

**IMMIGRATION POLICY AND INTERNATIONAL STUDENT MIGRATION
IN THE UNITED STATES**

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Abstract

Prior research has noted several instances when immigration laws and policies might impact the migration patterns of international students; however, the effort to link international student research with the broader study of migration remains limited. One key limitation is the lack of data on international students that encompass multiple destinations or multiple time frames. As King and Raghuram (2013: 132) noted a recent review, “a more sophisticated quantitative analysis [...] is also necessary if any kinds of causal relations are to be established.”

Accordingly, I curated the best available data on international students in the United States, through a Freedom of Information Act request and two restricted data licenses, which would enable large-scale analyses of international student migration patterns. My overarching hypothesis is that international students are vulnerable to the negative impacts of U.S. anti-immigration policies, both at the federal and the state level, because of their unique status as “side-door immigrants,” an in-between status between “desirable” and “undesirable” immigrants.

I examine empirical evidences of international students’ vulnerability with three analyses. First, I consider whether and how U.S. states’ anti-immigration policy may have spillover effects on the enrollment patterns of international students. Second, taking a historical view of changes in U.S. immigration policies since 1986, I consider how policy changes towards a crimmigration regime impact international students’ ways of staying, i.e., their transitions into subsequent migration statuses. Third, contributing to the understanding of localities as unique immigration destinations within the United States, I provide a baseline estimate—the first of its kind—of lifetime retention of international students in their first study location, relative to other U.S.-educated immigrants. My results suggest that international students are indeed vulnerable to anti-immigration policies. By destabilizing the discrete categorization of immigrants, the “side door” framework facilitates future efforts to theorize and analyze unintended, or spillover, policy effects. This is essential for understanding the experiences of all temporary immigrants at the side door relative to policy change.

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Chapter 1. Introduction

In October 2015, *The New York Times* ran a story on the growing number of international students “finding American dreams” in Flint, Michigan (Young 2015). On one hand, this is surprising because, in many ways, Flint is the opposite of what comes to mind when one thinks of major destinations for international students. Flint, a city 60 miles northwest of Detroit, does not house a world-class university, and is perennially in the news for issues and problems related to public safety and services, including, most recently, high lead levels in the city’s water supply (Haimerl and Goodnough 2016). On the other hand, international students’ reason for choosing Flint is simple: they see a relatively affordable opportunity to pursue an education in the United States, which, in turn, might lead to employment and permanent residence in the country.

In many ways, the story of Flint echoes the experiences of several U.S. states and cities in the past few decades. Places that have little to no experience with international education, and with international migration generally, are getting a relatively large influx of students (Frey 2005; Massey and Capoferro 2008; N. Ruiz 2014). Against the backgrounds of consistent and severe cuts in public funding to higher education (e.g., see Slaughter and Rhoades 2004) , international students who typically pay full tuition and fees provide an important source of income for American universities and colleges to balance the coffers. The influx of international students, as such, has been welcomed as an important economic force that helps supporting not only higher education institutions but also local economies.

The positive economic aspects of international student have thus motivated U.S. states to adopt policies to attract and retain international students, forming organizations such as Study Alabama and Study Minnesota. These are international education consortia (IEC), which are formal partnerships between the state governments and local universities and colleges, to attract international students. To date, IEC are active in 24 U.S. states. In terms of retention, a number of U.S. cities, such as Detroit, Michigan and St. Louis, Missouri, and one U.S. state, Ohio, introduced policies to facilitate the transition from international education to employment or entrepreneurship (Etzcorn and Tobocman 2016; Farkas 2015; Khalid 2017).

Alongside positive policies for attraction and retention, the story of Flint also exposes several problematic connections where international students brush against immigration laws and policies. The first connection is the idea of *international student as a “semi-finished” immigrant* (Khadria 2001). Similar to how international students in Flint expressed their desire for becoming skilled immigrant workers in the United States, several studies have defined international students as future skilled immigrants who are on a “study-migration” pathway (Findlay et al. 2016; Hawthorne and To 2014; Robertson 2013). In other words, they emphasize international education as a process in which (some) students become skilled immigrants, if they choose to do so after graduation. The limitation of this idea is that it neglects the experience of international students as immigrants *during* the pursuit of education. Although international students spent several years living in a foreign country, they do not fit neatly into any category of immigrants. For example, international students are authorized to work part-time, but they are not fully labor immigrants (Findlay et al. 2016). Due to this conceptual shortcoming, existing

research has remained silent about how social and political structures that regulate immigration, such as immigration policies, are linked to the migration patterns of international students (King and Raghuram 2013, 2013; Riaño, Van Mol, and Raghuram 2018). There are nascent concerns that an increasingly restrictive immigration policy context, both in the United States and in other developed immigrant-receiving countries around the world, will scare incoming international students away (Riaño, Lombard, and Piguet 2018; Wermund 2018), yet these claims remained untested.

The second connection is the idea of *international students as individuals of “doubtful” values* (Riaño, Van Mol, et al. 2018). As the majority of international students comes from less developed countries, and some are seeking a more permanent stay through employment, prior research has noted public and political discourses of international students as law-circumventing individuals who will likely overstay their welcome (Levatino et al. 2018; Lomer 2018). Doubts are heightened as some students manage to stay through unexpected paths. For example, although international students are typically expected to transition to employment for permanent stay, a study in 2010 finds that most international students who become legal permanent residents in the United States do so via marriage with a U.S. citizen (Jasso et al. 2010). Others chose to start their international education early, such as in non-degree English intensive programs in the United States, hoping that more exposure to the U.S. education system and culture will enhance their chances at future education and migration (Clark 2012; N. Ruiz 2014). These “doubtful” strategies have been used to advance the political agenda for evermore invasive immigration enforcement efforts against students (e.g., see Feinstein 2011).

The third connection is that *international students likely impact multiple destinations*. When international students show up in Flint, the concern is whether and how Flint can absorb these future skilled immigrants, thus assuming that they do not intend to move elsewhere within the United States. A few studies have pointed out that this mode of binary thinking (stay or leave) is limited, highlighting the increasingly interconnectedness of student-receiving destinations. For example, in a study of international students in Europe, Van Mol (2013) finds that international students dispersed across countries in the European Union after graduation, oftentimes ending up in countries that are neither their home nor their education destination. To date, it is unclear what factors are implicating these onward migration patterns.

Researchers who study international student migration are well-aware of these connections; however, the effort to link international student research with the broader study of migration remains limited. The gap between two lines of research is increasingly consequential, as international students are one of the fastest growing groups of immigrants globally in the past few decades (Findlay 2011; Kritz 2006). At the same time, restrictive immigration policies are spreading both globally and at several sub-national units (Bhagwati 2003; Czaika and de Haas 2013; Stumpf 2007), casting a shadow of fear over international students whose migration intentions remain dubious in the eye of policy-makers.

One key limitation is the lack of data on international students that encompass multiple destinations or multiple time frames. Qualitative studies have given depth and complexity to the students' experiences and their subjectivities, however, as King and Raghuram (2013: 132) noted a recent review of the literature, "a more sophisticated

quantitative analysis [...] is also necessary if any kinds of causal relations are to be established.” Such an effort will also provide important insights for policy debates in both international education and migration.

Accordingly, my work in this dissertation uses a quantitative approach to shed light on the reality of international student migration. As I bridge the gap between international student research and the broader study of migration and of migration policies, my goal is to incorporate some theoretical complexity around international students that qualitative research has uncovered, while analyzing large-scale and representative samples of international students. In the process, I also curated the best available data to date on international students in the United States, through a Freedom of Information Act request and two restricted data licenses.

In three empirical chapters, which I develop as stand-alone research papers, I address three questions on the relationship between migration policies and migration patterns of international students in the United States. First, I consider whether and how U.S. states’ anti-immigration policy may have spillover effects on the enrollment patterns of international students. Second, taking a historical view of changes in U.S. immigration policies since 1986, I consider how policy changes towards a crimmigration regime (Beckett and Evans 2015; Stumpf 2008) impact international students’ ways of staying, i.e., their transitions into subsequent migration statuses. Third, contributing to the understanding of localities as unique immigration destinations within the United States (Frey 2005; Kritz, Gurak, and Lee 2011; Massey and Capoferro 2008; Singer, Hardwick, and Brettell 2008), I provide a baseline estimate—the first of its kind—of lifetime

retention of international students in their first study location, relative to other U.S.-educated immigrants.

Drawing from crimmigration research (Beckett and Evans 2015, Stumpf 2008) as well as studies of spillover policy effects (Aranda, Menjívar, and Donato 2014), my overarching thesis is that international students are vulnerable to the negative impacts of U.S. anti-immigration policies, both at the federal and the state level, because of their unique status as “side-door immigrants,”¹ a theoretical concept I elaborate in Chapter 2. If legal permanent residents (LPRs) are welcomed into a country through a front door, with a clear path to citizenship and full right to stay, while undocumented immigrants are perceived as slipping through a back door, circumventing border control efforts, then international students are somewhere in between. I further place different types of international students on a continuum of desirability, indicating their proximity to either the front or back door. Using this conceptual framework, I argue that being a “side door” immigrant for several years makes international students susceptible to spillover effects from restrictive immigration policies. This is manifested in the students’ resulting migration patterns, including their choice of first study destination, their pathways towards the front door of immigration, and their onwards migration patterns within the United States. In Chapter 2, I deploy a unique set of data containing enrollment in pairs of 113 origin countries and 51 U.S. destination states over a 15-year period, and my statistical analysis confirms the negative spillover effects of anti-immigrant state-level policies on enrollment.

¹ This analogy is borrowed from research that demarcates different spaces of immigration status (e.g., see Zolberg 1989).

While Chapter 2 focuses on the enrollment of new international students, in Chapter 3 and 4, I turn my attention to stayers and examine patterns of long-term international student retention. Chapter 3 is devoted to understanding the factors that sort student-stayers into different migration statuses: temporary visa, LPR, and naturalized citizenship. I examine these long-term migration outcomes over two dimensions: entry cohorts and educational trajectories. Borrowing the age-period-cohort analysis framework from life course research (Keyes et al. 2010; Luo 2015; Ryder 1965), I propose that one way to examine the changing meaning of migration status relative to the national policy context is to consider how status composition varies by the timing of first entry, or *variation by entry cohort*. My analyses reveal that student-stayers who enter the United States in periods with more restrictive national policy context are more likely to obtain LPR status, signifying a defensive move to affirm their right to stay in volatile policy context.

In Chapter 4, I consider to a broader phenomenon: the retention of foreign-born students in new U.S. destination states. Several U.S. new destination states, which have little to zero experience with hosting immigrants, have invested in the efforts to retain international students as skilled workers. My statistical analysis in this chapter establishes a baseline expectation, providing a historical view of foreign-born student retention before these policies came into action. Using a nationally representative sample of foreign-born students among U.S. scientists and engineers, I find that more than half of U.S. foreign-born students leave their first study location, and former international students are particularly more likely to leave. These fluid patterns of onwards migration suggest that state retention policies could be fruitful, not only in retaining their own

students, but also attracting students from other destinations, especially when they provide a pathway for international students to transition into employment.

I conclude the dissertation with a discussion of the implications of the three studies for our understanding of international student migration relative to the broader immigration policy contexts. In particular, the fluid nature of the international student status provides an important opportunity to recognize and remedy the rigid understanding of immigrant categories as discrete and separate. By dispelling the rigid categorization, this work advances the field away from the historical obsession with the social, economic, and political dimensions of migration (King 2002, Findlay et al. 2016, Hollifield 1992) and into a more nuanced understanding of immigrants' lived experiences.

Chapter 2. Will they come anyway? Effects of U.S. state immigration policies on international student enrollment, 2001-2015.

2.1 Introduction

Anti-immigration rhetoric and harsh policies following the 2016 U.S. presidential election sparked debates over the negative spillover effects of such discourses and actions on international student enrollments in American universities and colleges (Wermund 2018). A sharp decline in college applications from overseas students was documented for the 2016-17 academic year (AACRAO 2017; Smith 2017). In the same year, enrollments of international students suffered a 3.3% drop—a slight yet alarming decline, as it ended a steady 12-year period of growth (Bothwell 2018; IIE 2017). Such news raise concerns that anti-immigration policies may cause students to abandon the United States for other study destinations.

While recent federal actions are currently in the news, the debate echoes similar earlier concerns about harsh immigration policies at the state level. In 2010, when Arizona passed SB 1070, a state law that criminalizes undocumented immigrants and allows the police to check the immigration status of anyone suspected of being undocumented, University of Arizona president Robert Shelton opined that the law could impact the “health and safety of our international students” and undermine efforts to attract “the best and brightest students to Arizona” (Kotok 2010). He, like others (Archibold 2010), took issue with the immigrant profiling and discrimination likely to emerge from the harsh law.

These concerns highlight important, yet unresolved, questions for research on anti-immigration policies—namely, *whether and how such policies have spillover effects on immigrants that states are trying to attract*. Two lines of research offer opposite predictions of anti-immigration policies’ effect on international student enrollments. Theories of immigrant selection (Borjas 1987; Chiswick 1999; Sjaastad 1962) posit that policies can selectively target distinct groups, simultaneously deterring “undesirable” immigrants (such as poor, undocumented ones) while attracting “desirable” ones (such as graduate students attending major universities). From this perspective, other incentives for desirable immigrants should outweigh anti-immigration policies. In contrast, much research on immigration enforcement policies in the U.S. has documented several ways policies aimed at policing, criminalizing, and punishing undocumented immigrants generate tensions and hostilities towards the immigrant population as a whole (Allen and Ishizawa 2015; Coleman 1988; Filindra, Blanding, and Coll 2011; A. Leerkes, Varsanyi, and Engbersen 2012; Varsanyi et al. 2012). These tensions and hostilities can cause immigrants to flee those states and cities (Ellis, Wright, and Townley 2016). Adopting this logic, it is not difficult to imagine that anti-immigration policies could cause a decline in international student enrollments.

I argue that the key to resolving these two conflicting perspectives lies in recognizing that legal status and immigrant desirability do not overlap perfectly. In this chapter, I adopt the definition of international students as “student-migrants” (King and Raghuram 2013), which prioritizes their lived experiences as temporary immigrants

while pursuing education in a foreign country.² Drawing from research that demarcates different spaces of immigration status (e.g., see Zolberg 1989), I develop a framework for “the side door of immigration,” which denotes the fluid space that temporary immigrants occupy. If legal permanent residents are welcomed into a country through a front door, with a clear path to citizenship, while undocumented immigrants are perceived as slipping through a back door, circumventing border control efforts, then international students are somewhere in between: the side door. One could view students as future skilled immigrants (L. Hawthorne 2010; Hazen and Alberts 2006; Khadria 2001; King and Raghuram 2013), which means they are often encouraged to transition towards legal permanent resident (LPR) status, or the front door, if they choose to stay. However, any visa violation formally pushes students towards the back door of undocumented status. I argue that being at the migration side door for several years contributes to international students’ vulnerability, making them particularly susceptible to negative spillover effects from state anti-immigration policies.

In this chapter, I empirically test this idea by assessing the impact of both student recruitment programs (international education consortiums, or IECs) and anti-immigrant policies, in the form of Omnibus Immigration Legislation (OIL), on international students’ choices of study destinations in 50 U.S. states and the District of Columbia (hereafter, 51 states). I study international student enrollments from 2001 to 2015 using a unique longitudinal data set constructed from student visa information. Results from negative binomial regressions support the idea of a spillover effect of anti-immigrant policies. My findings indicate that state IECs are not associated with increases in

² Duration is typically longer than one year, which fits the statistical definition of a migrant.

international student enrollments, net of other factors. State OILs, however, are associated with declining student enrollments over time.

To further unpack the analogy of the side door in the context of this chapter, I use the idea of the “best and brightest” (Kapur and McHale 2005) to consider students’ proximity to the front or back doors along a desirability continuum based on two factors: their prestige and their skill. *Prestige* refers to the reputation of the schools in which international students are enrolled. *Skill* refers to the degree(s) being pursued. A student who is enrolled in a high prestige school for a graduate degree is thus closer to the front door of immigration. In contrast, a student who attends a non-degree program at a low prestige school is closer to the back door. Partially supporting this theoretical idea, my findings show that only the very top students enrolled in prestigious graduate programs are insulated from the spillover effect of state immigration enforcement policies. This is concerning because other enrollments, including graduate students outside of top schools and undergraduate students in prestigious schools, decline following the adoption of OIL.

2.2 Background

2.2.1 International students & state recruitment policies

The number of international students in the United States has increased rapidly in the past two decades, surpassing one million in the 2015-16 academic year (Institute of International Education (IIE) 2016). Further, the number of places and institutions of higher education hosting international students has also expanded. Enrollment has grown

rapidly in states that do not have prior histories with global education, such as Alabama or Nebraska (N. Ruiz 2014).

U.S. states have an interest in recruiting international students because of their short- and long-term economic contributions to state economies. Public colleges and universities have faced multiple severe budget cuts in the past few decades (Slaughter and Rhoades 2004), and international students—who pay full tuition and fees for their entire degree duration³—provide much-needed profits to help balance university coffers. Some policymakers further comment on how students contribute to the state economies via their consumption while studying (Fischer 2011). If they chose to stay, students also have the potential to become high-skilled laborers and entrepreneurs, who can integrate more easily into a state’s social and cultural fabric than complete newcomers (L. Hawthorne 2010; Hazen and Alberts 2006; Lloyd 2014; Seitz 2014). Additionally, internationalization—the process of integrating international dimensions into higher education—has become a bigger part of many university ranking schemes (Altbach and Knight 2007; Stromquist 2007); thus, having more international students can help to boost school rankings.

Not surprisingly, and for a host of reasons, U.S. states began adopting policies to encourage international student enrollment as early as 2003. These typically take the form of an “international education consortium” (IEC), which is a formal partnership between state governments⁴ and their local institutions of higher education. These partnerships form the basis for outreach efforts, often pooling resources to represent the

³ The amount is similar or higher than out-of-state tuition, but unlike Americans, international students cannot convert to resident tuition brackets.

⁴ Typically, the state department of economics and/or the state department of international trade.

state as a unique destination to potential students (Fischer 2011). When a state IEC reaches out to international students, e.g., at recruitment events, they seek to convince students to come to their state, and not others. To date, 24 U.S. states have established IECs, including both traditional international student destinations, e.g., such as California, and new destinations like Minnesota and Iowa. Despite the growth of IECs, their effectiveness has never been systematically examined.

2.2.2 International students and state immigration enforcement policies

In the past two decades, U.S. states have also become more involved in efforts to curb undocumented immigration, giving rise to several state immigration enforcement policies that create unwelcoming and sometimes hostile contexts for immigrants (Allen and Ishizawa 2015; Coleman 1988; Filindra et al. 2011; A. Leerkes et al. 2012; Varsanyi et al. 2012). While the admission of immigrants remains under the authority of the federal government, state immigration policies influence immigration enforcement (Stumpf 2008; Varsanyi et al. 2012). Some states have introduced verification obstacles for immigrants seeking employment or public services (Rosenblum and Hoyt 2011) and, for children of immigrants, access to public education (Filindra et al. 2011). These initiatives cumulate into a phenomenon called “borders behind the border” (Leerkes, Bachmeier, and Leach 2013; Arjen Leerkes, Leach, and Bachmeier 2012), as they make life so difficult for immigrants and their families that immigrants may choose to “self-deport.” Research has found no consistent effect of those policies on the undocumented immigrant population (e.g., see Massey 2013); yet there is some evidence for spillover effects, such as resulting racial tensions pushing Latino immigrants, including documented ones, away

from such states (Amuedo-Dorantes and Pozo 2014; Bohn and Pugatch 2015; Ellis et al. 2016).

