

Secular Stagnation: A Supply-Side View

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Origins of Secular Stagnation on the Supply Side

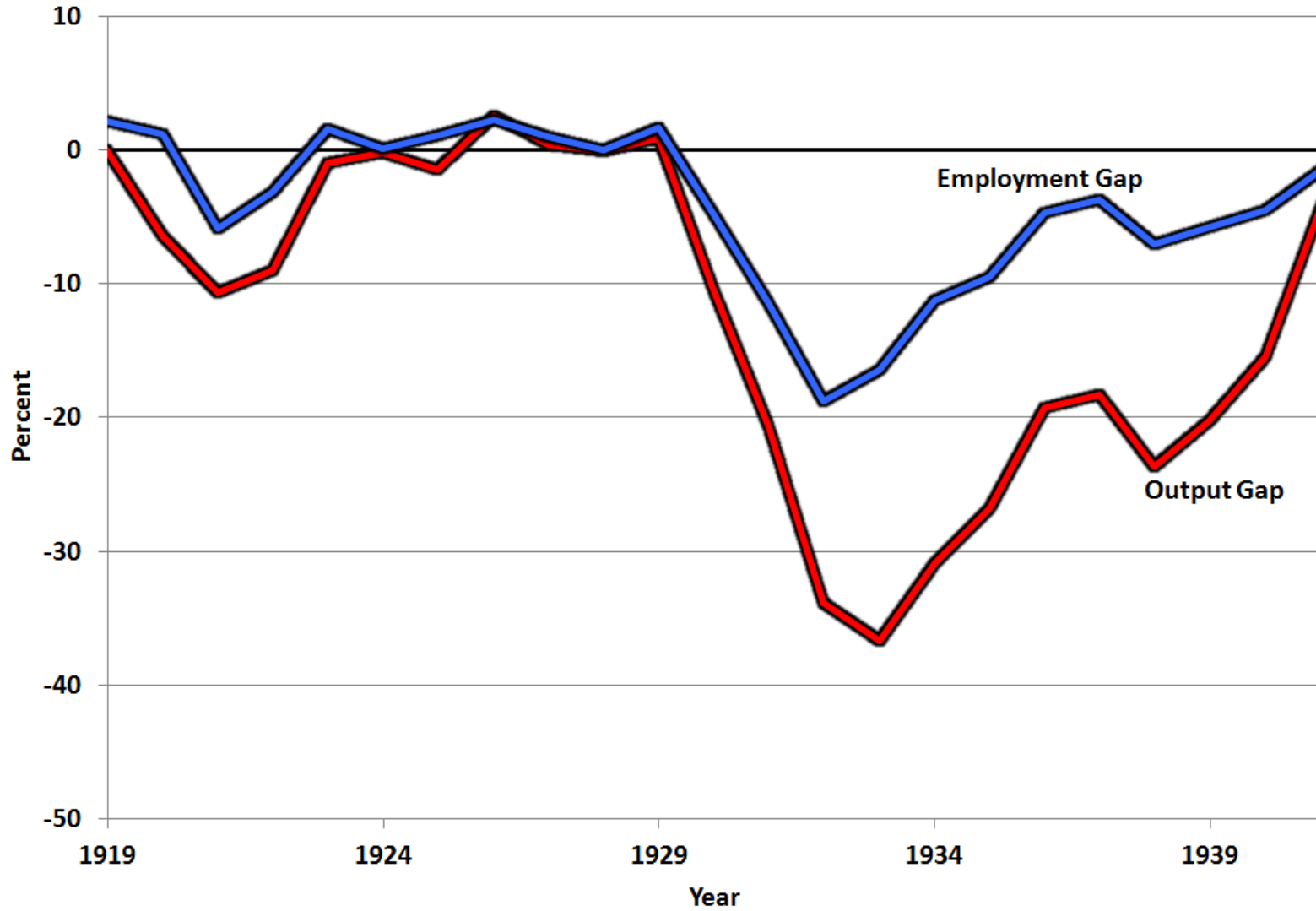
- **Secular Stagnation: slow not no growth**
- **Sources emanate from supply side:**
 - Hansen in 1938: slowing population growth
 - Today 2015: slowing potential GDP growth
 - 1974-2004: 3.12% 2004-2015: 1.56%
 - Potential Output per Hour
 - Potential Hours of Work
 - Working-age Population
 - Labor-force Participation Rate (LFPR)
- **Difference for Hansen: Productivity growth in late 1930s was very fast, hence his concern about population growth**

