

Does University Students' Choice of Field of Study Respond to High-Skilled Immigration?*

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Rachel M. Friedberg

Brown University and NBER

Department of Economics

Brown University

Providence, RI 02912

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*Alyce Abdalla provided able research assistance. Correspondence may be addressed to Rachel_Friedberg@Brown.edu or Department of Economics, Brown University, Providence, RI 02912.

Abstract

This paper explores a new margin of adjustment to immigration, namely university students' choice of field of study. The field choices of university students in Israel – particularly those of freshmen and prospective freshmen – are found to have changed significantly, following the immigration to Israel of a large number of experienced Russian engineers and medical professionals in the 1990s. The share of Israeli undergraduates majoring in those two fields fell substantially, while the share majoring in law, a field with almost no Russians, rose. Students appear to respond to perceived changes in relative labor market conditions across fields. However, the magnitude of the response is insufficient to explain the finding that relative wages across occupations in Israel did not change following the mass migration of Russians to Israel.

There is a large literature studying the effect of immigration on the economic outcomes of natives in the receiving country (for a review, see Friedberg and Hunt 1995). Most research has focussed on labor market outcomes, such as wages, employment and unemployment. One of the puzzles to emerge from this literature is the common finding that even large immigrations do not appear to adversely affect the earnings or employment of natives. This has led to research into omitted factors which might counteract the effects of immigration and bias estimates of its effect.

Many studies assess the impact of immigration using geographic variation within a country, comparing labor market conditions in cities with high and low levels of immigration (Altonji and Card 1991, LaLonde and Topel 1991). These studies generally find little correlation. A criticism of this approach has been that, if natives avoid cities with high immigration or deteriorating labor market conditions, an increase in a city's labor supply due to immigration may be offset by outmigration of natives. This will lead cross-city estimates of the overall effect of immigration to be biased toward zero. Several papers look for direct evidence of such offsetting internal migration (see Filer 1992 and Card 1997 for opposing results).

In this paper, I apply the same reasoning to a different dimension of the labor market, namely occupations. Similar to the cross-city approach, one can estimate immigration's effects by correlating labor market outcomes and immigration across skill or occupation groups (see Borjas, Freeman, and Katz 1997, Friedberg 1997, Jaeger 1996). Here, counterbalancing movements of native workers across groups could play a role analogous to that of internal migration in cross-city studies. Estimates of immigration's overall effects will be biased toward zero if there is net outmigration of native workers from skill or occupation groups which receive more immigrants.

Because they have occupation-specific experience, veteran workers are less likely than new entrants to be responsive to changes in relative labor market conditions across occupations. However, even new entrants have specific human capital, having already completed their schooling and training in a particular field. For this reason, I look yet earlier, at the decisions of people still in school.

Do students avoid fields with large influxes of immigrants? Using data on university applicants as well as enrolled students, I analyze whether students' choice of field of study responds to changes in relative labor supply across occupations brought about by immigration (For related papers on students' knowledge of and responses to labor market conditions, see Berger 1988, Betts 1996, Freeman 1976, and Ryoo and Rosen 1992).

The natural experiment I use to examine this question is the mass migration of Russians to Israel which began at the end of 1989. Four aspects make this case particularly well-suited to the question at hand. First, the immigration was unanticipated and large, augmenting the Israeli labor force by 5.5% in under two years, and by 12.7% by the end of 1995. Second, the skill level of the immigrants was very high, with half of them having 13 or more years of schooling. Third, their occupational distribution was heavily skewed toward certain fields. Of the Russians who came to Israel in 1990-95 and who had worked in Russia, 20.1% were engineers or architects, and 8.9% were medical professionals (compared to 6.7% and 4.8% of Israelis, respectively). Roughly half of the latter were physicians and dentists, with the other half comprised of nurses, pharmacists, and other para-medical professionals. On the other hand, in this highly educated group, less than 1% were jurists. Finally, both the number and occupational distribution of the immigrants was common knowledge, clear to anyone who read the newspaper or walked down the street.

Did the sudden appearance of thousands of experienced Russian engineers and medical

professionals discourage Israelis from entering those occupations? Did university applicants and students, anticipating depressed wages and increased competition for jobs, avoid the fields in which the new Russian immigrants had flooded the labor market?

