

# Econ 323

# Economic History of the U.S.

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# Today's outline

- Essays
- Final Study Tips posted
- Gordon and the 3<sup>rd</sup> Industrial Revolution

# Gordon

- Have computers and the Internet led to a third Industrial Revolution?

# What *is* a revolution?

- Increase in GDP per capita growth rate
- Increase in **labor productivity** growth
  - Output per worker
- Increase in **multifactor productivity**
  - Technology (A)
  - $Y=f(\text{capital, labor, technology})$
  - Measured as growth not attributable to increases in inputs

# Gordon

- 1<sup>st</sup>-1760-1830
  - Power Loom, steam engine, cotton gin

# Gordon

- 2<sup>nd</sup>-1860-1900
  - **Electricity**, light bulb, motors, air conditioning
  - **Internal combustion engine**, suburbs
  - **Petroleum/chemicals**, plastics, pharmaceuticals
  - **Communication/entertainment**, telegraph/telephone, radio, TV, photography
  - **Indoor plumbing**, sewers, toilets

The urban streets of the 1870s and 1880s were full not just of horses but pigs, which were tolerated because they ate garbage. In Kansas City, the stench of patrolling hogs was so penetrating that Oscar Wilde observed, “They made granite eyes weep.” The increasing production of animal waste caused pessimistic observers to fear that American cities would disappear like Pompeii—but not under ashes. Added to that was acrid industrial smog, sidewalks piled high with kitchen slops, coal dust, and dumped merchandise, which became a liquid slime after a rain. All of this was made worse in the summer, which was almost as unbearable outdoors as inside, especially with the heavy clothes of the day. Rudyard Kipling said of Chicago, “Having seen it, I desire urgently never to see it again. Its air is dirt.” Added to putrid air was the danger of spoiled food—imagine meat and poultry hung unrefrigerated for days, spoiled fruit, bacteria-infected milk, and so on. Epidemics included yellow fever, scarlet fever, and smallpox. Many hospitals were deathtraps.

# Gordon

- 3<sup>rd</sup> Industrial Revolution?
  - **Computers, Internet**
  - “If you could choose only one of the following two inventions, indoor plumbing or the Internet, which would you choose?”-p. 60



- “We can see the computer age everywhere but in the productivity statistics” -Robert Solow 1987
- But by the late 1990s, there *did* appear to be productivity gains

## Growth Rates of Output, Inputs, and Multifactor Productivity, Selected Intervals, 1870–1999

|   | 1870–1913 | 1913–1972 | 1972–1995 | 1995–1999 |
|---|-----------|-----------|-----------|-----------|
| 1. Output ( $y$ )                               | 4.42      | 3.14      | 2.75      | 4.90      |
| <i>Without Composition Adjustment to Inputs</i> |           |           |           |           |
| 2. Labor Hours ( $h$ )                          | 3.24      | 1.28      | 1.71      | 2.25      |
| 3. Capital ( $k$ )                              | 4.16      | 2.07      | 2.98      | 4.87      |
| 4. Capital per Hour ( $k-h$ )                   | 0.92      | 0.79      | 1.27      | 2.62      |
| 5. Output per Hour ( $y-h$ )                    | 1.18      | 1.86      | 1.04      | 2.65      |
| 6. Multifactor productivity growth ( $m$ )      | 0.77      | 1.60      | 0.62      | 1.79      |
| <i>With Composition Adjustment to Inputs</i>    |           |           |           |           |
| 7. Labor Hours ( $h$ )                          | 3.73      | 1.72      | 2.09      | 2.71      |
| 8. Capital ( $k$ )                              | 4.22      | 2.76      | 4.04      | 5.58      |
| 9. Capital per hour ( $k-h$ )                   | 0.49      | 1.04      | 1.95      | 2.87      |
| 10. Output per Hour ( $y-n$ )                   | 0.69      | 1.42      | 0.66      | 2.19      |
| 11. Multifactor productivity growth ( $m$ )     | 0.47      | 1.08      | 0.02      | 1.25      |

Table 1. See text for details

# But productivity growth limited to computers:

- After removing effects of more computers and better computers, very little increase in multifactor productivity
- If look outside the computers+durable manufacturing sector (12% of economy) then no productivity gains

**Decomposition of Growth in Output Per Hour, 1995:4–1999:4, into  
Contributions of Cyclical Effects and Structural Change in Trend Growth**  
(*percentage growth rates at annual rate*)

