Productivity and Growth Over the Years at BPEA

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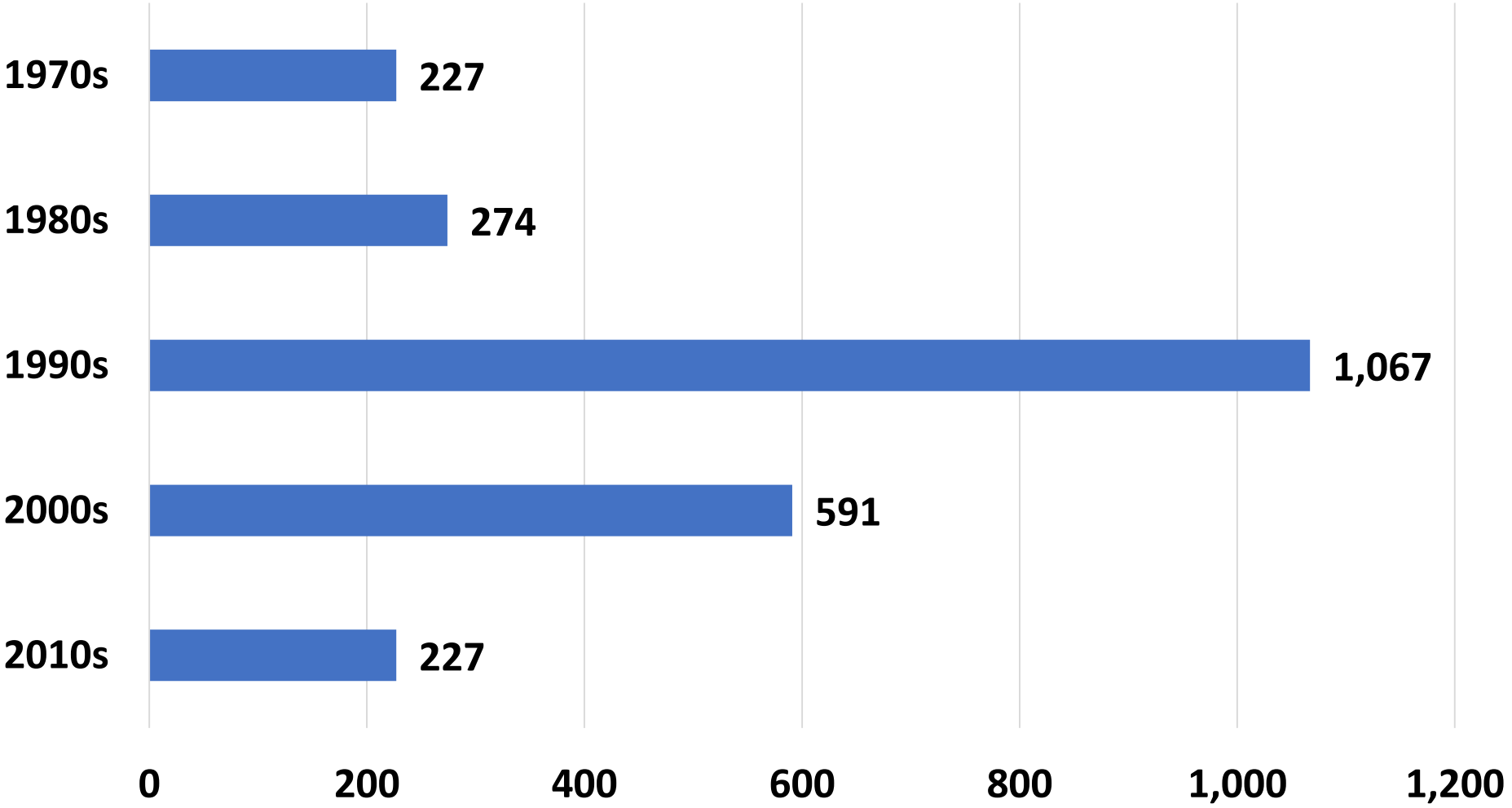
Productivity and Growth Over the Years

