

International Graduate Enrollments in Science and Engineering and Research and Development in the United States

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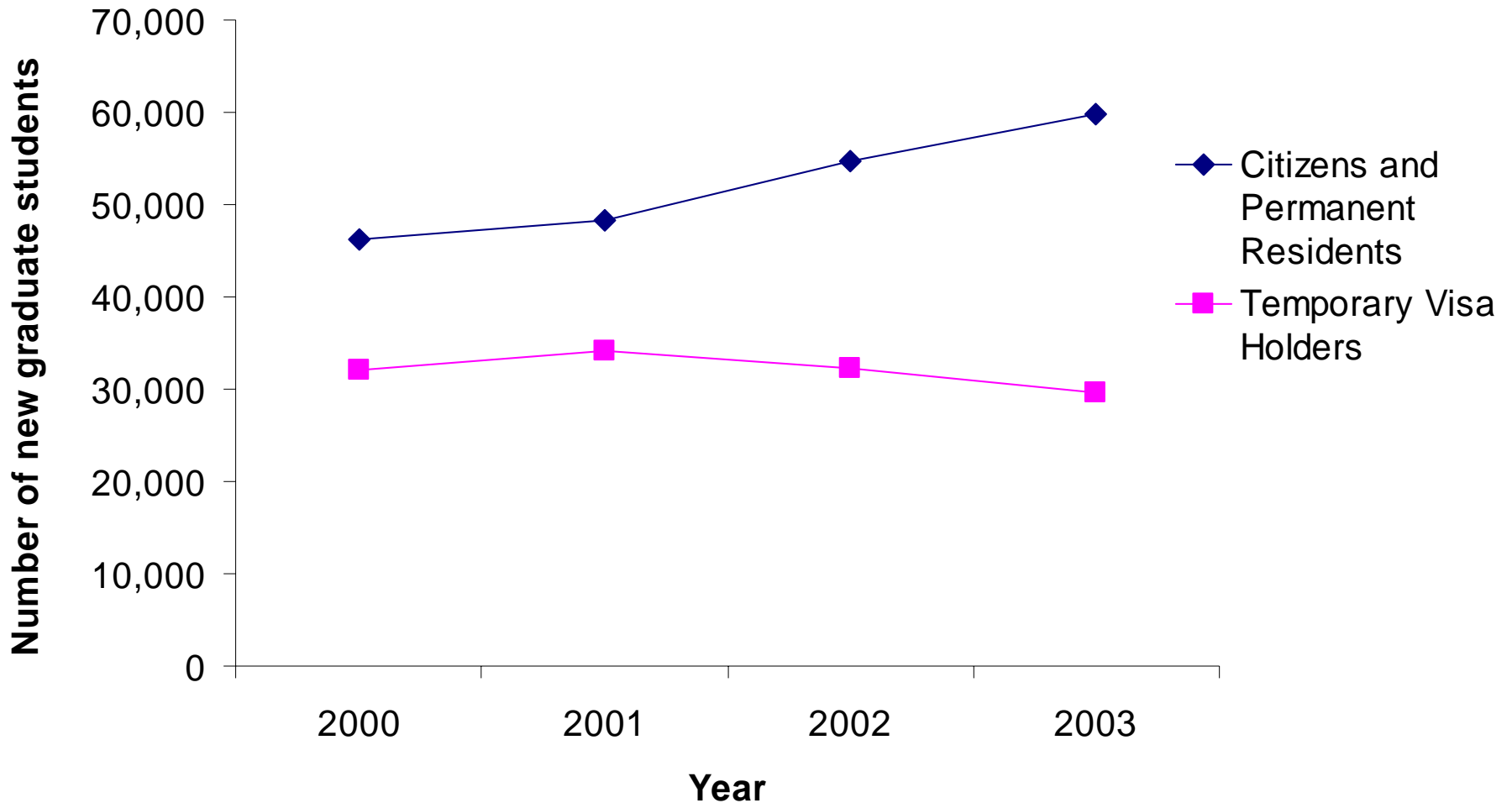
Prepared for the annual meeting
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Dec. 9, 2005

What has sustained U.S. technological innovation?

