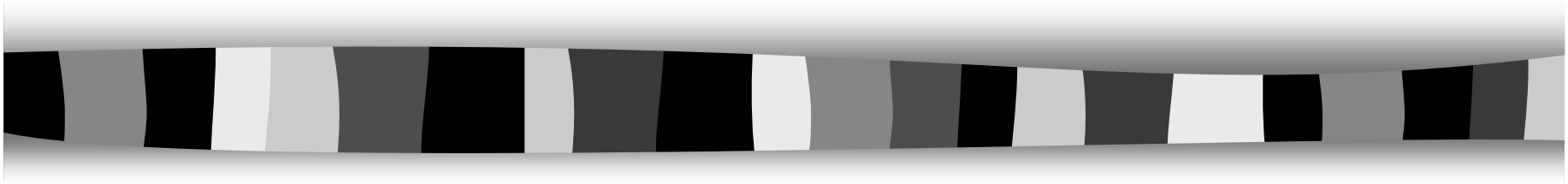
The Entrepreneurial State:

State-Based Initiatives in the US and a Second Stage in University-Industry Collaborations



Cambridge-MIT Institute/World Bank Symposium
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John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

Second Stage Theme

FIRST STAGE

Bayh-Dole and Reagan Era made Science Policy a key component of Federal Economic Policy: 1980 - 1990

SECOND STAGE

Relative stability in federal policy and shift to new targetted policymaking at the state level marked by an increased sense of interstate economic competition, and by a great faith in HT as an economic driver: 2000-

What are the political dynamics of the Second Stage?

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

State Initiatives: Patterns of Investment

- State funding and policies are largely focused on promoting or creating new university-business collaborative “clusters” to build additional research capabilities

- States are increasingly targeting their efforts on promoting and directly funding high profile ”discovery” research, reflecting a relatively new political understanding of the nature of technological innovation.

- State initiatives are intended to leverage (and not replace) existing federal science funding and to attract additional industry and venture capital.

- Many states are only marginally dipping into their state operating budgets, instead using funding derived from a huge 1998 settlement reached with the US tobacco industry or via bonds.

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

State Initiatives: Patterns of Investment

- Most state initiatives require some form of matching funding from private-sector businesses.
- Many states struggle with issues related to intellectual property right—essentially mirroring the debates over the Bahy-Dole Act.
- Policies to promote university-business collaborations and tech transfer are usually part of a larger set of Tech-Based Economic Development (TBED) policies that include tax incentives and providing venture capital for start-ups, often focused on attracting existing high-tech businesses from other states, or (like federal policies) on supporting and promoting small businesses.
- State initiatives often include financing for consortiums of universities within a state to “spread the wealth” and meet political needs of lawmakers and reduce opposition.

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

Gauges of High-Tech Research and Economic Activity: Sample of Twelve Large and Midsized States

SAMPLE OF LARGE STATES < 12.5 Million People	California		Texas		Michigan		New York		Illinois		Florida	
	#	Rank	#	Rank	#	Rank	#	Rank	#	Rank	#	Rank
Employment in HT Businesses in 2000**	1,397,776	1	703,206	2	514,017	3	513,472	4	491,433	5	339,093	9
% of Employment in HT in 2000**	10.8	6	8.8	20	12.6	1	7.0	37	8.9	18	5.5	44
Net Formation of HT Businesses in 2000**	2,452	1	306	6	196	16	841	2	248	11	596	3
Fastest Growing Tech Companies: 2002***	151	1	21	6	28	3	24	4	11	14	18	7
Total University R&D Expenditures	$4.422b	1	$2.244b	3	$1.107b	10	$2.476b	2	$1.280b	7	$.997b	10
University R&D/$1,000 of GSP	$3.25	23	$2.94	32	$3.45	20	$3.00	31	$2.69	35	$2.03	44
Industry R&D/$1,000 of GSP	$29.74	7	$12.88	27	$44.57	1	$13.17	26	$17.31	20	$7.64	33
Federal R&D/$1,000 of GSP	$1.66	12	$0.69	26	$0.37	39	$0.33	40	$0.17	48	$1.76	11
Venture Capital Invested/$1,000 GSP	$6.96	2	$1.68	10	$0.23	35	$0.97	20	$0.48	27	$0.73	23
# HT Incubators: 2003	123	1	43	5	20	11	76	2	26	10	36	7
Total US Patents Generated in 2000-02	20,647	1	6,632	3	4,194	6	7,097	2	4,241	5	3,044	10
Patents Issued/10,000 Businesses: 2000-02	256	2	140	17	177	9	144	16	138	18	70	32