- U.S. labor productivity (LP) growth has always been a prime BPEA topic
  - Early 1970s, why did LP growth slow after 1965?
  - Early 2000s, why did LP growth revive after 1995?
- More recent concern, rich vs. poor countries
  - Why haven't the poor countries converged?
  - What are the secrets to growth?
  - Is there an empirical strategy to reveal secrets?
- Criteria for my selections:
  - Two early LP papers, flavor of early BPEA
  - Three more LP papers and three growth papers

Average BPEA Citations per Paper, Inequality by Decade



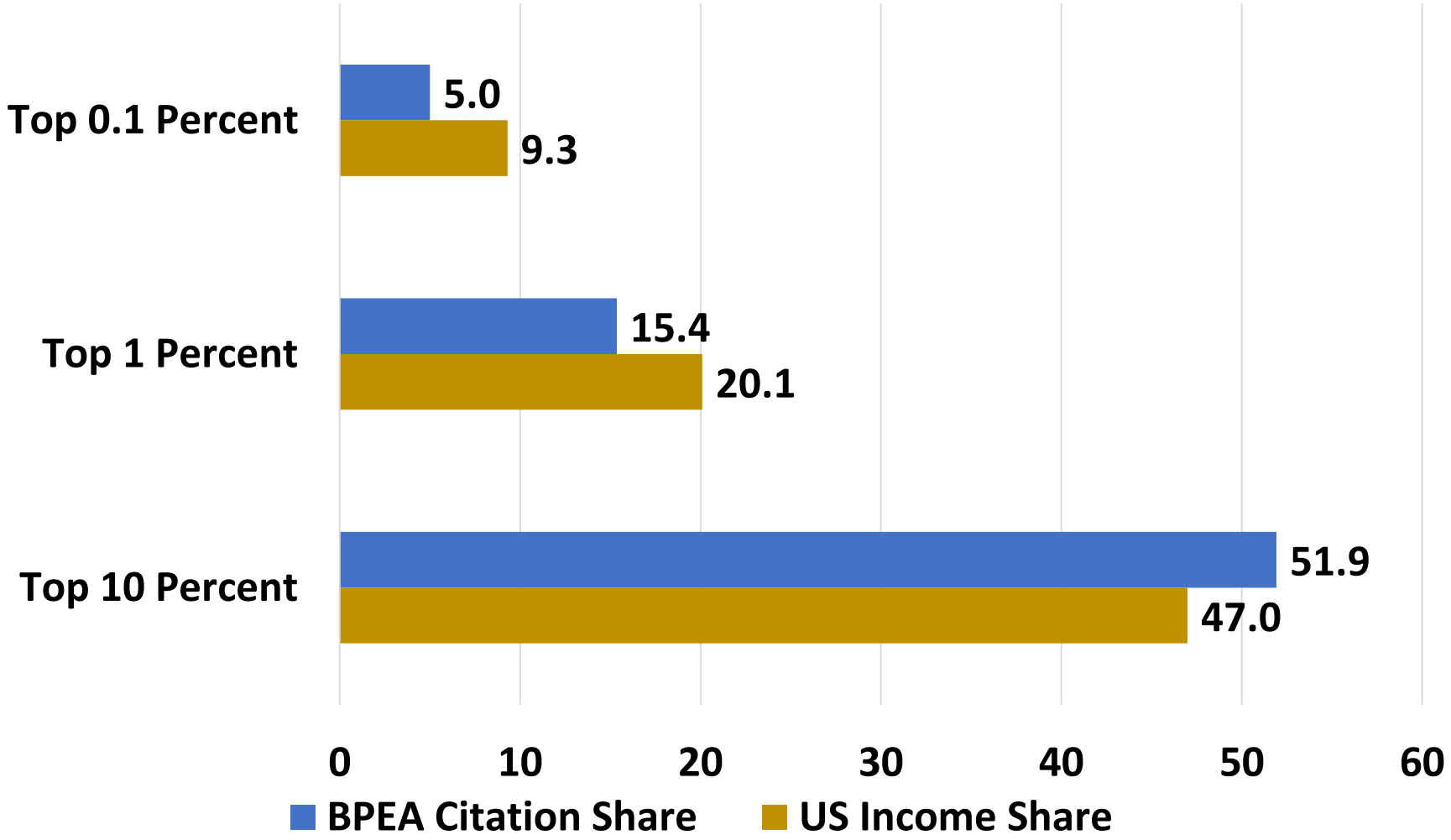
Citations Across Decades

- Reasons for high citations in 1990s and 2000s
  - Editors' taste in topics broadened out
  - Many authors were already prominent
- Reasons citations so low in 2010s
