

**The Demise of U.S. Economic
Growth: The Fifth Debate
With Joel Mokyr**

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Output per Person equals Output per Hour times Hours per Person

$$Y/N \equiv Y/H * H/N$$

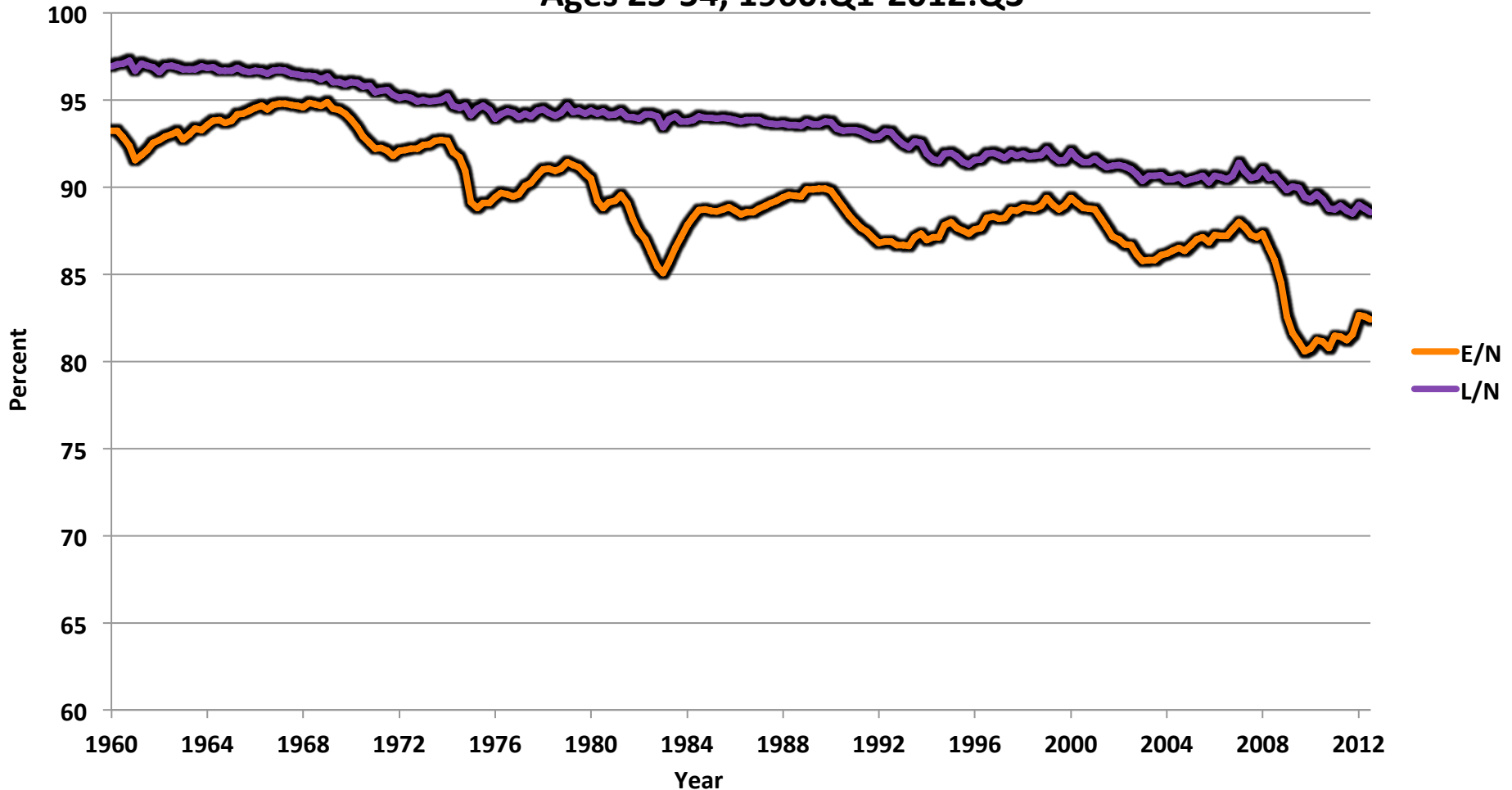
- Productivity growth combines the role of innovations with educational advancement.
- Standard of living can grow faster than productivity if hours per capita increase. Or the reverse can happen.
- Example #1: Women enter the labor force 1965-95
- Example #2: Baby-boomer generation retires.
 - This reduces the growth of our standard of living; someone has to pay the bill for the idle hours of the baby-boomers.

The Decline in Hours per Capita is Not Just About Baby-boom Retirement

- **Prime-Age Males**
 - Employment/Population Ratio 95% in 1968 to 83% in 2012
- **Youth**
 - Employment/Population Ratio 65% in 1988 to 46% in 2012. Only about 1/3 of this decline is accounted for by increased school participation
- **Females 20 and Over**
 - Labor Force Participation Rate rose 35% in 1968 to 58% in 2000, then fell back to 55% in 2012

Prime-Age Male Participation Is Part of the Demographic Headwind

Figure 20: Employment per Capita and Labor Force Participation Rate, Males
Ages 25-54, 1960:Q1-2012:Q3



Second Headwind: Education

- **A major driver of that epochal 20th century productivity achievement was education**
 - **High school completion rate has barely changed since 1970.**
 - **Most people drop out of 2-year community colleges**
 - **College completion is increasing but 40% of recent graduates are in jobs that do not require a college education**
 - **The U. S. is the only developed country where the educational attainment of the 55-64 cohort is the same as 25-34 cohort**
- **U.S. has dropped from #1 to #16 in college completion as percent of population; same for high-school dropouts**
- **This will reduce future economic growth by -0.3 percent per year compared to the contribution of education to 20th century growth**

Third Headwind: Inequality

- **For 1993-2012 the gap between average real income growth of total vs. bottom 99% is -0.53 percent per year.**
- **This is continuing, it's not over. Count the ways**
 - **CEO pay, sports and entertainment stars. (\$10-15 million)**
 - **Wage pushbacks – lower wages, two-tier wages, shaving pension and medical care benefits (Caterpillar, Boeing)**
 - **Firms pushing employees into part-time work (Wal-Mart)**