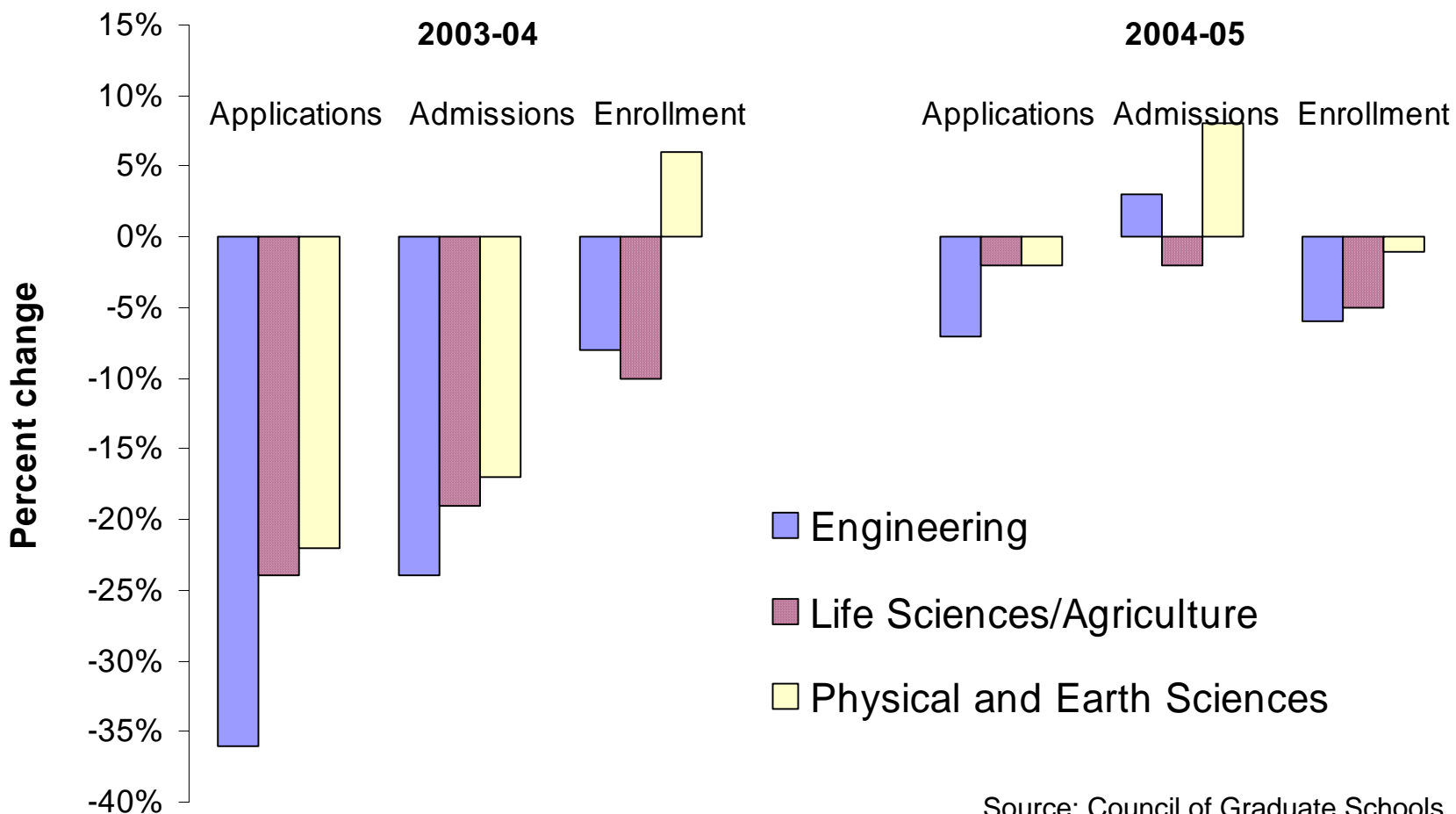
- Excellence in higher education
 - Attracts foreign S&E students
- High priority on basic research and product development
- High-tech industry that converts innovation
- Open and flexible immigration system
- Historically, relative global monopoly on these factors