II. DATA

Administrative data from the Israeli university system report the number of students by field of study for students at five stages: applicants to bachelor's degree programs, first-year students in bachelor's degree programs, and the total number of students enrolled at the bachelor's, master's, and doctoral levels. These data are a census, not a sample, of the population of university students in Israel. The data used here cover the period 1979-95, so it is possible to take account of pre-existing trends in the distribution of students across fields of study in examining the pattern following the Russian immigration. The focus will be on three fields: engineering, medicine, and law. The first two are the fields most markedly affected by the influx of Russians, and the latter is one of the least, both because of the small number of Russian jurists and because of the importance of language and country-specific institutional knowledge for practice of the law. Combined, these three fields account for about one-quarter of students at the bachelor's degree level in Israel.

A few institutional comments about the Israeli educational system are in order. In contrast to the United States, in Israel, law and medical training begin with the bachelor's degree, which is officially a three-year program, though many students take longer to complete it. Most law students end their schooling with a bachelor's degree, with which they can practice law. Continuing on to a master's indicates a higher level of legal expertise, rewarded in the market by higher pay. In medicine, to become a physician requires both a bachelor's and a master's degree, a total of six years of university training. Those with doctorates in law and

medicine are usually scholars and researchers. An additional feature of university study in Israel is that people generally attend only after completing compulsory military service, which lasts at least three years for men and two for women. Compared to U.S. students, Israeli students are older and perhaps more attuned to practical labor market considerations in selecting their course of study.

III. ANALYSIS

Completing training for a particular field requires making choices at several points: first, to apply to a bachelor's degree program in that field; second, conditional on being accepted, to enroll; third, to remain in that field throughout the bachelor's degree; fourth, to choose to continue on to a master's degree, and so on. The Russian immigration could have affected the decisions of Israeli students at any or all of these stages. For example, the distribution of applicants across fields could change, with no other changes once students are enrolled. Or we could see changes in the rate of student retention by field within the bachelor's degree, or the rate of continuation on to more advanced degrees by field. A change in behavior at any single juncture will eventually propagate through the later stages.

Although data for the academic year 1990-91 could reflect some knowledge about the Russian immigration, the first year for which applications and enrollments are likely to reflect full information is 1991-92 (denoted 1991).

A. The Share of Undergraduate Students by Field

Figure One displays the share of students at the undergraduate level who are in the field of engineering. Note that freshmen are a subset of applicants, since, as mentioned above, applicants can be rejected and, if accepted, can decline to enroll. Freshmen are also

a subset of bachelor's degree students. Applicants and freshmen are likely to be the most sensitive to changes in relative labor market conditions across fields, but veteran students may respond as well, by switching fields, dropping out, or by not continuing on to the next degree level.

The fraction of applicants opting for engineering was increasing during the 1980s, rising from 10.3% in 1979 to 12.7% in 1990. Following the beginning of the Russian immigration, however, there was a sharp downturn, with the share falling by one-quarter within three years. The data for freshmen show a similar decline after 1990, from 13.6% to 9.9% in 1995. The same turnaround is apparent in the fraction of bachelor's students majoring in engineering, which after rising through most of the 1980s, fell by 21% during the five years following the immigration.

Figure Two presents the same data for medicine. The fact that in this figure, the line for applicants lies well above the line for freshmen reflects the fact that it is much harder to be accepted into medicine than engineering (about three students apply for every slot). The fraction of applicants choosing medicine rose by over 50% in the 1980s. But after 1990, there was a sharp decline of one-quarter within three years. Consistent with queuing, the pattern for freshmen is similar in direction but smaller in magnitude. The share of freshmen in medicine rose from 4.8% in 1979 to 7.1% in 1990, but then fell 18% by 1995. Finally, among bachelor's students, following a strong rise, there was a levelling out in the late 1980s, and only a mild decline in the share studying medicine after 1990.

The data for law are presented in Figure Three. They stand in sharp contrast to the patterns of rise and decline seen in engineering and medicine. After a decline at the end of the 1980s, law accounted for a rising share of applications 1990-92. The decrease after that is probably attributable to a change in the Israeli Law of Higher Education, which began to

allow for the accreditation of degree-granting colleges of law outside of the university system. Among freshmen, the share studying law, which had fallen from 4.4% to 2.7% in the 1980s, doubled by the end of the period. The data for bachelor's students shows a significant decline over the 1980s (5.2% to 4.0%), followed by a steep rise of about 50% after 1990.

