



Annual Report Essay

Altered States: A Perspective on 75 Years of State Income Growth

Ohio Board of Regents

April 23, 2007

IN THE *ANNUAL REPORT* WE ASK:

- **Why do residents of some states have higher incomes than residents of other states?**
- **Why have these income differences persisted for the past 75 years?**

BASED ON A LONG-TERM RESEARCH PROJECT

- An early initiative of our Regional Issues Program
- Paul Bauer, Scott Shane (of Case), and myself
- *State Growth Empirics* (Federal Reserve Bank of Cleveland Working Paper 06-06)

**BASIC STATE
INCOME GROWTH FACTS**

Figure 1

Income Growth

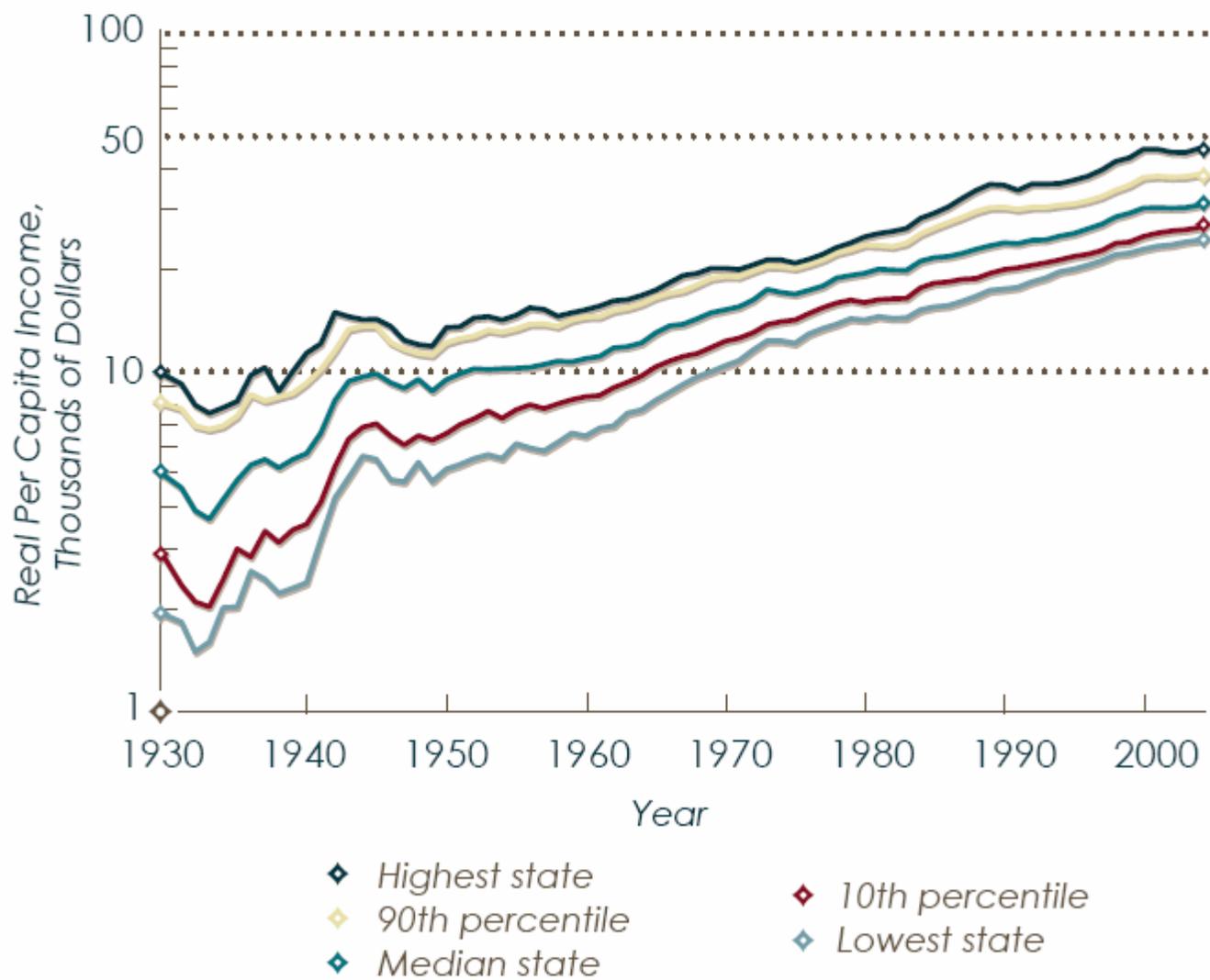
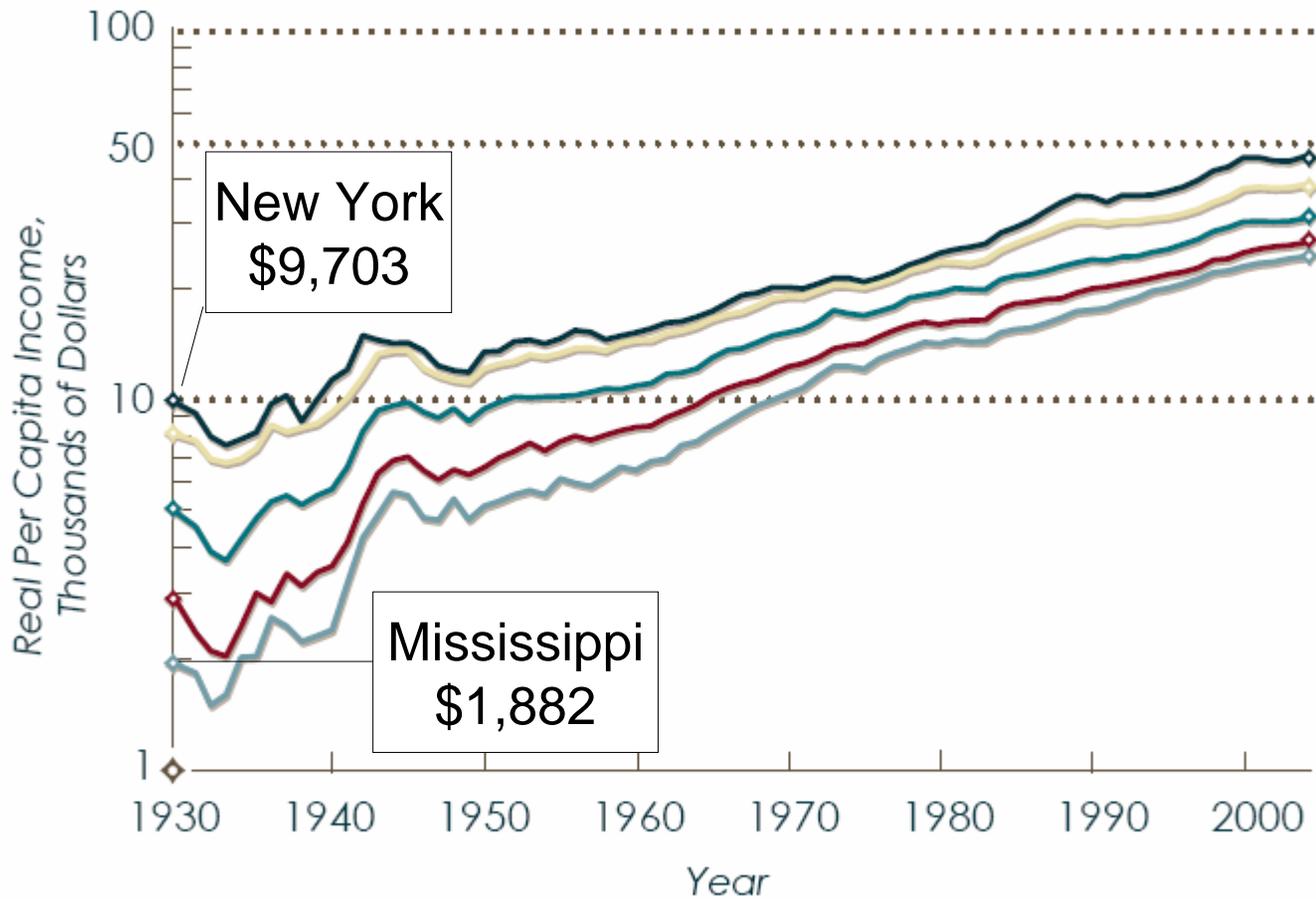


