

Economic Growth: Thinking Past the Short-run

Automotive Communities and Work Force Adjustment
October 9, 2009

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OUR RESEARCH ASKS:

- 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?

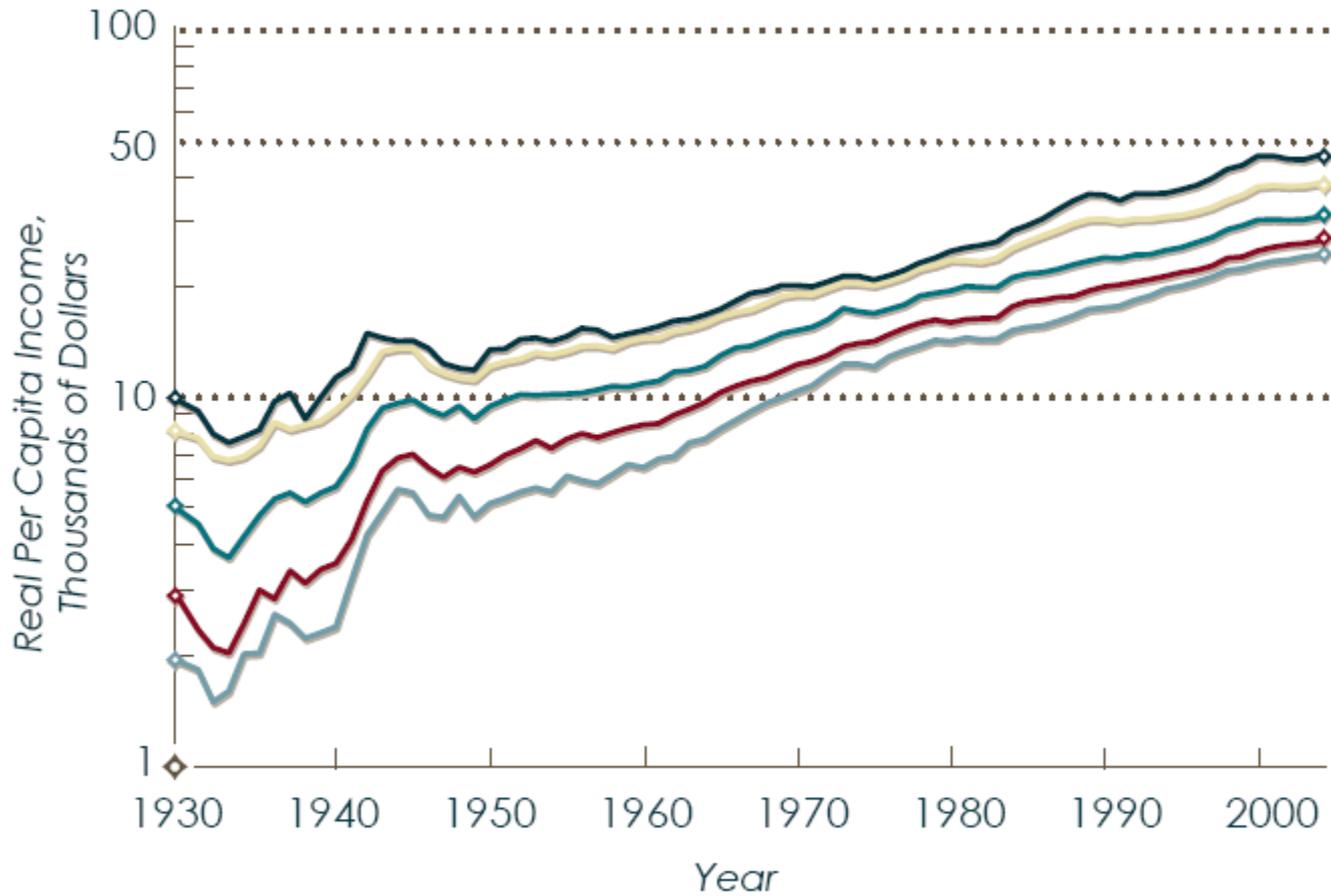
BASED ON A LONG-TERM RESEARCH PROJECT

- Paul Bauer, Scott Shane (of Case), and myself
- *State Growth Empirics* (Federal Reserve Bank of Cleveland Working Paper 06-06)
- Revising our work. The publication process has enabled us to do some out-of sample tests.