Omnibus Immigration Legislations (OILs), spearheaded by Arizona SB 1070, stand above the rest as the “toughest” (Archibold 2010), rivaling the forms of anti-immigration rhetoric and policies pushed by the Trump administration. OILs criminalize immigrants’ failure to produce documentation of legal status, meaning it is a crime if one forgets to bring their passport and relevant forms with them at all times. Further, as critics have pointed out, these laws inevitably lead to racial profiling of non-citizens (Nier et al. 2012; Romero 2006; Sadowski-Smith and Li 2016; Selden, Pace, and Nunn-Gilman 2011). Given their wide reach and potentially criminal implications, these laws could have a negative spillover effect on international students, as noted by University of Arizona president Robert Shelton. While its detrimental effects continue to be debated, legislation similar to SB 1070 has subsequently been enacted in Alabama, Georgia, Indiana, South Carolina, and Utah in recent years (Wallace 2014). Notably, some states, such as Alabama, have both OIL and IEC.

2.3 The side door of immigration: How does migrant desirability overlap with legal status?

Modern policy regimes in major immigrant-receiving countries tend to center on two goals: attract desirable immigrants *and* deter undesirable ones (Bhagwati 2003; Castles 2004). Immigrant desirability is often conflated with legal immigration status; as reflected in the language of President Clinton (1993: 1194), the U.S. “must say no to

illegal immigration so we can continue to say yes to legal immigration.” Accordingly, decades of research have examined policies examining *each* of the two goals, namely the success of policies to attract skilled immigrants (e.g., see Antecol, Cobb-Clark, and Trejo 2014) and the (in)effectiveness of deterrence policies (e.g., see Massey 2013). There is surprisingly little research on how the two goals might be at odds with each another.

In this chapter, I argue that the gap in research results from thinking of desirability and legal status as discrete concepts. A growing number of immigrants, such as international students and guest workers, live and work on U.S. soil without permanent immigrant status (Lowell 2001). Although these immigrants—legally categorized as non-immigrant visitors, or NIVs—are welcomed, their rights to work and stay are much more limited than those of LPRs. NIVs can make the U.S. their permanent home by becoming LPRs, but the process is typically plagued with mounting requirements, obstacles, and delays (Jasso et al. 2010; Lowell and Avato 2014). To the extent that desirability is a moving array of requirements and becoming an LPR is a lengthy process, I argue that considering the two as overlapping continua helps elucidate the conditions of international student migration.

To capture how these two continua overlap, I propose the concept of “the side door of immigration” to demarcate the space that international students and other NIVs occupy while being in the United States. A similar analogy of doors is sometimes used to describe different groups of immigrants according to the legality of their immigration statuses at entry (Cornelius et al. 1994; Zolberg 2008). As shown in Figure 2.1, LPRs come through the front door, meaning they have full rights to stay and naturalize into U.S. citizenship. Undocumented immigrants come through the back door and stay

without an authorized legal status. Those entering through the side door hold NIV status. Since the early 1990s, the number of side-door immigrants in the United States has been growing in both number and complexity (Castles 2000; Lowell 2001).

---FIGURE 2.1 HERE---

Importantly, Figure 2.1 shows that legal status and immigrant desirability do not overlap perfectly. The line that demarcates authorized status includes immigrants both at the side door and at the front door. Desirability, as indicated by the shaded bar – where a lighter shade means more desirable – shows the extent to which a temporary immigrant is welcome to become a permanent member of the host society. Most countries want more high-skilled workers, and to some extent, “the best and brightest” international students (Kapur and McHale 2005). Low-skilled workers and asylum seekers are much less welcome to stay (Hatton 2009; Hollifield 2004). Asylum seekers who are granted Temporary Protected Status (TPS) can live and work in the United States, but only temporarily (Warren and Kerwin 2017). Although the current chapter focuses on international students, the side door of immigration has relevance for understanding the experiences of other categories of migrants who hold “in-between” statuses.

Within the side door, Figure 2.1 shows four examples of NIVs on the continuum of desirability, ordered by their proximity to the front door: high-skilled workers, students, low-skilled workers, and asylum seekers. Proximity to the front door indicates how easily a migrant can transition into permanent immigrant status. Studies of international students sometimes refer to this process as a “two-step migration” (L. Hawthorne 2010), or an “education to migrate” pathway (Baas 2010; Robertson 2013).

While at the side door, students also risk falling into the back door: for example, any criminal offense will lead to visa revocation.⁵ Thus, side-door immigrants experience both an opportunity to transition towards the front and a risk of falling into the back door. While it is debatable whether all LPRs are “desirable” and all undocumented immigrants are “not desirable,” I did not include the front and back doors of immigration in the desirability continuum, because desirability does not impact immigrants’ current and future status in these two spaces. LPRs can become naturalized U.S. citizens with few additional requirements (Bloemraad 2006a), while undocumented immigrants have limited paths to legal status, regardless of their actual skills or education credentials (Donato and Massey 2016). Thinking about desirability as a continuum between the front and back door of immigration enables us to understand the predicament of international students relative to both the front and back door. In the U.S. case, as the effort to tighten the back door intensifies, ripple effects might touch those at the side door.

Further, this continuum also operates within immigrant groups, such that desirability, marked by immigrants’ potential contributions to U.S. society, further differentiates international students by at least two additional dimensions: skill and prestige. As shown in Figure 2.2, *skill* is reflected in the degrees the students are seeking, and *prestige* refers to their schools’ reputations. Graduate students pursuing Doctorate and Master’s degrees meet the typical definition of skills based on education credentials (e.g., see Czaika and Parsons 2017). Thus, they might have a better chance at securing employment and transitioning towards LPRs, if they choose to stay. It is estimated that

⁵ Students who leave due to visa revocation are typically unable to enter again through the side or front door.

between 50 and 70 percent of international doctoral students stayed in the United States after graduation (Finn 2014). Students seeking Bachelor's degrees are in the middle, while students in non-degree programs are closest to the back door.

---FIGURE 2.2 HERE---

The first quadrant (Q1) includes students in the highest degrees attending high prestige schools. This group is closest to the front door. The fourth quadrant (Q4) represents students with the lowest skills in low prestige schools. This group is closest to the back door. The second and third quadrants (Q2 and Q3) represent those in the middle, who are neither closer to the front nor back door.

2.4 Immigration enforcement policies and spillover policy effects

2.4.1 Crimmigration and immigrants' vulnerability

Using the side door continuum, it is then possible to connect international students to potential spillover policy effects. As U.S. states and localities became increasingly active in making their own immigration enforcement policies, several studies have warned about their negative effects on the overall immigrant population (Aranda et al. 2014; Leerkes et al. 2013). The effects of policies for specific groups of migrants are less clearly theorized (Armenta 2017), although many studies have focused on the case of Latinx immigrants, suggesting that racial profiling is an inevitable outcome of enforcement policies and is the main culprit for creating an "underclass" of immigrants (Massey and Pren 2012a:15) vulnerable to discrimination (Ellis et al. 2016; Hernández 2008; Romero 2006).

With the side door analogy, this chapter connects the idea of vulnerability to one's legal status as a documented but temporary migrant. I further draw on the concept of "crimmigration," which denotes the integration of the criminal justice system into the immigration enforcement system in a quest to deport "criminal aliens" from U.S. soil (Beckett and Evans 2015; Stumpf 2008). International student's temporary migrant status makes them vulnerable in encounters with crimmigration regimes. This unique form of vulnerability is a potential mechanism for understanding why international students might experience negative spillover effects from anti-immigration policy. Within a crimmigration system, consequences for immigrants who are marked with a criminal record are severe: detention, deportation, and future inadmissibility.⁶ Following deportation, migrants' families are disrupted, their lives upended. Immigrants themselves have few legal protections because due process and many legal provisions available in the U.S. criminal justice system do not apply to non-citizens (Hernandez 2005). On top of immigrant enforcement, the crimmigration system also broadens the list of offenses that criminalize immigrants (Stumpf 2006). Crimes that are deemed minor for U.S. citizens become grounds for detention and deportation proceedings for immigrants (Hernandez 2005).

State OILs go one step further by making it a crime for non-citizens who fail to produce documentation of their legal status when asked by law enforcement. As critics have pointed out, OILs inevitably lead to racial profiling (e.g., see Archibold 2010, Nier et al. 2012). Beyond race, other factors also contribute to a migrant's vulnerability:

⁶ Inadmissibility means that an immigrant with a deportation record will not be able to obtain a new visa if they apply in the future.

whether one speaks a foreign language, whether one speaks English with an accent, one's occupation, one's place of residence, etc. (Romero 2006; Sadowski-Smith and Li 2016; Selden et al. 2011). Recent studies confirm that even documented immigrants are leaving states with OILs (Amuedo-Dorantes and Pozo 2014; Bohn and Pugatch 2015; Ellis et al. 2016), which means that immigrants may avoid certain destinations where they fear being targeted.

Against this backdrop, losing legal status is a highly consequential loss for international students. The risk of visa revocation means that international students might not finish their degree program(s); thus, their financial and time investments are forfeited. At the same time, a visa revocation record makes it difficult, if not impossible, to migrate elsewhere. Similar to other side-door immigrants, international students have limited access to civil, social, and political rights to combat the threat of crimmigration (De Giorgi 2010). In a recent study based on a survey and in-depth interviews, many international students expressed concerns about dealing with U.S. immigration policies that are both complex and restrictive (Han et al. 2015). Students' interactions with the law are further complicated by discrimination, which can happen both on and off campus (Brown and Jones 2013, Hanassab 2006, Lee and Rice 2007).

Even before coming into the United States, existing research suggest that prospective international students are highly agentic in choosing their study destinations, weighing different factors including cost, quality, and lifestyle (Bodycott 2009; Mazzarol and Soutar 2002). With respect to the aim of this chapter, one particularly important expression of agency is avoidance of certain destinations where the policy context is antagonistic. Given that state OILs have a wide reach with severe implications, they

might become a factor in students' considerations. Prospective international students could be aware of state OILs, such as SB 1070, received considerable international coverage: countries throughout Central and South America criticized the law, and two countries (El Salvador and Mexico) issued travel warnings to their citizens traveling to the U.S. (Totenberg 2012). As such, my first hypothesis (H1) predicts that *states that enact an OIL will have lower international student enrollments, compared to its pre-OIL enrollments.*

Further, students with more knowledge of state immigration enforcement policies could likely avoid the hostile contexts. As outreach and promotion are key features of state IECs, they could become unintended channels that make students aware of both the positive and negative conditions. My second hypothesis (H2) therefore predicts that *the effect of OIL will be negative when IEC is present* (that is, a negative interaction effect).

2.4.2 Immigrant selection theories and immigration categorization

With respect to the two sides of the debate, opponents of spillover policy effects focus on the fact that international students who hold proper immigration status should not be worried about immigrant enforcement (for example, see Babones 2017). This view has its roots in the theories of immigrant selection, which provide the null hypotheses for my analysis.

The idea of immigrant selection rests firmly on the distinct categorization of immigrants and how potential immigrants in each category respond to the specific costs and benefits—also known as *pull factors*—of migrating to a specific destination (Bartel 1989; Bartel and Koch 1991; Borjas 1987; Funkhouser and Ramos 1993). The pull

factors relevant to international students, as a category of immigrants, are identified along the primary nexus of their activities in the host society: education, and to a lesser extent, employment. Several studies have examined students' destination-choice, taking countries as distinct destinations, and found that both educational factors, e.g., capacity and prestige of a destination's higher education system, and non-education ones, e.g., economic conditions, have significant impacts on students' destination-choice (Beine, Noël, and Ragot 2014; Bessey 2012; Levatino 2015; Rosenzweig 2006; Shields 2013). Economic conditions matter because many international students work part-time to gain experience and/or to help defray the high cost of international education (Baas 2010; Raghuram 2013), while some also hope to transition towards permanent migration through employment after graduation (L. Hawthorne 2010; Robertson 2013; Wadhwa et al. 2009).

This notion of specificity extends into studies of immigration policies. In particular, economic theories of immigrant selection argue that distinct categories of immigrants respond to policy incentives and disincentives that target them (Borjas 1987, 2016). At the macro level, policies are seen as an instrument to alter the composition of the immigrant population, with the goal to increase *favorable selectivity*, indicated by a higher proportion of high-skilled immigrants (Chiswick 1999). Policies can achieve this goal by making it difficult for all immigrants to migrate, and then lowering the costs only for desirable ones. The point-based systems in Canada and Australia are clear examples of this approach, where only the top-ranked immigrants—based on their professional skills, language proficiencies, and other criteria—are admitted to legal permanent residency (Antecol et al. 2014; Tani 2014). The skilled worker visa (also known as the

H1-B visa) in the United States imposes similar selection criteria, though less explicit and with a more convoluted path towards permanent immigration (Czaika and Parsons 2017; Jasso et al. 2010).

Based on the implicit categorization of international students as a desirable group of immigrants, the immigrant selection perspective would predict that a potential student only responds to policies that directly provide an incentive or disincentive for them. State IECs provide such incentives by equipping students with information about the admission process and living conditions at the destination. As such, theories of immigrant selection predict that: (H3) *IECs have a positive effect on overall international student enrollments.*

The effectiveness of IECs, however, is debatable, as research also distinguishes between “supply-” and “demand-driven” policies (Chaloff and Lemaître 2009). While supply-driven policies, such as a point-based system, tend to set period-specific targets for immigrant admission, demand-driven policies accept as few or as many immigrants that the country needs, for instance, by requiring a job offer prior to granting entry. State IECs resemble demand-driven policies in that they provide only information and minimal support for potential students, with the hope that more students will come. According to current research, demand-driven policies tend to not increase immigration flows (Chaloff and Lemaître 2009; Czaika and Parsons 2017). Accordingly, this perspective provides a null hypothesis for H1, suggesting that *state IECs will not influence international student enrollments.*

Further, as immigrant selection theories rest on the assumption that immigrants only respond to policies that target them, it also provides a null hypothesis for the first hypothesis (H1), such that *state OILs will not influence international student enrollments*. For example, Borjas (2016) argues that policies aimed at stopping lower-skilled workers, and particularly undocumented ones, will not undermine the attractiveness of the U.S. to prospective high-skilled migrants. When both types of policies are present, immigrant selection theories suggest that the incentive policy will fully offset the negative effect of enforcement policy. The fourth hypothesis (H4) predicts that *when OIL and IEC co-exist, international student enrollments will increase or stay the same*.

2.4.3 Heterogeneity among international students

While relatively less common, some critics holding the immigrant selection perspective (e.g., see Babones 2017) argue that “fraudulent” international students, characterized as those attending “phony” schools and non-degree programs (Feinstein 2011), are the only ones who got scared away by harsh immigration policies. In other words, the argument modifies the categorization to include only students with an “earnest” intent to study.

I do not take this argument wholesale, as it would be impossible and unreasonable to generalize a student’s intention based on school prestige and level of education. However, I think this underlying sentiment—judging students as “fraudulent” based on their education programs—might influence student’s destination-choice. If a potential student knows that they will be met with suspicion, they might feel especially more vulnerable of the U.S.’s crimmigration complex, and as such, they might choose to avoid U.S. states whose immigration laws expose them to harsher enforcement efforts. In

section Three and Figure 2.2 above, I have shown that international students can be further divided into four quadrants, which map sub-groups of students to different levels of desirability, and related, their proximity to the back versus the front door of immigration. Stemming from the above perspective, my fifth hypothesis (H5) predicts *a negative spillover effect of state OILs on students closest to the back door, i.e., those in the fourth quadrant (Q4)*. Those in the other three quadrants, who either attend traditional degree programs and/or prestigious schools, are less likely to be viewed as “fraudulent” students, and as such, my sixth hypothesis (H6) predicts that there is *no negative spillover effect on the other three quadrants (Q1, Q2, and Q3) that are closer to the front door*.

2.5 Data and Methods

2.5.1 International student enrollment data

To examine the above hypotheses, this study uses administrative records from the Student and Exchange Visitor Information System (SEVIS) database to capture international student enrollments from 113 different origin countries into 51 U.S. states. I obtained data through a Freedom of Information Act (FOIA) request, filed with Immigration and Customs Enforcement (ICE), an agency under the Department of Homeland Security (DHS).⁷ As every student must obtain a visa to enter the United States, administrative records provide an excellent opportunity to understand the experience of *all* international students. Full coverage of the international student

⁷ In my FOIA request, I asked for information attached to students’ I-20 forms. For international students entering the United States with an F-1 or M-1 visa, the I-20 form contains information about the academic programs that they enroll in. While a student might obtain multiple visas if they frequently exit and reenter the U.S., all records are ultimately tied to a single I-20 form, which is uniquely identified by a SEVIS identification number. This reduces the risk of over-counting enrollments.

population ensures that estimations of policy effects are more reliable, and is also a major advantage over previous studies, which typically rely on non-random and non-representative samples of students (Han et al. 2015; Wadhwa 2016).

While administrative data are excellent in coverage, the acquisition process is uncertain and time-consuming, and the data contain unmeasurable errors (Greenberg 2016; N. Ruiz 2014). Administrative data are not collected for research purposes; therefore, researchers must know the visa-granting and maintenance processes in order to ask for the correct variables. Further, the very structure of the SEVIS database raises additional possibilities for misidentifying the entry location and for over-counting students. SEVIS is constantly updated, meaning that new information is entered as students make changes to their study programs, which can range from major changes (e.g., transferring to a different school) to minor changes (e.g., adding a minor field of study). As such, a snapshot of SEVIS in time could reflect the student's updated location instead of the initial one. To minimize this error, I specifically requested the *initial* record associated with each SEVIS number in order to obtain details on the first education program instead of subsequent ones, and then used each student's program start year as their year of entry.

Additionally, counting enrollments through SEVIS records might be wrong if one student has multiple SEVIS records, which typically happens when a student attends several U.S. education programs and receives one new SEVIS record for each program. To understand this error possibility, I attended professional conferences and training

workshops for school counselors who work with international students.⁸ I learned that schools typically inquire about students' previous U.S. education, and they prefer to use an existing SEVIS number rather than making a new one. At the same time, students are often inclined to provide information on previous U.S. education to improve their chance of visa approval. The extent of this error is unmeasurable, but given practices to ensure consistent records, I believe that its magnitude is small.

Between 2001 and 2015, there were over six million new international enrollments at U.S. schools. Panel A in Figure 2.3 shows annual enrollments, which mostly increased steadily over time. A small number of origin countries and territories are dropped from the analysis because of missing data in the control variables (such as export and import data with the United States); however, the remaining 113 origin countries account for more than 95 percent of overall enrollments. As shown by the distance between the solid and dashed lines in Panel A, the proportion of missing data is less than five percent in any given year.

---FIGURE 2.3 HERE---

To create my dependent variable, *enrollment flow*, which is the annual number of international students coming from a given origin country to a U.S. state, I aggregate records by pairs of origin country and destination state over time. The resulting sample includes 5,763 enrollment flows (113 origin countries x 51 destination states, including Washington D.C.) which are observed through a 15-year period.⁹ Although the overall trend in Panel A shows a steady increase in enrollments, there is much more fluctuation

⁸ These administrative staff are also called “international educators.”

⁹ The number of observation is $5,763 \times 15 = 86,445$ flow-years.

when individual origin-destination flows are considered. Panel B of Figure 2.3 shows annual change to each of the 5,763 origin-destination flows. Between 2001 and 2008, most origin-destination flows of international students become larger. There were large drops in more than half of the origin-destination flows between 2008 and 2009, likely an effect of the global economic recession (Tsiligiris 2012). From 2010 onwards, most flows increased in size, yet a large proportion of flows also became smaller.