Figure 1

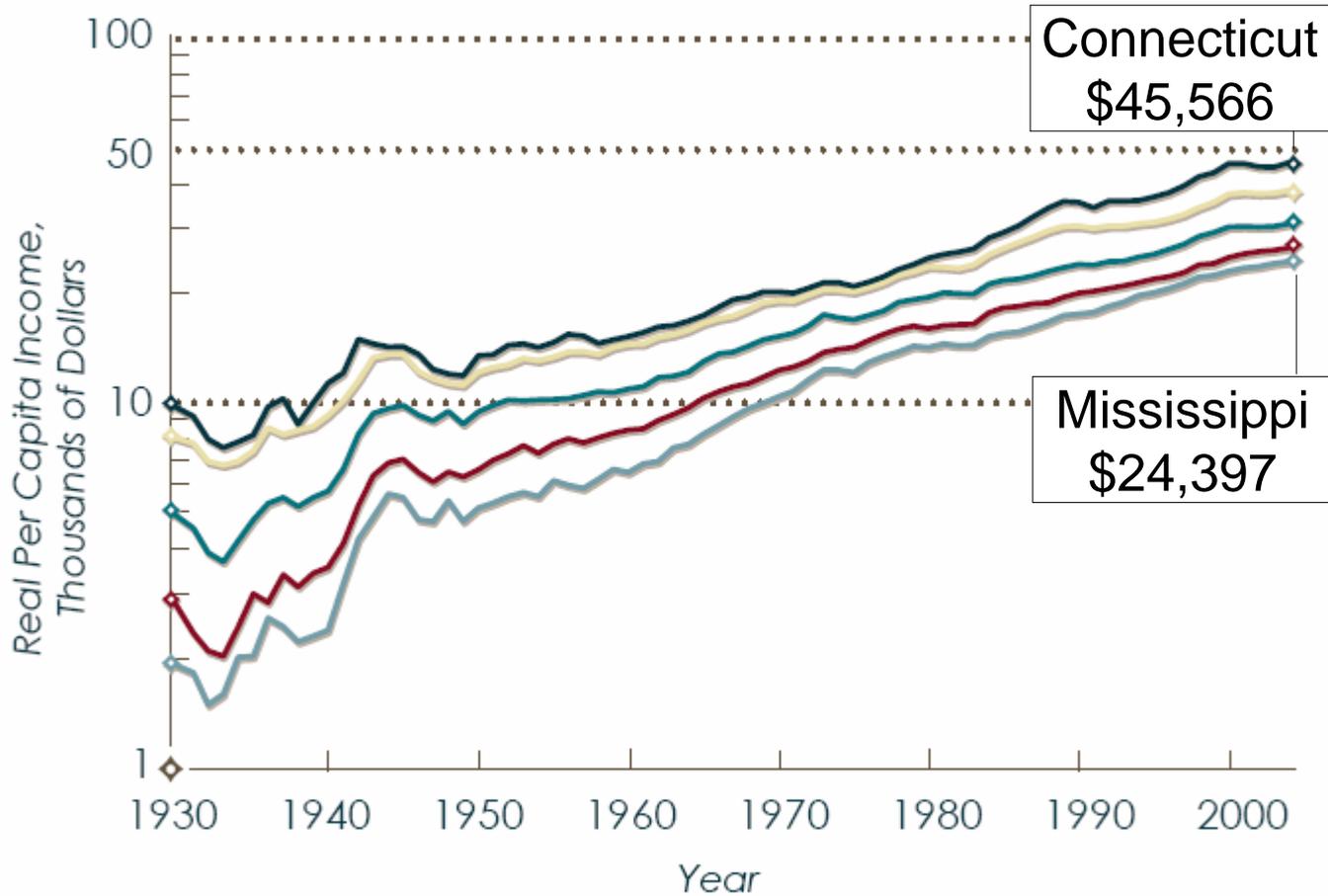
Income Growth



- ◆ Highest state
- ◆ 90th percentile
- ◆ Median state
- ◆ 10th percentile
- ◆ Lowest state

