

# The Role of Research in a High-Tech Economy

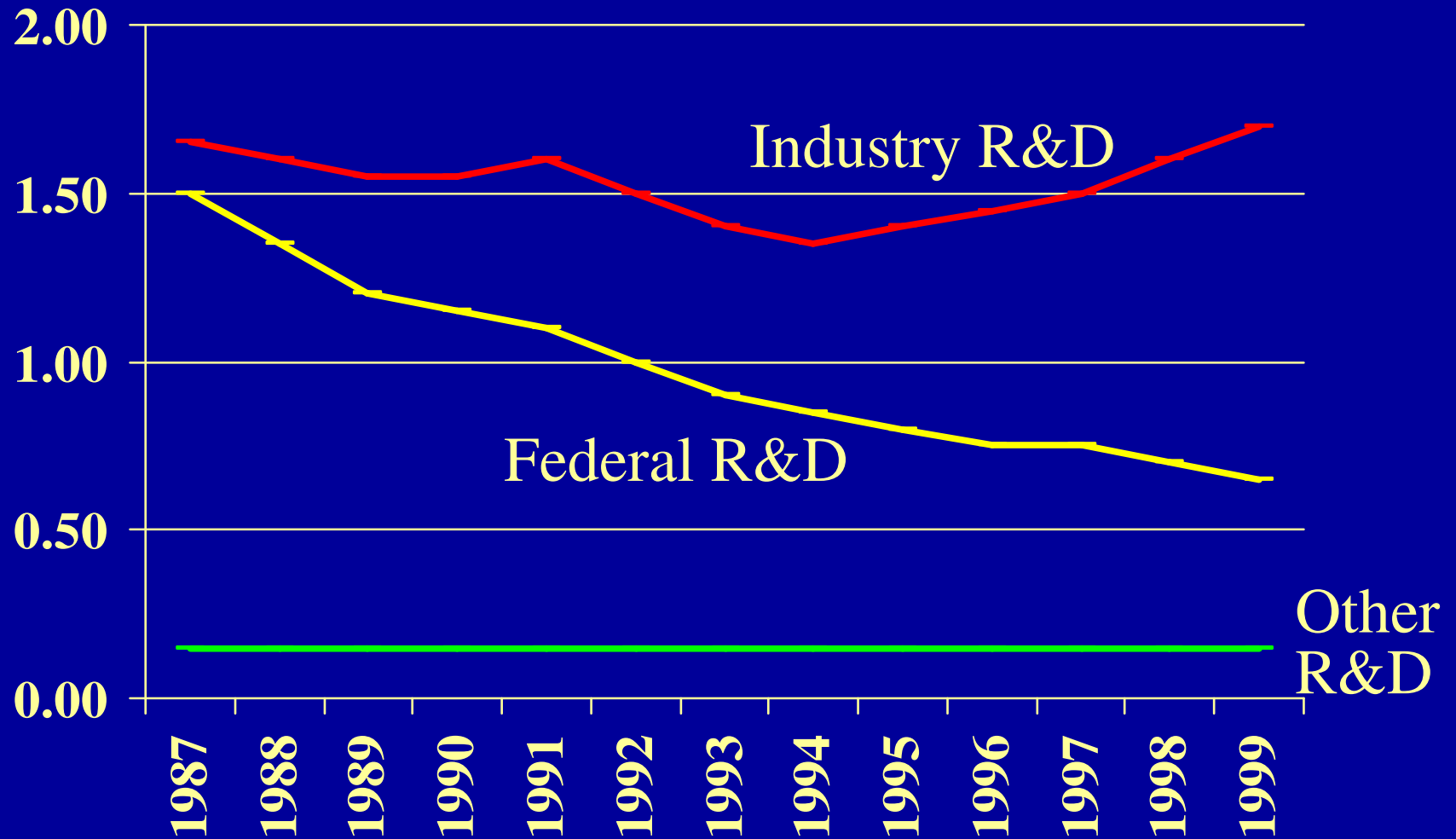
President G. Wayne Clough  
Georgia Tech Research Corporation  
June 8, 2001

# Tracing the Trendline

- In the heyday of defense research, the federal government funded **70%** of nation's R&D portfolio. By 1985, it had dropped to **46%**, and by 1999 to **27%**.
- Federal R&D funding is now **less than 1%** of the Gross National Product – lowest level since the 1950s.

# Federal and Industry R&D

Percentage of the Gross Domestic Product



*U.S. Competitiveness 2001*, Council on Competitiveness

# Setting the Context

- Innovation is the driving force of the global economy.
- The growing R&D investment by private industry does not replace federal funding.
- **73%** of patent applications filed by private industry cite fundamental research funded by the federal government as the basis for their invention.

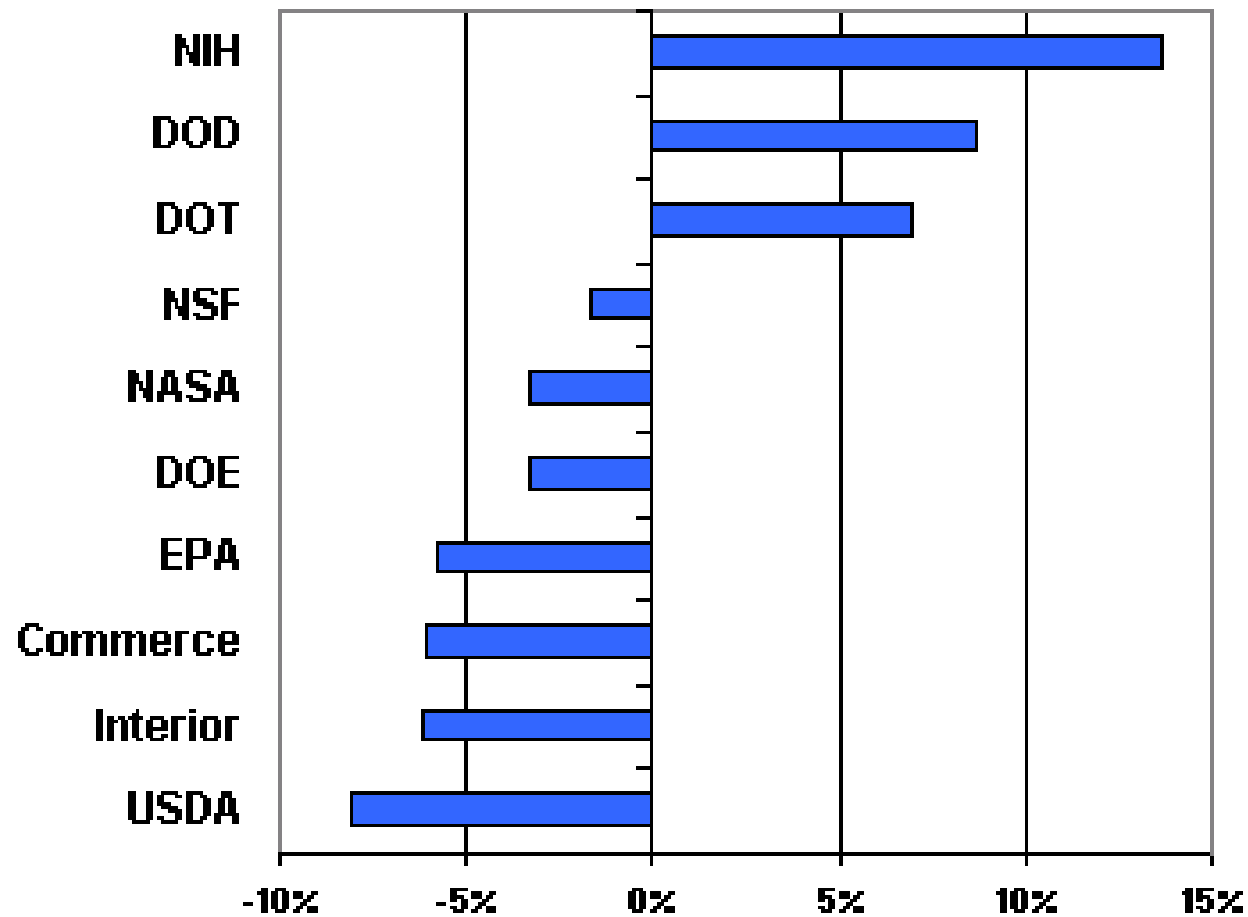
“In the long run, the eroding base for innovation is the real challenge and the abiding constraint on our standard of living.”

