

Getting the Incentives Right (and what happens when they aren't)

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A Quick Theoretical Digression

- Hurwicz, Maskin, and Meyerson (2007 Nobel Memorial prizes in economics) thought about markets as shaped by incentives.
- “Incentive compatibility”
 - Prices and quantities (or wages and employment) where the economic actors behave on the basis of self interest.
 - Basic argument: the market for doctoral biomedical scientists is not incentive compatible, resulting in disequilibria that are reflected in an oversupply of young investigators

Characterizing STEM labor markets

- Shortages: excess demand should make wages rise, or we should see outsourcing (employers search for additional sources of supply)
- Surplus: Wages should fall and/or workers should be unemployed or underemployed
- Difficult to find these signs in most STEM labor markets

“Players” in STEM markets

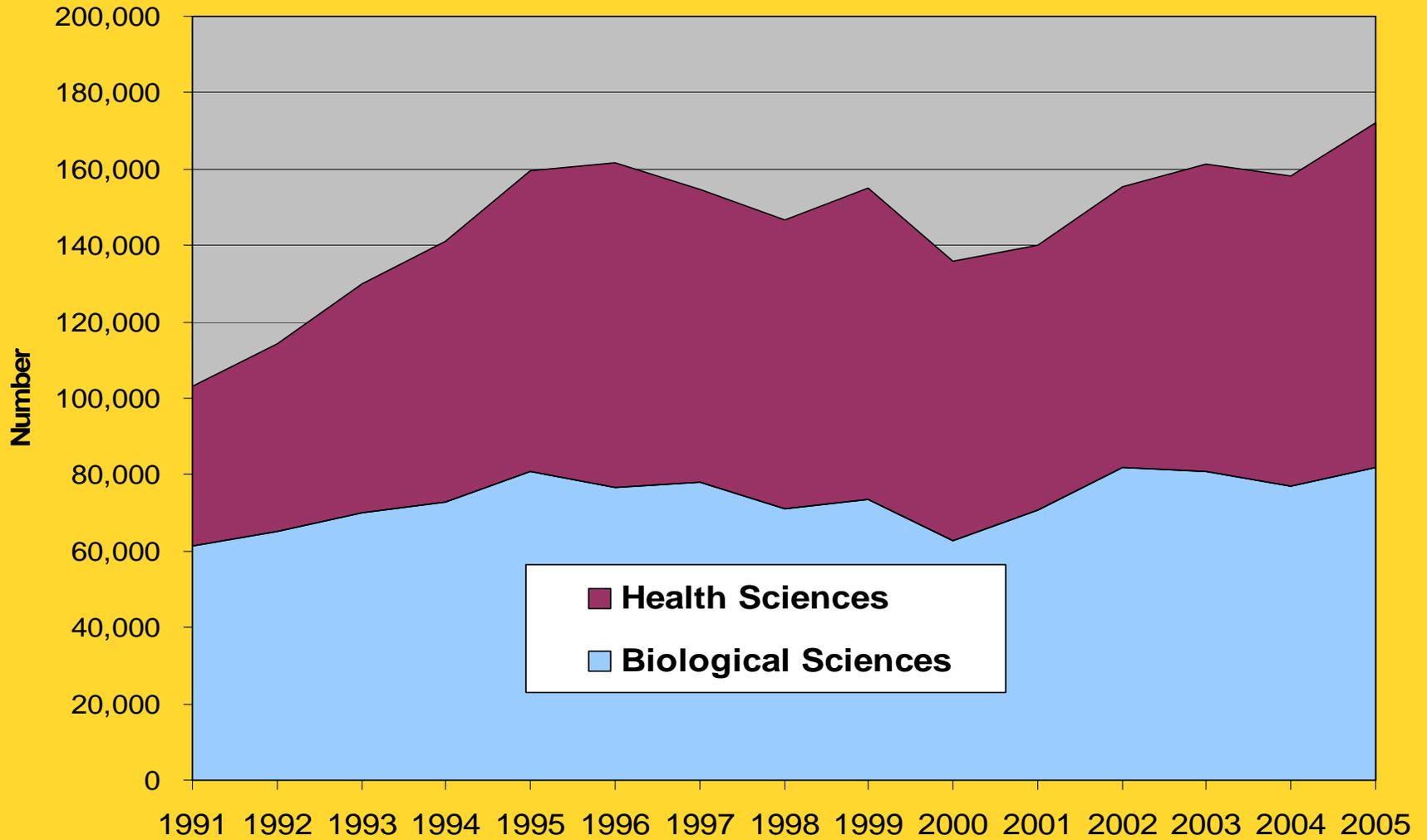
- Suppliers of highly trained personnel
 - Universities that train and certify people
 - Students themselves, who choose fields based on the assessment of their abilities and forecast of salaries once they’re trained
- Demanders of highly trained personnel
 - Universities who produce research and train students
 - Government that creates demand through research funding
 - Industry that sells products and services that embody knowledge gained through research