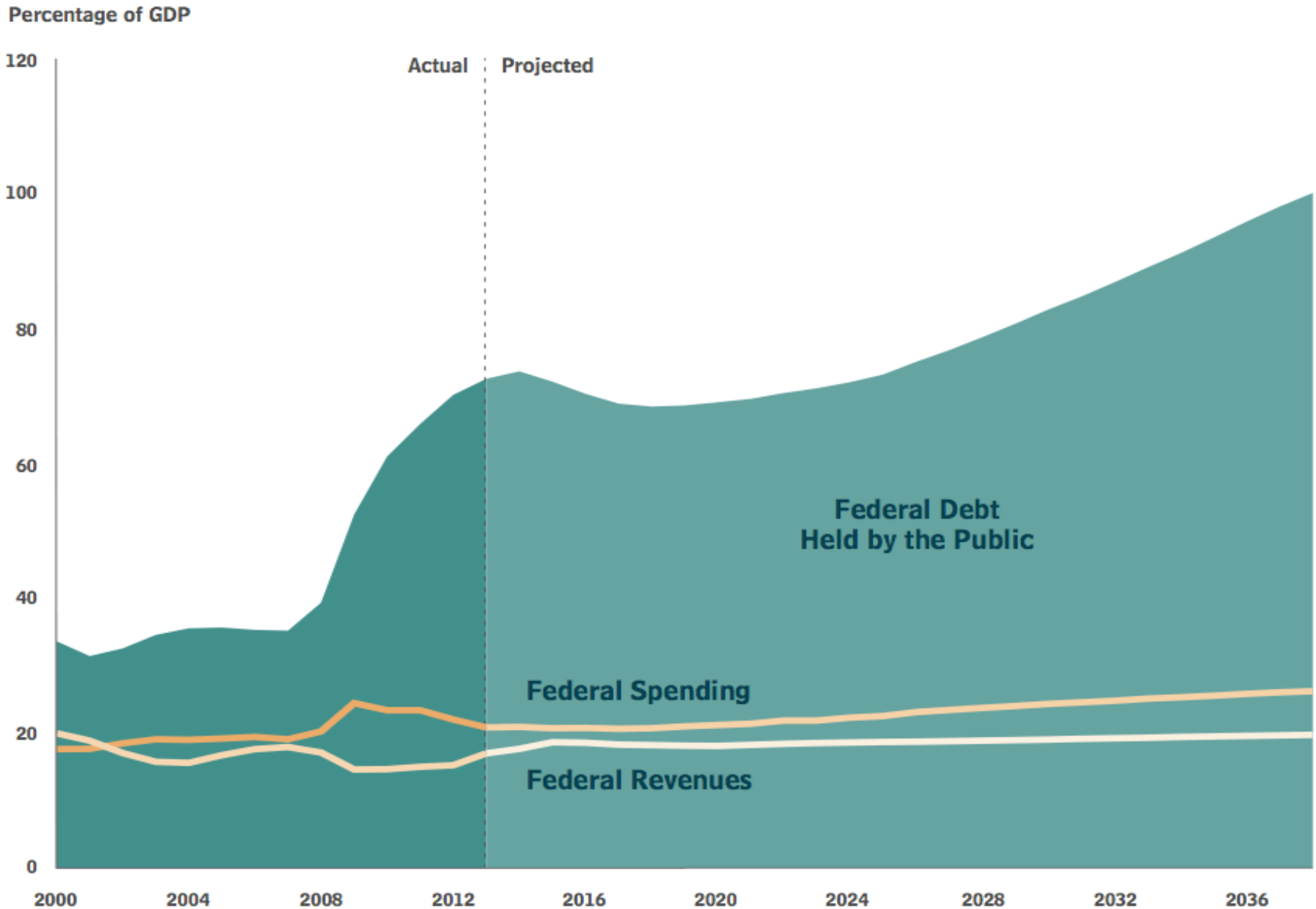
Interaction Demographics, Education, Inequality

- **Charles Murray's division of white population into Belmont (top 20%) and Fishtown (bottom 30%)**
- **Social stability in Belmont, not in Fishtown**
 - **Percent of children of women aged 40 living with both biological parents, change from 1960 to 2010:**
 - **Belmont 98% to 87%**
 - **Fishtown 95% to 35%**
- **Interaction with education: for a child to live without a father at home is a predictor of more high school drop outs in the future**

Further Interactions Poverty, Education, and Inequality

- **Proponents of subsidized early childhood education emphasize the vocabulary gap**
 - Children in the top half arrive in kindergarten with 2 to 3 times the vocabulary of children coming from poverty families
- **In the CPS last year, 20% of children were absent more than one month during the academic year**
 - Only 12% went on to receive any college degree
- **International OECD-run PISA test results for 2013 were released in December, 2013**
 - Of 38 developed countries, U.S. ranked #21 in reading, #24 in science, and #31 in math

Fourth Headwind: Eventually We Have to Raise Taxes and/or Cut Entitlement Spending Growth