SAMPLE OF MIDSIZED STATES > 12.5 Million People	Ohio		Pennsylvania		Massachusetts		North Carolina		Washington		Wisconsin	
	#	Rank	#	Rank	#	Rank	#	Rank	#	Rank	#	Rank
Employment in HT Businesses in 2000**	484,110	6	394,786	7	388,928	8	268,284	12	258,234	13	200,932	14
% of Employment in HT in 2000	9.7	13	7.8	30	12.6	1	6.2	39	11.4	5	9.1	15
Net Formation of HT Businesses in 2000**	129	19	257	10	300	7	238	13	253	10	54	30
Fastest Growing Tech Companies: 2002***	1	33	13	12	28	3	15	10*	15	10*	3	20
Total University R&D Expenditures	$.995b	11	$1.687b	4	$1.576b	6	$1.137b	8	$.706b	12	$.728b	11
University R&D/$1,000 of GSP	$2.67	36	$4.13	10	5.48	2	$4.13	11	$3.17	24	$4.11	12
Industry R&D/$1,000 of GSP	$17.91	17	$21.96	13	$39.05	3	$15.01	22	$38.98	4	$13.92	25
Federal R&D/$1,000 of GSP	$2.43	9	$0.44	35	$1.26	19	$5.08	26	$0.80	24	$0.23	46
Venture Capital Invested/$1,000 GSP	$0.59	25	$1.03	19	$8.21	1	$1.00	7	$2.69	6	$0.36	31
# HT Incubators: 2003	37	5	58	3	36	6	34	8	13	17	48	4
Total US Patents Generated in 2000-02	3,999	7	3,829	9	3,883	8	2,202	12	2,202	12	2,150	14
Patents Issued/10,000 Businesses: 2000-02	148	14	130	21	219	5	108	25	134	20	153	12

* States are tied

** HT Businesses as classiffied by NAICS codes, US Dept of Commerce

*** 2002 Ranking of Technology Fast Companies by Deloittee & Touche based on revenue growth; note that some 29 states had 2 or fewer fast growth HT businesses.

Source: US Office of Technology Policy, State Science and Technology Indicators, 2004.

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

California's Two High-Tech Ventures

- *California Institutes for Science and Innovation*
  - The *California Institute for Telecommunications and Information Technology* (Cal-(IT)© based at UC San Diego and in collaboration with UC Irvine (both in Southern California).
  - The *California NanoSystems Institute* (CNSI) based at UCLA and in collaboration with faculty and researchers at UC Santa Barbara.
  - The *Institute for Bioengineering, Biotechnology and Quantitative Biomedical Research* (QB3), based at the University of California-San Francisco, UC's only campus devoted exclusively to medicine, and in collaboration with the Berkeley and Santa Cruz campuses.
  - Center for Information Technology Research in the Interest of Society based at UC Berkeley.

- *California's Stem Cell Initiative - Proposition 71*

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

Concluding Thoughts

- *Devolution (US) Versus Evolution (EU)*
- *Interstate Competition - Information Networks and Rankings*
- *Signs of Overall Vitality*