For subsequent analyses, I disaggregated total enrollments into eight subgroups based on degree types (Non-degree, Bachelor's, Master's, and Doctorate) and school's prestige.¹⁰ I used a binary variable indicating high prestige, constructed from the Carnegie Classifications (Indiana University Center for Postsecondary Research 2015). A school is considered high prestige if the test score (SAT or ACT) of its incoming freshmen belong to the 80th to 100th percentile of all baccalaureate institutions. High prestige schools include both private schools, e.g., Harvard University, and public ones, e.g., University of Illinois at Urbana-Champaign. More private schools (530) are classified as high prestige than public schools (133).

2.5.2 Independent variables

State Immigration Policies

¹⁰ Note that the number of observations for high prestige schools is smaller, because four U.S. states (Alaska, Idaho, Nevada, and West Virginia). The number of origin countries remain the same (113 countries). While there are more zero-enrollment flows among high prestige schools, the distribution of zero flows and non-zero flows viewed from the perspective of origin countries is similar across high and low prestige school. Non-zero flows are right-skewed, dominated by prominent sending countries such as China, India, and South Korea. Zero flows are more common among countries that send fewer international students overall. As the distributions of countries across four quadrants and across the overall population of U.S. international students are similar, it is unlikely that other mechanisms (such as racialization directed at a certain subset of students) are influencing the outcome.

Two independent variables capture states' immigration policies. First, I consider whether and when a state IEC is formally created. I obtained a list of all current consortia from the U.S. Department of Commerce's Export website,¹¹ where all active IECs are indexed. I then contacted each consortium to find out exactly when the IEC was created. Using this information, I created a binary variable (1 = yes, 0 = no) for each state-year in which IEC is present.

Second, I created a binary variable reflecting whether and when OIL is enacted in a U.S. state. I use data from the National Conference of State Legislature (NCSL 2016), which provides a comprehensive database for U.S. state laws and policies. The variable focuses on the state-year in which OIL is successfully enacted (1 = yes, 0 = no), and thus instances where OILs were proposed but failed to pass are considered zero.¹²

Control variables

To account for various non-policy factors¹³ known to influence international student enrollments, I include several control variables¹⁴ that reflect characteristics of origins and destinations that, just like policies, change over time.

¹¹ https://2016.export.gov/industry/education/eg_main_022048.asp

¹² In 2012, OILs were proposed in Kansas, Mississippi, Missouri, Rhode Island, and West Virginia, but none of these bills were enacted.

¹³ It is remotely possible that policies of the origin country, such as policies seeking to internationalize higher education and to retain domestic students, could have a negative impact on international student enrollment in the U.S. However, such policies have only appeared in in very recent years in a few countries (such as China, South Korea, Singapore). Studies to date have yet to document any effect of these policies on the number of out-going international students (e.g., see Sidhu et al. 2016).

¹⁴ My use of control variables is similar to economic studies where these variables are used to account for factors (other than the independent variables) that could influence the outcome (e.g., see Beine et al. 2014, Shih 2016). There are notable similarities between control variables and confounders, although they are not

Destination tertiary enrollments. States might enroll more international students simply because of expanding educational capacity (Beine et al. 2014). To capture the changing capacity of states' tertiary education, I use data from the Integrated Postsecondary Education Data System (IPEDS) which detail the total number of students enrolled in each U.S. tertiary education institution annually. I aggregated these counts to the state level and created a continuous variable indicating the number of tertiary enrollments by state-year.

Destination unemployment rate. As discussed earlier, students may expect to work part-time while in school (Baas 2014; Raghuram 2013). Accordingly, they might gravitate towards states with more economic opportunities, such as states with lower unemployment rates. To capture this aspect, I used annual state unemployment rate data obtained from the U.S. Bureau of Labor Statistics.

Destination cost of living. International student enrollments might decrease when the cost of living at destinations becomes more expensive (Beine et al. 2014; Shields 2013; Shih 2016). To proxy changes in expected cost of living in each U.S. state over time, I construct a variable from per capita consumption expenditures data by state, which are collected by the U.S. Bureau of Labor Statistics. I included expenditures on both goods and services (such as rent and utilities), as these are the main expenditures for international students (Beine et al. 2014; Shields 2013; Shih 2016).

exactly the same (see Wunsch 2007 for a detailed discussion). In a nutshell, confounders are factors that might cause both the treatment (in this case, policy change) and the outcome (in this case, change in international student enrollment).

Destination foreign-born population. Prior research suggests that international students tend to gravitate towards places with a stronger presence of immigrants (Beine et al. 2014; Shields 2013; Shih 2016) . As such, states having increasing proportions of foreign-born residents could become more attractive to international students. I constructed a variable capturing the percentage of foreign-born residents in each state population in each year from 2000 to 2014. For this, I used weighted microdata from the American Community Surveys (ACS), which is harmonized and made available by the Integrated Public-Use Microdata Series (IPUMS).

Destination population. All else being equal, state population growth could mean more economic and social opportunities for international students, and as such, enrollments could increase. A variable reflecting annual state population size is included in the model. This variable is constructed from ACS data, as described above.

Origin-U.S. import and export values. Trade linkages can foster educational or labor exchange (Mayda 2010; Shih 2016), and thus a stronger import and export relationship between an origin country and the U.S. might lead to increased enrollments from that origin country. I constructed two variables for origin countries' annual import and export values with the U.S. The source data for these two variables are compiled by the U.S. Census Bureau and are made publicly available by Peter Schott (Schott 2008).

Origin Gross Domestic Product (GDP) per capita. Favorable changes in the origins' economic conditions, such as higher GDP per capita, may enable more individuals to pursue international education (Beine et al. 2014; Bessey 2012; Shields 2013). Following current research, I use a variable reflecting expenditure-side real GDP, which captures real living standards and is a fitting indicator for whether people can

afford international education (Shih 2016). This variable is obtained from the Penn World Tables (Feenstra, Inklaar, and Timmer 2013)

Origin tertiary-age population. As the analyses predict the number of international students, it needs to control for demographic changes that may change the number of eligible students (Bird and Turner 2014; Liu and Wang 2009; Kim and Cohen 2010). I constructed a variable reflecting annual counts of the college-aged (aged 18-30) population for each origin country. The source data for this variable come from the UNESCO's Institute for Statistics.¹⁵

Origin currency exchange rate to USD. Exchange rates can influence the cost of U.S. higher education, such that the cost will be higher when exchange rate increases. This might lead to a decline in international student enrollments for a particular year (Shih 2016). I used a variable capturing annual exchange rates of various origins' currencies relative to USD. This variable is also obtained from the Penn World Tables (Feenstra, Inklaar, and Timmer 2013)

2.5.3 Model

To test the influence of state IECs and OILs on international student enrollments, I follow the gravity model approach (Greenwood 1997), which has become a staple in research seeking to measure the impact of push and pull factors on place-to-place migration flows

¹⁵ For more information, see <http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx>

(e.g., Kim and Cohen 2010, Mayda 2005, Pedersen et al 2008, Beine et al 2012, Czaika and Parson 2017; Chort and Rupelle 2016).

Because my dependent variable is a count of international students that contains many true zeros and has substantial over-dispersion (variance larger than the mean), a negative binomial specification is preferred (Chort and Rupelle 2016; Nawrotzki and DeWaard 2018; Silva and Tenreyro 2006). The negative binomial model is a generalization from the conventional Poisson model with a dispersion parameter θ ,¹⁶ which absorbs possible bias caused by over-dispersion (Hilbe 2014, Cameron and Trivedi 2013). Fixed effects are also included to account for unobserved differences between specific origins and specific destinations (Allison 2009), including, for example, a country's policies preventing students from leaving for international education. A dummy indicator for each year is included to account for common time shocks such as the 2007-2009 Great Recession.

The negative binomial gravity model is formally written as follows:

$$\ln(E_{odt}) = \beta_0 + \beta_1(IEC)_{dt-1} + \beta_2(OIL)_{dt-1} + \beta_x \ln(Controls)_{ot-1} + \beta_z \ln(Controls)_{dt-} + u_o + v_d + \tau_t + \theta_{odt}$$

where E_{odt} represents the count of international students from origin country o enrolled in U.S. destination state d at time t . The parameter β_0 represents the intercept, and two coefficients, β_1 and β_2 , show the influence of two state policies, IEC and OIL, on enrollments. The model also controls for time-varying characteristics of origin countries, $\ln(Controls)_{ot-1}$, and for time-varying characteristics of U.S. states, $\ln(Controls)_{dt-}$.

¹⁶ In Stata 14.0, this parameter is called *alpha*.

All control variables are log-transformed and lagged by one year. The parameters u_o , v_d , and τ_t represent fixed-effects for origins, destination, and time. Over-dispersion is accounted for by the dispersion parameter *theta* (θ_{odt}). Finally, standard errors are clustered for origin-and-destination pairs (*od*) to adjust for serial correlation (Colin Cameron and Miller 2015; Kim and Cohen 2010; Wooldridge 2003). Table 2.1 provides descriptive statistics for all variables used in the analysis.

---TABLE 2.1 HERE---

I confirm the robustness of the estimates in the above model by examining different model specifications. First, I consider generalized estimating equations (GEE), and estimated models with different correlation structures to ensure that the results are not biased due to the correlation structure assumed under the negative-binomial regression (Hardin and Hilbe 2003; Kim and Cohen 2010; Pedersen et al 2008). I report results from the most optimal structure based on quasi-likelihood information criterion (QIC) (Cui 2007; Pan 2001). Second, a zero-inflated negative binomial (ZINB) model is used to determine if the large number of zeros in the dependent variable is generated by a separate underlying process from the non-zero values (e.g., see Moore and Shellman 2004). Third, as it is possible that the immigration policy effects might be driven by extremely large or small origin-destination enrollment flows, I run two separate negative binomial models: one for the top senders, which are origin countries that sent over 30,000

students in the entire 15-year period,¹⁷ and the other for remaining senders. The results, which I will discuss later, are remarkably stable across different specifications.

2.6 Results

To assess hypotheses H1 through H4, Table 2.2 display results for fixed effects negative binomial models of overall international student enrollment flows. In Model 1, I estimate the effects of IEC and OIL, controlled for other variables. Most control variables perform as expected, for example, every percent increase in state tertiary enrollments is associated with a 38.3% increase¹⁸ in international student enrollments in the next year. States with increased unemployment rates attract fewer international students. Growth in tertiary-age population at the origin country has a strong positive effect on enrollments. Presence of a foreign-born population is the only control variable that does not perform as expected, as gains in percentage of foreign-born population are associated with a large decline in enrollment.

Model 1 shows that IEC contributes an increase of 4% in enrollments,¹⁹ which is marginally significant at $p < 0.1$. States that adopted OIL experience an average decline of 12.4% in international student enrollments,²⁰ and this effect is statistically significant at $p < 0.01$. Model 2 adds an interaction effect between IEC and OIL. The interaction effect

¹⁷ This top-sender group consists of 31 countries. By sending over 30,000 students, each of these origin countries contribute to over 0.5 percent of all international students in the United States.

¹⁸ $38.3\% = (1.383 - 1) * 100$

¹⁹ $4\% = (1.04 - 1) * 100$

²⁰ $-12.4\% = (0.876 - 1) * 100$

is not statistically significant, meaning that IEC does not offset the negative effect of OIL.

---TABLE 2.2 HERE---

In Table 2.3, I display results from alternative specifications of Model 1. Model 3 is a GEE model with independent correlation structure, which has the best fit (lowest QIC value) compared to other correlation structures.²¹ Model 4 shows results only for the non-zero part of the ZINB model. The effect of OIL and IEC are consistent with the main model. In Model 5, I included fixed effects for pairs of origin countries and destination states. This approach takes up a lot of degrees of freedom by estimating 5,694 fixed-effects, and also causes 69 origin-destination pairs to drop out because of all zero outcomes. The estimates from Model 5, as such, are more conservative, but even so, a significant and negative effect of state OIL is confirmed.²²

---TABLE 2.3 HERE---

I also perform the analysis on sub-groups of the samples to ensure that the effect is not driven by origin countries that send an extremely large or extremely small number of students. Model 5 and 6 have the same specification as Model 1, and they are estimated for two subsets of the sample: top senders and other senders. The numbers of observations in Model 5 and 6, as such, are smaller. The coefficients for OIL are

²¹ I compared QIC values with three other correlation structures: exchangeable, auto-correlated, and unstructured. Those results are not shown here.

²² As an additional sensitivity analysis, I also coded OIL back to zero to indicate instances when a law was retracted as a result of being legally challenged in court (Duara 2016). The results remains unchanged, which indicates that the adoption of OIL is probably the major event that triggers fear and causes international students to avoid a specific state. This is consistent with the outburst of international news coverage surrounding the announcement of OIL adoptions, which might make potential international students aware of (and worry about) their migrant status. The results from this analysis are shown in Appendix A1.

consistent across different specifications, meaning that adoption of OIL is associated with a decline in enrollments that ranges from 11.5% to 12.5%. Similarly, IEC has a small, positive, and marginally significant effect across all models. Taken together, results in Table 2.2 and 2.3 lend support to hypotheses H1, and to a lesser extent, H2.

In Table 2.4, I display the last set of results, in which specifications of Model 1 (the additive model) and Model 2 (the interaction model) are estimated separately for eight different subsets of international students, cross-classified by skill and prestige. Only three coefficients of interest—state IEC, state OIL, and IEC-OIL interaction—are displayed. Panel A shows results for enrollments in high prestige schools, and Panel B for low prestige schools. Note that the number of observations for high prestige schools is smaller, because four U.S. states (Alaska, Idaho, Nevada, and West Virginia) do not have any students in high prestige schools, and therefore had to be dropped from the analysis. The results indicate that state IEC has no independent effect on enrollments in high-prestige schools, while OIL has significant and negative effect on Bachelor’s enrollments ($r=0.849$, $p<0.01$). Interactively, the presence of IEC only offsets the negative effect of OIL on Bachelor’s enrollments. For non-degree student enrollments in high-prestige schools, state OIL has a negative effect ($r=0.85$, $p<0.05$) only when state IEC is absent. Both state policies do not have any effect on enrollments in Master’s and Doctorate programs at high-prestige schools.

---TABLE 2.4 HERE---

In Panel B, the results indicate that state IEC has a positive and significant effect for enrollments in Master’s and Doctorate programs at low prestige schools (contributing a 9% and a 23.7% increase, respectively). State OIL has a large negative effect on

Master's student enrollments, estimated at a 30% decline. Interactively, state IEC and OIL co-existence leads to significant declines in enrollments at prestigious non-degree and Doctorate programs. For these two groups, state IEC has a positive effect on enrollments only when OIL is absent ($r=1.068$, $p<0.01$ and $r=1.237$, $p<0.001$, respectively). The results partially confirm H4, such that non-degree enrollments in low prestige schools (Q4 in Figure 2.2) decline in the presence of OIL, but only when IEC is also present. Contrary to H5, enrollments of international students who are closer to the front door of immigration (Q2 and Q3) are also negatively associated with OIL.

2.7 Discussion

Harsh policies under the Trump presidency continue to spur debates about the spillover effects of anti-immigration policies in the United States—a country whose strengths have been and are still drawn from its diverse immigrant population (Bothwell 2018; Wermund 2018). In this study, I examine a similar paradox among U.S. states, wherein two seemingly contradictory types of state immigration policies, one to deter undocumented immigration and the other to attract international students, have spread swiftly in the past two decades. To do so, I develop a framework for understanding “the side door of immigration,” which denotes the fluid space that international students occupy as temporary immigrants in the United States: they are desirable immigrants and are often encouraged to transition towards permanent immigration status, yet any visa violation will push them towards undocumented status. I argue that being at the migration side door for several years contributes to international students' vulnerability, making them particularly susceptible to negative spillover effects from state anti-immigration policies.

The side door framework helps clarify the mechanism through which spillover policy effects can ripple towards international student. At the same time, I also develop and test the null hypothesis of no spillover policy effects, which comes from the economic theories of immigrant selection. Using a unique set of data containing enrollment data in pairs of 113 origin countries and 51 U.S. destination states over a 15-year period, my analysis confirms that state OIL adoption has a negative effect on overall international student enrollments, bringing enrollment down by approximately 12%, compared to pre-OIL enrollments in the same state. State IEC has a small positive effect on enrollments, but this effect is not robust and not consistent across different model specifications. Further, I consider how the continuum of desirability operates within international student populations, hypothesizing that they could be closer or further from the front door of immigration based on two dimensions of their education: skill and prestige. As I divided students into four quadrants, with those in the fourth quadrant being students attending low-prestige schools and in non-degree programs, I test research hypotheses to examine whether this group, who are frequently suspected of being “fraudulent” students, is more sensitive to OIL policy. The results indicate that enrollments of students in the fourth quadrant only decline when OIL is present and IEC is absent. Contrary to the expectation that “earnest” students, or those in the other three quadrants, have less to worry about regarding immigrant enforcement (Babones 2017), I find that the negative effect of state OIL implementation has a much broader reach, impacting even Master’s and Doctorate students in low prestige schools.

The “side door of immigration” framework developed in this study contributes to both research on spillover policy effects and research on immigrant selection. It connects

the gap in two lines of research, by showing that desirability and legal status do not overlap and suggesting that desirability is better viewed as a continuum that stretches over the side door of immigration. The side door framework clarifies that immigrants occupying the side door for an extended time are vulnerable to the U.S. crimmigration complex (Stumpf 2006), an ever-expanding system seeking to criminalize immigrants and impose harsh punishments on them. At the same time, I also explore dimensions of the side door, which are further demarcated by skill and prestige, in an effort to connect the idea of spillover effect to the idea of immigrant selection. Results based on analyses of student sub-groups are concerning, as those in the fourth quadrant, i.e., students closest to the back door, are not the only group whose enrollments falter after state OIL adoption. This means that the reality of student-migrants' lives is more complex than the two dimensions of skill and prestige. With respects to immigrant selection theories, it means that the underlying assumption of discrete categorization of immigrants should be reconsidered, so as to fully incorporate the experiences of people who hold an in-between legal status, like international students.

The current chapter provides the first empirical test to the idea that anti-immigration policy, in the form of OIL, has a negative spillover effect on international student enrollments. The results from my analysis confirm this negative spillover effect for overall international student enrollments. This lends some support to the current concern that anti-immigration policies might trigger economic losses (through the loss of international student enrollments) and undermine the international standing of American universities and colleges (which are still world-leading in international student enrollments, but by a smaller margin compared to previous years). The practical

contribution of this study lies in clarifying this linkage and dispelling the notion that higher education is a privileged bubble, separated from the reality of harsh immigration policies. It forces us to realize that international students are student-migrants (Raghuram 2013) who also need to be protected from the pitfalls of anti-immigration sentiments and policies, such as through systemic legal counseling services. At the same time, American universities and colleges might also consider stepping out of their professional silos to weigh in against the expansion of anti-immigration policies.

The analysis has a number of limitations. First, there are unmeasurable errors in the data, as explained in section Five, but this error is likely small and inconsequential to the results. Second, the analysis measures outcome in enrollments, and not the process. The underlying assumption is that potential international students know about state policies prior to enrollment. I choose to analyze state OILs because they received international coverage (Totenberg 2012), and thus are more likely to be known among potential international students. Further, potential students could know about U.S. state policies prior to coming, as research has shown that potential students are increasingly savvy and rely on the Internet to connect to existing students and immigrants at the destinations (McEwan and Sobre-Denton 2011; Ye 2006), therefore this assumption is not very far-fetch. Additionally, the split model between top senders and other senders shows that policy effects are similar between both groups, thus the effects are not driven by idiosyncratic events in an outlier origin country. Third, my use of fixed effects for country of origin means that it is not possible to understand whether and how international students from different origin countries (and thus, potentially different racial and ethnicity backgrounds) vary in their reactions to changes in U.S. state laws. To truly

understand the interaction between race (and/or ethnicity) and “side-door” immigrant status, additional data are necessary. It would be inaccurate to equate origin countries (country of citizenship) with races and ethnicities, as many countries are highly diverse in these regards. Finally, heterogeneity in the side door is captured by two measures of “skill” and “prestige” at entry (enrollment). While the prevalence of students who intend to transfer into a different program soon after enrollment (Townsend 1995) remains unknown, the value of this analysis still holds in that it evaluates the relative attractiveness of each U.S. state as the initial point of migration.

