

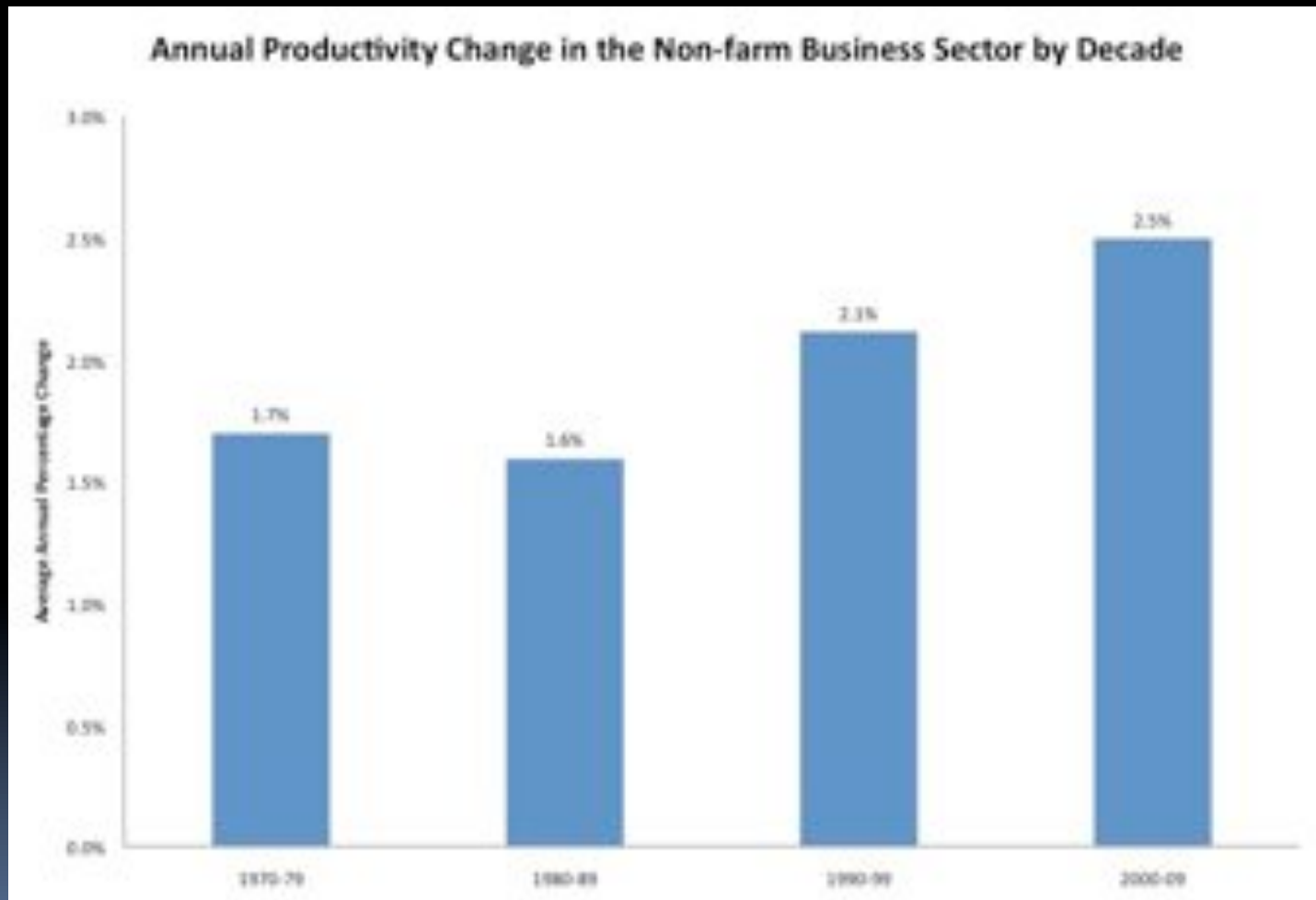
THE ECONOMIC IMPACT OF NETWORKING AND INFORMATION TECHNOLOGY ON PRODUCTIVITY AND INNOVATION



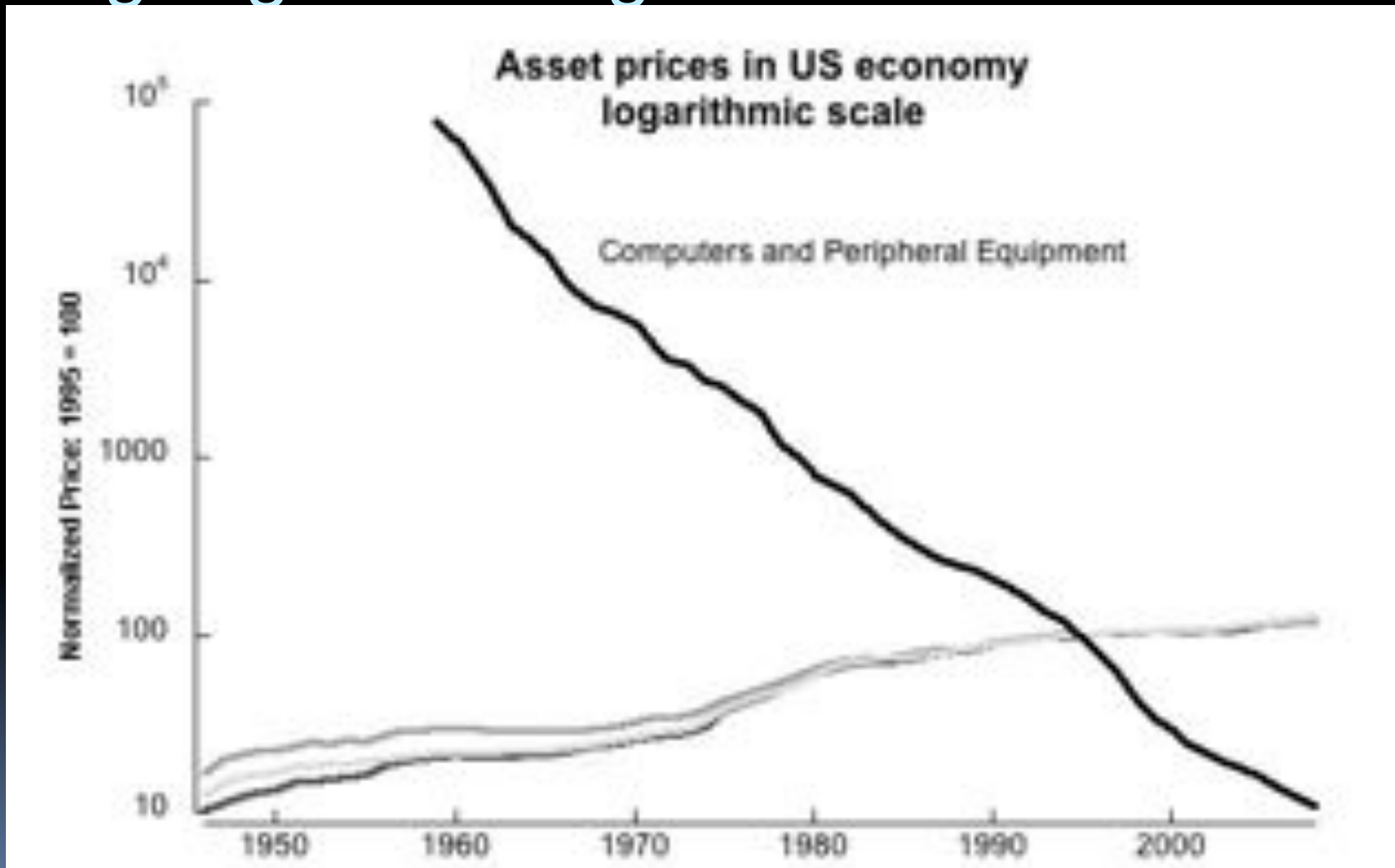
Erik Brynjolfsson
MIT Center for Digital Business
<http://digital.mit.edu/erik>

