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**Paulo Goes**
*Dean, Eller College of Management*

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## Welcome.

**Patricia Feeney**
*Executive Director, Southern Arizona Market*
*Chase*

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## Our region

**Outlook for Tucson**

**George W. Hammond, Ph.D.**
*Director, Economic and Business Research Center*

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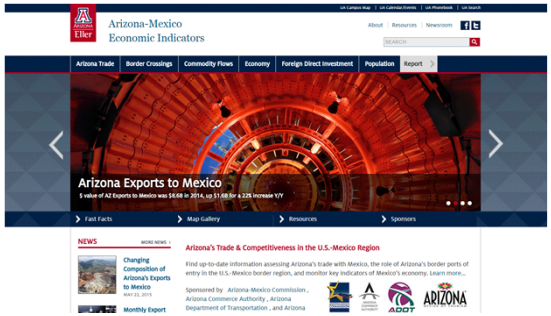
**Explore** data for border economies.
## Arizona-Mexico Economic Indicators

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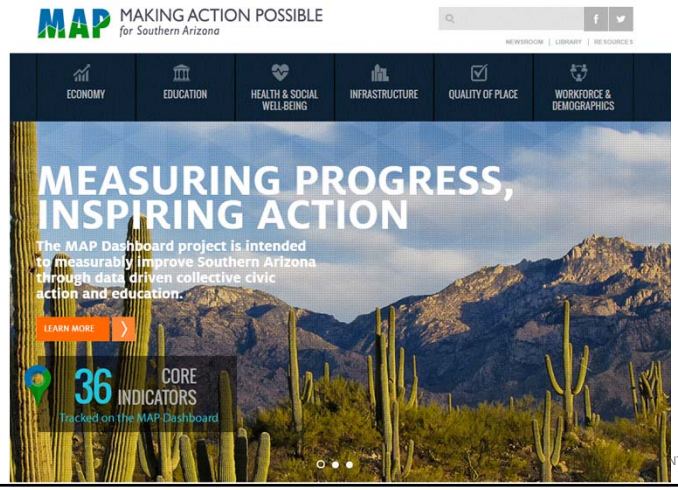
## mapazdashboard.arizona.edu

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## Our Game Plan

- **Arizona's job growth accelerated recently**
  - Faster gains for both Phoenix and Tucson
  - Arizona and Phoenix jobs are above pre-recession levels
- **Federal procurement spending still falling**
- **Arizona wage growth remains subdued**
- **U.S. dollar is still elevated and gasoline prices are still low**
- **U.S. growth accelerates in the near term**
- **Tucson economy gains momentum**

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## Tucson MSA Economy Overview

| INDICATOR | HOW ARE WE DOING? | HOW DO WE COMPARE? | RECENT CHANGE |
|---|---|---|---|
| BUSINESS GROWTH | -0.2% FROM 2013 TO 2014 | | ▼ |
| EMPLOYMENT GROWTH | 0.8% FROM 2014 TO 2015 | | ▲ |
| MEDIAN HOME PRICE | $182,900 | | ▲ |
| MEDIAN HOUSEHOLD INCOME | $46,233 | | ▲ |
| PATENTS | 15.7 PER 10,000 WORKERS | | ▼ |
| REAL GDP | 0.5% FROM 2013 TO 2014 | | ▲ |

Ranked in Top 1/3 · Ranked in Middle 1/3 · Ranked in Bottom 1/3 · Ranked Last

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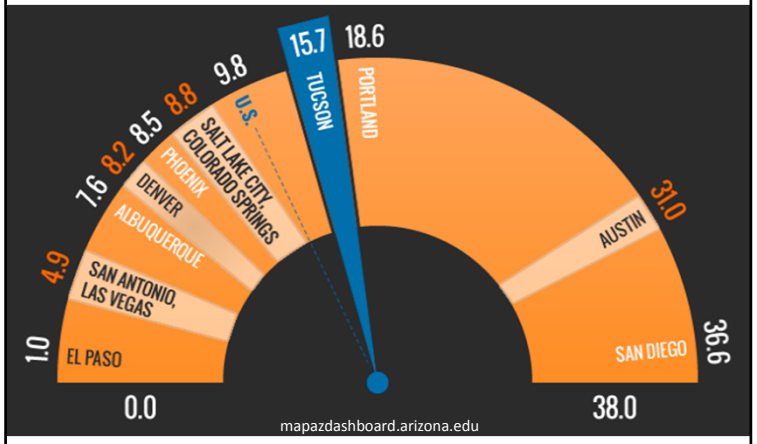
## Patents Per 10,000 Workers

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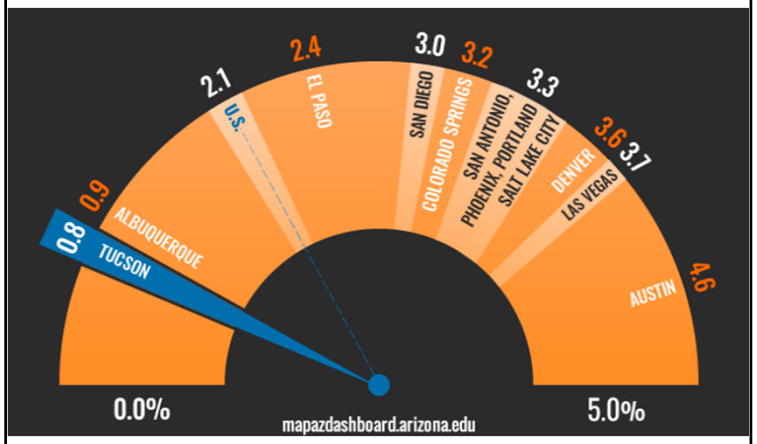
## Tucson MSA Job Growth 2015

