

Brain Drained

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EXECUTIVE SUMMARY

1. Introduction

This paper shows how Israel's system of higher education evolved, how stagnation set in, and how policies and bureaucracies became hardened in stone. It provides evidence on an academic exodus unparalleled in scope – not only in terms of the number of scholars who have left the country but also in terms of the quality that the country has lost: a double-digit share of Israel's top scholars currently reside on a full-time – non-visiting – basis in America's leading universities.

2. National Priorities and Israeli Academia

In 1950, Israel's standard of living, as reflected by GDP per capita (in 2005 prices) was 1,296 shekels per month – just one-sixth of the 2007 standard of living. There were two universities – the Hebrew University in Jerusalem and the Technion in Haifa – with 138 professors and lecturers and 3,000 students. Though the country was still relatively poor, absorbing huge numbers of holocaust survivors and immigrants with only the clothes on their backs, building towns and roads from scratch, fighting major wars and endless smaller skirmishes, it managed to find the wherewithal to establish 7 major research universities and to increase the number of senior faculty per capita between 1959 and 1973 by a factor of 5 (figure 1).

For each billion shekels of GDP (in 2005 prices) that the country produced in 1950, there were just 7 academic scholars. But by the end of the sixties, the country had allocated the resources to fund 26 scholars for each billion shekels of production.

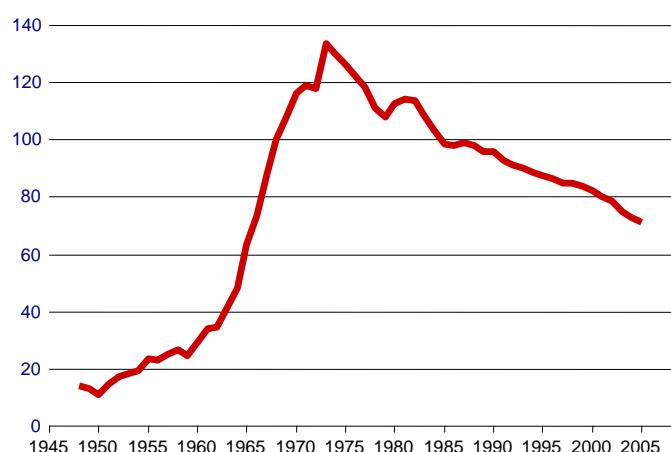
Within two and a half decades after its creation, that relatively poor country succeeded in reaching nearly the same number of senior faculty per capita as the United States. Just like the other major infrastructures being built from scratch at the time, higher education was considered an important infrastructure and it ranked high among the national priorities.

That huge investment by Israel's founding fathers produced the yield that the country is reaping today. All seven of the universities built then are ranked among the top 500 in the world, while four of the Israeli universities – Hebrew University, Tel-Aviv University, the Technion and Weizmann Institute – are among the top 150. In terms of number of top-150 universities per capita, Israel is behind only Switzerland. It is ranked number one in the world in terms of top-150 universities per GDP.

This latter point is not immaterial because it relates between the overall ability of a country to finance education and the quality of education that it provides. A high rank in this regard gives an idea of the type of national priorities in place that enabled such an outcome. The problem is that today's level of education was determined by yesterday's investments while today's priorities will determine tomorrow's level.

Figure 1

Senior research faculty in Israeli universities
per 100,000 people, 1948-2006



source: Dan Ben-David, "Brain Drained" (2008)

data from Israel's Central Bureau of Statistics and the Council for Higher Education's Planning and Budgeting Committee

In the 1970s, Israel changed direction – in its leadership, in its functioning and in its national priorities – with all that this implies with regard to the country's future. This change lead not only to a relative decline in per capita incomes, in relation to leading developed countries, it was also reflected in a marked change in direction with regard to higher education.

From 1973 through the 2005-06 academic year, the number of senior faculty in Israel's research universities rose by just 12% – from 4,389 to 4,937 – while the country's population grew by 109%. Even when the relatively new, non-research, colleges are included, the overall number of senior faculty in Israel grew by just 30% during this period. In other words, for over three decades in a row the number of senior faculty per capita in Israel's research universities has been steadily falling.

In today's relatively wealthy country – compared to then – the number of senior faculty members (including the non-research colleges) per billion shekels GDP is back to where it was in 1960. While Israel reduced the number of its research and teaching faculty per capita by 35%, the United States went and increased its academic faculty per capita by 29%.

As the number of academic positions per capita in Israel was being reduced, the number of students soared. In 1970, the United States granted three times as many degrees per capita as did Israel (Figure 2). Over the course of the next three and a half decades, the number of American academic degrees per capita rose by 31%. In Israel, the number of degrees per capita rose by 355% and surpassed the American mark by 13% in 2005.