In conclusion, this study highlights an important point: international students are people with a complex understanding of vulnerability. Simplistic categorization as authorized versus undocumented cannot capture how individuals feel and fear for their future as temporary immigrants in a climate that is increasingly hostile towards immigrants. Future research could take on a finer grain of analysis to further flesh out the mechanisms through which immigration policies affect international students, as well as other groups of temporary migrants. As the Trump administration pushes for harsh immigration practices even for naturalized U.S. citizens, such as prosecuting for denaturalization (Kopan 2018), it means that the side door might expand into and overtake the front door. As this future draws close, it is crucial to take policy spillover effects seriously, and this study hopes to be a useful first step in that direction.

Figure 2.1. The side door of immigration

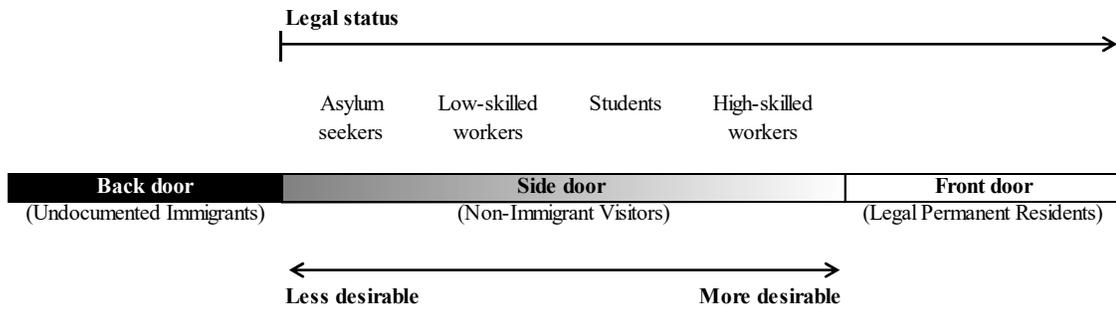


Figure 2.2. Heterogeneity among international students

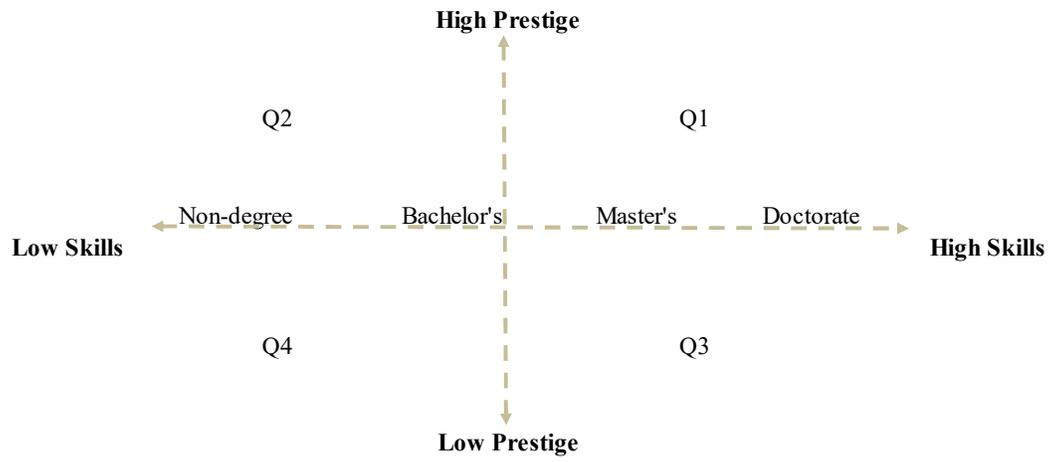
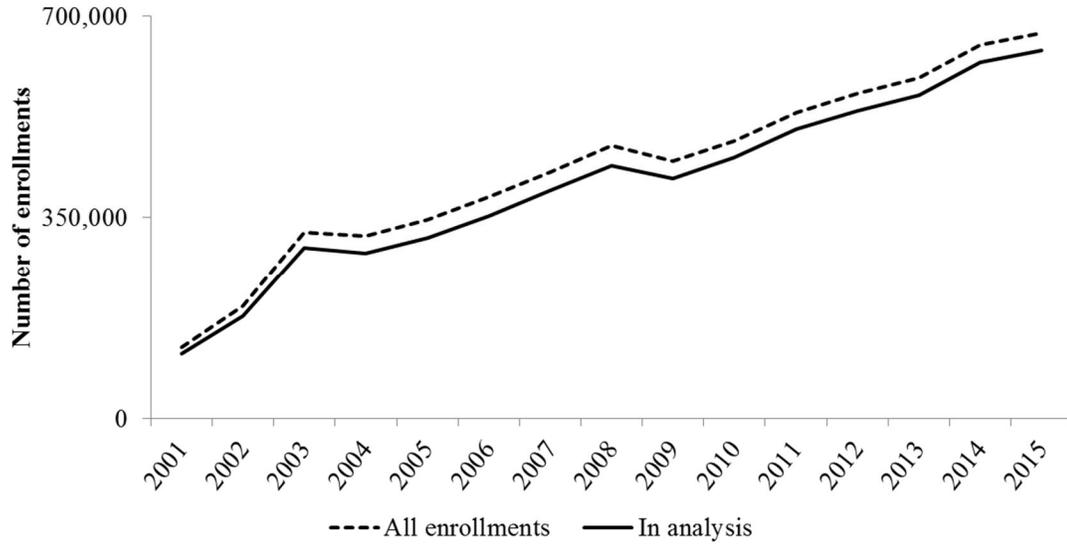


Figure 2.3. Changes in international student enrollments, 2001-2015

Panel A. Changes in number of enrollments over time



Panel B. Changes in enrollment flows over time

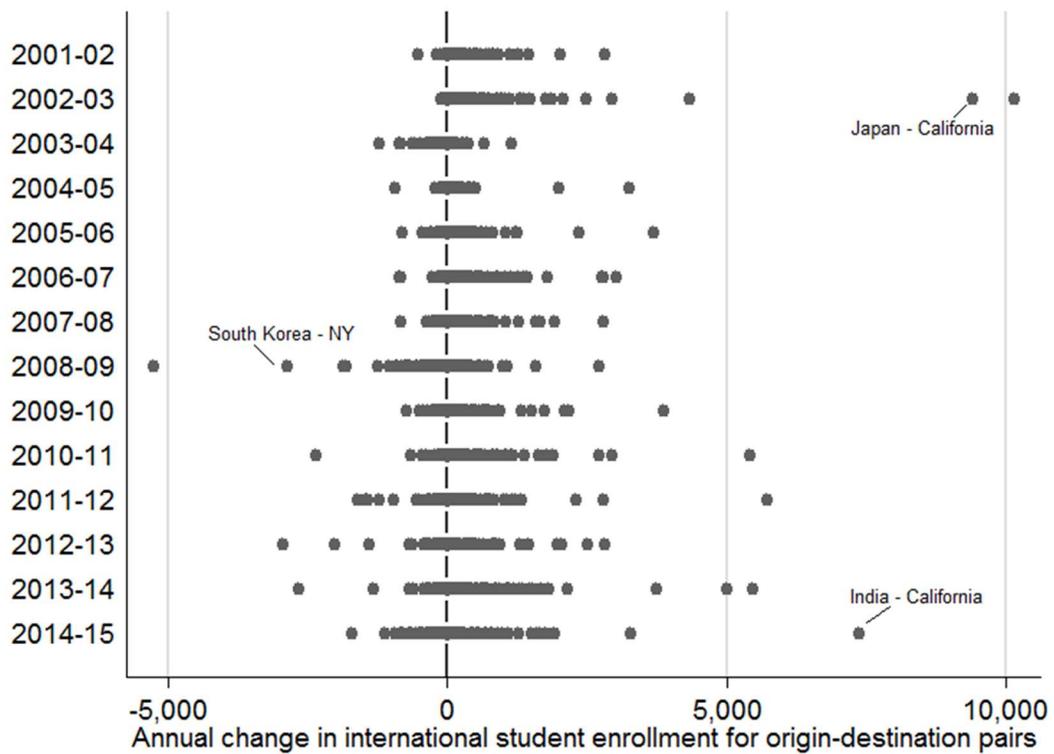


Table 2.1. Descriptive statistics of variables used in analysis

	Mean/ Percent	SD	Min	Max
<i><u>Dependent variable</u></i>				
Enrollment flows	70.54	519.70	0	38,862
<i><u>Independent variables</u></i>				
IEC	17.12		0	1
OIL	3.27		0	1
<i><u>Controls</u></i>				
Destination tertiary enrollments (log)	12.30	1.01	10.22	14.85
Destination unemployment rate (log)	1.90	0.29	1.19	2.69
Destination cost of living (log)	10.16	0.21	9.63	10.78
Destination % foreign-born (log)	2.13	0.59	0.76	3.37
Destination population (log)	15.08	1.04	13.07	17.47
Origin US import values (log)	20.93	2.77	11.32	26.87
Origin US export values (log)	20.92	2.18	15.30	26.47
Origin GDP per capita (log)	9.19	1.22	5.82	11.98
Origin tertiary-age population (log)	13.97	1.61	8.21	18.68
Origin currency exchange rate to USD (log)	3.11	2.51	0.24	9.96
Observations	86,445			

Table 2.2. Analyses of international student enrollments, 2001-2015

	Model 1	Model 2
IEC	1.040+ (0.023)	1.049* (0.025)
OIL	0.876*** (0.035)	0.893* (0.040)
IEC x OIL		0.915 (0.059)
Destination tertiary enrollments (log)	1.383** (0.156)	1.379** (0.156)
Destination unemployment rate (log)	0.866** (0.048)	0.872* (0.049)
Destination cost of living (log)	1.810+ (0.616)	1.814+ (0.618)
Destination % foreign-born (log)	0.584*** (0.054)	0.588*** (0.054)
Destination population (log)	3.107*** (0.755)	3.127*** (0.760)
Origin US import values (log)	1.032** (0.012)	1.032** (0.012)
Origin US export values (log)	0.974+ (0.015)	0.974+ (0.015)
Origin GDP per capita (log)	1.290*** (0.043)	1.290*** (0.043)
Origin tertiary-age population (log)	3.890*** (0.281)	3.890*** (0.280)
Origin currency exchange rate to USD (log)	0.935* (0.030)	0.935* (0.030)
Dispersion parameter (theta)	0.759*** (0.018)	0.759*** (0.018)
Fixed destination effects (51 states)	Yes	Yes
Fixed origin effects (113 countries)	Yes	Yes
Fixed time effects (15 years)	Yes	Yes
Observations	86,445	86,445
Pseudo R-squared	0.2095	0.2095

Notes: Negative binomial models, exponentiated coefficients, robust SE in parentheses
 +p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table 2.3. Alternative specifications for Model 1

	Model 3	Model 4	Model 5	Model 6	Model 7
	GEE	ZINB	NB, fixed pairs effects	NB, top senders	NB, other senders
IEC	1.040+ (0.024)	1.044+ (0.023)	1.025** (0.008)	1.015 (0.040)	1.059* (0.027)
OIL	0.876** (0.036)	0.880** (0.035)	0.915*** (0.012)	0.864* (0.060)	0.890** (0.039)
Destination tertiary enrollments (log)	1.383** (0.174)	1.341** (0.151)	1.196*** (0.034)	1.369+ (0.255)	1.339* (0.166)
Destination unemployment rate (log)	0.866* (0.053)	0.884* (0.049)	1.002 (0.021)	1.003 (0.089)	0.819** (0.054)
Destination cost of living (log)	1.810 (0.658)	1.960* (0.669)	2.855*** (0.181)	1.689 (0.825)	1.817 (0.778)
Destination % foreign born (log)	0.584*** (0.057)	0.581*** (0.053)	0.888*** (0.015)	0.592*** (0.082)	0.600*** (0.068)
Destination population (log)	3.107*** (0.805)	3.327*** (0.815)	1.072* (0.029)	4.884*** (1.869)	2.456** (0.725)
Origin US import values (log)	1.032* (0.014)	1.030* (0.012)	1.096*** (0.006)	1.285*** (0.051)	1.005 (0.011)
Origin US export values (log)	0.974 (0.017)	0.977 (0.015)	0.982*** (0.004)	0.989 (0.041)	0.975 (0.015)
Origin GDP per capita (log)	1.290*** (0.048)	1.280*** (0.043)	1.072*** (0.010)	1.200* (0.090)	1.267*** (0.049)
Origin tertiary-age population (log)	3.890*** (0.321)	3.898*** (0.281)	1.070*** (0.007)	3.961*** (0.698)	4.186*** (0.318)

Origin currency exchange rate to USD (log)	0.935+	0.939+	1.014***	0.735***	1.010
	(0.032)	(0.030)	(0.003)	(0.051)	(0.036)
Dispersion parameter (theta)				0.661***	0.781***
				(0.024)	(0.023)
Fixed destination effects (51 states)	Yes	Yes		Yes	Yes
Fixed origin effects (113 countries)	Yes	Yes		Yes	Yes
Fixed time effects (15 years)	Yes	Yes	Yes	Yes	Yes
Fixed origin-destination effects (5,694 pairs)†			Yes		
Observations	86,445	86,445	85,410	23,715	62,730
Pseudo R-squared				0.1615	0.1611

Notes: GEE stands for generalized estimating equations, ZINB for zero-inflated negative binomial, NB stands for negative binomial. Results from the zero components of ZINB are not shown. †69 origin-destination pairs are dropped from the model because of all zero outcomes. Table displays exponentiated coefficients and robust SE in parentheses.
+p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table 2.4. Analyses for subsets of international student enrollments

Panel A. High prestige schools

	Additive Models				Interaction Models			
	<i>Non-degree</i>	<i>Bachelor's</i>	<i>Master's</i>	<i>PhD</i>	<i>Non-degree</i>	<i>Bachelor's</i>	<i>Master's</i>	<i>PhD</i>
IEC	0.957 (0.043)	0.991 (0.025)	0.997 (0.025)	0.994 (0.022)	0.930 (0.044)	0.964 (0.024)	1.008 (0.026)	1.006 (0.024)
OIL	0.900 (0.066)	0.849** (0.045)	0.912 (0.046)	1.026 (0.047)	0.850* (0.066)	0.797*** (0.051)	0.937 (0.054)	1.058 (0.054)
IEC x OIL					1.264 (0.199)	1.330** (0.120)	0.885 (0.077)	0.883 (0.071)
Observations	79,665	79,665	79,665	79,665	79,665	79,665	79,665	79,665
Pseudo R-squared	0.2705	0.2493	0.3372	0.3578	0.2705	0.2493	0.3372	0.3579

Panel B. Low prestige schools

	Additive Models				Interaction Models			
	<i>Non-degree</i>	<i>Bachelor's</i>	<i>Master's</i>	<i>PhD</i>	<i>Non-degree</i>	<i>Bachelor's</i>	<i>Master's</i>	<i>PhD</i>
IEC	1.045 (0.024)	0.955 (0.026)	1.098** (0.033)	1.211*** (0.053)	1.068** (0.025)	0.951 (0.027)	1.090** (0.035)	1.237*** (0.058)
OIL	0.934 (0.035)	0.937 (0.050)	0.714*** (0.040)	0.930 (0.060)	0.985 (0.041)	0.926 (0.057)	0.696*** (0.047)	0.988 (0.071)
IEC x OIL					0.789** (0.062)	1.046 (0.089)	1.093 (0.102)	0.772* (0.092)
Observations	86,445	86,445	86,445	86,445	86,445	86,445	86,445	86,445
Pseudo R-squared	0.2402	0.2007	0.2652	0.3145	0.2403	0.2007	0.2652	0.3146

Notes: Negative binomial models which include control variables and fixed effects for origins, destinations, and time (not shown here). Tables display exponentiated coefficients and robust SE in parentheses. + p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Chapter 3. Ways of Staying: Immigrant Status of International Student-Stayers and Its Variations over Cohorts and Education Trajectories

3.1 Introduction

Studies of international student retention are limited by the short observation time-frame for which data are available. In the United States, research typically relies on visa transitions after graduation to understand retention up to five years after graduation (Finn 2014; Ruiz 2017; Ruiz and Budiman 2018). Long-term outcomes for international students, particularly their transitions into more permanent migration statuses, remain a black box.

In this chapter, I examine the characteristics of stayers,²³ i.e., international students who stay and become part of the United States workforce, to shed some light on their long-term migration outcomes. I focus on the composition of stayers' with respect to migration status (hereafter, status composition), asking whether stayers are retained in the United States predominantly in temporary, legal permanent resident (LPR), or naturalized U.S. citizenship status. I also consider how status composition varies across two elements: broader changes in U.S. immigration policy context and the educational trajectories of student-stayers. In the process, I connect research on LPR transition and naturalization in the United States with a life-course perspective on migration (Conway 1980; Elder 1995, 1994; Paul 2011), to generate new concepts and hypotheses for understanding long-term migration outcomes. These results lay the groundwork for further examining the underlying selection processes (Chiswick and Miller 2009; Massey

²³ In this chapter, I will use the term “stayers” and “student-stayers” interchangeably.

2016; Massey and España 1987; Walsh 2011) that retain and sort student-stayers into different migration statuses. These insights are crucial to move the sociology of migration towards a nuanced understanding of the varied pathways through which temporary immigrants transition into permanent settlement in the United States. These insights also elucidate the impact of immigration policies, in that immigrants do not simply respond to restrictive policy changes by leaving a location, but also by transitioning towards permanent immigrant status in a shorter timeframe.

Migration status is a crucial element for international student retention. As I discussed in Chapter 2, students entering the United States through the side-door must switch into a different migration status (e.g., workers) to stay after graduation. The primary channel for students to become workers in the United States is the H1-B visa, which—like a student visa—is temporary. Those who desire to migrate permanently must gain admission through the front door of LPR status, and subsequently, naturalized U.S. citizenship, which confers full social and political rights.

Importantly, the meaning of each migration status might be driven by broader changes in the national policy context. Naturalized citizenship is considered a commitment to become a permanent member of the society with full social and political rights and responsibilities; yet it can also become a “defensive” strategy in volatile times (Ong 2010). As immigration policy in the United States in the past two decades took a turn towards harsh enforcement, relying on criminalizing non-citizens and denying them due legal process, naturalization rates among vulnerable immigrant groups rose sharply (Massey and Pren 2012b; Passel 2007).

I propose that one way to examine the changing meaning of migration status relative to the national policy context is to consider how status composition varies by the timing of first entry, or *variation by entry cohort* (Elder 1975; Ryder 1965). The life-course perspective suggests that life events are connected, such that the timing and quality of one experience can shape later life transitions and outcomes (Ryder 1965). Stayers' experience of policy context at entry could thus impact their long-term migration status. For example, stayers experiencing more restrictive policy contexts at entry could be more likely to have LPR status and naturalized citizenship as a defensive move.

In addition to studying expression of policy changes through cohort variations, I also consider how students, as active agents (Bakewell, Haas, and Kubal 2012), negotiate their migration experiences. Drawing on the theory of stepwise migration (Conway 1980; Paul 2011), which suggests that immigrants develop unique trajectories—comprised of multiple steps—to get to their desired destinations, I understand expressions of agency through *variations in migration status by trajectories*. Perhaps the most common image of a student-stayer is one who moves through a lockstep of education-graduation-employment, but this is not the only possible trajectory. Some students deepen their connection to the United States by earning multiple degrees or by starting with a lower degree, such as a high school diploma. Others come as young people with their families, another way of anchoring a stronger attachment to the United States. Still others begin, but do not complete, a degree in the United States, and return later for employment. In examining the presence of trajectories, especially the less familiar ones, this chapter expands current research on international student migration to a broader expression of staying.