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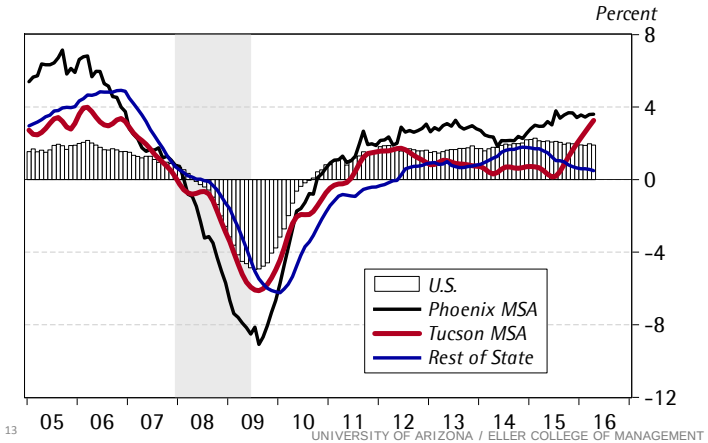
## Arizona Job Growth

### Over The Year

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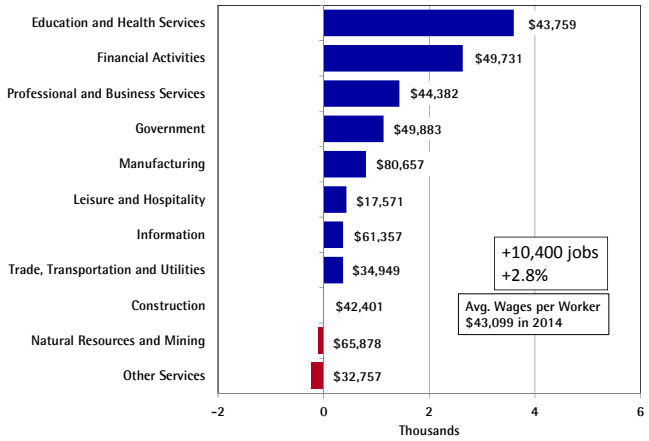
## Tucson MSA Job Growth

### Over The Year, First Quarter 2016

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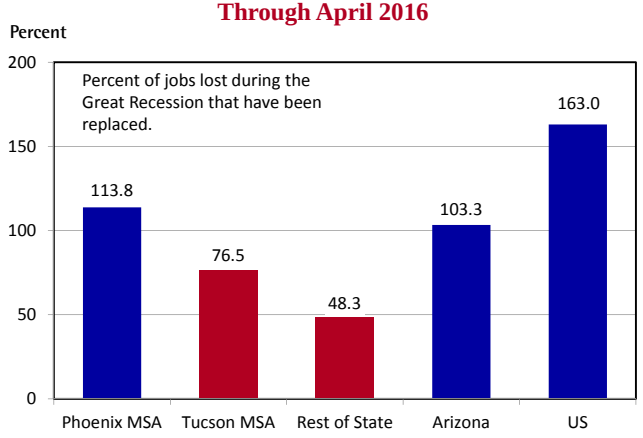
## Job Replacement Rates

### Through April 2016

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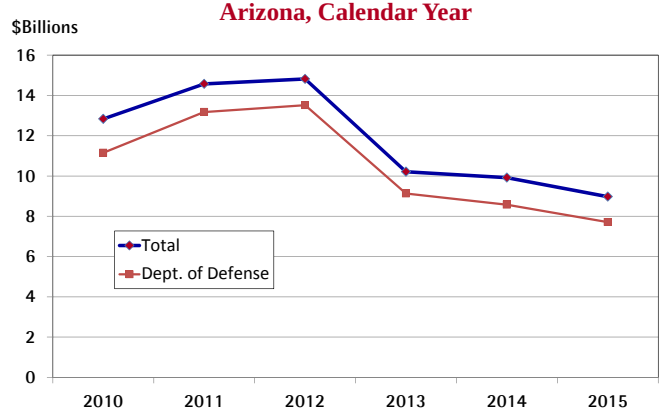
## Federal Procurement Spending