Focus on the market for PhDs in the biomedical sciences

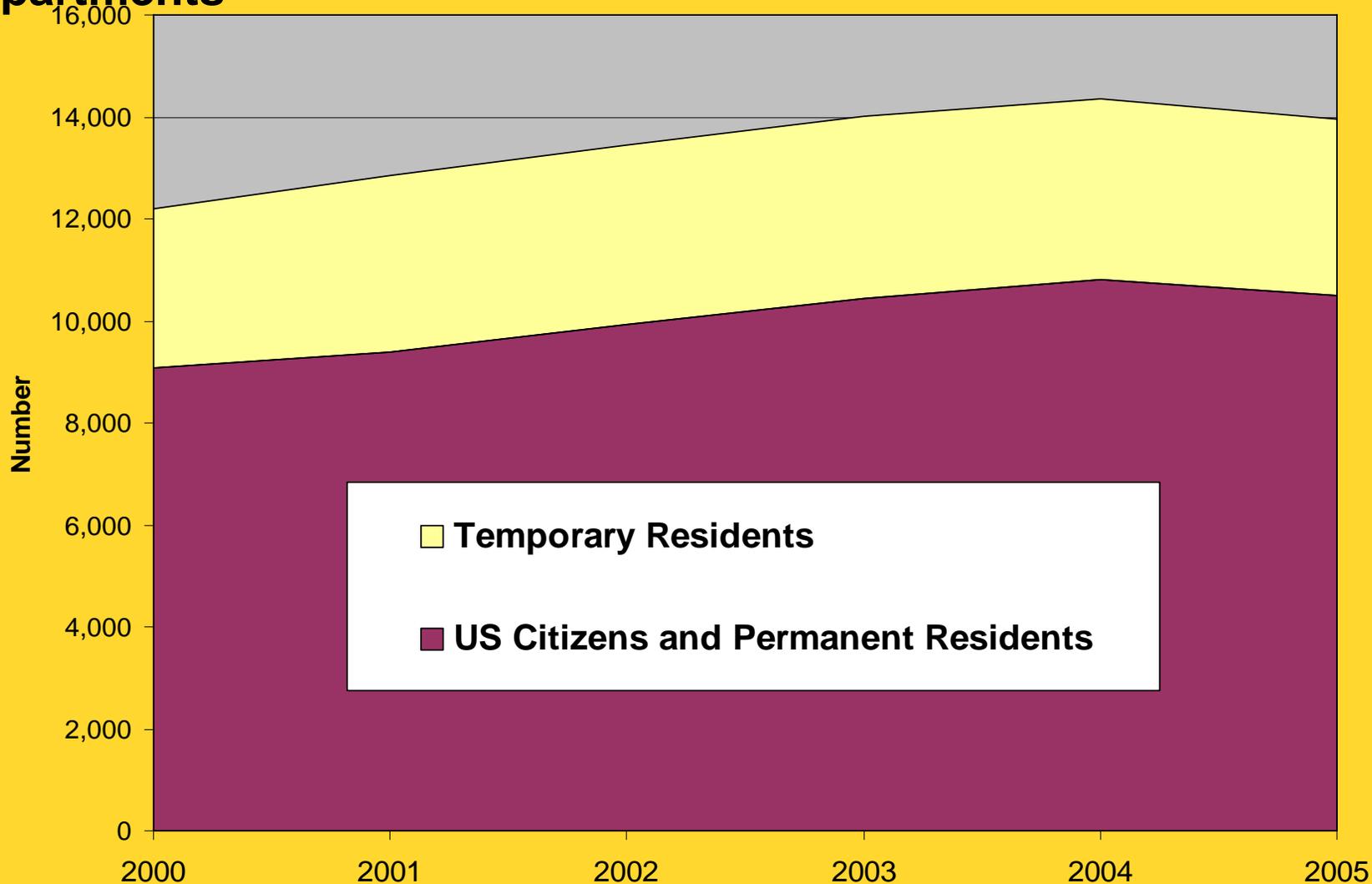
Who moves this market?

- The funders: NIH and others
- The demanders: Universities, who long ago moved to a system where most of their biomedical faculty are funded on soft money. Industry, with a very different research model, cost structure and incentives.
- The future workforce: graduate students and post docs.
- The ultimate beneficiary: human health.

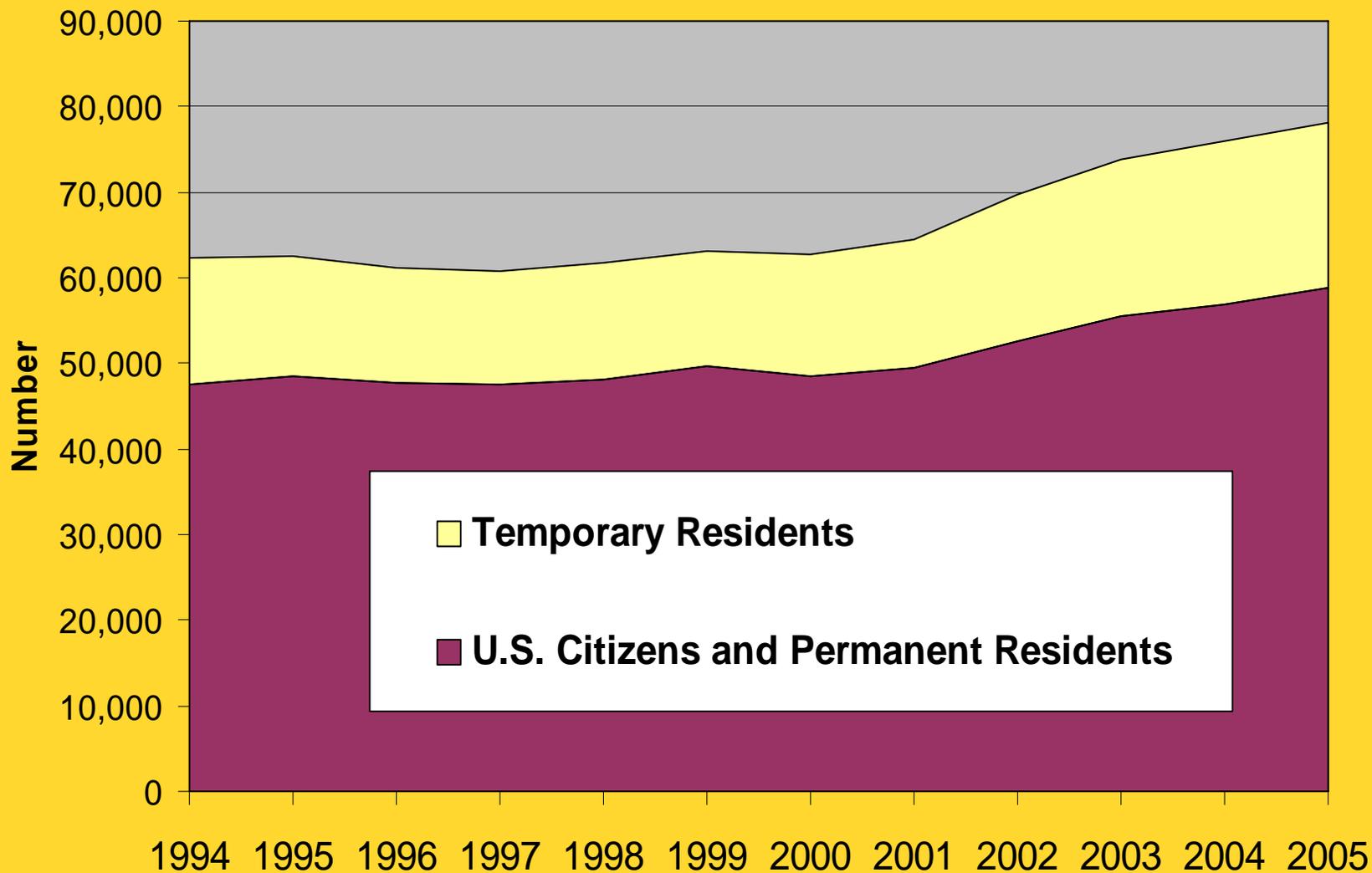
Graduate school applications in health and biological sciences have continued to rise