Why Secular Stagnation Matters

- **Direct AS Effects:** low productivity growth, declining LFPR reduce growth in output per capita
- **Indirect Effects:** any source of slow potential output growth reduces net investment
 - Basic idea: steady state with fixed long-run capital-output ratio
 - Slower output growth means slower growth in capital
- **Lower net investment:** reduces aggregate demand and feeds back to lower productivity growth
- **Hansen 1938:** the AD channel from population
- **Today 2015:** the AS channel from LFPR and slow productivity growth

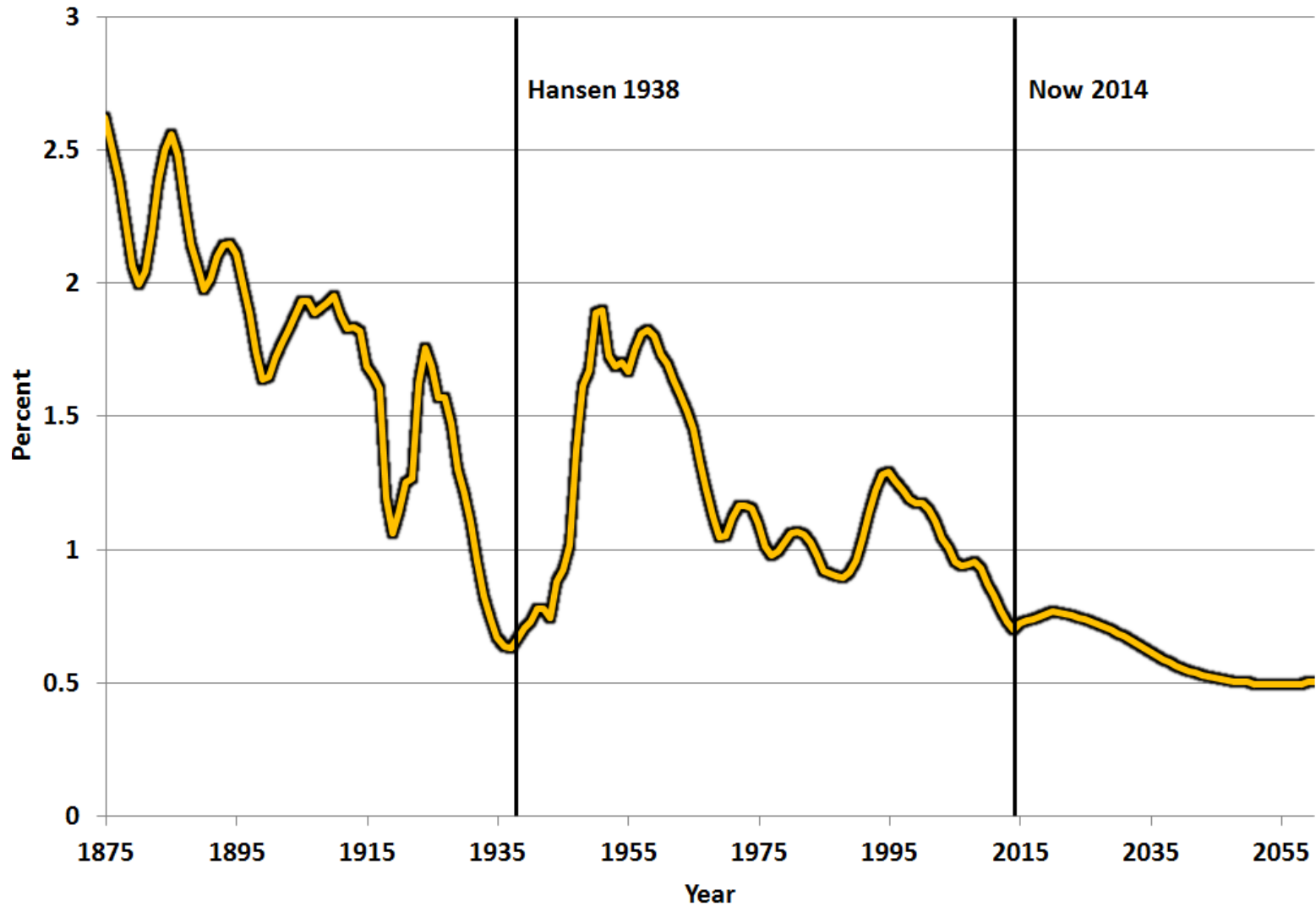
For Hansen the Problem Was Inadequate Aggregate Demand