BASIC STATE INCOME GROWTH FACTS

Figure 1

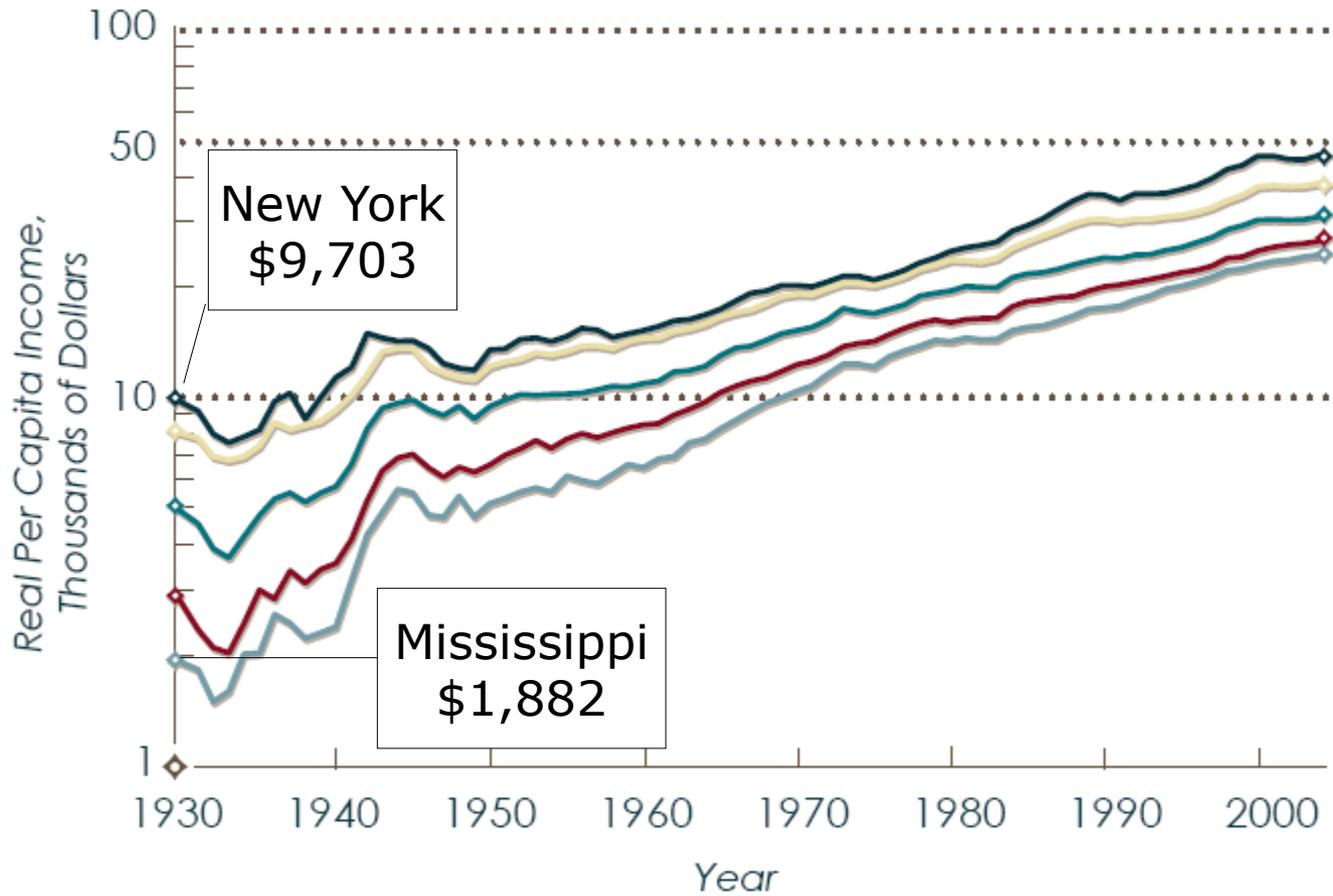
Income Growth



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

Figure 1

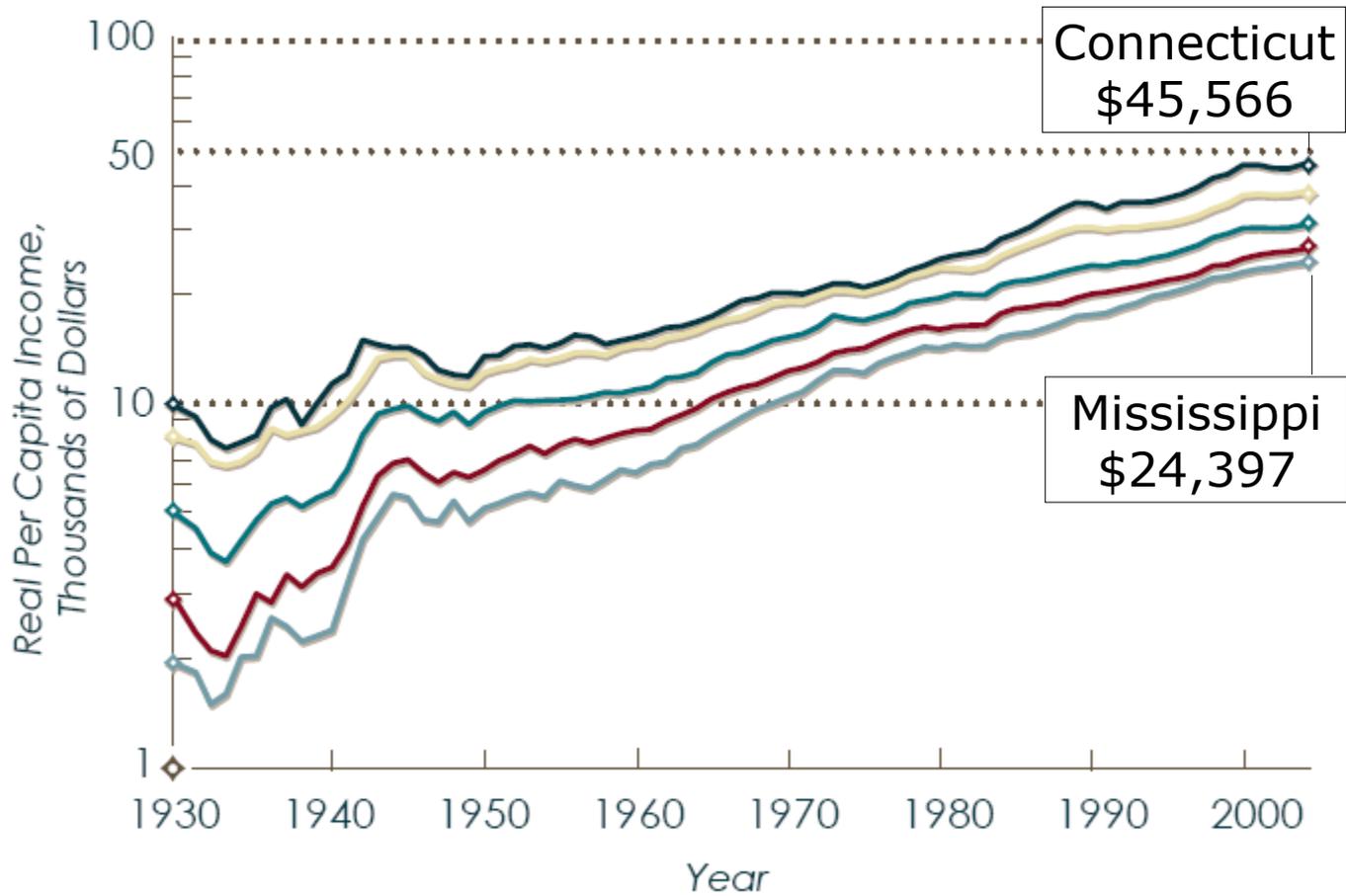
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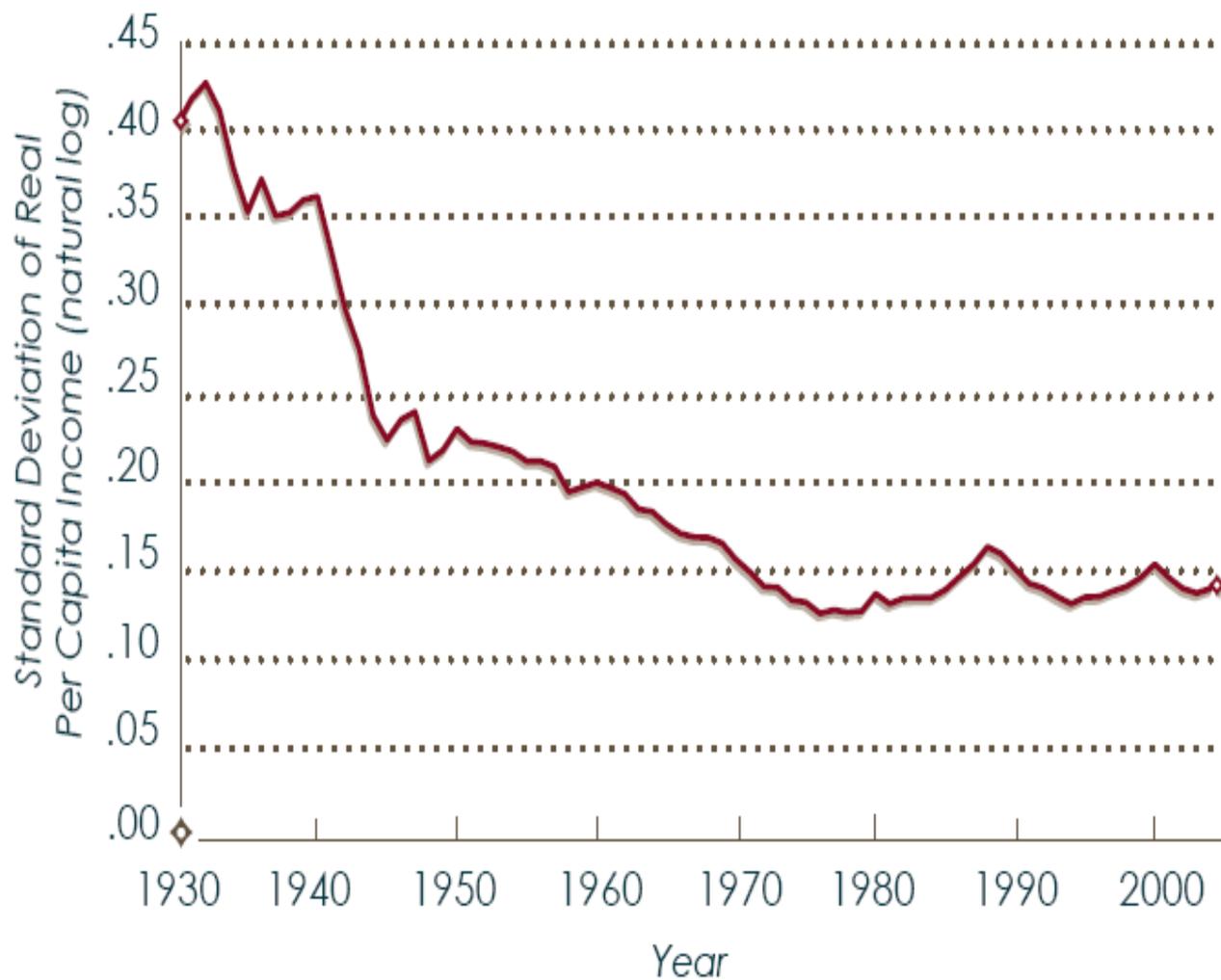
Income Growth



