Interstate migration of foreign scientists and engineers.

National Institutes of Health funded Principal Investigators (PIs) are valuable commodities. They are often targets of recruiting because of their funding. Upon them depends some of the success of their states' and institutions' research and human capital. As 'free agents' PIs they can move to new jobs to improve their status, salaries, ranks, collaborations, working environments, and personal situations. When they move to change jobs, they often take their funded grants with them.

In this paper, we give the results of our study funded by the Alfred P. Sloan Foundation based on biosketches we collected from about 1,500 NIH and 800 NSF PIs. We compare groups of PIs working in the US who made at least one interstate move in the period 1994-2007 with foreign scientists. Our indicator of origin outside the US is receipt of a degree abroad. We compare three subgroups of interstate movers: US Trained (terminal degree), Foreign Trained (terminal degree) (in our entered NIH data, 14%, NSF, 9%), and Foreign Origin (Bachelors/Masters degree abroad) - (in our entered data NIH, 7%, NSF, 21%). We examine the effect on their number of interstate moves, gateway states/other state origins, destinations, types and amounts of funding and fields of science.

According to Richard B. Freeman and David L. Goroff, editors of the NBER volume Science and Engineering Careers in the United States, foreign students of science and engineering are motivated to come to the US by four factors:

- The extension of higher education throughout the world so that large increases in bachelor's degree holders led to large increases in their graduates coming to the US to earn doctorates.
- The greater opportunity to pursue graduate training here than in their home countries, primarily in China and India.
- The potential for working in the US as a Ph.D. scientist or engineer with a US graduate degree.
- With the increase in federal research funding, the need for additional students and postdocs to work in American labs.

With preliminary analysis of the partial NIH data (about half) that has been entered thus far, (which will be finalized by the time of the 2010 annual meeting), we can report the following tentative findings:

Of data from 856 NIH PIs, US Trained PIs constitute 79%, Foreign Trained PIs about 14%, and PIs of Foreign Origin, 7%.

US Trained cohorts moved an average of 1.29 times, Foreign Trained 1.45 times, and PIs of Foreign Origin, 1.46 times.

The movements of Foreign Trained PIs and those of Foreign Origin who have been funded in the 1994-1997 annual cohorts exceed those of US Trained PIs in the same cohorts to a statistically significant degree.

Looking at just our 2007 and 2008 cohorts, Foreign Trained PIs and PIs of Foreign Origin had had about twice (33%, 35%) the rates of R29 awards – FIRST (First Independent Research and Transition awards) – as US Trained PIs (14%).

US Trained PIs had about double the rate (6.5%) of K08 awards – mentored research training awards for medical students – as Foreign Trained PIs (3.7%). This is not a surprising finding since acceptance of foreign medical degrees faces significant hurdles.

Among Foreign Trained NIH PIs, most come from England, Canada, China and India. Among PIs of Foreign Origin most are originally from India, Taiwan, Canada or China.

The largest proportions of the 877 out-migration moves by PIs with US Training were from these states – in order of frequency - CA, MA, NY, PA, TX, MD, NC, and IL. These are the seven most funded states in order of funding and the ninth.

Of the 174 moves by Foreign Trained PIs most left MA, NY, TX, CA, NC, and PA, in that order. (Four of these are "gateway states" for immigrants entering the U.S. The other gateway states are FL, IL, and NJ).

Of the 83 moves of PIs of Foreign Origin, (a subset of US Trained PIs) the largest numbers left PA, CA, and NY. (Two of these, CA and NY, are gateway states).

US Trained PIs migrated to almost every state in the union – 47 states plus the District of Columbia. Their most frequent destinations were CA, NY, PA, MA, OH, and MD.

For PIs with Foreign Training, who moved to 37 states plus D.C., major destinations were CA, MA, NY, IL and OH.

32 states plus Washington, D.C. were destinations for PIs of Foreign Origin with only CA, GA, NY, OH, and PA ahead of the others by a few PIs each.

In fact, OH was the only state that gained more PIs than it lost for all three subgroups.

Perhaps because Foreign-Trained PIs and PIs of Foreign Origin had to move to come to the US, they have weaker community ties. This may have made it is easier for them to move the shorter distance between states to take new jobs. An alternative explanation may be that they come here to take positions of lower rank or are relatively early in their careers than US Trained PIs. Hence, they must move more often to advance their careers.

These and other issues will be explored with fuller data and multivariate statistics by the time the complete paper is submitted.