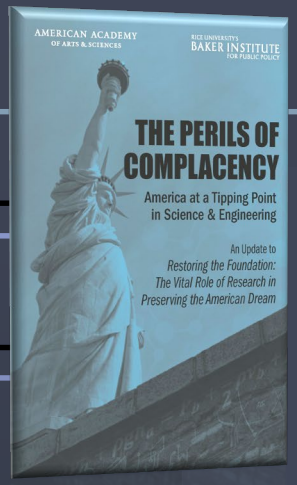
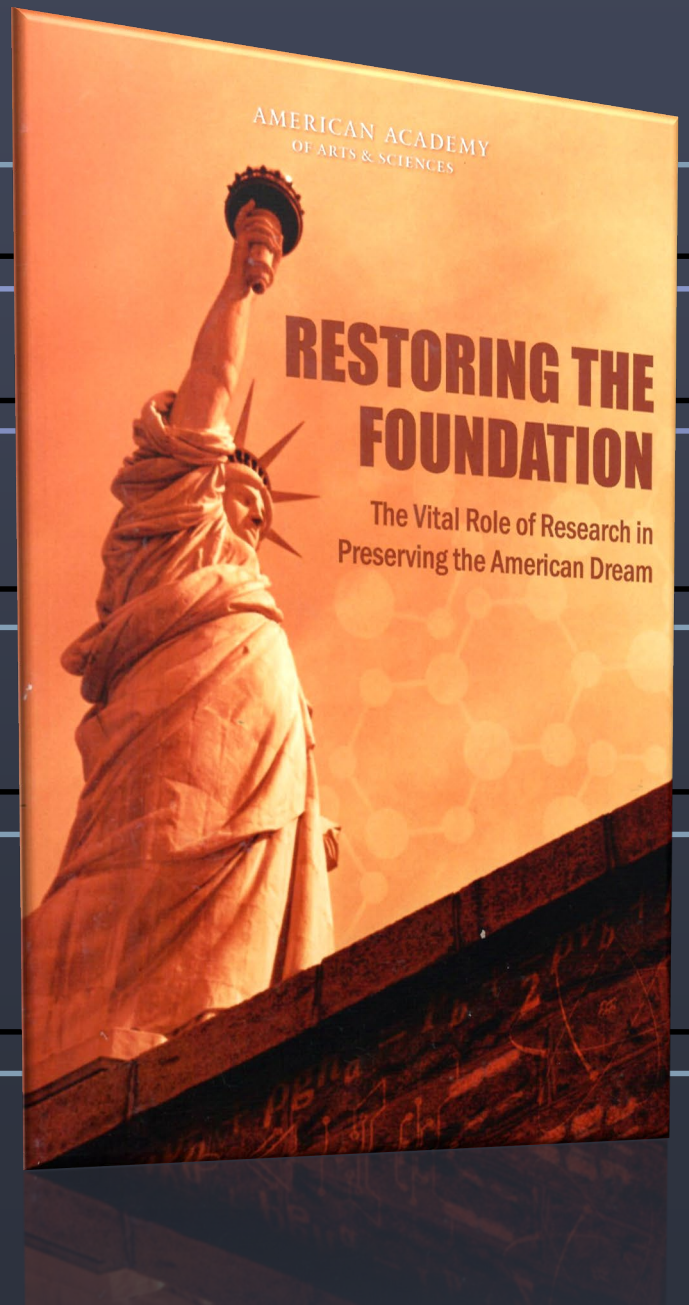


THE PERILS OF COMPLACENCY
America at a Tipping Point In Science & Engineering

A report of the American Academy of Arts and Sciences and Rice University's Baker Institute for Public Policy

