The Future Of U.S. Productivity Growth: A Skeptical View

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Symposium: U.S. Productivity Growth – Looking Ahead

NY Fed, February 16, 2024
To Forecast the Future
We Need a Starting Point

• Will U.S. Productivity Growth Over the Next Two Decades be:
  • 1.0%?  1.5?  2.0%?  2.5%?  3.0%?
• CBO new forecast 1.4% for 2024-34
• Review U.S. History since 1950
• Comparison to E17 (17 nations of Western Europe) and to Developed East Asia since 1950
• What factors will make productivity grow faster or slower than this history?
U.S. Total Economy
Productivity Growth, 1950-2023

1950-1972: 2.8
1972-1995: 1.3
1995-2005: 2.6
2005-2019: 1.2
2019-2023: 1.2
Western Europe 17 Nations, Productivity Growth, 1950-2023

- 1950-1972: 5
- 1972-1995: 2.6
- 1995-2005: 1.4
- 2005-2019: 0.7
- 2019-2023: 0.3
Developed East Asia,
Productivity Growth 1950-2023

<table>
<thead>
<tr>
<th>Period</th>
<th>Growth Rate</th>
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<tbody>
<tr>
<td>1950-1972</td>
<td>6.6</td>
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Confronting This History

- U.S. record 1.3% 1950-72, 1.2% 2005-2023
  - Contrast to 2.6% 1995-2005, more later
- Continuous slowdown in Europe, Asia
- Sources of slowdown to date
  - Innovation is less potent
  - “Ideas are getting harder to find”
  - Education plateau
  - Corporate profits used for dividends and share buybacks in place of innovation-oriented investment
Conference Agenda for this Session

• Conference agenda: demographics, superstar firms and employees

• Demographics?
  • Babyboom teen bulge 1970s cited for initial post-1970 slowdown
  • Bulge over by 2028, then even age distribution.
  • Flat age distribution means little productivity impact of aging: Vigorous youth vs. experienced older workers
This topic depends on immigration policy
- Aging population implies growing dependency ratio
  - Sustained consumption, labor shortage
- Depletion of Medicare and Soc. Sec. Funds
  - Higher taxes or lower benefits
- Debt/GDP ratio from 99% now to 116% in 2034
- Continuing rise of debt service from 2.4% of GDP now to 3.9% in 2034
- Crowding out of private investment, government R&D and infrastructure spending
The Educational Plateau

• Conference agenda: superstar workers, inequality, and superstar firms
  • Differing impact across Europe and Asia but the growth slowdown is common
• More important, educational plateau
  • 1900-1970, HS graduation 10 to 80%
  • Gradual increase college completion
  • Goldin-Katz, added 0.4% to LP growth
  • But HS and college completion flatline
  • Completion of 4-year BA and higher degree: born 1968 39.1%, 1997 39.6%
<table>
<thead>
<tr>
<th>Birth Year Range</th>
<th>Percent Completing BA or More Advanced Degrees</th>
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<tbody>
<tr>
<td>Pre 1947</td>
<td>30.2</td>
</tr>
<tr>
<td>1948-52</td>
<td>34.9</td>
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<tr>
<td>1953-57</td>
<td>33.2</td>
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<tr>
<td>1958-62</td>
<td>32.4</td>
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<tr>
<td>1963-67</td>
<td>33.8</td>
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<tr>
<td>1968-72</td>
<td>39.1</td>
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<tr>
<td>1973-77</td>
<td>41.2</td>
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<tr>
<td>1978-82</td>
<td>42.8</td>
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<tr>
<td>1983-87</td>
<td>43.2</td>
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<tr>
<td>1988-92</td>
<td>42.5</td>
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<tr>
<td>1993-97</td>
<td>39.6</td>
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</tbody>
</table>
End of Education’s Contribution to Productivity Growth

- Plateau in educational attainment has already occurred after rapid rise in 20th century
- Declining demand for college education
  - Rising tuition, student debt
  - 40% of BAs cannot find a suitable job
  - Low U.S. standing on intl PISA tests
  - Lack of systematic apprenticeships
- Social changes
  - Age 25-54 % married down 67 => 53
  - “Unpartnered” now 38%
  - Children of single-parent families
Conference Agenda: The Green Technology Transition

- Green transition implies crowding out
  - Discarding fossil fuel heating and industrial equipment to be replaced by electric equipment
  - Replacement of diesel truck fleet
  - Multifold increase in electric grid for EVs
  - Crowding out of R&D and productivity-enhancing technology
  - Humble example: gas leaf blowers
- Higher productivity in making EVs and in operating solar and wind renewables
U.S. Total Economy
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Industrial Revolutions, #3 vs. #4

- Total economy productivity growth in 1995-2005 was 2.6%
- Upsurge vs. pre-1995 and post-2005 linked to digital revolution, “dot.com” decade
- Ubiquity of IR#3. Web, e-mail, spreadsheets, end of repetitive retyping, conversion of paper records to digital, bar-code scanning, electronic checkout, medical records
- How can IR#4 match this pervasiveness?
- Consider robots in manufacturing
- Then consider LLMs
The Robot Paradox: U.S. Manufacturing Productivity Growth, 1950-2023

- 1950-1972: 2.6
- 1972-1995: 2.6
- 1995-2005: 4.7
- 2005-2019: 0.6
- 2019-2023: 0.2
AI Revolution is Already Here

• Last decade expansion of AI in . . .
  • Customer service phone response
  • Voice recognition (my doctor’s dictation)
  • Language translation
  • Legal searches
  • Radiology diagnosis
• New: Large Language Models (LLMs)
  • Creation of written text, memos, sales
  • Creation of moving and still images
  • Creation of software code
How Many Jobs Will Vanish?

- Consider what workers actually do
- 20% are producing **goods**
  - Manufacturing, mining, construction, utilities
- 53% are producing **contact services**
  - Retail, wholesale, transportation, recreation, food, education, health
- 27% are producing **creative services**
  - Management, information, technical, scientific, administrative, finance, insurance, real estate
How Many Jobs Will Be Lost in Creative Services?

• Substantial job loss in content creation
  • Software coding, Image creation
  • Marketing documents, TV scripts
• But each call to a LLM requires a person to:
  • feed prompts & review results for errors and hallucinations
  • Check copyright violations & robocalls
• Wall St. Journal, Wed Feb 14, p. A4
• LLMs are trained by scraping the web
  • They know the past, not the future
  • Corporate data confidentiality
Conclusion:

Pros and Cons for Faster Growth

- Starting 1.2% since 2005, slower than CBO
- Education attainment plateau
- Future crowding out
  - Student debt, government debt
  - Green transition
- 4th IR less pervasive than 3rd IR 1995-2005
- Robots: too few to revive manufacturing
- AI: Main source of optimism, but how much?
  - Impact on 25% of workers, little on 75%
  - Worker still needed to prompt and manage LLMs