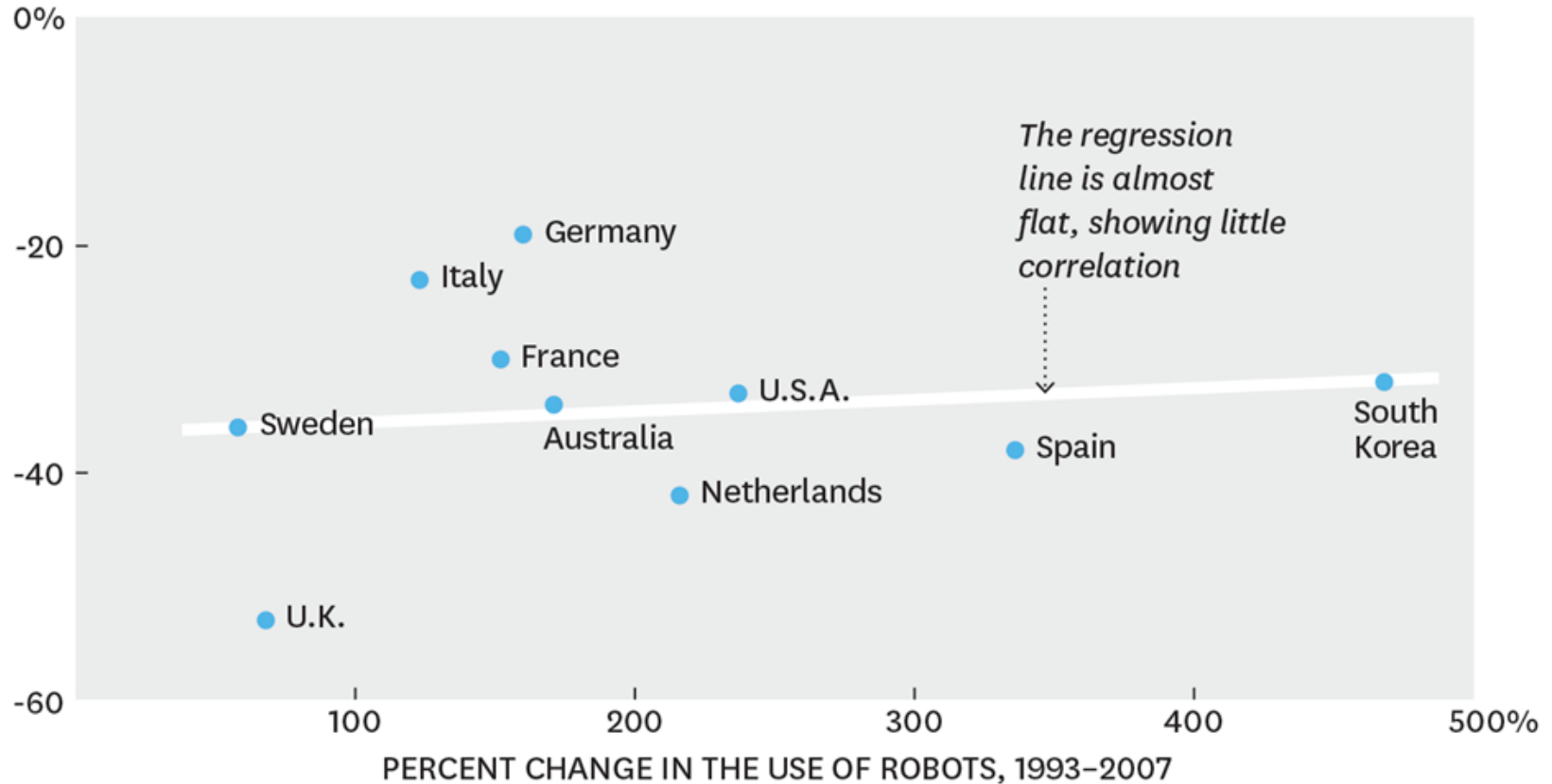
0.61

correlation between robot adoption and current account balance

Source: Data from International Federation of Robots (15 nations)

Relationship Between Robots and Employment

PERCENT CHANGE IN MANUFACTURING EMPLOYMENT, 1996–2012



Source: George Graetz and Guy Michaels, “Robots at Work”;
Muro and Andes, “Robots Seem to Be Improving Productivity, Not Costing Jobs”

