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The State of Innovation in the States

iKuben Delegation

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The Great Stagnation?

The United States achieved a 2.0 percent average annual growth rate of real GDP per capita between 1891 and 2007. This paper predicts that growth in the 25 to 40 years after 2007 will be much slower, particularly for the great majority of the population. Future growth will be 1.3 percent per annum for labor productivity in the total economy, 0.9 percent for output per capita, 0.4 percent for real income per capita of the bottom 99 percent of the income distribution, and 0.2 percent for the real disposable income of that group.

The primary cause of this growth slowdown is a set of four headwinds, all of them widely recognized and uncontroversial. Demographic shifts will reduce hours worked per capita, due not just to the retirement of the baby boom generation but also as a result of an exodus from the labor force both of youth and prime-age adults. Educational attainment, a central driver of growth over the past century, stagnates at a plateau as the U.S. sinks lower in the world league tables of high school and college completion rates. Inequality continues to increase, resulting in real income growth for the bottom 99 percent of the income distribution that is fully half a point per year below the average growth of all incomes. A projected long-term increase in the rate of debt to GDP at all levels of government will inevitably lead to more rapid growth in tax revenues and/or slower growth in transfer payments at some point within the next several decades.

There is no need to forecast any slowdown in the pace of future innovation for this gloomy forecast to come true, because that slowdown already occurred four decades ago. In the eight decades before 1972 labor productivity grew at an average rate of 0.9 percent per year faster than in the four decades since 1972. While no forecast of a future slowdown of innovation is needed, skepticism is offered here, particularly about the techno-optimists who currently believe that we are at a point of inflection leading to faster technological change. The paper offers several historical examples showing that the future of technology can be forecast 50 or even 100 years in advance and assesses widely discussed innovations anticipated to occur over the next few decades, including medical research, small robots, 3-D printing, big data, driverless vehicles, and oil-gas fracking.
Is the Great Age of Innovation Over?

1. We’re experiencing “long-term technological stasis”; the “low-hanging” innovation fruit is gone.

2. There were only a few truly fundamental innovations, and we’ve mostly made them.

3. We really haven’t innovated anything all-that-impressive since the 1970s/1980s.

4. Technology destroys, not creates, jobs.
“Everything that can be invented already has been.”

- Commissioner U.S. Patent & Trademark Office, 1900
Innovation Economics

Innovation Economics
THE RACE FOR GLOBAL ADVANTAGE
Robert D. Atkinson and Stephen J. Ezell
Benefits of ICT Innovation Far From Over

- The lag between investments in ICT and improvements in productivity is between 5-15 years.

*Echoing electrification*

US labour productivity, year 26=100

- Information technology (beginning 1970)
- Electrification (beginning 1890)

Source: Chad Syverson, University of Chicago
Innovation Is Far From Over

- On the cusp of breakthroughs in many sectors:
  
  We only mapped the human genome a decade ago; biologics/drugs take 12-14 years to develop.

- 92% of all scientists and engineers in world history live today.
Innovation Is Far From Over

“There is no reason to expect the slackening of output through the exhaustion of technological possibilities.”

Joseph Schumpeter
The Atlantic Century II

- **The Study:** Compares innovation-based competitiveness of 44 nations and regions.

- **16 indicators:** Including corporate and government R&D, scientists and engineers, new firms, corp. tax, productivity growth and others.
Overall Score for Global Competitiveness and Innovation
A Tale of Two Americas:

1. A Very Robust Silicon Valley/High-Tech Sector
   ▫ Strong in ICTs; Apps; Aerospace; Biotechnology
   ▫ Still the Best Business Environment for Innovation

2. A Faltering Innovation Policy Environment
   ▫ Faltering Innovation Infrastructure
   ▫ Lacking Political Consensus to Support Innovation
U.S. Hotbed for ICT Innovation
Share of OECD ICT Sector Value-Added by Country

Source: OECD Information Technology Outlook, 2011
The “App Economy” Now Driving Innovation

- The “App Economy” has created over 500,000 jobs since 2007.
- 100 million mobile applications downloads per day globally; 36B/year.
- The U.S. applications development generated $25 billion in revenue in 2013.

Source: Michael Mandel, *The App Economy*
- U.S. Remains Global Leader in Venture Capital Investment
But All is Not Well With the U.S. Innovation Economy

Rate of Improvement in Innovation Capacity, 1999-2011

Source: ITIF, *The Atlantic Century II*
But All is Not Well With the U.S. Innovation Economy

- Lagging R&D Investment
- Short-term Corporate Behavior
- Bad Policy Hurting Innovative U.S. Industries

- U.S. Manufacturing Decimated
- Trade Deficit Enormous

- Poor Tax Environment
- Education and Infrastructure Faltering
- Self-destructive Immigration Policies
Federal R&D in the Budget and the Economy
Outlays as share of total, 1962 - 2015

Source: Budget of the United States Government, FY 2015. FY 2015 is the President's request. © 2014 AAAS
U.S. Firms Investing Less in Long-term R&D

U.S. Firms Investing Less in Capital Goods

- Business investment in equipment, software and structures grew 5.2% from 1990 to 1999, but just 0.5% from 2000 to 2010.