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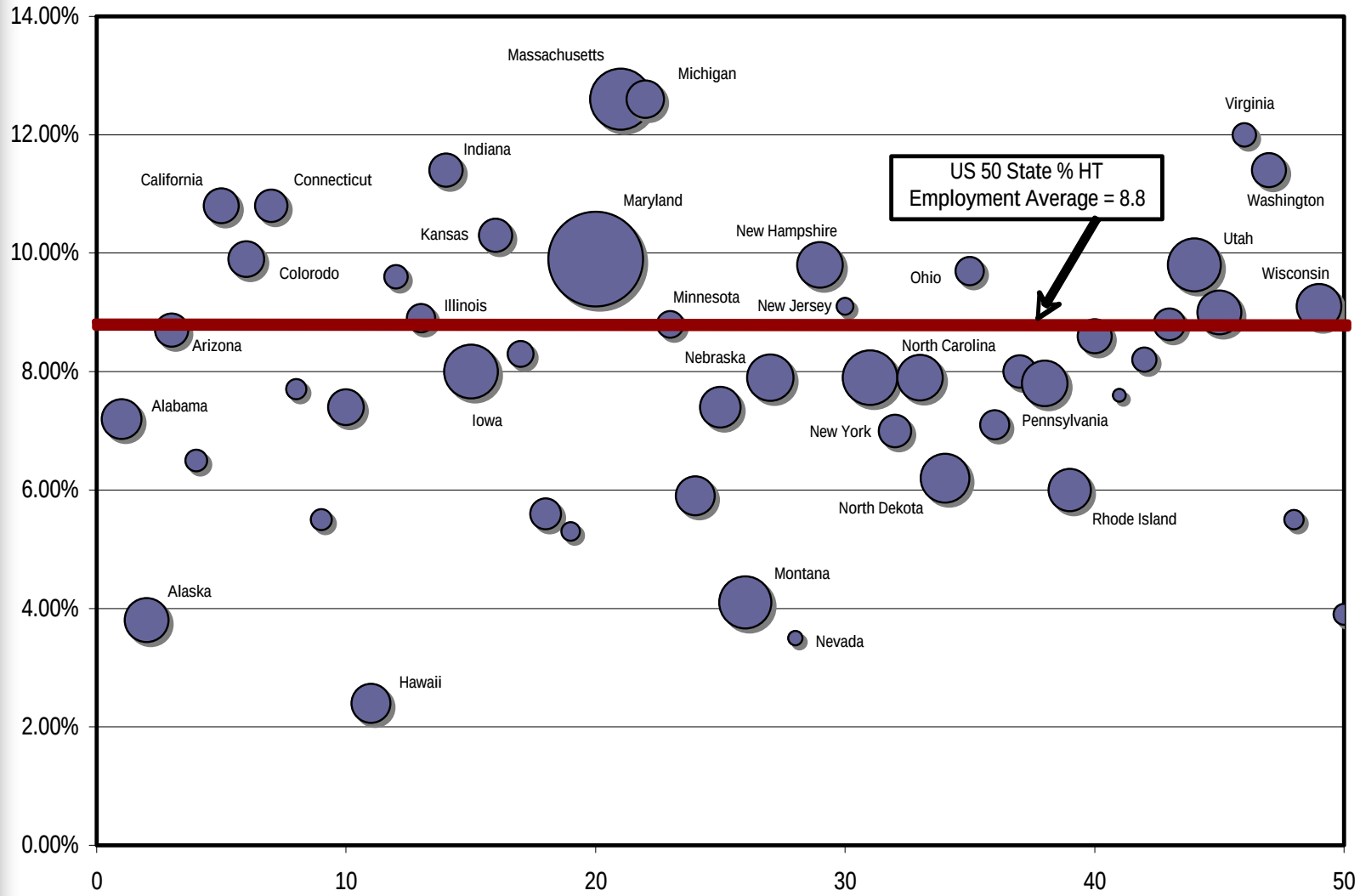
50 State Comparison: HT as a Percentage of All State Employment and University R&D Per $1,000 of Gross State Product, 2000