First-time foreign graduate students in S&E are declining



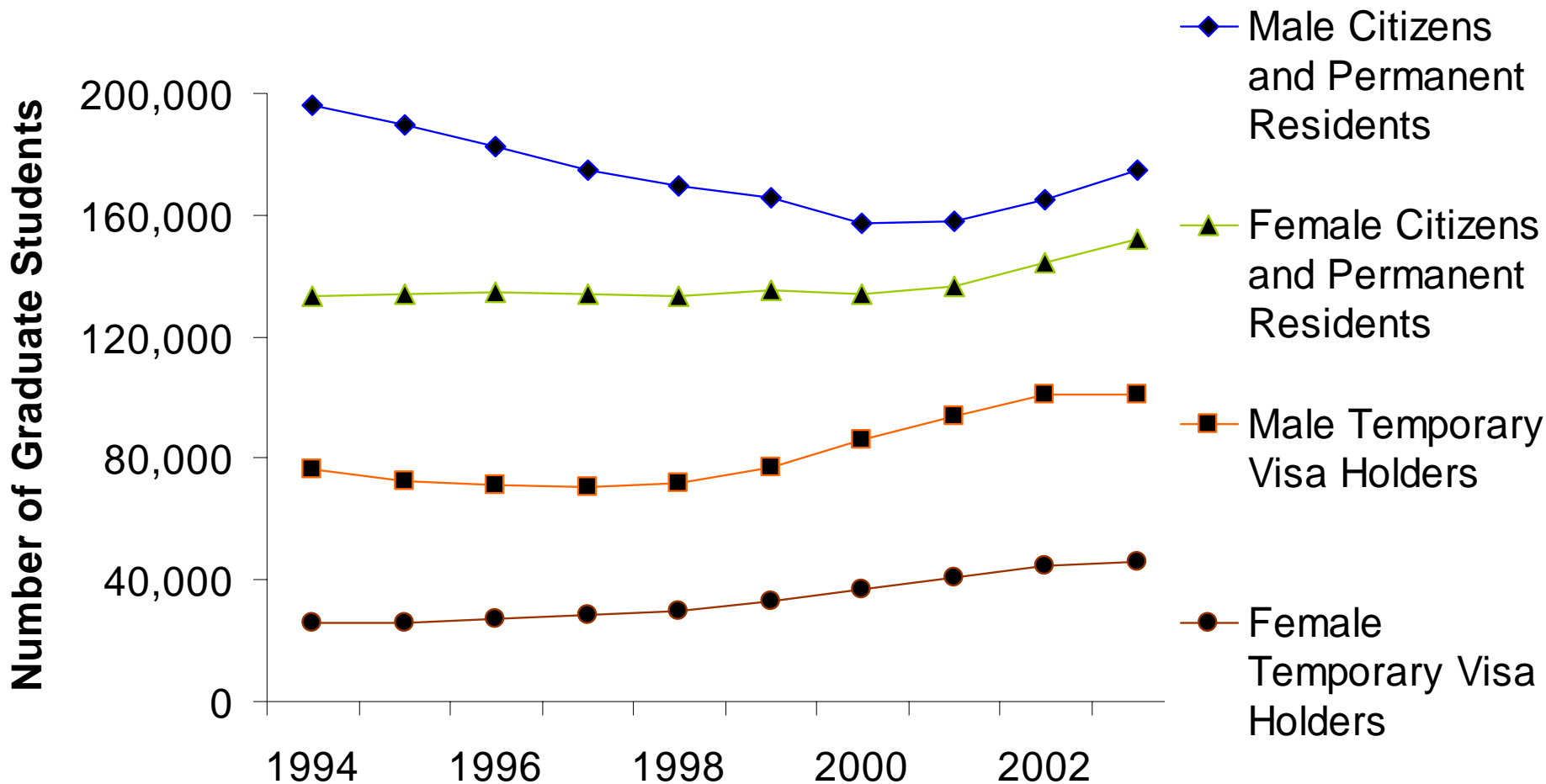
Source: National Science Foundation. 2004. *Survey of Graduate Students and Postdoctorates in Science and Engineering*. Division of Science Resources Statistics. Washington, D.C.