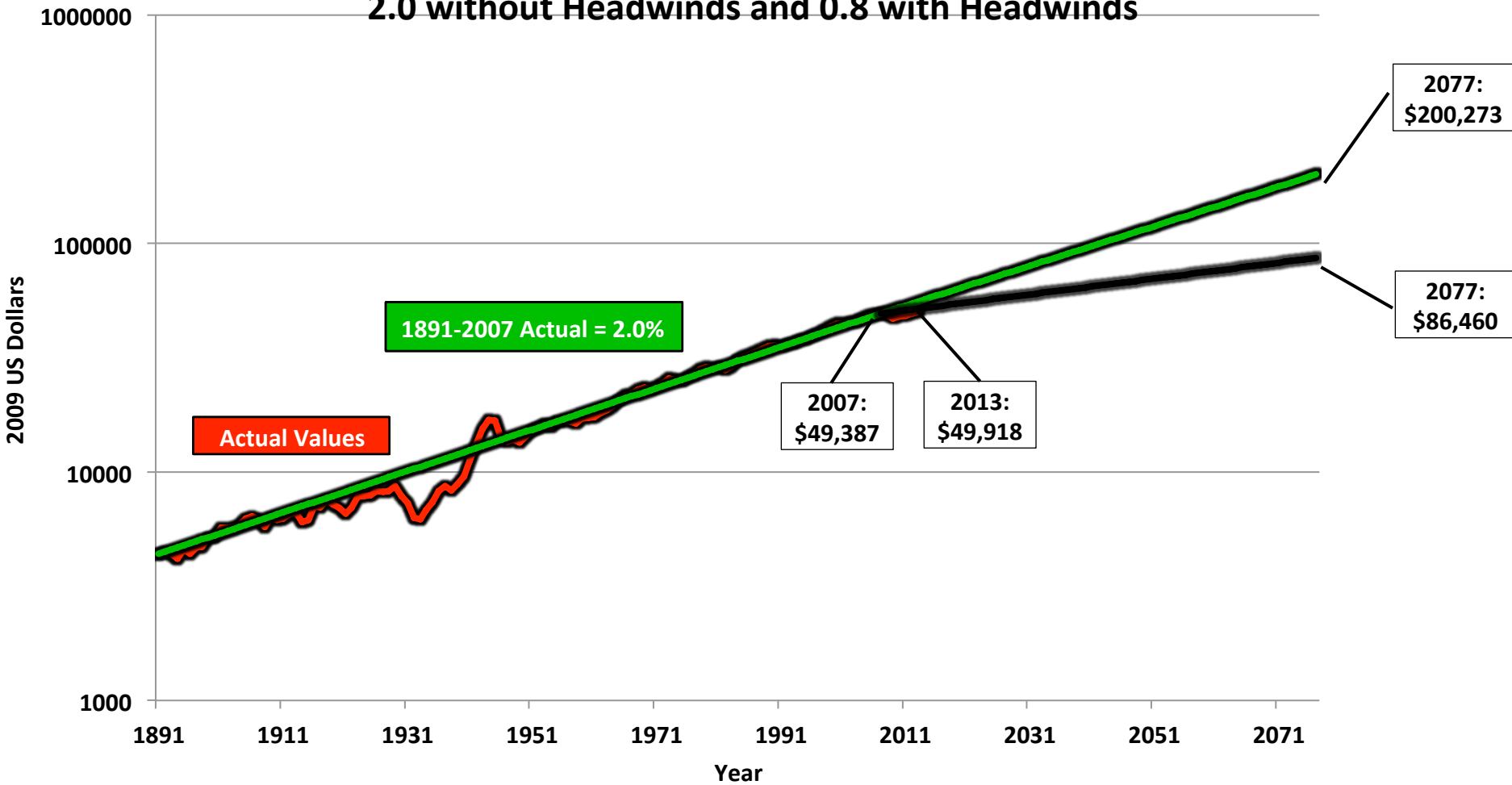


Fiscal Fix Will Reduce Growth in Disposable Income

- **This chart understates future growth in debt/GDP ratio because it is overly optimistic on future GDP growth**
- **Many state/local governments have huge pension liabilities**
- **Solutions at all levels of government will require faster growth of taxes and/or slower growth of benefits**

Subtracting the Headwinds from Future Growth

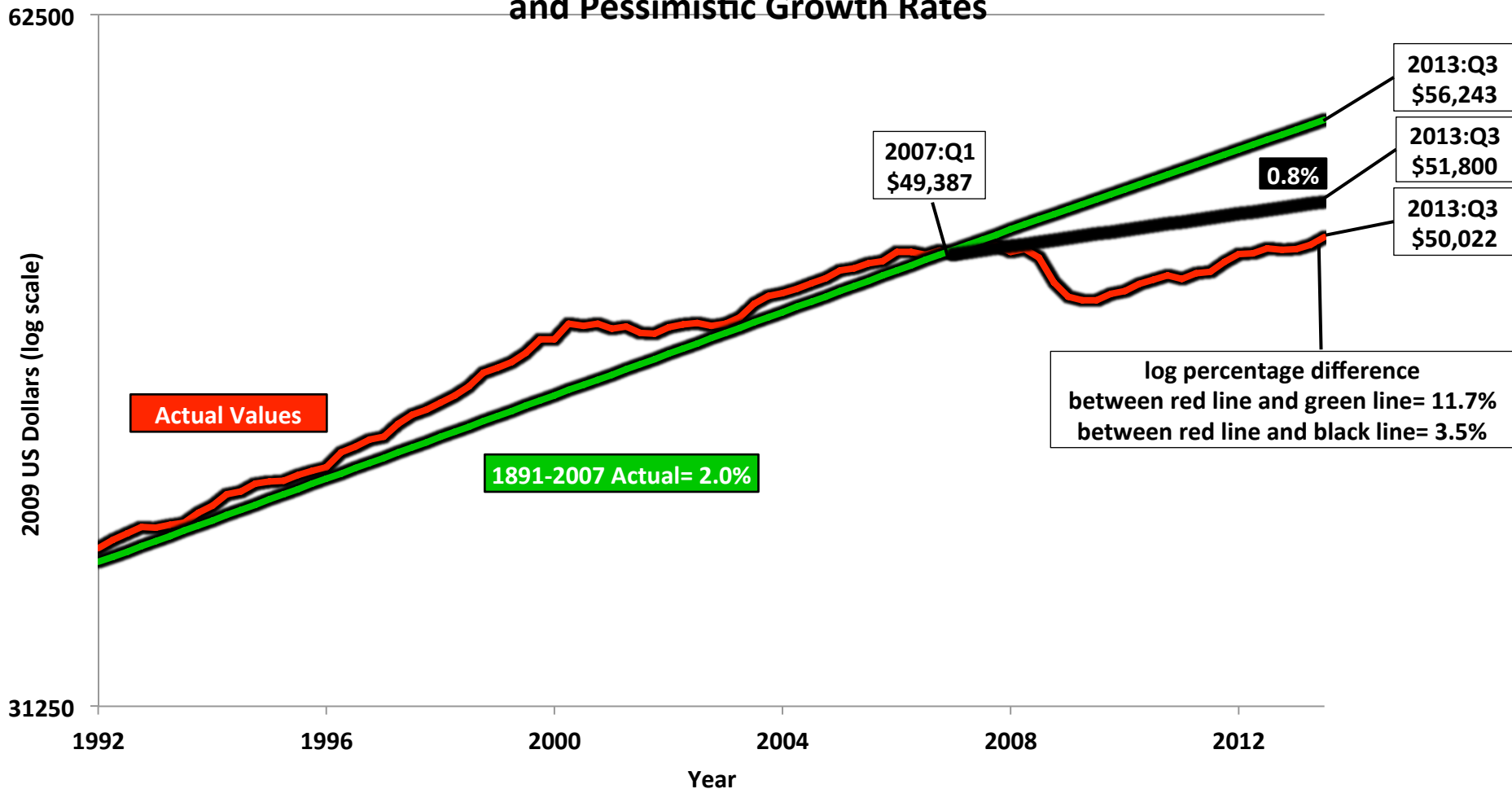
Figure 3. Future Economic Growth, 2.0 without Headwinds and 0.8 with Headwinds



How Are We Doing Now?

12% Below Green, 4% Below Black

Figure 4. Level of Real GDP per Capita through 2013:Q3, Actual, Optimistic, and Pessimistic Growth Rates