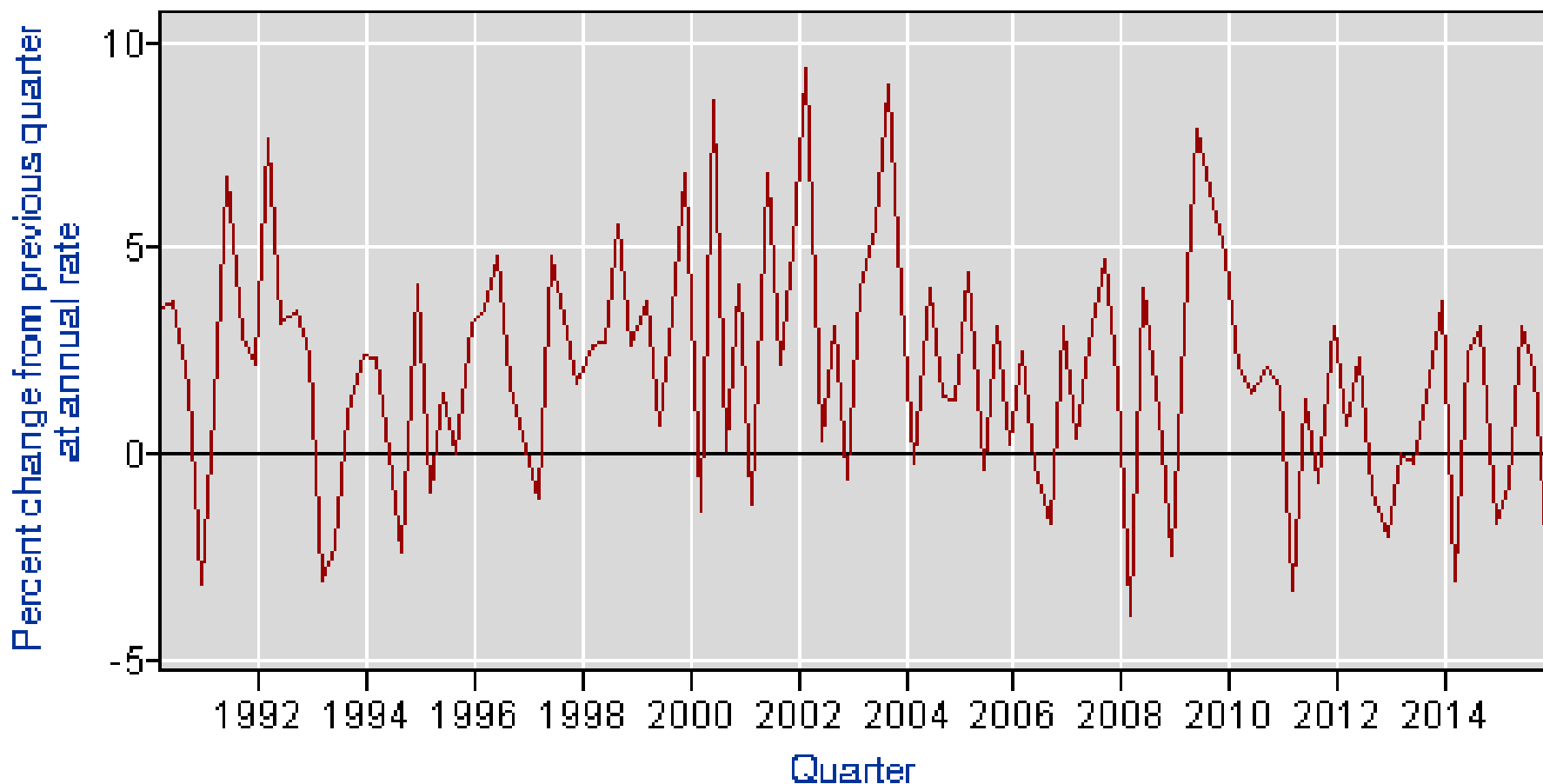
|   | <i>Nonfarm Private<br/>Business</i> | <i>NFPB Excluding<br/>Computer Hardware<br/>Manufacturing</i> | <i>NFPB<br/>Excluding<br/>Durable<br/>Manufacturing</i> |
|---|-------------------------------------|---|---|
| 1. Actual Growth  | 2.75                                | 2.30  | 1.99  |
| 2. Contribution of Cyclical Effect  | 0.50                                | 0.51  | 0.63  |
| 3. Growth in Trend (line 1–line 2)  | 2.25                                | 1.79  | 1.36  |
| 4. Trend, 1972:2–1995:4   | 1.42                                | 1.18  | 1.13  |
| 5. Acceleration of Trend (line 3–line 4)  | 0.83                                | 0.61  | 0.23  |
| 6. Contribution of Price Measurement  | 0.14                                | 0.14  | 0.14  |
| 7. Contribution of Labor Quality  | 0.05                                | 0.05  | 0.05  |
| 8. Structural Acceleration in Labor<br>Productivity (line 5–line 6)                               | 0.64                                | 0.42  | 0.04  |
| 9. Contribution of Capital Deepening  | 0.33                                | 0.33  | 0.33  |
| 10. Contribution of MFP Growth in<br>Computer and Computer-Related<br>Semiconductor Manufacturing | 0.29                                | 0.19  | —   |
| 11. Structural Acceleration in MFP (line<br>7–lines 8 through 10)                                 | 0.02                                | −0.10   | −0.29   |