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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

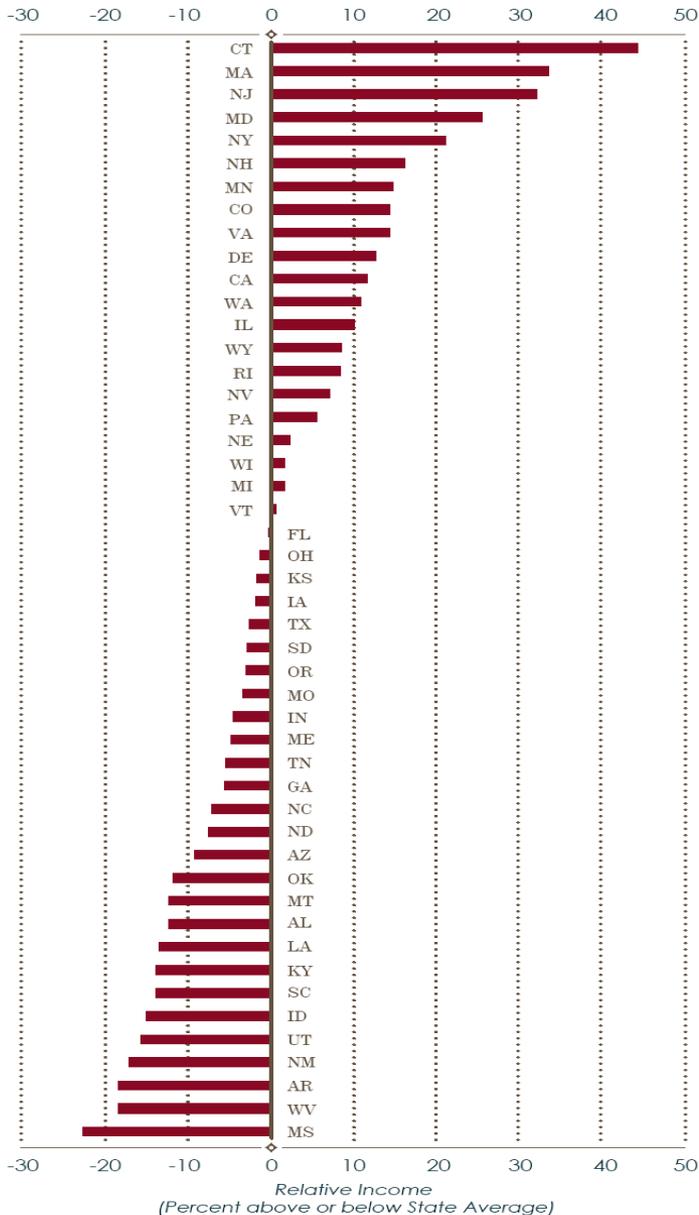
- Simple workhorse macro model that tells how much output to expect based on capital, labor, and technology
 - Strong implications for relative growth
 - Shared technology
 - Capital mobility
 - Labor mobility
- 
- Income convergence

EXTENDED MODEL (ENDOGENOUS GROWTH)

- Newer growth theory models focus on the process of acquiring new technology
- Growth could vary more permanently
 - Human capital
 - Taxes and public infrastructure
 - Research and development

Figure 4

State Relative Incomes in 2004



- There are still income differences worth investigating
- There have been notable changes