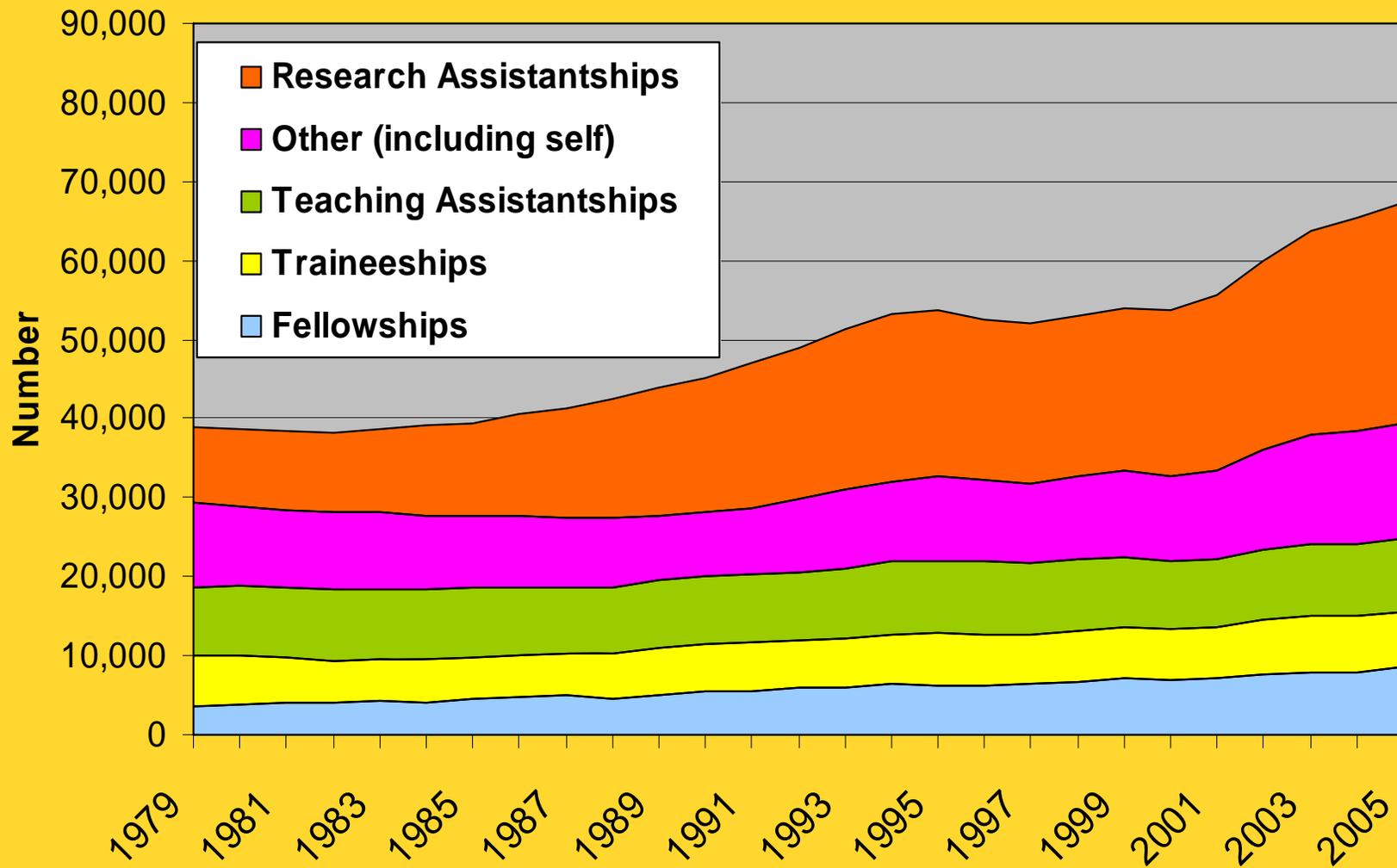
The rise was not reflected in first time, full time biological and medical sciences graduate students in doctorate granting departments