### Arizona, Calendar Year

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## Arizona Wages Per Worker

**Nominal, Over-The-Year Growth Rates**


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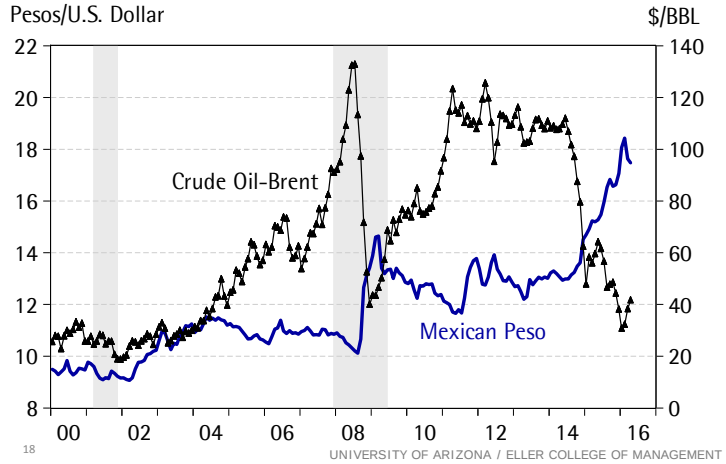
## U.S. Dollar And Crude Oil Prices

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## Arizona Merchandise Exports To Mexico

**Nominal, Monthly Rate**


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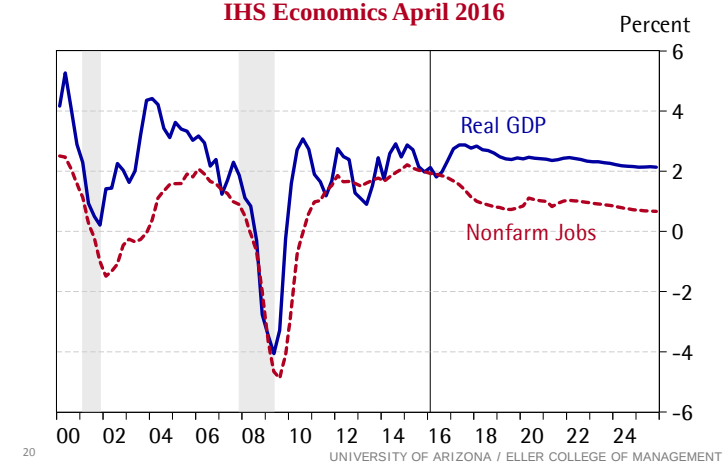
## U.S. Real GDP And Job Growth

**IHS Economics April 2016**

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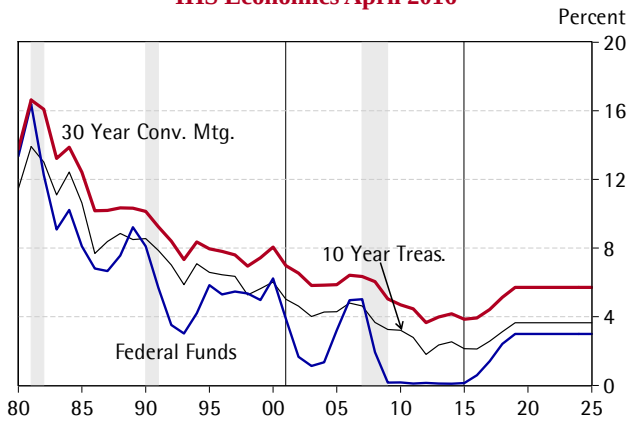
## U.S. Interest Rates

IHS Economics April 2016

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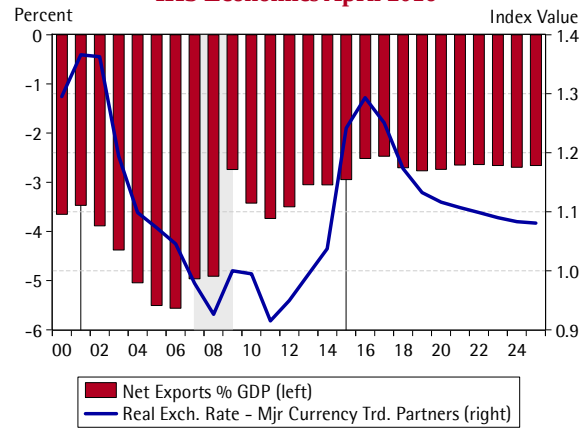
## U.S. Dollar And Net Exports

IHS Economics April 2016

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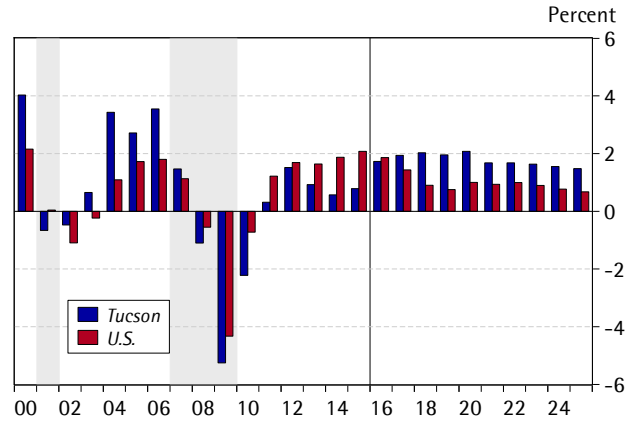
## Tucson MSA And U.S. Job Growth