B. The Share of Graduate Students by Field

As might be expected, patterns at the master's degree level do not change at 1990, but rather after a lag of a few years, as the freshman cohorts of the 1990s begin to enter graduate school. This can be seen in Figure Four. Engineering fell as a share of enrollments throughout the period, but declined substantially in 1995. Medicine was also declining at the end of the 1980s, but then dropped 21% in 1995 alone. Finally, the share of law was flat from 1985-92, but more than doubled in 1993 and continued to rise subsequently.¹

Among doctoral students, shown in Figure Five, engineering shows no clear pattern. Medicine, which had risen, levels off, and law shows a slight upturn. It should be noted that the number of people pursuing doctoral degrees is less than one-tenth the number at the bachelor's level and less than one-quarter the number at the master's level.

C. The Retention Rate Among Undergraduate Students

To measure the importance of switching fields and dropping out among undergraduate students, a "retention rate," RR, can be defined as:

$$RR_t = (B_t - F_t) / (F_{t-1} + F_{t-2})$$

¹ This may have been a response to the opening of the law colleges, as the increased availability of bachelor's degrees in law provided university law students with an incentive to differentiate themselves by obtaining a master's degree. It could also be due to a larger national pool of law students with bachelor's degrees for the master's programs to draw on.

where B_t is the number of students enrolled at the bachelor's degree level at time t , and F is the number of freshmen. The retention rate is a rough measure of the share of students who entered the bachelor's program in the previous two years who remain enrolled. It is only a rough measure because many students take longer than three years to complete the bachelor's degree, so that in practice, RR is often greater than one. Figure Six charts the retention rate by field, relative to the average retention rate across all fields. Engineering and law show no particular change at 1990. Medicine, which had had a substantially lower retention rate than the other two fields for most of the period, began to rise in 1992, reaching a similar rate by 1995. This could reflect the smaller number of medical students being more committed on average than were earlier cohorts. It could also reflect an increase in the number of years medical students (perhaps non-physicians) remained in school before completing the degree.

D. Continuation to Advanced Degrees

A final margin of adjustment is the decision of students to continue on to get advanced degrees. Overall, the pattern of continuations to higher degrees appears stable. The rate of continuation from the bachelor's to the master's degree can be measured as the ratio of the number of master's students at time t to the number of bachelor's students at time $t-1$ in a given field, relative to that ratio for all fields. In Figure Seven, engineering and law show no change throughout the period, while medicine shows a gradual decline, with no particular change at 1990.

The analogous measure for continuations from the master's degree to the doctorate, graphed in Figure Eight, shows engineering unchanged throughout the period. Medicine ceases to rise in the 1990s, but the level remains stable. Law declines at the end of the period, but shows no particular change at 1990.

E. Magnitudes

Was the drop in the number of Israelis entering engineering and medicine large enough to offset the increase in labor supply to those fields implied by the arrival of the Russians? If, rather than falling, the share of undergraduate students majoring in engineering had remained constant after 1990, the number of additional Israeli engineers trained by 1995 would have been 6,820. This is the number of potential engineers who were "lost" to other fields. By contrast, 67,964 Russian engineers arrived in Israel in 1990-95. The rate of native offset is thus about one native switching out of engineering for every 10 Russian engineers who arrived.

By the same calculation, the number of potential Israeli medical professionals lost was 1,241. In 1990-95, 14,782 Russian physicians and dentists and 15,388 Russian nurses, pharmacists, and other para-medical workers immigrated to Israel. The rate of native offset for medicine is thus one native for every 24 Russians.

Even considering that many Russians did not find work in their former professions (because of imperfect skill transferability, licensing barriers, etc.), the number of natives who exited these professions was not of a sufficient magnitude to account for the finding of Friedberg (1997) that relative wages across occupations did not change following the mass migration of Russians to Israel.

IV. CONCLUSION

This paper explores a new margin of adjustment to immigration, namely university students' choice of field of study. The field choices of university students in Israel-- particularly those of freshmen and prospective freshmen-- are found to have changed significantly, following the immigration to Israel of a large number of experienced Russian engineers and medical professionals in the 1990s. The share of Israeli undergraduates majoring in those two fields fell substantially, while the share majoring in law, a field with almost no Russians, rose. Students appear to respond to perceived changes in relative labor market conditions across fields. However, the magnitude of the response is insufficient to explain the finding that relative wages across occupations in Israel did not change following the mass migration of Russians to Israel.