Figure 1. Output Gap vs. Employment Gap, 1919 to 1941.

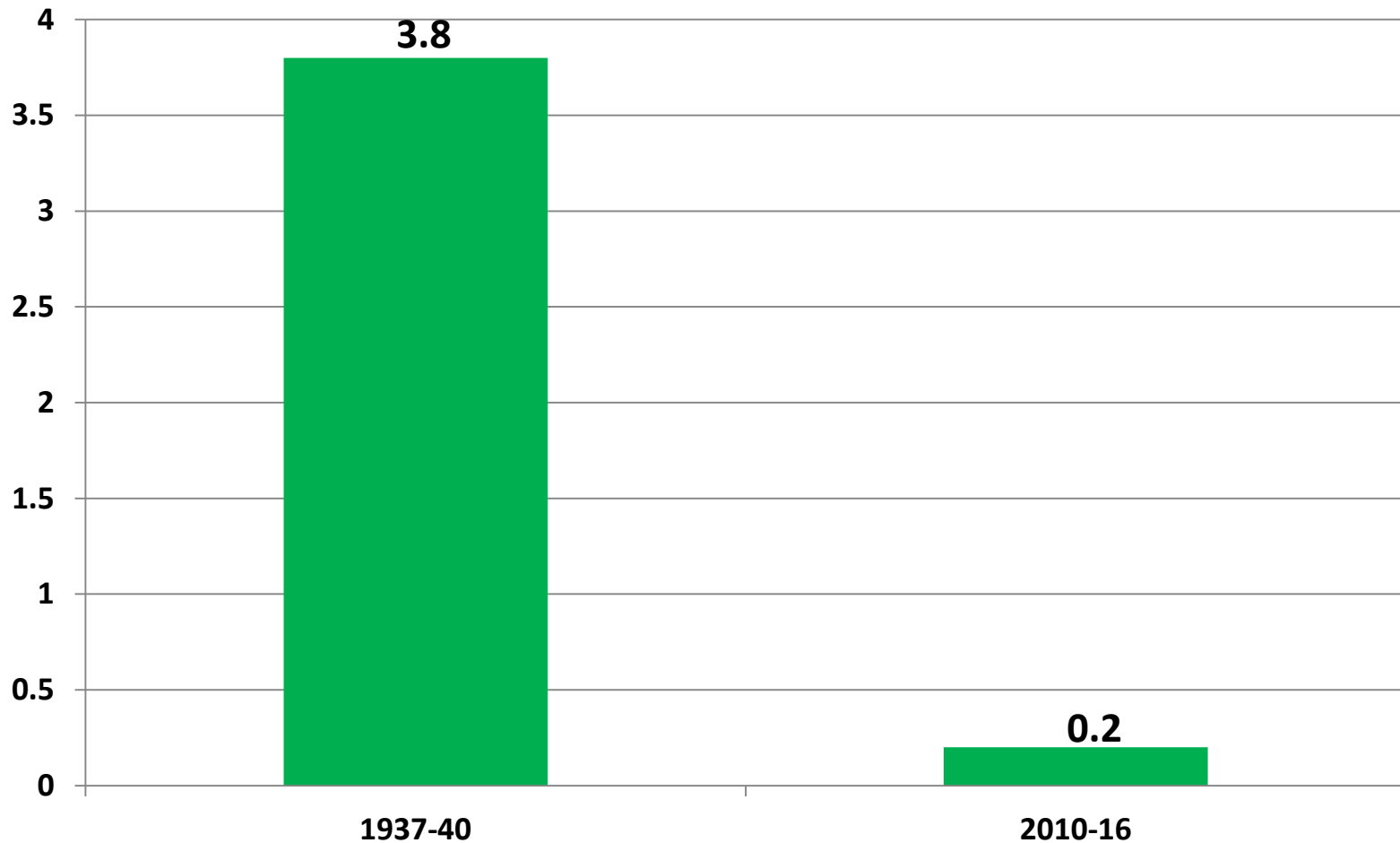


Population Growth 1875-2060

Figure 2. Annual Growth Rate of Population, 1875 to 2060.



