Emerging Research

Declining Numbers of Foreign Students and America's Science and Engineering Enterprise

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The enterprise of science and engineering (S&E) is powerfully affected by the role of immigrants in institutions of higher education and in US labour markets (Freeman et al., 2004). Especially since the 1970s and increasingly in the 1990s, educational institutions and labour markets have experienced steady increases of foreign students and workers and have come to expect more of the same. Yet, since 2001 there have been notable downturns in the number of foreign students applying and attending US institutions of higher education.

During the New Economy of the 1990s there was a boom in the number of immigrants employed in S&E occupations, as well as steady long-term growth in the number of foreign S&E students. In fact, as Figure 1 shows, the share of immigrants in various subfields of S&E employment increased dramatically in the 1990s, outstripping gains in previous decades. Immigrants made up 7 per cent of S&E workforce growth in the 1960s decade prior to 1970, but half of S&E labour force growth in the 1990s. That explosive growth is reflected in the surge in immigrants' share of all S&E workers to 17 per cent by 2000.[1] At the same time, the supply of foreign students has been even more significant, constantly growing since the 1980s. Twenty-three per cent of all S&E graduates were awarded a doctorate degree in 1977, and foreign students made up 41 per cent of S&E doctoral graduates in 2001. The consequences of these

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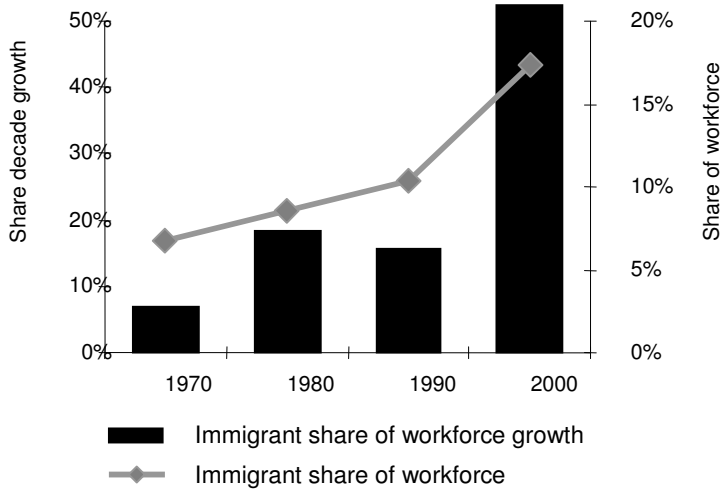
rather impressive rates of growth are positive in most aspects, but it is not certain that the pace of immigrant growth seen in the 1990s will continue.

FIGURE 1

IMMIGRANT SHARE OF S&E EMPLOYMENT



Source: Tabulations from US Census microdata

Many stakeholders assert that the United States is less hospitable in the aftermath of the terrorist tragedies of September 11 – due primarily to adverse shifts in immigration policy – and faces significant declines in the number of foreign students and workers:

> What the latest numbers make clear is that the enrollment declines are now widespread and dramatic enough to seriously threaten the US academic research enterprise, which has come to depend heavily on non-US students and scholars (IEEE, 2004).
>
> Historically, the United States has benefited from both an abundant supply of indigenous talent and the contributions of scientists, engineers, and graduate students from other countries… Analyses of current trends, however, indicate serious problems lie ahead that may threaten our long-term prosperity and national security (NSB, 2004).
>
> … the climate for creative talent in the United States has chilled somewhat both as a result of direct policies which restrict scientific information and make it harder for people to get into and out of the country and also because of a widening perception of the United States as… less friendly toward foreign-born people (Florida and Tinagli, 2004).

Such concerns are strongly expressed, widely held, and calculated to influence immigration and other policies, but there is some scepticism that the sky is falling. In part, scepticism has to do with the failure of past shortage forecasts, as well as the often discouraging labour market conditions that await either domestic or foreign students or workers. Many fields of endeavour have had tough labour markets for many years now while it should be obvious that the downturns in applications and enrolments coincide with the 2001 to 2004 "jobless recession".

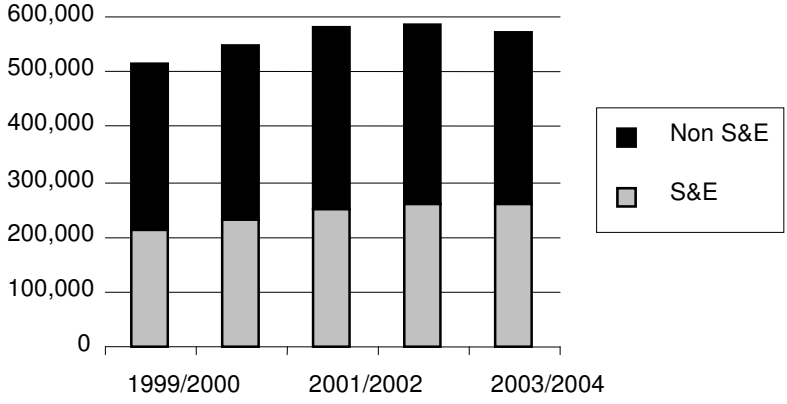
> The analysis found that despite concerns about potential shortages of STEM personnel… there is little evidence of such shortages in the past decade or on the horizon. Economic indicators, notably the low levels of unemployment and rising wages that one would expect to accompany shortages, have failed to materialize (RAND, 2004).
>
> … those who are concerned about whether the production of US scientists and engineers is sufficient for national needs must pay serious attention to whether careers in science and engineering are attractive (Teitelbaum, 2003).