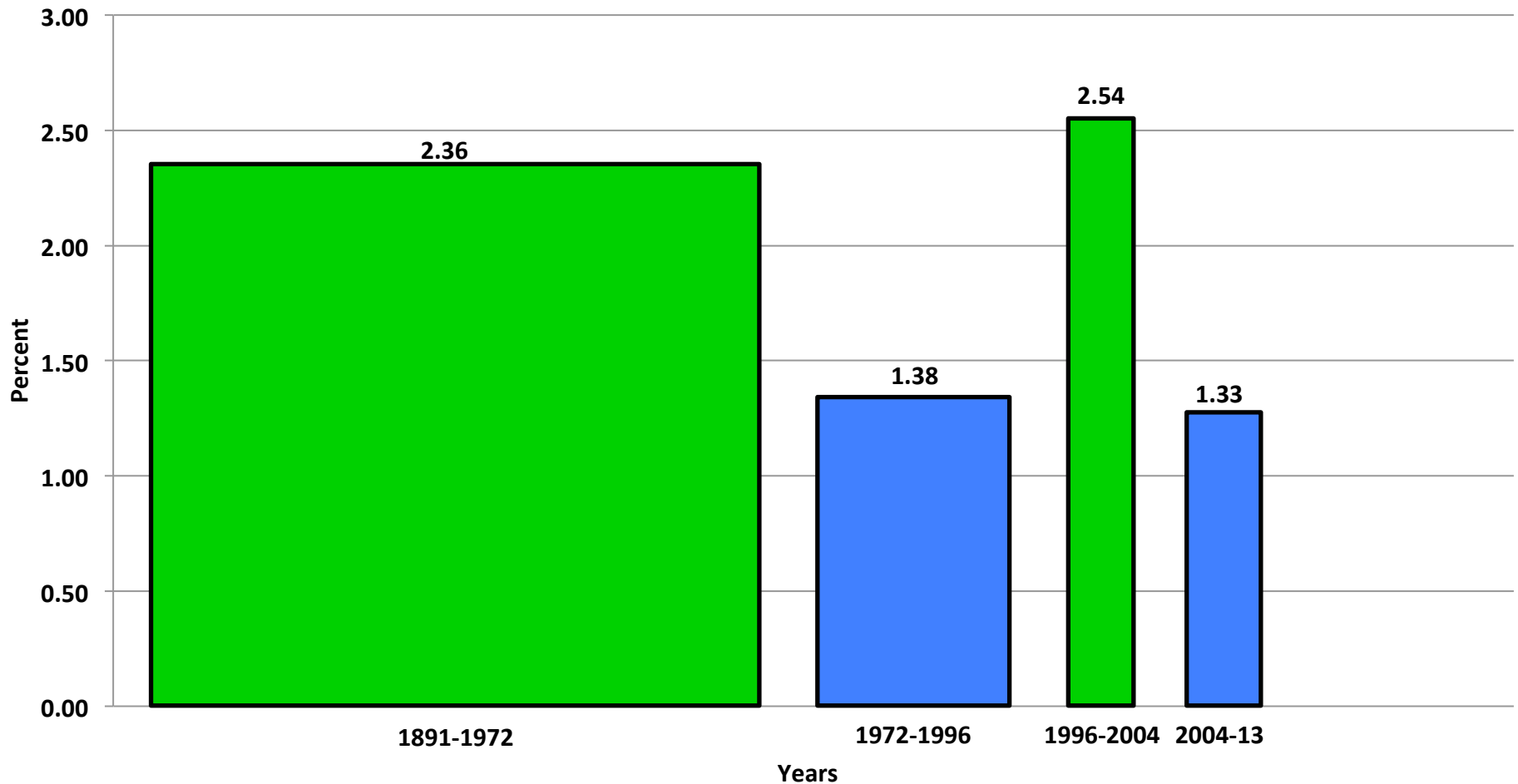


Now Let's Switch from the Headwinds to the Outlook for Innovation and Future Productivity Growth

- **Standard growth accounting decomposes growth in labor productivity into contributions of:**
 - growth in labor quality
 - effect of capital deepening (K/N)
 - residual (= total factor productivity or TFP)
- **But capital deepening is endogenous to TFP (Evsey Domar quote about plows)**
- **Thus growth in labor productivity reflects long-term effects of education and innovation broadly defined**

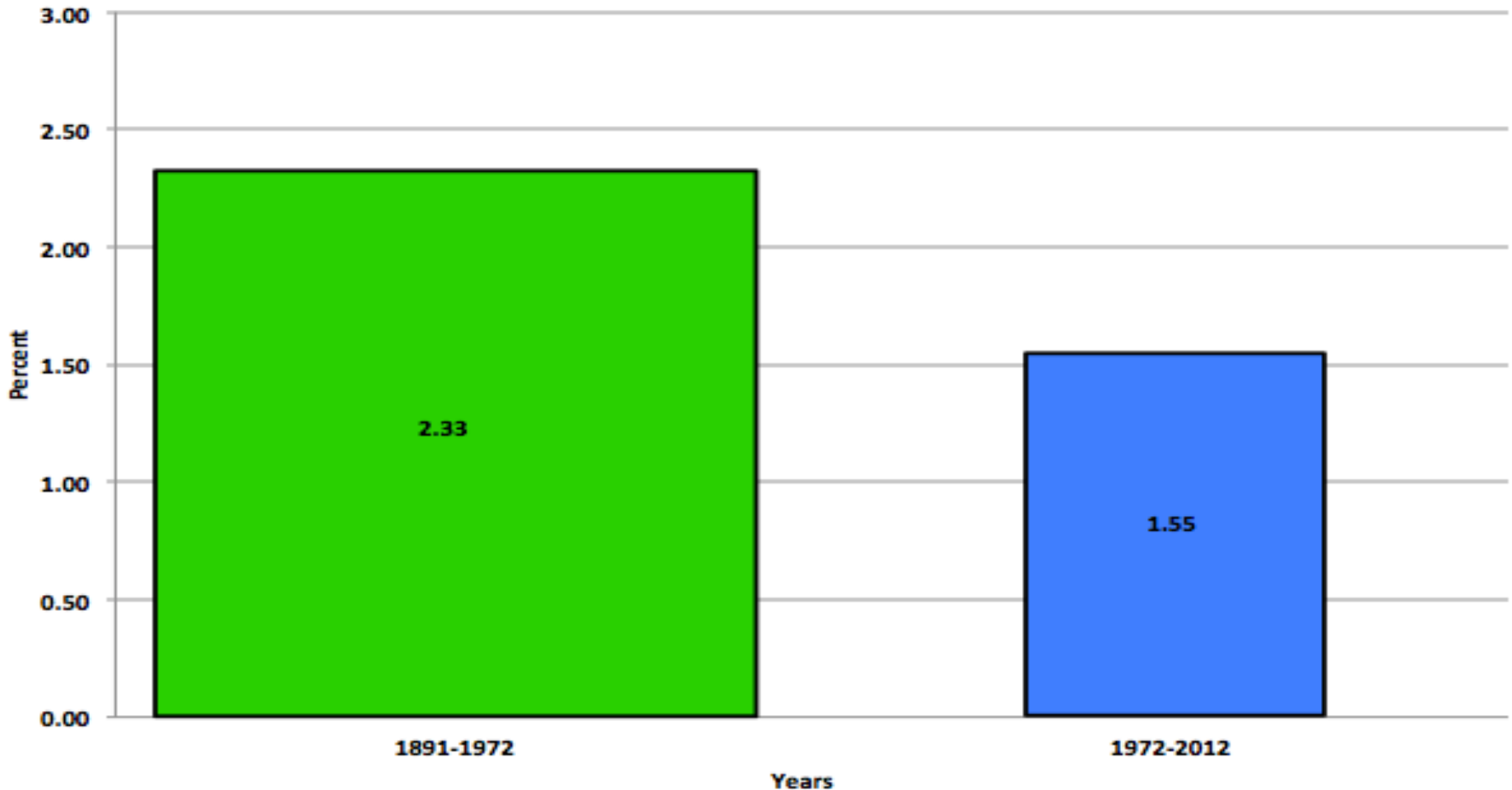
Productivity Growth: Innovation Plus Education