Figure 1

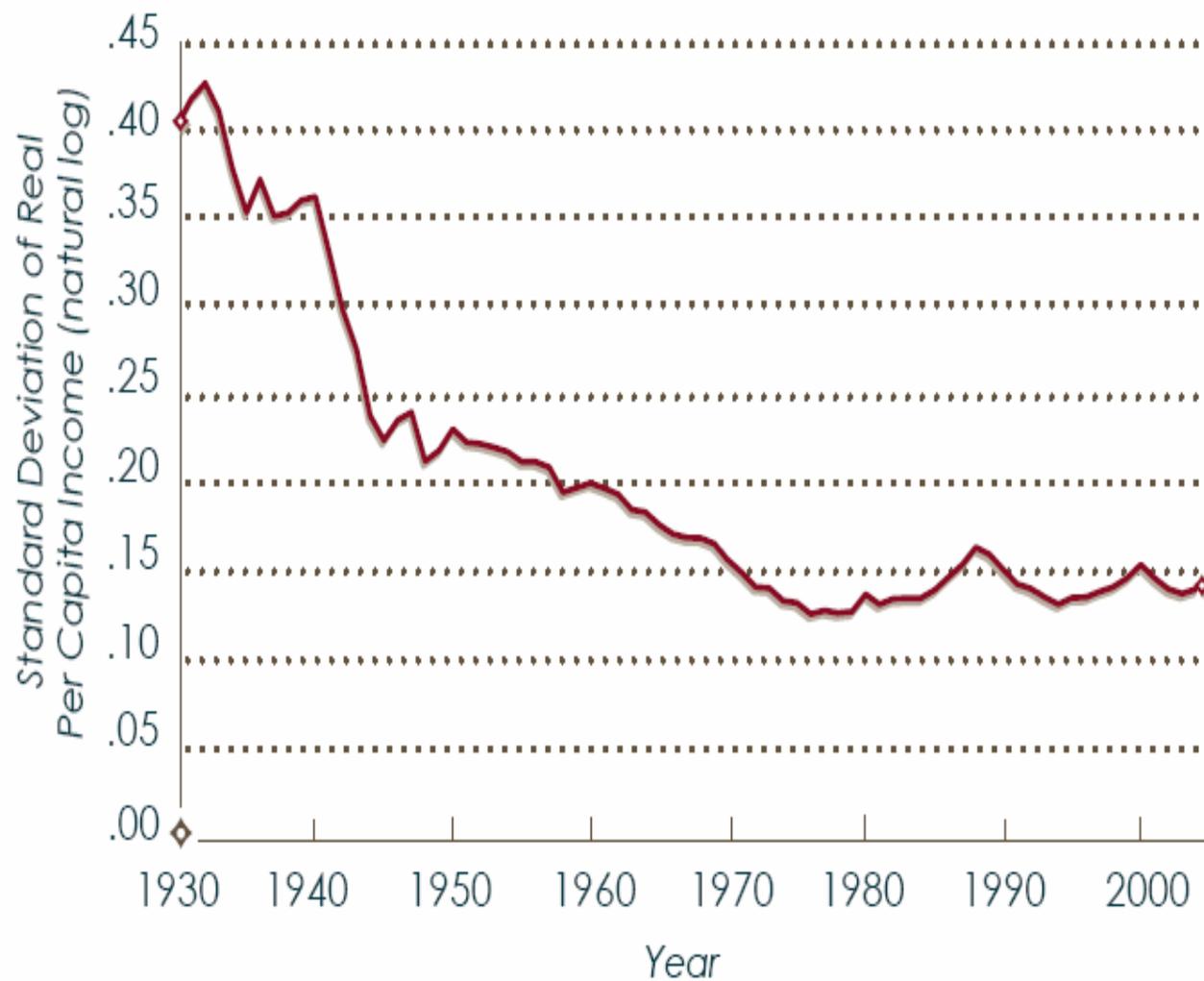
Income Growth



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Figure 2

Income Convergence



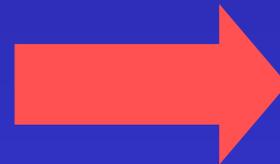
**WHAT SHOULD WE
EXPECT TO SEE?**

BASIC (SOLOW) MODEL

- Simple workhorse macro model that tells how much output to expect based on capital, labor, and technology

BASIC (SOLOW) MODEL

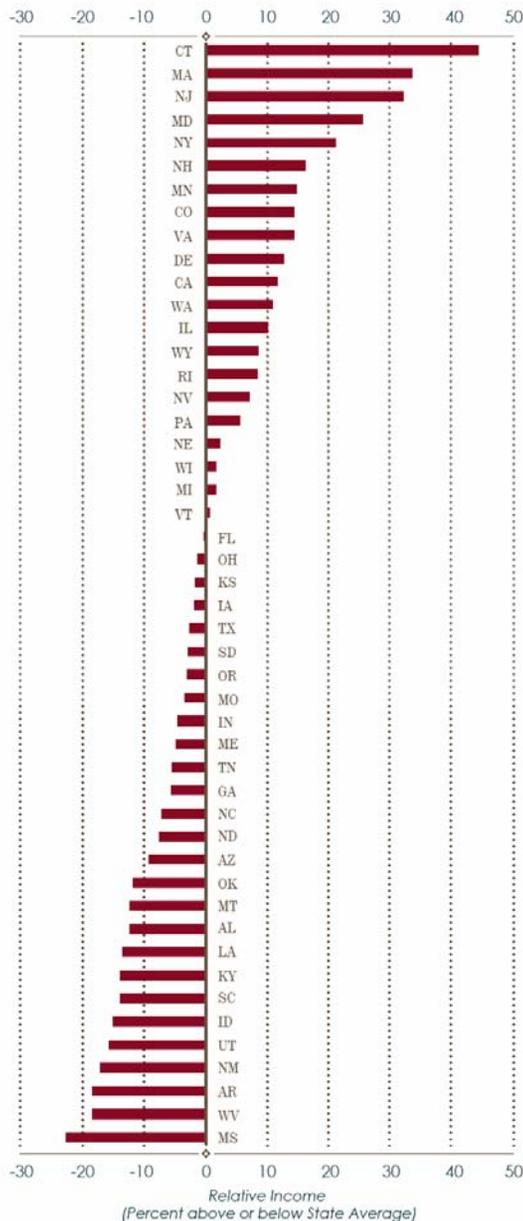
- Simple workhorse macro model that tells how much output to expect based on capital, labor, and technology
- Strong implications for relative growth
 - Shared technology
 - Capital mobility
 - Labor mobility