The combined implications of the upward trend in students and the downward trend in professors can be seen in Figure 3. The number of undergraduate degrees conferred per senior faculty member in Israel is 2.4 times the number in the States. In the realm of graduate studies – where one-on-one supervision is need most – the ratio of degrees to senior faculty in Israel is 2.8 times the U.S. ratio.

These multi-decade opposing trends have a negative impact on the quality of teaching that the next generation is receiving and a concurrent negative impact on the quality of research in the country. As the number of students per faculty member increases, classes become more crowded and more outside – non-academic – teachers are hired to teach the overflows. In addition, senior faculty in Israel have a relatively higher teaching load than is common in American research universities. As a result, there is less time for class preparations, for grading papers and tests, and possibly the most important of all, less time for supervising students, particularly graduate students. The greater the teaching load, the less time remains for research – with all that this implies on the subsequent quality.

3. The Magnitude of the Brain Drain

In its examination of the brain drain to the U.S., the European Commission (2003) reports that 73% of the 15,000 Europeans who studied for their PhD in the States between 1991 and 2000 plan to remain in America. If Europeans are concerned about the migration of their academics to the States, then Israelis should be nothing less than alarmed.

In general, the ratio of foreign scholars in America to scholars in the home country ranged from 1.3% in Spain to 4.3% in the Netherlands (Figure 4). Canada was an outlier. The ratio of Canadian scholars in the States to those in Canada was 12.2%, though this is much more of a two-way street than in any of the other cases.

Figure 2

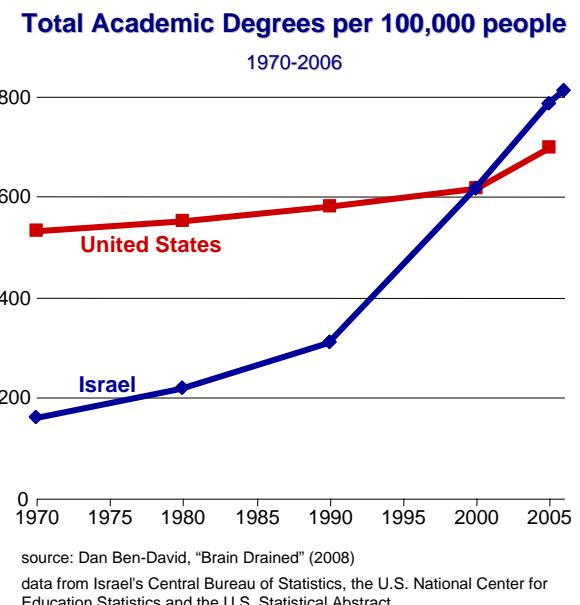
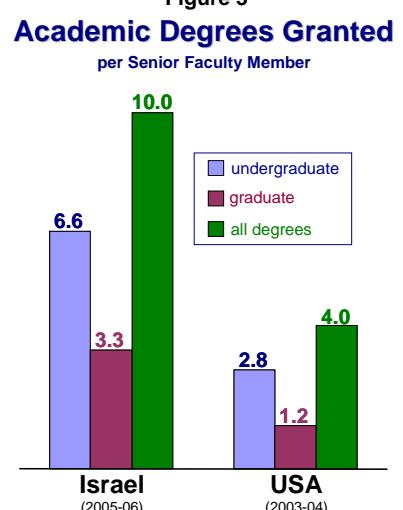


Figure 3



While Canada is an outlier, Israeli scholars in America are in a class by themselves. The Israeli academics residing in the States in 2003-2004 represented 24.9% of the entire senior staff in Israel's academic institutions that year – twice the Canadian ratio and over 5 times the ratio in the other developed countries.

An examination of five fields in which Israeli academia is considered to hold world-class scholars – physics, chemistry, computer science, economics and philosophy – is suggestive. In two of these fields, economics and chemistry, Israelis received 3 Nobel Prizes in recent years. Academic citations between 1997 and 2007 place Israeli universities among the top 150 in the world in all 4 of the 5 fields measured by the ISI Web of Knowledge (there is no ISI ranking for philosophy).

There are a fairly large number of Israelis among the tenured and tenure-track faculty members in the top 40 American departments (ranked by the American National Academy of Sciences) in each of the five fields. The number of Israeli physicists in just the top 40 American departments is one-tenth the entire number of physicists in Israeli research universities (Figure 5) – more than double the *overall* migration rate from the Netherlands, the European country with the greatest rate of academic emigration to the States. The share of top Israeli chemists in America accounts for one-eighth the entire discipline in Israel. The number of Israeli philosophers in top American departments accounts for 15% of the philosophers remaining in Israel.