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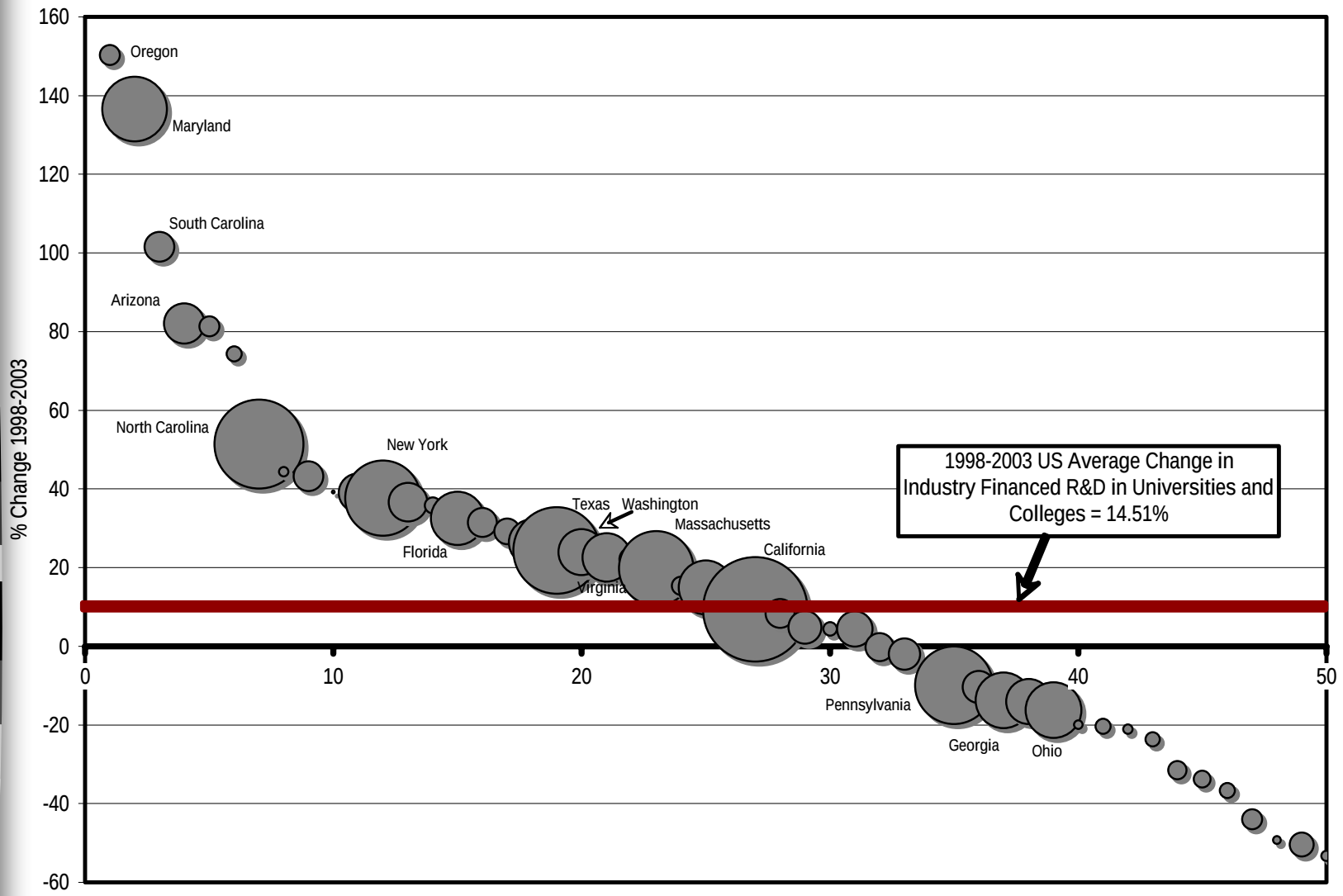
50 State Comparison: Change in Industry-Financed R&D Expenditures in US Universities and Colleges, 1998-2003



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- *Signs of Overall Vitality*
- *A Policy Disjuncture - Depth Versus Breadth*
- *Being Left Behind - Does A Vibrant HT Sector Lift All Socioeconomic Boats?*