Income
convergence

Figure 4

State Relative Incomes in 2004



- There are still income differences worth investigating
- There have been notable changes and elements of stability over the years

LONG-TERM RESEARCH PROJECT

- **Research looks for underlying patterns in relative income changes**
- **Need data on potentially relevant state differences**
 - **Human capital**
 - Education
 - **Taxes and infrastructure**
 - Per capita state revenues and road expenditures
 - **Innovation**
 - Patents per capita
 - **Industry structure**
 - Share of income by industry

Figure 4

State Relative Incomes in 2004

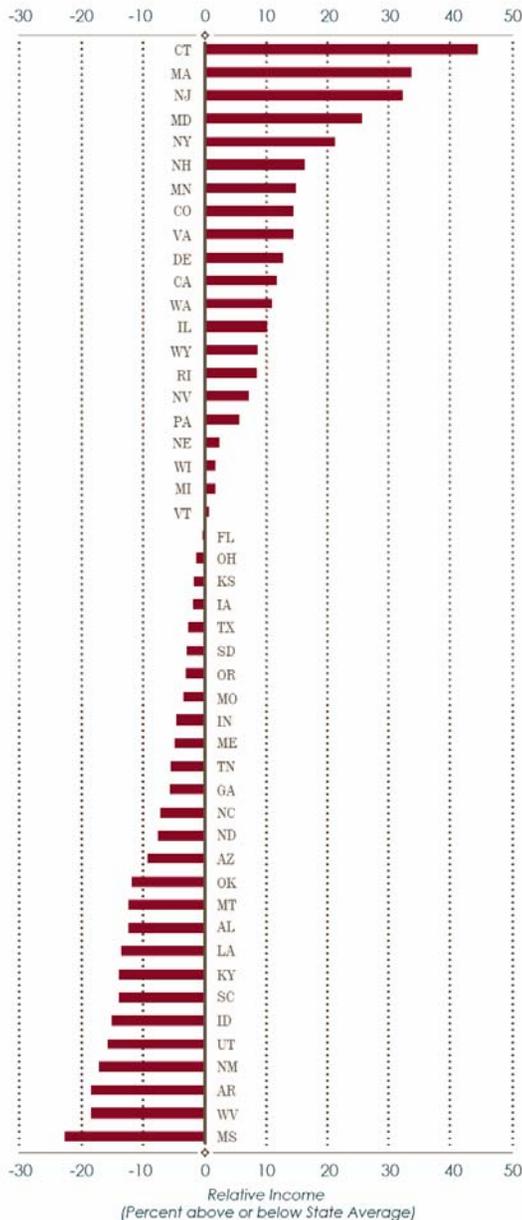
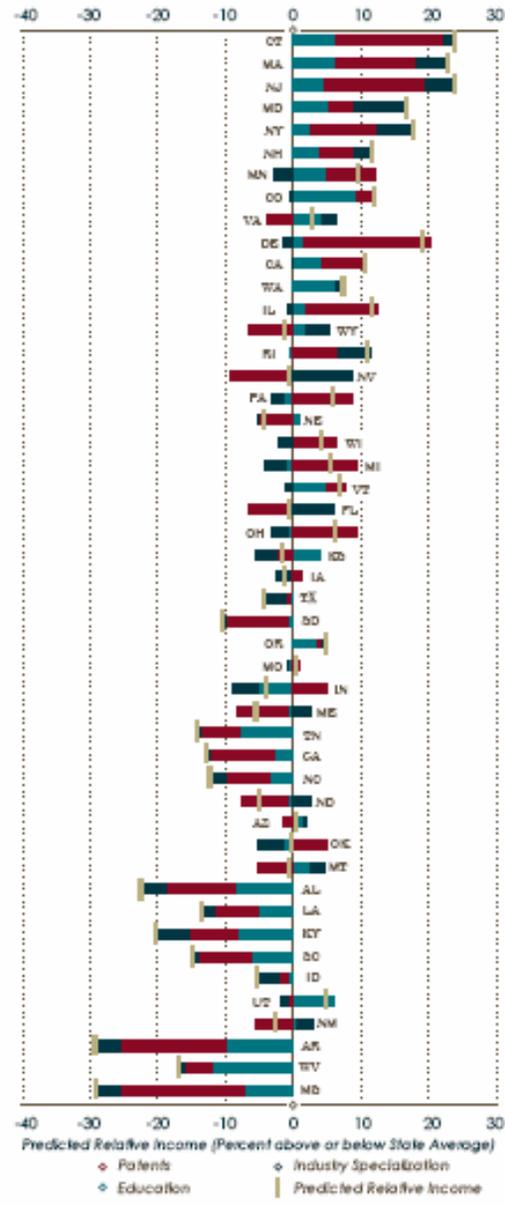