Michael Porter, Harvard University  
*U.S. Competitiveness 2001*  
Council on Competitiveness

# Bush Proposal: FY 2002

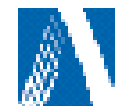
- Overall increase for R&D of \$5.2 billion (5.8%).
- R&D Increase for DoD and NIH of \$6.3 billion means that other funding agencies combined will experience a loss.
- Of non-defense R&D, NIH to receive 13.6% increase, while other non-defense R&D falls by 4.2%.

## FY 2002 R&D Request Percent Change from FY 2001



Source: AAAS, based on OMB R&D Budget Data and agency estimates for FY 2002.

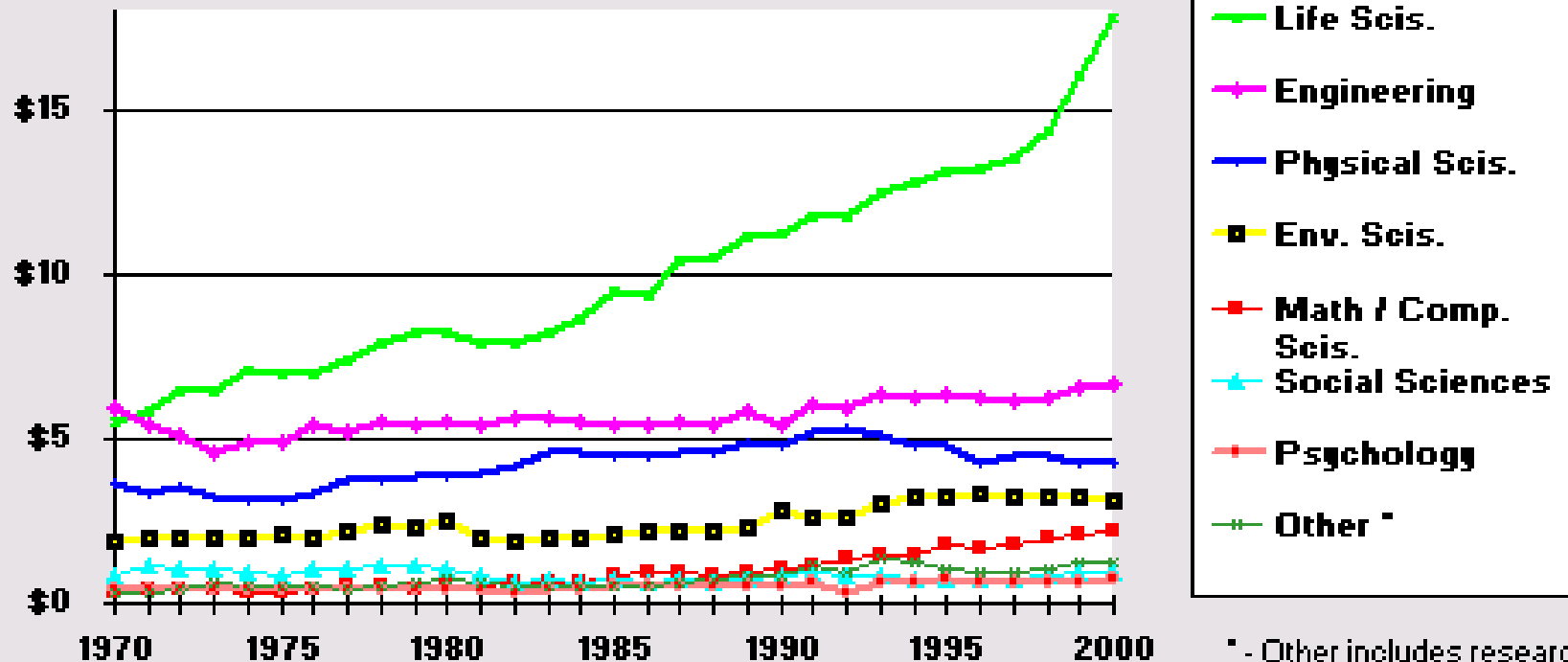
April '01 Preliminary © 2001 AAAS



AMERICAN ASSOCIATION FOR THE  
ADVANCEMENT OF SCIENCE

# Trends in Federal Research by Discipline, FY 1970-2000

obligations in billions of constant FY 2001 dollars



\* - Other includes research not classified (includes basic research and applied research; excludes development and R&D facilities)

Source: National Science Foundation, *Federal Funds for Research and Development FY 1988, 2000, and 2001*, 2001. FY 2000 data are preliminary. Constant-dollar conversions based on OMB's GDP deflators. APRIL '01 © 2001 AAAS



“The National Institutes of Health receives over half of the federal academic research pie. But that will continue to work only if we maintain a healthy foundation of basic science and engineering research from which the life sciences can draw.”