  - No good reason besides their youth
- Reasons citations so low in 1970s
  - Original BPEA model, equations of a macro model
  - Half the papers were short sector reports
  - Short-run orientation, intro to 1970, no. 1:
  - "particular attention is devoted to recent and current economic developments that are directly relevant to the contemporary scene. . . " (1970:1, p. 1).

Citation Inequality Across Papers

- Top paper had 7,500 citations
- Top 20 out of 646
  - 3% of BPEA papers
  - Cutoff for top 20: 1,239 citations per paper
- Mean citations per paper: 250
- Median citations per paper: 103
- Leads to question, more or less unequal than U.S. income?
- Data for 2014, consult Piketty-Saez-Zucman (2018)

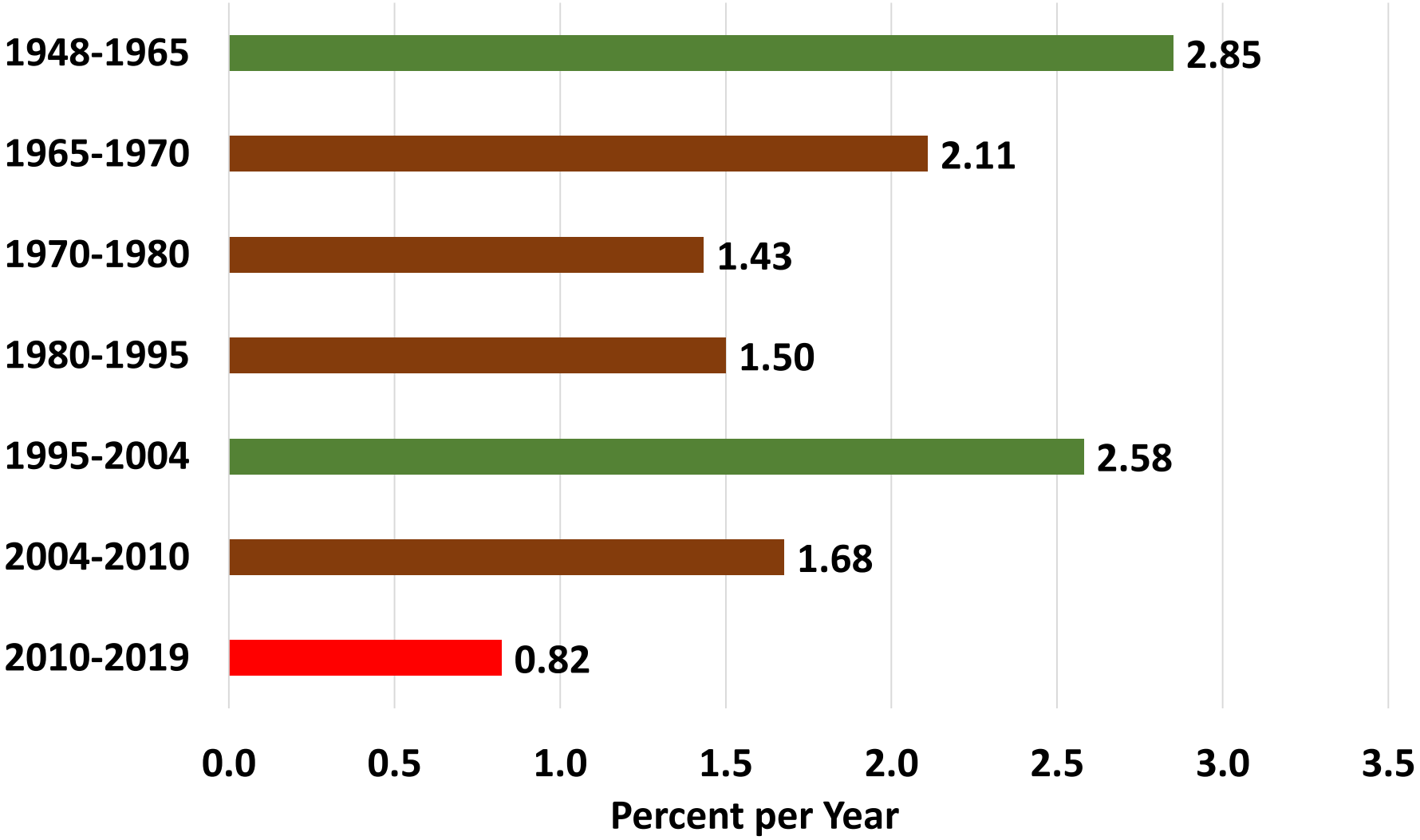
Inequality: BPEA Paper Citations And U.S. Income