Why Hansen Wasn't Worried About Productivity Growth



Slowing Productivity Growth As a Source of Secular Stagnation

- The best organizing principle to think about innovation is to distinguish among the industrial revolutions (IR #1, IR #2, IR #3).
- *The 1st IR occurred 1770-1840, continued impact through 1900*
 - Steam engine, railroad, steamships
 - Cotton spinning and weaving
 - Transition from wood to steel

***The 2nd IR occurred 1870-1920,
continued impact through 1970***

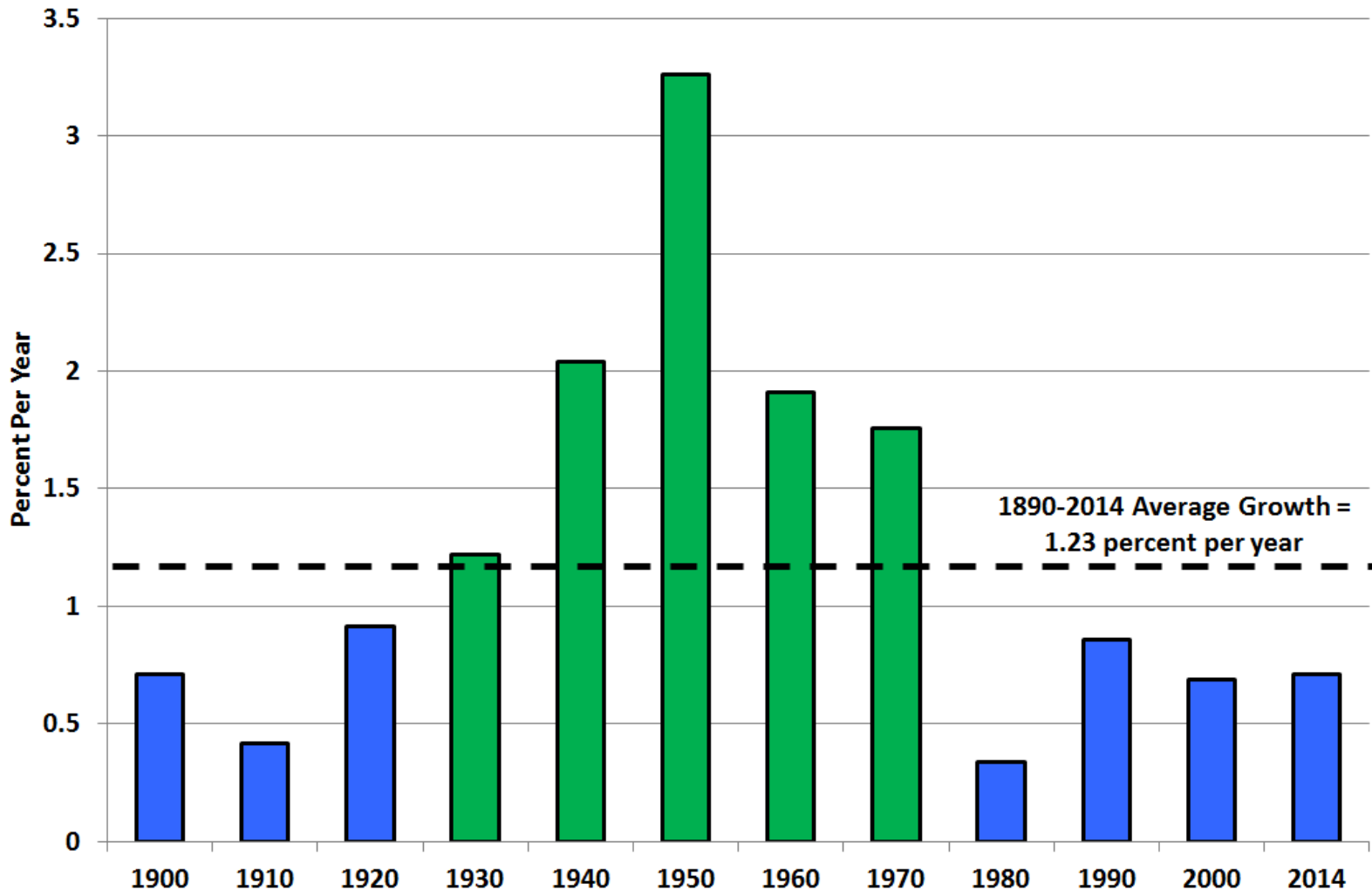
- **Electricity, light, elevators, machines, air conditioning**
- **Internal combustion engine, vehicles, air transport**
- **Telephone, phonograph, movies, radio, TV**
- **Running water, sewer pipes, and the conquest of infant mortality**
- **Chemicals, plastics, antibiotics, modern medicine**
- **Utter change in working conditions, job & home**