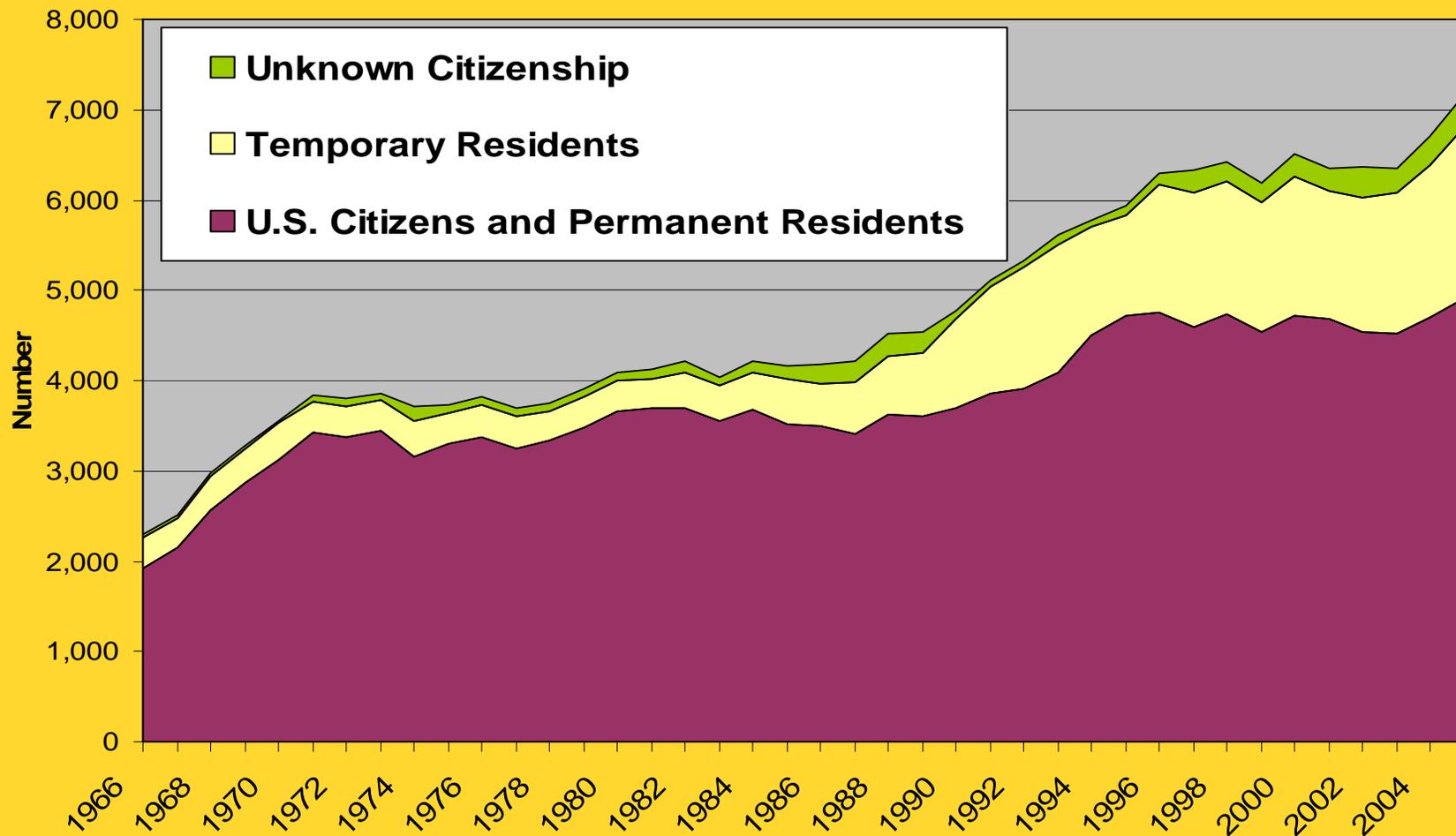
Still, the total number of doctoral students continued to rise



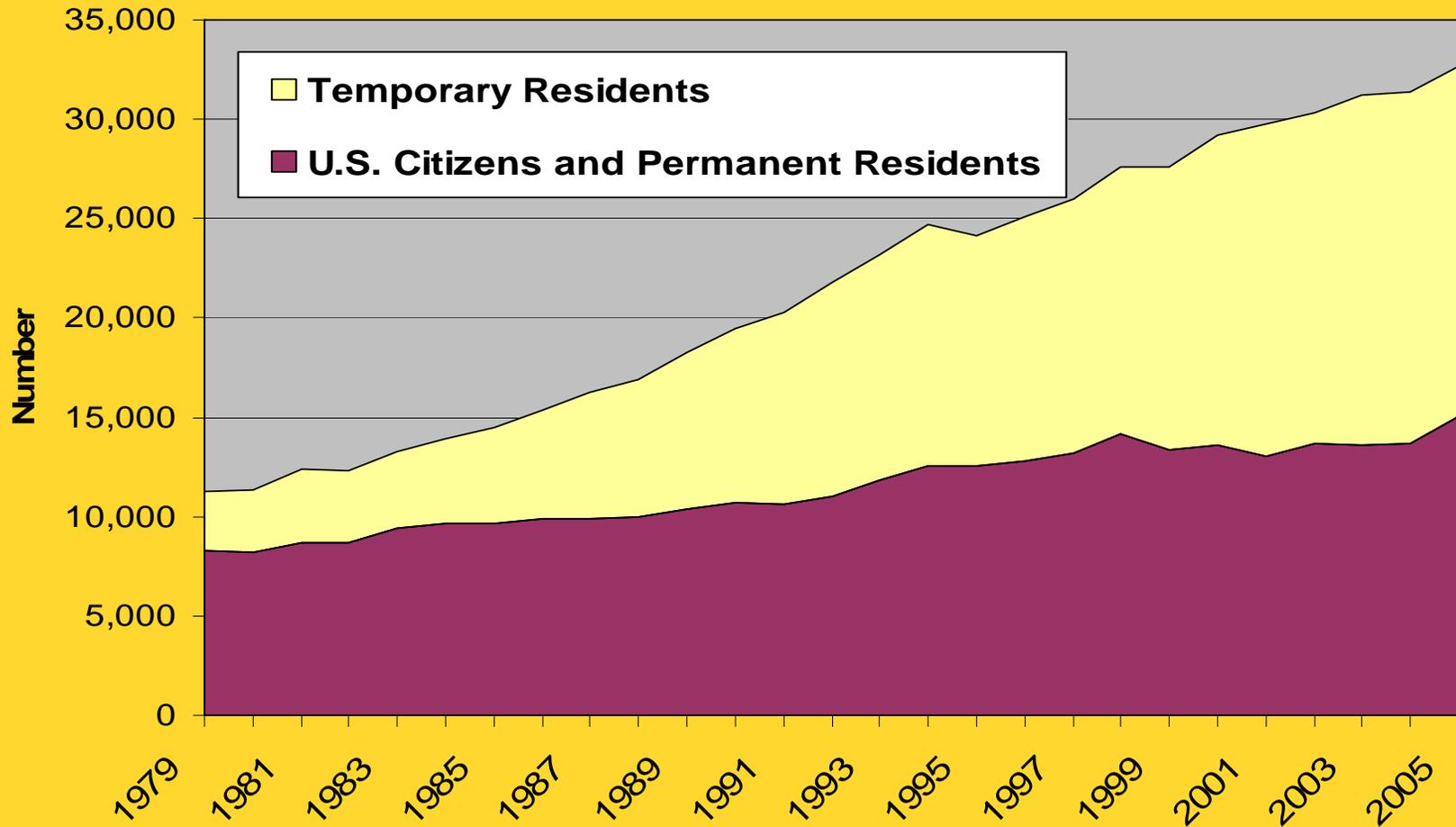
This increasing number of full time biological and medical sciences graduate students were funded primarily by a growing number of RAships



