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# How Globalization, Innovation, and Culture Are Changing Arizona's Economy

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# ITIF: Who We Are

The Information Technology and Innovation Foundation is a think tank at the cutting edge of designing innovation policies and exploring how innovation will boost economic growth and competitiveness. ITIF focuses on:

- Innovation processes, policy, and metrics,
- Internet, big data and IT policy,
- IT and economic productivity,
- Science and tech policy, and
- Innovation and trade policy

# Today's Presentation

1

Understanding Economic (R)evolution

2

Geography-Driven (R)evolution

3

Technology-Driven (R)evolution

4

Culture-Driven (R)evolution

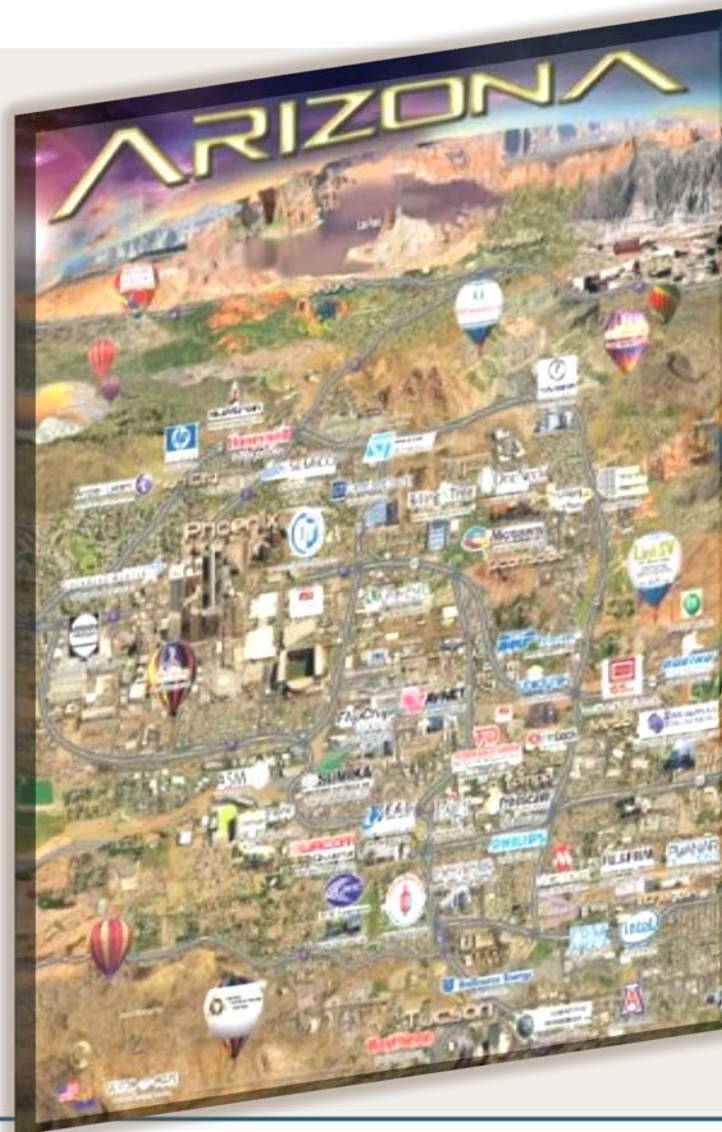
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Taking Advantage of (R)evolution