Figure 5. Annualized Growth Rates of Output per Hour, 1891-2013



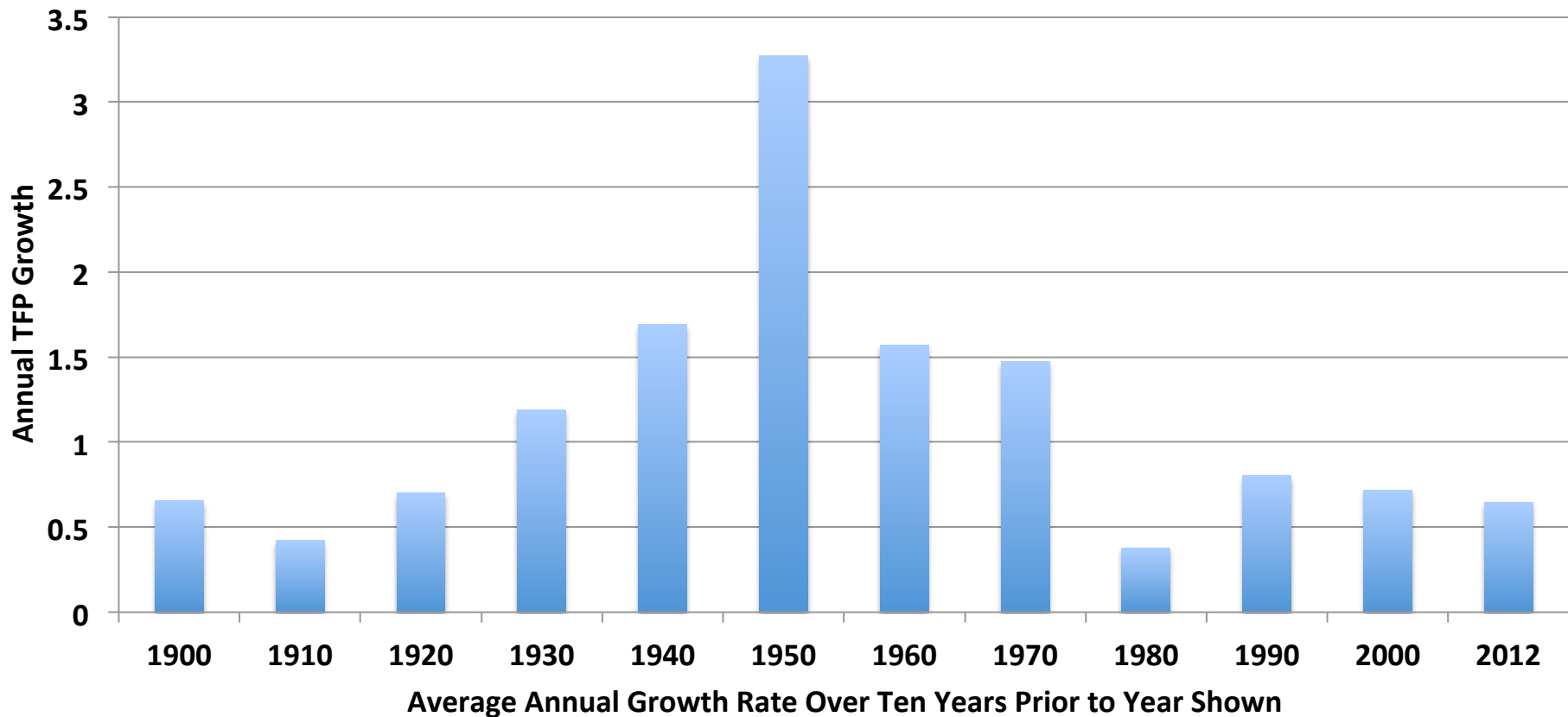
The Second Industrial Revolution vs. the Third Industrial Revolution

Figure 2.2: Annualized Growth Rates of Output per Hour , 1891-2012



TFP Growth by Decade, 1890-1900 through

10-Year Average Annual Growth in Total Factor Productivity, 1900-2012



Why Did Productivity Grow Faster In the Century Before 1972? The One-Time-Only Inventions

- Polluting flames for light >> instant on-off electric light**
- Factory power with steam engines and belts >> electric machine tools and hand tools**
- Offices and home cold and hot >> central heating and air-conditioning**
- Horses >> motor vehicles and air travel**
- Mainly rural 1870 >> mainly urban 1950**

More One-Time Changes Before 1972

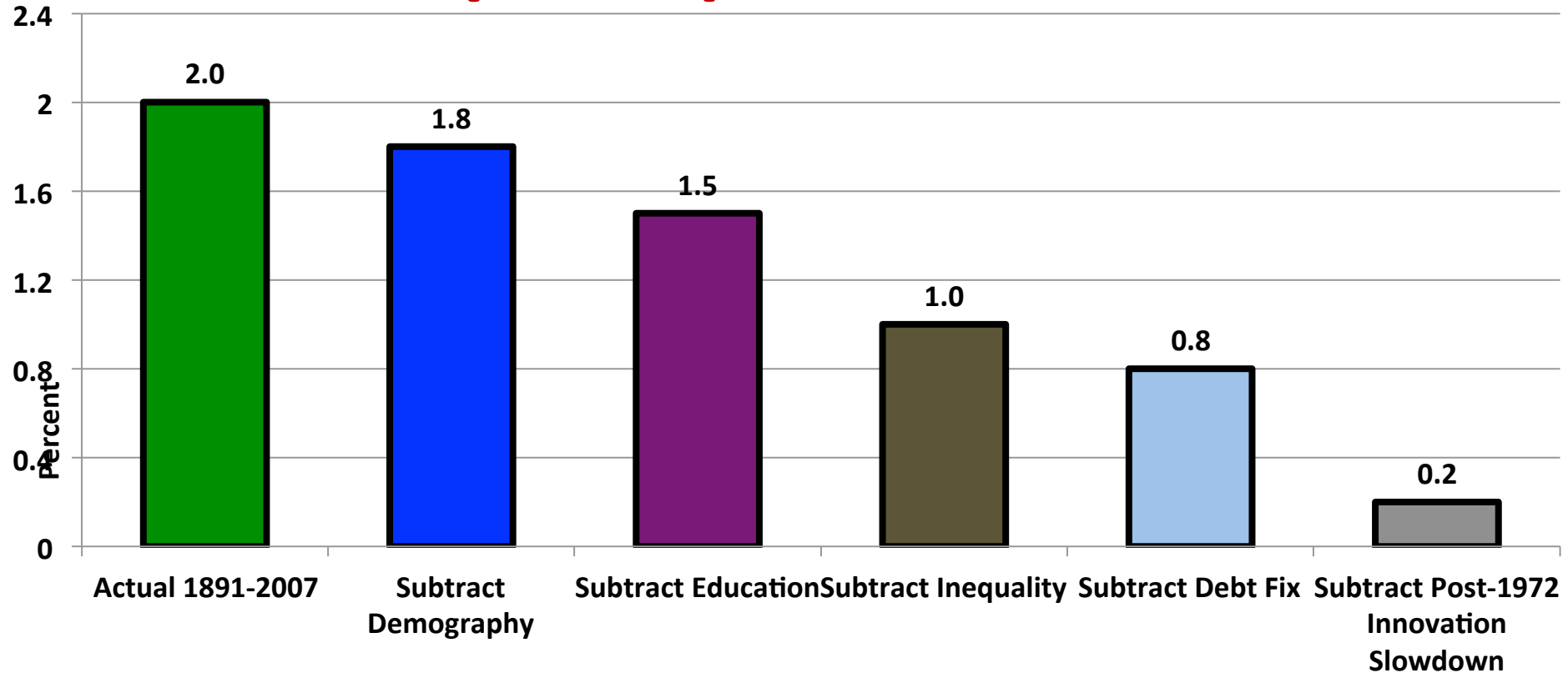
- Carrying pails of water >> running water
- Outhouses >> indoor bathrooms
- Infant mortality 20% >> infant mortality 1%
- Child labor. 1890 almost half of 14-15 year old boys were in the labor force >> almost none after 1940
- Isolation >> telephone + phonograph + radio + TV

