

Issues of Legislation and Merit in Scientific Labor Markets

Session 2

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Introduction:

During the 1990s, the basic research community has been experiencing a labor market collapse with many of the unemployment statistics for new PhDs registering in double digits.

Unemployment Rate for New Math PhDs:

1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
5.7%	12.4%	12.7%	12.4%	14.2%	14.7%	9.4%

According to the analysis of pro-immigration economists Jagdish Bhagwati and Milind Rao these gluts are largely due to the expanded presence of foreign scholars with the majority coming from just 4 countries: India, China, Taiwan and Korea. Bhagwati and Rao claim that

"The traditional way in which such 'gluts' are removed is simply by market forces: students walk away from education that yields low rates of return. But when foreign students are in the game, the market returns must fall more drastically before this happens. Even the currently diminished rates of return are unlikely to turn away foreign S&E students, because even these reduced rates return will be favorable compared to the compensation in their home countries."

While Bhagwati and Rao acknowledge the discouraging effects of 'diminished rates of return' on top domestic talent:

"...there is some evidence that science and engineering programs have recently become slightly less attractive to our best native-born students."

they claim that the benefits of sustained downward pressure on wages are strong enough to outweigh the concerns

"[The large presence of foreign students] means that scientist and engineer gluts, and consequent gripes against universities, can be expected to continue.

But why should we take this as a problem? As these Ph.D.s eventually take jobs downstream, their expertise becomes available to institutions and firms that can benefit from superior talent and education at unexpectedly affordable prices. ... This should be a matter for satisfaction, not lament."

We find the analysis given by Bhagwati and Rao intriguing but as yet incomplete. Specifically, we are concerned that amidst the benefits, there are numerous hidden costs to flooding such a critical market.

Further, Bhagwati and Rao suppress economic analysis of the effects due to the field specific changes in immigration law (1976 and 1990).

Markets and Meritocracy:

The International Meritocracy: 'Brain Gain' Vs. 'Missing Minds'

The reason so much basic research remains government funded is that it fits the twin criteria of a 'public good': discoveries are **inexhaustible** and (when published) **inexcludable**. Conversely, this means that many of the benefits of pure research are available to Americans whether or not the research is performed in the U.S. Thus, while pure research is often fueled by national interest, science is inherently international. Accordingly, many U.S. scientists believe that as an 'international meritocracy', science will be automatically benefited by a special U.S. 'open border' policy for scientists, even in the absence of reciprocity agreements. Unfortunately, this is invalidated by a simple labor model.

Imagine there exist only two countries: a rich one named 'Even' and a poorer one named 'Odd'. Imagine that talent is equally distributed between the two countries and that there are 15 Physicists, who in this simplistic idealization can be exactly ranked 1-15; while any random distribution will suffice, start by assuming that those physicists with even rankings are citizens of Even and those with odd rankings are citizens of Odd. Lastly, assume that both countries publish their discoveries in open journals and that the pay differential is moderate (e.g. U.S.A. and Canada) with all 15 preferring to work for higher pay in Even but willing to accept work in Odd before changing fields.

Now assume that borders can be open or closed. Here's what happens to the international meritocracy if there are 5 jobs in each country:

Even's Borders	Odd's Borders	Hirings in 'Even'	Hirings in 'Odd'	Displaced top 10 Physicists
Open	Open	1-5	6-10	None
Closed	Closed	2,4,6,8,10	1,3,5,7,9	None
Closed	Open	2,4,6,8,10	1,3,5,7,9	None
Open	Closed	1-5	7,9,11,13,15	6,8,10

Of course if the wealth differential is made more extreme (U.S. vs. P.R.C.) the low salaries in 'Odd' will function effectively as closed borders even in the presence of reciprocity agreements (leading to an exacerbated problem of 'missing minds').

It could be argued on nationalistic grounds that the simple model above produces better local outcomes for the richer country. Unfortunately, this is far from automatic. When risk is incorporated into such a model, it is possible that even the local outcome will be worsened.

Risk Aversion: A potential principal-agent problem.

There has been much discussion of the needs of scientific employers to access the 'best and the brightest'. Most of this discussion within the scientific community differs from the parallel discussion among economists as it possesses some curious features:

- The notion of 'best' is taken to mean 'best researcher' rather than 'best value'.
- The notion of 'best' is thought to be largely objective, and thus employer independent.
- There is little discussion of the role of risk in scientific hiring.

It has not been much discussed that in a labor market dominated by risk and uncertainty, expanding access to foreign S&Es could in fact lower expected returns to research for the country as a whole while simultaneously providing higher 'expected utility' to employers. Our claim is that if the hiring of a researcher is modeled as the acquisition of an inherently risky asset, under standard economic assumptions the US may find its expected return on research to be decreasing as employers are given access to a market-insensitive pool of foreign labor.

Assume for the moment that researchers are all equally priced and are modeled by probability density functions giving the probability of producing 'merit' at any given level. Assume further that standard economic assumptions are applicable to the hiring of S&Es:

1. There is a positive correlation between risk (variance) and return (mean).
2. Employers and funding agencies are risk averse.
3. Employers and funding agencies exhibit decreasing absolute risk aversion.
4. The expanded presence of foreign scholars responding to relatively depressed economic conditions in their home markets pushes the number of scientists well beyond the number of jobs.

With this in place a curious phenomena emerges. From the above perspective, the U.S. acts as a wealthy investor which relies on smaller co-investors (universities) to act as its agents in the hiring of basic researchers. In such a situation, researchers fitting the high risk-high return profile may have high 'expected utility' for the country (the principal) but present low expected utility for the universities (the agents).