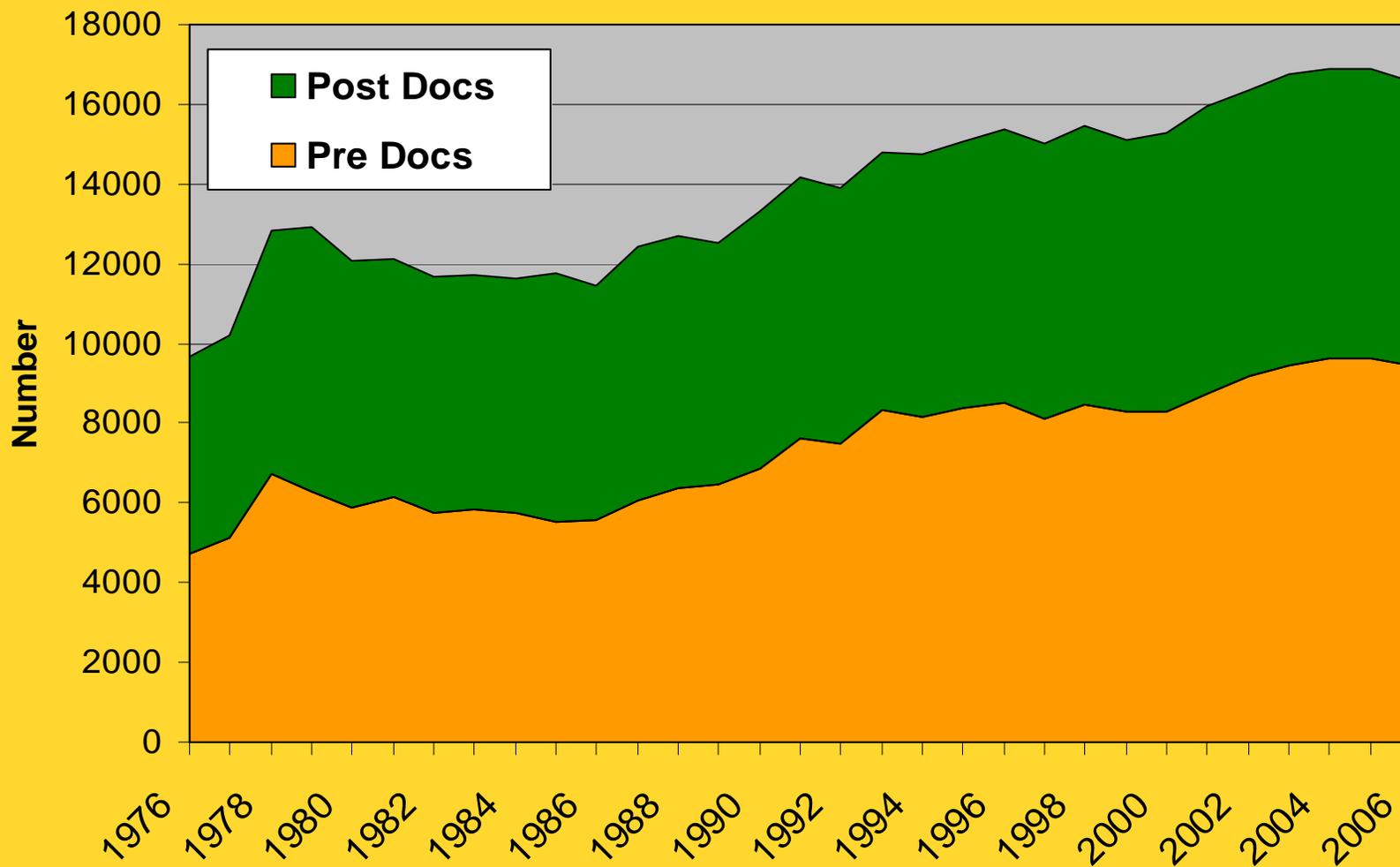
Doctorate degrees awarded in the biological and medical sciences have also continued to rise