Summing Up, Why Was Productivity Growth Faster Before 1972 than After?

- *The 2nd IR consisted of at least five dimensions of Great Inventions*
 - Each invention had spinoffs developed over 1890-1972
- In contrast the post-1960 3rd IR has been limited to one dimension, the ICT revolution, the digital economy
 - Its productivity impact was limited to 1996-2004

Summary of Subtraction

from 2.0 to 0.2, Disposable Real Income per Capita of Bottom 99%



Framing the Debate About Future Innovation

- **My forecast of productivity growth for the 25 years after 2007 assumes that innovation will proceed at the same pace as the last 40 years**
- **Many innovations will occur over the next 40 years, but will they be as important as the last 40? They must be as important, or else my growth forecast is too optimistic**

The Next 40 Like the Last 40? What a Stunningly Optimistic Outlook!

- **The next 40 years must bring us innovations as important as**
 - **The PC, the internet, e-commerce**
 - **Mobile phones, smart phones & ipads**
 - **Digitalization of library catalogues and parts catalogues**
 - **Instant free access to all the world's information**
 - **Revolution in office equipment and procedures**
 - **Bar-code scanning, the ATM machine, i-tunes, cable TV, CDs, DVDs, movie streaming**

Can Future Innovation Be Forecast in Advance

- **The myth that the future cannot be forecast.**
 - **“Any pessimist gazing into the future is condemned by a lack of imagination and doomed to repeat the mistakes of past pessimists.”**
- **The techno-optimists in making their predictions about the future are making guesses, just like those who are less optimistic. Optimism and pessimism are symmetric regarding future-gazing**

Comments on Techno-optimists, Brynjolfsson and McAfee

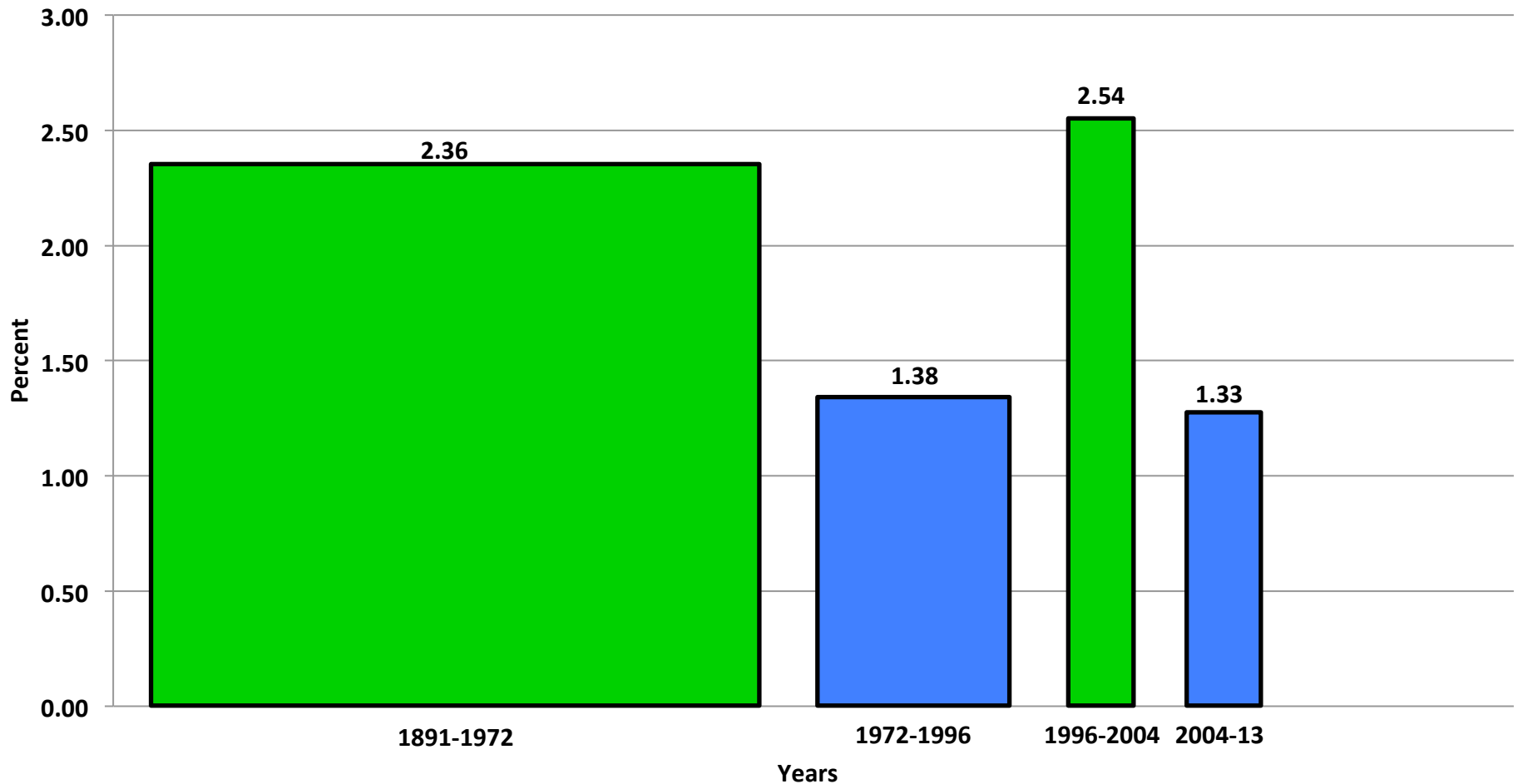
- **Their optimism centers on an explosion of data – billions >> trillions >> quadrillions (“BIG DATA”)**
- **Small, easily programmable robots**
- **Driverless cars, trucks, and taxis**
- **The genome will make possible advances in medical and pharmaceutical technology**