NITRD Symposium, Washington, DC, February 16, 2012

U.S. Productivity Growth is Accelerating



Networking and IT R&D Created an Ongoing Technological Revolution

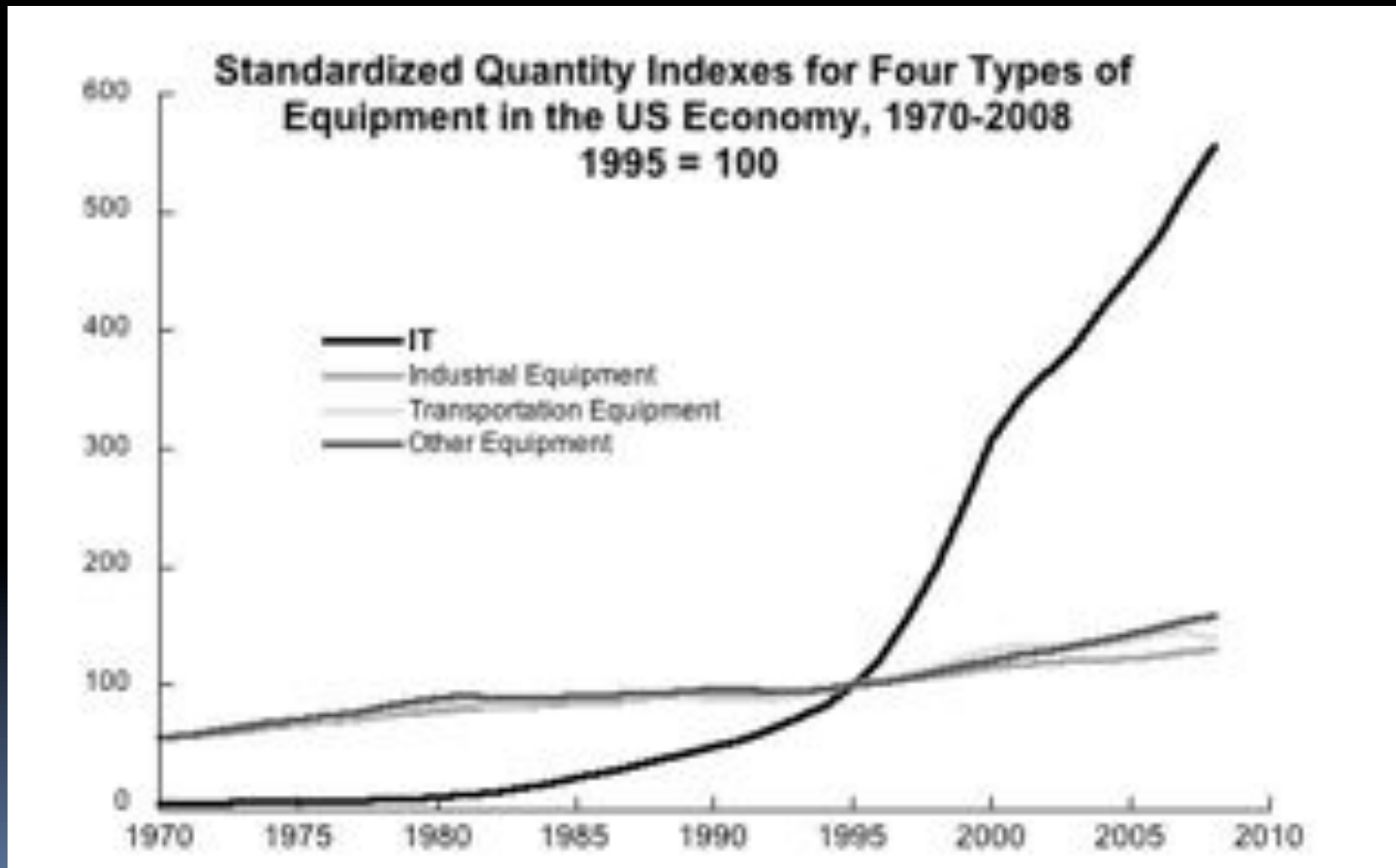


Source: BEA

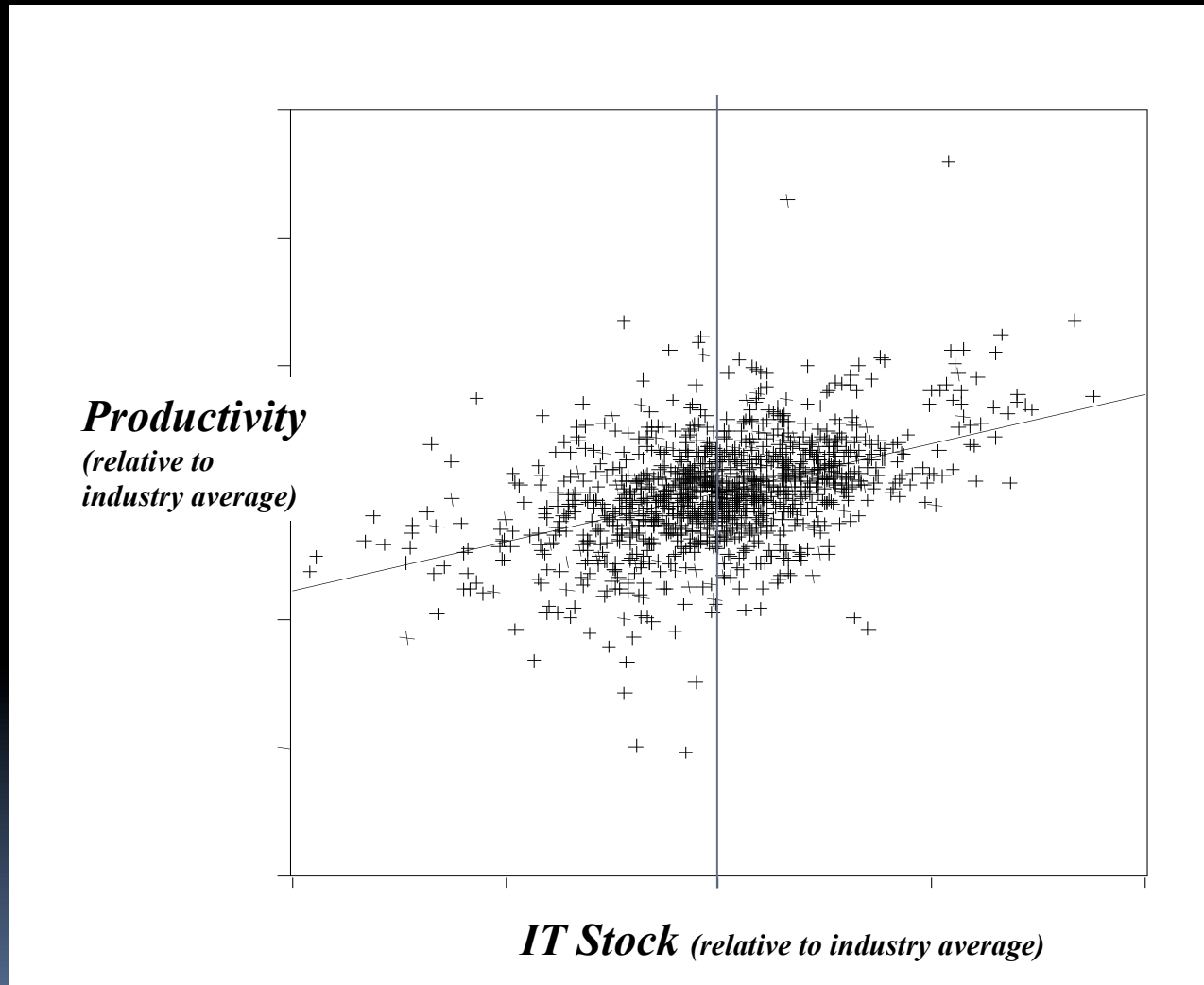