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FIGURE ONE

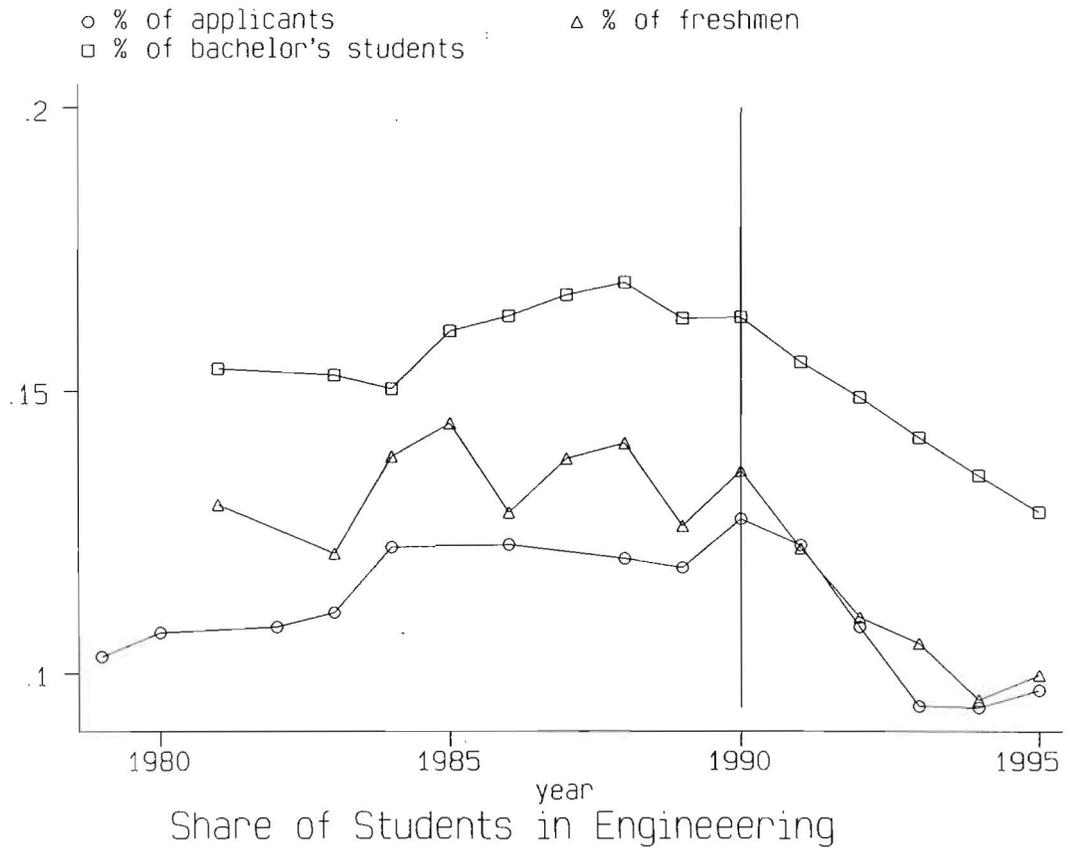


FIGURE TWO