Third Industrial Revolution

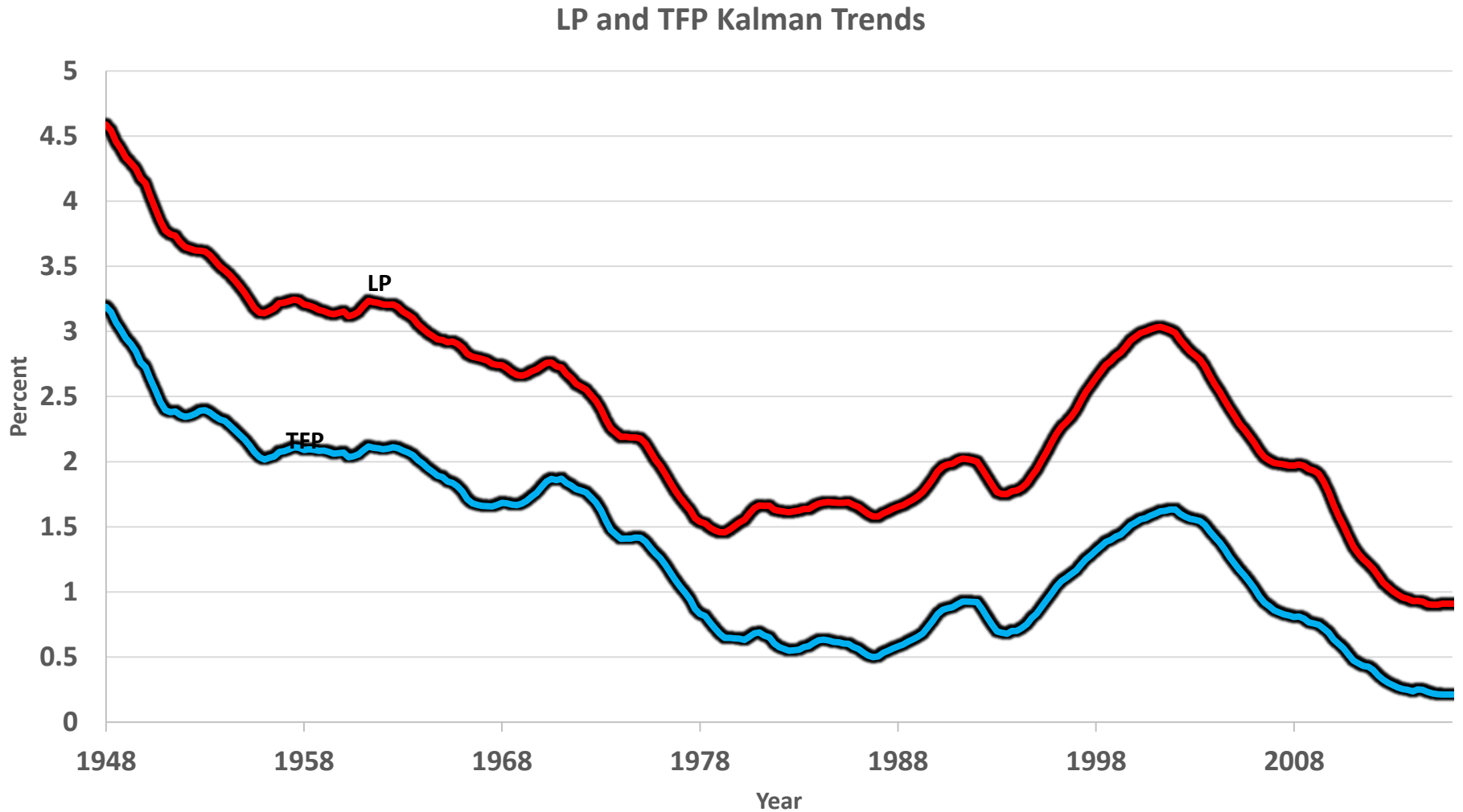
- **Since 1960 the “EICT” Revolution**
 - **Entertainment: the evolution of TV from color to time-shifting and streaming**
 - **Information Tech – the evolution from mainframes to PCs, the web, and e-commerce**
 - **Communications: mobile phones, smart phones**
 - **Productivity enhancers: ATM, bar-code scanning, fast credit card authorization**