# Arizona Then...

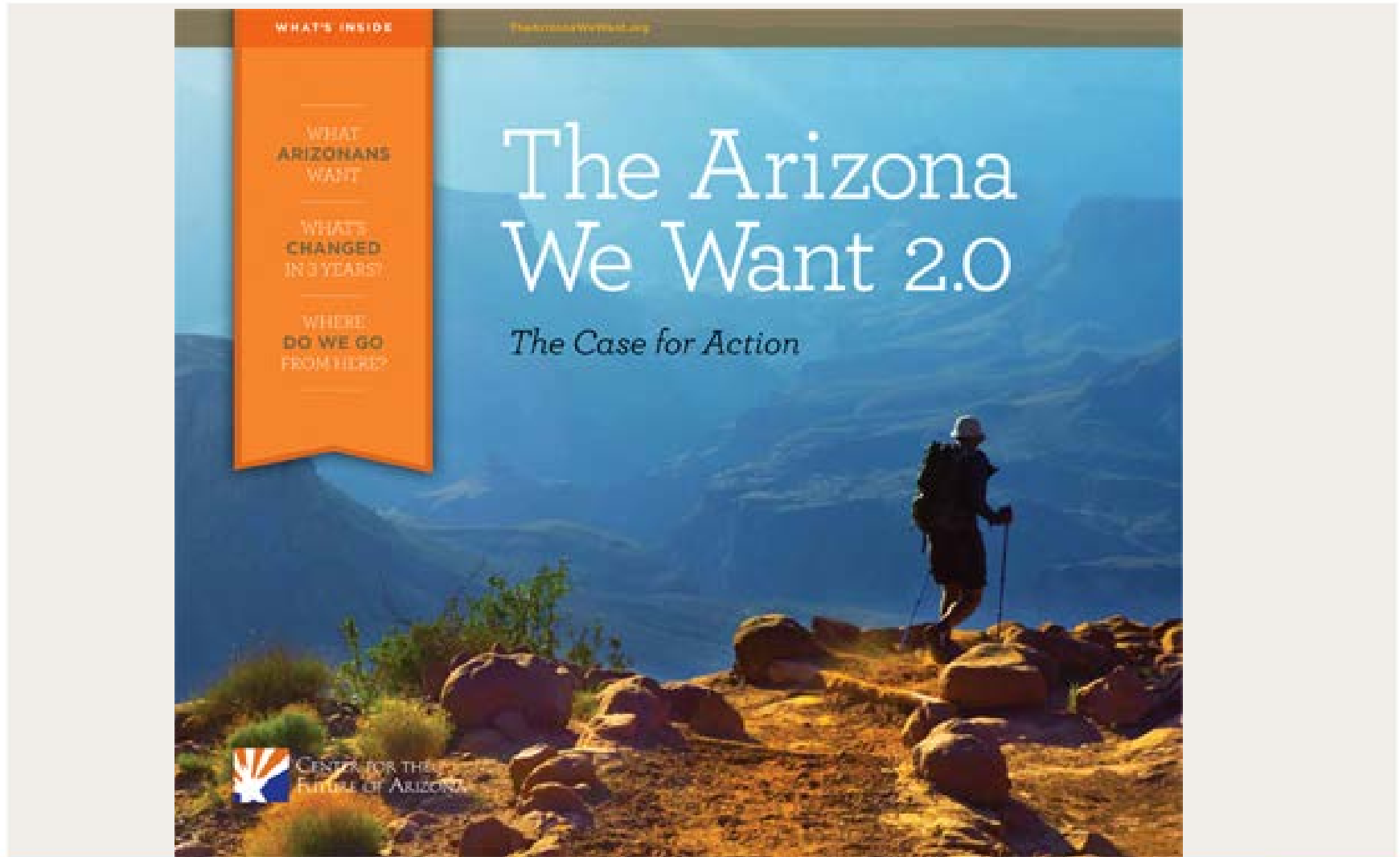


# Arizona Now...





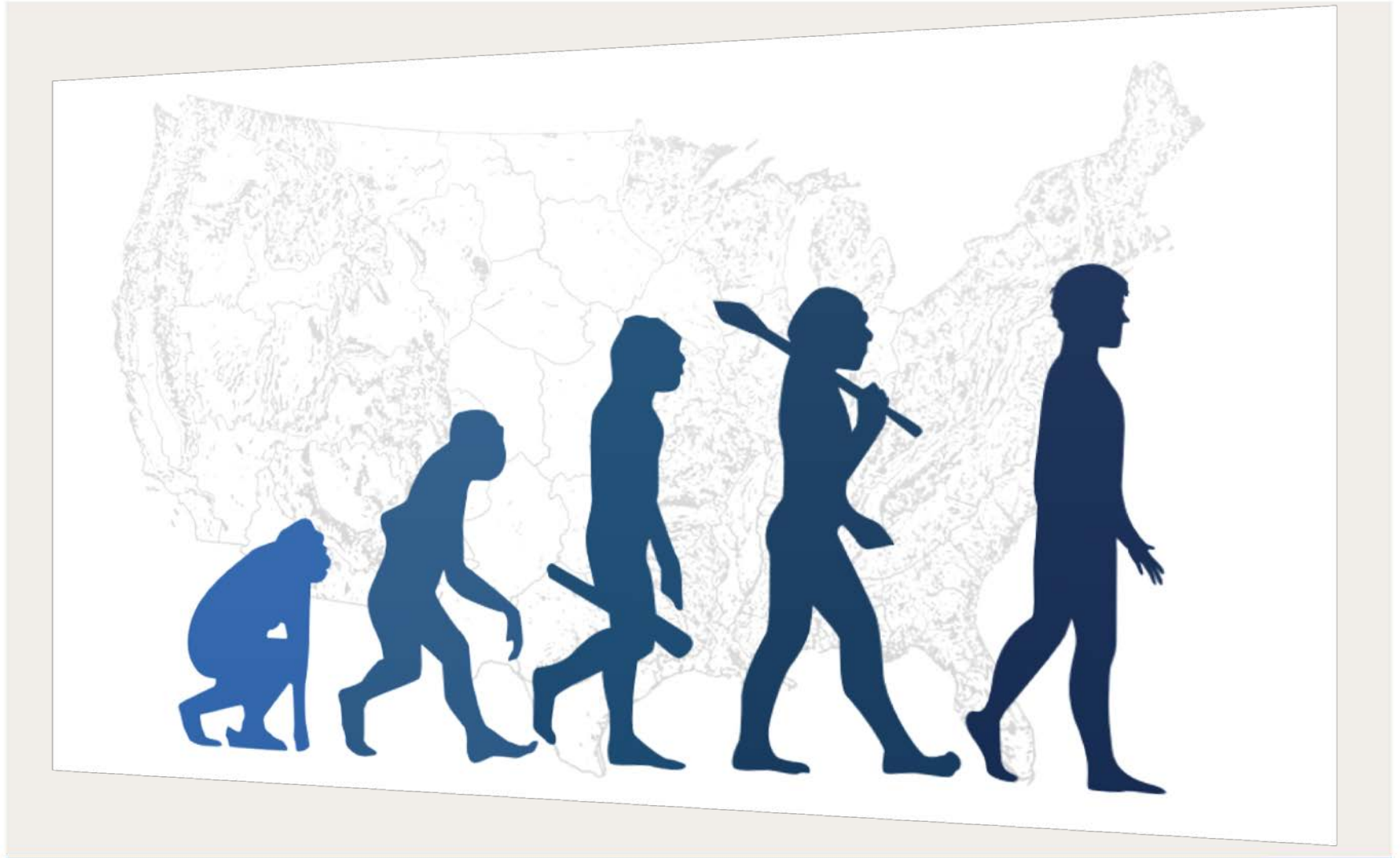
# Arizona Next...?



# Economies: “Engines” That Get Bigger?



# Or Systems That Evolve?





# During My Talk ...

- 25 Patents Will be Issued
- 18 New Products Released
- 18 New Production Processes Adopted
- 150 Firms Will Go Out of Business
- But 166 Firms Will Start Up

# Drivers of Economic Evolution

- Geography and movement of firms and people
- Technological innovation
- Culture and demography

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# Geography Drives Economic Evolution