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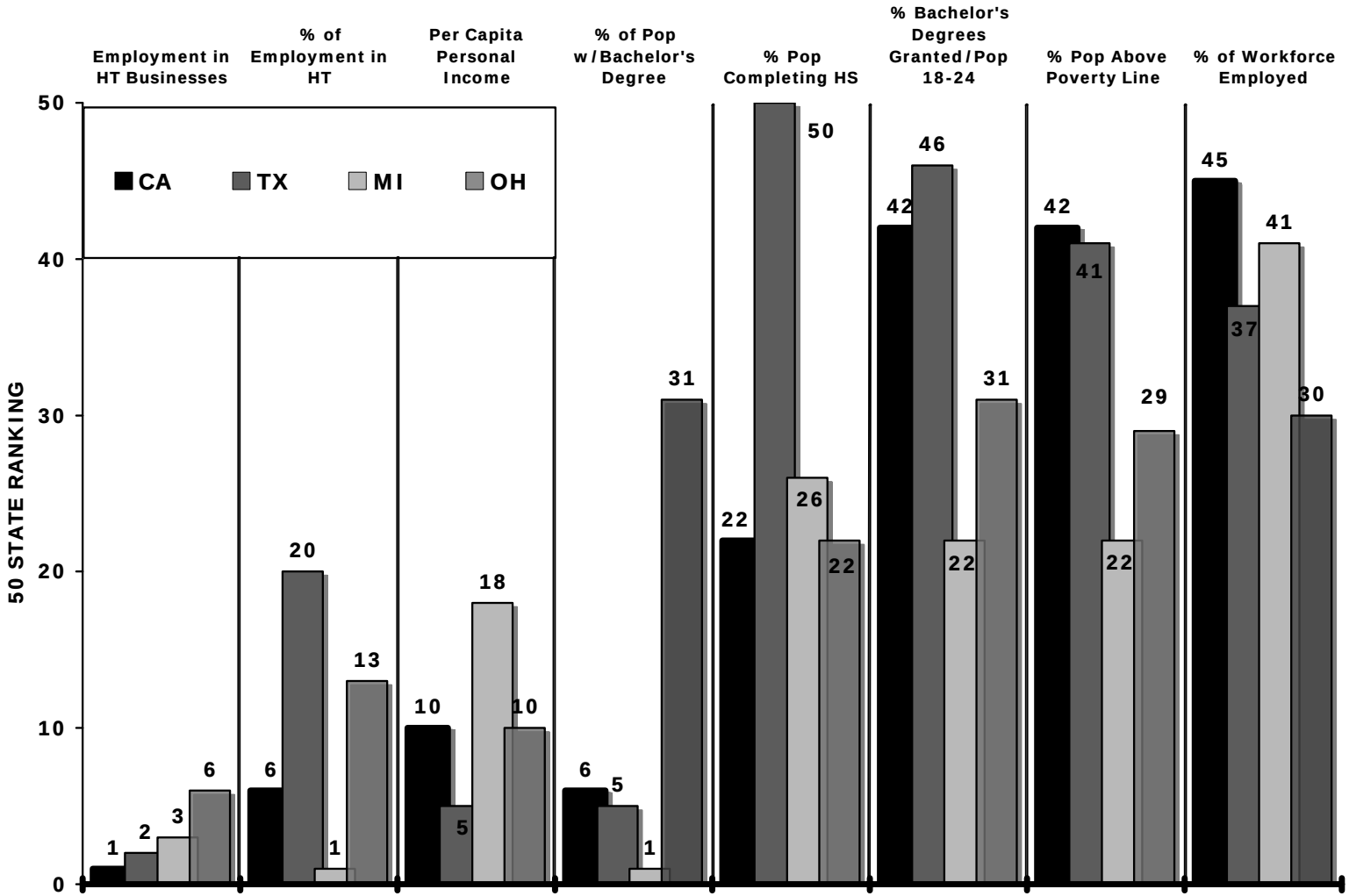
National Ranking of Educational Attainment, HT Labour Pool, Employment and Poverty Rates: California, Texas, Michigan and Ohio



John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

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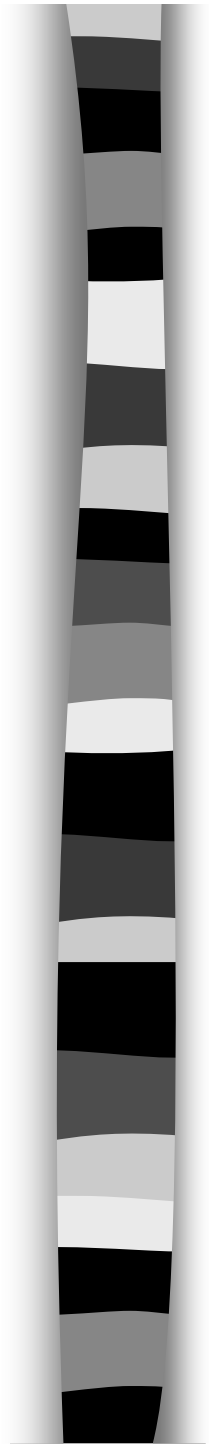
- *Sustainability of the Second Stage*

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley

Sustainability?