Changes in Applications, Admissions and Enrollment of New Intl. Graduate Students in S&E



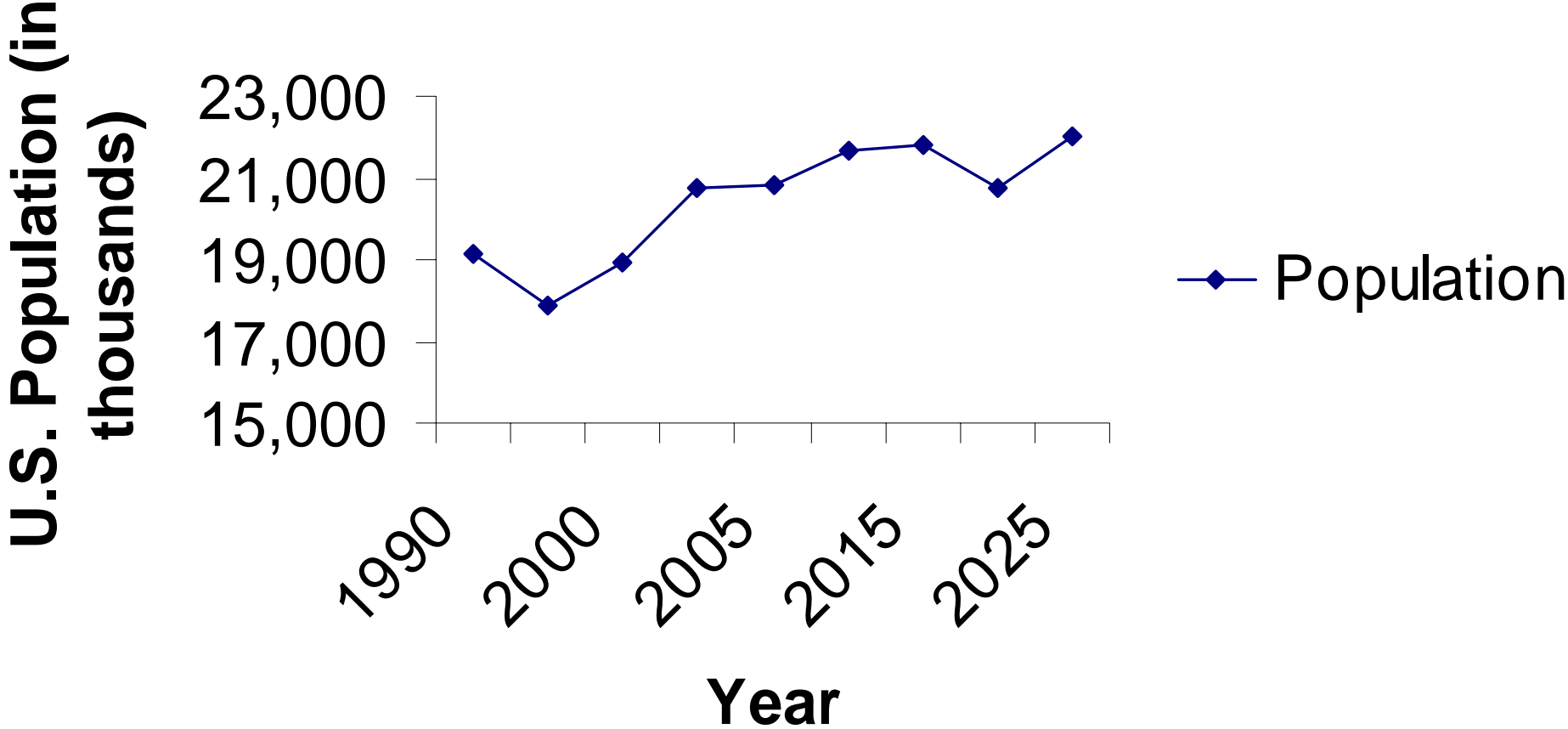
Source: Council of Graduate Schools, 2005.