IT Investment is Soaring



IT Investment is Transforming Production



IT and Productivity: The Data Speak



(Source: Brynjolfsson and Hitt)

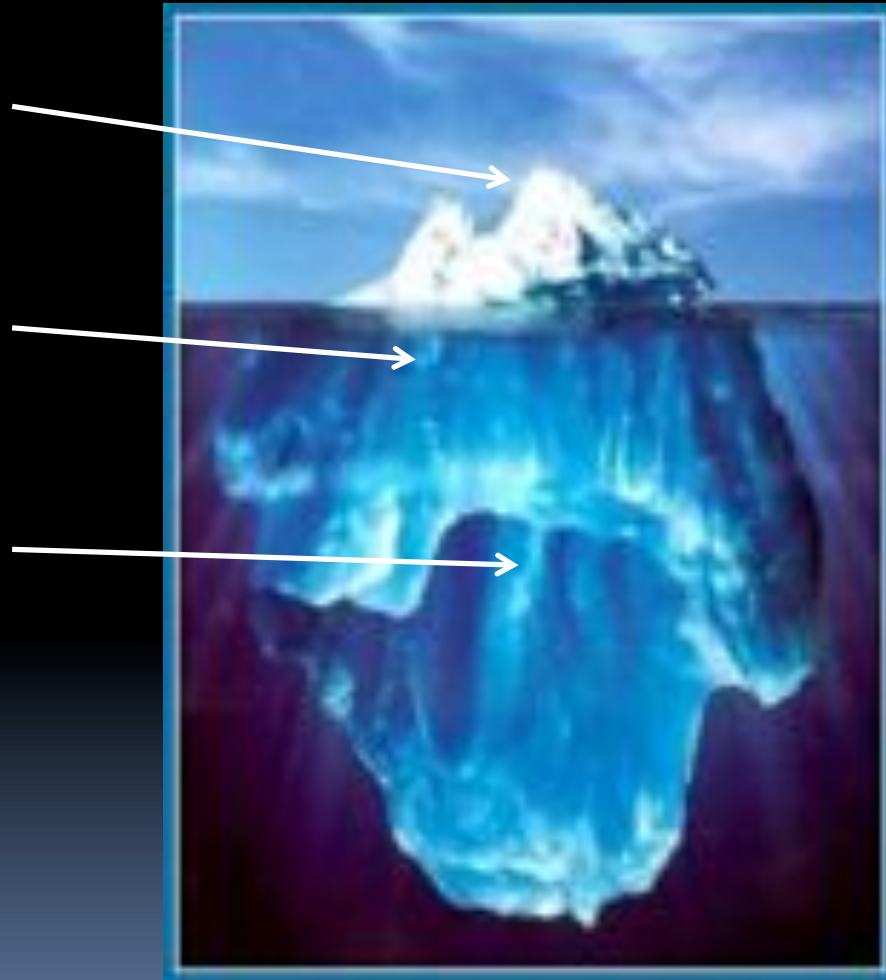
Computerization > Computers

IT Capital (10%)

