Field of Study Variation throughout the College Pipeline and its Effect on the Earnings Gap: Differences between Ethnic and Immigrant Groups in Israel

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Abstract

This study demonstrates the analytical leverage of using a longitudinal perspective for understanding how the various stages involved in the formation of field of study inequality before and during college shape the earnings gaps among workers with a bachelor's degree. Using data from three elite universities in Israel, this investigation tracks field of study variation among different ethnic and immigrant groups throughout the college pipeline—through the application, admission and graduation stages—and quantifies the economic implications of this process. The findings reveal that a cross-sectional assessment of field of study inequality at any stage can generate misleading conclusions about the position of ethnic groups in the earnings hierarchy, and about the reasons for the advantaged or disadvantaged position of each.

Key words: Field of Study, Undermatching, College Pipeline, Earnings Gap, Ethnic Inequality, Israel

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In most Western countries, participation in all levels of the education system has been increasing for decades, as has the overall level of academic credentials. Yet there is a mismatch in many countries between the decline in racial/ethnic and gender gaps in educational attainment, and the persistence of earnings gaps. Certain types of educational disparities between high- and low-status groups also persist, partly because high-status groups are able to secure an education that, although quantitatively similar in terms of years of schooling, is qualitatively superior—either by type of institution or field of study—which, in turn, leads to better economic returns (Alon 2009; Lucas 2001). Recent evidence suggests that college major is the most important determinant of future earnings, even after controlling for ability (Arcidiacono 2004; Roksa and Levey 2010). The potential of using field of study variation to explain economic inequality is thus considerable.

Field of study inequality can be observed throughout the college pipeline, and is closely linked to three stages in the pipeline examined in this study: the application, admission and graduation stages. Field of study inequality is already manifest at the first stage, the application stage, in the form of variations in the major choice set of applicants—the result of disparities in K-12 academic preparation and different aspirations, preferences and motivations. In countries where applicants are asked to determine their major at the application stage—such as in Israel, Australia and most European countries—it is possible to study the variation in college major choice set even before college entry, as prospective applicants must list their preferred majors and rank them accordingly.[1] Hällsten (2010), for example, finds that college applicants in Sweden from service class backgrounds are more likely to choose majors with high potential earnings than those from manual labor class backgrounds. Other studies concur that social background affects the choice of field of study, although the direction of the effect is not clear (see, for example, Reimer and Pollak (2005) on Germany and Van de Werfhorst et al. (2001) on the Netherlands). Moreover, several studies have focused on the phenomenon of college undermatching—that is, when a high school graduate attends a college that is less selective than what her academic achievement indicates—which tends to be more widespread among minority and low-SES students (Bowen, Chingos, and McPherson 2009; Hoxby and Avery 2012). At the same time, we know little about *field of study undermatching*, and about whether there are class, gender, or ethnic differences in the fields of study that students consider, either before or after enrollment in college.

This inequality can then either contract or expand during the admission stage, because not everyone is accepted to their major/field of choice. But the effect of field of study on the formation of economic inequality does not end after enrollment in a major (whether upon admission or later on in college). Fields of study vary in their grading norms, curricular structure, and social and academic climates, all of which affect persistence. Students may change majors or drop out of college altogether, both of which contribute to the emergence of group differences in fields of study among graduates. If dropout patterns in fields vary by ethnicity, gender or class, then the predictions regarding group economic inequality will morph from enrollment to graduation.

Given that field of study inequality can (and tends to) transform throughout the stages of the college pipeline, studies that examine the type of diploma that graduates hold when they enter the labor market overlook the other important stages and factors involved in the formation of this inequality. Alternatively, studies that demonstrate group differences in the choice of field of study among applicants fall short of tracking the changes in field of study-related economic inequality that occur from application to degree attainment. In contrast, a longitudinal approach to economic inequality by field of study involves tracking the variation in field of study throughout the college pipeline, from the application stage

(field of study "choices") through the admission decision and until graduation (the type of diploma attained). This approach, which examines both individual and institutional decisions, can yield important theoretical and policy insights by ascertaining to what extent the variation in field of study among graduates stems from differences in the field of study choice set versus group differences in college performance.