Graduate S&E Enrollment by Gender, 1994-2003



Source: National Science Foundation. 2004. *Survey of Graduate Students and Postdoctorates in Science and Engineering*. Division of Science Resources Statistics. Washington, D.C.

U.S. Population Ages 20-24, 1990-2025 (projected)



Source: U.S Census Bureau, Statistical Abstract of the United States: 2005-2005; and PPL-41.

9/11 visa problems obscured other trends potentially discouraging S&E students

1. Growth in foreign universities

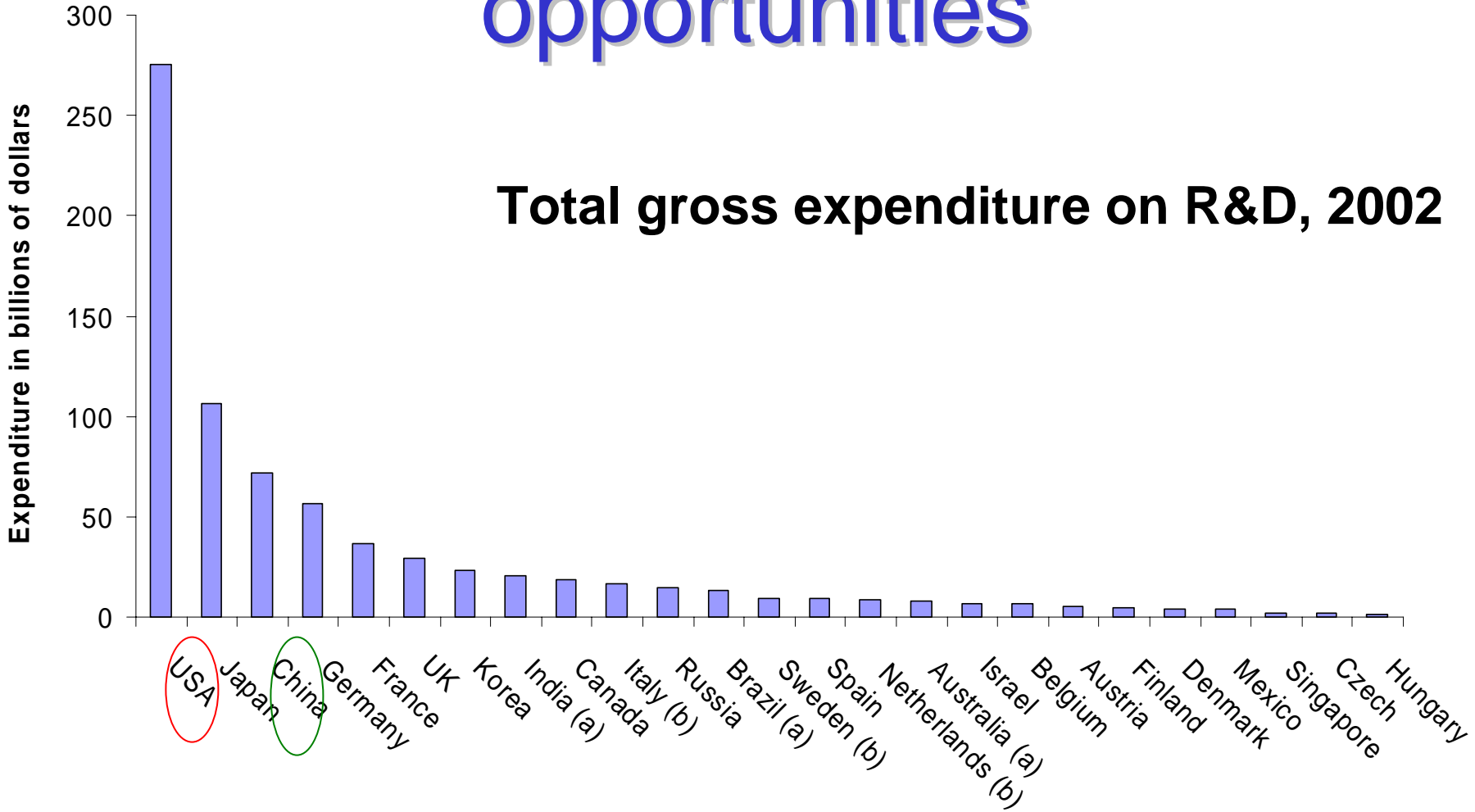
- In 1970, U.S. produced more than half of all S&E Ph.Ds
- By 2010, China on pace to produce more S&E Ph.Ds than U.S.
- By 2010, EU on pace to produce almost twice as many S&E Ph.Ds