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

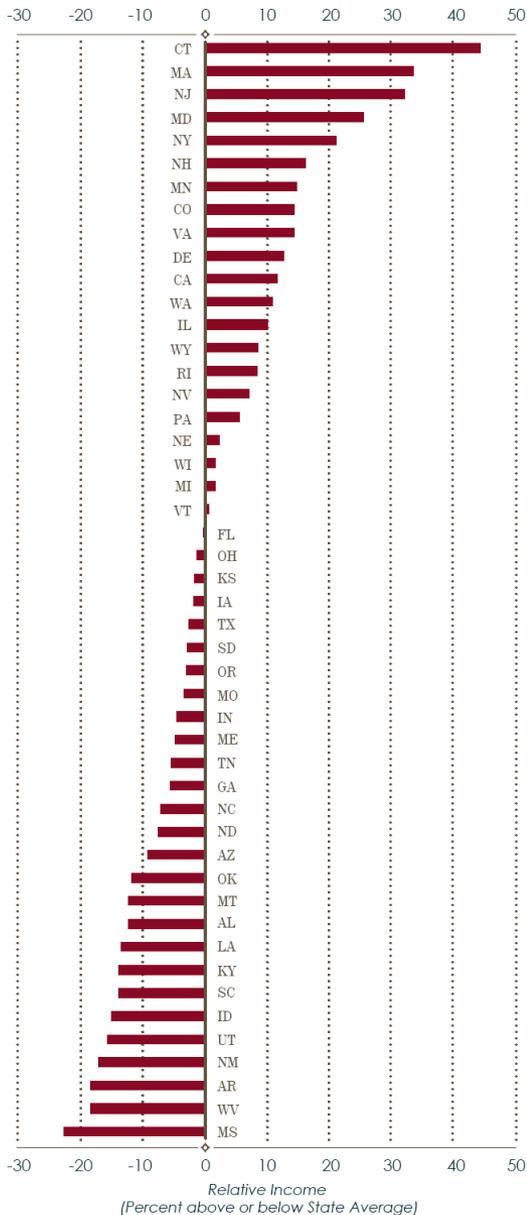
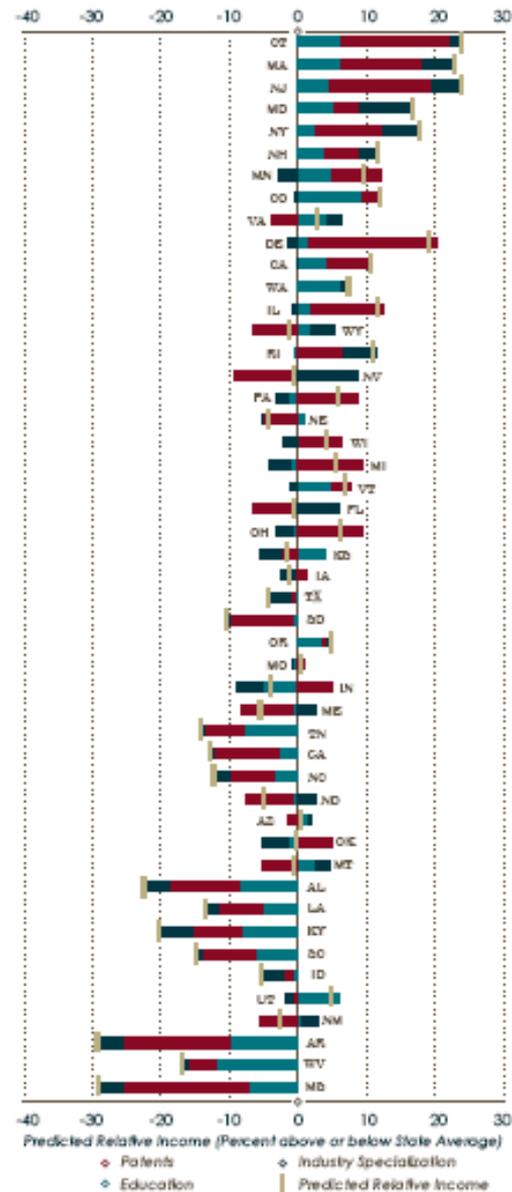
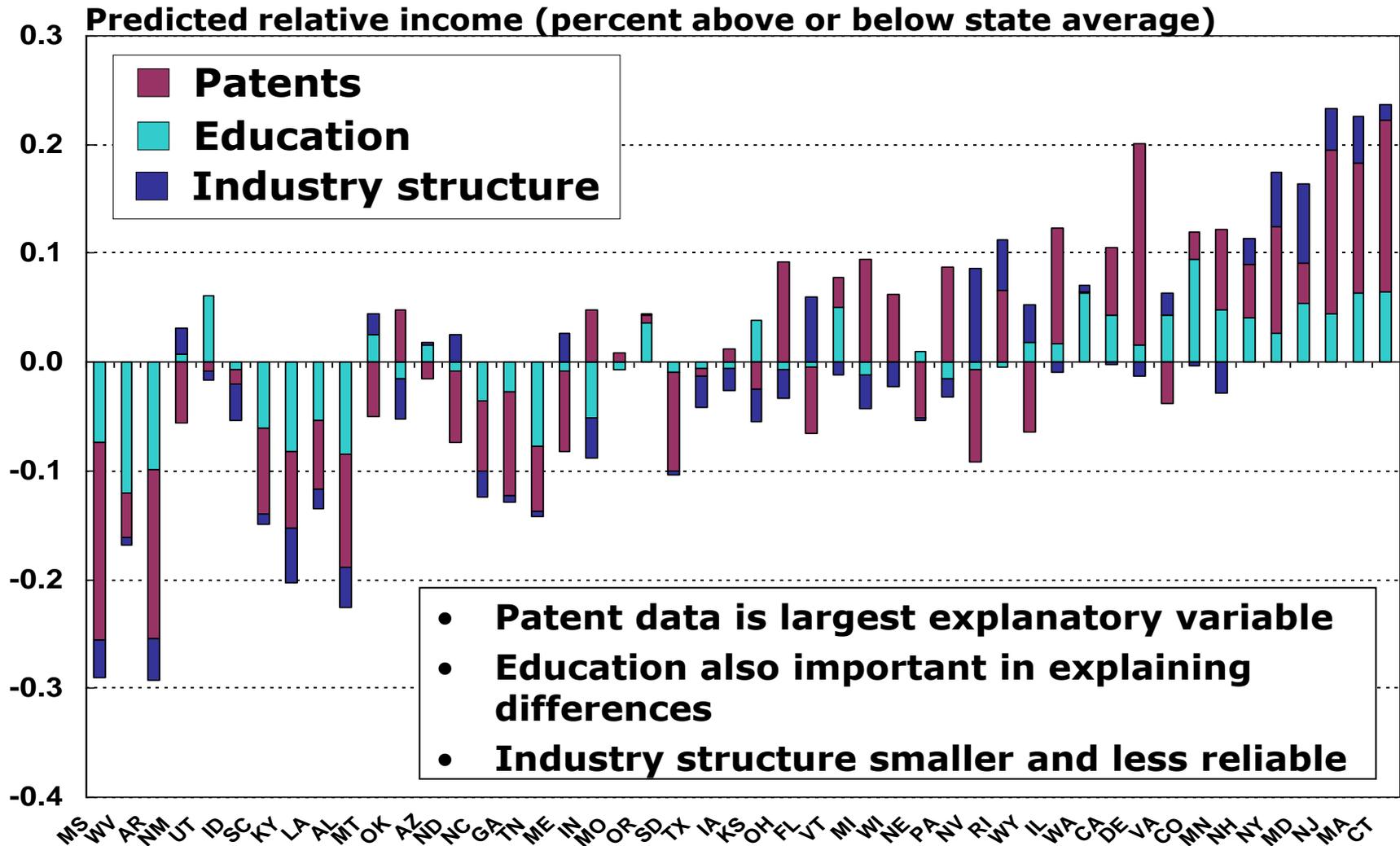