Committee Co-Chairs - Norman Augustine & Neal Lane

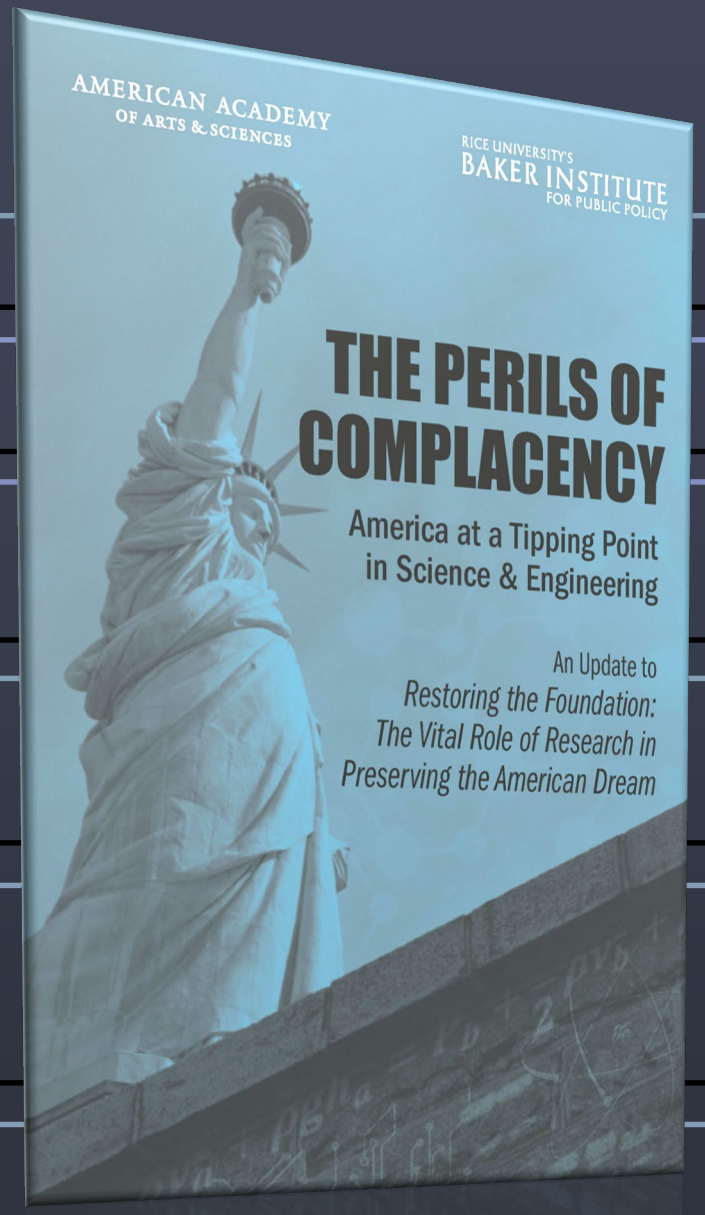


RESTORING THE FOUNDATION

The Vital Role of Research in Preserving the American Dream

Committee Members

- **Neal Lane (Cochair) –** Rice University
- **Norm Augustine (Cochair) –** Lockheed Martin Corp.
- **Nancy C. Andrews –** Duke University
- **Thomas R. Cech –** University of Colorado Boulder
- **Steven Chu –** Stanford University
- **Jared Cohon –** Carnegie Mellon University
- **James J. Duderstadt –** University of Michigan
- **Mark C. Fishman –** Harvard University
- **Sylvester James Gates, Jr. –** American Physical Society
- **Bart Gordon –** United States House of Representatives/ K&I Gates
- **M.R.C. Greenwood –** University of Hawaii/ University of California, Santa Cruz
- **John L. Hennessy –** Stanford University
- **Charles O. (Chad) Holliday Jr. –** Royal Dutch Shell/ Bank of America/DuPont
- **Peter S. Kim –** Stanford University School of Medicine/ Chan Zuckerberg Biohub
- **Richard A. Meserve –** Carnegie Institution for Science/ U.S. Nuclear Regulatory Commission
- **C.D. Mote, Jr. –** University of Maryland/ National Academy of Engineering
- **Venkatesh "Venky" Narayanamurti –** Harvard University
- **Maxine L. Savitz –** Honeywell, Inc.
- **Robert F. Sproull –** University of Massachusetts Amherst
- **Subra Suresh –** Nanyang Technological University, Singapore
- **Shirley M. Tilghman –** Princeton University
- **Jeannette M. Wing –** Columbia University
- **Elias Zerhouni –** Johns Hopkins Medicine