Dr. Rita R. Colwell  
Director, National Science Foundation

# The Importance of NSF

- Accounts for less than 4% of federal R&D spending, but roughly 50% of the non-medical fundamental research at universities.
- Primary source of federal funding for non-medical research in life sciences.
- Primary source of federal funding for fundamental research in other sciences, engineering, and computer science.

# Technology Drives the Economy

- Technology industries are accounting for an increasing portion of the growth in Gross Domestic Product.
- Wages in IT industries are both higher than overall industry wages, and have grown faster over the past decade.
- U.S. e-commerce in 2000:
  - ▶ Business-to-business - \$213 billion (up 119%)
  - ▶ Retail - \$45 billion (up 200%)

# Number of Patents Issued, 1999

1. California
2. New York
3. Texas
4. New Jersey
5. Pennsylvania
6. Illinois
7. Michigan
8. Massachusetts
9. Ohio
10. Minnesota
11. Florida
12. Washington
13. Colorado
14. Connecticut
15. North Carolina
16. Wisconsin
17. Maryland
18. Arizona
19. Indiana
- 20. Georgia**
21. Idaho
22. Oregon

# Patents in Metro Areas, 1999

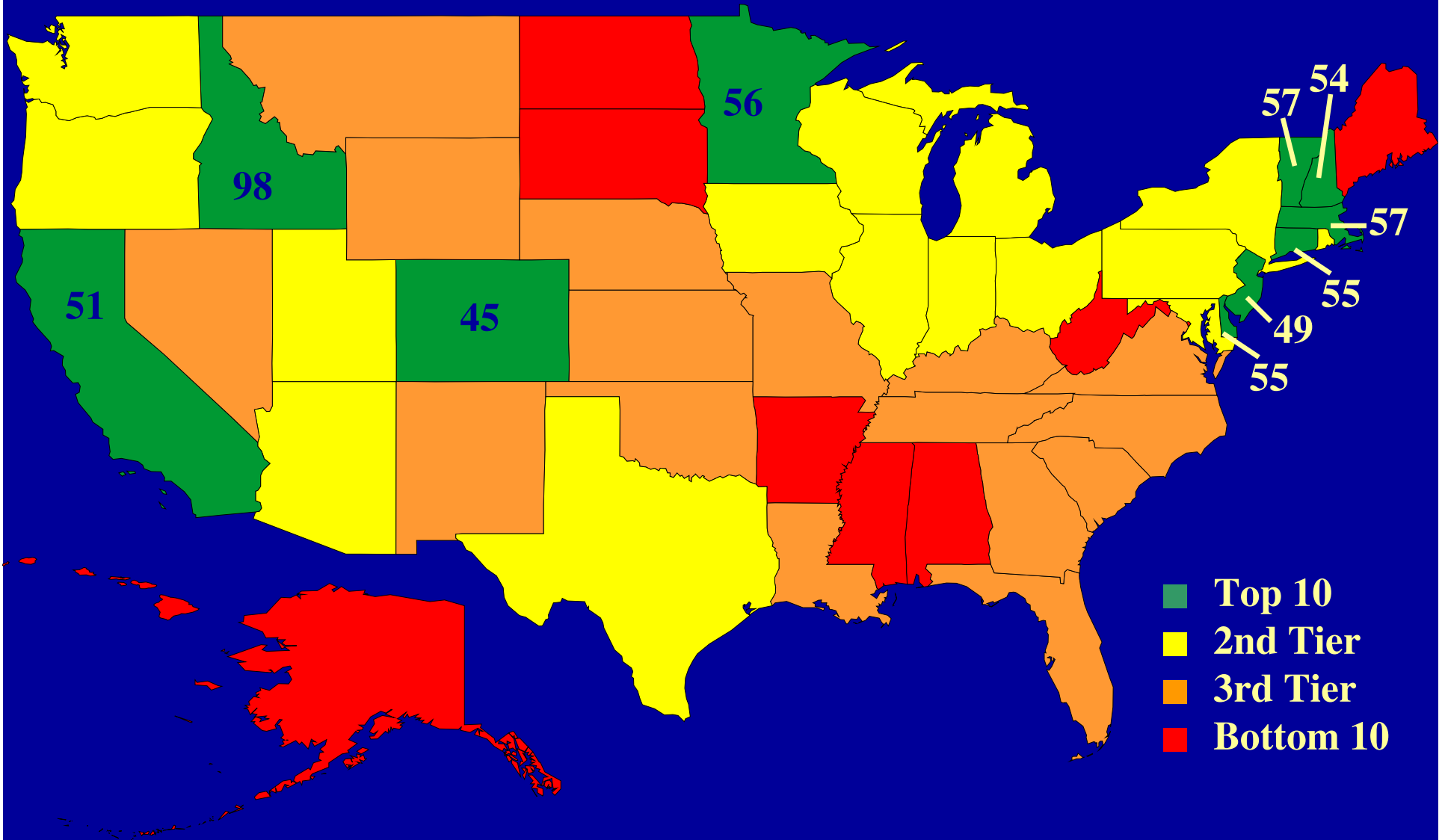
1. San Jose
2. Boston
3. Chicago
4. Los Angeles
5. Minneapolis
6. Detroit
7. Philadelphia
8. San Diego
9. New York
10. San Francisco
11. Dallas
12. Oakland
13. Austin
14. Rochester
15. Houston
16. Orange County, CA
17. Washington, D.C.
18. Seattle
19. Phoenix
20. Newark
21. Boise City
22. Middlesex area, NJ
- 23. Atlanta**
24. New Haven
25. Raleigh-Durham
26. Portland

# Patents per Population, 1999

1. Idaho
2. Vermont
3. Massachusetts
4. New Hampshire
5. Minnesota
6. Connecticut
7. Delaware
8. California
9. New Jersey
10. Colorado
11. Michigan
12. New York
13. Oregon
14. Washington
15. Wisconsin
16. Utah
17. Pennsylvania
18. Illinois
19. Ohio
20. Arizona
21. Texas
22. Maryland
23. Rhode Island
24. Iowa
25. Indiana
26. North Carolina
27. New Mexico
28. Missouri
29. Florida
- 30. Georgia**

# Patents Issued, 1999

## Per 100,000 Population



The New Geography

# Growth in Patents, 1990-1999

1. Idaho
2. Nevada
3. Vermont
4. Colorado
5. California
6. North Carolina
7. Arizona
8. Iowa
9. Washington
10. Utah
- 11. Georgia**
12. Texas
13. Oregon
14. Minnesota
15. South Dakota
16. Alaska
17. Montana
18. Wyoming
19. Rhode Island
20. Maryland
21. Massachusetts
22. Kansas
- National average**