They Are Slippery on Timing, Past vs. the Future

- Their book *Second Machine Age* claims that we are at a “point of inflection” toward an acceleration of technological change
- Yet they include as future progress things that have already happened in the past
- “Andy now sends Erik a file as an e-mail attachment whereas before he sent it as a floppy disk”.
- *Sorry, guys, we’ve been doing this since at least 1993!*
- Productivity growth has not responded to the innovations of the last decade
- Examples of how different were the late 1990s from the past decade

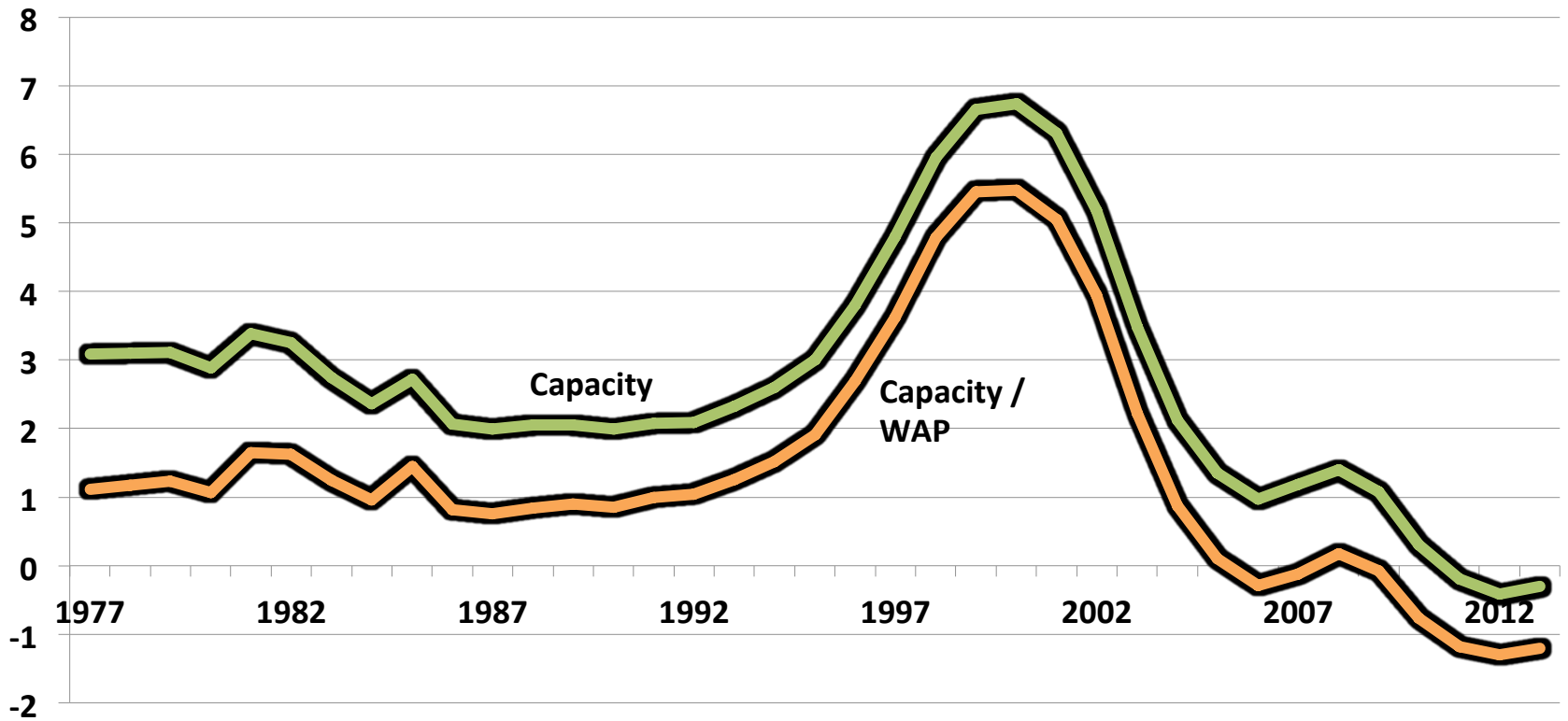
Four Pieces of Evidence That the Late 1990s Were Special

Figure 5. Annualized Growth Rates of Output per Hour, 1891-2013



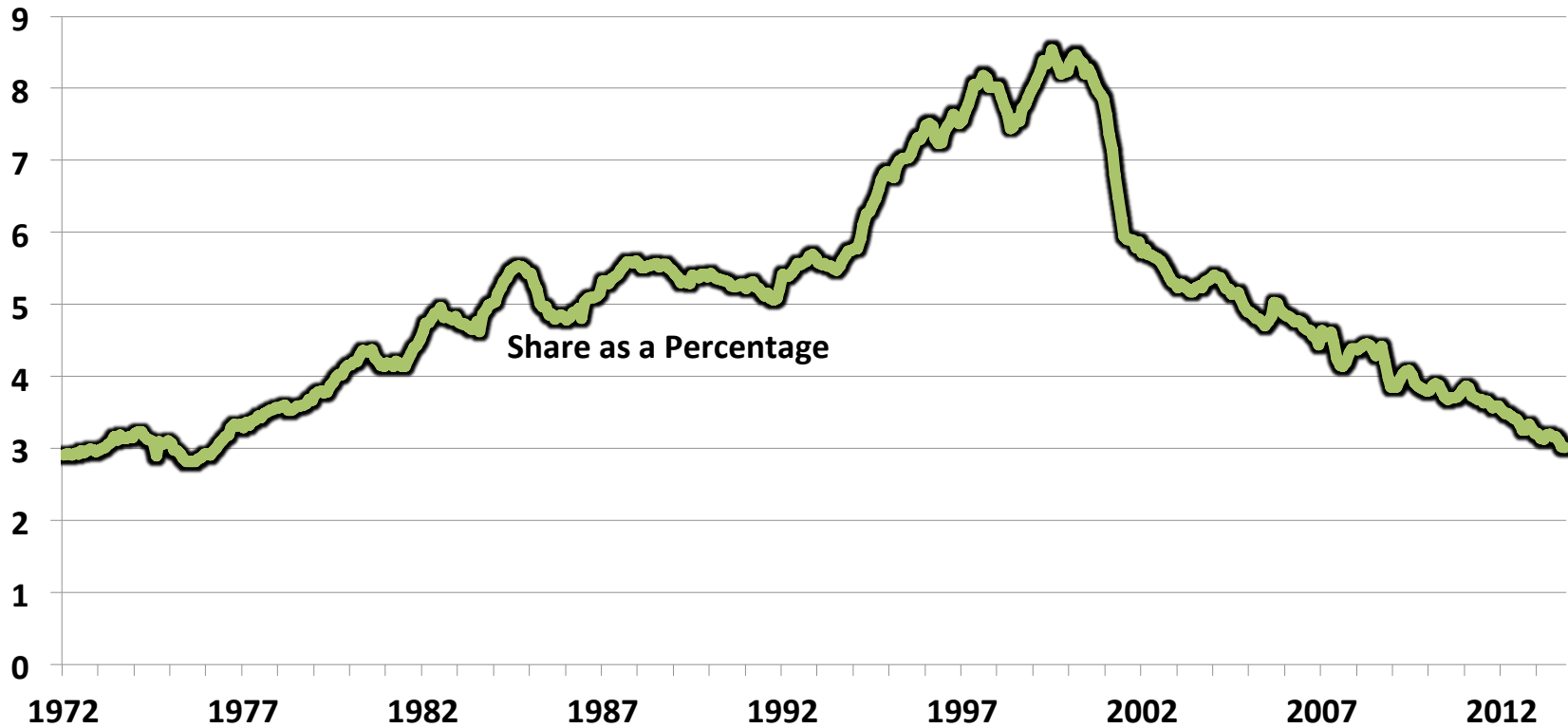
Growth in Manufacturing Capacity Peaked in the late 1990s