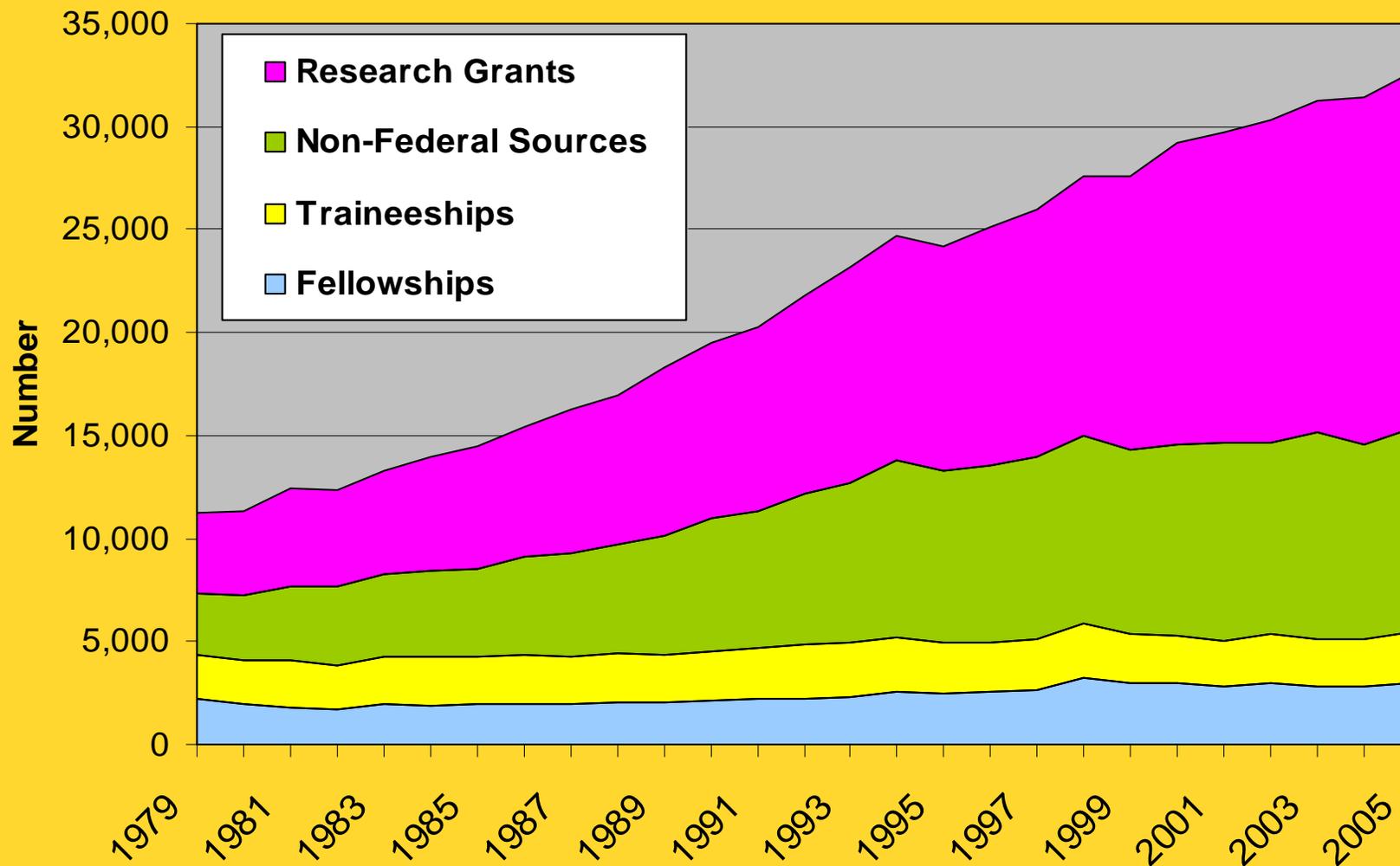
The number of postdocs in the biomedical sciences has continued to rise, primarily due to an increase in foreign scientists



At the same time, the number of pre-doctoral and post-doctoral positions on NIH Training Grants and Fellowships have begun to decline