# Population Growth, 1990-2000

1. Nevada
2. Arizona
3. Colorado
4. Utah
5. Idaho
- 6. Georgia**
7. Florida
8. Texas
9. North Carolina
10. Washington
11. Oregon
12. New Mexico
13. Delaware
14. Tennessee
15. South Carolina
16. Virginia
17. Alaska
18. California
19. Arkansas
- National average**

# Growth in Patents and Population

- In the top ten on both lists:

Arizona

North Carolina

Colorado

Utah

Idaho

Washington

Nevada

- Above the national average on both lists:

Alaska

Oregon

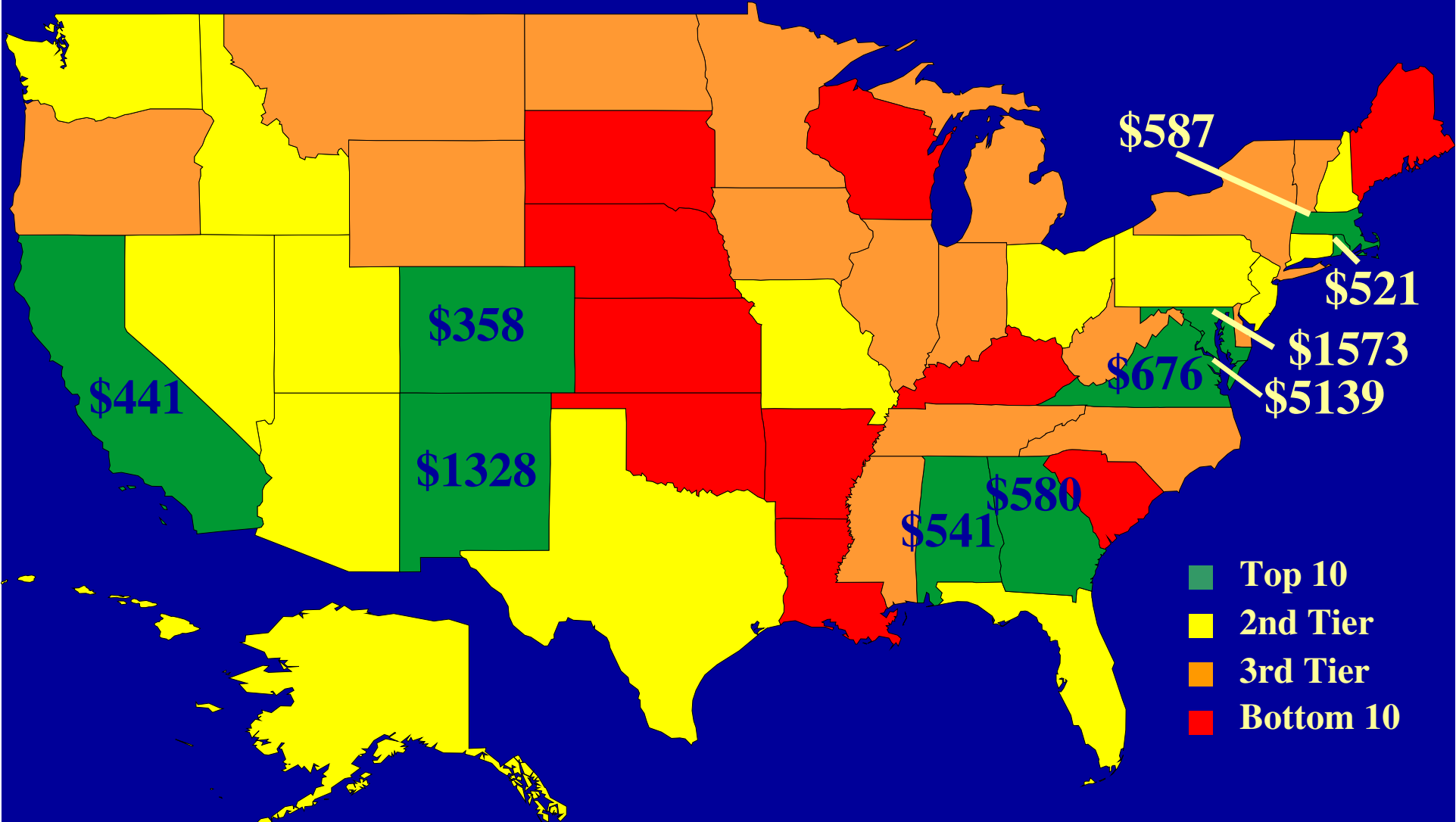
California

Texas

**Georgia**

# Federal R&D, 1998

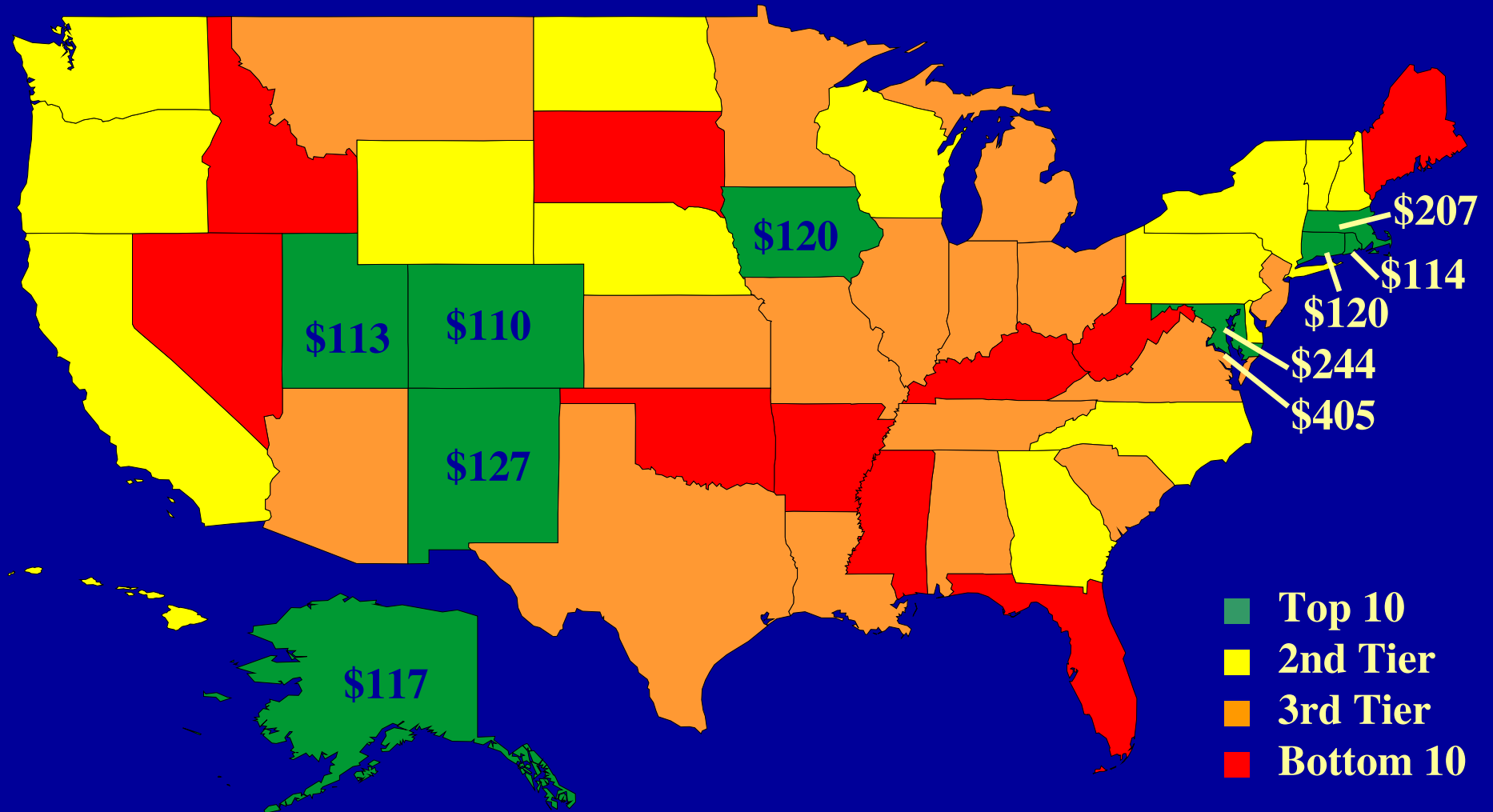
## Dollars Per Capita



- Top 10
- 2nd Tier
- 3rd Tier
- Bottom 10

# Academic R&D, 1997

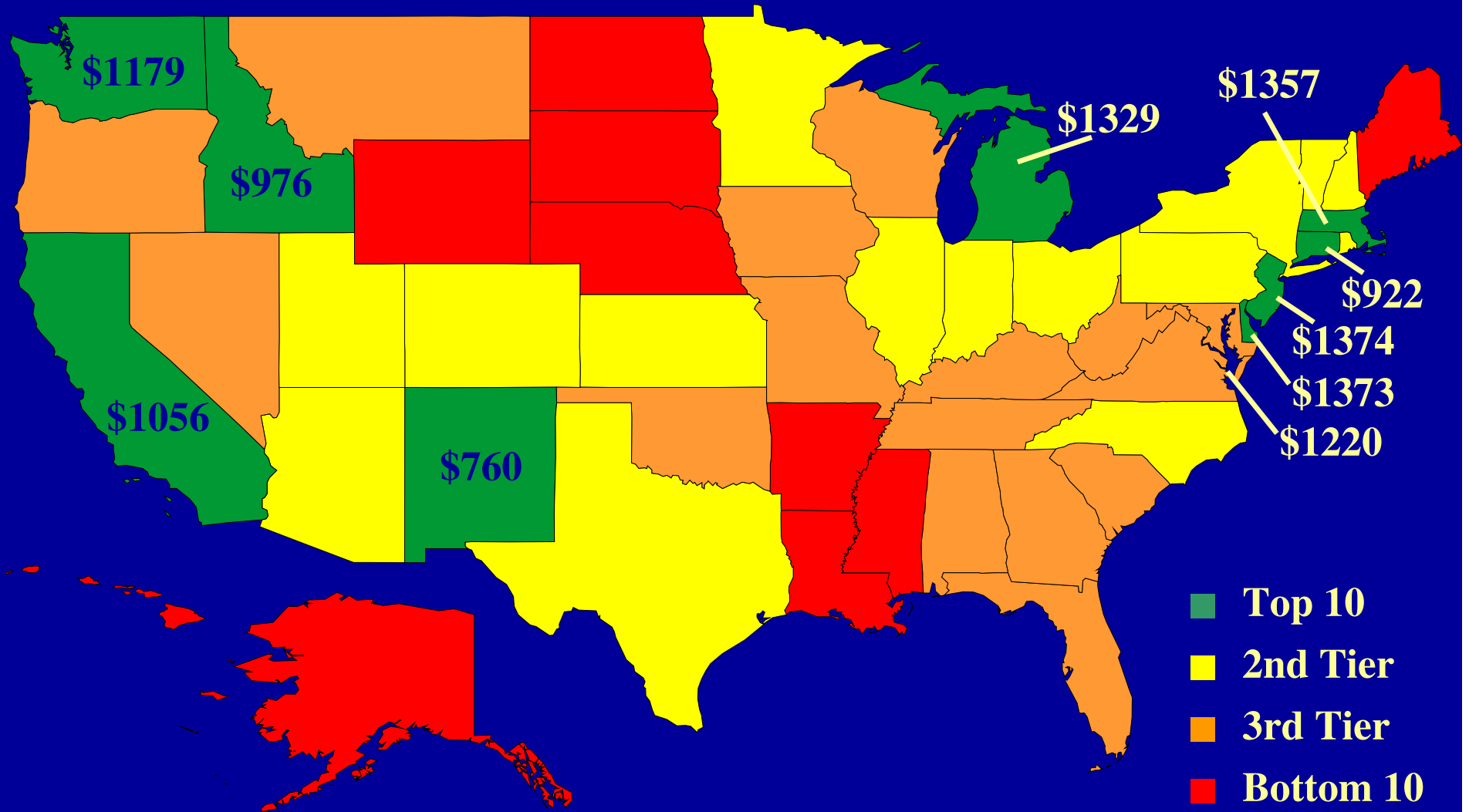
## Dollars per Capita



The New Geography