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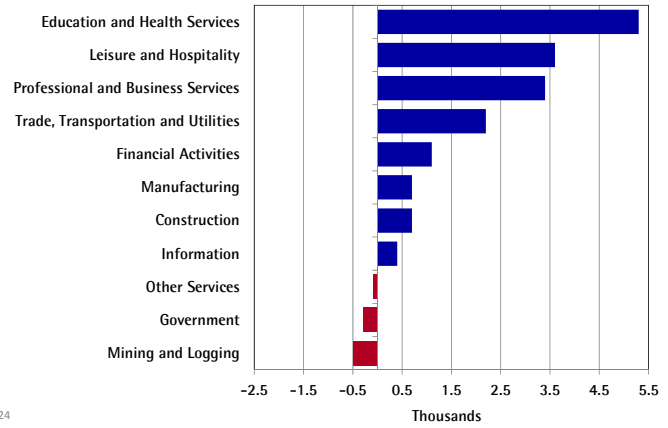
## Tucson MSA Job Growth By Industry

Net Change: 2015-2018

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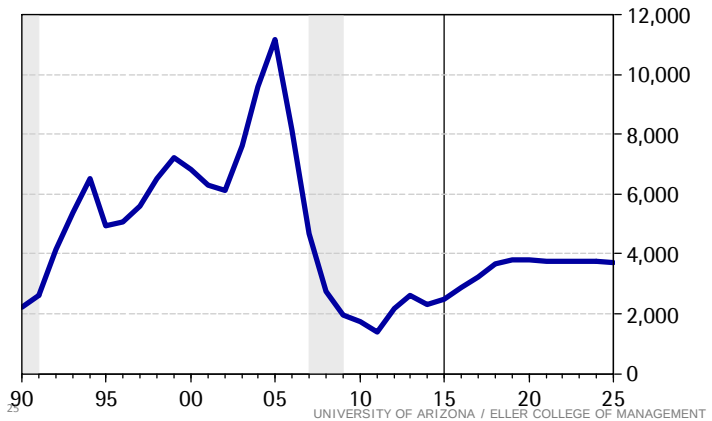
## Tucson MSA Single Family Permits

Annual Data

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## The Risks

- **Dismal productivity growth**
  - Which drives a surge in costs/inflation
- **Spike in crude oil prices**
  - Which contributes to faster inflation
- **Federal Reserve raises rates aggressively**
- **Global growth falters**
  - U.S. dollar surge, net exports drop
- **No increase in residential mobility**
- **Fiscal policy shock**

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## Tucson MSA Outlook Summary

| | Actual* | Forecast | | |
|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 |
| **Growth Rate** | | | | |
| Nonfarm Jobs | 0.8 | 1.7 | 1.9 | 2.0 |
| Personal Income | 3.8 | 4.1 | 4.4 | 5.1 |
| Retail Sales Less Food | 7.5 | 4.0 | 3.7 | 3.4 |
| Population | 0.2 | 0.6 | 1.0 | 1.2 |

*Personal income data are forecast.

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## Competitive Places

**The critical role of human capital**

**Ross DeVol**

*Chief Research Officer, Milken Institute*

## Presentation overview

**Long-term regional growth process**

**Education and knowledge in metro economic success**

**State Technology and Science Index**

**Conclusions:**

- **Human capital formation**

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## Long-term regional growth process

**Large regional differences in growth**

**Few barriers to flow of economic activity**

**Export-intensive activity is critical**

**Manufacturing is an export sector**

**Healthcare services can be an export**

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## Factors affecting disparity in regional growth

**Existing industrial structure**

**Cost of doing business:**

- **Tax rates, capital costs, wage rates, space costs, energy costs, health care costs, etc.**

**Labor force skills, access to markets and capital**

**Research, development and innovation capacities**

**Quality of place issues**

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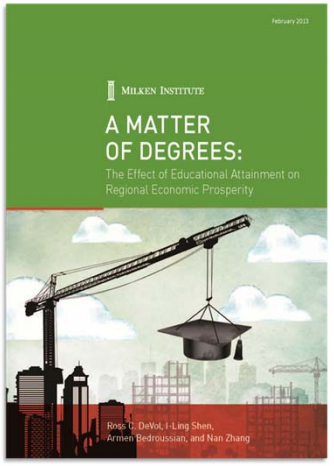


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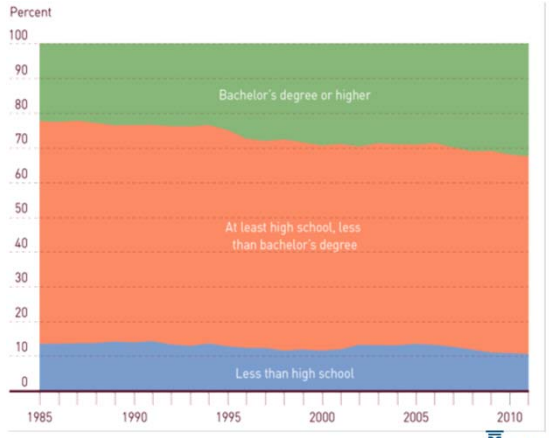
## Education attainment of young adults in the U.S.

*Age 25-29, 1985-2010*




Sources: Milken Institute, Current Population Survey, National Center for Education Statistics.