*Technological
Complements (15%)*

*Organizational
Complements (75%)*

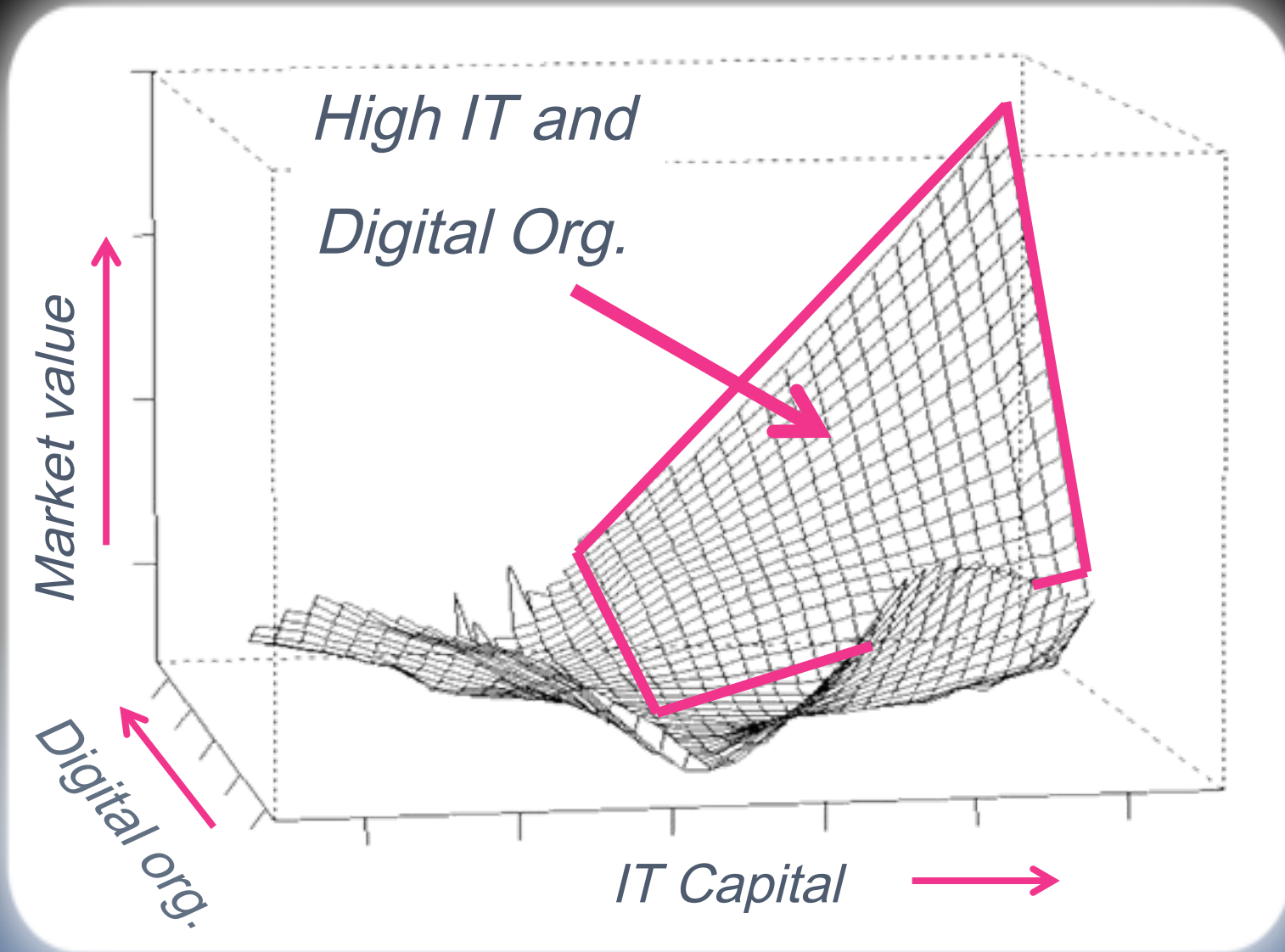
Intangible Assets
*are more important in
the Information Economy*



Source: Brynjolfsson, Hitt and Fitoussi, 2008

Image by Ralph Clevenger

Networking and IT is a Catalyst for Bigger Changes



Source: Brynjolfsson, Hitt, and Yang 2002

Networking and IT Enables Four Drivers of Innovation

Measure

Experiment

Share

Replicate

Measure

New Tools Beget Revolutions



The Big Data Revolution

- Clickstream/Page views/Web transactions
- Web links/Blog references/Facebook
- Google/Bing/Yahoo Searches
- Email messages
- Mobile phone/GPS/Location data
- ERP/CRM/SCM transactions
- RFID (Radio Frequency Identification), Bar Code Scanner Data
- Real-time machinery diagnostics/engines/equipment
- Stock market transactions
- Twitter feeds
- Wikipedia updates
- Etc....