Using a nationally-representative sample of U.S. scientists and engineers from the restricted-licensed Scientists and Engineers Statistical Data System (SESTAT) data, I examine the status composition of stayers who belong to four different entry cohorts. Entry cohorts are defined around three key policies that dramatically altered the United States' immigration enforcement landscape: the 1986 Immigration Reform and Control Act (IRCA), the 1996 Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA), and the 2002 Homeland Security Act (HSA) (De Genova and Peutz 2010; Hernandez 2005; Massey and Pren 2012b). In essence, each subsequent entry cohort experienced a more enforcement-focused (or more restrictive) policy context.

Results from logistic regressions indicate that the probability of holding LPR status is much higher among stayers in the 1997-2002 and the post-2002 cohorts, compared to the pre-1986 cohort. The same relationship does not hold for naturalization, such that the probability of naturalization does not differ significantly across entry cohorts. Further, in considering the impact of historical policy change (which is known as a “period” effect in the life-course literature (Elder 1995; Ryder 1965)), I estimate an interaction effect between entry cohorts and number of years since entry, and find that stayers from the two most recent cohorts tend to become LPR sooner (i.e., fewer years after entry). This suggests that LPR becomes a pre-requisite status for stayers in the latter two cohorts. In the sections that follow, I will further discuss the differences between the processes leading to LPR status and naturalization to help contextualize these findings.

With respects to elements of education trajectories, I identify a sizable proportion of stayers who divert from the common trajectory. Those with a “circular” trajectory, entering the United States as students but obtaining their degrees elsewhere, make up the

largest proportion of stayers in the post-2002 entry cohorts. These circular stayers are also more likely to have LPR status. Another type of stayers, “adjusted” ones who enter with non-student temporary visas and then change to student’s visas to pursue U.S. education, have the highest propensity to naturalize. These results help understand the underlying selection mechanisms that cumulate under the broader U.S. policy contexts. Contrary to the common wisdom that U.S.-educated foreign talents are the most desirable (e.g., see Obama 2014; Redden 2014), the current policy environment appears to favor “circular” stayers without a U.S. degree. The policy contexts also seem to attract more “Adjusted” stayers, who express the most agentic trajectories to pursue U.S. education, as they are the most likely to naturalize.

3.2 Backgrounds and Literature Review

This chapter moves the literature beyond an analysis of direct selection mechanisms, such as a point-based policy for selecting the “best” immigrants (Chiswick and Miller 2009), to focus on more indirect, yet potentially equally powerful, policies. I focus on changes in U.S. national approaches towards immigration since 1965, which encompass the devolution of policies towards a crimmigration strategy (Beckett and Evans 2015; Stumpf 2008). A key feature of the crimmigration regime is that it imposes a threat of deportation on all non-citizens who are marked with a criminal record. As I have argued in Chapter 2, this threat of deportation, coupled with the lack of legal protection²⁴, might evoke a unique sense of vulnerability among international students who enter the United States

²⁴ Immigrants themselves have few legal protections because due process and many legal provisions available in the U.S. criminal justice system do not apply to non-citizens (Hernandez 2005).

via the side door and thus hold an in-between legal status. I examine whether that vulnerability translates into student-stayers' choices concerning their status transitions in the United States. Specifically, I consider whether these increasingly punitive migration policies are associated with an increase in student-stayers becoming LPRs or naturalized citizens.

3.2.1 Staying after graduation: Processes and challenges

As I briefly discussed in the Introduction and in Chapter 2, the United States does not offer an official channel to streamline international students towards more permanent migration statuses after graduation (Riaño, Van Mol, et al. 2018; Ruiz 2001). The pathway to staying after graduation is thus fraught with uncertainty. Broadly, stayers can have three types of migration statuses: a temporary worker (H1-B) visa, LPR status, or naturalized U.S. citizenship. These statuses are inter-dependent, such that one is required to transition to another. However, individuals can also remain in one status and not making the transition.

The temporary skilled worker visa (H1-B) is considered the logical next step for student-stayers (Lowell and Avato 2014; Martin, Lowell, and Martin 2001; Ruiz 2001), although the majority of H1-B visas are given to workers coming from outside the United States, i.e., those without U.S. qualifications (Ruiz 2013). To add to this complexity, there is an annual cap²⁵ for H1-B visas, which means that if the number of applications exceeds the cap, eligible students must enter a lottery (e.e., see Peri, Shih, and Sparber

²⁵ The current cap is 65,000 visas plus 20,000 visas for those with advanced degrees. This cap has been adjusted over time, and it was the highest (at 195,000 visas) in 2001, 2002, and 2003. H-1B workers in the public and not-for-profit sector (such as in a not-for-profit university) are not limited by this cap.

2015). The H1-B visa confers a temporary migration status for up to 6 years,²⁶ with the condition that the migrant must not switch employer. An individual might apply for a new H1-B visa, which means they have to repeat the same steps above.

Those on H1-B visas can obtain LPR status when their employers sponsor their LPR applications. This process is even more arduous than H1-B visas application, as it is regulated by an overall ceiling *and* a per-country ceiling designed to prevent the monopolization of immigrants from major sending countries in the LPR pool (Argueta 2016). The average wait-time for LPR applications is estimated at 4.3 years in 2010 (Jasso et al. 2010), and it can stretch up to 10 years for applicants originating from countries with high volume of LPR applications, such as China and India (Herbst 2009; Li and Lo 2012). Those with LPR status can stay up to 10 years, and the LPR status can be easily renewed once expired.

The steps from LPR to naturalization are much more straightforward for skilled immigrants. They only need to satisfy a minimum stay requirement and pass a naturalization test (North 1987). The minimum stay requirement is typically 5 years, and it can be shortened to 3 years for LPRs who are spouses of U.S. citizens, and to one year for those who serve in the United States' army. The naturalization process takes about 2 years, and as such, prior research has used a typical length of 7 years to establish eligibility for naturalization (Chiswick and Miller 2009; Jones-Correa 2006). For student-stayers, the typical length of their respective education programs can be used to confirm their initial status as side-door immigrants.

²⁶H1-B is valid for 3 years and renewable for 3 additional years. Renewals does not count towards the H1-B caps, thus there is less uncertainty in renewals.

As the transition from temporary status to LPR is more uncertain, students might have to leave because they cannot obtain sponsorship for a H1-B visa or LPR status. In contrast, the transition from LPR status to naturalization is not instrumentally required²⁷ for staying. As such, in this chapter, I will examine the two transitions separately and attend to this difference when interpreting the results. The transition from LPR to naturalization can be understood largely as a choice, while the transition from temporary status to LPR reflects a combination of choice and constraints. Thus, the status composition of LPRs and temporary visas among student-stayers reflect the aggregate combination of leavers and stayers, among which stayers could be sorted into LPR status either because of their choices or because LPR becomes the only way to stay.

3.2.2 Immigration enforcement policy and its impact on permanent migration outcomes

Scholars generally agree that the Immigration and Naturalization Act of 1965 marked a radical break from prior U.S. immigration policies, by abolishing the national-origin quota and creating new preference systems such as employment for new immigrants (Hollifield, Hunt, and Tichenor 2008; Jasso and Rosenzweig 1990). The year 1965 also marked the sudden termination of the Bracero Program, which had been an important channel that streamlined temporary labor migration between Mexico and the United

²⁷ By “instrumentally required,” I mean the law does not require naturalization. It does not refer to the instrumental value of citizenship, for example, some immigrants, given their circumstances, might think that naturalization is instrumental to their well-being as an immigrant in the United States (e.g., see Ong 2010).

States, thus creating a large undocumented immigrant population (Massey and Pren 2012b).

Against this backdrop, three important policies were adopted in the post-1965 era, and they cumulated into the enforcement-focus immigration policy regime that we witness today in the United States. First, the passage of IRCA in 1986 laid the foundation for immigration enforcement (Massey and Pren 2012b; Meissner et al. 2013). IRCA was designed to solve the problem of unlawful immigration following the sudden termination of the Bracero Program in 1965. IRCA had three interrelated provisions: it made the hiring of unauthorized workers a crime for the first time in U.S. history, called for strengthened border enforcement, and provided for naturalization for a large share of the unauthorized immigrant population. Under the broad category of border enforcement, IRCA contained a provision requiring the United States' Attorney General to deport noncitizens convicted of removable offenses as quickly as possible. This set in motion the practice of targeting immigrants who commit crimes and expanded the range of policing practices (Abrego et al. 2017).

In 1996, IIRIRA was enacted, and it ratcheted up the punitive aspects of U.S. immigration laws. Specifically, it expanded the list of crimes that make immigrants deportable, stripped rights to due process from immigrants with criminal records and from immigrants apprehended within 100 miles of the border, and, most importantly, authorized the 287(g) program, paving the way for state and local authorities to enforce immigration law (Abrego et al. 2017; Juarez, Gomez-Aguinaga, and Bettez 2018; Valdez, Coleman, and Amna 2016). With this move, immigrant enforcement practices expanded

beyond the border and border-crossing to impact the daily life of immigrants in the United States (Wong 2012).

These policy developments came to the forefront after the terrorist attacks of September 11, 2001. Shortly after these attacks, the Homeland Security Act (HSA) was passed in 2002, which created the Department of Homeland Security (DHS) and increased funding for surveillance and deportation of foreigners. With the creation of DHS, funding for immigration enforcement increased dramatically, which translated into the creation of a complex apparatus for targeting, detaining, and deporting immigrants over the next decade (see Stumpf 2006). As policy quickly evolves into “hyper-enforcement” (Longazel 2013), immigrants and their families experience a constant state of fear stemming from the risk that they could be targeted for detention and deportation for an expansive list of crimes, many of which would be considered minor for native-born Americans (De Genova and Peutz 2010; Stumpf 2006).

In the post-1965 era, the adoption of each of these three policies represent key historical events that altered immigration policy contexts that student-stayers encountered when entering the United States. Drawing from the life course perspective (Elder 1975; Ryder 1965), the idea of a *cohort* suggests that individuals who experience shared temporal experience, such as entering the country in the same year, will have similar long-term migration outcomes. Considering stayers in four entry cohorts before and after each policy adoption, we might expect each cohort to have a distinct experience as immigrants in the United States. Prior to 1986, immigration enforcement has not yet been so strongly linked to criminal enforcement; thus, student-stayers do not experience fear associated with immigration enforcement and its consequences. With each subsequent

cohort, immigrant enforcement became harsher and assumed a more regular presence in immigrants' daily lives (De Genova and Peutz 2010; Longazel 2013). As such, those in latter cohorts likely experience more fear and uncertainty while pursuing education in the United States.

With respect to long-term migration outcomes like naturalization, research on “defensive naturalization” suggests that hyper-enforcement policies make immigrants more likely to seek a permanent status that would give them social and political protection (Ong 2010). For some, such as Latin American immigrants, the risk of racialized enforcement compels them to naturalize, as citizenship provides important protections like due legal process. Not surprisingly, naturalization rates among Latin American immigrants have risen sharply since the 2000s (Massey and Pren 2012b; Passel 2007). Applying a similar logic to student-stayers, entering the United States in more recent years might mean that permanent status, such as LPR, provides important assurance to alleviate the fear that stems from hyper-enforcement. If those who stay need LPR status,²⁸ the overall status composition will comprise of less temporary visas and more LPRs. In my analysis, I thus expect that *student-stayers in more recent cohorts are retained predominantly with LPR status rather than temporary status*. The same perspective would predict *that stayers from more recent entry cohorts are more likely to naturalize*, as well.

Beyond entry cohorts, life-course research also considers two related expressions of time: age and period (Elder 1975). With respects to migration, “age” is analogous to

²⁸ This implies that those who cannot obtain LPR status will be more inclined to leave. The analysis cannot compare stayers and leavers, but it can assess the aggregated phenomenon based on the experience of stayers.

immigrant's length of stay, which is typically measured by the number of years since entry (Jones-Correa 2006; Van Hook, Brown, and Bean 2006). Prior research on immigrant incorporation suggests that immigrants who have been in the United States longer become more connected to the country, which can translate to a higher probability of obtaining LPR or citizenship (e.g., see Jones-Correa 2006). As such, *stayers who accumulate more years since entry will be more likely to have LPR and naturalization status.*

At the same time, life-course research suggests that period effect, which denotes the impact of historical changes on individuals, can be estimated as an interaction effect between the other two elements, cohort and age (Keyes et al. 2010; Luo 2015; Ryder 1965). Accordingly, in this chapter, I suggest that the impact of historical changes in U.S. immigration policies on migration outcomes can be understood as the variations in the degree to which entry cohorts and years since entry are moderated by each other (Luo 2015). Drawing from the discussion of “defensive naturalization” above, an expression of defensive status change is that student-stayers will obtain permanent migration status as soon as they become eligible for it. Thus, I expect that *length of stay will have a larger effect on LPR and naturalization among the more recent entry cohorts, compared to the pre-1986 cohorts.*

Beyond the instrumental explanations for LPR and naturalization as a protective status for stayers to remain in the United States without fear, as discussed above, prior research also suggests that naturalization is a different step that requires a sense of belonging and a strong commitment for long-term stay (Bloemraad 2006b, 2002; Van Hook et al. 2006). Naturalization is thus less desirable for those coming from countries

that do not allow dual citizenship, which means the immigrants must formally give up their original citizenships (Jones-Correa 2006; Yang 1994). Considering the effect of the policy context, scholars find that the United States' singular focus on enforcement sends an ambiguous message to immigrants about their desirability as new citizens, which explains low naturalization rate in the United States since the early 20th century (Bloemraad 2006). Contrary to “defensive naturalization” research (Ong 2010), this perspective implies that those who enter in hyper-enforcement policy contexts are even less likely to naturalize. As such, among those eligible for naturalization, *stayers from the more recent entry cohorts are less likely to acquire naturalized U.S. citizenships.*

3.2.3 Variations in education trajectories

Research on the international student post-graduation retention (Leslyanne Hawthorne 2010; Robertson 2013) often evoke an image of an individual who moves through a lockstep of education-graduation-employment in order to stay. I call this a “Common trajectory.”

Given great uncertainty embedded in the process, which I described in Section 2.1, students develop strategies to enhance their chance at migration. The theory of stepwise migration (Conway 1980; Paul 2011) suggests that immigrants can forge their unique trajectories so as to reach their desire destinations. This includes taking additional steps, as each step helps an immigrant gain resources, or capital, in many forms: information, networks, financial resources, experience, etc. Extending this framework to student-stayers, it means there are possible alternatives beyond the Common trajectory.

Limited findings from existing research provide an idea of how an alternative trajectory may look like. Some studies find that students can take a “roundabout” route to education, for example, by trying out different destination countries before settling in one (Brooks and Waters 2009; Waters 2007). In the United States, non-degree programs, such as intensive English training, enable students to take this route and to experience the U.S. higher education context even before applying for admission into American universities and colleges. These programs have the most impressive growth in the past decade, as enrollments in non-degree programs moved up by over 8,000 percent between 2002 and 2012 (N. Ruiz 2014). Further, some studies note cases of “astronaut households,” where parents migrate so that their children can obtain an education in the host country (Ley 2013; Tsong and Liu 2009; Waters 2002).²⁹ This strategy might work for dependent spouses as well, though its prevalence among spouses has not received attention from either researchers or the popular media.

From these findings, I suggest that there are at least two additional trajectories, which can be identified through a combination of visas and education history. I use the term “Circular trajectory” to refer to the “roundabout” routes. On this trajectory, stayers begin with a U.S. student’s visa, but ultimately obtain higher education degrees elsewhere before returning to the United States for employment. The other trajectory is called “Adjusted,” and it captures the experiences similar to those of children and spouse in “astronaut households.” Individuals in this group enter with a temporary visa for dependents, and then switch to student visas to pursue education. Note that it is possible

²⁹ Only those who attend schools while holding temporary visas are considered international students. In my identification strategy (Section 3.1), I explain how to distinguish this group in the data.

to adjust from a temporary work visa to a student's visa as well; however, there is no prior research on this type of status adjustment.

My analysis will consider whether and how individuals with these two uncommon trajectories have different LPR and naturalization outcome. Due to the absent of prior research, my hypotheses in this Section are exploratory and lean towards instrumental explanations based on the characteristics of each trajectory. For Circular stayers who do not have U.S. qualification, I expect that they will have a harder time fitting in the narrative of a desirable skilled immigrants who have both the required qualification and cultural immersion in the United States (Redden 2014). As such, stayers with a *Circular trajectory would be less likely to be retained as LPR*, compared to those having a Common trajectory. At the same time, Circular stayers might have other options outside of the United States, and therefore *stayers with a Circular trajectory would be less likely to become naturalized citizens*. For Adjusted stayers who have more resources to facilitate the transition towards permanent migration, including the possibility that they would also become LPR if their parents or spouses get it, I expect that *stayers with an Adjusted trajectory are more likely to be retained with LPR status*. At the same time, Adjusted stayers likely have family members in the United States, which is an expression of strong commitment and connection. As such, I expect that *stayers on an Adjusted trajectory would be more likely to become U.S. citizens*.

On top of the three trajectories, qualitative findings in international student research, albeit limited, confirm that students also try to increase their chances for long-term migration by obtaining several U.S. degrees (Knight 2012; Pang and Appleton 2004) or by starting at a lower level, such as high school (Institute of International

Education (IIE) 2017; Marklein 2014) to deepen their social connections in the United States. I expect that these elements impact permanent migration outcomes: *those who have more than one U.S. degree and those who start with a U.S. high school degree are more likely to be retained as LPRs*. Further, as these elements also increase stayers' social and cultural connection with the United States, I expect that among those eligible for naturalization, *stayers who have more than one U.S. degree, and stayers who start with a U.S. high school degree are more likely to become naturalized citizens*.

3.3 Data and Method

3.3.1 Data

To consider the expectations described above, I use data from the National Science Foundation's (NSF) SESTAT database. SESTAT is an integrated data system that combines data from the National Survey of College Graduates (NSCG), the National Survey of Recent College Graduates, and the Survey of Doctorate Recipients. The data are integrated, and weights are adjusted by SESTAT to represent the U.S. science and engineering workforce. Pooling data from three waves of SESTAT, including the 2003, 2010, and 2013 surveys, I created a nationally representative sample of the science and engineering workforce in the United States in the 2003-2013 period. SESTAT participants have all received at least a bachelor's degree and have at least one degree in science and engineering or are working in a science and engineering occupation (including those whose degree are not in science and engineering). From this, I identify a sub-sample of student-stayers (discussed further in Section 3.2) for the analysis.

Consistent to prior research which indicate that international students are a rare population who are difficult to capture in national surveys (King and Raghuram 2013), the sub-sample is small (N=9,778) relative to the overall pooled SESTAT sample (N=140,117).

I treat the data as repeated cross-sections, although some respondents appear in more than one wave of data. SESTAT uses a rotating panel design, which means that about two-thirds of all respondents in one wave are retained into the next wave, but about one-third of respondents are dropped and new replacement respondents are added (Fecso and Phelps 2007; Finamore et al. 2011). Given this sampling design, I only keep the first observation for individuals who appear more than once in the data. As my main predictors are based on retrospective information about visa and education history, which do not vary across survey waves, it does not matter which instance is kept.³⁰ I also deflate the weights to reflect the pooled data and adjusted the weight in each wave according to its sample size relative to the other waves.