Industry	Decline
Plastics	17%
Fabricated Metals	20%
Furniture	26%
Paper	27%
Nonmetallic Minerals	30%
Primary Metals	36%
Apparel	40%

Real output loss, 2000 to 2010 for selected U.S. manufacturing industries.

Source: Bureau of Economic Analysis

- Economies are entities that evolve over both time and space
- The U.S. has to generate new industries to replace the ones it loses to low-wage nations
- Competition for “replacement” firms is much stiffer



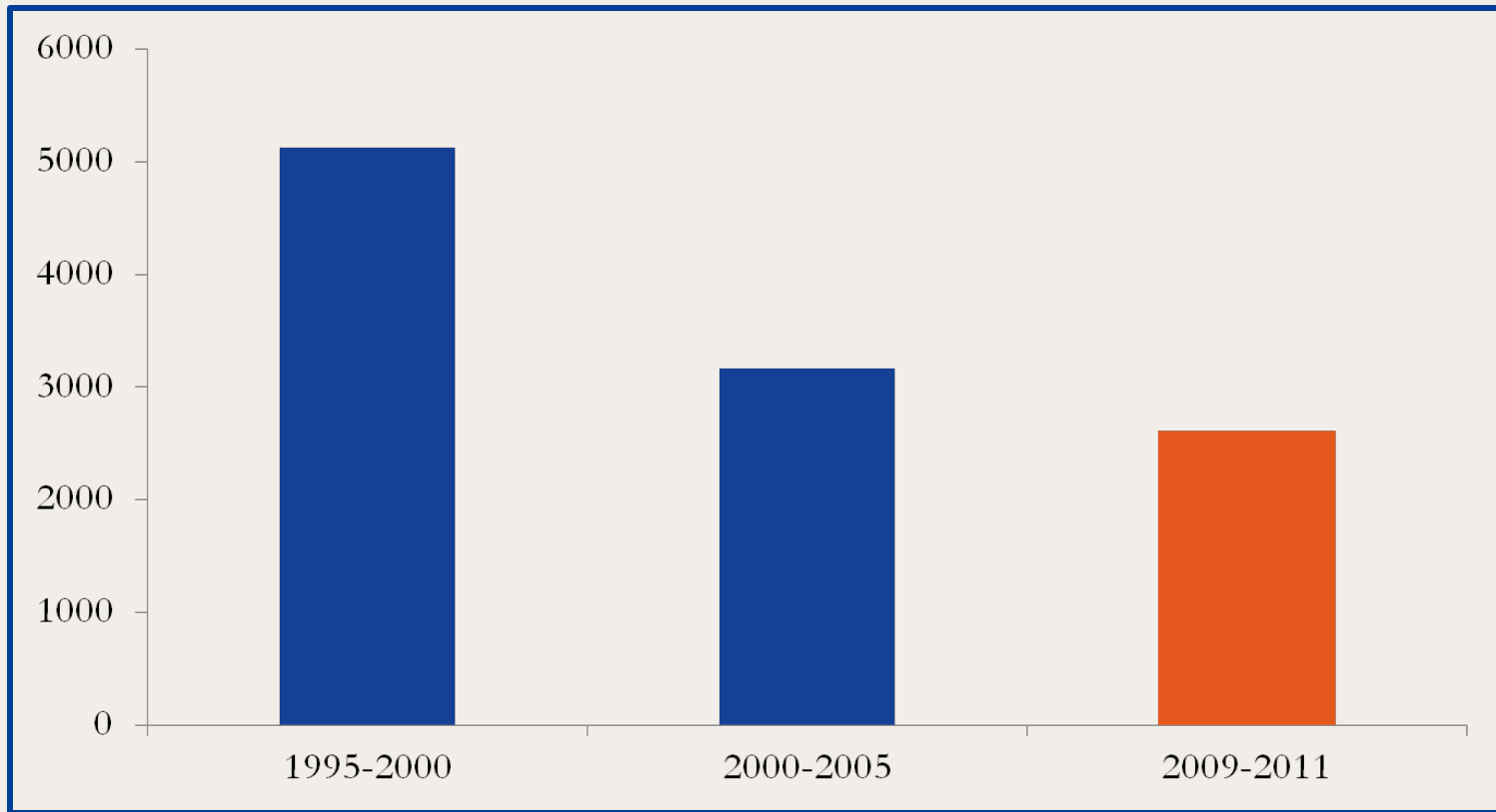
# Migration of Firms Used to Be National