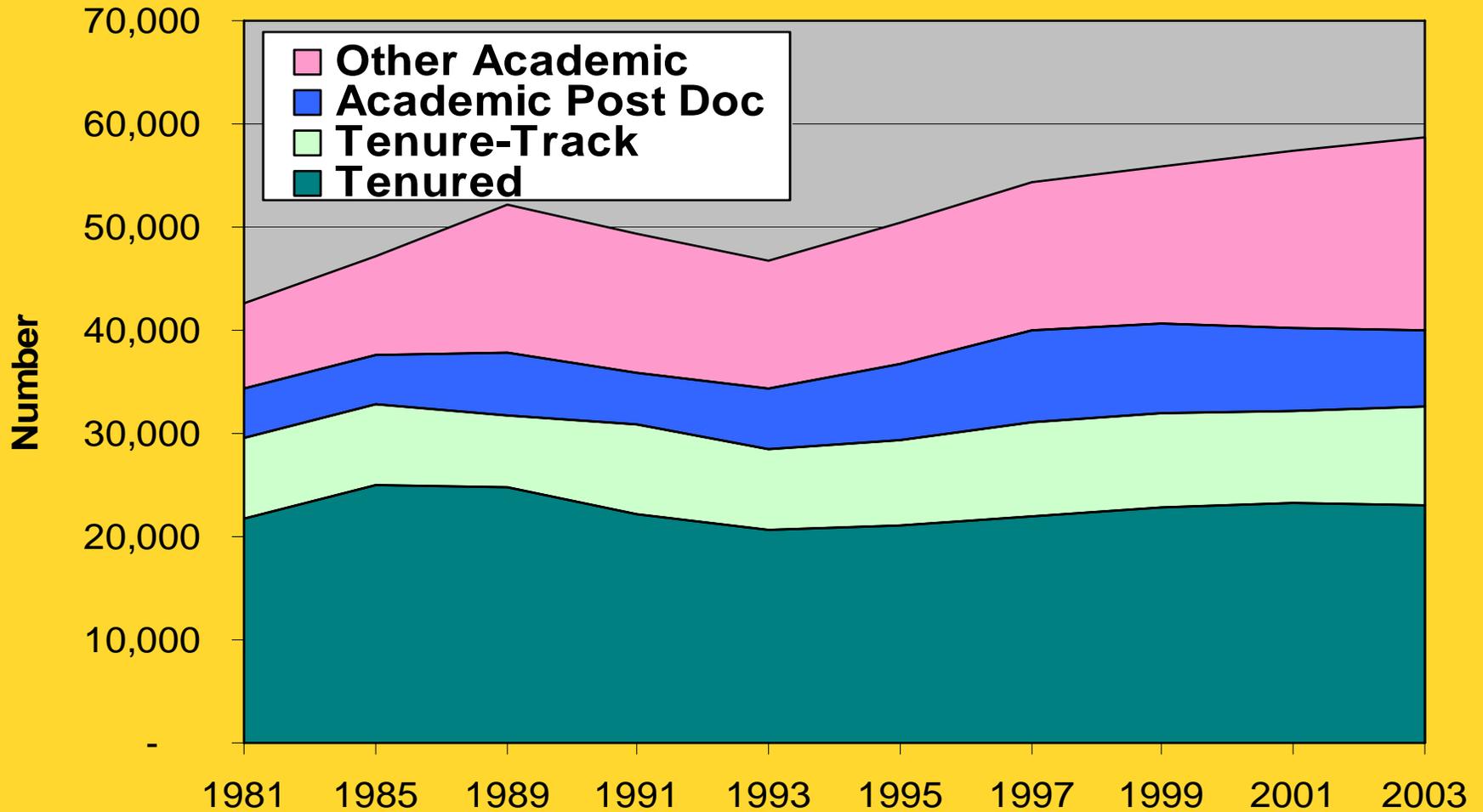
These postdocs are funded primarily by research grants.



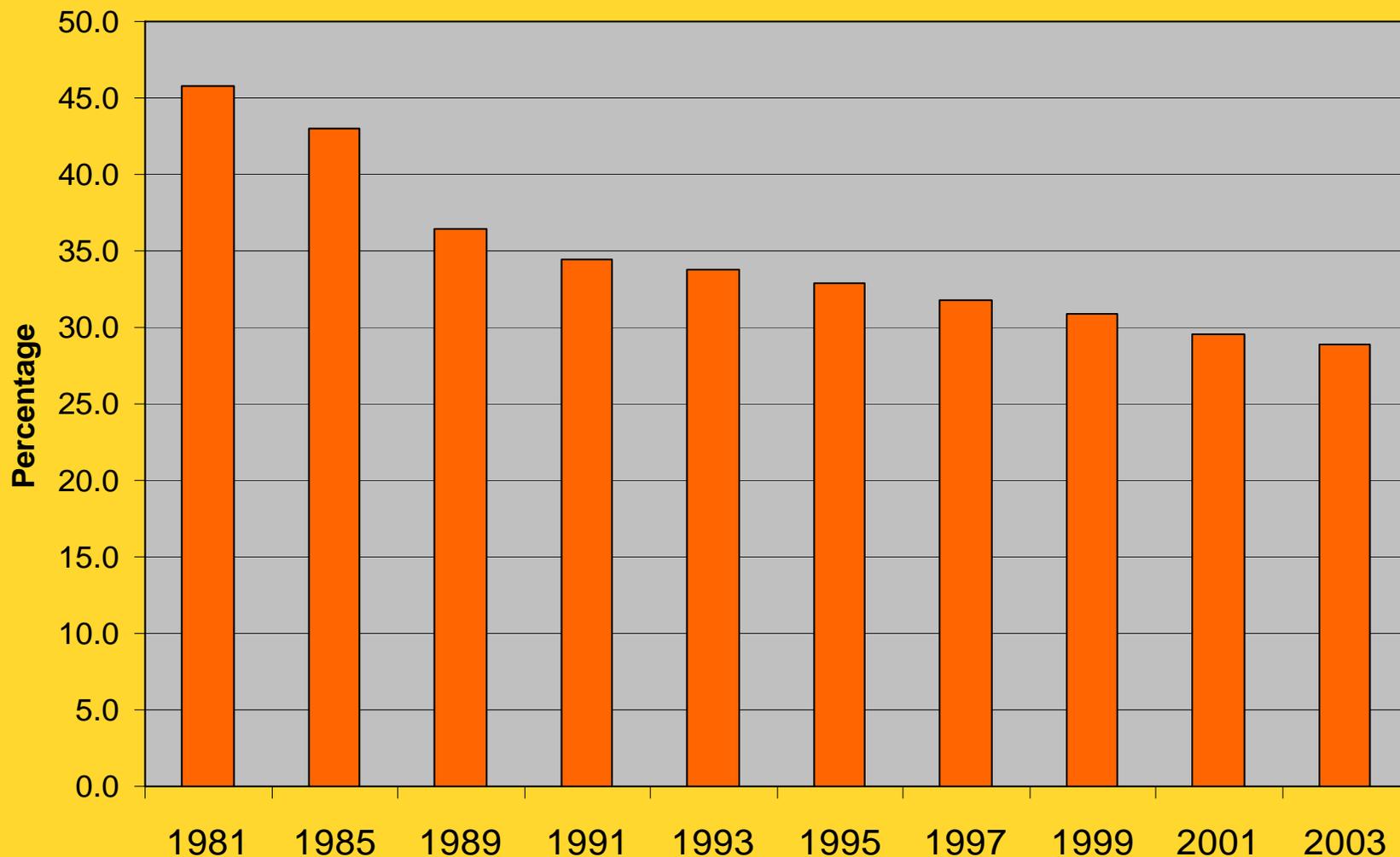
Up to this point, all the players
have been happy to have a
willing, inexpensive supply of
young researchers