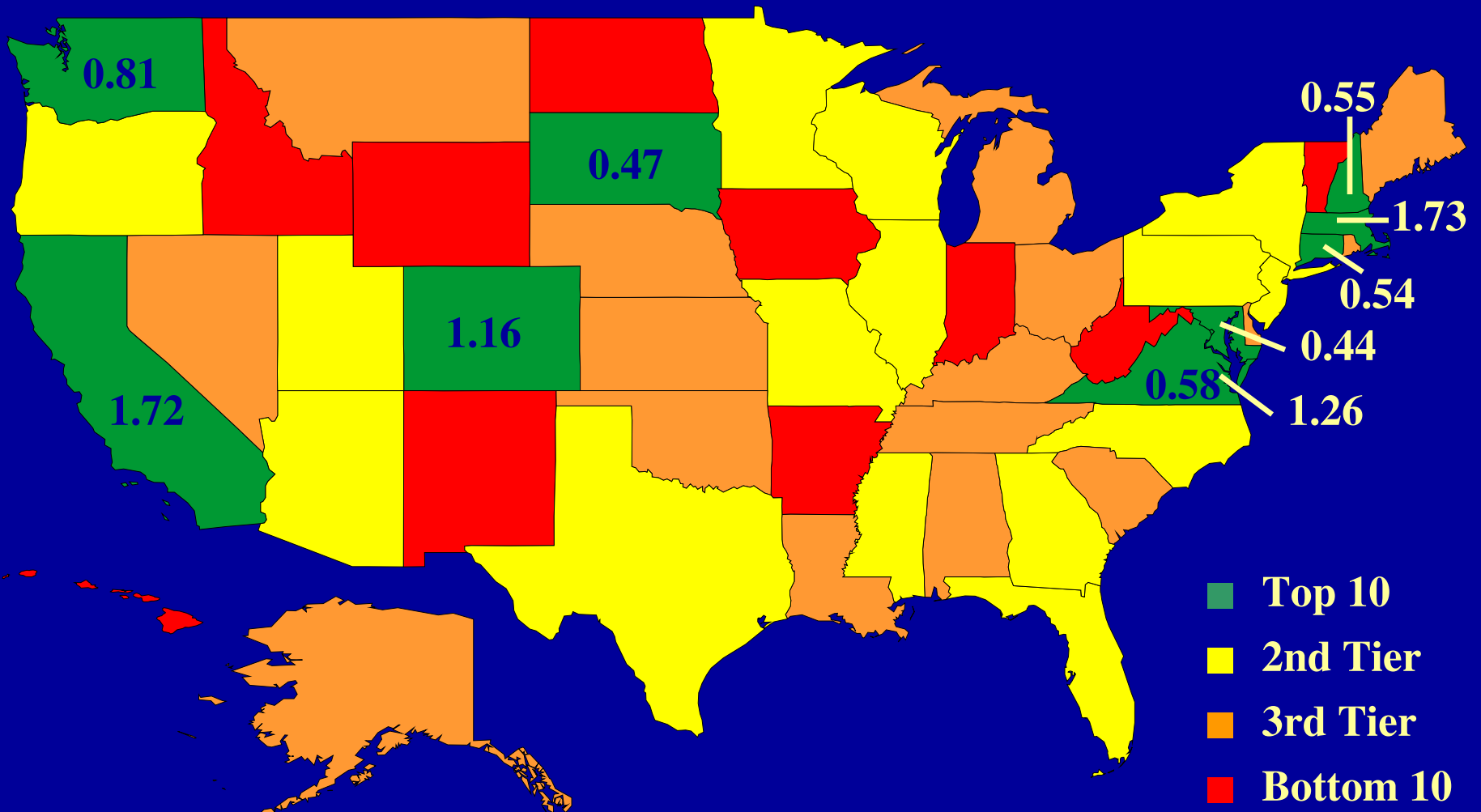
# Industry R&D, 1997

## Dollars per Capita



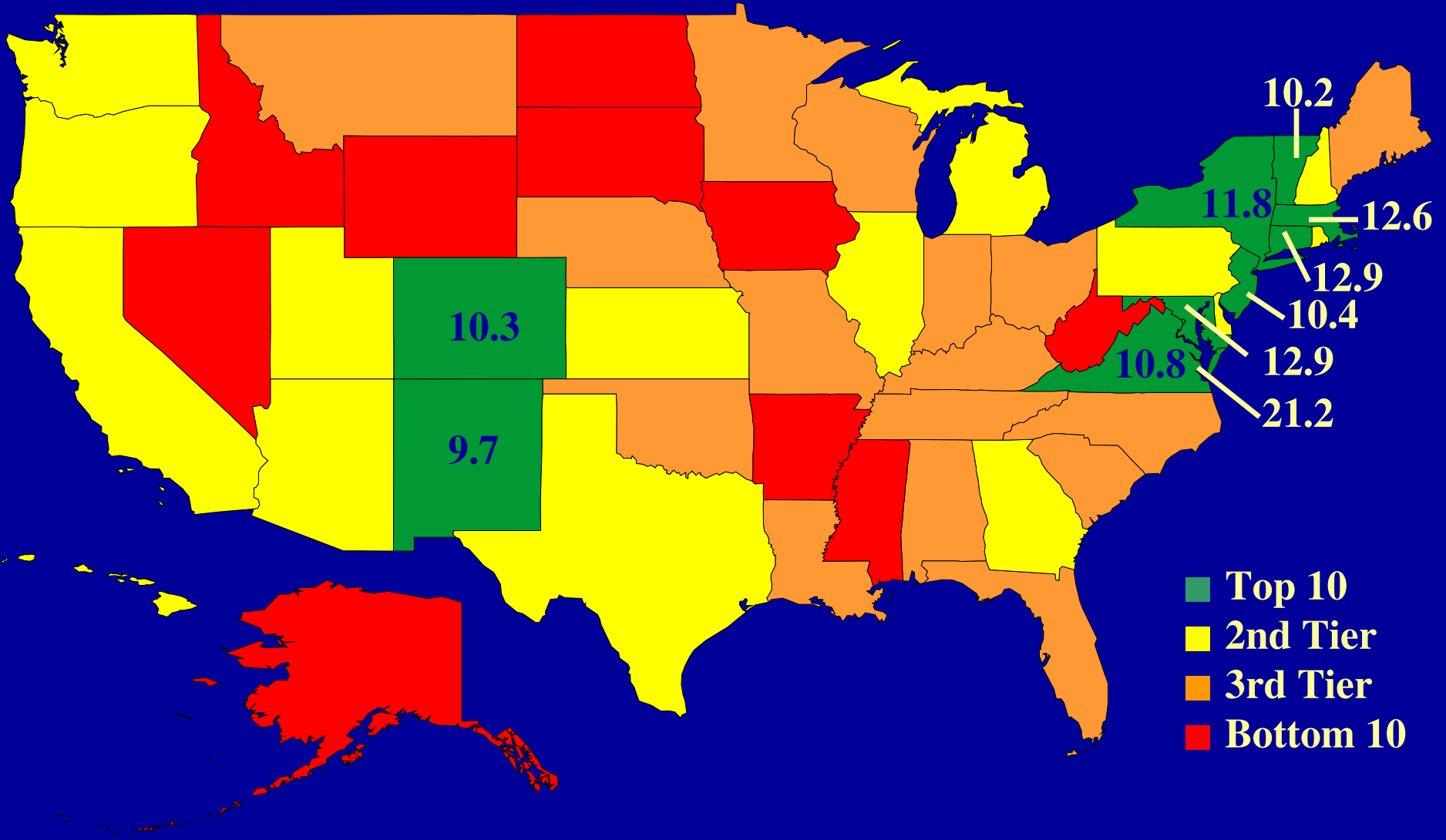
# Venture Capital Investment, 1999

## Percent of Gross State Product



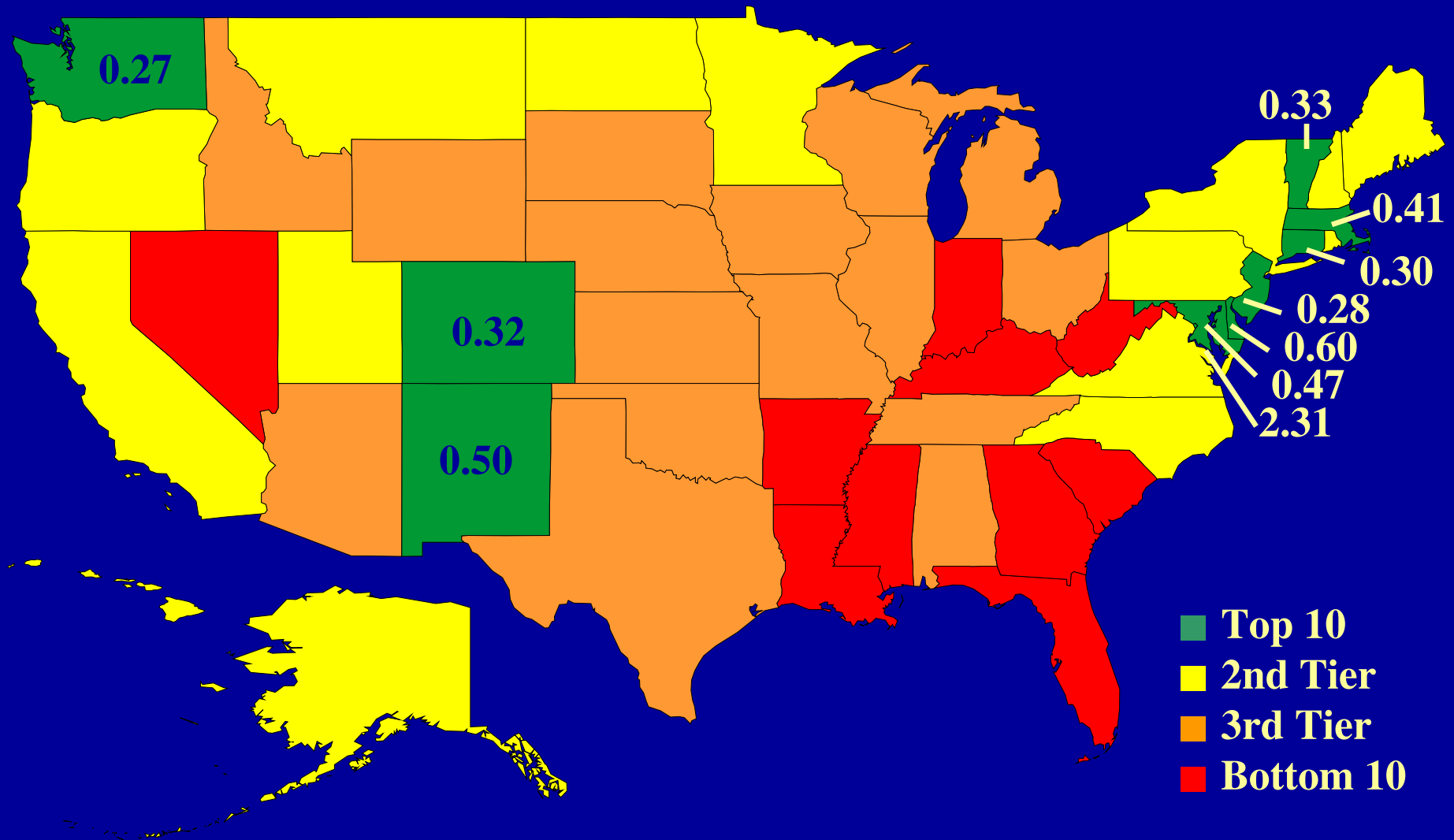
# Educational Attainment Levels

## Percentage Population Age 25+ with Advanced Degree



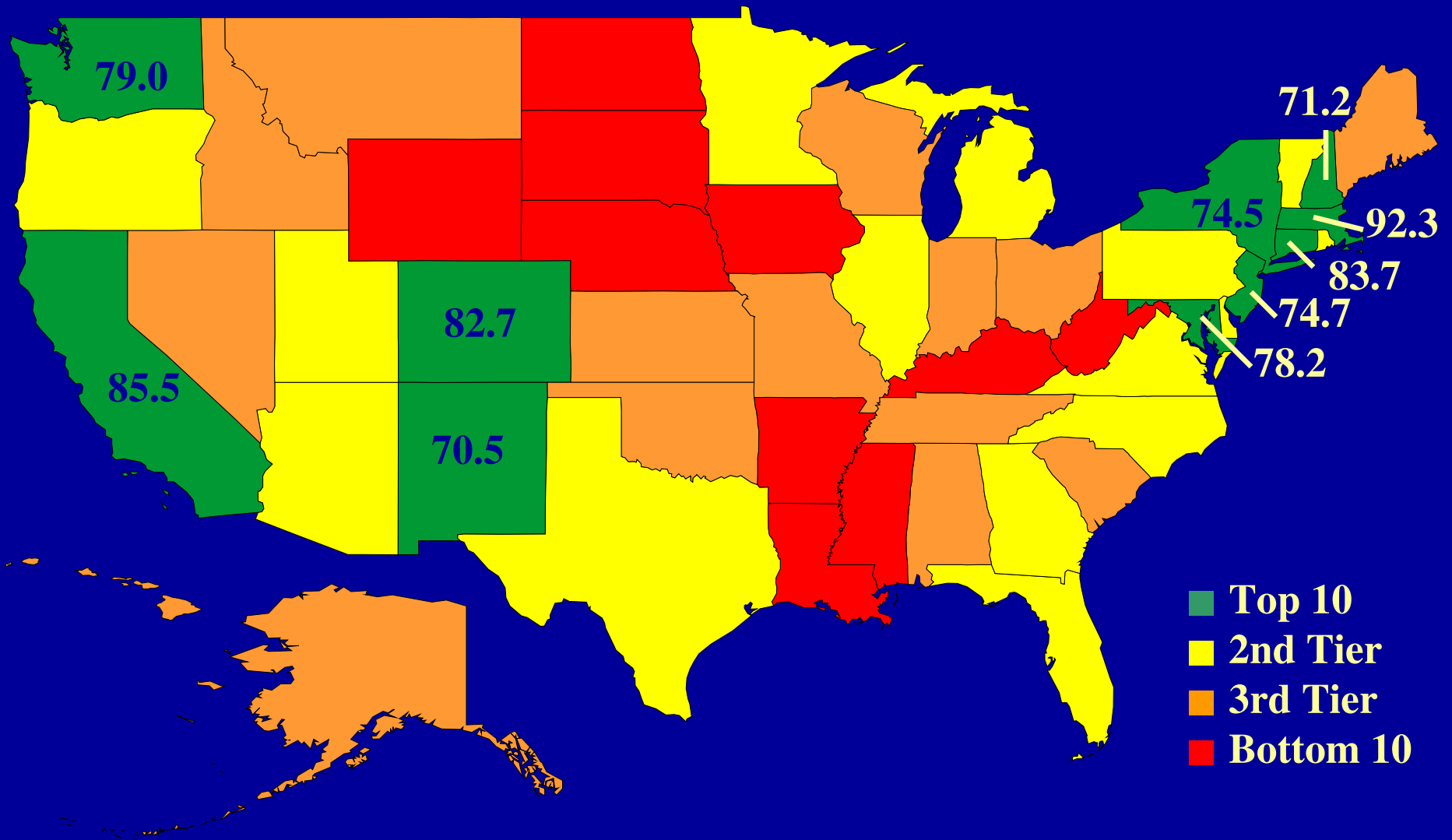