# Now It's Global

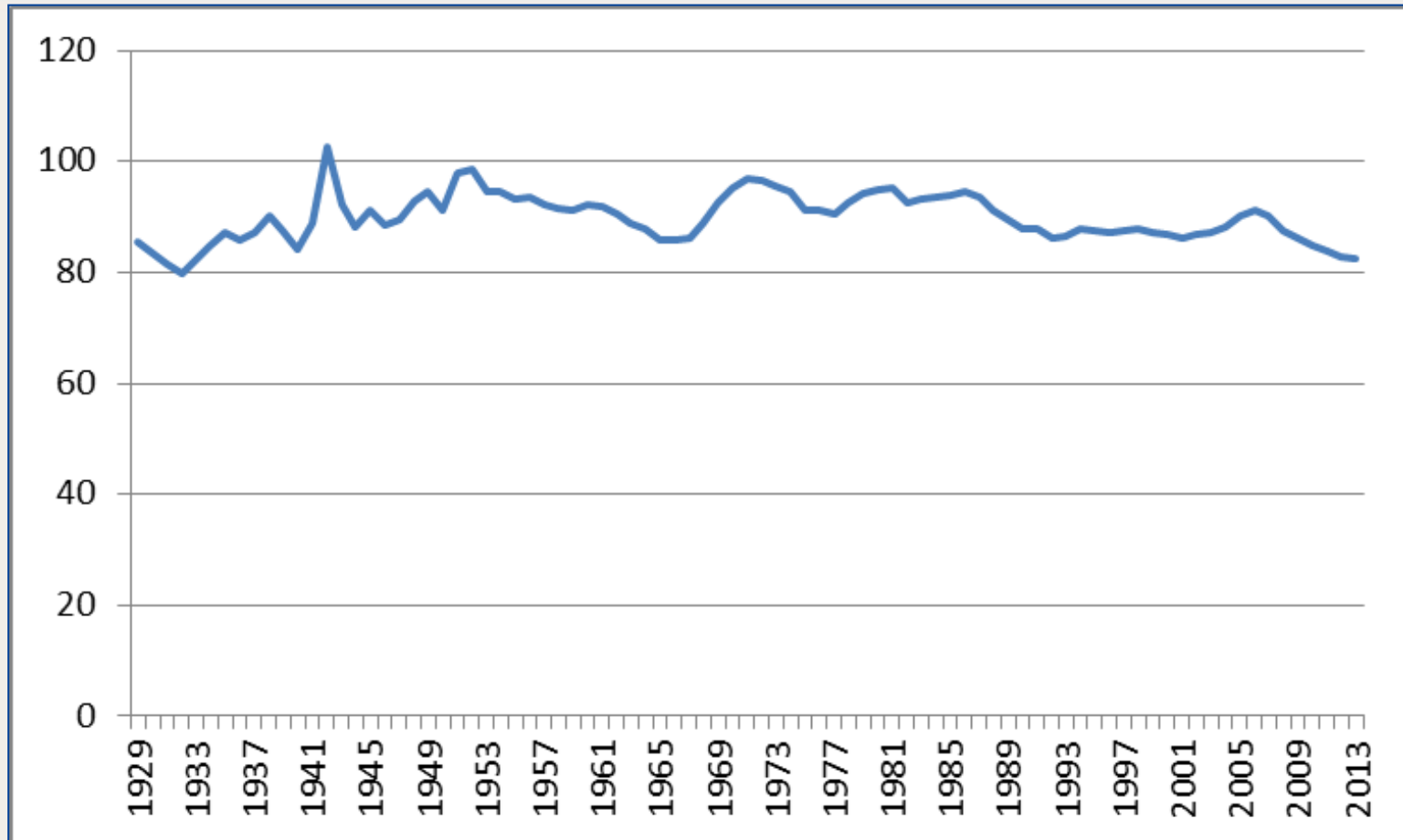


# Fewer Relocations to Target



**Major Industrial Manufacturing Relocations & Expansions in U.S.**

# Arizona Has Long Been Lower Cost

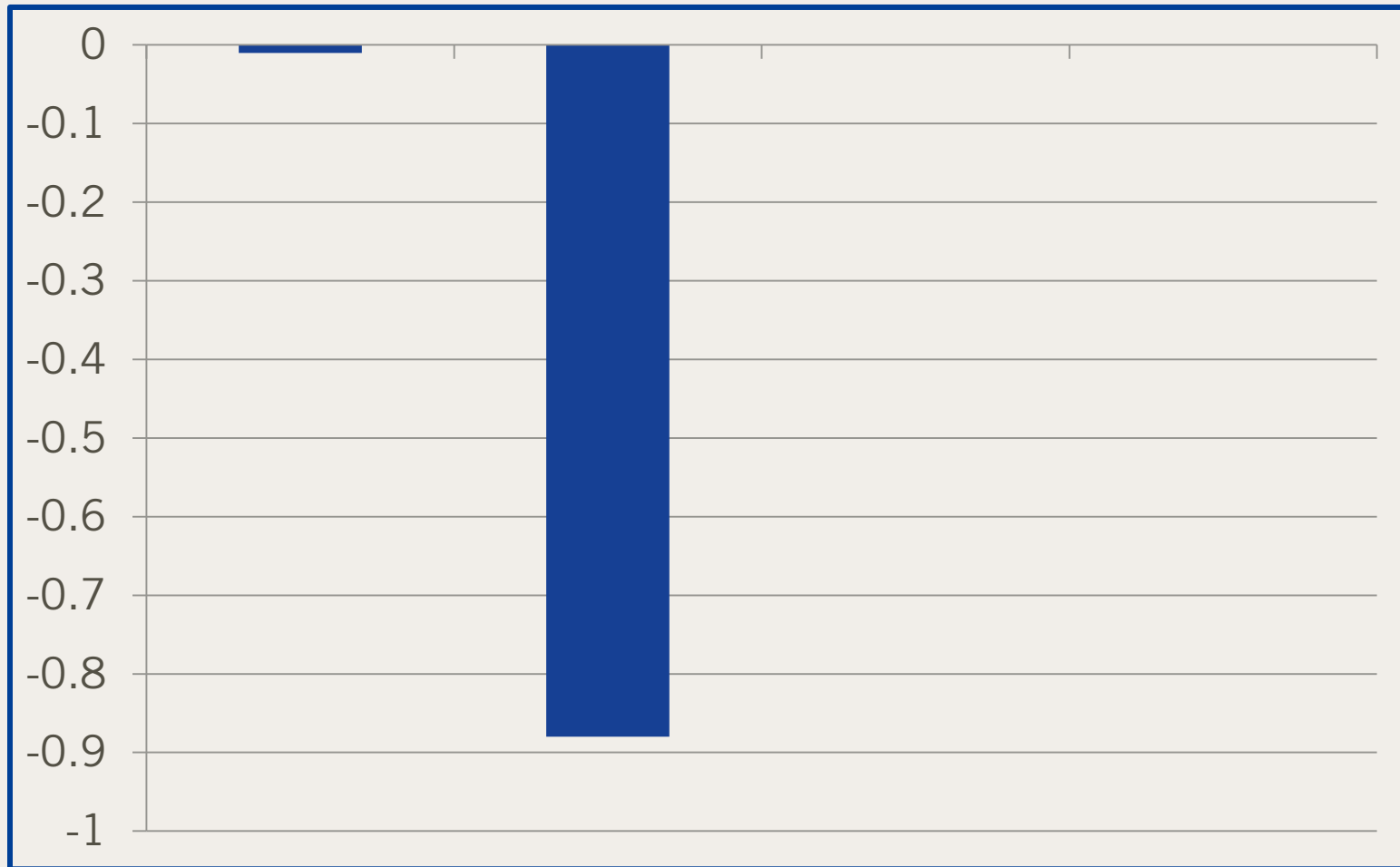


Arizona per-capita income as share of US per-capita income (Source: BEA)



# But Low Costs are Less of an Advantage

Arizona production costs as share of US vs. Mexico's



# Future of Geographic Evolution

- Continued competition from low cost commodity nations
- Growing competition from innovation-based economies