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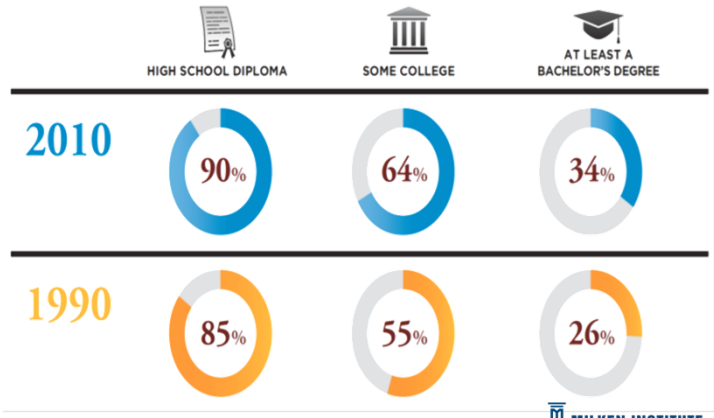
## Education in the U.S. workforce




Source: Milken Institute.

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## Metros with the highest average years of schooling

*Workers age 16 and older, 2010*

Top 10 metros

| Metro | Average years of schooling | Real GDP per capita (US$) |
|---|---|---|
| Fort Collins-Loveland, CO | 14.78 | 40,369 |
| Columbia, MO | 14.66 | 38,433 |
| Washington-Arlington-Alexandria, DC-VA-MD-WV | 14.58 | 62,666 |
| Ann Arbor, MI | 14.55 | 48,159 |
| San Jose-Sunnyvale-Santa Clara, CA | 14.54 | 68,609 |
| Boston-Cambridge-Quincy, MA-NH | 14.54 | 58,892 |
| Trenton-Ewing, NJ | 14.45 | 67,133 |
| Madison, WI | 14.42 | 53,057 |
| Champaign-Urbana, IL | 14.38 | 45,445 |
| State College, PA | 14.34 | 40,453 |

Sources: Milken Institute, U.S. Bureau of Economic Analysis, Moody's Analytics, American Community Survey 1-year estimates 2010.

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## Metros with the lowest average years of schooling

*Workers age 16 and older, 2010*

Bottom 10 metros

| Metro | Average years of schooling | Real GDP per capita (US$) |
|---|---|---|
| Visalia-Porterville, CA | 11.85 | 29,060 |
| Yakima, WA | 11.92 | 30,656 |
| Salinas, CA | 11.97 | 36,982 |
| Brownsville-Harlingen, TX | 12.13 | 24,619 |
| Merced, CA | 12.18 | 25,334 |
| McAllen-Edinburg-Mission, TX | 12.20 | 21,044 |
| Bakersfield-Delano, CA | 12.33 | 40,494 |
| Houma-Bayou Cane-Thibodaux, LA | 12.55 | 50,280 |
| Elkhart-Goshen, IN | 12.67 | 48,212 |
| Odessa, TX | 12.67 | 54,634 |

Sources: Milken Institute, U.S. Bureau of Economic Analysis, Moody's Analytics, American Community Survey 1-year estimates 2010.

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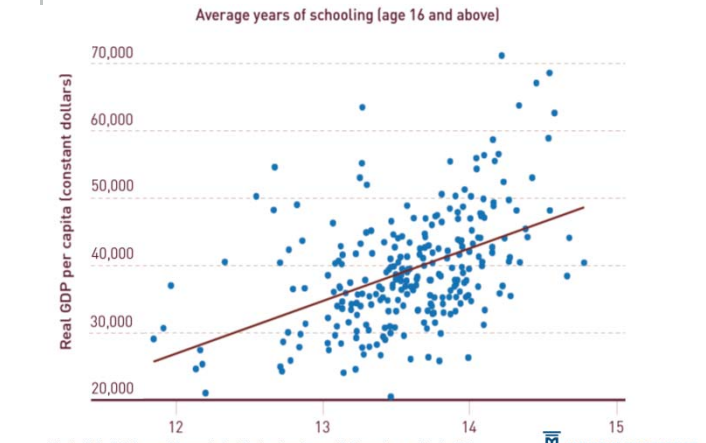
## Educational attainment and GDP per capita

*U.S. metropolitan areas, 2010*




Sources: Milken Institute, U.S. Bureau of Economic Analysis, American Community Survey 1-year estimates 2010.

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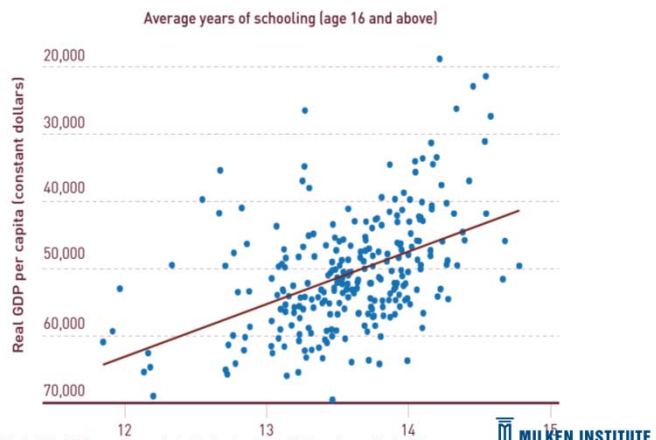
## Educational attainment and GDP per capita

*U.S. metropolitan areas, 2010*




Sources: Milken Institute, U.S. Bureau of Economic Analysis, American Community Survey 1-year estimates 2010.