- From 1999 to 2007, investments by U.S. business in workforce training declined by 45%.
Ratio of U.S.-Headquartered Manufacturing MNCs’ Foreign to Domestic Capital Investment

Source: Innovation Economics, ITIF, 2012
VC Investment in Medical Devices Devastated

Source: Patient Capital 3.0, National Venture Capital Association
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U.S. Manufacturing Jobs Have Fallen Precipitously Since 2000

Source: U.S. Bureau of Labor Statistics
Worse Manufacturing Job Loss than the Great Depression

![Bar chart showing job loss percentages.](chart.png)

- **1929-1933**: -30.9%
- **2000-2010**: -32.3%
A Rate of Loss Far Worse Than Peer Countries

Percent Change in FTE Manufacturing Jobs in Select Countries, Adjusted for Population Growth, 1997-2010

Source: ITIF, 2012
But Loss *Not* Principally Because of Productivity Gains
Only 4 of 19 U.S. Manufacturing Sectors Grew in the 2000s

Percentage Change in Real Value Added, 2000-2008

- Computer and electronic products: +260.5%
- Petroleum and coal products: +73.0%

Average share of manufacturing output: 72%

Total manufacturing

Sum of each industry's change in value-added

Source: Bureau of Economic Analysis
As U.S. Manufacturing Value-Added Significantly Fell

<table>
<thead>
<tr>
<th>Country</th>
<th>Value-Added 2000 (%)</th>
<th>Change 2000-2010 (%)</th>
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<tbody>
<tr>
<td>Taiwan</td>
<td>99.7</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>84.5</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>73.6</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>73.4</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>26.2</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>24.6</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>18.1</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>-0.7</td>
<td></td>
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<tr>
<td>France</td>
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<tr>
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<td></td>
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<tr>
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<td></td>
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<tr>
<td>United Kingdom</td>
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<tr>
<td>United States</td>
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<tr>
<td>Italy</td>
<td>-14.8</td>
<td></td>
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<tr>
<td>Canada</td>
<td>-15.7</td>
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</tbody>
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Manufacturing Value-Added, 2000-2010
U.S. Manufacturing Lags in Technological Intensity

Manufacturing Sector Composition by Technological Intensity

Australia  Canada  Germany  Japan  Korea  United Kingdom  United States

Low-technology  Medium-low technology  Medium-high technology  High-technology
U.S. Trade Deficits Have Reached Astounding Levels
And U.S. Share of Global High-Tech Exports Fell


Percent


Asia-9

United States

EU

Rest of world

China

Japan

The Information Technology & Innovation Foundation
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U.S. Has OECD’s Highest Corporate Tax Rate
- **U.S. Is 26th in R&D Tax Credit Generosity**
U.S. Education System Faltering

- U.S. 48th in quality of mathematics and science education.
- Gap in education achievement costs **U.S. $2.3 trillion** annually.
The Key Takeaway:

- Companies have moved from being price makers to price takers in global markets.

- *The U.S. has simply become a less attractive investment environment for globally mobile capital.*
So What Does America (Or Any Country) Need to Do?

1. Embrace “Innovation Economics”

2. Get the “Innovation Triangle” Right

3. Promote an Innovation-Maximizing Global Economic System

4. Recognize that an Innovator’s Job is Never Done
Embrace Innovation Economics

“Productivity growth is the single most important factor our economic well-being. But it is not a policy issue, because we are not going to do anything about it.”

1. The central goal of economic policy should be to spur higher productivity and greater innovation.

2. Markets relying on price signals alone will not always be as effective as smart public-private partnerships in spurring higher productivity and greater innovation.
Maximizing Innovation: Get the Innovation Triangle Right

- Business Environment
- Regulatory Environment
- Innovation Policy Environment
Maximizing Innovation: Get the Innovation Triangle Right

- Business Environment
  - U.S.: ✓
  - Europe: ➡️
  - Asia: ✓

- Regulatory Environment
  - U.S.: X
  - Europe: X
  - Asia: ➡️

- Innovation Policy Environment
  - U.S.: ➡️
  - Europe: ✓
  - Asia: ➡️
## Architect an Innovation-Maximizing Global Economy

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<tr>
<td>“Good” (e.g. R&amp;D Support)</td>
<td>“Ugly” (e.g. IP Theft; Currency or Standards Manipulation)</td>
<td>“Self-destructive” (e.g. Limiting High-Skill Immigration)</td>
<td>“Bad” (e.g. Import Substitution Industrialization)</td>
</tr>
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Beware the Innovation Paradox

The Fall of Kodak

When you don’t recognize the need to innovate until it’s too late!

Kodak:
1999 Revenues: $16B
2012 = Bankrupt

Source: The Economist, “The Last Kodak Moment”
Beware the Innovation Paradox

“Only the paranoid survive.”
– Andy Grove, Intel
Weaknesses of U.S. Innovation System

1. Believe we’ll always be #1 without having to do anything about it.

2. We lack a political consensus that technology and innovation drive economic growth.

3. Any kind of innovation strategy is demeaned as industrial policy.

4. We don’t do a good enough job commercializing and producing our technological innovations.

5. Running out of money for R&D investment.
Strengths of U.S. Innovation System

1. Strong embrace of innovation/use of ICT by our private sector.

2. Majority of the world’s best universities.

3. Fair amount of residual bench strength. (E.g. National Labs/DARPA).

4. Can still place a lot of bets across many emerging technology areas.

5. Entrepreneurs and innovators still want to come/be here.

So: Is Churchill still right?
Tusen Takk!

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