The Powerful But Delayed Impact of IR #2 on TFP Growth

Figure 3. Annual Growth Rate of Total Factor Productivity for Ten Years Preceding Years Shown, Years Ending in 1900 to 2014



Kalman Trends of Labor Productivity and TFP, Private Economy, 1948-2016



IR #3 Has Failed the TFP Test

- **Failure #1: TFP growth post-1970 barely 1/3 of 1920-70**
- **Failure #2: IR #3 boosted TFP growth only briefly 1996-2004**
- ***STARTLING QUESTION: HAS MOST OF THE PRODUCTIVITY IMPACT OF THE THIRD INDUSTRIAL REVOLUTION ALREADY HAPPENED?***

The IR #3 Changed Business Practices Completely 1970-2005

- **Transformation in offices completed by 2005.**
 - 1970 mechanical calculators, repetitive retyping, file cards, filing cabinets
 - 1970s and 1980s. Memory typewriters, electronic calculators, PCs with word processing and spreadsheets
 - Late 1980s. E-mail, interconnected PCs within firms
 - 1990s. The web, search engines, e-commerce
 - 2000-05 flat screens, home broadband, revolution in business practices was over

The IR #3 Changed Business Practices Completely 1970-2005

- **Transformation in retailing completed by 2005**
 - **1980s and 1990s Wal-Mart led big box revolution in supply chain, inventory management, dynamic pricing**
 - **Check-out revolution: bar-code scanners, credit/debit card authorization technology**

More Achievements Completed by 2005

- **Finance and Banking**
 - **1970s and 1980s, ATM machines**
 - **1980s and 1990s. Transition from multi-million share trading days to multi-billion share days**

Large Sectors Not Contributing to Productivity Growth

- **Medicine**
 - Electronic medical records are here
 - But they have not replaced either doctors nor nurses, complements not substitutes
- **Education**
 - Little impact so far of on-line learning in elementary, secondary, or higher education
 - Cost inflation due to bloat of administrative staff

Innovations Continue But How Important Are They?

- **3-D Printing**
 - Greatly speeded up speed and efficiency of designing prototypes, not mass production
- **Robots**
 - Robots date back to 1961, by mid-1990s were welding and painting auto bodies
 - **Robot description from *NYT***