Finally, as student-stayers are a small subset of the SESTAT sample, I use the sub-population estimate option in Stata to retain SESTAT's complex sampling design, which incorporates multiple sampling frames through the rotating panel method. Sub-population estimates increase the accuracy of variance estimations, thus creating more robust standard errors (Kreuter and Valliant 2007).

³⁰ As an aside, other studies focusing on time-sensitive information such as wages used a random selection mechanism to select one observation out of the multiple responses, e.g., see Sassler et al. 2017.

3.3.2 Method for identifying student-stayers

Following research on international student migration (Leslyanne Hawthorne 2010; King and Raghuram 2013; Robertson 2013; N. Ruiz 2014), I define international students as individuals who pursue U.S. education while on temporary visas. My identification strategy therefore ensures that those who are identified as student-stayers spend all or at least some of their study duration in temporary immigrant status. Using information on visa and education history, the identification strategy also distinguishes stayers based on three distinct education trajectories that I discussed earlier in Section 2.3.

To this end, I use retrospective information of education and visa histories available in the SESTAT data to identify student-stayers. Because SESTAT does not ask about the timing of naturalization, it is not possible to confirm that the respondents attend and complete schooling before obtaining citizenship. This missing variable will bias the identification strategy towards over-identification of student-stayers, for example, individuals who enter with a student's visa could naturalize via marriage before enrolling for their first U.S. degrees. For those on an adjusted trajectory, the risk of over-identification is even higher, as dependent children and spouses could naturalize as soon as their family members do. Further, as SESTAT only asks about the year in which a degree is granted, and not when the respondents start enrolling in school to pursue that degree. This exacerbates the uncertainty in mapping the time of transitioning to LPR status and the start of one's education.

To overcome these limitations, I generated a "typical duration" for each degree type. This typical duration is estimated as 5 years for Bachelor's degrees, 3 years for Master's degrees, 8 years for Doctorate and Professional degree, and 4 years for High

school and Other degrees. These numbers are estimated based on the average time to completion for each degree type in the United States (National Center of Education Statistics 2014; Sykes 2011). If a naturalized citizen entered with a student's visa and completed their first U.S. degree within this typical duration, they are flagged as student-stayers. Otherwise, they are not flagged as stayers.³¹ For LPR respondents, the typical duration is used to calculate a start-year for their first U.S. degree. LPR respondents who obtain LPR status before the calculated start-year will also be dropped from the sample. Using typical duration as a condition for identification errs on the conservative side, as I will likely underestimate the number of student-stayers by dropping those who take a longer time to complete their first U.S. degree. In the reverse direction, those who complete their degree sooner (e.g., one or two years) could not complete the lengthy LPR and naturalization process within that timeframe. As such, overestimation is unlikely.

It is important to note that the above identification strategy does not simply drop all stayers who take longer than the typical duration to complete their respective degrees. Respondents who take longer than the typical duration to complete their degree and who remain temporary visa-holders at the time of survey are included in the sample. The dropping strategy serves to remove individuals who are likely not student-stayers, for example, children and spouses who attend U.S. schools while waiting for their LPR family sponsorship to become effective. Nevertheless, some genuine student-stayers

³¹ I verified the accuracy of this identification strategy by checking with a different dataset, which is the restricted-use National Survey of College Graduates (NSCG) 2015 linked with the original ACS (only available in the Census Research Data Center). By linking the two surveys, I can link the ACS question on timing of naturalization to each respondent. I find that this strategy is mostly consistent, such that very few respondents are misidentified (such that they naturalize way before completing the first U.S. degree). The misidentification rate is lower than 0.05%. As the NSCG 2003-2013 and 2015 have the same set of questions and administration procedures; it provides some assurance that the use of typical duration is appropriate.

could be missed, particularly doctoral international students who take longer than 8 years to complete their degrees. Student-stayers whose first Doctorate degrees are outside Physical Sciences, Engineering, Life Sciences, and Social Sciences are likely overrepresented among those who are dropped, as the NSF has reported that their median time-to-degree is over 9 years (NSF 2009). Given that the SESTAT sample is representative of U.S. scientists and engineers though, these cases would be rare. Those who take longer to complete their degrees must also be able to renew their legal paperwork, and more importantly, to provide proof of resources for their continued legal stay in the United States. Thus, those not captured in my sample would also have to be relatively wealthy.

Specifically, I identify stayers as those who enter with a student's visa and those who enter with other temporary visa but acquiring U.S. degree(s) while on temporary status. I use five variables to identify student-stayers in the SESTAT sample. First, to capture individuals who enter the United States with a temporary visa status, I use a variable indicating type of the first visa, which distinguishes between student's visa, temporary work visa, and temporary dependent visa (e.g., F-2 visas are for dependent spouse or children of a F-1 student's visa-holder). Second, using a set of variables capturing the location (us or non-us location) of the schools granting the respondent's various degrees, I determine if the respondent ever obtained a U.S. degree (including high school). Third, with respects to the missing time of naturalization and missing degree start time, which I discussed in the earlier paragraph, I use three additional variables to filter out stayers who do not fit the typical duration condition: (1) current immigration status; (2) timing of LPR transition and (3) the duration between first entry and

completion of first U.S. degree. Naturalized respondents who took more years than the typical degree to obtain their first U.S. degrees are dropped from the sample. For LPR respondents, those who become LPR before finishing their first U.S. degrees are also dropped from the sample.

I identified student-stayers according to the three education trajectories, which I described in Section 2.3. “Common” stayers are those who enter with a student’s visa and obtain at least one U.S. degree in the process. The typical duration condition, which I described earlier, is used to drop LPR and naturalized respondents who likely transition before starting school. For example, if a naturalized respondent reports taking 6 years between entry and completion of their first Bachelor’s degree, they are dropped from the sample. If one is currently holding a temporary visa, the typical duration condition is not necessary, because they must have completed school while on temporary status.

Respondents in the second group, “Circular” stayers also enter with a student’s visa, but do not have any U.S. degree in their education history. Because they do not have U.S. qualification, the typical duration condition is not applied to this group. Finally, “Adjusted” stayers consist of respondents who enter with other temporary visas, including temporary work visa and dependent’s visa. They have at least one U.S. degree, and the condition of typical degree duration is applied to drop certain naturalized and LPR respondents in this group, similar to the previous discussion of “Common” stayers.

3.3.3 Statistical analyses

With student-stayers in each of the three education trajectories identified, I perform two sets of analyses to examine whether and how entry cohorts and trajectories are related to permanent migration outcomes. I use logistic regressions to predict two outcomes: LPR status (relative to temporary status), and naturalization (relative to LPR status). As I have discussed earlier, the transitions across three statuses are inter-dependent, such that it is impossible for one to go from temporary visa to naturalized citizenship without spending some time as LPR. Therefore, it is only appropriate to contrast the relative outcomes in two separate analyses.

Following prior research on naturalization (e.g., see Yang 1984), I use logistic regression with the following form:

$$\ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 Cohort + \beta_2 Years\ since\ entry + \beta_x Trajectories + \beta_z Controls$$

where $\ln\left(\frac{p_i}{1-p_i}\right)$ represents the logged odds of becoming LPR or naturalized citizens, α is the intercept, β_1 is the coefficient representing variations over entry cohorts, β_2 is the coefficient representing variations over years since entry, β_x refers to the set of coefficients capturing the impact of different elements of education trajectories, including trajectory type, type of first U.S. degree, number of U.S. degree, β_z refers to the set of coefficients for the control variables.

Additionally, applying insights from research on age-period-cohort effect, I estimate an additional model that taps into variations over periods as an interaction term between entry cohort and years since entry (I have discussed this in details in Section 2.2). The interaction model takes the following form:

$$\ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 \text{Cohort} + \beta_2 \text{Years since entry} + \beta_3 \text{Interaction} \\ + \beta_x \text{Trajectories} + \beta_z \text{Controls}$$

where there is one additional element, β_3 , which reflects how the coefficient for years since entry further varies across different entry cohorts.

The analyses are performed on different samples. Models predicting LPR status are only performed on those eligible for LPR (i.e., excluding naturalized citizens, N=5,499). Similarly, in models predicting naturalization, I restricted my sample to people who are eligible for naturalization, i.e., those who hold a green card for at least 7 years (N=5,085). Models that include characteristics of U.S. education, such as number of degrees and type of first U.S. degrees, only include stayers on the Common and Adjusted trajectories, thus resulting in smaller samples.

All models also include control variables that account for other key individual characteristics that might influence LPR and naturalization outcomes: gender, age at entry, educational achievement, and place of birth. All four control variables come from SESTAT data.

First, existing research on naturalization suggest that *age at entry* have a positive relationship with the propensity to naturalize, as those entering at a younger age might develop strong sense of belonging with the United States (Chiswick and Miller 2009; Van Hook et al. 2006; Yang 1994). Research has not examined how age of entry influences LPR status, but we might expect a similar relationship because LPR is a pre-condition for naturalization.

Second, prior research also indicates that patterns of Permanent migration are *gendered*, such that female immigrants are more likely to transition towards LPR and naturalization (e.g., see Yang 1994). In my models, I use a dummy variable for female respondents.

Third, *educational achievement* is an important factor that could influence LPR and naturalization outcomes. Education is an indicator of specialized skills, and as such, those with specialized degrees, such as Doctorate or Professional, are more desirable to the United States, and as such, they could access permanent migration more easily (Chiswick and Miller 2009; Jasso et al. 2010). I use a categorical variable indicating the respondent's highest degree to address this relationship.

Finally, *place of birth* is an important factor driving both LPR and naturalization outcomes. Previous studies have documented how the LPR backlogs are particularly long for certain origins countries, such as India and China (Jasso et al. 2010; Luthra 2009; Ruhs 2006). Naturalization outcomes also vary strongly by origins, such that immigrants from developed countries in Europe and Oceania are much less likely to naturalize (Bloemraad 2006c; Chiswick and Miller 2009). To control for this factor, I use a categorical variable for birthplace, which includes some countries which send large volume of immigrants (e.g., China, India, Mexico) and broad world regions (e.g., Europe).

3.4 Results

3.4.1 Types of student-stayers

Using the identification strategy described in Section 3.2 above, I identified 9,778 student-stayers in the SESTAT 2003-2013 database. Figure 3.1 displays the share of student-stayers among the United States foreign-born workforce in science, health, and engineering (SHE) fields. Overall, I estimated that slightly more than 23% are student-stayers. Among naturalized SHE workers, about 17% are stayers; and among LPR workers, stayers made up of 24%. The presence of student-stayers is largest among temporary SHE workers, accounting for nearly half of this group.

—FIGURE 3.1 HERE—

In Table 3.1 below, I show how this group is distributed across key characteristics. In 2003-2013, about 31% of the stayers have temporary visas, 27% have LPR status, and 42% are naturalized U.S. citizens. With respects to entry cohorts, a key independent variable in my analysis, it shows that stayers are quite evenly distributed across the four entry cohorts, with 30% in the pre-1986 cohort, 27% in the 1987-1996 cohort, 18% in the 1997-2002 cohort, and 25% in the post-2002 cohort. On average, stayers have been in the United States for about 16 years, and their average age at entry is 25 years old.

—TABLE 3.1 HERE—

Across education trajectories, 50% of student-stayers in SESTAT are on the “Common” trajectory, about 16% are “Adjusted” stayers, and 33% are “Circular” stayers. The majority of those who have U.S. qualification start with a Master’s degree or a Bachelor’s degree, which constitute 42% and 35% of the group, respectively. Close to one-third of U.S. educated stayers have multiple U.S. degrees.

Distributions of the control variables are consistent with research on the SHE workforce (Lan, Hale, and Rivers 2015; Sassler, Michelmore, and Smith 2017), for example, the majority of stayers are male (64%) and most have advanced degrees (66% have graduate degrees). India and China are countries that send the largest share of student-stayers, at 21% and 12%, respectively.

3.4.2 Models predicting LPR status

Do LPR outcomes vary by entry cohorts and education trajectories? I used logistic regressions to examine how entry cohorts, years since entry, and different elements of one's education trajectory are linked to different logged odds of obtaining LPR status, relative to temporary status. Results from these models are displayed in Table 3.2 below.

—TABLE 3.2 HERE —

As expected, Model 1 shows that entry cohorts have a large and significant effect, indicating that stayers in latter cohorts are much more likely to be retained with LPR status, compared to the pre-1986 cohort. Note that the coefficient sizes are quite dramatic: those in the 1987-1996 cohorts have about 1021% higher odds³² of becoming LPR, those in the 1996-2002 cohort have about 765% higher odds,³³ and those in the post-2002 cohort have about 400% higher odds.³⁴ This result is not driven by small cells,

³² $1021\% = (11.21 - 1) * 100$

³³ $765\% = (8.65 - 1) * 100$

³⁴ $349\% = (3.49 - 1) * 100$

as cross-tabulating entry cohorts by LPR outcome reveals that the smallest cell (those in the pre-1986 cohort who do not have LPR status) contains 70 individuals.

In Model 2, I add interaction effect between entry cohorts and years since entry as a way to understand “period effect,” or the impact of historical policy changes are expressed differentially as the stayers spend more years in the United States (Keyes et al. 2010; Luo 2015; Ryder 1965). This alters the previous set of coefficients. In Model 2, entry cohorts assume a negative relationship with LPR outcomes, while the interaction effects between entry cohorts and years since entry are positive and significant. I show predicted margins in Figure 3 to help understand this interaction effect.

—FIGURE 3.2 HERE—

Figure 3.2 shows that the two cohorts entering the United States in 1997-2002 and post-2002 have much lower probability of being retained as LPRs, compared to the pre-1986 and the 1987-1996 cohorts, in the first 10 years since entry. However, the probability of LPR grows more sharply with each additional year in the United States for the 1997-2002 and post-2002 cohorts, compared to the pre-1986 cohort. The probability of becoming LPR approaches 1 at about 20 years since entry for the two most recent cohorts, while the same predicted probability is less than 0.8 for the pre-1986 cohort. This interactive relationship is consistent when Circular stayers, who do not have U.S. qualification, are excluded in Model 3. These results indicate some tendency to obtain LPR status quickly, possibly as a defensive measure, among stayers in more recent cohorts.

Turning our attention to variations over trajectories, results from Model 1 and 2 in Table 3.2 indicate that Circular stayers, compared to Common stayers, have 63% higher odds³⁵ of obtaining LPR status, net of other factors. This result is not stable, as it is only significant in the interactive model (Model 2) and not the additive model (Model 1). This relationship is contrary to my expectations in Section 2.2 which predict that Circular students would have the lowest odds of obtaining LPR status.

In Model 3, I restrict the sample to only U.S.-degree-holders, which means that Circular stayers are excluded. Model 3, like Model 2, also contain an interactive effect between entry cohorts and years since entry. Results in Model 3 indicate that U.S. education history explains some of the variation in LPR status. Stayers who start in Doctorate or Professional degree are much more likely to be retained as LPR (or=2.863, $p<0.05$). Having multiple U.S. degrees increases the odds of LPR status by about 63%. This partially supports my expectations in Section 2.3, such that those with more U.S. degrees are indeed having higher odds of obtaining LPR status. Contrary to my expectations, an early education trajectory which starts in high school does not make a difference to one's odds of obtaining LPR status.

3.4.3 Models predicting naturalization

To further examine whether and how naturalization outcomes vary across entry cohorts and education trajectories, I perform logistic regressions on a different sample of stayers who are eligible for naturalization. The results are displayed in Table 3.3. Note that for

³⁵ $63\%=(1.63-1)*100$

this analysis, I need to combine the most recent two cohorts into one (Post-1997), as the sample is restricted to respondents who have LPR status for at least 7 years, which means that very few in the post-2002 cohort can satisfy this condition.

—TABLE 3.3 HERE—

The results in Model 1, 2, and 3 indicate that differences in the odds of naturalization are not statistically significant across four entry cohorts. Years since entry have a significant relationship with naturalization outcome, as evidenced by the positive and statistically significant coefficient, where one additional year increases the odds of naturalization by about 8.4%.³⁶ The interaction effect between entry cohorts and years since entry, as shown in Model 2, is also not significant in Model 1 and 2. In Model 3, where the sample further excluded Circular stayers, the interaction effect between the post-1997 cohorts and years since entry is marginally significant at $p < 0.1$. The effect can be interpreted as a negative relationship where every additional year since entry decreases the odds of naturalization for those in the post-1997 cohort by about 15.8%.³⁷ This thus provides some support for the expectations that an enforcement-focus policy regime makes new immigrants feel ambivalent about their values to the country (Bloemraad 2006), which then dampens their desire to naturalize.

With respects to education trajectories, Adjusted stayers are about 60% more likely to naturalize, compared to Common stayers. This result is robust across all model specifications, and it supports the expectation that Adjusted stayers are more likely to

³⁶ $8.4\% = (1.084 - 1) * 100$

³⁷ $-15.8\% = (0.842 - 1) * 100$

naturalize because of their existing connections (e.g., family members) with the United States.

In Model 3, the education history variables are included, and they do not matter much. Stayers who start with Doctorate or Professional degrees are less likely to naturalize, and stayers starting with high school or other degree are more likely to naturalize, although these relationships are marginally significant at $p < 0.1$. These opposite relationships imply that those who start early (in U.S. high schools) cultivate a stronger sense of membership with the country than those who start at the most advanced degree. This interpretation lends support to the idea that education trajectories that cultivate more social connections with the United States will increase the probability of naturalization. However, having multiple U.S. degrees is not statistically significant for naturalization outcomes, and thus the expectation is only partially supported.

3.5 Discussion

In this chapter, I consider long-term retention outcomes of international students in the United States and analyze how the status composition of stayers varies over entry cohorts and education trajectories. This effort provides important insights into how broader policy structures implicitly sort stayers into different migration statuses (Chiswick and Miller 2009; Massey 2016; Massey and España 1987; Walsh 2011). The implication for immigration policies is that restrictive policy changes do not only influence migrant's decision to leave or to stay, they also accelerate stayers' transition into more permanent immigrant statuses. This may create more strain on the system, leading to severe backlogs and longer processing times. At the same time, my exploration of education

trajectories helps capture some expressions of students' agency (Bakewell et al. 2012). Taken together, these insights lay the groundwork for future research dissecting the patterns and consequences of long-term international student retention. More broadly, they also contribute to the sociological study of the varied pathways through which temporary immigrants transition towards permanent settlement.

As I analyze the variations in LPR status across four entry cohorts, I find that the odds of obtaining LPR status are dependent on entry cohorts, such that student-stayers in latter cohorts are much more likely to become LPR. The interaction effect between entry cohorts and years since entry, which is analogous to a "period effect" (Keyes et al. 2010; Luo 2015; Ryder 1965), further clarifies that length of stay matters differently for stayers in different entry cohorts. Among stayers in the post-2002 cohort, the probability of having LPR status approaches one (meaning that everyone has LPR status) at about 15 years since entry. In contrast, the predicted probability of having LPR is smaller than 0.8 at 15 years since entry for the pre-1986 cohort. This implies that having LPR status is possibly a prerequisite for staying among more recent cohorts of student-stayers. In contrast, perhaps as a function of entering in a less restrictive policy context, those in the pre-1986 cohort could develop social connections that allow them to be more open-ended about their migration statuses.

With respects to naturalization outcomes, the relationship described above does not materialize. There is no variation across cohorts of student-stayers in naturalization outcomes. The results indicate that only longer duration of stay, as expressed by more years since entry, significantly increases the odds of naturalization. Further, the interaction between entry cohorts and years since entry only has one marginally

significant coefficient, such that stayers who came after 1997 are less likely to naturalize as they accumulate more years in the United States. Taken together, these findings refute the “defensive naturalization” expectation (Ong 2010). However, it is noteworthy that naturalization rate is quite high among this group, as about 80% of the sample have naturalized U.S. citizenships. Perhaps naturalization is more common among the population of scientists and engineers, who have established careers in the United States, and thus, policy changes do not make them much more likely to become U.S. citizens.