In this study, I implement such a longitudinal approach in order to quantify the economic implications of field of study inequality throughout the college pipeline between ethnic and immigrant groups in Israel. The empirical investigation tracks the variation in field of study throughout the college pipeline—from the application stage (field of study "choices"), through admissions, to graduation (field of degree attained); quantifies the economic implications of this process in terms of expected salary; and consider several factors that may account for the variation in fields of study. The evidence from this case study, based on both individual and institutional decisions, is used to demonstrate the analytical leverage of adopting a longitudinal perspective for understanding the formation of field of study variation and economic inequality.

THE ECONOMIC AND EDUCATIONAL GAPS IN ISRAELI SOCIETY

The Israeli population is divided along ethnic lines. The first cleavage is between Israeli Jews, who account for approximately 80 percent of the population, and Israeli Arabs, who make up the rest. This investigation focuses on the Jewish population because Arabs have distinct patterns of participation in both the higher education system and the labor market. The Jewish population in Israel is divided along ethnic lines: "Ashkenazi," those of European and/or American origin, and "Mizrachi," those with roots in Asia and/or Africa. Before 1948, there were several immigration waves to Israel from both America and Europe, with the first major wave starting in 1882. The establishment of the State of Israel in 1948 brought with it massive waves of Jewish immigrants, who continued to arrive throughout the 1950s. These waves consisted mainly of refugees from Europe, on the one hand, and those from Asia and Africa, on the other. In the early 1990s, there was another massive immigration wave, dominated by immigrants from the former Soviet Union (FSU).[2]

The social and cultural assimilation of the European and American immigrants in Israeli society was smoother, in general, than that of the immigrants from Asia and Africa. Consequently, an earnings hierarchy was institutionalized among the Jewish population of Israel, one in which the Ashkenazi Jews are at the top of the socioeconomic ladder, the Mizrachi Jews are at the bottom, and Jews of mixed ethnicity occupy the space in the middle (Cohen, Haberfeld, and Kristal 2007; Dahan et al. 2002; Yaish 2001). Within each category, second- and third-generation immigrants rank higher than the first generation, and the ethnic earnings gaps are smaller among women than among men.

The economic differential between Ashkenazi and Mizrachi Jews has largely been attributed to the gaps in educational attainment between these groups. Recent studies indicate a gradual convergence in the ethnicity-based educational attainment gap in Israel over time, as measured mainly by mean years of schooling and the share of group members holding a bachelor's degree (Friedlander et al. 2002; Haberfeld and Cohen 2007; Okun and Friedlander 2005). Yet, the ethnic gaps in annual earnings among male bachelor's degree holders in Israel widened (Cohen and Haberfeld 1998; Haberfeld and Cohen 2007). Indeed, in analyzing several Israeli Income Surveys, I find that there is indeed an ethnicity-based gap in earnings, even among the younger cohorts of the college-educated population.

This pattern of mismatch between educational attainment and earnings is not unique to Israel. For example, in the US the gap in earnings determinants, such as education, between black and white women has been on the decline since the early 1980s. At the same time, the gap in earnings between these two groups has persisted (Altonji and Blank 1999; Blau and Beller 1992). In addition to the possibility of rising discrimination, several other theories have been offered to explain this paradox. One of them, put forward by Juhn, Murphy, and Pierce (1991), deals with the rising returns in the US for high educational quality. They found that between 1979 and 1987, almost the entire wage gap between racial groups at the same education levels was attributable to differences in education quality—that is, education quality is a key factor in the slowdown of the black-white wage convergence. Following this logic, Cohen, Haberfeld, and Kristal (2007) speculate that group-based differences in the quality of education, such as differences in institution type and/or field of study, may be one of the reasons that the ethnicity-based gaps in earnings persist in Israel. Since field of study is likely the most important determinant of future earnings, the ethnic variation in majors may explain the ethnicity-based gaps in earnings, even among the younger cohorts of the college-educated population. This study examines this proposition.

DATA AND METHODS

Database

The empirical investigation utilizes the institutional administrative records of the three largest first-tier Israeli universities—Tel Aviv University (TAU), The Hebrew University (HUJI), and Ben-Gurion University (BGU). Due to the over-time changes in the demographic composition of the college-age population, as described below, I limit the analyses to the applicant cohorts from 1999 to 2002. During this period, these three universities received 90,000 applications (each applicant can apply to multiple majors). About 63,000 applicants were admitted and 45,000 students eventually enrolled. Seventy-three percent of the latter graduated from one of these three universities.