# Doctoral Scientists and Engineers, 1997

## Percentage of the Population





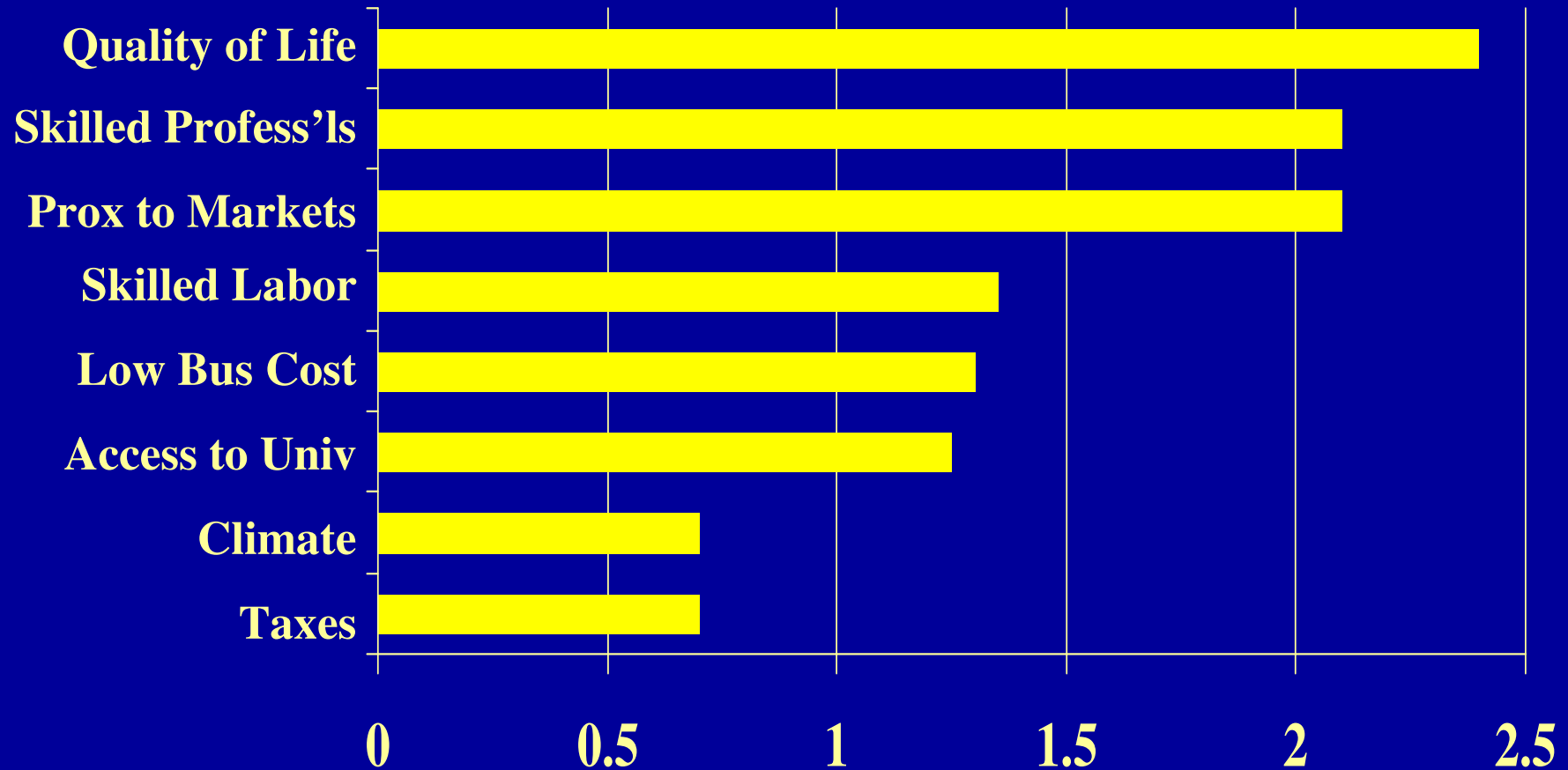
# Milken Institute New Economy Index



# The Importance of Location

- Growth of a specific region depends on entrepreneurs, investors and knowledge workers locating there.
- The locations and regions that appeal to these groups are most likely to generate high-tech businesses.

# Company Location Factors



Bank of Boston

# Challenges for Georgia

- Overcome tradition as an economic laggard and leapfrog other regions to become leader in technology and economic strength
- Move from production-based economy to research and content-oriented economy
- Education and cultural issues
- Partnership between higher education, government, and private industry
- High-tech infrastructure