# Routine Production Metros Will Lag Innovation Metros



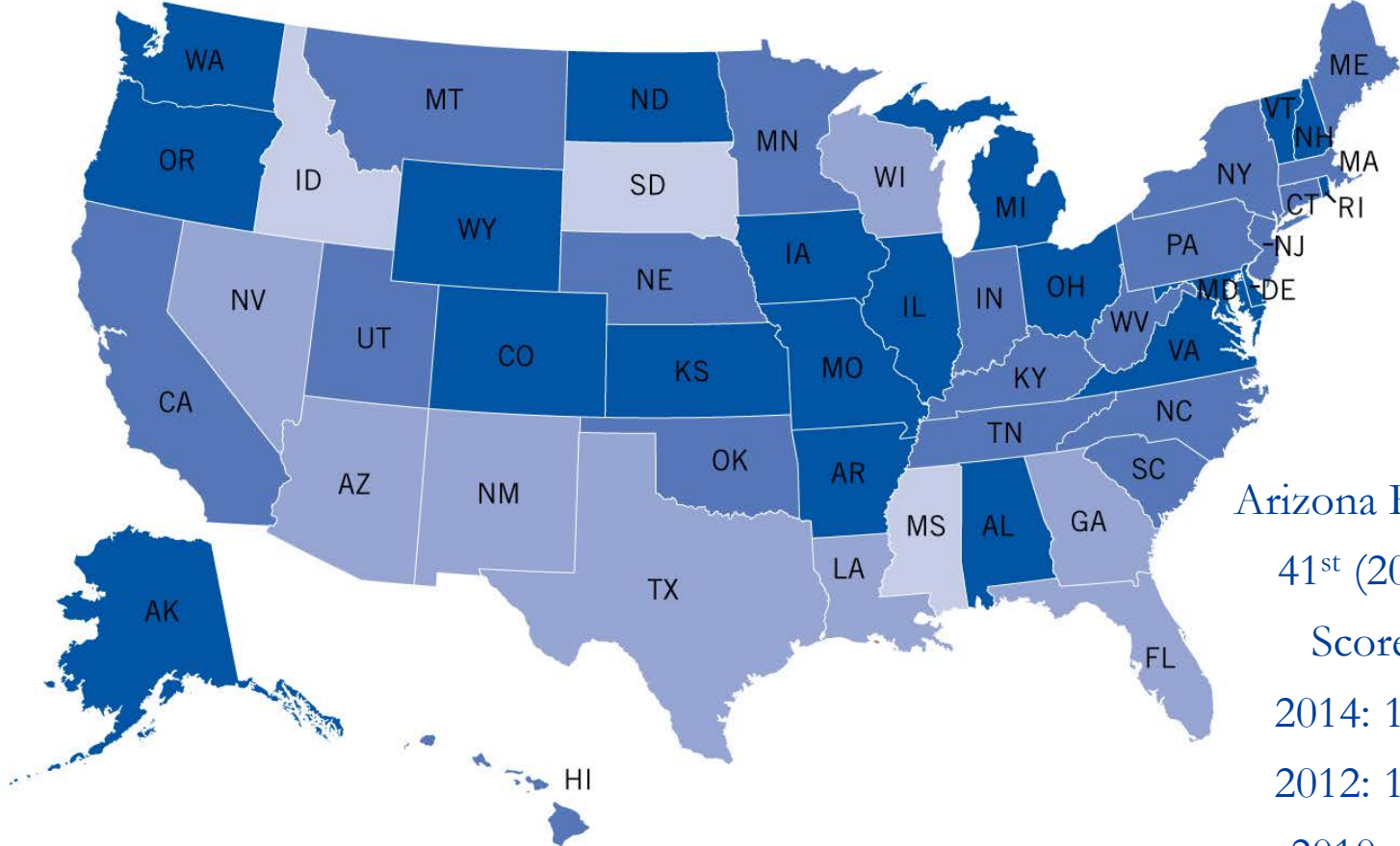
# People Move

## Five fastest growing metros (2000-2014):

- San Antonio
- Las Vegas
- Riverside-San Bernardino
- Houston
- Austin



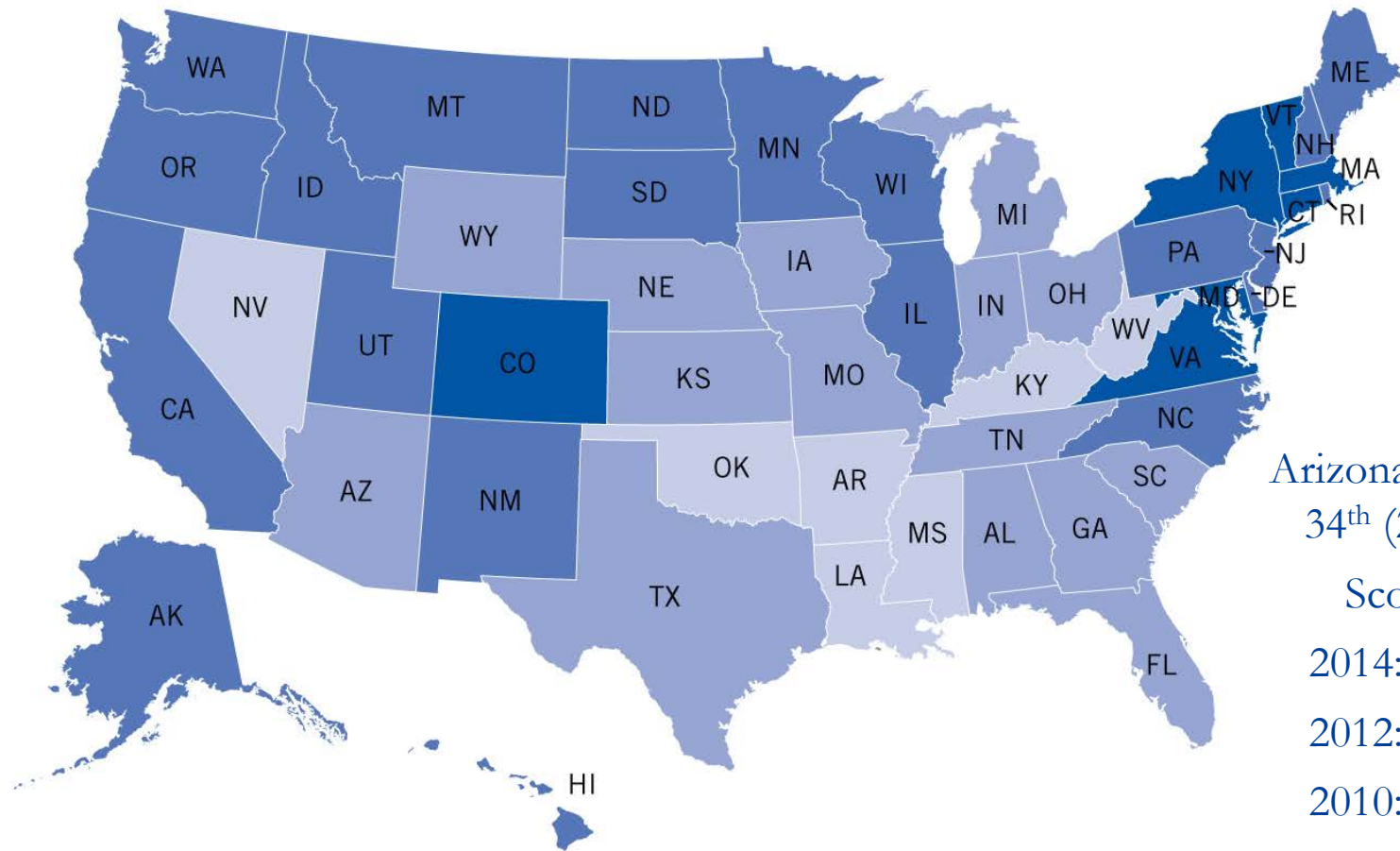
# Immigration of U.S. Knowledge Workers



Arizona Ranks  
 41<sup>st</sup> (2014)  
 Score:  
 2014: 12.2  
 2012: 12.1  
 2010: 10

100th–76th percentile
  75th–51st percentile
  50th–26th percentile
  25th–1st percentile

# Migration of U.S. Knowledge Workers



■ 100th–76th percentile ■ 75th–51st percentile ■ 50th–26th percentile ■ 25th–1st percentile

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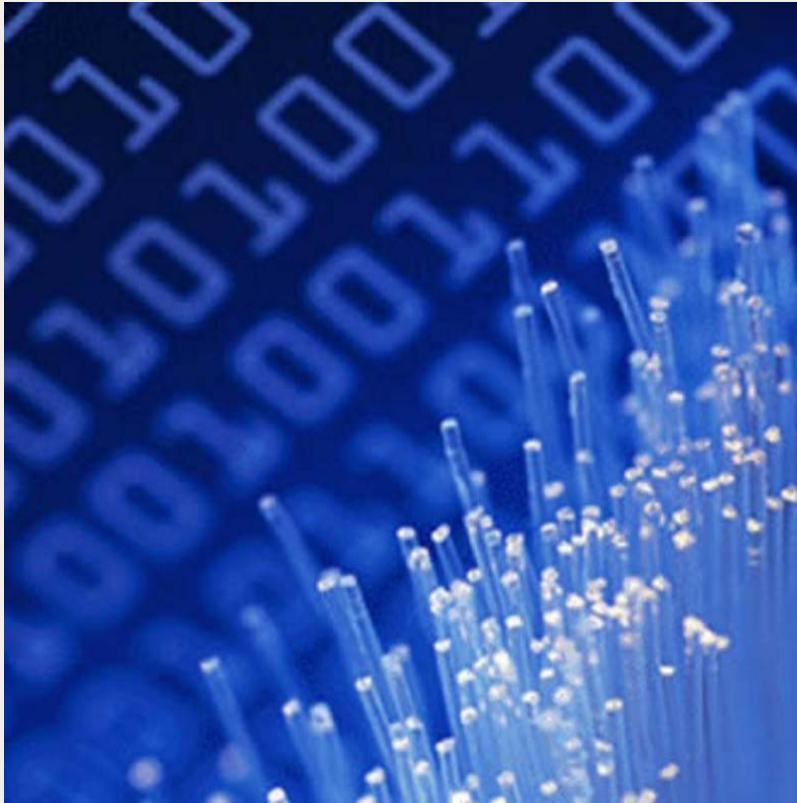
Taking Advantage of (R)evolution

# Technological Innovation Drives Evolution

- New production processes
- New products and services
- New business models



# IT Drives Innovation



- 1,200 quintillion transistors in the world:  
(1,215,500,000,000,000,000,000,000)
- Up 14,300 times in the last 15 years

# IT Changing Enterprises and the Economy

- Social
- Mobile
- Internet of Things
- Analytics
- Cloud
- Kiosks



# Technology Drives Evolution

Industry	NAICS Code	Real Gross Output Change 1998-2012
<b>Growth Due to Technology</b>		
Internet publishing and broadcasting and Web search portals	519130	1094.2%
Wireless telecommunications carriers (except satellite)	517210	699.9%
Support activities for oil and gas operations	21311A	386.1%
Biological product (except diagnostic) manufacturing	325414	137.4%
Data processing, hosting, and related services	518200	132.7%
Software publishers	511200	116.2%
Environmental and other technical consulting services	5416A0	101.4%
Computer systems design services	541512	56.7%
Primary battery manufacturing	511200	111.2%