Data vs. HiPPOs



Truck Routing

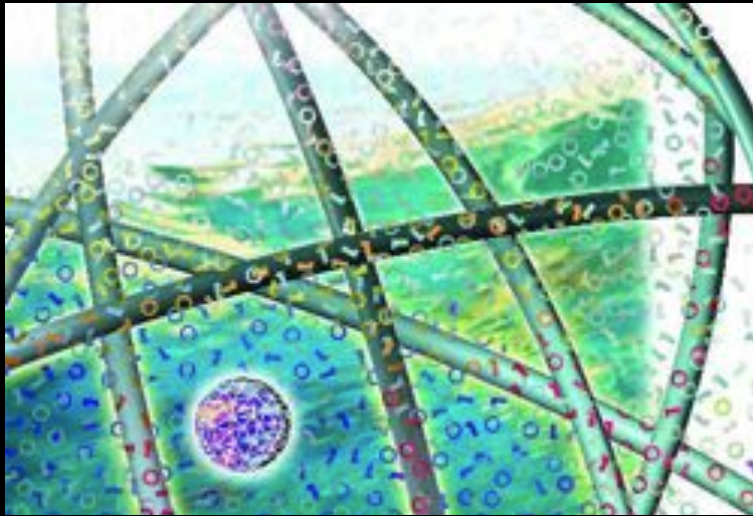


Wine Chemistry



Housing Sales

Data Driven Decision-makers are Winning



✓ Data-Driven Decision-makers:
4% higher productivity

✓ *Data-Driven Decision-makers:*
6% greater profitability and 50%
higher market value from IT

Source: Brynjolfsson, Hitt and Kim, 2011



Experiment

Shop All Departments

Search Books



Your Lists

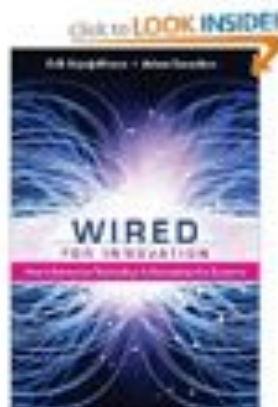
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by [Erik Brynjolfsson](#) (Author), [Adam Saunders](#) (Author)

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- *Over 10,000 Macintosh users at Cisco, but no central IS support*
- *A few users established a wiki, where users could post tips, tricks, files, links and other content*
 - *Example: tip for using the Linux printers which were ubiquitous at Cisco*
- *Many users all over world got up to speed entirely via Mac Wiki*
- *Thousands of small ideas from hundreds of users*

Scale

What Does IT Do?

1. Replicate Bits

Shop All Departments

Search Books

Cart

Your Lists

Books

Advanced Search

Browse Subjects

New Releases

Best Sellers

The New York Times® Best Sellers

Children's Books

Textbooks

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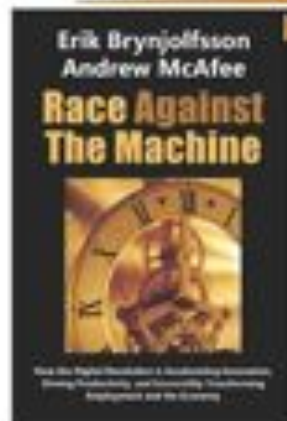
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Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy [Paperback]

Erik Brynjolfsson (Author), Andrew McAfee (Author)

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Share

Book Description

Publication Date: **January 23, 2012**

Why has median income stopped rising in the US?
Why is the share of population that is working falling so rapidly?

What Does IT Do?

1. Replicate Bits

2. Replicate Processes

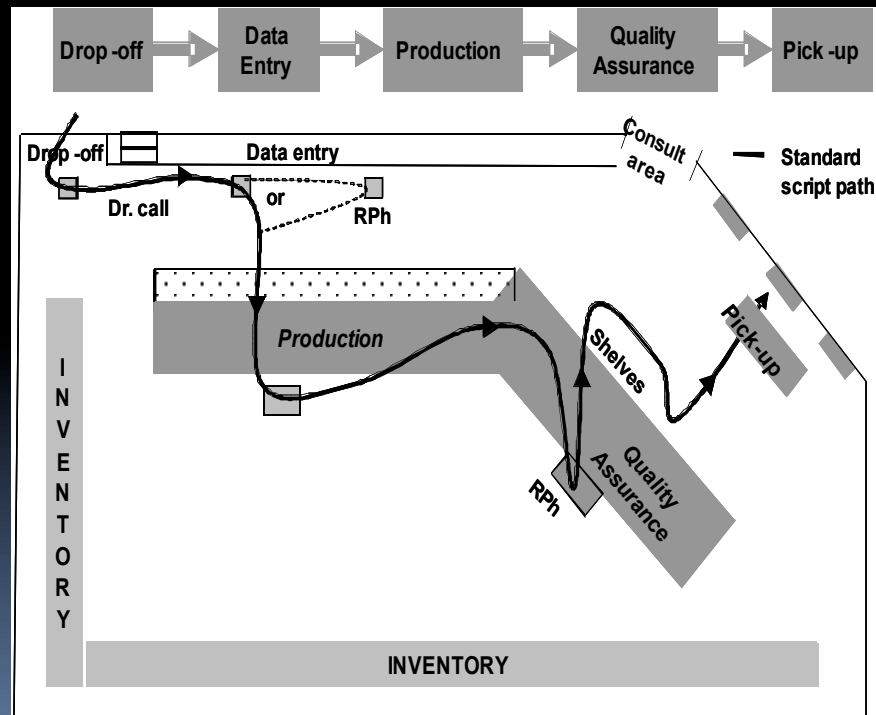
Case Study: CVS

Basic 'script fulfillment process:

1 hour before pick-up

1st step = drug utilization review (DUR)