2. Worse job market in S&E relative to many other occupations

- Different opportunity costs for native-born (especially males) and foreign-born
- Lower gains in pay over 1990s

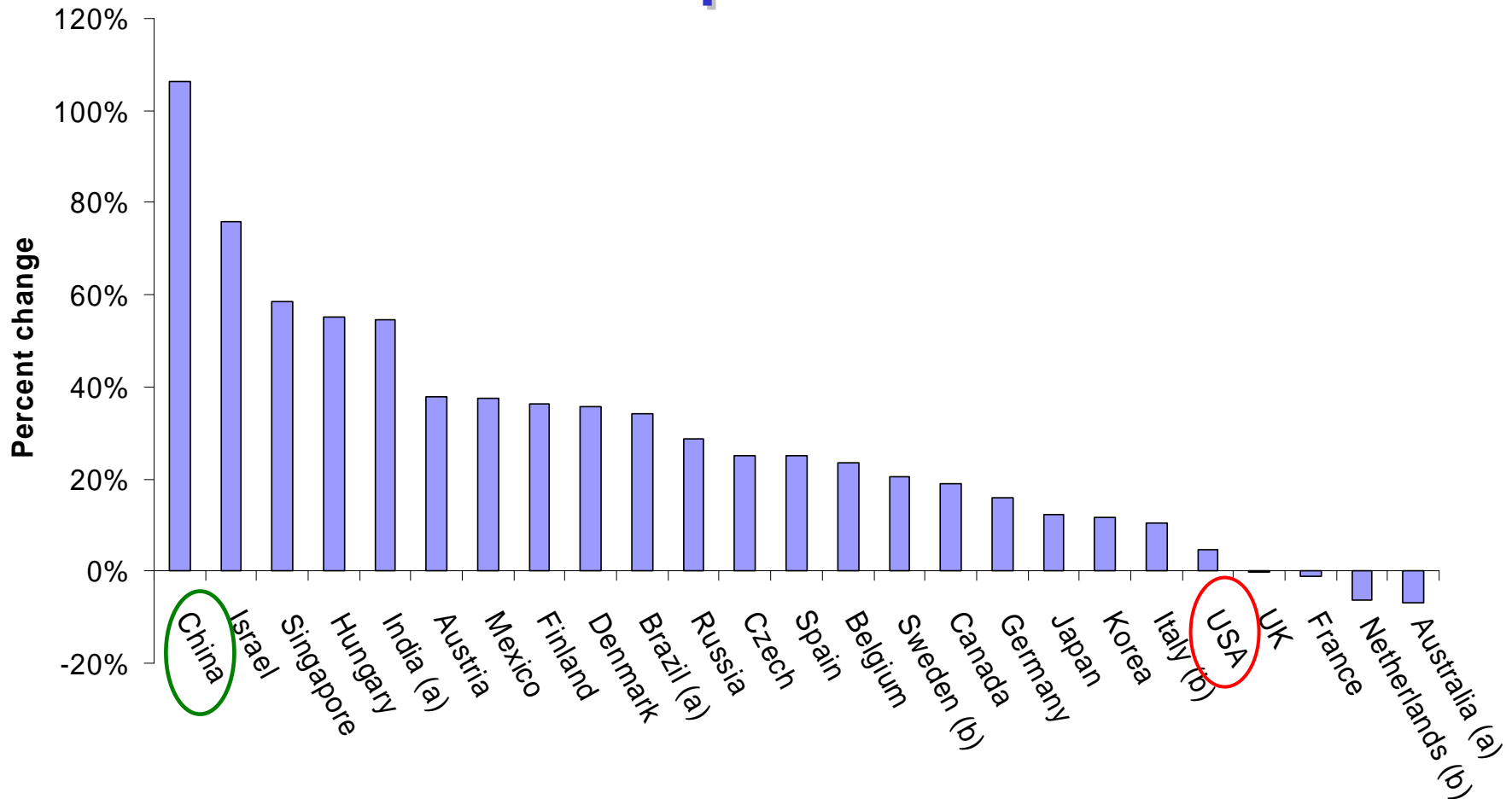
3. Diminishing research opportunities