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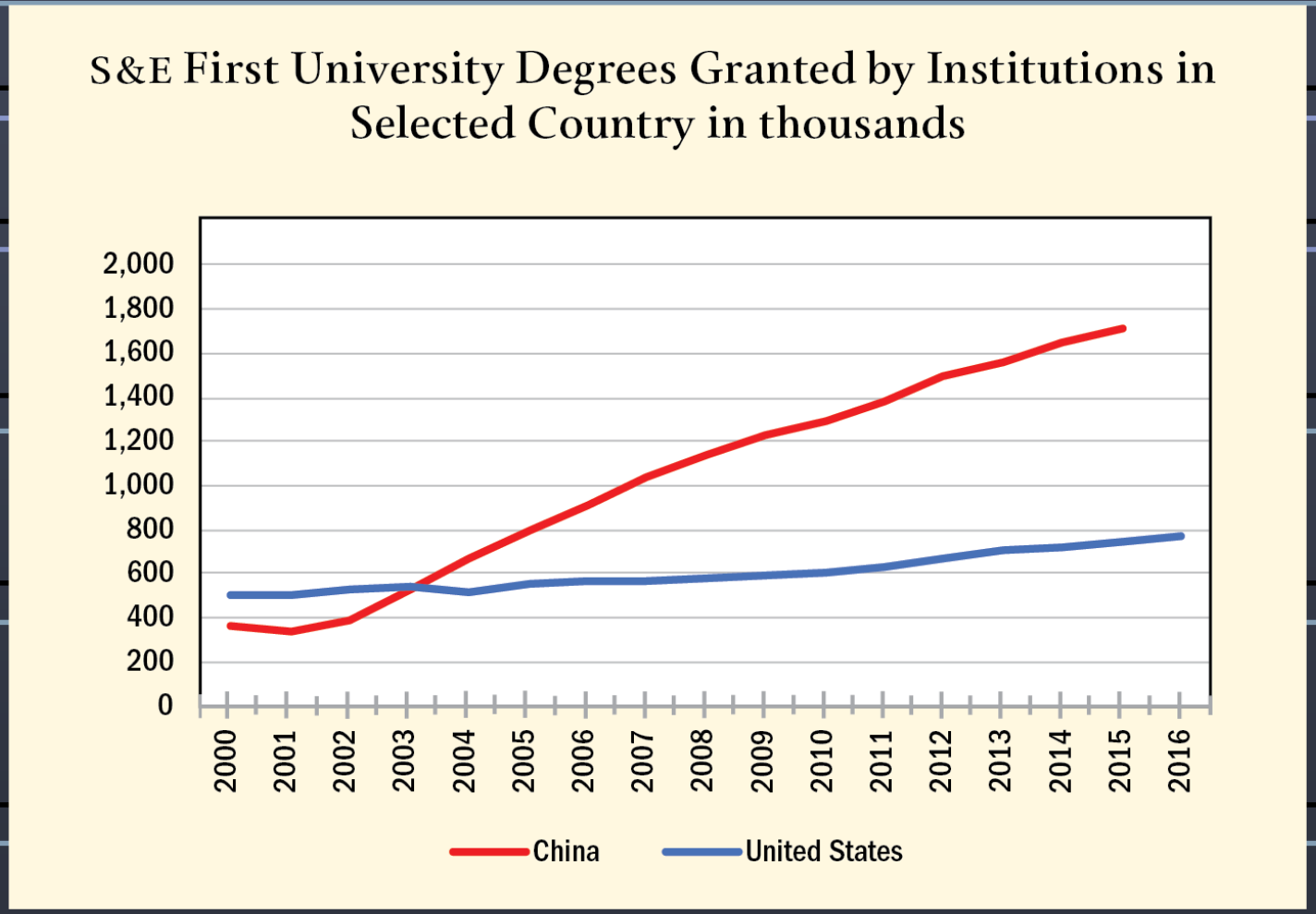
“The history of modernization is, in essence, a history of scientific and technological progress. Inventions have brought about new civilizations, modern industries, and the rise and fall of nations….I firmly believe that science is the ultimate revolution.”