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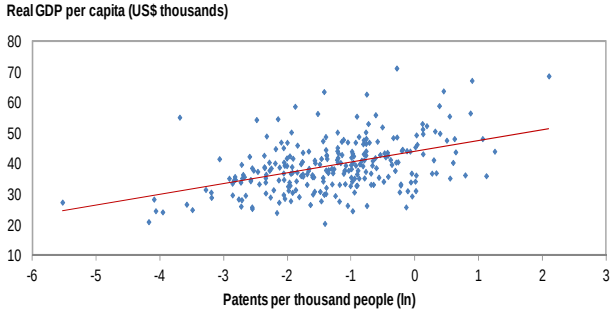
## Patents and GDP per capita

*In 261 U.S. Metropolitan Areas*




Sources: U.S. Bureau of Economic Analysis, Moody's Analytics, Science-Metrix, Milken Institute.

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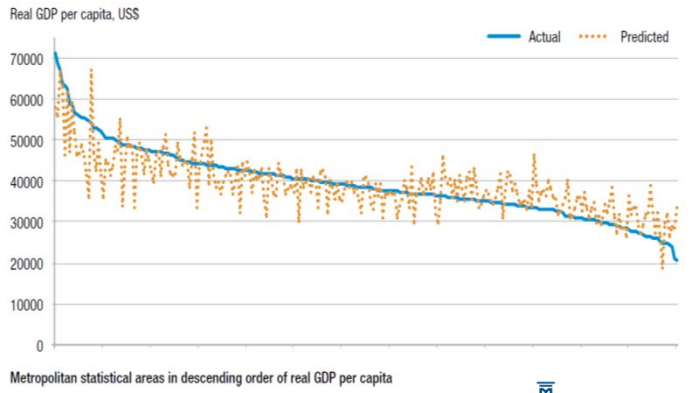
## Real GDP per capita of U.S. metros, 2010

(actual vs. predicted)




Source: Milken Institute 'A Matter of Degrees' (2013).

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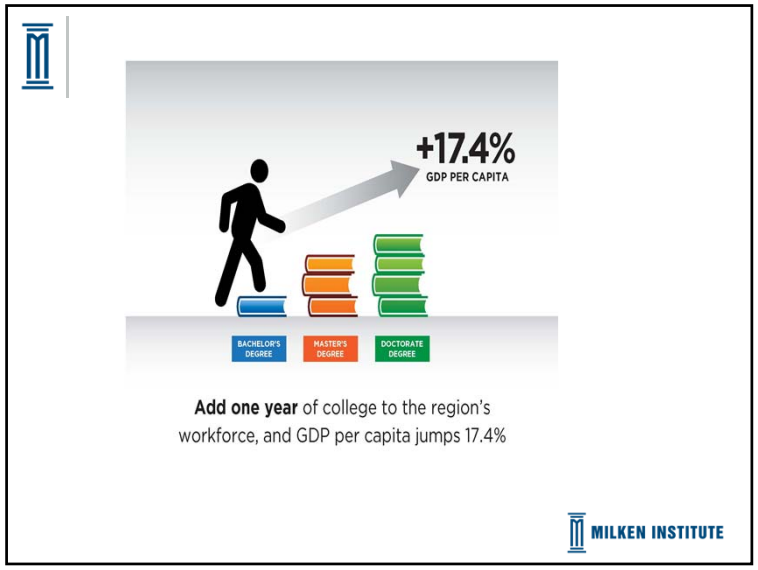