Total gross expenditure on R&D, 2002



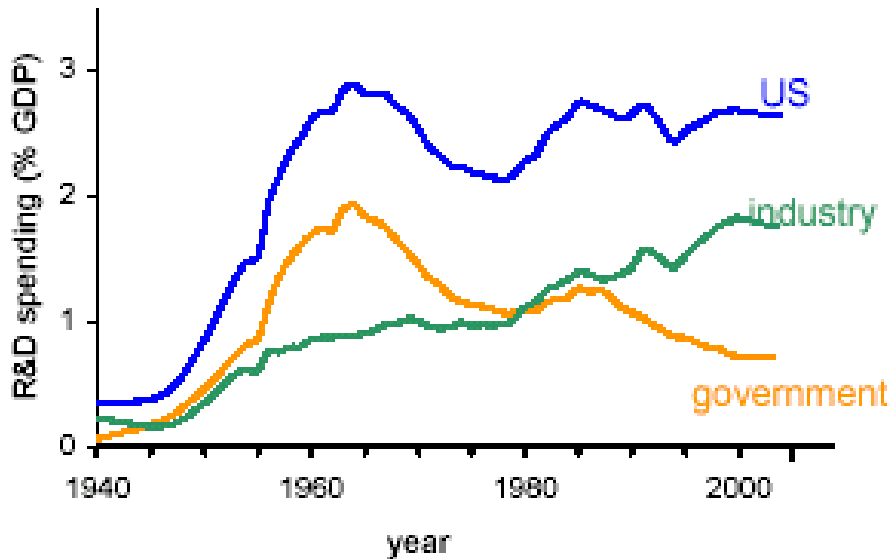
Source: UNESCO Institute for Statistics. 2004.

Change 1996-2002 in percent of GDP spent on R&D

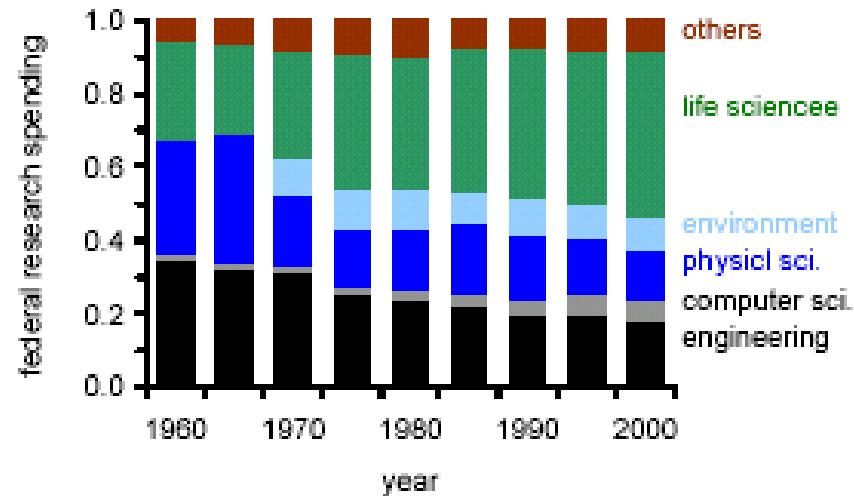


Source: UNESCO Institute for Statistics. 2004.