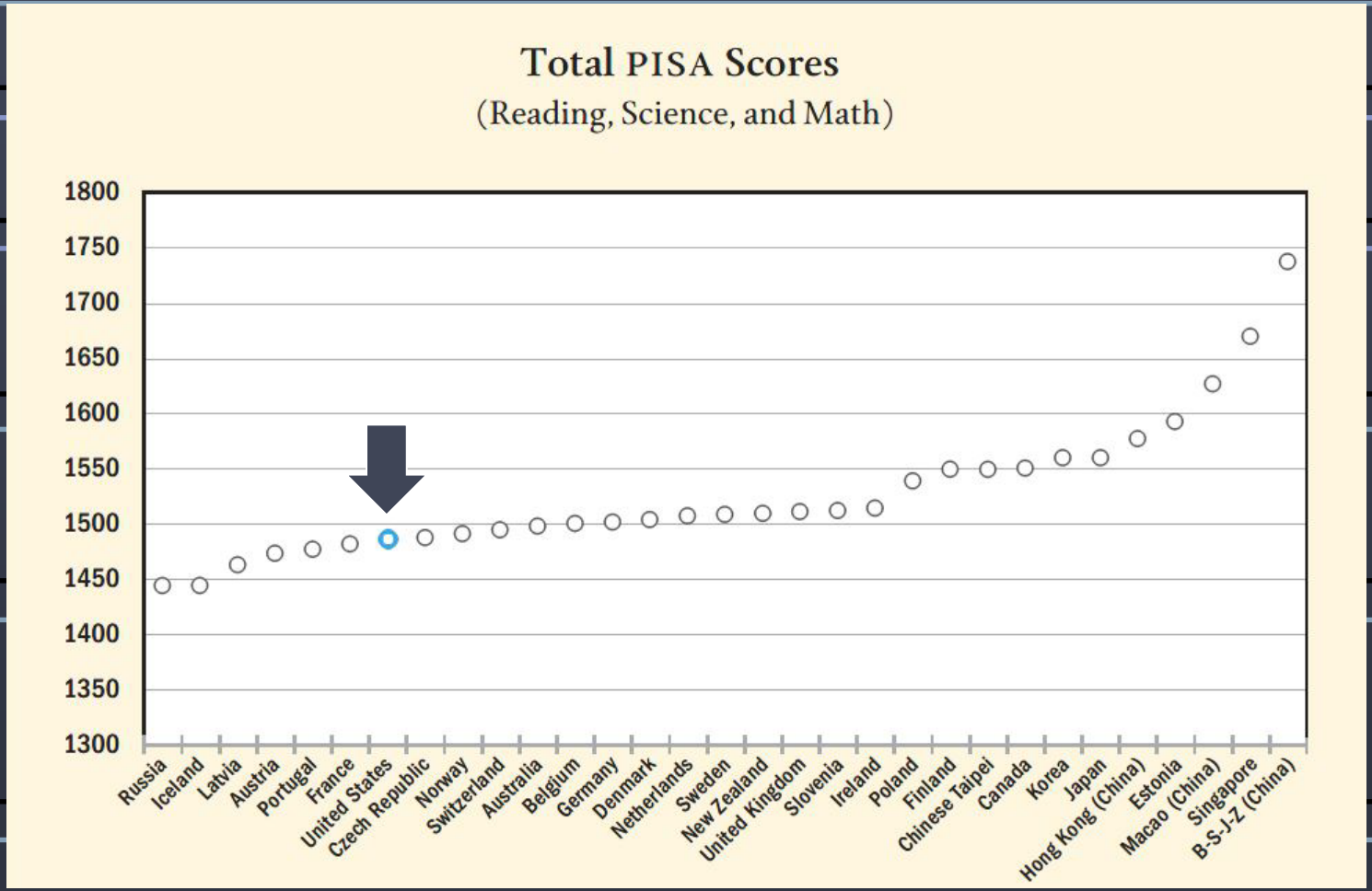
- Wen Jiabao, former Premier of the State Council of the People’s Republic of China