Productivity Growth Viewed from the Early 1970s

- Perry (1971) and Nordhaus (1972) both sought to explain first stage of LP growth slowdown
- Data refer to total economy, not NFPB sector
- Total economy LP growth averaged 2.8% per year 1920-1970
- Postwar: 3% accepted as normal
  - Remember 3.2% criterion for Kennedy-Johnson wage-price guideposts
- By 1971 evidence of a slowdown was there

Total Economy Productivity Growth per Year, Selected Intervals



George Perry, "Labor Force Structure, Potential Output, and Productivity" (1971)

- Highlighted drop from 3.4% 1948-55 to 1.6% 1965-70.
- Explanation of this 1.8 point drop:
  - 0.4% change in age-sex mix to more women and teens who were assumed to have lower productivity
  - 0.7% cyclical effect, recession in 1970
  - 0.7% unexplained residual
- Projected for 1970-80, Y 4.3%, Y/H 2.9%
- Actual 1970-80, Y 3.2%, Y/H (graph) 1.43%

William Nordhaus, "The Recent Productivity Slowdown" (1972)

- 1.2% decline to be explained vs. Perry's 1.8%
- Rejected age-sex adjustment (discrimination)
- Instead, 0.9 of 1.2 point decline due to a changing mix to industries with a lower level of productivity
- Solow suggested compatible explanations
- Nordhaus productivity forecast for 1972-80
  - Predicted 2.1%, same as 1965=71
  - Actual for 1972-80, 1.2%

Martin Baily and Robert Gordon, "The Productivity Slowdown, Measurement Issues, and the Explosion of Computer Power" 1988

- **Their slowdown 1.6% between 1948-73 and 1973-87**
- **Most measurement errors equal pre- and post-1973**
- **Identified 0.5 of measurement issues**
  - **Age-sex composition, other labor quality issues**
  - **Computer power? Emphasized advances in finance, communications should be credited to durable mfg**
- **Conclusion: most of slowdown was real**
- "the impetus to productivity advance in the early postwar years, perhaps a backlog of innovations and investment opportunities delayed by depression and war, followed, after the mid-1960s, by a depletion of opportunities"

William Nordhaus, "Productivity Growth and the New Economy" (2002)

- New income-side industry database
- Distinguished between
  - "Pure productivity effect" with constant output shares
  - "Baumol effect", impact of shifting output shares (0 for post-1977)
  - "Denison effect", impact of hours-output interaction
- Headline result: post-1995 revival not primarily due to ICT, only a 13% contribution to post-1995 revival in NFPB sector
- Discrepancy with other authors finding much higher ICT shares. Why?
- Discussants: Nordhaus only counted contribution of ICT-producing industries, not ICT using industries
- Current consensus: ICT production and use explains most post-1995 revival