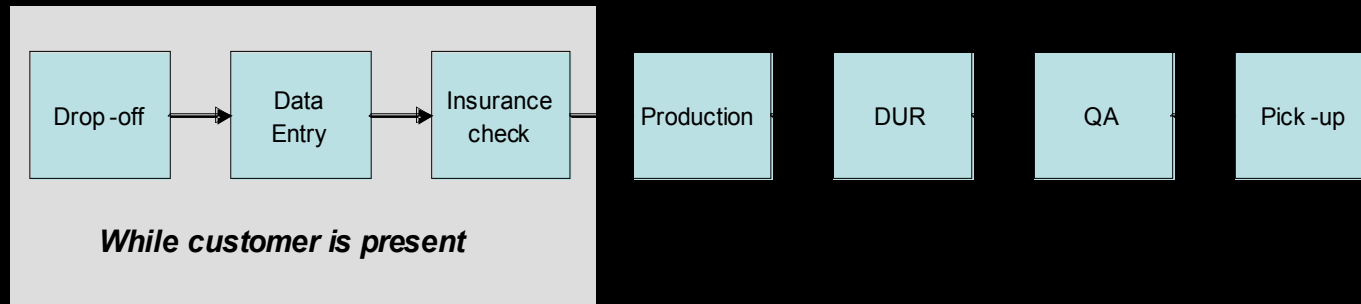
2nd step = insurance check



- 27% of scripts encountered a problem
- 16% of customers disappointed at pick-up

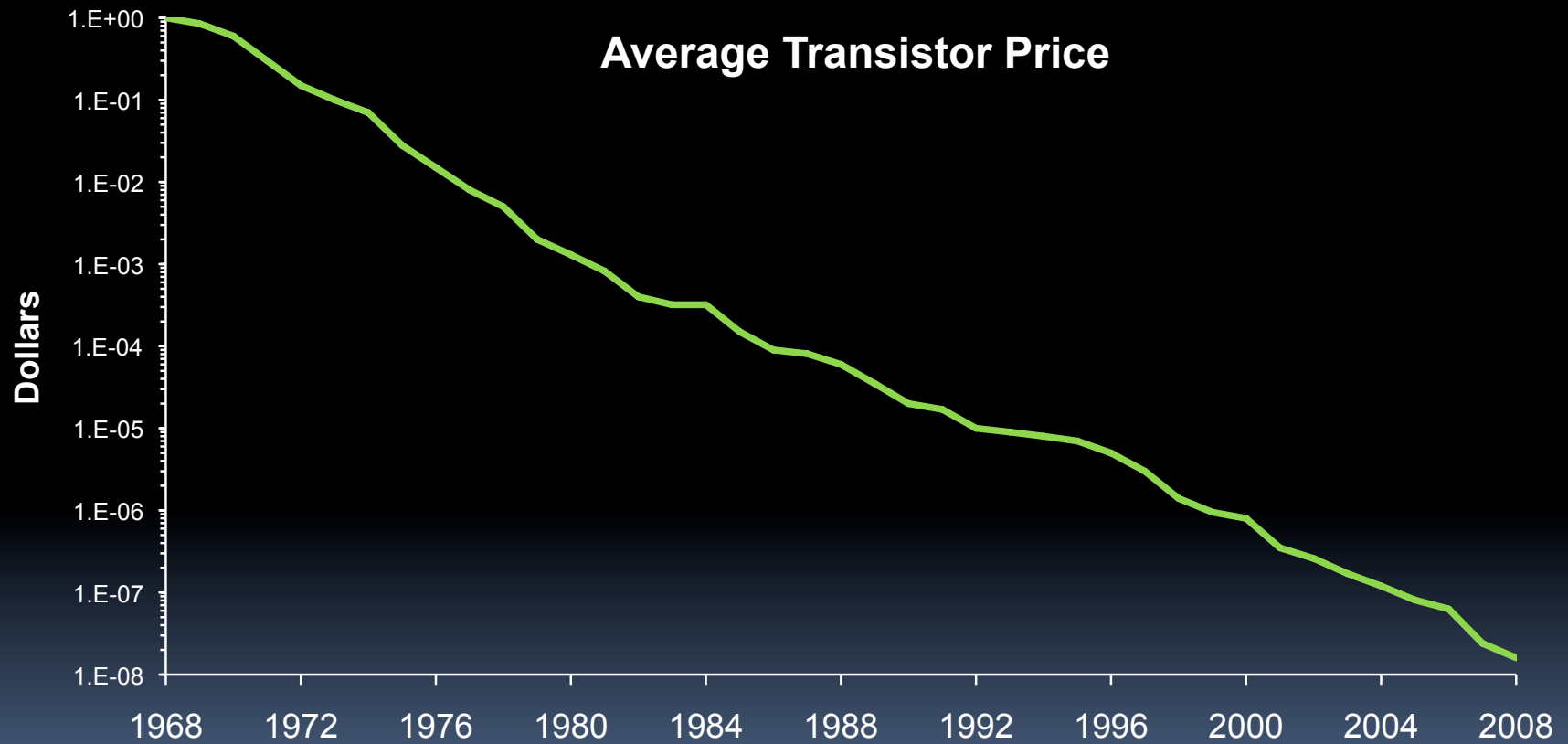
CVS: Scale without Mass

New fulfillment process:

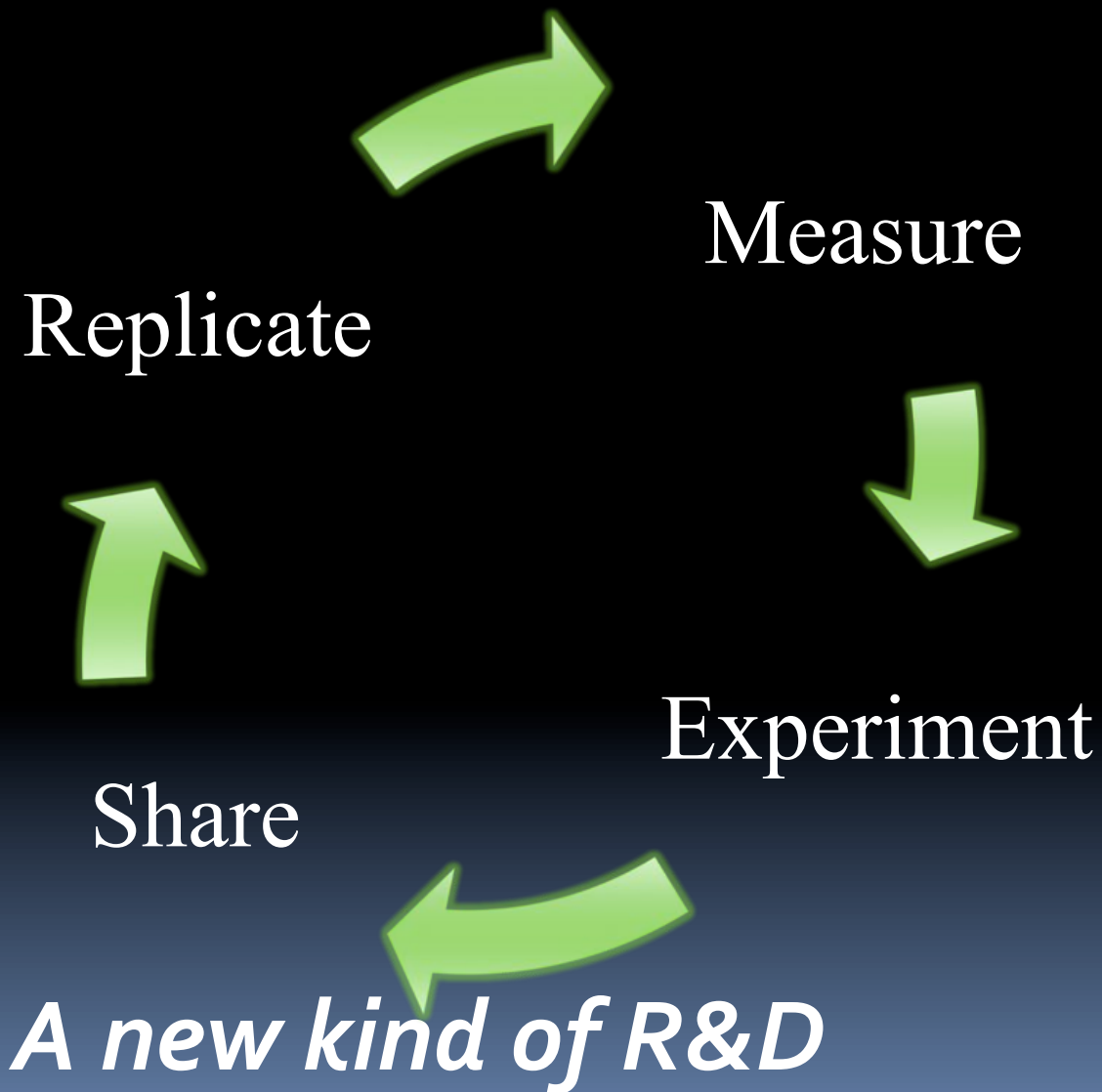


- Short-term results: customer satisfaction scores
 - Wait time satisfaction: 76 → 86
 - Overall pharmacy satisfaction: 86 → 91
- New process embedded in Enterprise IT (EIT)
 - 100% compliance
- Rapid roll-out to over 4000 retail pharmacies

Networking and IT Reduce the Costs of Measurement, Experimentation, Sharing and Replication