Table 2. See text for details

# Beyond Gordon's data (after 1999)

- Productivity gains continued very impressively after 2000
- But recent signs of productivity declines after 2008 recession

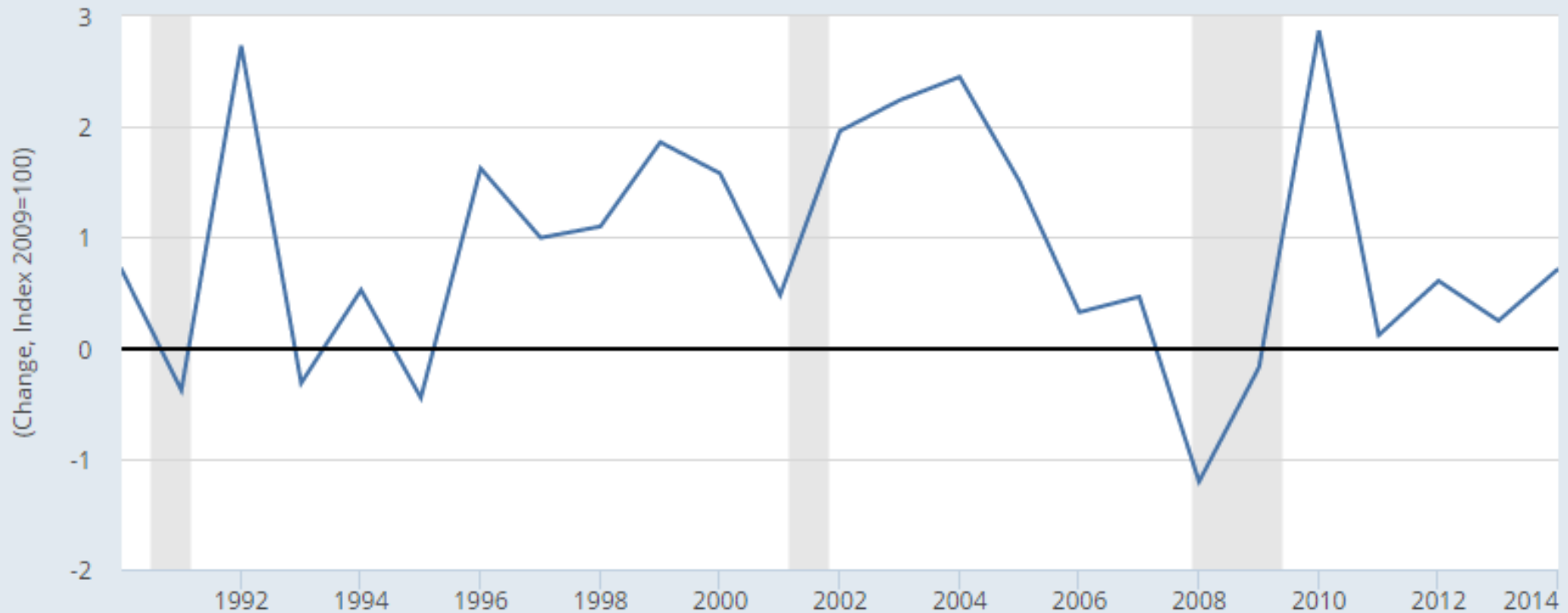
# Output per Hour Non-farm Business Sector