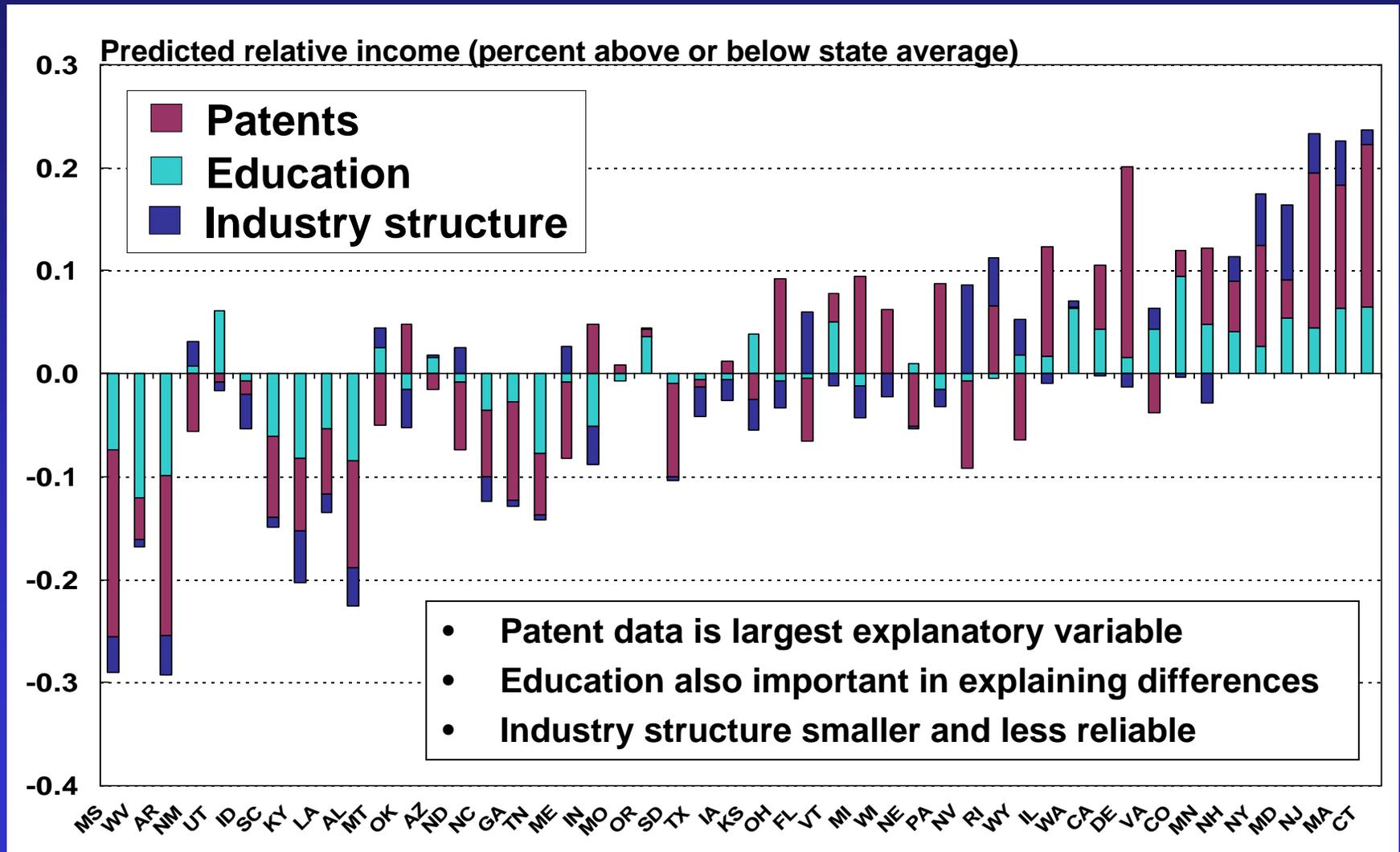
Figure 6

Predicted Impact of Key Factors on 2004 State Incomes

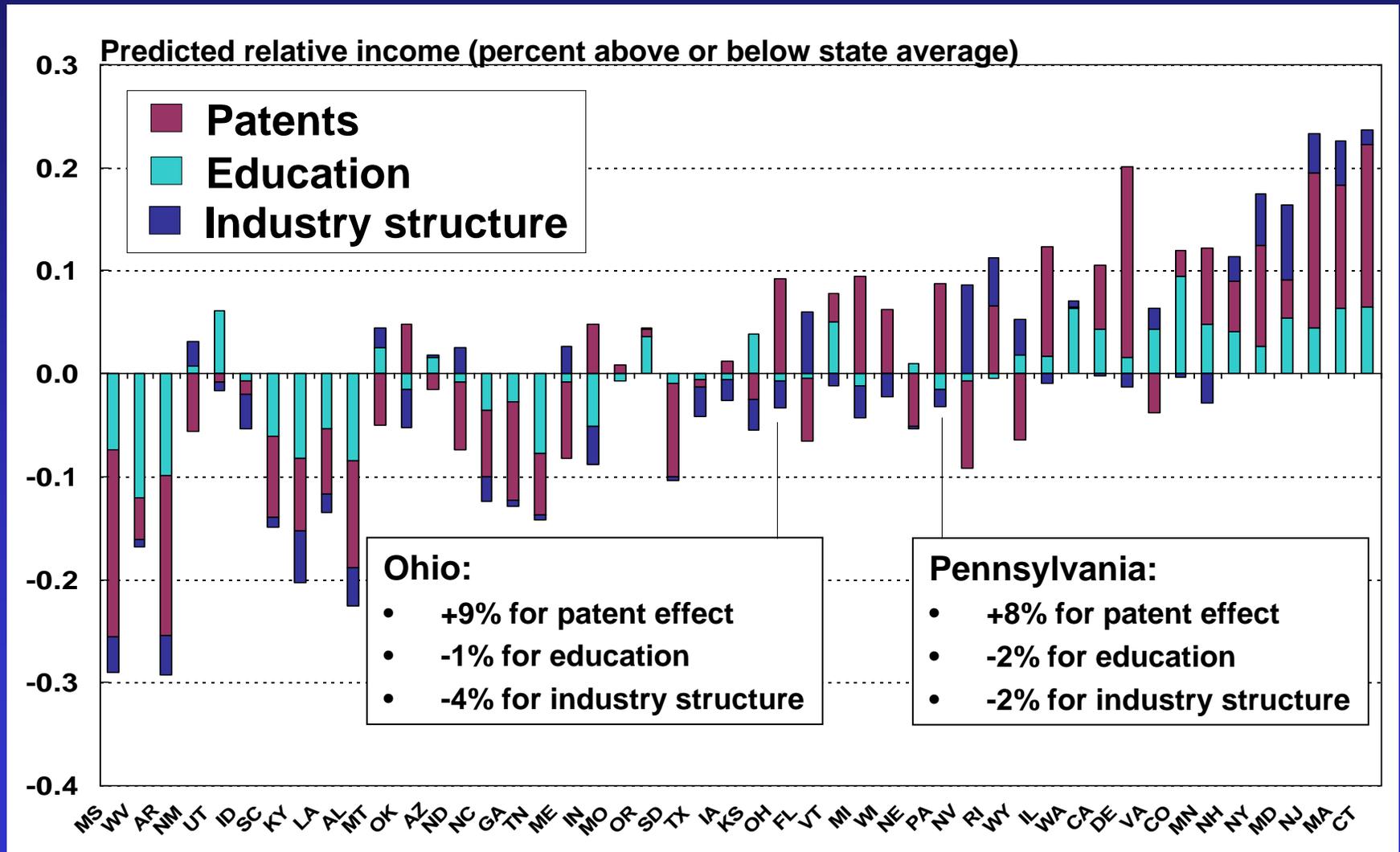


- Not exact, but the pattern is reproduced applying only state histories of these variables
- Ordering largely preserved
- Scale of total three predictions large (~70% of overall variation)