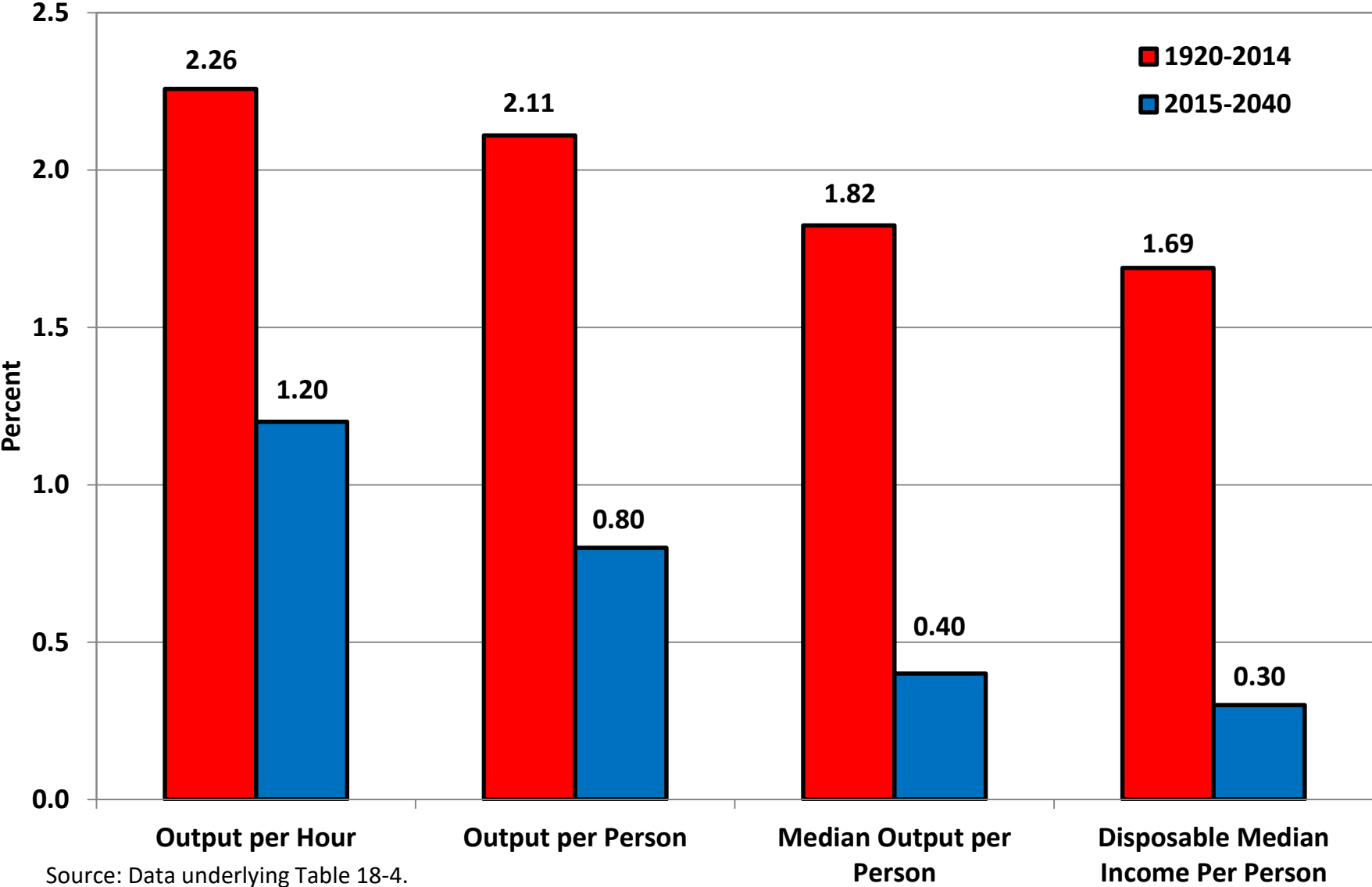
Innovations Continue But Are Evolutionary Not Revolutionary

- **Driverless Cars and Trucks**
 - Truck drivers don't just drive trucks, they unload them and stock the shelves
- **Artificial Intelligence**
 - Predominant uses of big data are in marketing, zero-sum game
 - Evolutionary change: legal searches, radiology reading, voice recognition, language translation

Combined Effects of the Four Headwinds

- **Education headwind reduces productivity growth**
- **Demographic headwind reduces hours per person**
- **Inequality headwind reduces median growth below average growth**
- **Fiscal headwind raises taxes or reduces transfer payments**

Figure 18-5. Annual Growth Rate of Alternative Real Income Concepts, Actual Outcomes 1920-2014 and Projected Values 2015-2040



Conclusions

- **70 percent of all TFP growth since 1890 occurred 1920-70, attributed to IR #2**
- **The big impacts on TFP of IR #3 were largely completed by 2005**
- **Innovation continues but has less impact**
- **Much of the slowdown in future growth is caused by the headwinds**
- **A moderate pace of innovation means that jobs will not disappear *en masse* as predicted by the techno-optimists**