While the demand for *domestic* S&E students and workers has been variable, and concerns over shortages are very often misguided, the recent downturn in the supply of *foreign* students and workers is a break from a long-term trend. And as a result of past trends, foreigners today represent a significant share of enrolments and workers, so one way or the other the break in trend could have substantial impacts and deserves an objective analysis. As Figure 2 shows, the enrolment of all foreign students (F visa holders) declined 2.4 per cent in the 2003 to 2004 school year. The S&E enrolments continued to grow due to increases in the social, and the physical and life sciences. But the *total* S&E figures obscure declines by field. After growing at rates of up to 18 per cent, enrolments in math and computers sciences declined 6 per cent in academic year 2002 to 2003 and again in 2003 to 2004. In the latter year, engineering enrolments fell 2 per cent.

Leading indicators of declining foreign enrolments – applications and admits – appear to be even steeper and particularly affect graduate departments. The Council of Graduate Schools (2004a, 2004b) found a 28 per cent decline in international applications from fall 2003 to 2004.[2] There was no decline among domestic students. There was a 26 per cent decrease in S&E applications and 18 per cent in admits. The Council on Graduate Students worried that these steep declines in applications might yield equally steep declines in foreign enrolments. However, a third report found a, still worrisome, but much lesser decline of just 6 per cent in foreign graduate enrolments in 2004 to 2005, albeit there were somewhat larger declines in the life/agricultural sciences (-10%) and engineering (-8%). At the same time, underlying rates of application and acceptance often run in different directions such that enrolments suffer less than thought.[3]

FIGURE 2

FOREIGN STUDENT ENROLMENT



Source: IEE Open Doors

Many observers conclude that America's immigration policy has developed an unhealthy obsession with security, a bias against students and workers from middle-eastern and Asian nations, and that policy has been implemented clumsily. A survey by GradSchool.com (2004) found that 44 per cent of prospective international students cited "cumbersome" admission requirements as the greatest barrier to applying to US schools.[4] Visa processing after September 11 led to a 67-day wait for security clearance by 2003 and two to three weeks before a counsellor officer interview. At the least, because international competition is not likely to abate, and US educational institutions and labour markets continue to offer high quality opportunities, it seems straightforward to single out immigration policy as the most amenable to action.

Other reasons noted as playing a possible role in the decline are the immediate aftermath of the 2001 recession and the increased global competition for both students and workers. Thus, the United Kingdom's policies increased the enrolments of foreign S&E graduate students by 52 per cent between 1994 and 2001. During the 1990s, five leading Asian countries saw their number of Ph.D. graduates double (NSF, 2004). It should also be unsurprising that the steepest enrolment declines are in the information technology-related fields impacted by the recessionary IT bust. But we do not know which of these various factors have played a significant role in the recent short-term decline in applications and which have either reinforced that decline or will play a significant role in future

trends. And future foreign student enrolments could remain strong for the foreseeable future – even while global competition is increasing America retains the lead in S&E activities – as hinted at by last year's upward bounce in foreign student visas. Regardless, a convergence of trends has reignited a long-running controversy over the role of immigration policy in supplying foreign students and workers for American's S&E labour market.

The Institute for the Study of International Migration (ISIM) at Georgetown University is undertaking a one-year project to evaluate the causes and consequences of recent numerical trends. We plan to shed light on the admission policies of foreign S&E students and provide proactive input on this critical aspect of what has become a contentious debate. The project will analyse immigration legislation post-September 11 and interview a range of stakeholders; and will generate a nuanced assessment of how security concerns affect admission procedures. Further, an analysis will be carried out of S&E labour market trends that are rarely given much attention in the debate. Data will be collected and expert papers will be commissioned to generate a solid understanding of how global pressures may impact present and future US competitiveness. The results of the project will result in a careful understanding of how admission policies are implemented and concrete recommendations on how they might be improved.

NOTES

1. Authors' tabulations; the definition of S&E used here excludes teachers in order to be comparable over time.
2. Note that "graduate" in the case of engineering typically means a Master's end degree, while for other sciences "graduate" more typically refers to a smaller population of Doctorates.
3. In fact, rates of acceptance increased for many graduate schools, offsetting declining applications so that, in part, it appears that the quality of applicants may have gone up. At the same time, applications can drop if the cost of education in the United States increases, while acceptances might fall at US colleges whose budgets are suffering (Monastersky, 2004).
4. Yet, the same survey found that just 19 per cent of prospective students decided against coming to American and just 20 per cent of these cited strict visa requirements as the deciding factor (GradSchool.com, 2004).

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