Annualized Five-Year Change in Manufacturing Capacity
and Capacity per Capita, 1977-2013

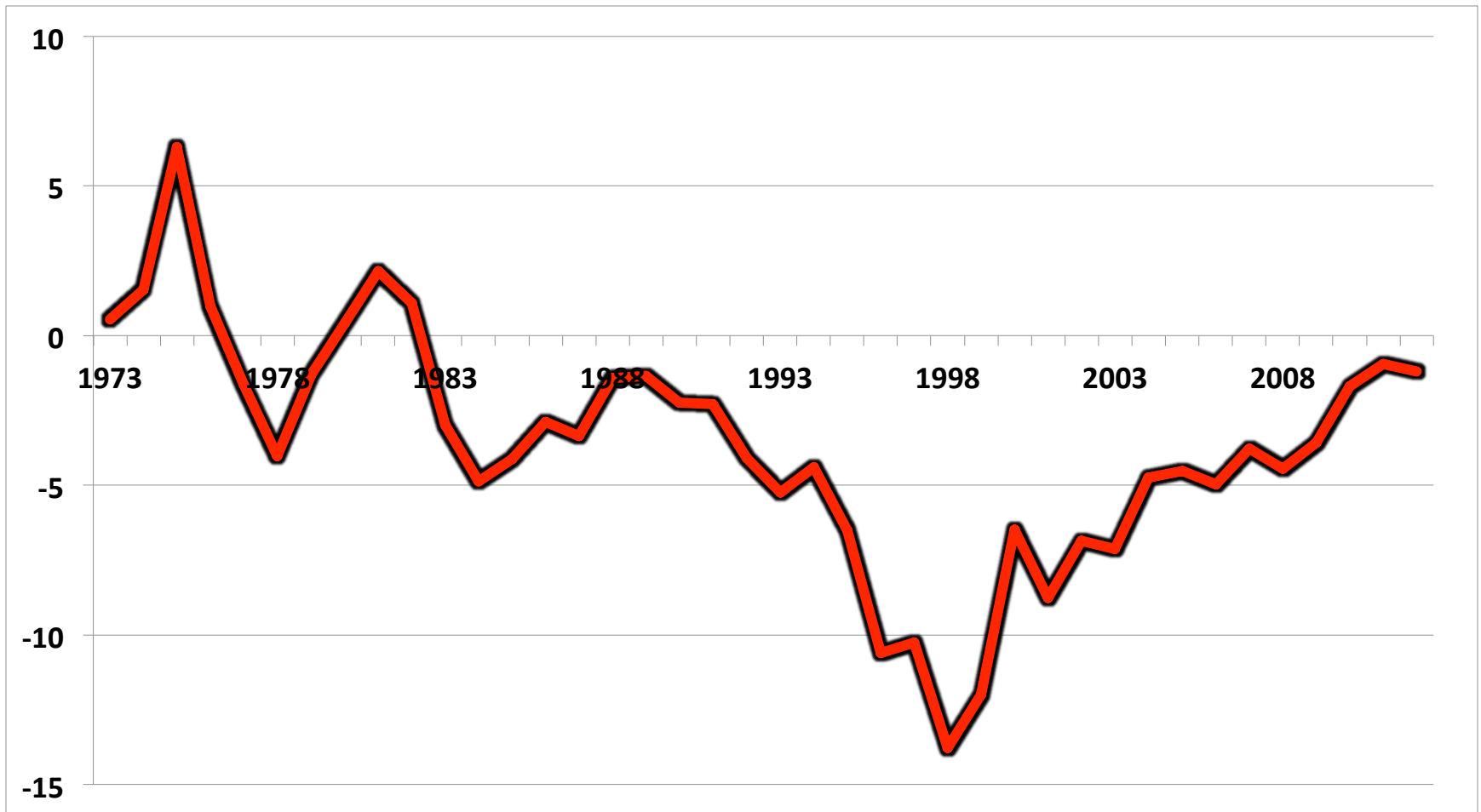


The Most Dynamic Part of Manufacturing Has Disappeared

Share of ICT Manufacturing Value-Added in Total Manufacturing Sector, 1972-2013



Annual Rate of Change of ICT Deflator



Are There Policy Solutions?

- **Demographics:** index the retirement age to life expectancy and sharply raise quotas for legal immigration
- **Reduce the share of the population in prison by legalizing drugs**
- **Education:** impose higher standards in secondary school while investing in pre-school to reduce the “vocabulary gap”
- **Inequality:** return capital gains and dividend tax rates to pre-1997 levels.
- **Fiscal:** eliminate \$1.6 trillion of tax loopholes, mainly benefitting the rich
- **Make medical care a right of citizenship, not tied to employment status**

Summary:

Headwinds vs. Innovation

- If future innovations are less important than the last 125 years and especially if they are less important than the last 40 years, all developed nations are affected
 - Still room for catching up in emerging markets
- Headwinds in other countries may be less serious
 - Better education (Canada, Korea)
 - Less inequality (Japan, Korea, France, Scandinavia)
 - Less future burden of rising debt/GDP ratio
- **Assignment for our panel: Comment on all of the above.**