S&E First Degrees Granted



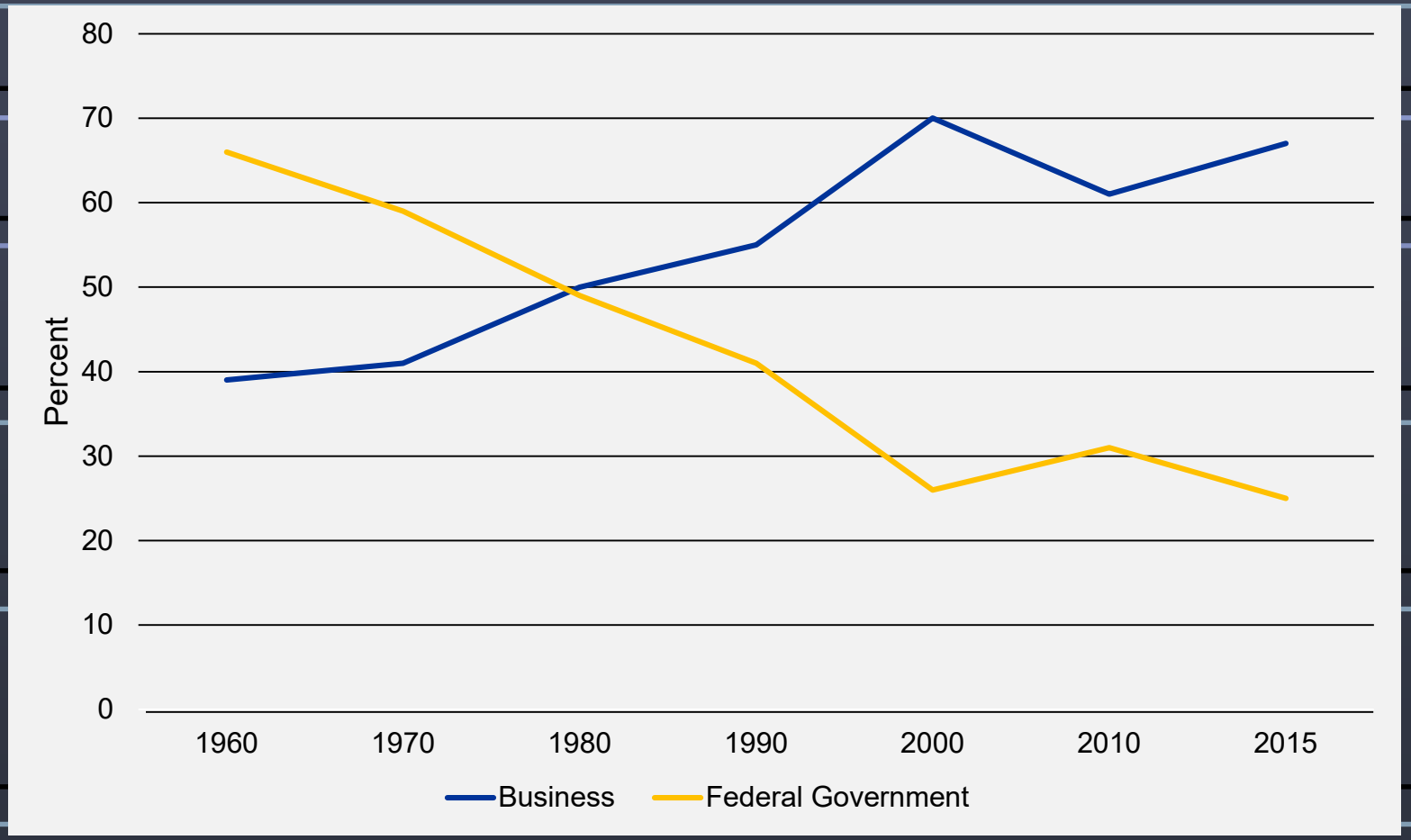
Reproduced from Figure 2-19 in National Science Board, Science & Engineering Indicators 2020 (Alexandria, VA: National Science Foundation, 2020).