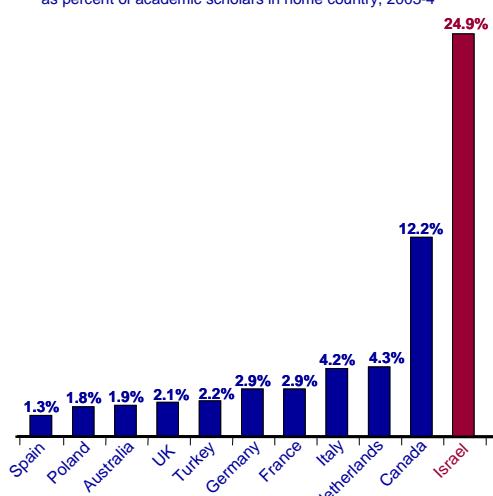
Though the emigration rate by top-end researchers in physics, chemistry and philosophy is very high, that rate is doubled by the economists. The number of top Israeli economists in the States is 29% of those still remaining in Israeli departments of economics. The group with the greatest proportional representation in the top American departments is in computer science. The number of Israelis in just the top 40 U.S. computer science departments represents a full third of the entire contingent remaining in Israel. Some of the leading American departments have no less than 5-6 Israelis each.

Why do they leave? One reason – albeit, not the only one – is wages. Salary differences between academic fields in the States reflect salary differences within the private sector and the need of American universities to compete in order to retain at least a portion of the top minds. Since the academic salary structure in Israel has never enabled salaries to differ between fields, different academic wage gaps began to materialize within each field between the U.S. and Israel.

Figure 6 shows that those fields with the highest rate of Israeli migration to the top American schools were also the fields that paid considerably higher salaries. While emigration rates in physics, chemistry and philosophy are not as high as in economics and computer science, they are still much higher in comparison with emigration rates from other countries. In each of these three fields, American academic wages are close to the American academic median wage – which is nonetheless much higher than Israeli academic wages. That said, the relative high brain drain in these fields indicates that while wage differentials play an important role in academic migration from Israel to the States, they are not the entire explanation. Even when wage differentials are not very high, there is a large number of first-rate Israeli scientists who are not returning to Israel's research universities. The insufficient number of faculty positions plays an important role in this regard.

Figure 4
Foreign Scholars in U.S. Universities

as percent of academic scholars in home country, 2003-4



source: Dan Ben-David, "Brain Drained" (2008)

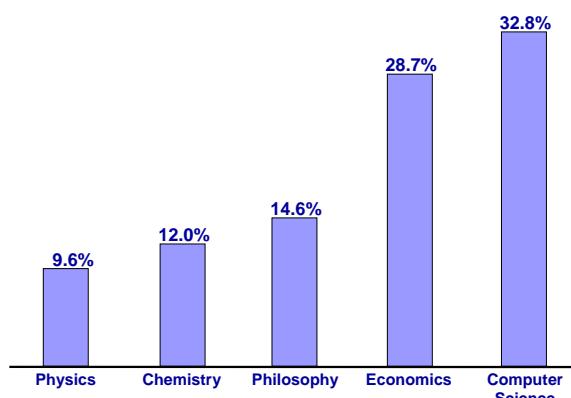
data from OECD, European Commission, Israel Higher Education Commission, Statistics Canada and Australian Department of Education

The *overall* migration rate from the Netherlands, the European country with the greatest rate of academic emigration to the States. The share of top Israeli chemists in America accounts for one-eighth the entire discipline in Israel. The number of Israeli philosophers in top American departments accounts for 15% of the philosophers remaining in Israel.

Figure 5

Israelis in top American departments, 2007*

as percent senior faculty in Israel, by field



* Top 40 departments in each field according to 1995 ranking by National Academy of Sciences

source: Dan Ben-David, "Brain Drained" (2008)

4. Policy Implications

It is ironic, to say the least, that a country with no natural resources, which has discovered the high-tech route to raising per capita incomes, could have adopted policies that have led to such a predicament. In the very fields necessary for fueling the minds that enter the high-tech market, Israel has allowed itself to lose an unparalleled proportion of its top researchers.

When put into perspective, this loss becomes even less fathomable. A country with a GDP of more than \$200 billion is unable to find the wherewithal to attract several hundred of its top minds to its research universities.