# Multifactor Productivity Private Business

**FRED**

— Private Business Sector: Multifactor Productivity

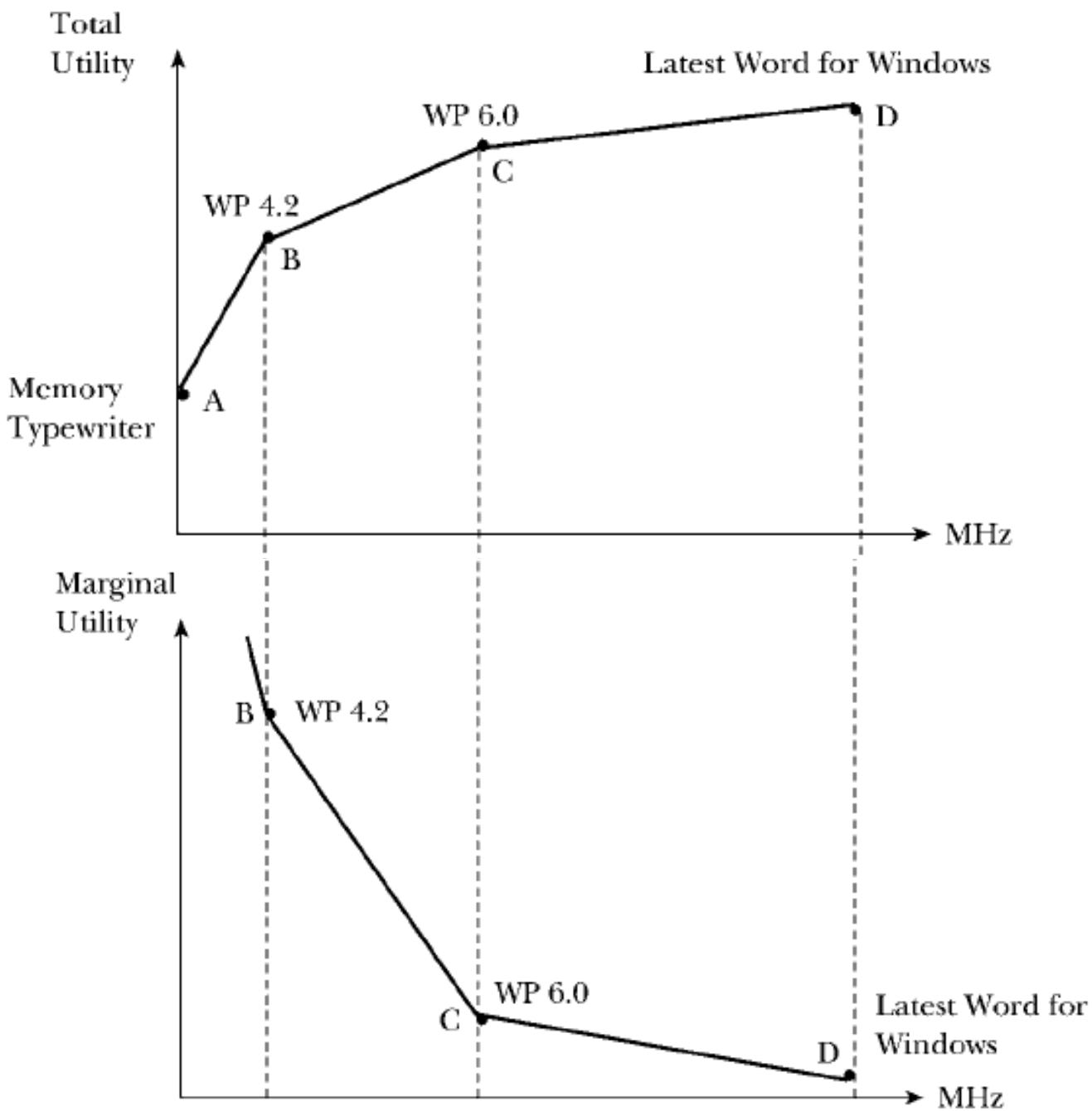


# Diminishing Returns in Computers

- The most important innovations were made early (the first mainframe, first Windows, first modem)
- Today, faster but not fundamentally different
  - Word Processor Example
  - Can't fully replace the human
- “What Intel giveth, Microsoft taketh away” p. 63



Figure 3.  
Total and  
Marginal  
Utility  
For Word  
Processing



# Internet

- There are more “consumer benefits,” but:
  - Faster access to information is not necessarily better information
  - Firms and market share protection
    - Keeping up with the Joneses and
    - zero sum game
  - Substitute for other existing forms of entertainment
  - Surfing on the job

- Final thoughts on Gordon?