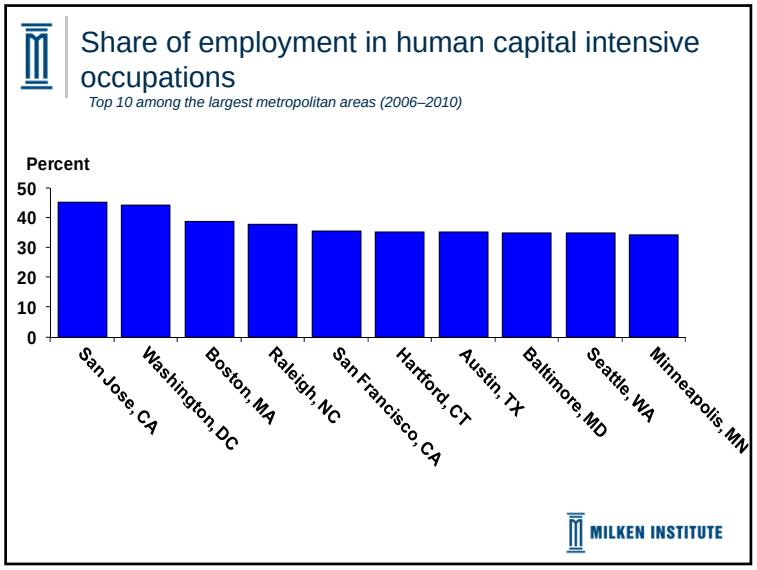


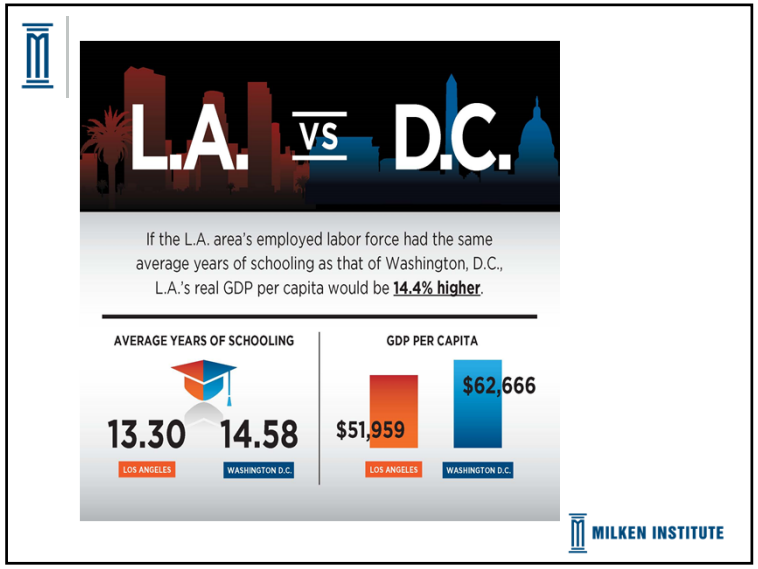


## A Matter of Degrees: Arizona metro rankings by educational attainment, 2010

| Metro area | Rank | Average years of schooling | Percent difference from the national level |
|---|---|---|---|
| Tucson, Arizona | 87 | 13.82 | 1.04 |
| Flagstaff, Arizona | 89 | 13.82 | 0.98 |
| Phoenix-Mesa, Arizona | 138 | 13.58 | -0.76 |
| Yuma, Arizona | 249 | 12.71 | -7.10 |

Source: Milken Institute.

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## Workforce educational attainment - Tucson, Arizona

| Educational attainment | 2010 share (percent) | 2010 rank | 1990 share (percent) | 1990 rank |
|---|---|---|---|---|
| At least a high school diploma (or equivalent) | 90.6 | 171 | 87.9 | 88 |
| At least some college (no degree) | 69.3 | 57 | 65.4 | 32 |
| At least a bachelor's degree | 33.3 | 90 | 28.3 | 62 |
| At least a master's degree | 13.2 | 63 | 11.1 | 38 |
| Average years of schooling | 13.8 | 87 | 13.5 | 52 |

Source: Milken Institute.

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## Workforce educational attainment – Phoenix-Mesa, Arizona

| Educational attainment | 2010 share (percent) | 2010 rank | 1990 share (percent) | 1990 rank |
|---|---|---|---|---|
| At least a high school diploma (or equivalent) | 88.9 | 206 | 87.7 | 95 |
| At least some college (no degree) | 67.6 | 84 | 64.3 | 35 |
| At least a bachelor's degree | 32.7 | 103 | 26.5 | 76 |
| At least a master's degree | 11.5 | 103 | 8.6 | 107 |
| Average years of schooling | 13.6 | 138 | 13.3 | 86 |

Source: Milken Institute.

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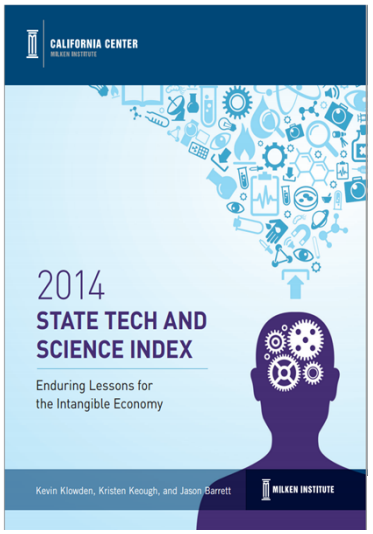


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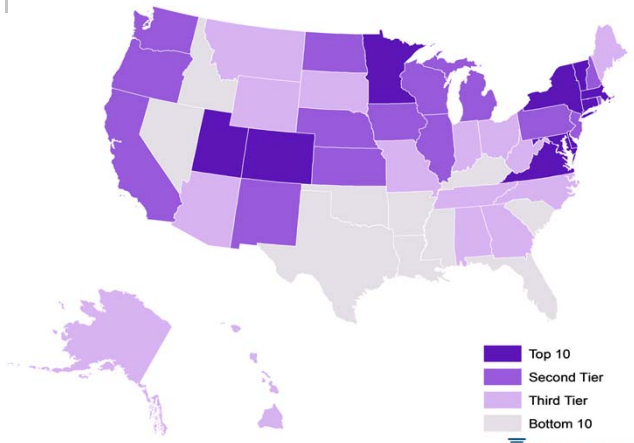
## Human Capital Investment Composite Index




Source: Milken Institute.

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## State Technology and Science Index 2014: Arizona Human capital investment composite

| | Indicators | 2014 Rankings |
|---|---|---|
| 1 | Population with a Bachelor's degree or higher | 27 |
| 2 | Population with advanced degrees | 24 |
| 3 | Population with PhDs | 28 |
| 4 | Recent Bachelor's degrees in science and engineering | 1 |
| 5 | Recent master's degrees in science and engineering | 2 |
| 6 | Recent PhDs in science and engineering | 18 |
| 7 | Science, engineering, and health PhDs | 33 |
| 8 | Science, engineering, and health postdoctorates | 40 |
| 9 | State appropriations for higher education | 48 |
| 10 | State spending on student aid | 49 |

Source: Milken Institute.