In addition to tapping into the effect of policy contexts with different measures of entry cohorts, years since entry, and an interactive “period” effect, I also explore the extent to which stayers have different education trajectories and consider if these variations in trajectories matter for LPR and naturalization outcomes. Among student-stayers identified in SESTAT, I identify three education trajectories, which I call Common, Circular, and Adjusted. Despite limited research about the uncommon trajectories, I estimate that Circular and Adjusted stayers contribute close to half of all student-stayers in the United States’ SHE workforce in 2003-2013. With respects to LPR and naturalization outcomes, I find that Circular stayers are more likely to have LPR status, relative to temporary status. This generates two related interpretations. First, the presence of Circular stayers and their higher odds of obtaining LPR, net of other factors, indicate that the United States policy environment favors Circular stayers, despite the fact that they do not have U.S. qualifications. Second, it also indicates that Circular stayers, due to their precarious link with the United States, need to anchor their stays with the LPR status. The broader implication of this finding is that it refutes the general wisdom that international students with U.S. degrees should be retained more (Lesleyanne

Hawthorne 2010; Obama 2014; Redden 2014; Robertson 2013). It means that the absent of a specific retention policies as well as the country's reliance on the market forces (i.e., through H1-B visas which are completely driven by employer's sponsorship) (Ruhs and Martin 2008) have produced an outcome opposite to the desire of policy-makers.

Additionally, I find that students' efforts to create more connections with United States society, such undertaking an Adjusted trajectory, make them more likely to become naturalized U.S. citizens. The evidence is mixed though. For example, having multiple U.S. degrees increases one's odds of obtaining LPR status, but it does not influence the odds of naturalization. Keeping in mind that these two outcomes are estimated on two separate samples, this result still indicates that LPR status and naturalization are two different processes, wherein LPR status guarantees one's permanent stay and citizenship requires a strong commitment to become a fully-pledged member of the United States society. For these reasons, Adjusted students, who likely move with their family members, are more inclined to pledge allegiance via citizenship.

The work in this chapter is limited in three areas. First, as it was only possible to study stayers and not those who left, I have been careful to talk about "staying" as both a choice and a constraint, such that not all who desire to stay can do so. This weakness is common among studies of international student long-term retention, as it is not possible to identify the time point at which international graduates leave (Finn 2014) or to track leavers over time in the same way that we can track stayers. It is only possible to compare incoming international students and stayers in the United States after 2001, as detailed data on international students' characteristics, such as citizenship, gender, academic major, are only available since then (Ruiz and Budiman 2018). If information about

leavers had been available, I may have found significant differences across country of origin. For instance, I suspect that student-stayers from Mexico and Latin American countries would be significantly more likely to naturalize as a defensive response to restrictive policy changes³⁸. Prior research has hinted at shifts in the origins of stayers in the United States over time. Specifically, students originating from India and China have come to form a larger share among Doctoral student stayers since the 2000s (Finn 2014).

Second, data on visa history in this chapter only provide limited view of the first and the last migration status of stayers. As such, it was not possible to consider other trajectories that diverge from education and employment, such as a trajectory that cross paths with marriage, which is documented among new immigrants in the United States (Jasso et al 2010). The uncommon education trajectories, particularly the Adjusted one, shed some light on the complex interaction of education, employment, and family, such that starting in dependent status (e.g., children or spouse) does not preclude their future values as immigrants: these stayers end up contributing to the United States science and engineering workforce. As such, this work fosters the understanding of long-term international student retention as a process that connects different spheres of one's life, not just education and work. Third, my effort to understand alternative education trajectories is limited by the lack of research in this area, such that it is not possible to generate much expectation in the statistical analysis. However, by showing that these trajectories do exist and estimating their likelihoods among student-stayers, my hope is to invite further research on the nuanced experiences of these students on uncommon paths. Additionally, as the average age of stayers in my sample is 25, it is likely that their

³⁸ The current analysis shows a non-significant yet positive coefficient for this group of student-stayers.

migration status transitions occur concurrently with other important life transitions, including family formation and childbearing, both of which might compel student-stayers to seek a more permanent statuses for staying. Future research could likewise shed more light on these relationships.

My next steps with this research will be to test the sensitivity of my identification strategy, which is based on a typical duration for each degree type. I increase the typical duration by one year at a time, up to three additional years, replicate the main analyses, and compare the results. The typical duration should not be extended too far, as it further increases the risk of misidentification. That is, I might classify individuals who attended U.S. schools while on LPR or naturalized citizenship status as student-stayers. In general, I expect that the results will not change significantly, as the number of new observations within each increase in the typical duration is small.

In closing, I show one additional figure on the relationship between entry cohorts and education trajectories of student-stayers in the SESTAT 2003-2013 data. Figure 3.3 indicates that the relative share of Circular stayers has grown steadily in each subsequent cohort, and that Circular stayers are in fact the majority of stayers in the final cohort, post-2002.

—FIGURE 3.3 HERE—

I want to situate these estimates in the context of explosive growth in international student’s enrollment in the past two decades in American universities and colleges (Ruiz 2014), which has been interpreted as the continued global prominence of U.S. higher education (Raghuram 2013) and the creation of a “future” immigrant workforce which

are ready to be incorporated at any time (e.g., see Obama 2014; Redden 2014). Given Figure 3.3, there are possible gaps in these assumptions. The first is that explosive enrollments might not mean that students are more committed to U.S. education (e.g., they might not complete a degree and choose to go elsewhere). The second is that implicit selection through the market-driven H1-B visas coupled with increasingly restrictive policy context could have conditioned new international students to expect a more circular and flexible path, rather than committing to making the United States their permanent homes. The implications of these two gaps is that if the policy context continues to move in its current (more restrictive) direction, the loss for U.S. higher education and skilled workforce would be even more pronounced as these uncommon trajectories remain under-studied.

Figure 3.1. Presence of student-stayers in the United States foreign-born SHE workforce, 2003-2013

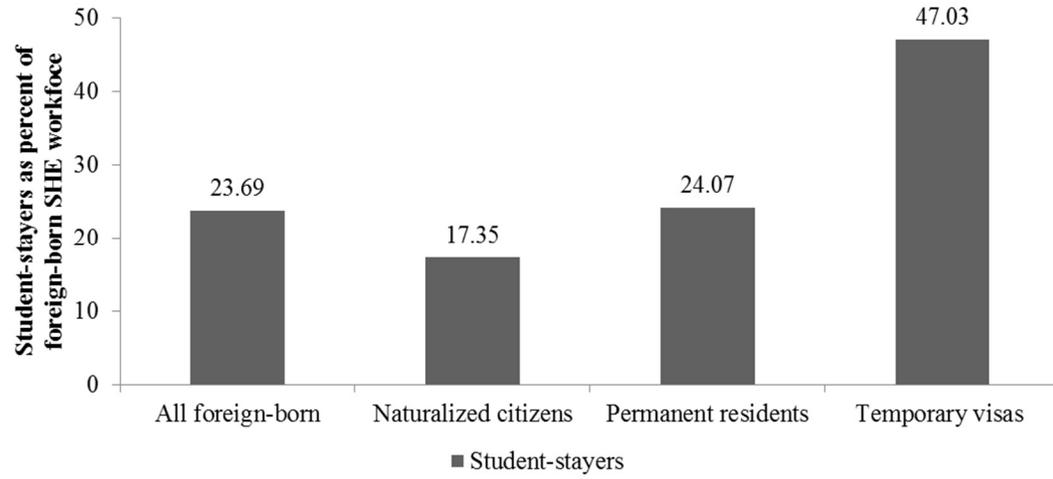


Figure 3.2. Predictive margins showing interaction effect of entry cohort and years since entry on LPR status

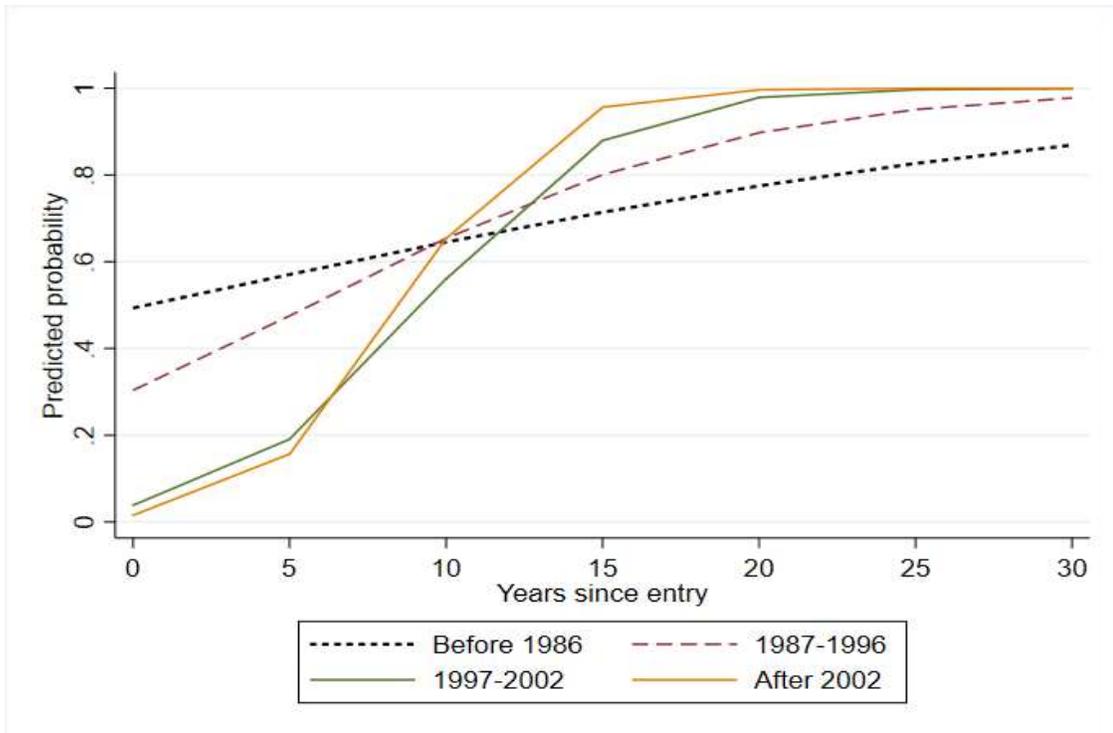


Figure 3.3. Types of student-stayers by entry cohorts

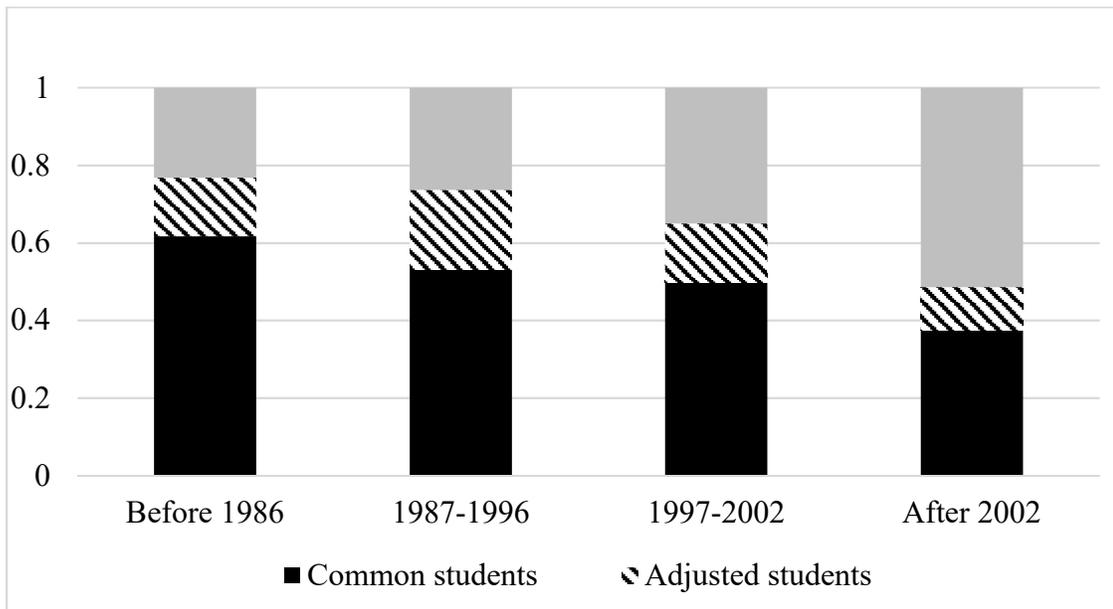


Table 3.1. Descriptive statistics of variables used in analysis

	All student-stayers			Sample 1: Temporary and LPR status			Sample 2: Naturalized citizens and stayers eligible for naturalization+		
	Mean/ Prop	S.D.	Note	Mean/ Prop	S.D.	Note	Mean/ Prop	S.D.	Note
<i>Migration status:</i>									
Temporary visas	0.31			-			-		
LPR status	0.27			0.47			-		
Naturalized U.S. citizen	0.42			-			0.79		
<i>Independent variables:</i>									
Entry Cohort									
Pre-1986	0.30			0.09			0.54		
1987-1996	0.27			0.25			0.34		
1997-2002	0.18			0.25			0.11		
Post-2002	0.25			0.42			0.01		
Years since Entry	16.67	12.79		10.06	8.05		24.85	11.03	
Trajectory type									
Common	0.51			0.48			0.55		
Adjusted	0.16			0.13			0.19		
Circular	0.33			0.40			0.26		
First U.S. degree*			N=6,892			N=3,627			N=3,780
High School or Other	0.18			0.10			0.26		
Bachelor's	0.35			0.34			0.38		
Master's	0.42			0.50			0.33		
Doctorate or Professional	0.05			0.07			0.04		

Have more than one U.S. degree*	0.27	N=6,892	0.16	N=3,627	0.39	N=3,780
<i>Control variables:</i>						
Female	0.36		0.36		0.36	
Place of birth						
India	0.21		0.25		0.15	
China	0.12		0.13		0.10	
Mexico	0.02		0.02		0.02	
Philippines	0.03		0.02		0.04	
Europe	0.14		0.16		0.14	
Other Asia	0.27		0.23		0.30	
North America	0.04		0.04		0.05	
Other Latin America	0.11		0.09		0.12	
Africa	0.06		0.05		0.06	
Oceania	0.01		0.01		0.01	
Highest degree						
Bachelor's	0.34		0.33		0.36	
Master's	0.45		0.46		0.43	
Doctorate or Professional	0.21		0.20		0.21	
Age at Entry	24.89	0.14	25.16	6.40		
Survey year						
2003	0.32		0.26		0.37	
2010	0.34		0.37		0.31	
2013	0.35		0.37		0.32	
Number of observations	9,778		5,499		5,085	

Notes: *denotes different sample sizes; + eligible individuals are those who have been in LPR status for at least 7 years; this similar to prior research on naturalization (e.g., see Jones-Correa 2001).

Table 3.2. Logistic regressions predicting LPR status (relative to temporary visas)

	All stayers		Only U.S.-degree holders
	Model 1	Model 2	Model 3
Entry cohort (Ref=Pre-1986)			
1987-1996	11.212*** [4.971,25.289]	0.403 [0.065,2.491]	0.58 [0.077,4.381]
1996-2002	8.651*** [2.970,25.201]	0.030*** [0.005,0.186]	0.086* [0.011,0.693]
Post-2002	4.489* [1.018,19.789]	0.011*** [0.002,0.081]	0.034** [0.003,0.339]
Years since entry	1.302*** [1.223,1.387]	1.073* [1.007,1.143]	1.087* [1.012,1.167]
Entry cohort x Years since entry			
1987-1996 x Years since entry		1.100* [1.014,1.194]	1.096+ [1.000,1.202]
1997-2002 x Years since entry		1.364*** [1.238,1.503]	1.260*** [1.130,1.406]
Post-2002 x Years since entry		1.570*** [1.402,1.758]	1.428*** [1.236,1.650]
Trajectory type (Ref= Common)			
Adjusted	0.815 [0.552,1.204]	0.918 [0.620,1.358]	0.908 [0.627,1.315]
Circular	1.256 [0.929,1.698]	1.631** [1.185,2.245]	

First U.S. degree (Ref=Bachelor's)			
High school and Other			1.32 [0.766,2.273]
Master's			1.342 [0.814,2.213]
Doctorate and Professional			2.863* [1.175,6.980]
More than one U.S. degrees			1.631*
<u>Control variables:</u>			
Female	1.271+ [0.995,1.623]	1.23 [0.954,1.587]	1.327+ [0.985,1.787]
Place of birth (Ref=India)			
China	1.062 [0.781,1.444]	1.131 [0.812,1.576]	0.944 [0.649,1.372]
Mexico	1.936 [0.862,4.350]	2.351+ [0.995,5.557]	1.743 [0.571,5.321]
Philippines	0.587 [0.238,1.452]	0.477 [0.193,1.179]	0.54 [0.161,1.814]
Europe	2.246*** [1.499,3.364]	2.281*** [1.490,3.492]	1.353 [0.820,2.233]
Other Asia	1.116 [0.811,1.536]	1.243 [0.893,1.730]	1.138 [0.774,1.674]
North America	1.582+ [0.938,2.666]	1.899* [1.098,3.285]	1.898+ [0.978,3.682]
Other Latin America	1.563+ [0.938,2.666]	1.587+ [1.098,3.285]	1.303 [0.978,3.682]

Africa	2.668** [0.997,2.451]	3.024*** [0.995,2.531]	2.413* [0.720,2.358]
Oceania	0.986 [1.430,4.978]	0.75 [1.621,5.640]	0.28 [1.170,4.976]
Highest degree (Ref= Bachelor's)			
Master's	0.847 [0.620,1.157]	0.854 [0.623,1.172]	0.734 [0.442,1.221]
Doctorate or Professional	0.767 [0.541,1.088]	0.688* [0.479,0.989]	0.314** [0.146,0.679]
Age at entry	1.079*** [1.052,1.108]	1.079*** [1.051,1.108]	1.063*** [1.035,1.091]
Survey year (Ref=2003)			
Survey 2010	1.002 [0.611,1.641]	1.229 [0.735,2.056]	1.025 [0.565,1.860]
Survey 2013	0.71 [0.376,1.338]	0.622 [0.335,1.156]	0.587 [0.287,1.202]
Observations	5,499	5,499	3,627

Notes: Exponentiated coefficients; 95% confidence intervals in brackets

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.3. Logistic regressions predicting naturalized citizenship (relative to LPR status)

	All former students		Only U.S.-degree holders
	Model 1	Model 2	Model 3
Entry cohort (Ref=Pre-1986)			
1987-1996	0.997 [0.617,1.610]	1.038 [0.617,1.747]	0.801 [0.446,1.441]
Post-1997	1.353 [0.636,2.880]	0.872 [0.185,4.112]	0.281 [0.054,1.468]
Years since entry	1.084*** [1.055,1.114]	1.085*** [1.055,1.115]	1.066*** [1.036,1.096]
Entry cohort x Years since entry			
1987-1996 x Years since entry		1.011 [0.949,1.077]	1.012 [0.938,1.091]
Post-1997 x Years since entry		0.939 [0.780,1.131]	0.842+ [0.689,1.029]
Trajectory type (Ref=Common)			
Adjusted	1.781* [1.093,2.902]	1.776* [1.089,2.897]	1.557+ [0.934,2.596]
Circular	1.005 [0.676,1.494]	0.991 [0.668,1.470]	
First U.S. degree (Ref=Bachelor's)			
High school and Other			1.716+ [0.944,3.121]
Master's			1.203 [0.705,2.052]
Doctorate and Professional			0.297+

			[0.079,1.118]
More than one U.S. degrees			1.422
			[0.862,2.346]

Control variables:

Female	1.124	1.143	1.249
	[0.814,1.553]	[0.830,1.574]	[0.867,1.799]
Place of birth (Ref=India)			
China	1.973*	1.964*	1.697
	[1.091,3.568]	[1.086,3.552]	[0.852,3.378]
Mexico	0.838	0.829	0.625
	[0.353,1.990]	[0.349,1.971]	[0.224,1.748]
Philippines	1.678	1.642	0.589
	[0.575,4.895]	[0.558,4.831]	[0.199,1.743]
Europe	0.617 ⁺	0.615 ⁺	0.501*
	[0.356,1.070]	[0.354,1.068]	[0.260,0.963]
Other Asia	1.297	1.277	1.403
	[0.760,2.214]	[0.747,2.181]	[0.778,2.530]
North America	0.297**	0.291**	0.238**
	[0.119,0.743]	[0.117,0.727]	[0.096,0.587]
Other Latin America	1.206	1.192	1.129
	[0.655,2.218]	[0.647,2.198]	[0.552,2.312]
Africa	1.206	1.159	0.917
	[0.552,2.636]	[0.536,2.508]	[0.402,2.090]
Oceania	0.135**	0.132**	0.324 ⁺
	[0.039,0.467]	[0.038,0.460]	[0.088,1.188]
Highest degree (Ref= Bachelor's)			
Master's	1.234	1.23	1.085
	[0.868,1.754]	[0.868,1.743]	[0.629,1.870]
Doctorate or Professional	1.197	1.207	1.476

	[0.738,1.942]	[0.743,1.960]	[0.640,3.406]
Age at entry	0.985	0.985	1.021
	[0.961,1.010]	[0.961,1.010]	[0.990,1.053]
Survey year (Ref=2003)			
Survey 2010	0.594**	0.568**	0.556*
	[0.401,0.882]	[0.376,0.858]	[0.354,0.873]
Survey 2013	0.742	0.719	0.791
	[0.465,1.184]	[0.412,1.255]	[0.431,1.455]
Observations	5,085	5,085	3,780

Notes: Exponentiated coefficients; 95% confidence intervals in brackets

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Chapter 4. Retaining Foreign-Born Students in Local Economies Post-Graduation

4.1 Introduction

In Chapter 2 and Chapter 3, I discussed how the migration patterns of international students are linked to immigration policies at both the state level and the national level. My focus in this chapter shifts to a broader phenomenon, which is the linkage between higher education and the retention patterns of U.S.-educated immigrants³⁹ in specific U.S. states. While continuing to consider specific immigration policies, I expand the focus in this chapter to a more encompassing aspect of the destination: its history and long-term experience with immigrants.