There are four main reasons for the emigration of many of Israel's leading researchers from its universities: (a) insufficient positions; (b) relatively low salaries in comparison with employment possibilities abroad and in Israel's private sector; (c) inadequate funding of research laboratories; and (d) an archaic institutional organization controlled by the country's finance ministry, which is solely preoccupied with preventing a run on the public sector's purse, with no long-run strategic perspective (this is true in other, non-academic, realms as well) and no accountability for any of the long-term consequences of its policies. Israel's higher education system is not given the freedom to adapt itself to a changing reality that endangers a continuation of the academic excellence that was built with past investments.

Positions

The number of research faculty positions in Israel is too small according to two important measures. First, there are insufficient senior faculty members to teach and advise students. To the extent that an academic education yields more productive workers – not to mention more aware and enlightened citizens – this issue has evolved into a serious problem. The other main reason for increasing the number of research faculty positions has to do with the links between frontier research, innovation, productivity and economic growth. At the front end of this “food chain” is academic research – basic or otherwise. While this link in the chain is important for all countries intending to increase their standards of living, it is particularly important in countries lacking natural resources and economies of scale such as Israel. The primary hope that countries like this have in working their way up the income ladder is to invest in processes that yield new ideas which can be translated into new/better products that can be sold at a lower prices.

Salaries

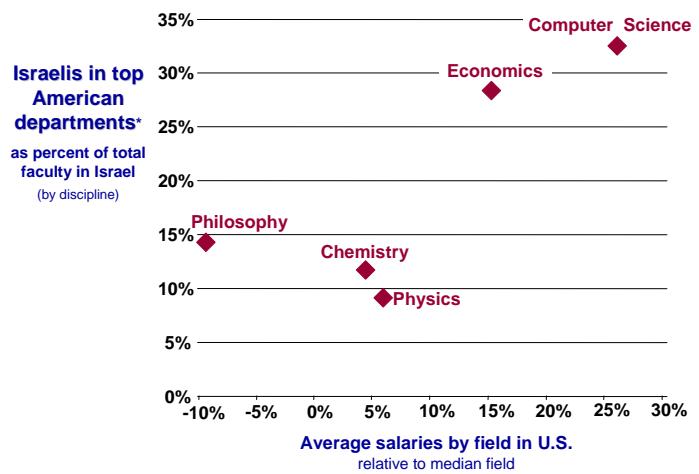
Large salary gaps between leading American academic departments and Israeli universities are steadily increasing over time. Salaries of U.S. professors rose in real terms while Israeli academic salaries did not even eclipse inflation, not to mention erosion in comparison with leading competing fields within Israel (Figure 7).

External Micromanagement

The twin issues of salaries and archaic institutional organization are bound together in a Gordian knot. The bureaucratic mindset that pervades all of Israel's public sector – including its universities – is one of extensive micromanagement by external bodies. As in other areas in the public sector, there is a need to separate between determination of priorities, allocation of budgets

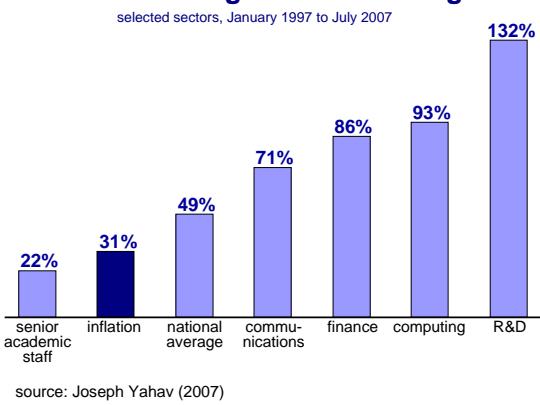
Figure 6

Salary differences between fields and emigration by top Israeli academics



source: Dan Ben-David, "Brain Drained" (2008)
data on salaries from Ehrenberg, McGraw and Mrdjenovic (2006)

Figure 7
Nominal Changes in Israeli Wages



source: Joseph Yahav (2007)

and oversight on the one hand, and the merging of accountability and the authority to implement on the other hand. In the current organizational environment, academic units are extremely limited in their ability to compete and attract senior faculty from outside the university – or in keeping current faculty members – in the realms of salaries, research support, promotion , teaching loads and so on.

5. Summary

Israel's founding fathers may not have been aware of the current evidence and theoretical underpinnings of the importance of investing heavily – in per capita as well as per GDP terms – in higher education, but their basic intuition certainly paid off later, as Israel became better-placed to take advantage of the future high-tech revolution. While today's academia is a product of yesterday's investments, today's investments will determine the future quality of Israel's higher education – and of the country's ability to compete, and thrive, in a modern global economy, not to mention its ability to continue existing in a very hostile neighborhood.