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Innovation Economics and The State of Innovation in the States

Entrepreneurship and Innovation in Silicon Valley: Best Practices and Emerging Trends Conference

Stephen Ezell, Senior Analyst

Information Technology and Innovation Foundation
ITIF is an economic and technology policy think tank committed to articulating and advancing an unabashedly pro-productivity and pro-innovation policy agenda internationally, in Washington, and in the states.

**ITIF focuses on:**

- Innovation and competitiveness
- Science/technology policy
- Digital transformation (E-commerce, e-government, e-health, etc.)
- ICT and economic productivity
- Broadband/Internet tech policies
- Energy innovation/Climate change policy
The Great Stagnation?

The United States achieved a 2.6 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 which are 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 exit 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 90 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 ratio 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 0.8 percent per year faster than it has been since 1972. The stagnation of the future will not be caused by a lack of ideas, but by our failure to turn ideas into innovation. The result is a slowdown in the growth of investment and hence in productivity growth.
Is the Great Age of Innovation Over?

1. We’re experiencing “long-term technological stasis;” “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 is not creating, but destroying, jobs.
“Everything that can be invented already has been.”

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

Charles H. Duell
Innovation Economics

Robert D. Atkinson and Stephen J. Ezell

Yale University Press
September 2012
Benefits of ICT Innovation Far From Over

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

![Graph showing the lag between investments in ICT and improvements in productivity](image)
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.
“There is no reason to expect the slackening of output through the exhaustion of technological possibilities.”

Joseph Schumpeter
The Study: Compares innovation-based competiveness 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.

*App economy employment, not including spillovers. Based on 90 days ending December 31, 2011. Industry employment as of November 2011. App economy jobs are distributed across all industries. Data: The Conference Board, BLS

Source: Michael Mandel, The App Economy
Silicon Valley Bouncing Back After Great Recession

Silicon Valley Financing History: Investment Deals and Dollars
Q1 2009 - Q3 2013

- Investment Dollars ($M)
- Deals
U.S. Remains Global Leader in Venture Capital Investment
IPO Market Starting to Bounce Back

**Off to Market**

Number of IPOs through February of each year

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
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<tbody>
<tr>
<td>2000</td>
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<td>20</td>
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<td>2012</td>
<td>20</td>
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<td>2014</td>
<td>20</td>
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Sector breakdown of IPOs through February of this year

- **Health care/biotech**: 23
- **Finance**: 6
- **Oil & gas**: 4
- **Construction/building**: 3
- **Transportation**: 2
- **Technology**: 1
- **Real estate**: 1
- **Professional services**: 1
- **Leisure & recreation**: 1
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

**Innovation Environment**
- Lagging R&D Investment
- VC Investment Still Down Over Past Decade
- Bad Policy Killing Innovative U.S. Industries

**Economic Environment**
- Trade Deficit Enormous
- Manufacturing Decimated

**Framework Environment**
- Poor Tax Environment
- Education and Infrastructure Faltering
- Self-destructive Immigration Policies
Change in National R&D Intensity, 1995-2008

80% Declines in VC Investments, 1999-2011

From 2000-2011, U.S. VC investment fell by 78%.

Source: OECD 2012 Information Economy Outlook
VC Investment in Medical Devices Devastated

Source: Patient Capital 3.0, National Venture Capital Association
Compromising Our Cloud Computing Companies

- NSA spying program may result in U.S. cloud providers losing up to 20% of foreign markets to overseas competitors.

- $35-$45 billion in U.S. cloud computing industry losses over just the next three years.
But All is Not Well With the U.S. Innovation Economy

- Lagging R&D Investment
- VC Investment Still Down Over Past Decade
- Bad Policy Killing Innovative U.S. Industries
- Trade Deficit Enormous
- Manufacturing Decimated
- Poor Tax Environment
- Education and Infrastructure Faltering
- Self-destructive Immigration Policies
U.S. Trade Deficits Have Reached Astounding Levels

![Line chart showing U.S. trade deficits from 1989 to 2011. The chart compares manufacturing, non-manufacturing, and advanced technologies. The deficits for manufacturing and non-manufacturing have decreased over time, while the deficit for advanced technologies has remained relatively stable.](image-url)
Worse Manufacturing Job Loss than the Great Depression

-30.9% (1929-1933)

-32.3% (2000-2010)
But All is Not Well With the U.S. Innovation Economy

- Lagging R&D Investment
- VC Investment Still Down Over Past Decade
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- Trade Deficit Enormous
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- Poor Tax Environment
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- Self-destructive Immigration Policies
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.
U.S. Not as Welcoming to High-Skill Immigrants

Immigrant-Founded Start-Ups as a Percent of Total Start-Ups in Tech Centers

The Message:

- 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
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

<table>
<thead>
<tr>
<th>Country</th>
<th>World</th>
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<tbody>
<tr>
<td></td>
<td>Wins</td>
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<tr>
<td></td>
<td>“Good”</td>
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<tr>
<td>Wins</td>
<td>(e.g. R&amp;D Support)</td>
</tr>
<tr>
<td>Lose</td>
<td>“Self-destructive”</td>
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<tr>
<td>(e.g. Limiting High-Skill Immigration)</td>
<td>(e.g. Import Substitution Industrialization)</td>
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</table>
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

“There is no way around innovation.”
– Babis Papadopoulos, Secretary for Economic & Commercial Affairs, Embassy of Greece, Washington, DC
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.
   - Any kind of innovation strategy is demeaned as industrial policy.

3. We have become a risk averse society that views innovation and progress with fear and loathing.

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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