Relationship Between Productivity and Unemployment

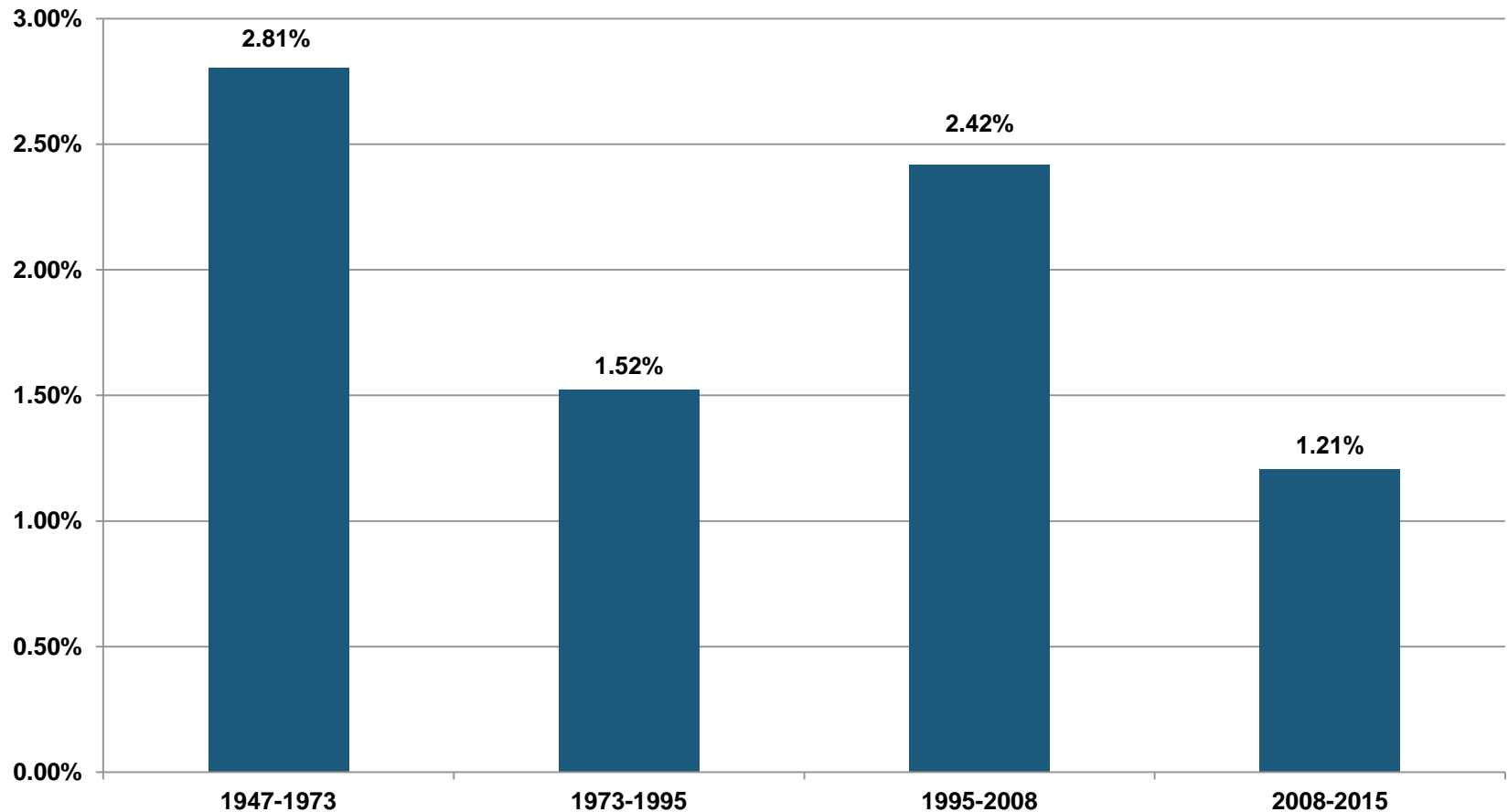
U.S. Change in Productivity and Average Unemployment Rate by Decade, %



Source: ITIF, *Are Robots Taking Our Jobs? Or Making Them?*

We Really Need “Pedal to Metal” for Robots

(annual U.S. labor productivity growth)

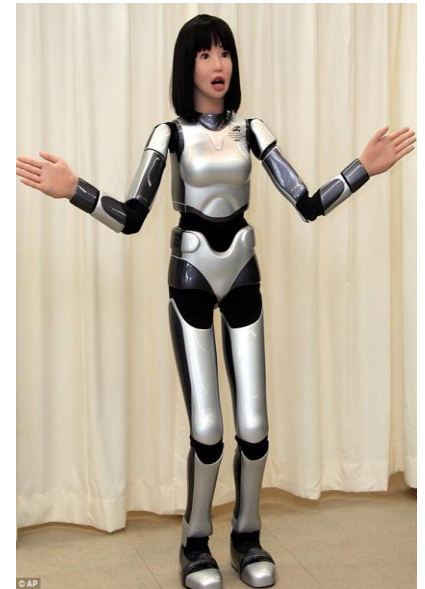


Reality: Robots Won't Lead to Joblessness

Most jobs are really hard to automate.