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## State Technology and Science Index 2014: Arizona Human capital investment composite(cont.)

| | Indicators | 2014 Rankings |
|---|---|---|
| 11 | All Recent Degrees in Science and Engineering | 1 |
| 12 | Average ACT Scores | 44 |
| 13 | Average Math SAT Scores | 25 |
| 14 | Average Verbal SAT Scores | 28 |
| 15 | Number of Doctoral Engineers | 18 |
| 16 | Number of Doctoral Scientists | 48 |
| 17 | Change in State Appropriations for Higher Education | 30 |
| 18 | Bachelor's Degrees Granted in Science and Engineering | 40 |
| 19 | Graduate Students in Science, Engineering, and Health | 27 |
| 20 | Households with Computers | 15 |
| 21 | Households with Internet Access | 14 |

Source: Milken Institute.

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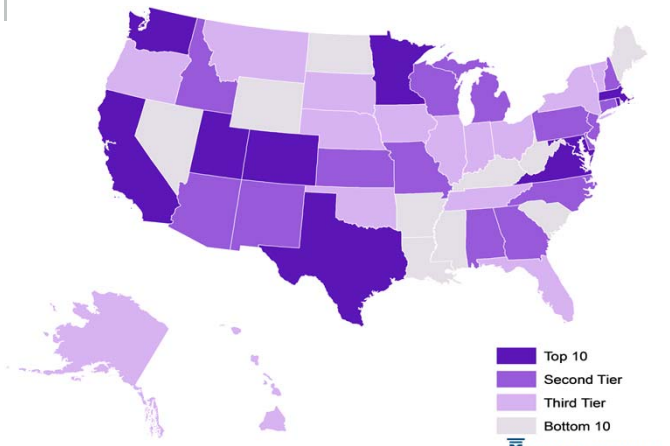
## Tech. and Science Workforce Composite Index




Source: Milken Institute.

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## State Technology and Science Index 2014: Arizona Technology and science workforce composite

| | Indicators | 2014 Rankings |
|---|---|---|
| 1 | Intensity: Computer and Information Scientists | 22 |
| 2 | Intensity: Computer Programmers | 28 |
| 3 | Intensity: Software Engineers, Systems Software | 10 |
| 4 | Intensity: Computer Support Specialists | 11 |
| 5 | Intensity: Computer Systems Analysts | 7 |
| 6 | Intensity: Database and Network Administrators | 15 |
| 7 | Intensity: Agricultural and Food Scientists | 38 |
| 8 | Intensity: Biochemists and Biophysicists | 29 |
| 9 | Intensity: Microbiologists per 100,000 Civilian Workers (2012) | 37 |
| 10 | Intensity: Medical Scientists | 17 |

Source: Milken Institute.

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## State Technology and Science Index 2014: Arizona Technology and science workforce composite (cont.)

| | Indicators | 2014 Rankings |
|---|---|---|
| 11 | Intensity: Physicists | 20 |
| 12 | Intensity: Other Life and Physical Science Occupations | 39 |
| 13 | Intensity: Electronics Engineers | 4 |
| 14 | Intensity: Electrical Engineers | 17 |
| 15 | Intensity: Computer Hardware Engineers | 5 |
| 16 | Intensity: Biomedical Engineers | 9 |
| 17 | Intensity: Other Engineers | 21 |

Source: Milken Institute.

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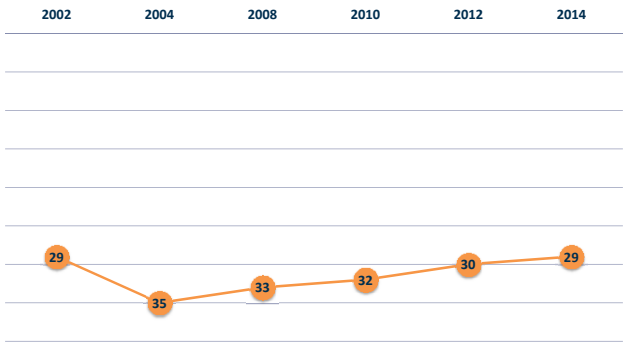
## Arizona's human capital capacity

*Rank in human capital investment composite*




Source: Milken Institute.

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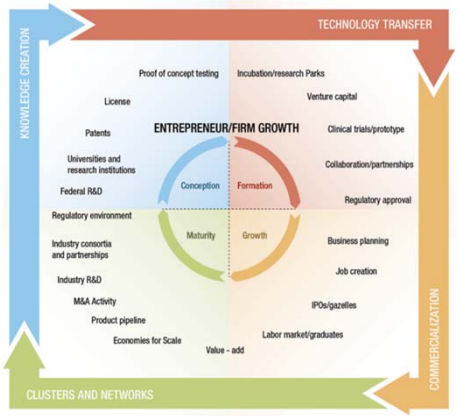
## Regional innovation life cycle




Source: Milken Institute.

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## Conclusions: Human capital formation

1) **Make higher education more affordable**
2) **Make higher education more accessible**
3) **Increase higher education graduation rates**
4) **Strengthen coordination between higher education institutions and industries**
5) **Promote research and development**

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