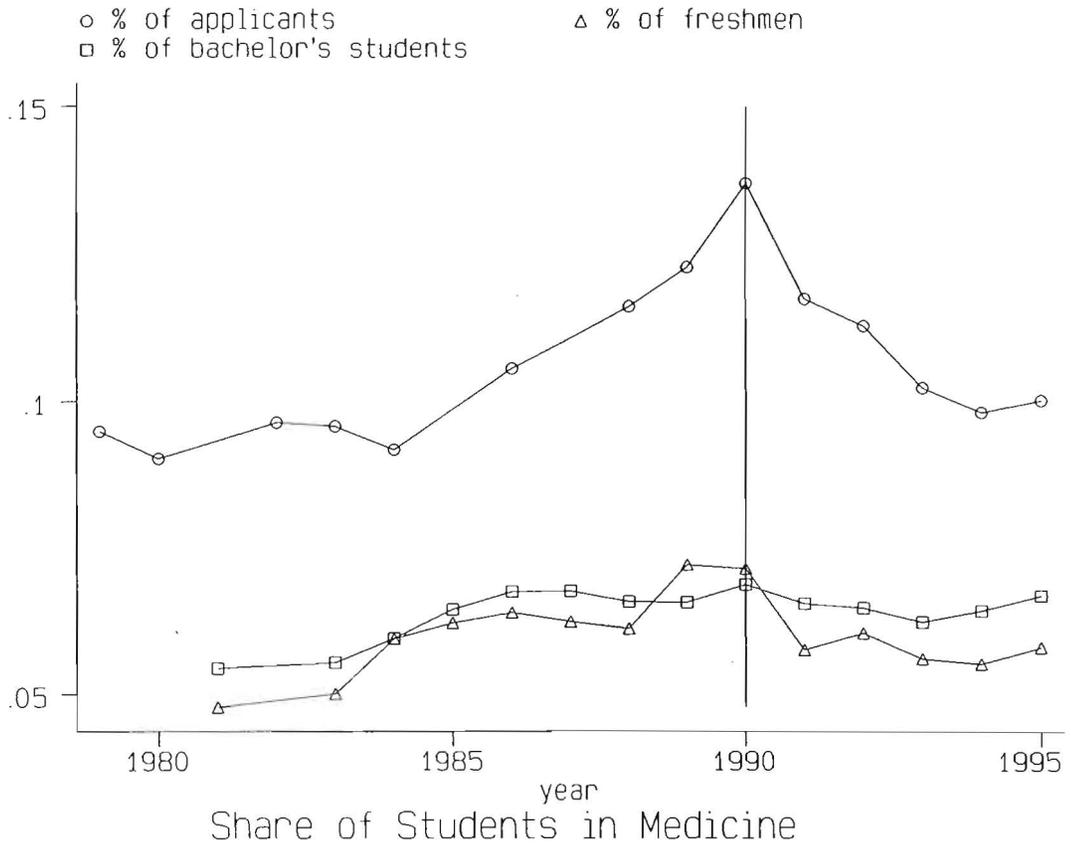


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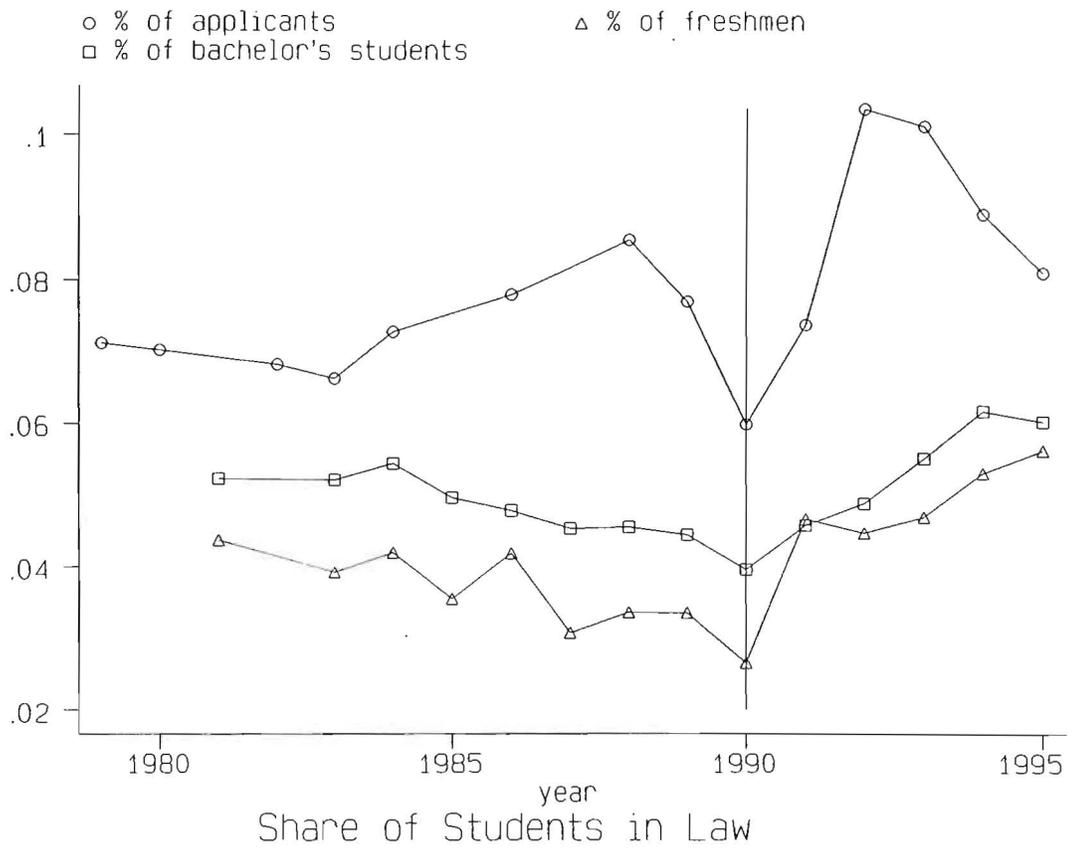