Total PISA Scores



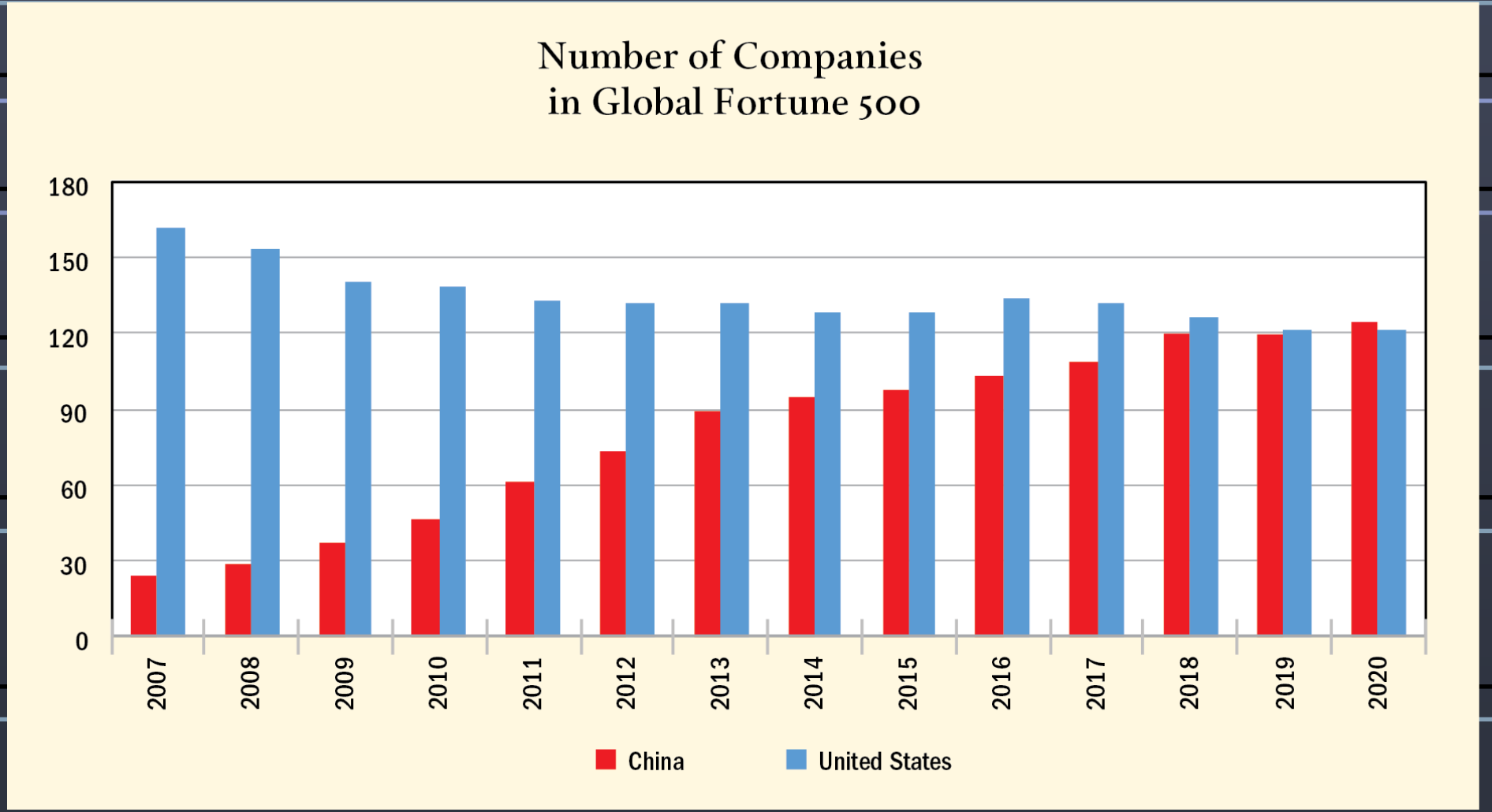
Source: OECD

U.S. R&D Funding (Percent)



Source: National Science Foundation

Number of Companies in Global Fortune 500



Top Merchandise Trading Partner

State of the Union in R&D Competitiveness (U.S. Rank)

Investment in R&D (PPP)	1st
Innovation[1]	8th
R&D as Percent of GDP[2]	9th
Education[3] (primary and secondary)	25th
Professionals Engaged in R&D Per Capita	28th
Fraction of Research Funded by Government	29th
Fraction of Initial Degrees Awarded in Engineering[4]	76th