PREDICTED IMPACT OF KEY FIGURES ON 2004 STATE INCOMES



PREDICTED IMPACT OF KEY FIGURES ON 2004 STATE INCOMES

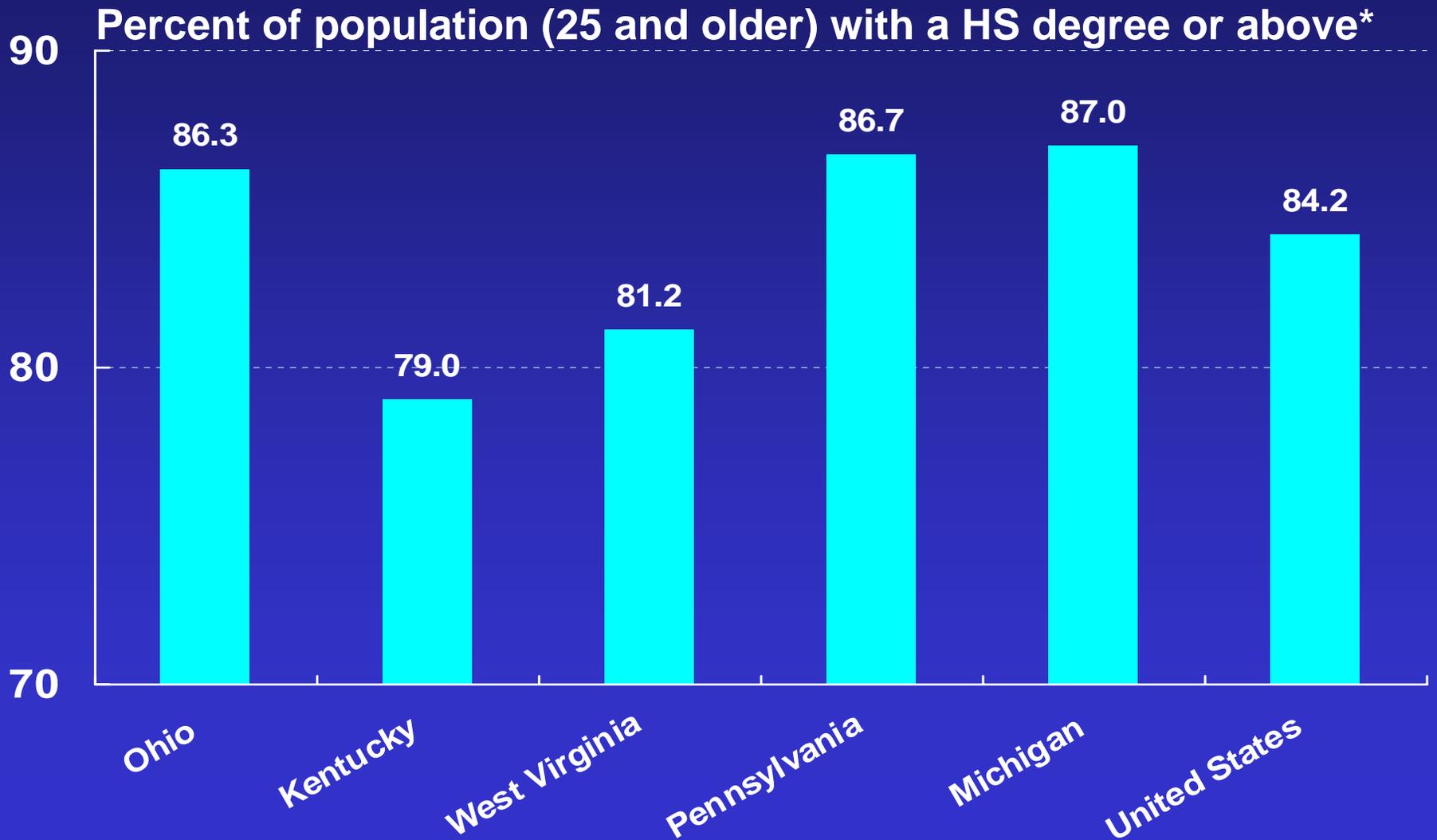


LESSONS FOR THE STATES

- We do not study specific policies that might be implemented and thus have no specific recommendations
- However, it is evident that over a span of 75 years the most reliable indicators of relative income levels and growth are knowledge variables
- Economic development efforts should not ignore either education or innovation