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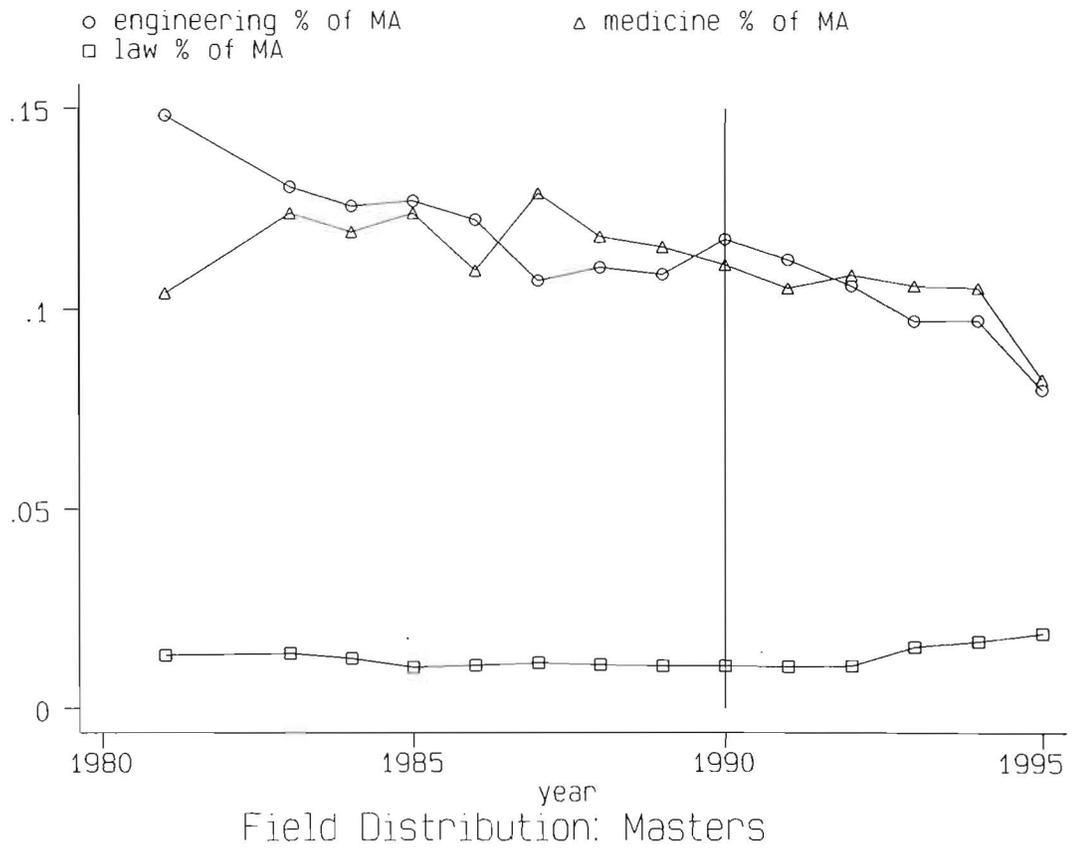