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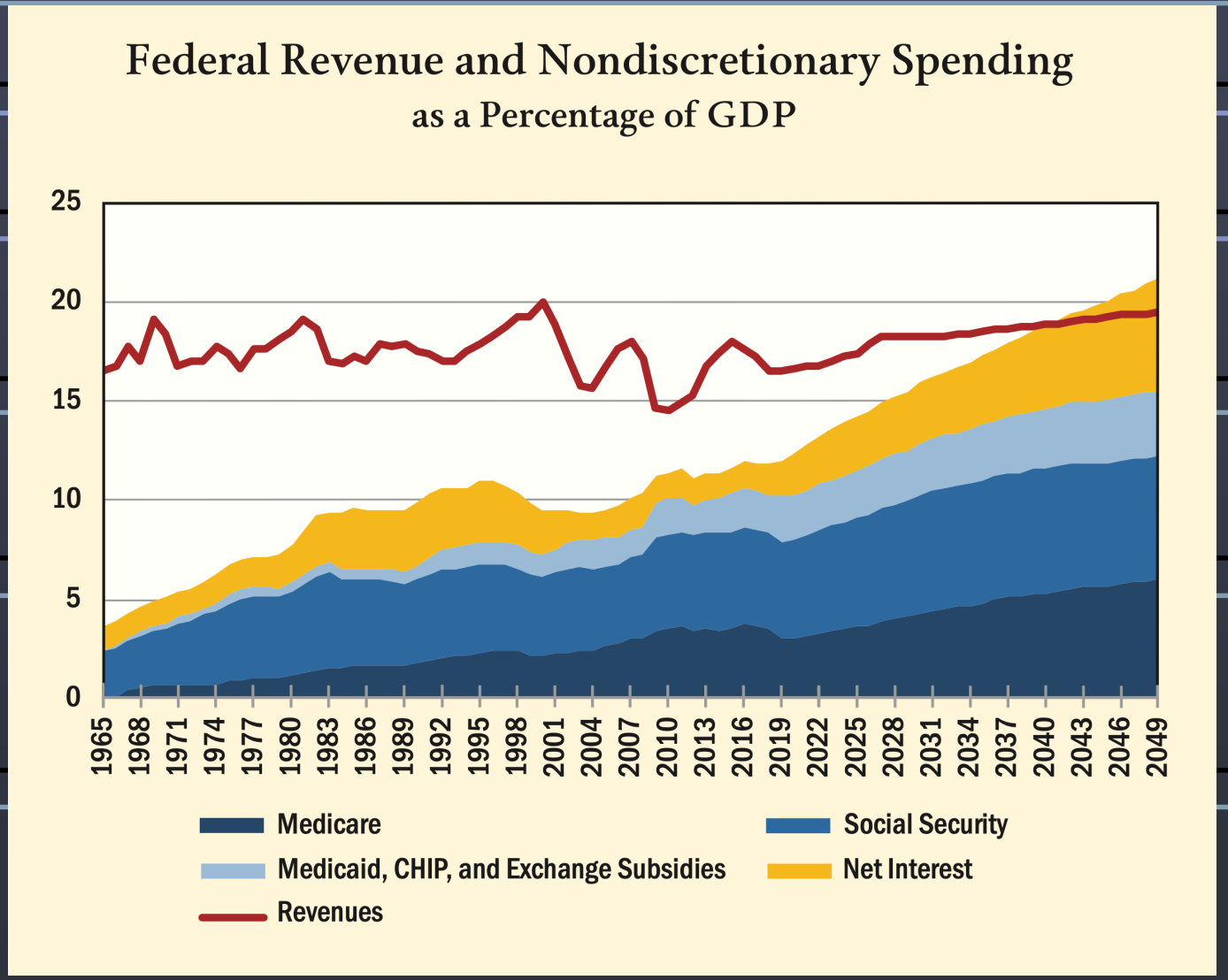
[1] Bloomberg Index
[2] OECD Nations
[3] PISA Test – Composite reading, math, science score
[4] Fraction of individuals receiving tertiary education