Variables

Ethnic Origin

The conventional classification scheme for ethnicity among the Jewish population in Israel, used in previous research and official statistics, is based on either continent of birth or father's continent of birth, using the dichotomy of Asia/Africa (Mizrachi) and Europe/America (Ashkenazi).[3] However, because this scheme recognizes only first- and second-generation immigrants, and ignores the possibility of mixed ethnicity, it is inadequate for describing the contemporary college-age population, which, as time lapses from the major immigration waves of the late 1940s and 1950s, is increasingly comprised of third-generation Jews—that is, native-born Israeli Jews whose parents were also born in Israel.[4]

I created a measure for ethnic origin that takes into account both mixed-ethnicity status and immigrant generation, which is presented in Table 1. Thirty-three percent of applicants between 1999 and 2002 were third generation on both sides and thus their ethnicity cannot be classified. Yet, this classification distinguishes between applicants who are "veteran" Ashkenazi—those who are third-generation on one side (one parent was born in Israel but the grandparents likely immigrated from Europe/America) and second-generation from Europe/America on the other—and second-generation Ashkenazi, individuals whose parents both immigrated from Europe or America. Likewise, Mizrachi applicants, those with roots in Asia/Africa, are classified as veteran Mizrachi or second-generation Mizrachi. Twenty percent of the applicant body were first-generation Jewish immigrants, the majority of

which was part of the massive immigration wave from the FSU that began in the early 1990s, while about a quarter of the first-generation pool from non-FSU countries came from the US.

[Table 1 about here]

Field of Study Economic Hierarchy

To quantify the economic consequences of field of study inequality by ethnic origin, I use data from the Israeli Central Bureau of Statistics, which draws from the administrative records of the state tax authorities. Specifically, I use the monthly salary of university graduates during their first years in the labor market following graduation, by field of study and by institution (ICBS 2012). Altogether, there was institution-specific data on expected earnings for 39 fields of study. The data was obtained for four cohorts of university graduates, from 2000 through 2003, during their first two years in the labor market, separately for men and women. I divided the annual earnings by the number of months that the graduates in each field of study were employed, in order to adjust for differences in labor supply. I merged this information on field of study expected salary with the data, assigning each applicant, admit, and graduate the corresponding projected salary by his or her field of study at each stage. In the case of double majors, the salary assigned was that of the major with the highest salary (at each stage). In sum, each woman in the sample was assigned, at each stage—application, enrollment and graduation—the average monthly salary of female graduates in her corresponding field. Similarly, each male was assigned, at each stage, the salary of male graduates in his field. The expected salary ranges from 5,000 to 20,000 New Israeli Shekels (NIS), for the graduates of three universities who began their studies between 1999 and 2002. Leading the pack in terms of starting monthly salary are the graduates of various engineering programs, the computer sciences, exact sciences, pharmaceutical studies and economics. At the bottom are the graduates of several fields in the humanities and social sciences.

PRELIMINARY RESULTS

How important are economic returns in shaping the field of study choices of applicants?

To compare the magnitude of the effect of several characteristics of a major on inclusion in the choice set, I use the McFadden's choice model (McFadden 1974), which is intended specifically for individual decisions that are at least partly based on an observable attribute of each alternative.[5] The results demonstrate that relative to other attributes of fields of study, economic returns are an important determinant of a major's desirability for male applicants. The effect of economic returns on women's decision making is more subtle, and not very different from the effect of a major's other characteristics. Male and female applicants may weight factors differently when choosing what to study, but the key question for this study is, within each sex group, are there differences in ethnic orientations towards a major's pecuniary returns, and, if so, what are the economic implications of such a disparity?

The Ethnic Gap in Field of Study Expected Salary among University Graduates

By the time university graduates in Israel enter the labor market, there is already an ethnic gap in earning potential due to differences in the type of diploma attained. The ethnic gaps, which are strikingly similar among both male and female graduates, reveal a tripartite hierarchy. Leading the pack are graduates who immigrated from the FSU, together with veteran Ashkenazi graduates (native-born Israeli Jews with one

parent born in Europe or America and one native-born parent). The middle tier consists of second-generation or third-generation Mizrachi graduates as well as second-generation Ashkenazi graduates. The expected monthly salary, by major, of male graduates in these groups is about 95-96 percent that of FSU-born immigrants (94-95 percent for females). At the bottom are first-generation male and female immigrants from other (non-FSU) countries: their expected salary, by major, is only 91 percent that of their FSU-born counterparts. This detailed classification of ethnicity exposes that both factors—*country of origin* and *immigrant generation*—are intertwined in determining economic hierarchy.