FIGURE FIVE

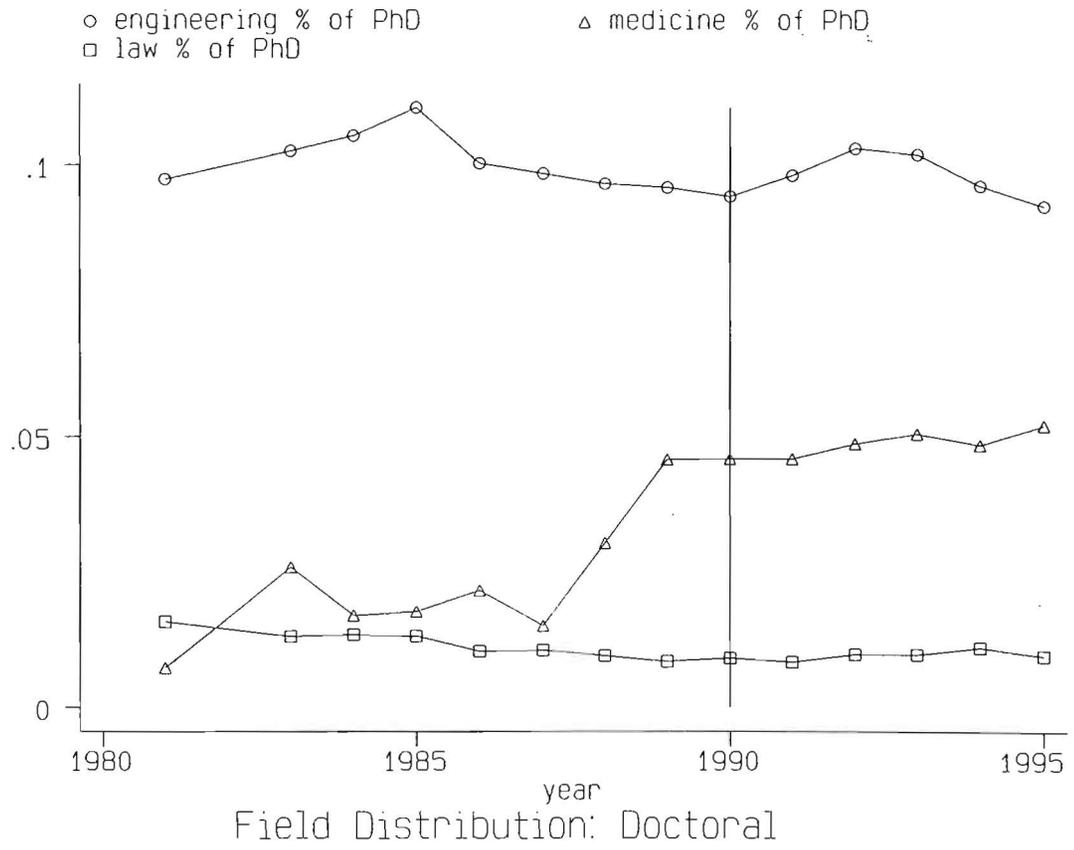


FIGURE SIX

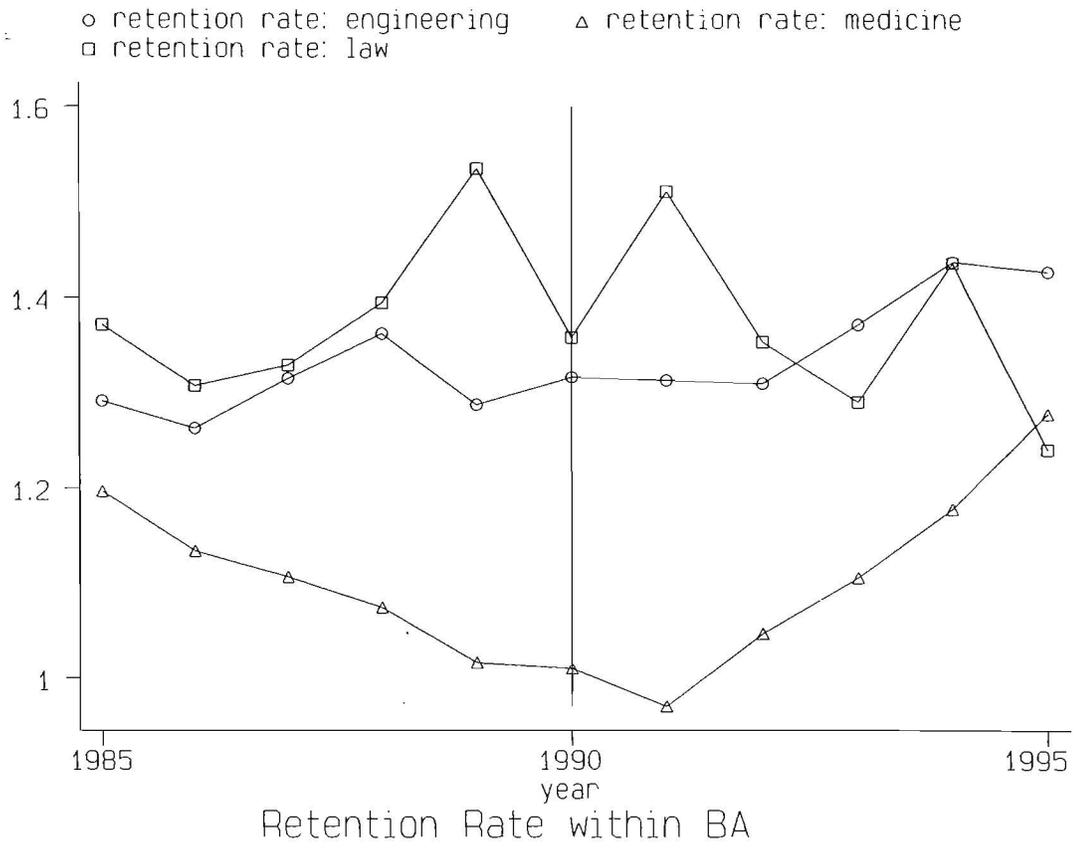


FIGURE SEVEN