- As private sector investment in such university-business collaborations, and for university basic research, grows, intention to withdraw state support.
- Many initiatives funded using temporary sources, including tobacco settlment funds and bonds. What will happen as the fortune of state budgets shift and as new political priorities arise
- What is the actual effectiveness of such initiatives and how will state TEBD strategies change? Will priorities shift?
- What is the relative role of the federal versus state governments in funding both basic research (like stem cells) and S&R relevant fields?
- What shifts will occur in science and technology research that will open new opportunities for university-business collaborations?
- How will the global market for S&T products and research change?
- Initiatives sponsored by one political party or politician in one era are often not supported in a succeeding era.

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley



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Educational Attainment, HT Labour Pool, Employment and Poverty Rates: Sample of Twelve States

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% of Employment in HT in 2000	10.8	6	8.8	20	12.6	1	7.0	37	8.9	18	5.5	44
% of Population Completing High School	80.20	41	78.10	50	86.50	26	83.70	35	85.90	29	83.30	36
% of Population with Bachelor's Degree	27.90	15	26.20	5	22.50	39	28.80	13	27.30	16	25.70	25
% Bachelor's Degrees Granted/Pop 18-24	3.56	42	3.37	46	4.82	22	5.38	12	4.55	28	3.80	39
% S&E BS Degrees Granted/Total BS	18.20	18	17.00	33	19.70	7	15.80	41	17.30	27	14.80	47
% S&E Graduate Students/Pop 18-24	1.58	14	1.28	27	1.65	11	2.18	3	1.97	6	1.19	33
Computer Specialists/10,000 Workers	205.00	8	188.00	14	130.00	29	179.00	17	185.00	15	143.00	27
Life & Physical Scientists/10,000 Workers	24.90	16	20.20	25	130.00	35	20.90	23	13.10	42	13.70	39
Engineers/10,000 Workers	101.30	8	96.10	10	94.90	11	63.00	26	62.80	27	54.10	35
% Population Above Poverty Line	86.90	39	85.90	41	90.30	17	85.90	41	89.80	22	88.00	31
Per Capita Personal Income	32,898	10	35,708	5	30,222	18	35,708	5	33,320	8	29,559	22
% of Workforce Employed	93.30	45	93.90	37	93.80	41	93.90	37	93.50	44	94.50	25

SAMPLE OF MIDSIZED STATES > 12.5 Million People	Ohio		Pennsylvania		Massachusetts		North Carolina		Washington		Wisconsin	
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Employment in HT Businesses in 2000**	484,110	6	394,786	7	388,928	8	268,284	12	258,234	13	200,932	14
% of Employment in HT in 2000	9.7	13	7.8	30	12.6	1	6.2	39	11.4	5	9.1	15
% of Population Completing High School	87.30	22	86.10	28	86.50	26	80.10	43	90.40	5	86.80	23
% of Population with Bachelor's Degree	24.50	31	26.10	24	34.30	4	22.40	40	28.30	14	24.70	30
% Bachelor's Degrees Granted/Pop 18-24	4.71	25	5.88	8	7.26	3	4.29	30	4.03	35	5.27	14
% S&E BS Degrees Granted/Total BS	15.90	40	17.60	24	16.80	36	18.10	19	16.60	38	18.20	17
% S&E Graduate Students/Pop 18-24	1.50	16	1.64	13	3.43	1	1.29	25	1.01	42	1.45	19
Computer Specialists/10,000 Workers	144.00	26	149.00	24	304.00	3	167.00	19	245.00	6	135.00	28
Life & Physical Scientists/10,000 Workers	14.40	38	23.00	19	39.10	4	28.00	11	33.00	9	17.30	34
Engineers/10,000 Workers	79.30	16	68.40	25	117.40	2	56.10	34	139.90	1	69.60	23
% Population Above Poverty Line	89.20	29	90.80	16	89.80	22	87.10	37	89.60	27	91.40	12
Per Capita Personal Income	29,317	25	31,663	15	39,044	3	27,566	34	32,661	12	29,996	21
% of Workforce Employed	94.30	30	94.30	30	94.70	22	93.30	45	92.70	48	94.50	25

Source: US Office of Technology Policy, State Science and Technology Indicators, 2004.

John Aubrey Douglass
Center for Studies in Higher Education - UC Berkeley