Future Analyses

These findings demonstrate that the documented ethnic gaps in earnings among employees with a college diploma are partly shaped by field of study variation upon graduation. In the case that earnings trajectories depend on starting wages or vary by occupation, these initial gaps, measured when university graduates first embark on their labor market careers, can translate into a lifelong divide in economic well-being.

To better understand how graduates from different ethnic groups ended up in such advantaged or disadvantaged positions on the economic hierarchy, the analyses will track the formation of economic stratification throughout the college pipeline from the high school years until graduation. To illustrate the analytical leverage of this longitudinal information, I will focus on the distinct pathways of three ethnic groups: FSU immigrants (top of hierarchy); other first-generation immigrants (bottom); and veteran Ashkenazi (top). To help with the tracking of inequality, two types of evidence will be presented simultaneously:

1. The expected salary of each group at various stages (gross gaps as well as adjusted for academic achievements), and
2. The transition probabilities from high school graduation until the attainment of a bachelor's degree for the three groups mentioned above.

REFERENCES

Alon, Sigal. 2009. "The Evolution of Class Inequality in Higher Education: Competition, Exclusion, and Adaptation." *American Sociological Review* 74(5):731-755.

Altonji, Joseph G. and Rebecca M. Blank. 1999. "Chapter 48 Race and Gender In The Labor Market." Pp. 3143-3259 in *Handbook of Labor Economics.* Vol. 3, C, edited by A. Orley and D. Card.Elsevier.

Arcidiacono, Peter. 2004. "Ability Sorting and the Returns to College Major." *Journal of Econometrics* 121(1–2):343-375.

Blau, Francine D. and Andrea H. Beller. 1992. "Black-White Earnings Over the 1970s and 1980s: Gender Differences in Trends." *The Review of Economics and Statistics* 74(2):276-286.

Bowen, William G., Matthew M. Chingos and Michael S. McPherson. 2009. *Crossing the Finish Line: Completing College at America's Public Universities.* NJ: Princeton University Press.

Cohen, Yinon and Yitchak Haberfeld. 1998. "Second-Generation Jewish Immigrants in Israel: Have the Ethnic Gaps in Schooling and Earnings Declined?" *Ethnic and Racial Studies* 21(3):507-528.

Cohen, Yinon, Yitchak Haberfeld and Tali Kristal. 2007. "Ethnicity and Mixed Ethnicity: Educational Gaps among Israeli-Born Jews." *Ethnic and Racial Studies* 30(5):896-917.

Dahan, Momi, Natalia Mironichev, Eyal Dvir and Shmuel Shye. 2002. "Have the Educational Gaps Narrowed?" *Economic Quarterly (Hebrew)* 49(1):159-188.

Friedlander, Dov, Barbra S. Okun, Zvi Eisenbach and Lilach L. Elmakias. 2002. "Immigration, Social Change and Assimilation: Educational Attainment among Birth Cohorts of Jewish Ethnic Groups in Israel, 1925-29 to 1965-69." *Population Studies* 56(2):135-150.

Haberfeld, Yitchak and Yinon Cohen. 2007. "Gender, Ethnic, and National Earnings Gaps in Israel: The Role of Rising Inequality." *Social Science Research* 36(2):654-672.

Hällsten, Martin. 2010. "The Structure of Educational Decision Making and Consequences for Inequality: A Swedish Test Case1." *American Journal of Sociology* 116(3):806-854.

Hoxby, Caroline M. and Christopher Avery. 2012. *The Missing" One-Offs": The Hidden Supply of High-Achieving, Low Income Students*.

Israel Central Bureau of Statistics (ICBS). ------. 2010b. *Table 2.22: "Jews, by Continent of Origin, Sex and Age."* .Central Bureau of Statistics. Jerusalem, Israel.