If the number of jobs is roughly equal to the number of researchers, then such individuals will still be hired even if it is by lesser institutions. However, when a glut is produced, the most original researchers may be passed over entirely if their expected utility to risk averse universities is lower than that of less risky candidates.

The upshot is that even if the US system of inquiry based learning is viewed as successfully continuing its traditional production of risk-taking/'high return' individuals, in a glut we may expect rational universities to pass over these innovators if given a chance to lower their risk exposure.

Opportunity costs and the American Scientist: The need for a new Todaro Model for Scientists and Engineers

Top American science students are economically distinguished from their foreign colleagues from LDCs in four main ways:

Permanent Visas Granted	1976	1993	Percentage Increase
Total U.S. Immigration*	502289	880014	+75%
College and University Teachers**	267	3452	+1193%

We now discuss the specific provisions added by the Eilberg amendment and the Immigration Act of 1990.

The Sheepherder Provision: Special Handling

It is a little known fact that in 1952 and 1954, congress was moved to declare a shortage of Basque Sheepherders in the western United States. Since that time, an employers association of ranchers (known as the 'Western Range Association') has enjoyed anomalous immigration privileges in recognition of the hardship posed by the alleged shortage conditions.

This would be little more than a footnote to history except that in 1976, the Association of American Universities (AAU) succeeded in inserting (almost unnoticed) a parenthetical clause into Title 8 of the U.S. Code. This clause had the effect of removing the universities from the uniform labor certification requirements and placing them within the 'Special Handling' regulation reserved for immigrant shepherds.

The result of this switch was that Universities were granted unique privileges found nowhere else in the economy. For example, qualified American researchers are distinguished in that they alone can be technically reclassified (for purposes of labor certification) as 'unavailable for work' in the event that a university succeeds in portraying a foreign applicant as even marginally more qualified.

Curiously, in recent years the AAU has claimed that labor certification meaningfully protects American researchers from unfair university hiring practices. Publicly responding to charges that universities lower their labor costs by using special immigration exemptions, AAU president Cornelius Pings wrote:

"This is simply not true. ... in most cases where foreign scientists are hired using permanent work visas, universities and businesses are required to prepare detailed labor certifications, which need to be approved by the Department of Labor before an individual can be hired. These certifications must demonstrate that the person sought is being paid at or above the prevailing wage for the position." -Cornelius Pings, Letter to the Editor WSJ, Sept. 1996.

This is not easy to reconcile with private correspondence between the former AAU president and the sponsor of the 1976 Eilberg Amendment:

"...you have circumvented the primary rationale for denial of labor certification: that an unlimited supply of American manpower exists whose employment prospects are being usurped by alien labor." -John Osvald, AAU President, Letter to Joshua Eilberg, Nov. 1975.

The Shortage Provision: 'Schedule A'

While a sustained labor shortage may be nothing more than market pressure on employers to improve wages and working conditions, short term labor shortages can occur in skilled occupations for the duration of the time needed to train new workers. These temporary shortages could conceivably last several years in fields requiring extensive training.

Recognizing the legitimate needs of employers who on rare occasions may face such emergencies, the United States maintains a (very) short list of occupations experiencing labor shortages; this list is known as the 'Schedule A' list of shortage occupations.

Despite the unusual levels of unemployment and underemployment which currently affect young researchers, colleges and university employers have been listed on Schedule A as suffering from shortages of "college and university teachers of exceptional ability" for the last 20 years following the passage of the Eilberg amendment in 1976-77. Even more surprising is that under the provisions of 'Eilberg', colleges and universities are apparently mandated at the level of regulation to be listed as shortage afflicted in perpetuity and without regard to future labor market conditions.

The 'Einstein Exemption': Priority 1 Aliens with Extraordinary Abilities

The U.S. has a long standing history of encouraging the immigration of extraordinary aliens without regard to their 'market impact'. The numbers of such researchers admitted through the granting of 'National Interest Waivers' is naturally self-limiting.

Despite the presence of these waivers, representatives of universities, corporations and government agencies succeeded in adding (to the Immigration Act of 1990) an exemption for priority 1 aliens with 'Extraordinary Abilities'. Interestingly, INS records reveal that the percentage of employment based immigrants portrayed as possessing 'extraordinary abilities' has been growing linearly over the past 4 years in the categories governing professors and scientists:

Percentages of Aliens Granted Permanent Residency under the Priority 1 Category for 'Aliens of Extraordinary Abilities'	1992	1993	1994	1995
University and College Professors	4.4 %	17.8 %	27.8 %	40.1 %
Natural Scientists	4.6 %	21.4 %	36.0 %	52.4 %

Despite this dramatic growth, there has been little discussion of the underlying reasons for such seemingly high percentages.

The Anti-Shortage Quota

During the 1980s, Erich Bloch as director of NSF sounded an alarm that the nation was going to be facing a massive shortfall of 675,000 scientists and engineers in the 1990s and in the years to come. In response to the famous NSF 'Shortfall' study, Congress greatly increased the number of permanent visas available to employers. Unfortunately, later House and Senate oversight hearings later cast doubt on the original motivations for the study:

"In 1987 the NSF adopted a plan to double its budget in five years. There is no doubt in my mind that this shoddy science was knowingly disseminated by the federal government's premier scientific agency to further the attainment of this goal." -Rep. Howard Wolpe,

1992.

Despite, the fact that no labor shortage emerged, there has been no move on the part of NSF or AAU to reverse this provision.

Issues:

- Are scientific employers misportraying foreign applicants in a systematic fashion?
- How do we develop economic models for scientific labor markets in the presence of so many non-monetary variables? Can revealed preference be used to estimate the values of permanent residency, tenure, scientific job satisfaction etc...?
- What are the expected economic consequences of exempting a particular class of workers from the protection of uniform labor laws?

References

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