Figure 6
Predicted Impact of Key Factors on 2004 State Incomes

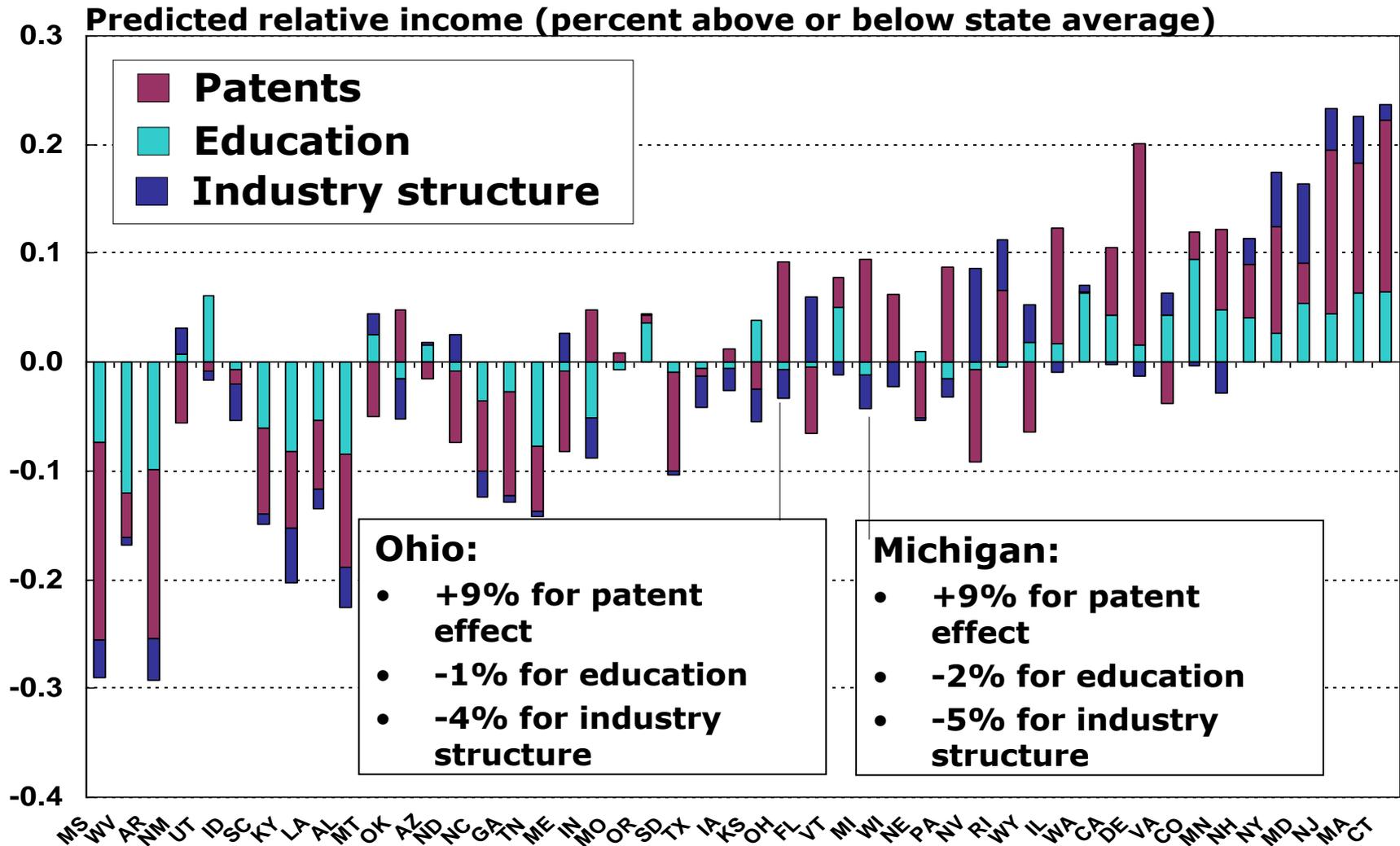


- Not exact, but the pattern is reproduced applying only state histories of these variables
- Ordering largely preserved
- Scale of total three predictions large (~70% of overall variation)