Juhn, Chinhui, Kevin M. Murphy and Brooks Pierce. 1991. "Accounting for the Slowdown in Black-White Wage Convergence." Pp. 107-143 in *Workers and their Wages.*, edited by M. Kosters. Washington, DC: AEI Press.

Lucas, Samuel R. 2001. "Effectively Maintained Inequality: Education Transitions, Track Mobility, and Social Background Effects." *American Journal of Sociology* 106(6):1642-1690.

McFadden, Daniel. 1974. "Conditional Logit Analysis of Qualitative Choice Behavior." Pp. 105-142 in *Frontiers in Econometrics.*, edited by P. Zarembka. New York: Academic Press.

Okun, Barbara S. and Dov Friedlander. 2005. "Educational Stratification among Arabs and Jews in Israel: Historical Disadvantage, Discrimination, and Opportunity." *Population Studies* 59(2):163-180.

Reimer, David and Reinhard Pollak. 2005. *The Impact of Social Origin on the Transition to Tertiary Education in West Germany 1983 and 1999.*Mannheimer Zentrum für Europäische Sozialforschung Mannheim.

Roksa, Josipa and Tania Levey. 2010. "What can You do with that Degree? College Major and Occupational Status of College Graduates Over Time." *Social Forces* 89(2):389-415.

Van de Werfhorst, Herman G, Nan D. De Graaf and Gerbert Kraaykamp. 2001. "Intergenerational Resemblance in Field of Study in the Netherlands." *European Sociological Review* 17(3):275-293.

Yaish, Meir. 2001. "Class Structure in a Deeply Divided Society: Class and Ethnic Inequality in Israel, 1974-1991." *The British Journal of Sociology* 52(3):409-437.

End Notes

[1] Even in countries where college applicants do not generally choose a major at the application stage, as in the US, preferences regarding fields of study (and future occupations) shape applicants' decisions about educational attainment (Altonji, Blom, and Meghir 2012; Schneider and Stevenson 1999). However, field of study preferences cannot be observed directly at the application stage in these settings—rather, the only information that surveys and college administrative data provide is regarding "intent to major" and "declared major."

[2] They consist of about 15 percent of the Jewish population. There were also two small waves of immigration from Ethiopia during this period.

[3] This scheme distinguishes between native-born Israeli Jews with a native-born father; native-born Israeli Jews with a father born in Asia or Africa; native-born Israeli Jews with a father born in Europe or America; immigrants from Asia or Africa; and immigrants from Europe or America.

[4] Today, almost 40 percent of the age cohort of potential university applicants is third-generation Jews (Israel Central Bureau of Statistics (ICBS) 2010b).

[5] In this conditional fixed-effects logit regression (see Eq. 1), the dependent variable, y, is the most lucrative major listed by each applicant, and the key independent variable, z, is the major's expected salary. The specification compares the magnitude of this effect to the effect of other characteristics of a major: academic score (average standardized composite score among enrolled students), percent female (percent of females among enrolled students), and graduation rate (the percent of enrolled students that graduate). All variables are standardized to facilitate the interpretation of the results.

$$(1)\ \ Pr(y_i = j|\boldsymbol{z}_i) = \frac{\exp(\boldsymbol{z}_{ij}\gamma)}{\sum_{j=1}^{j}\exp(\boldsymbol{z}_{ij}\gamma)}, \quad j = 0,1,\dots,J$$

Table 1: A classification of ethnic origin of the Israeli universities applicant pool, 1999-2002

Origin Group	Generation	Definition	Applicants 1999-2002 (%)
ISR / ISR	3rd	Two native-born parents	33.2
AS-AF / ISR (veteran "Mizrachi")	2nd-3rd	One native-born parent and one from Asia or Africa	9.5
EU-AM / ISR (veteran "Ashkenazi")	2nd-3rd	One native-born parent and one from Europe or America	13.8
AS-AF / AS-AF (2nd generation "Mizrachi")	2nd	Both parents from Asia or Africa	10.6
EU-AM / EU-AM (2nd generation "Ashkenazi")	2nd	Both parents from Europe or America	9.1
AS-AF / EU-AM	2nd	One parent from Europe or America and one from Asia or Africa	3.2
Immigrants from FSU	1st	Immigrants from former USSR countries	13.7
Immigrants - others	1st	Immigrants from other countries	6.9