Research and development as a percentage of GDP by sector in the U.S., 1940-2003



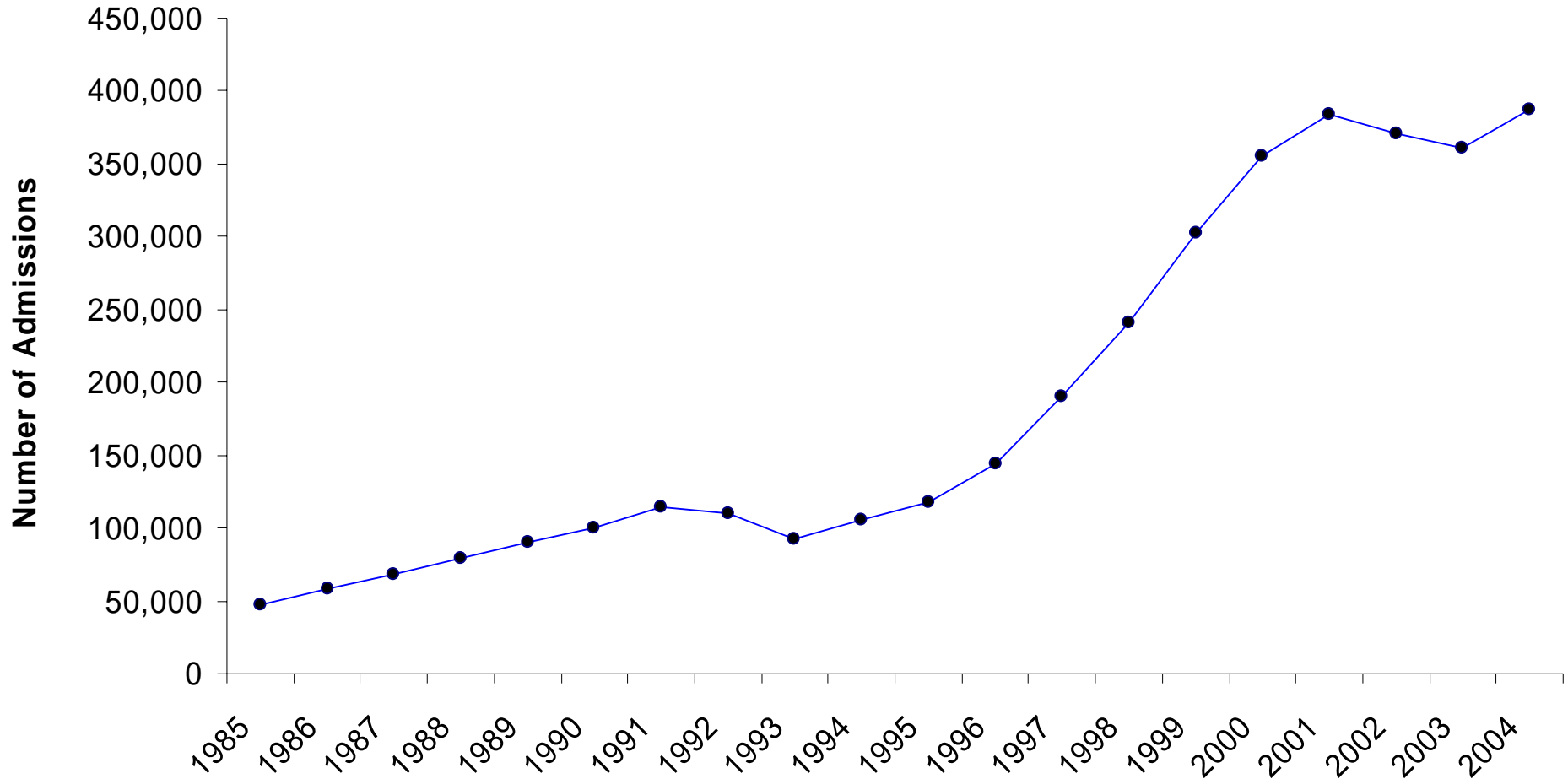
Federal research spending by sector in the U.S., 1940-2000



4. Ability to attract foreign students derives in part from ability to migrate – and visas are capped

- 1990 Immigration Act raised annual permanent slots for workers and their families from about 56,000 to 140,000
- Congress is more likely to increase temporary residency permits (e.g. H-1B)

Number of H-1B admissions by year



In 2020?

- The U.S. share of S&E degrees is likely to continue to shrink
- What can the U.S. do?
 - Raise the ceiling on high-skilled visas
 - Improve research funding for basic science and engineering
 - Make pay and working conditions more appealing for S&E graduate students and postdocs