○ BA to MA contin. rate: engineers
△ BA to MA contin. rate: medicine
□ BA to MA contin. rate: law

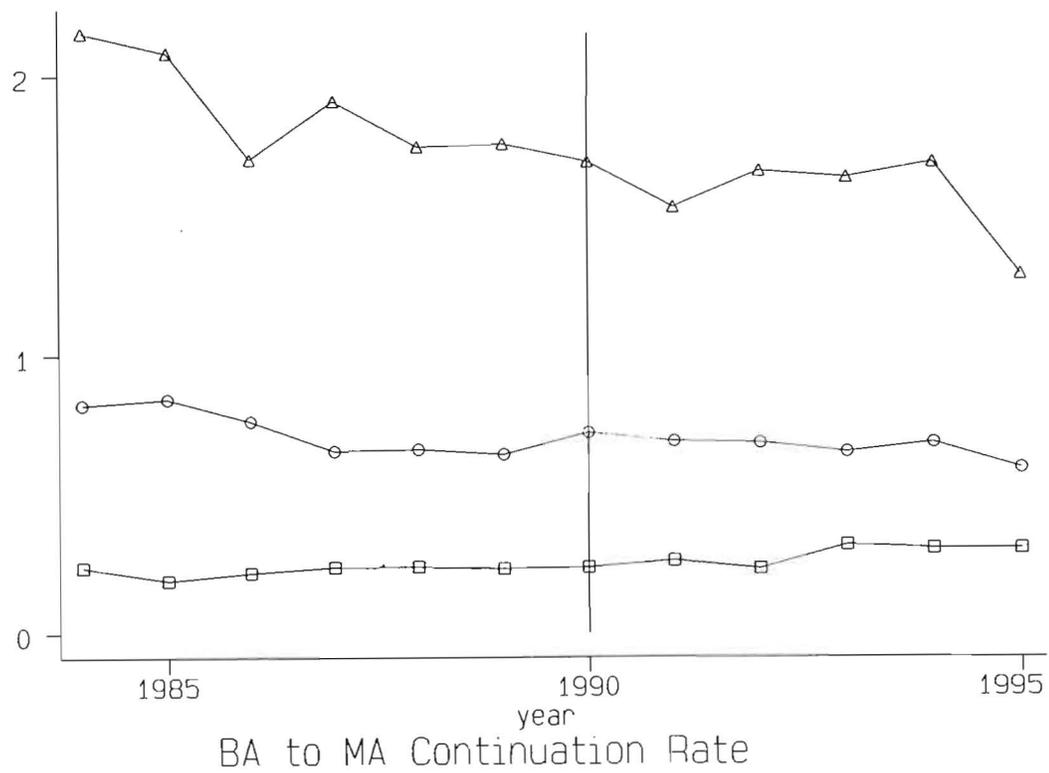


FIGURE EIGHT