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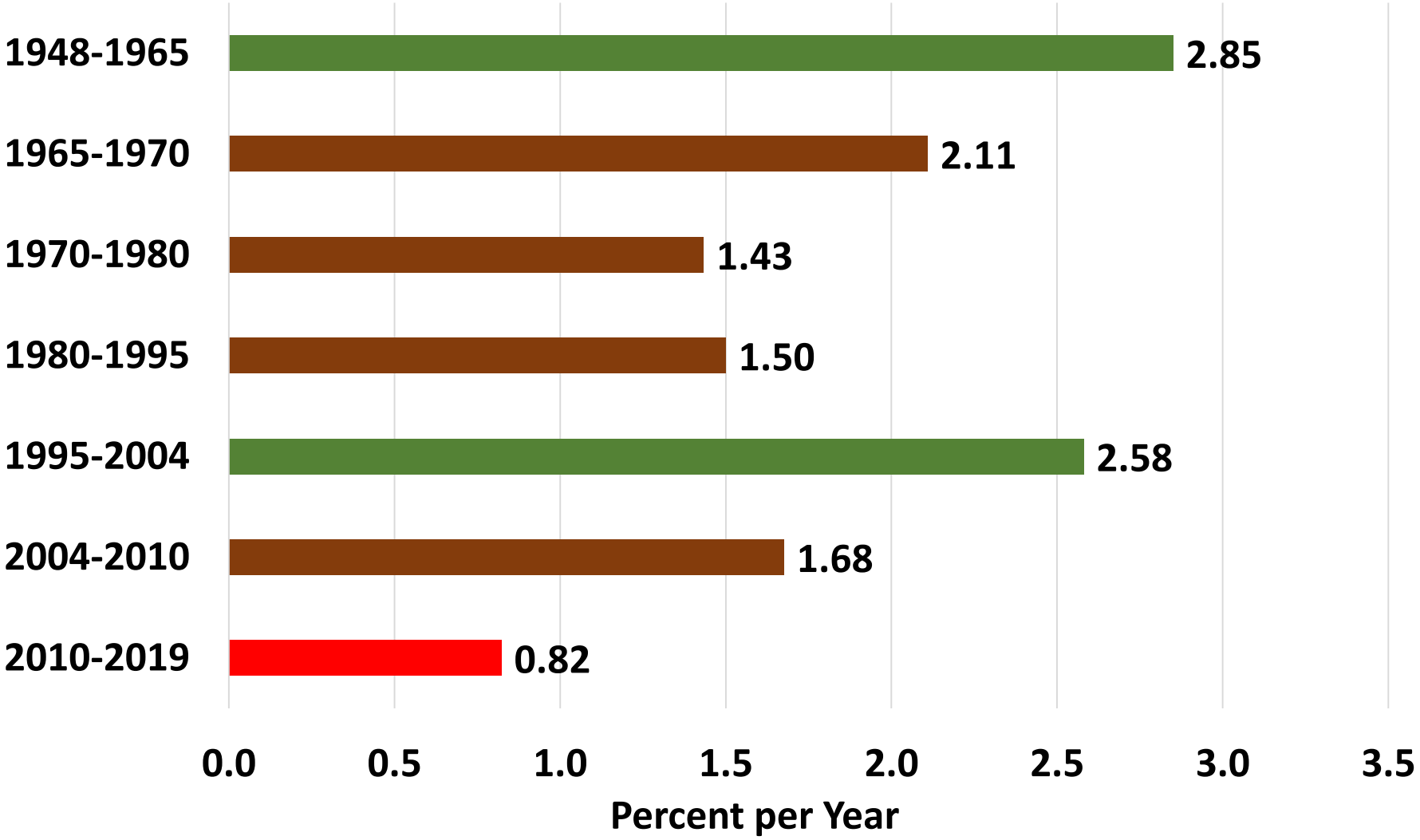

Erik Brynjolfsson *et al.*, "Intangible Capital: Computers and Organizational Capital" (2002)

- Studied hundreds of computer-using firms over 11 years
- Effectiveness of ICT on productivity depends on business organization and practices
  - Use of teams, individual decision making authority, broadly defined jobs, investment in skills and education
- Headline result: Firm market value responds MUCH more to computer capital than to other types of capital
  - $1 of computer capital produced $15 of market value
  - Addition of organizational capital didn't change much
- Concern: reverse feedback. High MV firms can buy computers
- Example of successful ICT-using firm: Walmart
  - Big-box store format, computer-driven redesign of supply chain