PREDICTED IMPACT OF KEY FIGURES ON 2004 STATE INCOMES

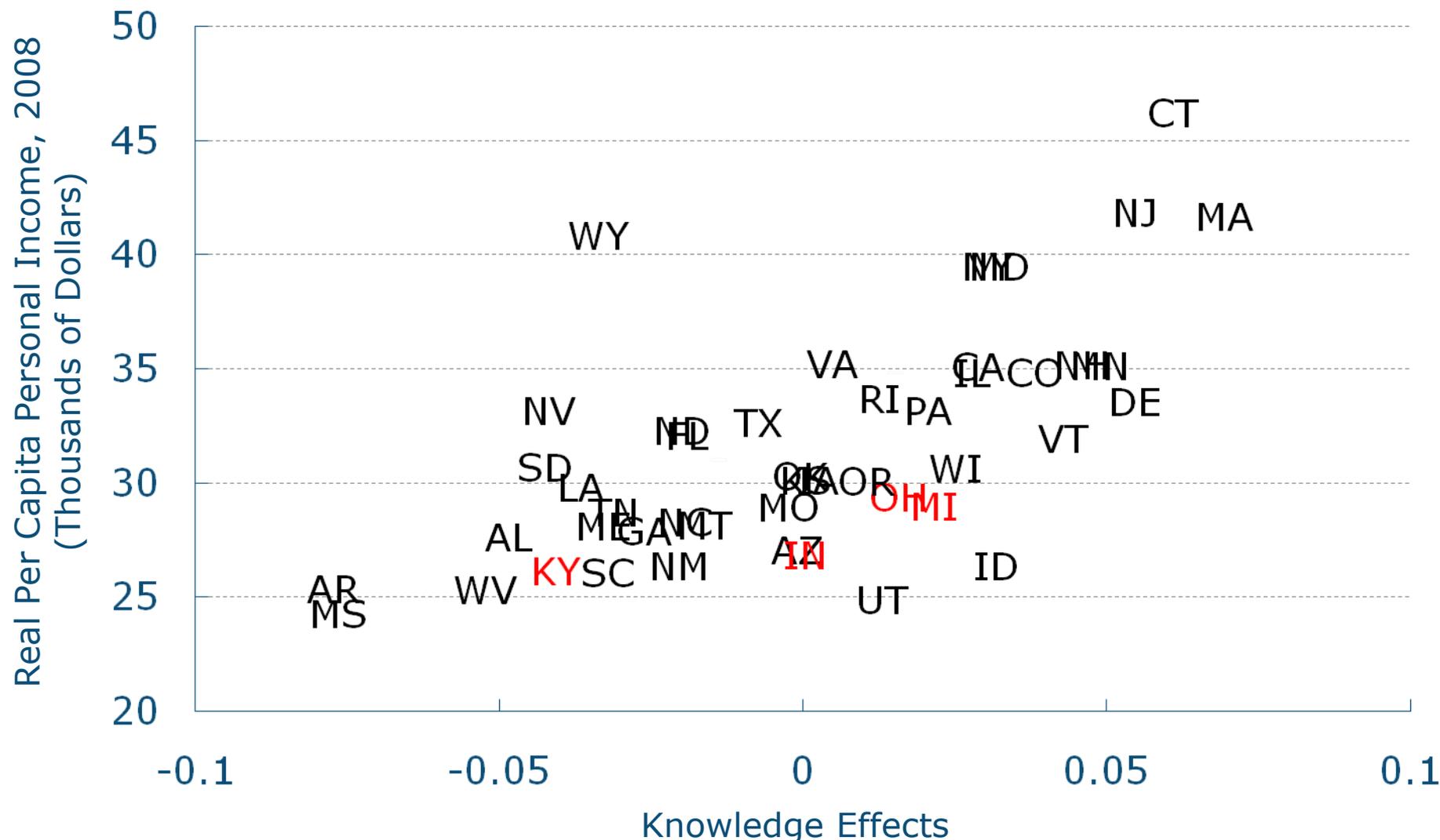


PREDICTED IMPACT OF KEY FIGURES ON 2004 STATE INCOMES

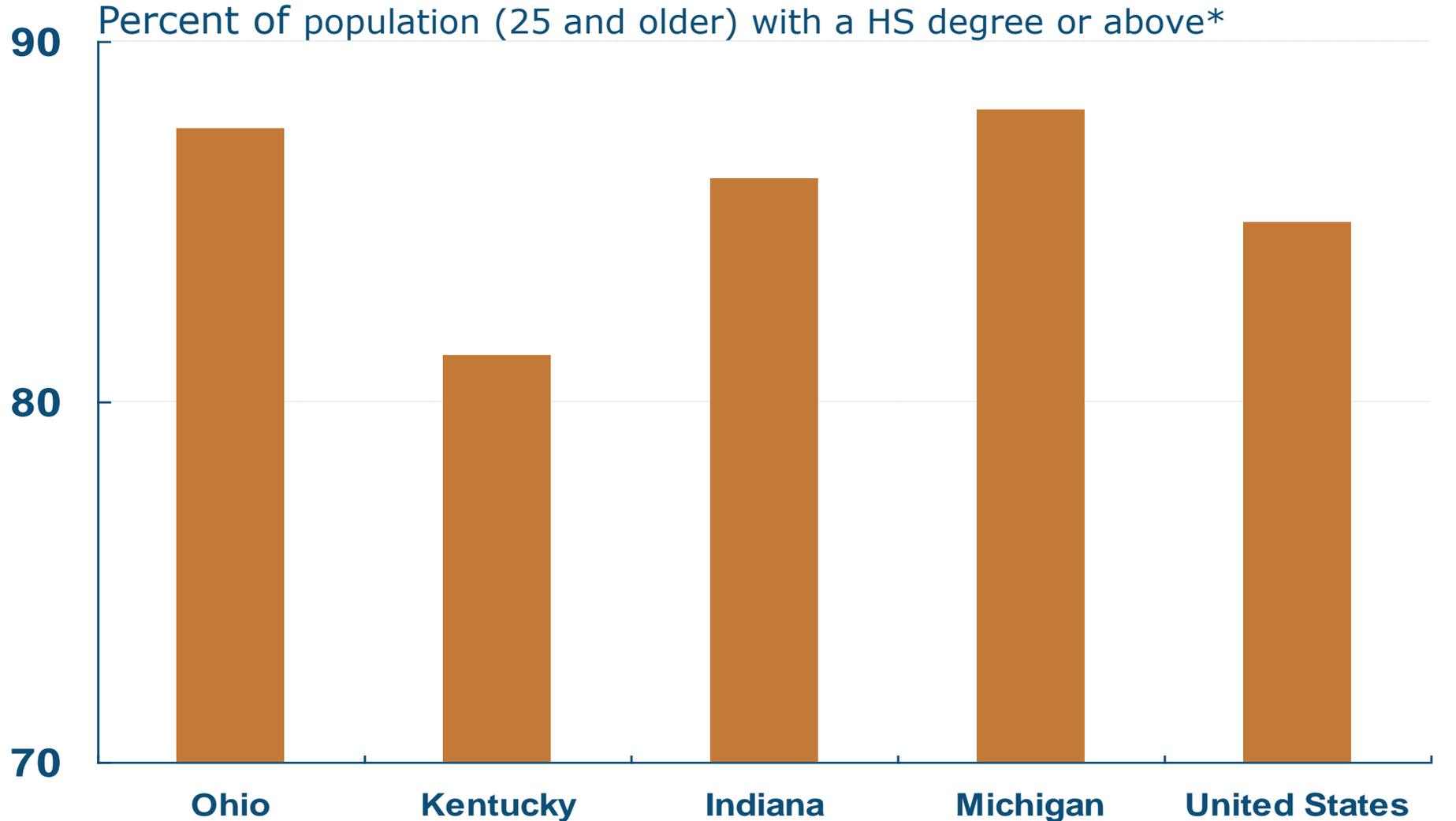


WHAT'S HAPPENED MORE RECENTLY?