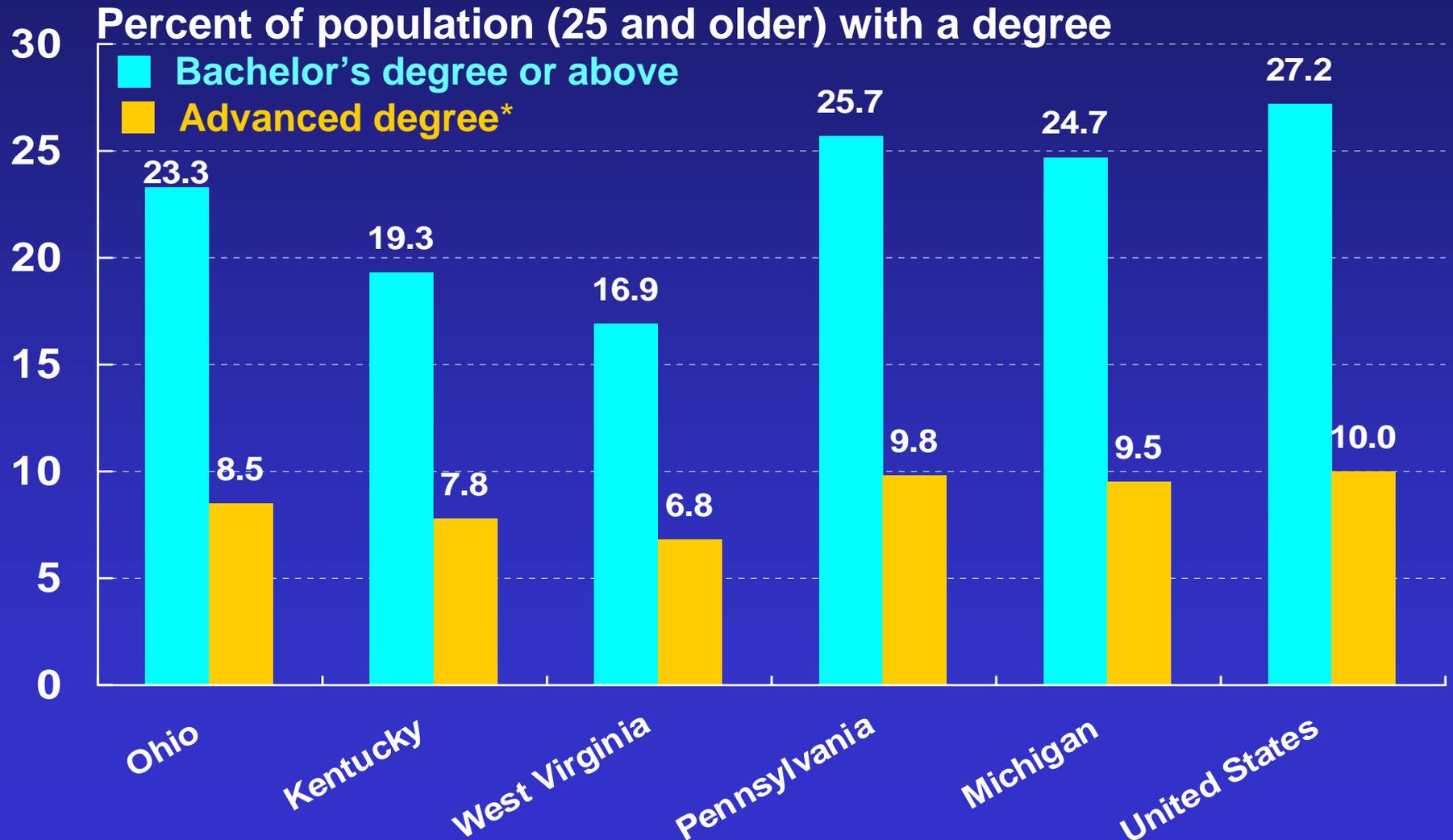
Ohio: Education and Innovation

EDUCATIONAL ATTAINMENT, 2005



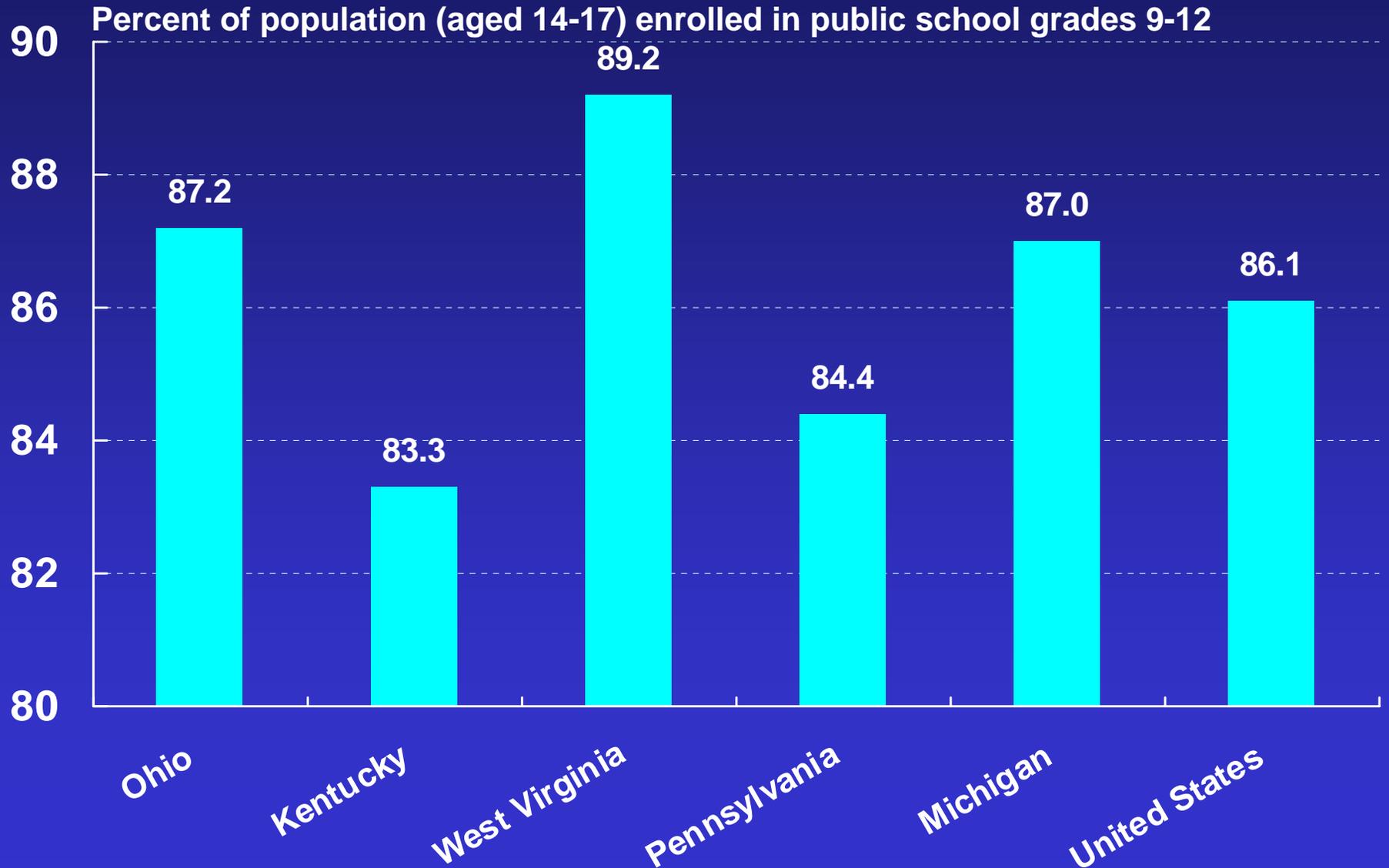
* Includes equivalency and GED

EDUCATIONAL ATTAINMENT, 2005

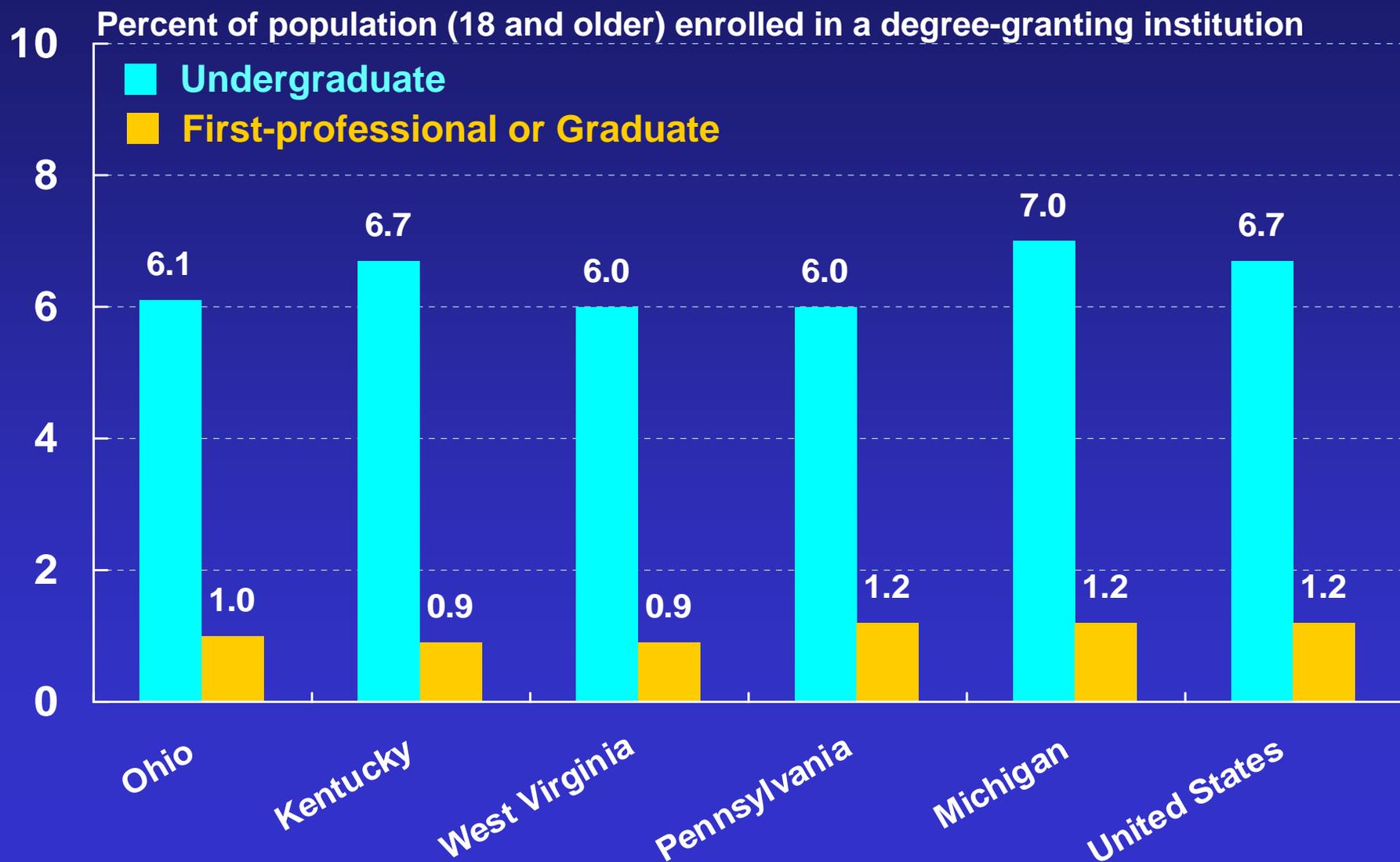


* Advanced degree includes Master's degree, Professional school degree and Doctorate degree

EDUCATIONAL ENROLLMENT, 2004



EDUCATIONAL ENROLLMENT, 2004



TOP PATENTING ORGANIZATIONS IN OHIO

Rank	Company	Industry	Total Utility Patents 2001-2005
1	Procter & Gamble	Nondurable household products	1,271
2	General Electric	Diversified industrials	1,036
3	Goodyear Tire & Rubber	Diversified machinery	528
4	Delphi Technologies	Automobile parts	449
5	Owens-Corning Fiberglass	Building materials	133
6	United States Air Force	Defense	125
7	Honda	Automobiles	122
8	Equistar Chemicals	Commodity chemicals	119
9	Lubrizol	Specialty chemicals	115
10	Bridgestone	Diversified machinery	113

UNIVERSITY PATENTING IN OHIO

Organization State Rank	First-Named Assignee	Total Utility Patents 2001-2005
19	Ohio State University	79
22	Case Western Reserve University	74
32	University Of Akron	51
33	University Of Cincinnati	50
97	Kent State University	18
98	University Of Toledo	18
113	University Of Dayton	16
125	Ohio University	14
291	Cleveland State University	6
400	Wright State University	5

ISSUES FOR OHIO

- Economic development efforts should not ignore either education or innovation
- Education attainment lower in Ohio
 - Is it due to enrollments or attraction?
- Patent activity focused on wide-range of businesses
 - Is there a greater role for universities?



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