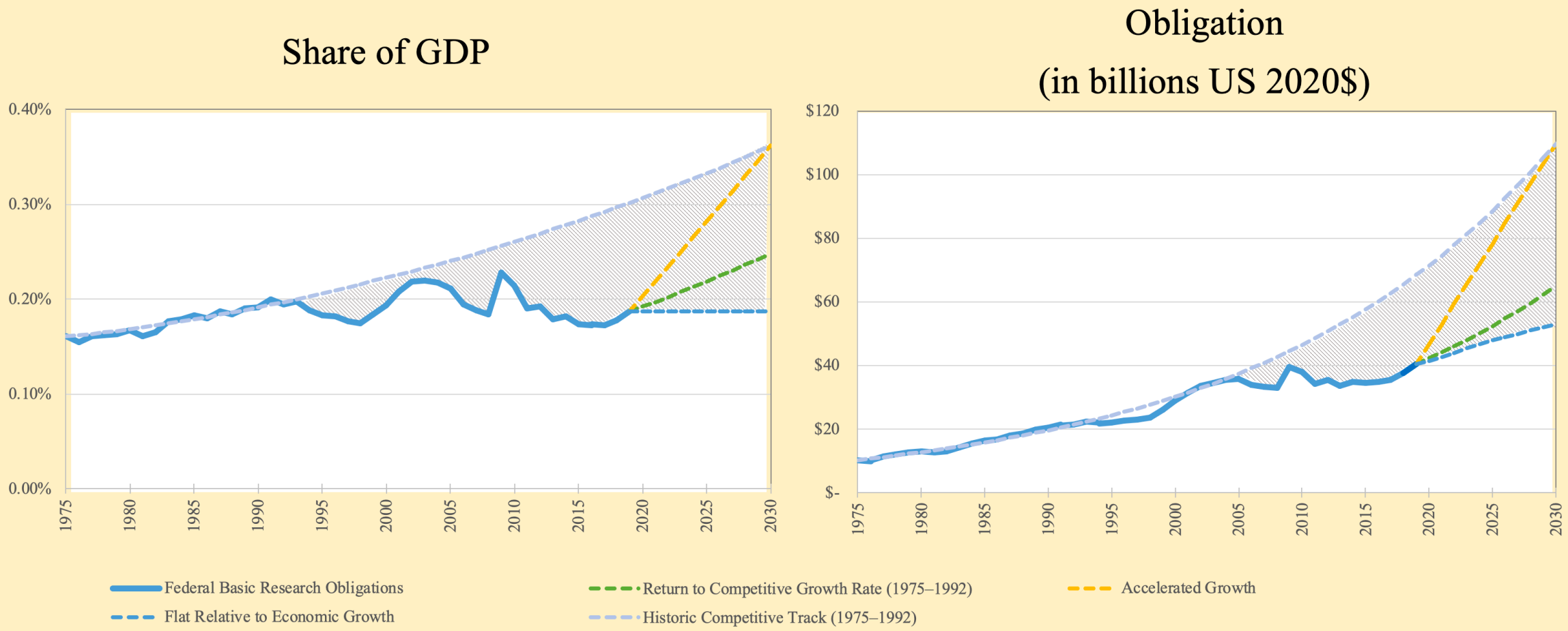
Federal Revenue and Nondiscretionary Spending



Recommendations

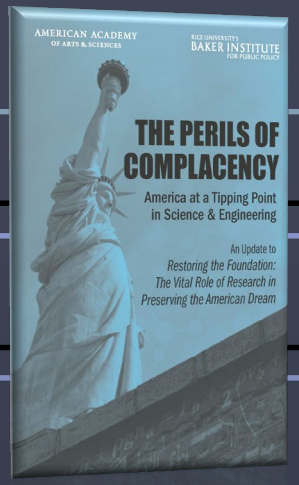
- R&D – boost federal research funding by at least 50%
- Budget process – rolling 5-year plan, 2-yr funding cycle and capital budget
- Rules & regulations – review, replace or remove
- Workforce – grow STEM numbers and skills – US & foreign born
- Education – transform quality of pre-K12 education & access for all Americans
- GUI partnership – change laws & regulations and offer incentives
- Universities –restore State funding – Congress repeal tax on endowments

US Federal Basic Research Investment



Source: National Center for Science and Engineering Statistics "Survey of Federal Funds for Research and Development"
Notes: Baseline calculated assuming R&D budgets continue to be directly proportional to total discretionary outlays, as they have for decades. Constant dollars are calculated using total nondefense composite outlay deflators from Office of Management and Budget. 2020. "Fiscal Year 2021 GDP and Deflators."

Our Message to Policymakers



How to Lose Global Competitiveness in 10 Easy Steps

☑ 1. Underfund R&D: fail to increase basic research funding to 0.3 percent of GDP and fail to grow the national R&D investment to 3.3 percent of GDP

☑ 2. Deter immigration of talented STEM students and workers

☑ 3. Have no integrated, coherent federal funding strategy

☑ 4. Provide minimal capital resources to federally funded R&D facilities

☑ 5. Fund long-term scientific projects through single-year, volatile funding cycles

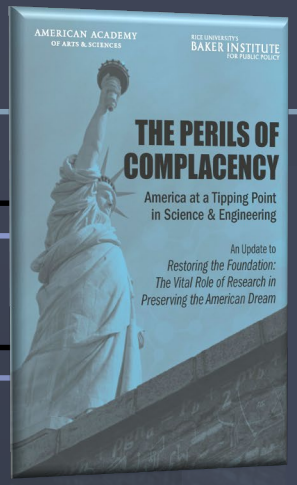
☑ 6. Saddle researchers with onerous regulations that offer no clear benefit

☑ 7. Maintain a second-rate primary and secondary education system in STEM

☑ 8. Continue to cut state investments in higher education

☑ 9. Avoid high-risk/high-potential research and federal support of innovation

☑ 10. Maintain a federal budget that produces vanishing discretionary funds in the future



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Thank you !