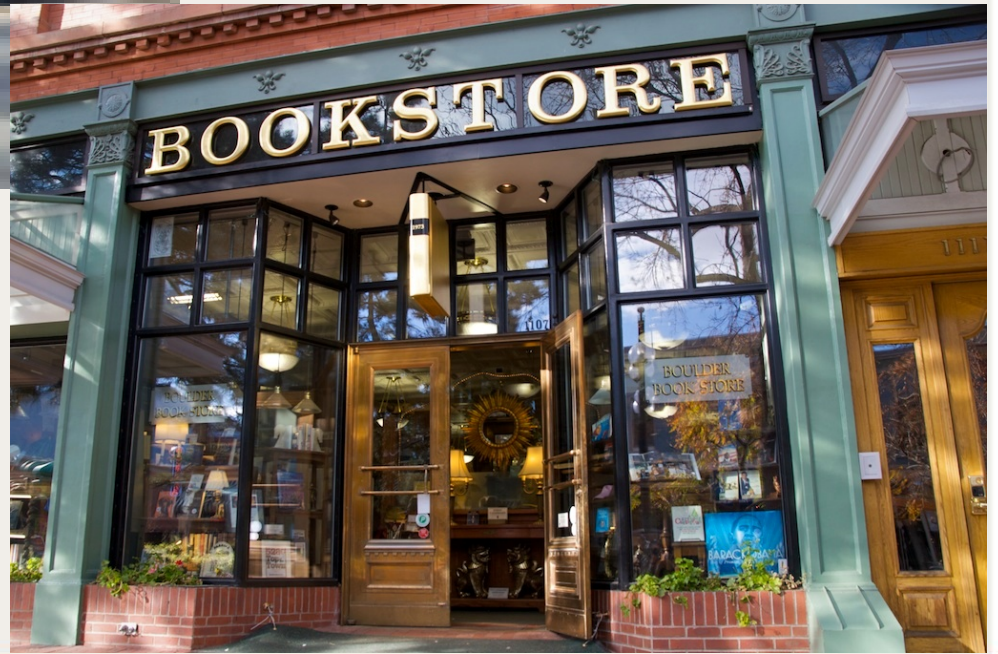
Industry	NAICS Code	Real Gross Output Change 1998-2012
<b>Decline Due to Technology</b>		
Electron tube manufacturing	33441A	-54.7%*
Software, audio, and video media reproducing	334611-2	-51.6%*
Magnetic and optical recording media manufacturing	334610	-42.4%
Video tape and disc rental	532A00	-39.0%*
Electronic and precision equipment repair and maintenance	811200	-33.9%
Postal service	491000	-30.2%
Directory, mailing list, and other publishers	5111A0	-26.0%
Couriers and messengers	492000	-19.6%

**Changes in real industrial output by industry and cause**

**\*1998-2011 data**

**Source: Bureau of Economic Analysis**

# Technology is Making Industries That Were Local...



# National...



# Where's Technological Evolution Going?



# Software Is “Eating the World”

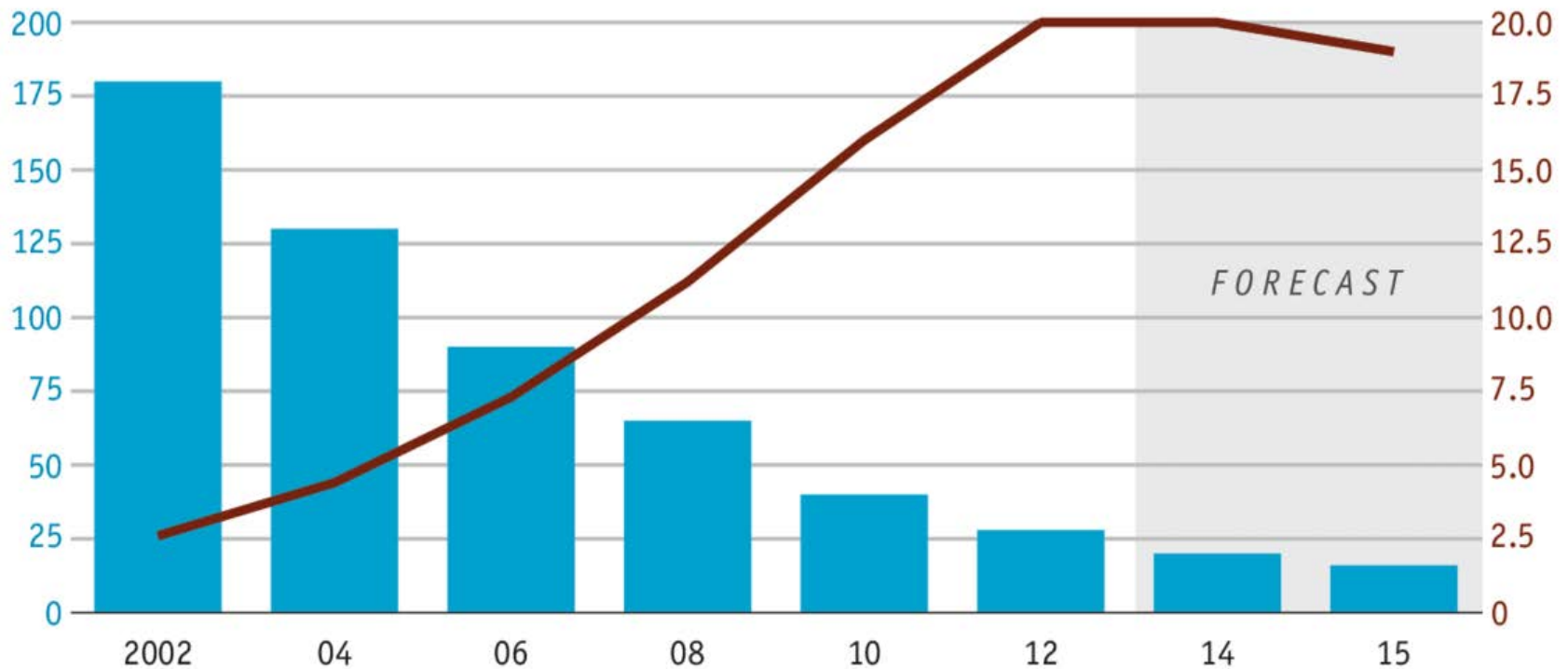


# End of Moore's Law or Robots Taking Over?

## Shrinking chips

Number and length of transistors bought per \$

*Transistor size, nanometres (nm)*



Source: Linley Group

[Economist.com/graphicdetail](http://Economist.com/graphicdetail)

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# Changes in Culture Drive Evolution

Industry	NAICS Code	Real Gross Output Change 1998-2012
<b>Growth Due to Societal Changes</b>		
Military armored vehicle, tank, and tank component manufacturing	336992	294.9%
Tortilla manufacturing	311830	103.4%*
Wineries	312130	102.7%
Medical and diagnostic labs and outpatient and other ambulatory care services	6214-5, 6219	78.4%
Securities, commodity contracts, investments, and related activities	523A00	69.4%
Fitness and recreational sports centers	713940	62.8%*
Offices of physicians, dentists, and other health practitioners	6211-3	53.3%
Home health care services	621600	43.3%

Industry	NAICS Code	Real Gross Output Change 1998-2012
<b>Decline Due to Societal Change</b>		
Newspaper publishers	511110	-46.7%