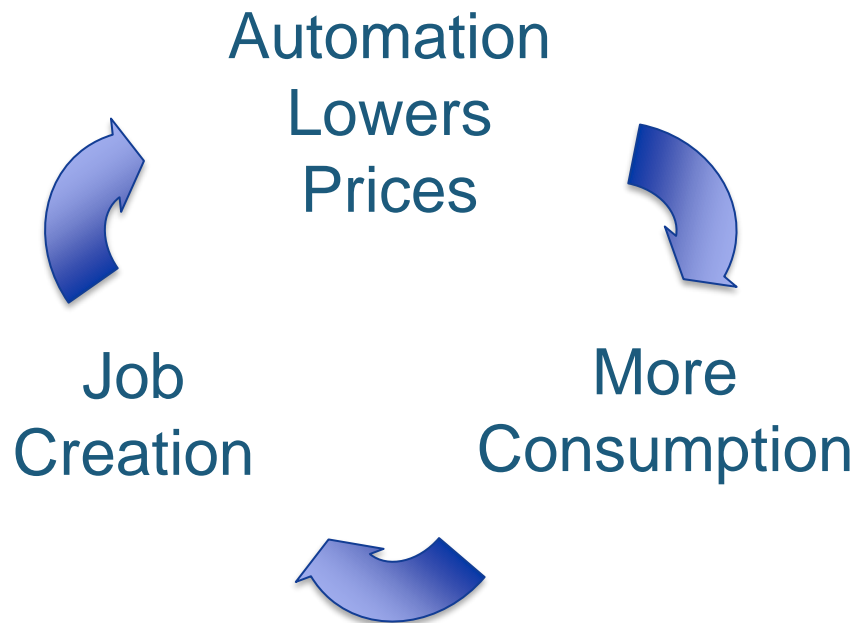
Current U.S. Employment:

- 500K pre-k teachers
- 230K athletes/coaches
- 110K detectives
- 70K massage therapists
- 45K clergy
- 25K computer scientists
- 6K fashion models



Reality: Robots Won't Lead to Joblessness

Most observers miss the second-order effects from productivity increases.



Are Robots Taking Our Jobs, or Making Them?

BY BEN MILLER AND ROBERT D. ATKINSON | SEPTEMBER 2013

INTRODUCTION

The view that machines are a problem taps the American spirit of its resilience and aggressive support for innovation and progress. It is time to consign neo-Luddism and its particular refrain that technology cuts jobs once and for all to the dustbin of history.

With U.S. unemployment remaining stubbornly above seven percent and job growth anemic, many have latched on to a compelling explanation: "the robots are taking our jobs." In other words, a "neo-Luddite" narrative has taken hold. According to this line of thinking, high productivity driven by increasingly powerful IT-enabled machines is the cause of U.S. labor market problems, and accelerating technological change will only make those problems worse. There's only one flaw in this narrative: it is completely wrong and not supported by data, scholarly evidence or logic.

This report analyzes the "robots are killing our jobs" arguments, shows how they are constructed on faulty analysis, examines the extensive economic literature on the relationship between employment and productivity, and explains the logic of how higher productivity leads to more jobs. We show that more technology benefits not just the economy overall, but also workers: more and better technology is essential to U.S. competitiveness and higher living standards. The claim that increased productivity eliminates jobs is misguided speculation.

These neo-Luddites make a rough and fallacious correlation between today's high unemployment and the cool technology they see all around them (e.g., their smart phones, the kiosks at airports, Watson on Jeopardy). Clearly, in their minds, there must be a connection. For them, technology is enabling the same amount of work to be done with fewer people and doesn't lead to a dynamic where those people become reemployed doing other work. In other words, they believe that the jobs are gone and the workers are added to the unemployment rolls.

Source: ITIF, *Are Robots Taking Our Jobs? Or Making Them?*

Automation Technologies Create Employment Through Several Channels

1. Automation reduces prices but also spurs demand, leading to compensating job creation in other sectors.
2. Creates employment in automation-producing firms/sectors.
3. Expands output by making possible new products/services.
4. In industries where technology serves as a complement to workers, makes output more valuable, increasing demand.



Source: Deloitte *Technology and People: The great job-creating machine*

Human Wants Are Far From Being Satisfied



Policy Implications

1. Countries should focus on skills security, not job security. Worker retraining programs must play a vital role.
2. Expand credits/incentives for enterprise investments in R&D, workforce training, and modernized capital equipment.
3. Cross-border data flows fundamentally underpin the new production revolution: trade agreements must reflect this.

Thank You!

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