The Rich vs. the Poor, or, Why the Poor Don't Converge

- New attention of BPEA to international growth issues in 1990s
- One reason why average citations were so high in 1990s and 2000s Robert Lucas ". . . it is hard to think of anything else"
- Papers broaden the traditional sources of growth literature
- Traditional: $Y = AF(K,H,N)$
- New: $Y = A(T,G,P)\ F(K,H,R,N)$
- Where added growth contributions come from
  - T = Technology
  - G = Geography
  - P = Political and Other Institutions
  - R – Infrastructure, particularly electricity

Greg Mankiw, "The Growth of Nations" (1995)

- Why some nations so rich, other so poor
  - Long neglected topic in economics, now much attention
- Well-known failings of Solow growth model with only K
  - Predicted smaller differences rich vs. poor
  - Predicxted faster convergence
  - Predicted larger differences MPK, much higher in poor countries
- Difficulties fade away with K and H, capital's share 2/3 not 1/3
- Endogenous growth models?
  - Hard to check with international data
  - Didn't explain East Asia where growth in K,H more important, not TFP
- Flaws in cross-country regressions
  - Simultaneity (growth made RHS variables larger)
  - Multicollinearity, low degrees of freedom (few years, many variables)
- Concl: not enough progress on why S and I so high vs. low

David Bloom and Jeffrey Sachs, "Geography, Demography, and Economic Growth in Africa (1998)

- Downplayed macro policy, market liberalization, institutions
- Geography:
  - Hot, humid, host to infectious diseases
  - No monsoon, frequent droughts
  - Natural toll, plus deterred foreign settlement and investment
- Topography
  - Lack of deep harbors and navigable rivers in some countries
  - Some countries land-locked, high transportation costs
  - Isolation a major cause of slow growth
- Demography
  - High fertility (social norms, lack of education)
  - High ratio of dependent youth, deterred S and I

Bloom and Sachs, (continued)

- Conclusion: Causation ran from geography and demography to politics and institutions with little reverse causation
  - Geography and demography explained 2/3 of growth deficit
  - Africa only place where 1980-96 negative growth in real net exports
- Policy
  - Encourage low capital-intensive manufacturing
  - Encourage privately financed infrastructure (cash-strapped governments)
- Discussants strongly disagreed
  - Civil wars, dictatorships
  - High political risk of appropriation
  - Poor information, lack of telephone service, electricity

Barry Bosworth and Susan Collins, "The Empirics of Growth: An Update" (2003)

- Growth accounting vs. regressions, differing conclusions regarding importance of S & I vs. TFP
- Differences depending on direct or indirect measures of K
- Differing results on role of H reflected differing measures of educational quality that were poorly correlated w/ each other
- New data, 84 countries, 1960-2000, improved measurement
  - Increased emphasis on K due to improved measurement
  - Less emphasis on H due in part to problems w/ educational quality
- Strongly correlated with growth
  - Initial life expectancy
  - Law and order, absence of corruption, protection of property rights
- Negative results
  - No role for macro policy or openness to trade
  - No explanation why growth slowed after 1980

Concluding Comments

- U.S. productivity growth
  - 1970-1995 slowdown, only limited role for age-sex composition or industry composition, more important was diminishing returns to the great inventions of the second industrial revolution
  - 1995-2004 revival: importance of ICT capital up to 2000, diffusion of new ICT-driven methods of business operation 2000-2004
  - Post-2010 slowdown remains unexplained. A role for dimishing returns to computer investment, plus a lot of unmeasured consumer surplus coming from new devices and free internet
- Rich vs. poor countries
  - No convincing explanation yet why slowed post-1980, revived post-2000, even to some extent in Africa
  - Remaining puzzles about huge success of East Asia, partial success south Asia, relative to other places
- Plenty of remaining puzzles for future BPEA authors