**Changes in real industrial output by industry and cause.**

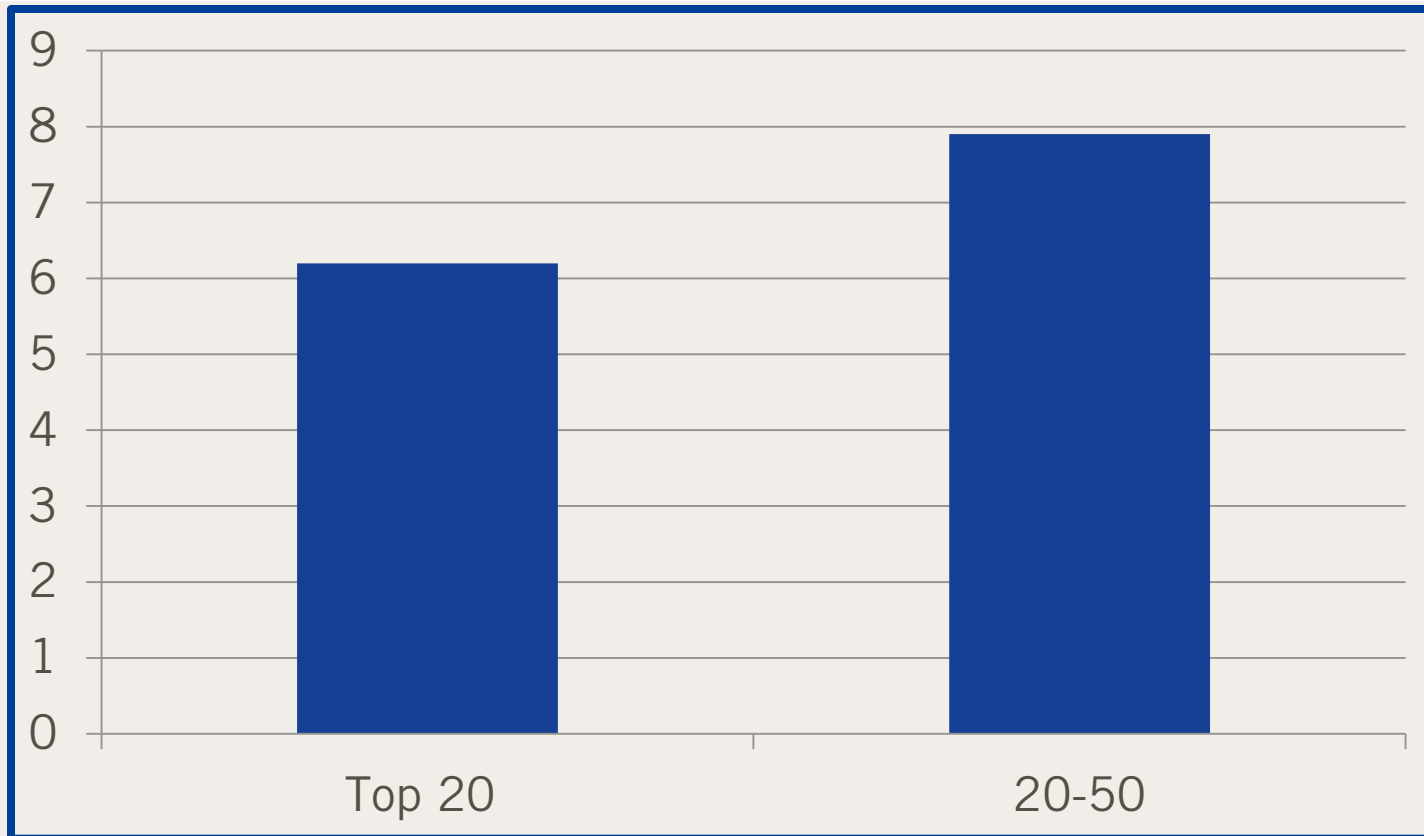
**\*1998-2011**

**Source: Bureau of Economic Analysis**

# As Industries Become More Footloose, Culture and Quality of Life Enable Growth



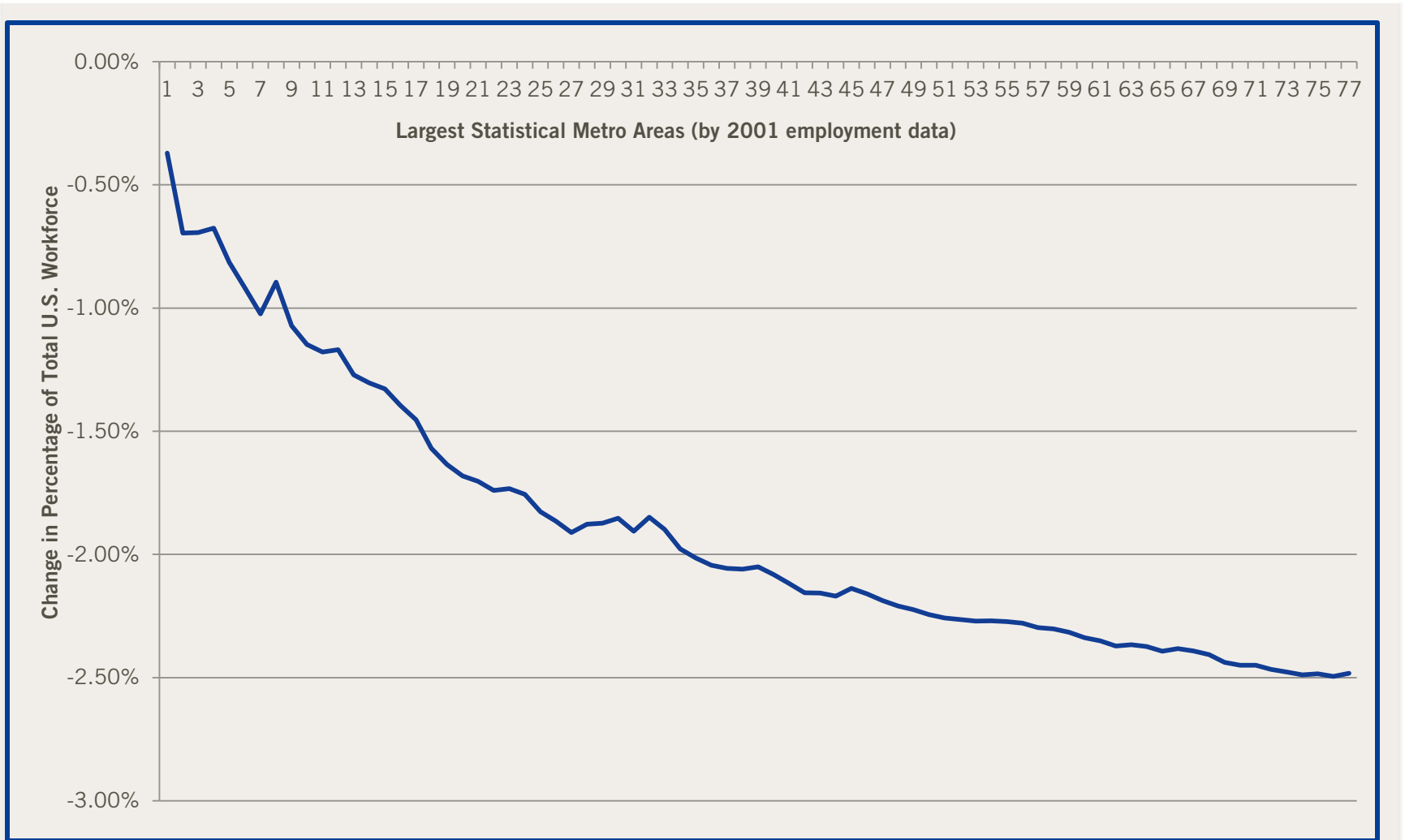
# Mid-sized Metros are Growing Faster



Percent employment growth, 2000-2014, top 50 metros (BLS)



