Secular Stagnation: A Supply-Side View

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Definitions: Supply and Demand

- **Secular Stagnation**: slow not no growth
- **Sources emanate from supply side:**
  - Hansen in 1938: slowing population growth
  - Today 2015: slowing potential GDP growth
    - 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 the 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.

Year
Percent


Hansen 1938

Now 2014
Why Hansen Wasn’t Worried About Productivity Growth

Figure 3A. Annual Growth Rate of Output per Hour, 1937-40 vs. 2009-14
The Dynamics of TFP Growth Since 1890

• 1\textsuperscript{st} Industrial Revolution (IR #1), 1770-1830
  – Benefits Continued Until 1900

• 2\textsuperscript{nd} Industrial Revolution (IR #2), 1870-1930
  – Benefits Continued Until 1970
  – Electricity, internal combustion engine, telephone, wireless, chemical engineering, conquest infectious diseases, antibiotics, foundations modern medicine

• Paul David “delay” hypothesis about IR #2
  – Developed for electricity
  – Also applies to motor vehicles, many other inventions
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

1890-2014 Average Growth = 1.23 percent per year
Could IR #3 Be Almost Over?

Output per Hour Growth Since 1953

Figure 4. Four-year Moving Average Annual Growth Rate, Total Economy Output per Hour, 1953:Q1 to 2014:Q3.
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
  – 1990s. The web, search engines, e-commerce
  – 2000-05 flat screens, revolution in business practices was over

• 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
  – By 2005 the technology was in place to create:
    – Sub-prime lending, MBS, layers of leverage, housing bubble, financial crisis

• How Long Ago Were the Creations:
Further Evidence of Diminishing Returns

• Consumer Electronics Show 2014, NYT quotes
  “This show was a far cry from the shows of old . . .
  Over the years it has been the place to spot some real
  innovations. [VCR 1970, CD player 1981, HD TV 1998,
  Xbox 2001] This year’s crop of products seemed a bit
  underwhelming by comparison.”

• Decline in Business “Dynamism”
  – Decline over last 30 years in creation of new firms

• Decline in labor market “Fluidity”
  – Decline in job and worker reallocation rates
Declining Contribution of Education to Productivity Growth

• Goldin and Katz 0.35 percent contribution of education
• Increase in educational attainment coming to an end
• Jorgenson -0.30 downward adjustment to education’s contribution, i.e., close to zero
• U.S. steady decline in league tables of high-school completion, four-year college completion
  – Poor preparation for college. International PISA test scores rank out of 34 OECD countries: US #17 in reading, 20th in science, 27th in math
• New issues of college affordability and $1 trillion of student debt
Socioeconomic Changes with Adverse Future Implications

- Changes 1982 to 2008, children born out of wedlock
  - White high school grads: 4 to 34 percent
  - White high school dropouts: 21 to 42 percent
  - Black high school grads: 48 to 74 percent
  - Black high school dropouts: 76 to 96 percent

- Change 1960-2010, bottom 1/3 of white population
  - For 40-year-old women, percent of children living with both biological parents declined from 95 to 34 percent

- Future consequences of single-parent households
  - More children growing up in poverty
  - Greater likelihood of future high-school dropping out

- Additional adverse effects: 1979-2009 percent of white high school dropouts with prison records: 4 to 28 percent; blacks: 15 to 68 percent
Will the Productivity Revival of the Late 1990’s Be Repeated?

Figure 5. Average Annual Growth Rates of Total Factor Productivity, Selected Intervals, 1890-2014
Growth of Manufacturing Capacity, 1977-2014

Figure 6. Annualized Five-Year Change in Manufacturing Capacity, 1977-2014

Source: www.federalreserve.gov/datadownload/default.htm, G.17
Figure 7. Five-Year Moving Average of Ratio of Net Private Business Investment to Private Business Capital Stock, 1950-2013
Price Deflator for ICT Equipment and the Demise of Moore’s Law

Figure 7a. Annual Change of Price Index for Information and Communication Technology, 1973-2014

Figure 7b. Years Taken for Number of Transistors on a Chip to Double

Source: NIPA Table 5.3.4

Source: Intel Corporation website
Innovations Continue But How Important Are They?

- **Medical and Pharmaceutical**
  - Continuous progress in advancing life expectancy
  - Coming collision between physical wellness and mental illness (Alzheimers)
  - Increasing costs of drug development, fewer important new drugs

- **Small Robots and 3-D Printing**
  - Robots date back to 1961, continued development is evolutionary not revolutionary
  - 3-D printing useful for development prototypes, not mass production
Innovations Continue But How Important Are They?

• Big Data and Artificial Intelligence
  – Predominant uses of big data are in marketing, zero-sum game
  – Application to legal searches, radiology reading evolutionary, not revolutionary

• Driverless Cars and Trucks
  – Truck drivers don’t just drive trucks, they unload them and stock the shelves
  – Wholesale trade isn’t just gee-whiz Amazon warehouses. Most of it involves delivering bread, coke, and beer
Slowing Potential Output Growth: The Role of Productivity vs. Hours

Figure 8. Kalman Growth Trends of Output, Hours, and Productivity, 1953:Q1 to 2014:Q3
Comparing the Last 5 Years to the Last 10 Years

<table>
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<th>Real GDP</th>
<th>Aggregate Hours</th>
<th>Real GDP per Hour</th>
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<tr>
<td>2004:Q3 - 2009:Q3</td>
<td>0.81</td>
<td>-0.77</td>
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<td>2009:Q3 - 2014:Q3</td>
<td>2.31</td>
<td>1.49</td>
<td>0.82</td>
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<td>2004:Q3 - 2014:Q3</td>
<td>1.56</td>
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<td>Future Trend</td>
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<td>Memo: 1974-2004</td>
<td>3.12</td>
<td>1.40</td>
<td>1.72</td>
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Conclusions

• ¾ of TFP growth since 1890 occurred 1920-70
• The big impacts on TFP of IR #3 were largely completed by 2005
• Educational plateau and socioeconomic decay subtract from feasible future productivity growth
• The productivity revival of 1996-2004 was temporary
• Innovation continues but is less important in its impact on labor productivity and TFP
• Even if productivity growth returns to its 2004-14 average of 1.2, potential output growth is only 1.6
• Growth in real GDP per capita only 0.7 compared to 2.1 continuously from 1890 to 2007