Knowledge Effects



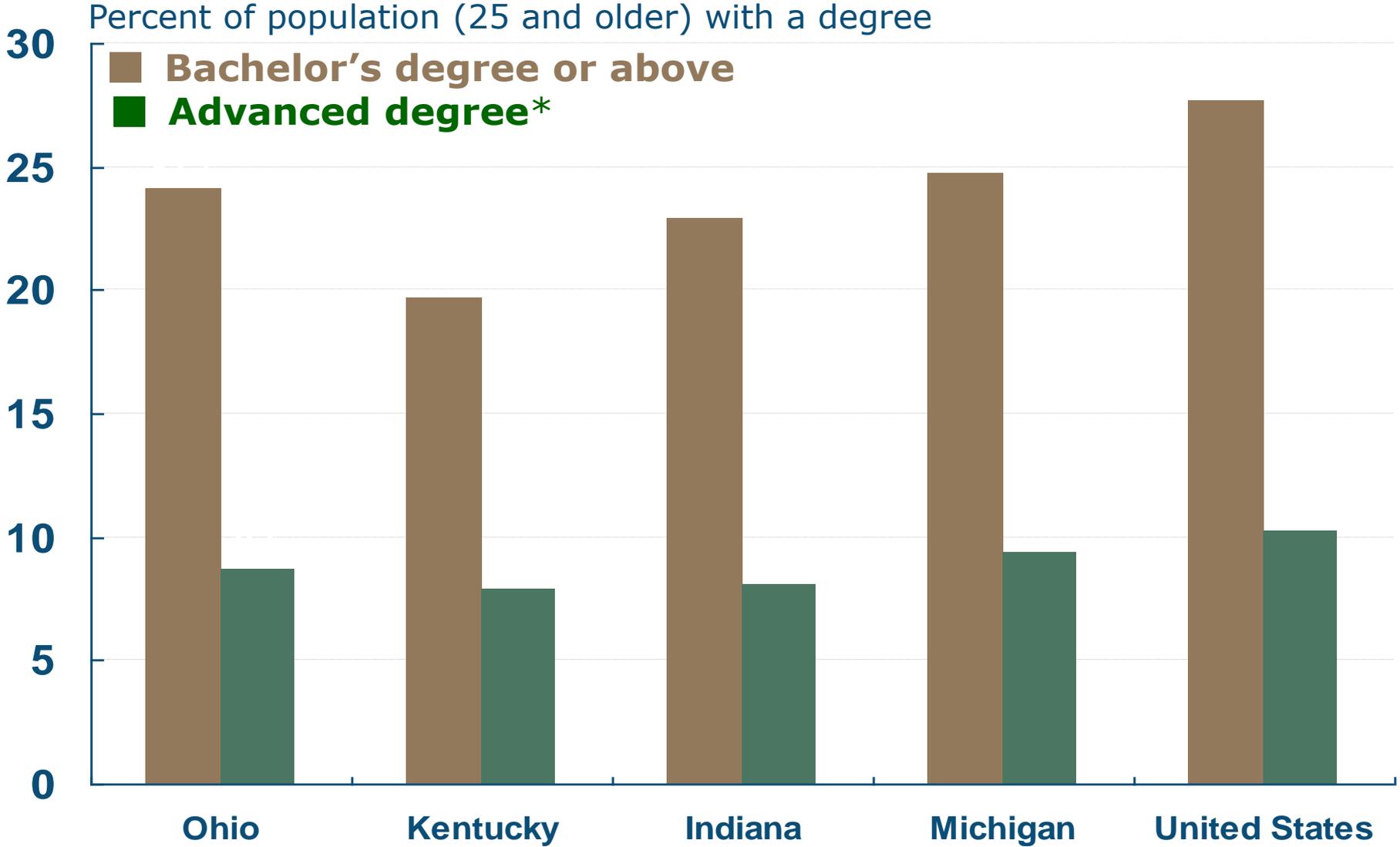
EDUCATIONAL ATTAINMENT, 2008



Source: Census Bureau; *Includes equivalency and GED

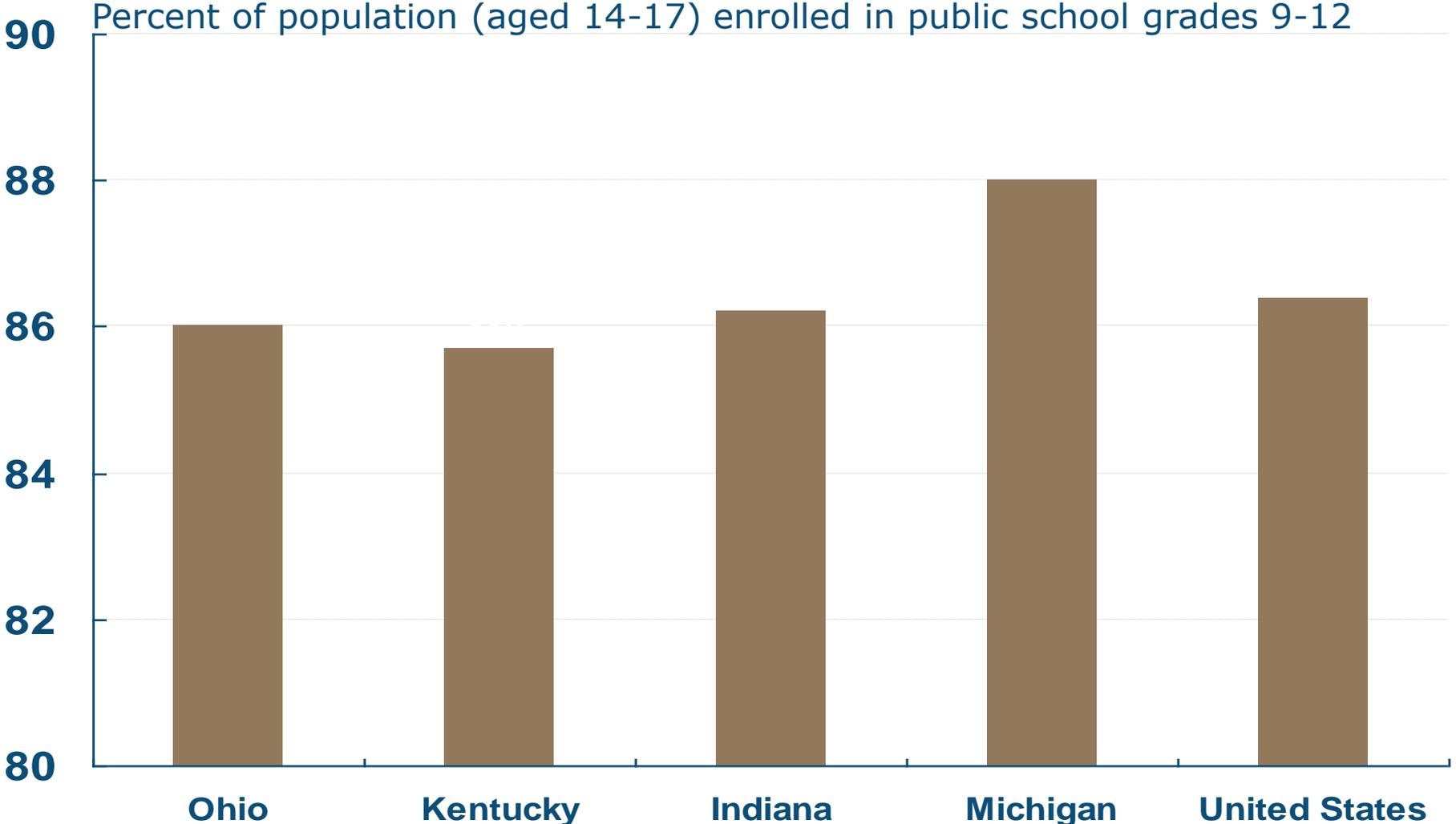
FEDERAL RESERVE BANK
of CLEVELAND

EDUCATIONAL ATTAINMENT, 2008



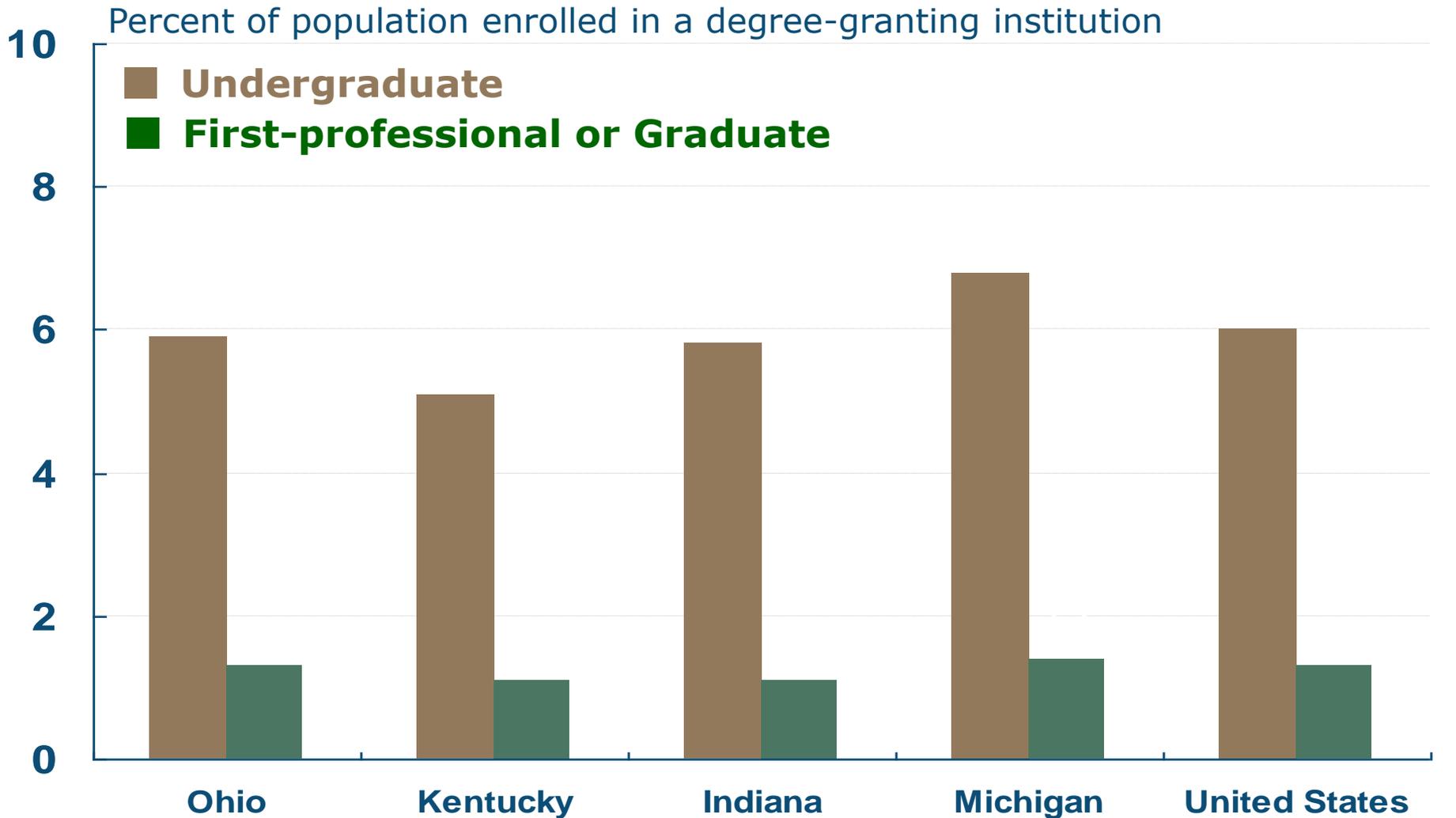
Source: Census Bureau, *Advanced degree includes Master's degree, Professional school degree and Doctorate degree

EDUCATIONAL ENROLLMENT, 2008



Source: Census Bureau

EDUCATIONAL ENROLLMENT, 2008



Source: Census Bureau

FEDERAL RESERVE BANK
of CLEVELAND

TOP PATENT ORGANIZATIONS: MICHIGAN, 2004-2008

GENERAL MOTORS CORPORATION	1332
FORD GLOBAL TECHNOLOGIES, L.L.C.	1285
DELPHI TECHNOLOGIES, INC.	643
VISTEON GLOBAL TECHNOLOGIES, INC.	616
LEAR CORPORATION	509
GM GLOBAL TECHNOLOGY OPERATIONS, INC.	459
DAIMLERCHRYSLER CORPORATION	285
UNIVERSITY OF MICHIGAN	273
FORD MOTOR COMPANY	193
EATON CORPORATION	181

TOP PATENT ORGANIZATIONS: Ohio, 2004-2008

PROCTER + GAMBLE COMPANY	854
GENERAL ELECTRIC COMPANY	826
GOODYEAR TIRE + RUBBER COMPANY	347
DIEBOLD	263
DELPHI TECHNOLOGIES, INC.	246
HONDA MOTOR CO., LTD.	209
ETHICON ENDO-SURGERY, INC.	143
LINCOLN GLOBAL, INC.	141
ROCKWELL AUTOMATION TECHNOLOGIES	138
CISCO TECHNOLOGY, INC.	91

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

ISSUES FOR THE REGION

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