# Large Metros are Losing Employment Share



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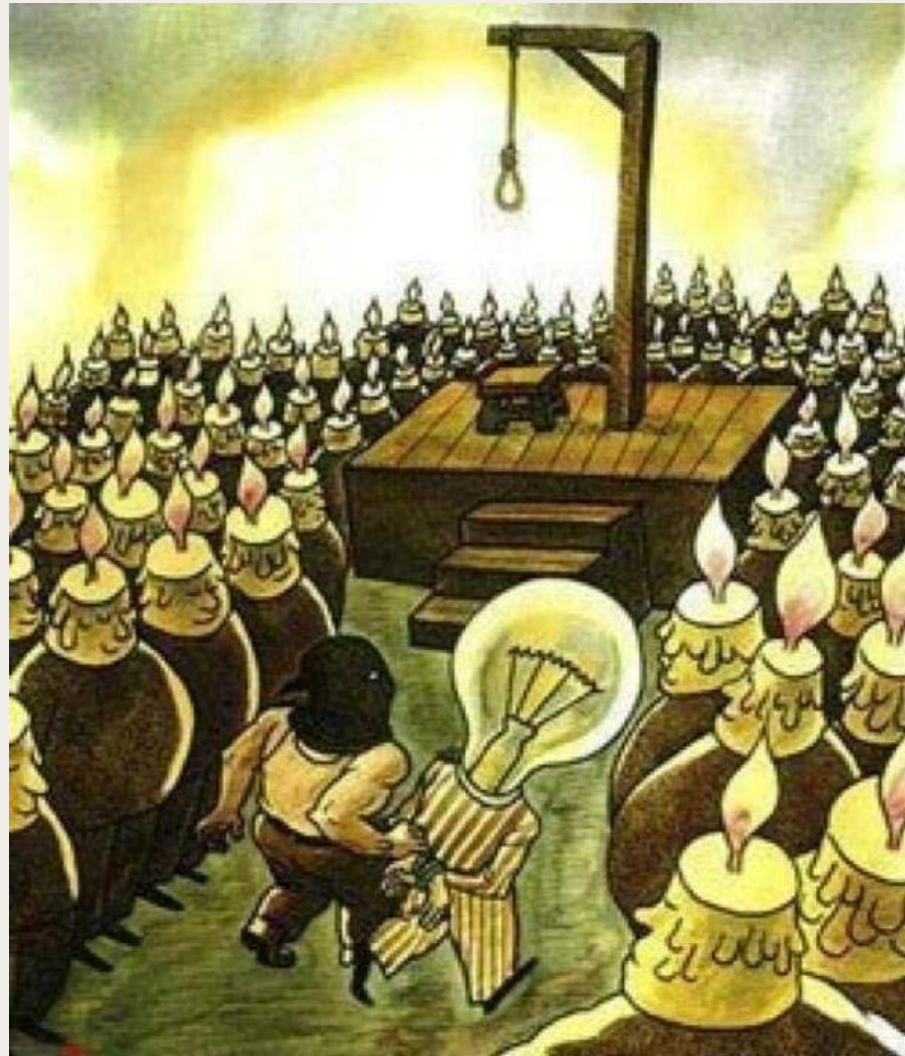
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**Taking Advantage of (R)evolution**

# Taking Advantage of Economic Evolution Means Embracing Innovation In...

- **Culture**

# So Now a Region's Culture and Quality of Life is You Don't Want This...



# You Do Want This



Think different.



# Taking Advantage of Economic Evolution Means Embracing Innovation In...

- Culture
- Institutions



*Institutional Innovation:  
Doing new things in new  
ways*

# Taking Advantage of Economic Evolution Means Embracing Innovation In...

- **Economic development policies**
  - Innovation vouchers (German lander)
  - Refundable and collaborative R&D tax credits (Norway, Australia, Ontario)
  - Design assistance (Ontario)
  - “On the spot” new firm registration (Portugal, Chile)
  - Industrial Ph.D. program (Alberta)



# Taking Advantage of Economic Evolution Means Embracing Innovation In...

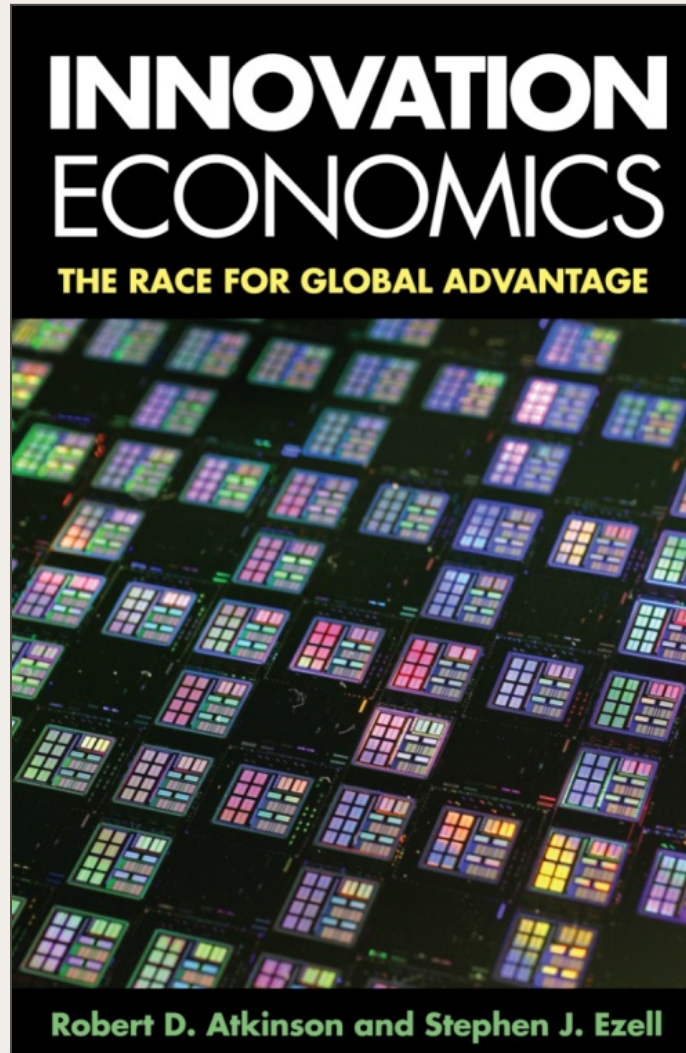
- Culture
- Institutions,
- Economic development policies, and
- **Government**

# Some Useful Questions to Ask About Innovation in Your Government

- Do I know my own innovation track record?
- Do I understand the innovation patterns in governments like mine around the world?
- Do I have a process in place where crazy, out of the box ideas (e.g., innovations) can get a hearing?
- Do I have clear metrics for innovation?
- Do I have effective incentives and rewards for innovating?

*Most governments have no answers.*

[www.globalinnovationrace.com](http://www.globalinnovationrace.com)



*Thank You*

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