But then, the young researchers become
young investigators/competitors

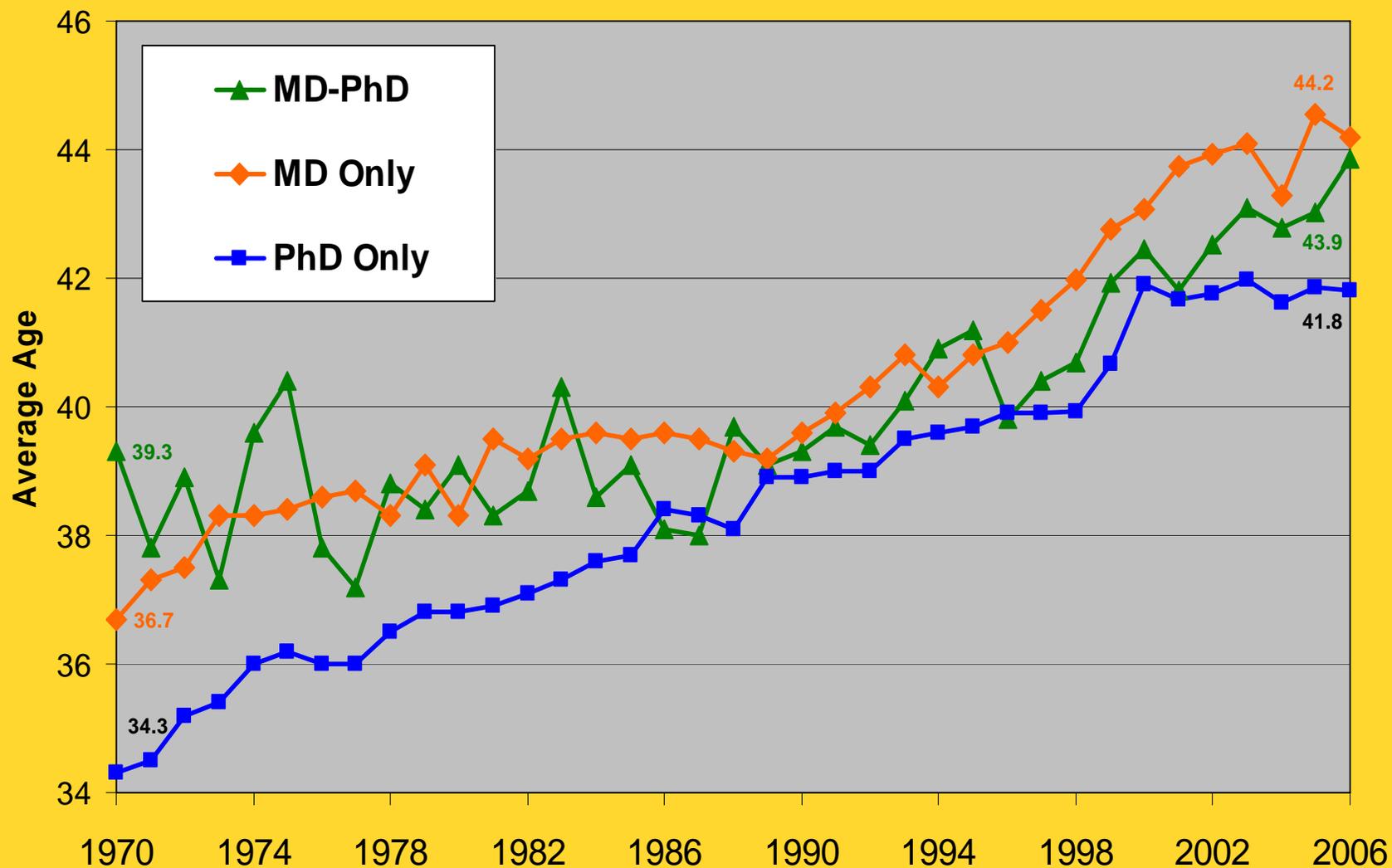
In academia, “other” has been the most rapidly growing employment status



The percent of US Biomedical Science PhDs holding tenure or tenure-track positions has been declining



The average age of first time R01 equivalent investigators has been rising



Incentives

- NIH wants to get the most productive science for its dollar (Incentive is budget dollars)
- Universities want prestige, visibility, and want to break even financially. (Incentive is position in ratings)
Industry faces high fixed costs (investment) as they exploit research findings. (Incentive is profits)
- Faculty want a dependable and inexpensive supply of trained hands for their research. They also want their grants to be renewed. (Incentive is grants and research \$)
- The future workforce wants rewarding careers in research. (Incentive is academic employment)
- The public wants affordable cures for disease.

Is there any reason why these different objectives should result in equilibration of demand and supply for biomedical researchers?

- **NIH worries about research and worries about the quality of the research workforce, which might be effected by oversupply**
- **Universities are finding that the research enterprise, although it buys prestige, does not necessarily pay for itself.**
- **Faculty are finding that funding is increasingly unreliable**
- **Young investigators are having increasing difficulty finding research positions and getting their research funded.**
- **Amazing breakthroughs are appearing that will eventually benefit the public, but are likely to be very expensive.**

Incentive compatibility?

- Market works for all but the new investigators and non-renewed faculty
- What effect will such a “disequilibrium” have on research to improve human health?
- What can be done so that the burden of adjustment does not fall so heavily on young investigators?