Synergies Amplify The Benefits

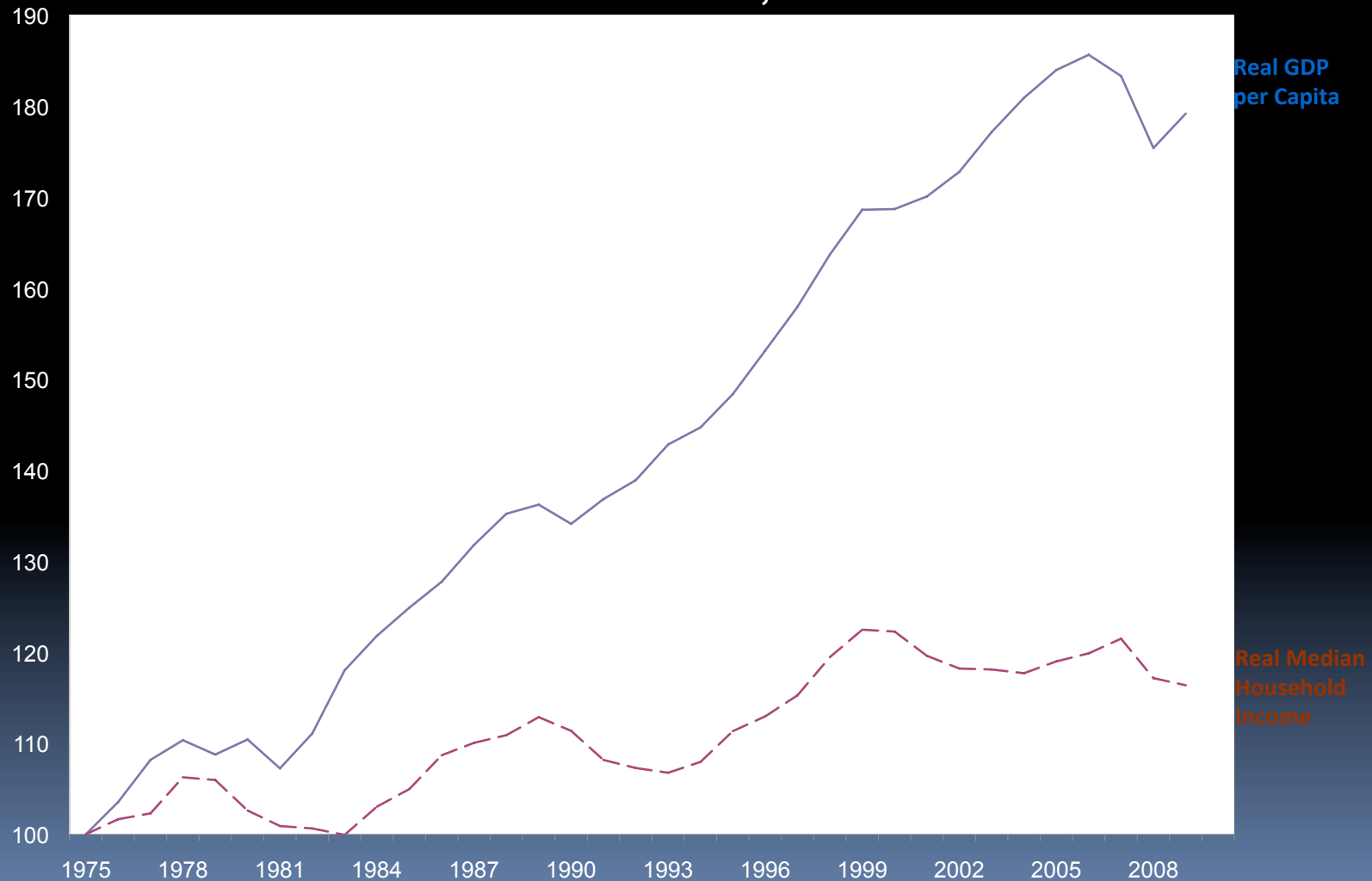


Technical Change Doesn't Always Benefit Everyone Equally

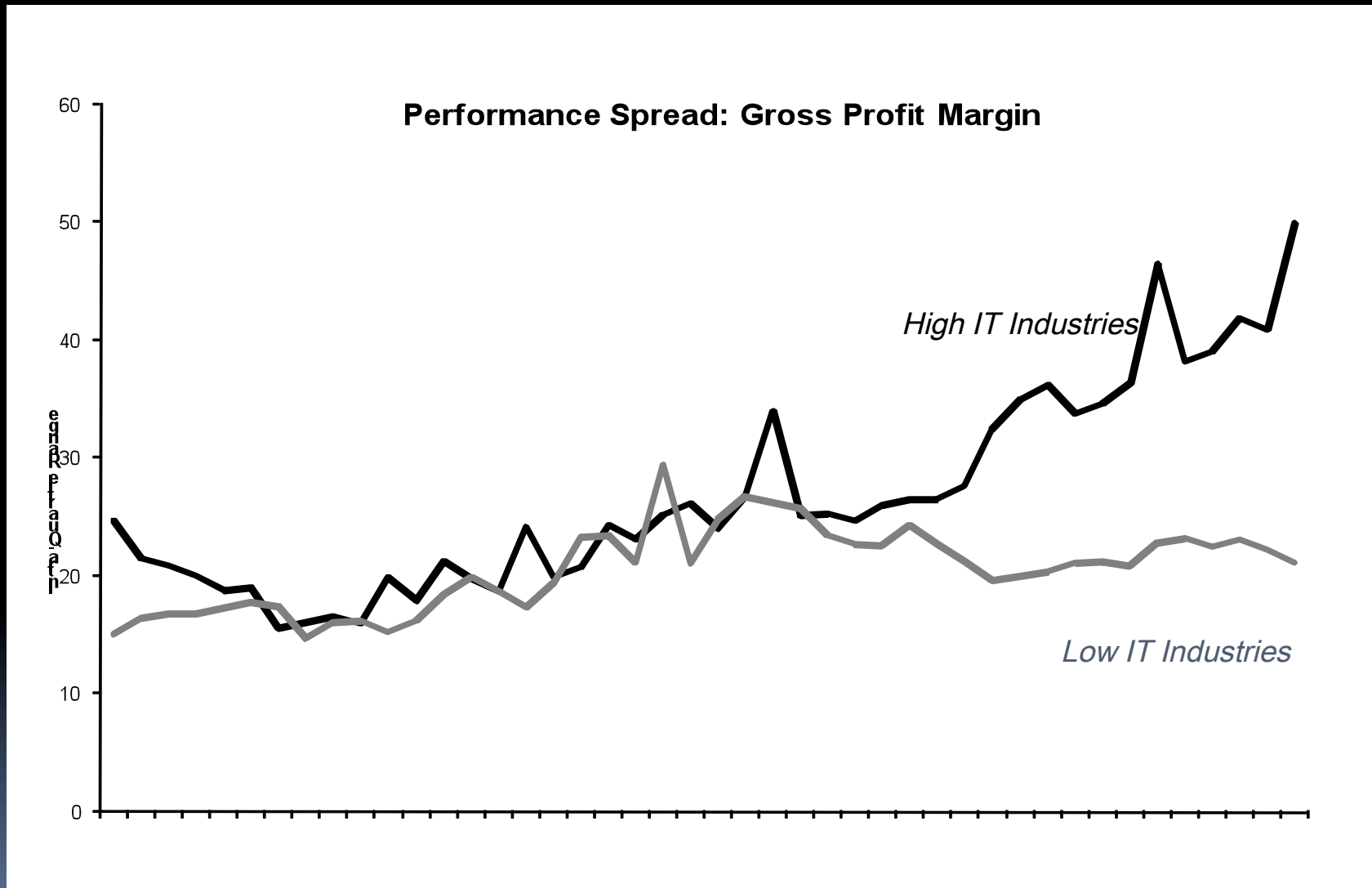


GDP per capita vs median Income

Index of Growth in US Real GDP per Capita and Real Median Household Income, 1975-2009



Corporate Performance Spread has Grown



Lessons from the Research

1. Productivity surge linked to Networking and IT revolution
 - Core technologies are improving at unprecedented pace
 - Biggest changes when networking and IT lead to business process changes and new ways to work
2. Networking and IT enable four drivers of innovation
 - Measurement
 - Experimentation
 - Sharing
 - Replication
 - These techniques are more powerful when combined:
 - *A new R&D*
3. People, organizations and institutions are not always keeping up with technology
 - Bigger pie, but not every slice is growing evenly
 - Dispersion in performance across firms is growing as leaders outrace laggards

The Race Between Technology and Institutions

**Erik Brynjolfsson
Andrew McAfee**

Race Against The Machine



How the Digital Revolution is Accelerating Innovation,
Driving Productivity, and Irreversibly Transforming
Employment and the Economy

“Computers are now doing many things that used to be the domain of people only. The pace and scale of this encroachment into human skills is relatively recent and has profound economic implications. Perhaps the most important of these is that while digital progress grows the overall economic pie, it can do so while leaving some people, or even a lot of them, worse off.”

Read the Book:

www.RaceAgainstTheMachine.com

Read the Papers:

<http://digital.mit.edu/erik>