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Staying in STEM or changing course: Do natives and immigrants pursue the path of least resistance?



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ABSTRACT

This paper examines why Science, Technology, Engineering and Math (STEM) fields are becoming “immigrant” fields of study as native students shift from STEM fields to law, medicine and business. Using data from the 2010 National Survey of College Graduates, the analyses find that foreign college-educated immigrants with STEM degrees tend to remain in STEM fields, while natives are more likely to shift from STEM fields to law, medicine and business in graduate school. Among those who moved into law, medicine and business, the gains in earnings are larger for natives than for foreign educated immigrants. These results have important implications for the social mobility of highly educated natives and immigrants.

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1. Introduction

The restructuring of the U.S. economy has changed the relative prestige of occupations since the 1970s. As manufacturing and defense spending has declined, engineers and other workers in technical and scientific fields have seen a slowdown in earnings growth (Bernhardt et al., 2001; Lee and Mather, 2008). In contrast, with the rise of the service sector over the same period, office-based occupations, especially business professionals and managers outside of scientific or technical fields, have gained in prestige and wages (Bernhardt et al., 2001).

Individuals have responded to these trends, especially at the graduate or professional degree level. In 2012,¹ natives' share of all doctoral degrees in the United States was 72.8%, but their share of engineering, math and statistics, and physical sciences PhDs was only 44.2%, 51.0%, and 59%, respectively.² Vacancies in these Science, Technology, Engineering and Math (STEM) fields at the graduate level tend to be filled by highly skilled immigrants who obtain their graduate degrees in the United States. It is especially advantageous for them to pursue STEM fields after immigration because these fields are characterized by universal knowledge and skills that are highly transferable across national contexts. The high transferability of skills means

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¹ Source: Tables 7–4 from special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2002–12 (National Science Foundation, 2013). <http://www.nsf.gov/statistics/wmpd/2013/pdf/tab7-4.pdf>.

² The leak of natives from the science pipeline starts in the transition between college and graduate school. In 2012, natives' share of all undergraduate degrees was 96.7%, and their share of engineering, math and statistics, and physical sciences undergraduate degrees was 92.4%, 90.5%, and 95.3%, respectively (National Science Foundation, 2013). As these statistics show, at the undergraduate level, natives are not as under-represented in STEM fields as they are at graduate level. http://www.nsf.gov/statistics/wmpd/2013/pdf/tab5-7_updated_2014_05.pdf.

that their undergraduate degrees will be less discounted in the United States than non-STEM degrees. Furthermore, due to a high demand for STEM workers, the U.S. government and many graduate schools have established preferential immigration and school admission policies to recruit foreign scientists, making the barriers in these fields smaller than in non-STEM fields.

Although there is an intense effort to recruit and retain native STEM students in the “science pipeline,” the outcomes have been less impressive when compared to recruiting and retaining immigrant STEM students. This may be due to the fact that, unlike their immigrant counterparts, many natives regard STEM training as a stepping stone to a law, medicine or business field (hereafter “professional fields”). Because professional fields have become more advantageous in terms of earnings growth than STEM fields and other non-professional fields (Bernhardt et al., 2001), individuals who take advantage of the flexibility of the U.S. education system and make the switch may enjoy substantial economic mobility. The growing advantage of professional fields over STEM fields at the same time indicates that persistence in a certain STEM pathway may not be as desirable as previous literature suggested (Bair and Haworth, 2004). Although shifting from STEM to professional fields of study may disrupt the educational pathway to some extent, it may also produce a better match between one’s interests, abilities and expertise, and eventually lead to a more prestigious occupation. If natives and immigrants tend to take different pathways in the transition following undergraduate education, these differences may have a profound impact on their economic mobility. Immigrants’ higher probability of majoring in STEM and persisting in STEM fields may limit their chances of economic mobility.

In this paper, I seek to answer the following questions: Are there differences between native and immigrant STEM students in remaining in the undergraduate field of study, when they continue to pursue graduate education in the U.S.? Are there differences between natives and immigrants in shifting from a STEM undergraduate field to a professional field? If natives and immigrants both shifted from a STEM field to a professional field, do they have higher earnings than graduates from other fields, and are the earnings premiums the same for natives and immigrants? Results show that foreign educated immigrants have a higher probability of remaining in STEM pathways and a lower probability of shifting to professional pathways compared with their native counterparts. Further, even when they shifted to a professional pathway, they have smaller earnings gains compared with native professionals. The findings contribute to the literature of horizontal stratification in higher education by emphasizing on the dynamic aspect of field of study, namely, how the exits and entries into a different field of study later in one’s educational career affect social mobility. The paper also contributes to the literature of immigrant assimilation by comparing not only different levels of education that immigrants and natives attained, but also the specific area of expertise they were channeled into. It shows that fields of study differ in their degrees of social closure, their potential to facilitate immigrants’ economic mobility, and furthermore, their potential to assimilate immigrants culturally.

2. Literature review

2.1. The flexibility of the U.S. higher education system

Shifting to another course of study can be the result of changing preference or a choice based on openings in the education system and the labor market. Either way, they are made possible by a flexible higher education system in the United States. Shifting between two fields of study is but one example of the freedom of movement in the U.S. education system, where large numbers of students move in, out and between institutions, and exit and re-enter higher education. The emphasis on individual autonomy, choice and range of curricular options sets the United States apart from most other educational systems in the world (LeTendre et al., 2003), and makes shifting between two fields of study a common practice.

For many in this system, undergraduate education is perceived as more of a time to explore one’s options than to choose a career. Students are free to explore multiple interests. As graduate school becomes an increasingly common choice after completion of an undergraduate degree, changing fields of study in graduate school can be regarded as a further exploration toward adulthood (Arnett, 2000). As a result, graduate fields of study may be more directly related to individuals’ occupational aspirations and should better reflect their understandings of the labor market conditions. Admittedly, field of study reflects one’s expectation of future occupations and earnings, but also his or her interests and preferences (Beffy et al., 2012) for certain types of knowledge. However, the purpose of a college degree nowadays leans more toward its labor market returns (Berrett, 2015). Thus the current study talks about changes of field of study in terms of a strategic response to labor market conditions, although it acknowledges that the changes may also be due to changing interests and preferences.

2.2. Human capital transferability and immigrants’ retention in “the science pipeline”

As college enrollment expands, educational stratification is characterized by different labor market returns to types of education as much as to levels of education. This difference in returns to types of education is called “horizontal stratification” (Charles and Bradley, 2002; Gerber and Cheung, 2008). Field of study and college selectivity are two well-established horizontal mechanisms that make returns to college degrees different. But for immigrants who earned their college degrees abroad, there is a third mechanism that discounts their foreign college degrees. A degree earned abroad may not be considered equal to, or as good as, one earned in the United States and is not fully transferable to the U.S. education system or the labor market. Thus human capital transferability is another contributor to the horizontal stratification between natives and immigrants. Previous

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