Specifically, in this chapter I seek to generate a baseline understanding of the overall pattern of immigrant retention in specific U.S. states through the channel of higher education. In the process, the analysis offers insights into variations in the retention patterns across different groups of immigrants. These are crucial issues given state policy patterns to attract and retain immigrants in recent decades. Since the 1990s, immigrants and international students have begun to choose new destinations in the United States, expanding beyond established gateway destinations such as New York and California (Massey and Capoferro 2008; N. G. Ruiz 2014; Singer et al. 2008). For these new destination states and cities in the United States, immigrants are seen as both a boon for local economies (Johnson–Webb 2002; Kandel and Parrado 2005; Massey and Capoferro 2008; Zúñiga and Hernández-León 2005) and a challenge, as the locales need

³⁹ By U.S.-educated immigrants, I refer to foreign-born individuals who have at least one U.S. degree (including high school).

to incorporate the new and diverse immigrant population into their social and political fabrics within short time frames (Breton 1964; Winders 2005). To date, a number of studies have noted that immigrants in new destinations tend to not settle in those places, but instead move on towards more established gateway locations (e.g., see Kritz et al. 2011; Kritz, Gurak, and Lee 2013). This tendency is more pronounced for immigrants with lower levels of education, although the reasons for this remain obscure. Equally important, it is unclear why highly educated immigrants choose to enter and remain in the new destination locations (Hempstead 2007; Kritz et al. 2011).

In Chapter 2, I delineated the ways in which U.S. states are trying to attract and retain international students. I noted several parallels between outreach to international students and states' recent trajectories as destinations for immigrants overall. In general, U.S. states that appear most committed to retaining international students, developing specific state- and city-sponsored efforts for post-graduation retention, are also new destination states. The Global Talent Retention Initiative, which spearheaded retention efforts, was launched in 2011 by the city of Detroit, Michigan to retain international students in the city's skilled workforce (Etzcorn and Tobocman 2016). Following Detroit, St. Louis created a similar initiative, called the Mosaic Project, in 2012 (Fan 2017). As these initiatives began to be discussed in other cities, including Lansing, Cincinnati, Toledo, Dayton, Pittsburgh, and Philadelphia, the state of Ohio became the first state, in 2014, to sign a law that declared a commitment to attracting and retaining international students within Ohio (Farkas 2015). None of these locations had previously been a gateway destination for immigrants.

The retention initiatives of new destinations call for a new line of research to understand the links between policies and outcomes. An important question for both the study of new destinations and research on international student retention is the extent to which the first study location becomes an “anchor” for the immigrant’s journey. In other words, to what extent do immigrants commit to stay in the locations where they obtain their first U.S. degrees? Further, for those who move, to where do they move and why? The answers to these questions will explain whether and how highly-educated immigrants, through the channel of education, are retained in local economies.

In addition, I also consider how state characteristics—namely, its history with immigrants, economic conditions, and immigration policy—influence the immigrants’ movement patterns. By considering the impact of state immigration policy, this chapter expands the notion of “vulnerability,” which I developed in previous chapters, to consider whether the policy context at the destination state has an impact on the immigrant’s lifetime destination choice—that is, whether they decide to stay or return to their first education location in the United States. Unlike Chapter 3 where I focus solely on side-door stayers, this chapter will compare the experience of side-door stayers who entered the United States as international students and front-door stayers who entered as permanent immigrants and obtained a U.S. education afterwards. This comparison will elucidate the unique vulnerability of side-door student-stayers based on their immigration status at entry. In the sections that follow, I first draw on previous new destinations research to map a destination typology of U.S. states (Funkhouser 2000; Hempstead 2007; Massey and Capoferro 2008). I then draw on insights from the theories of onward migration. This includes the theory of stepwise migration (Conway 1980; Paul 2011),

which argues that immigrants, when lacking the resources to migrate to their ideal destinations, will take a number of steps through intermediary destinations to get to their final, ideal destinations (Paul 2011). Connecting these two strands of research, I argue that the destination's long-term history with immigration is a proxy for understanding its desirability to immigrants. As such, an expression of stepwise migration is that U.S.-educated immigrants will likely leave new destination states and migrate to a more established gateway state.

I also consider two alternative perspectives on this topic. Research on the “study-migration pathway” implicitly assumes that students seek to study in places where they eventually want to migrate (Findlay et al. 2016; Hawthorne and To 2014; Robertson 2013). While this assumption might be true for the national level, as international borders are harder to move across, the extent to which this applies for a sub-national destination has yet to be examined. If the assumption holds true at the subnational level, then retention at the first study location will be large.

Additionally, research on onward migration further suggests that immigrants might continue to migrate as a coping strategy when conditions at the initial destination become unfavorable (Ahrens, Kelly, and Liempt 2016; Giralt 2017). To examine the merits of this idea, my analysis will consider how economic conditions and restrictive policy context at the first study destination impact U.S.-educated immigrants' migration patterns. Following my analysis in Chapter 2, I consider the same state policy, Omnibus Immigration Legislation (OIL), as an indicator of the policy context.

Taken together, my efforts in this chapter will contribute insights to both research and policy on immigrant retention through the channel of education. As I connect different strands of research on this topic, the results also serve as *empirical foundations* for future research seeking to theorize and understand subsequent migration patterns in different types of destinations. I then close with a discussion of key takeaways from this exploratory effort.

4.2 Backgrounds and Literature Review

4.2.1 A typology of immigrant destinations in the United States

To various extents, the current efforts to attract and retain international students are related to U.S. states' unique history as new immigrant destinations, which started in the 1990s. Immigrants started to show up in places that had not received them in large numbers since the 1920s (Gozdziak and Martin 2005; Lichter and Johnson 2006; Massey and Capoferro 2008; Zúñiga and Hernández-León 2005). The traditional gateway states, such as California and New York, still host a large number of immigrants, yet their relative share of the overall immigrant populations have been on the decline. For example, in the 1990s, close to 75% of recent immigrants in the United States stay into the big-five gateway states, which include California, New York, Texas, Florida, and Illinois. In 2005, only 50% of recent immigrants are located in those big-five destination states (Frey 2005; Hempstead 2007; Massey and Capoferro 2008; Singer et al. 2008). Compared to native-born Americans foreign-born individuals move internally at a lower rate (Perry and Schachter 2003). This means immigrants might be easier to retained.

Further, those who move to obtain higher education credentials are also more likely to remain in the same place after graduation (Winters 2011).

Existing research has focused on the stability of migration patterns into new destinations, asking whether immigrants will remain there. This question stems largely from the differential contexts of reception at different destination types. At traditional destinations with a long-standing history of immigration, immigrant communities are more developed, and as such, the social and political environments are more favorable towards immigrants (Breton 1964; Massey 1995; Portes and Sensenbrenner 1993; Portes and Zhou 1993). Favorable conditions can manifest as economic opportunities through the presence of immigrant enclaves, which particularly benefits lower-skilled immigrants and those who are not fluent in English (Logan, Xu, and Stults 2014; Moretti 2012; Portes and Zhou 1993). Beyond economic opportunities, multiculturalism at traditional gateways also offers a cultural sense of belonging for non-white immigrants, who make up the largest share of immigrants coming to the United States post-1965 (Breton 1964; Portes and Sensenbrenner 1993). Prior research also notes that immigrant communities open up opportunities for meaningful political integration, through activities such as participating in movements for immigrant's rights or voting in local and national elections (Bloemraad 2002). In contrast, new destinations which have not experienced much immigration in the past struggle with the influx of a diverse immigrant population, lacking the social and political structures to support them (Winders 2005, 2014). Studies have noted tensions along racial lines, as well as a rise in anti-immigrant sentiments, in new destinations (Hopkins 2010; Szkupinski Quiroga, Medina, and Glick 2014).

Lacking a cohesive social and political structure which would incorporate immigrants for long-term settlement, new immigrant destinations in the United States are thus seen as temporary stops for immigrants who are seeking either economic opportunities or reliefs from immigrant enforcement tensions at gateway destinations. Several studies have documented how the surge in labor demands, generated by a combination of job growths and low unemployment rates at Midwestern and Southern U.S. states, draw immigrants away from the gateway locations and into new destinations (Broadway and Ward 1990; Johnson–Webb 2002; Kandel and Parrado 2005; Zúñiga and Hernández-León 2005). Additionally, selective hardening of border enforcement tactics following the passage of the Immigration Reform and Control Act in 1986 is linked to immigrants' avoidance of popular gateway locations in California and Texas and to their choice of an alternative, new destination (Massey and Capoferro 2008). Eventually, however, research has indicated that immigrants at new destinations are more likely to out-migrate than those residing in traditional destinations, net of economic conditions and the presence of co-ethnic communities (Kritz et al. 2011). Those who leave are also more likely to gravitate towards a more established destination (Kritz et al. 2013). As immigrants are more likely to leave new destinations even after controlling for economic conditions and the presence of co-ethnic community, these findings indicate that perhaps the broader context of reception, which clearly distinguishes an established destination from a new destination, is crucial for long-term settlement.

The key takeaway from new destination research, as I discussed earlier, is that it is possible to approximate the general context of U.S. destination states through a typology of immigrant destinations. A typology of destinations can encompass the

complex history and potential social and political structures embedded in each location, which then is linked to the destination's relative desirability for new immigrants. To be sure, existing studies have used several typologies of destination, taking different geographical units as their focus. Many studies focused on metropolitan areas, as immigration in the United States have remained largely an urban phenomenon, and distinguished between gateway cities, such as Los Angeles and New York City, from new destination cities, like Atlanta or Las Vegas (Hall 2013; Singer et al. 2008). A few studies have also focused on new destination in rural areas, which receive lower volumes of immigrants compared to urban areas but nevertheless an influx of immigrants too significant for their histories (Donato et al. 2007; Lichter and Johnson 2006; Marrow 2011). Beyond the urban and rural divide, some studies go to the level of counties and labor market areas (Kandel and Parrado 2005; Kritz et al. 2011) in order to generate an encompassing comparison of all locations within the United States. Other studies, also seeking to encompass all locations within the United States, focus on states as distinct destinations (Funkhouser 2000; Gurak and Kritz 2000; Hempstead 2007; Massey and Capoferro 2008).

In this chapter, I focus on states as unique destinations, for three reasons. First, this is consistent with my focus in Chapter 2, where I examined specific state policies between 2001 and 2015. Second, while there might be significant intra-state variation, U.S. states are important units that can and do pass and change state laws and policies that influence the lived experiences of immigrants (Allen and Ishizawa 2015) and encourage or deter immigrant's long-term settlement. Third, a typology of destination based on states will encompass all possible locations within the United States. I adapt a

four-category typology that was developed by Massey and Capoferro (2008). As shown in Table 4.1, the four types of destination states are ranked by their relative histories with immigration, namely big-five destinations, second-tier destinations, new immigrant destinations, and not immigrant destinations.⁴⁰

---TABLE 4.1 HERE---

This typology is also flexible, in that it can be condensed into a binary distinction of traditional versus non-traditional destinations. The first two types (big-five and second-tier destination states) can be considered traditional destinations, as they have had extensive history hosting immigrants. The big-five states have hosted the largest number of immigrants, while second-tier states also have consistently hosted immigrants, but at a much smaller volume. Non-traditional destinations include new destination states and states that are not immigrant destinations. According to Massey and Capoferro (2008), new destinations are places that have experienced the influx of immigrants since the 1990s, while non-destination states have low levels of immigration throughout.

4.2.2 Retention in and beyond the first study destination

Turning to migrants themselves, in this section, I consider their onward migration—whether they remain in the location where they receive their first U.S. degrees or move on to new locations. Before discussing how new destinations and onward migration literature can be fruitfully integrated, I will say a few words about the unique group of

⁴⁰ For short, I also use the term “non-destination” to refer to places that are not immigrant destination in this chapter.

U.S.-educated immigrants, which is my focus in this chapter. These immigrants received at least one of their degrees at any institution in this country, which means that they have additional experience with the U.S. higher education systems. This additional experience makes them highly valuable to the U.S. national and local economies, as their qualifications match the country's standards and cultural exposure through education makes it easier to incorporate them into the social and political fabric (Hawthorne 2010; Hazen and Alberts 2006; Lloyd 2014; Seitz 2014).

Within this group, I further distinguish between side-door student-stayers and front-door student-stayers (hereafter, side-door stayers and front-door stayers). In Chapter 3, I have discussed the complicated pathway side-door stayers must go through to remain in the United States after graduation, simply because they entered with a temporary immigration status through the "side door" of immigration. In contrast, front-door stayers are those who attended schools while being Legal Permanent Residents (LPR) or naturalized citizens. The key difference is that side-door stayers face more challenges in staying. As such, local policy efforts like those in Detroit or St. Louis are developed to target side-door stayers, with the idea that easing the administrative challenge in staying beyond a student visa will encourage side-door stayers to remain long-term.

A key analysis in this chapter will compare the migration patterns of side-door stayers and front-door stayers, asking whether the former have a similar propensity to stay as the latter. This then contributes a *baseline* understanding for current and future policy efforts to retain international students after graduation. This analysis will establish some expectations about the level of mobility among side-door stayers, relative to front-door stayers, before retention policies were adopted.

With these conceptual definitions in mind, the new destination literature has generally viewed highly-educated immigrants as outliers. New destination research tends to focus on lower-skilled immigrants who are drawn in by job growth in new destinations' meatpacking and other manufacturing industries (Broadway and Ward 1990; Johnson–Webb 2002; Kandel and Parrado 2005). In analyses that compare highly-educated immigrants to other immigrants, studies find that highly-educated immigrants are more likely to settle in new destinations (Bartel and Koch 1991; Gurak and Kritiz 2000; Kritiz et al. 2011). This outcome is oftentimes attributed to the fact that economic opportunities at gateway locations, which are connected to ethnic enclaves and tend to be lower-skilled, are not relevant to highly-educated immigrants. Thus, they are less drawn to traditional destinations (Kritiz et al. 2013; Logan, Alba, and McNulty 1994). At the same times, these studies are ambivalent on the mechanisms that bring highly-educated immigrants to new destinations in the first place.

In this chapter, I consider one possible channel bringing highly-educated immigrants to new destinations: education. Drawing insights from research on international students, I propose that perhaps immigrants in general are drawn into new destinations through a combination of prestige and affordability of higher education in a specific U.S. state. Through this channel, it is then possible for new destination states to retain their own shares of skilled immigrants, including both side-door stayers and front-door stayers. My work in this chapter explores this possibility, and to do so, I incorporate further insights from existing research on onward migration.

First, the theory of stepwise migration suggests that immigrants have in mind an “ideal” destination (Paul 2011, Conway 1980), such that they take each initial migration

destination as a stepping stone to get closer to the final, ideal destination. In the same way, immigrants might treat their first study destinations as a step to enter the United States and obtain relevant education which qualifies them for transitioning into skilled immigration later. Mapping this “ideal” destination in the theory of stepwise migration to my previous discussion on the distinctive contexts of reception between new destination states and established gateways, it is reasonable to conceive that new immigrants (in this chapter, U.S.-educated immigrants) envision themselves thriving in a traditional destination, rather than a new destination. In other words, those who come to new destination might well treat it as a transit point, and thus they would be more likely to leave.

Prior empirical studies of stepwise migration have hinted at this correlation between a destination’s long-running immigration histories with its perceived desirability to immigrants. For example, in her study of domestic migrant workers, Paul (2011) finds that immigrants tend to see Canada as the ideal destination, whereas newer locations with poor support structures such as Dubai or Saudi Arabia are not. In the case of U.S.-educated immigrants, they might ultimately desire to be in the U.S. states that have established histories as “states of immigration” (Ellis and Goodwin-White 2006), rather than those without. Empirically, as the four categories in my chosen typology of destinations go from the most established destinations to the least known ones (not immigrant destinations), the expectation is that *out-migration is lowest when the first study destination is a big-five state and highest when the first study destination is not a destination state*. Further, *those leaving non-traditional (including new and non-*

destination) states will be heading towards more a traditional (big-five or second-tier) destination-state.

Second, studies of international students which focuses on the “study-migration pathway” or the “education-migration nexus,” (Findlay et al. 2016; Hawthorne and To 2014; Robertson 2013) implicitly assume that students seek to study in places where they eventually want to migrate to. This is particularly true for national level analyses, as international visas are hard to get, especially for students originating from less developed countries in the global South. It remains unknown if the same applies for the sub-national level of analysis. If it does, then *immigrant’s first study destination and their current destination state will be the same.*

Specific to international students, studies addressing retention at the sub-national level are few in number and are typically done as evaluations for specific sub-national retention programs in a few countries, such as Canada and Australia (Suter and Jandl 2008). In the absence of a retention policy, it is unclear whether and to what extent students who stay will do so in the very same location that they started education. Using front-door stayers as a comparison group, it is possible to understand the relative mobility level of international students. Under the assumption of a “study-migration pathway,” if side-door stayers indeed choose their first study destination as a migration destination, then side-door stayers’ *probability of out-migration from first study destination should be the same as front-door stayers* (i.e., those who migrate for non-education reasons, such as for family reasons).

Third, prior research suggests that onward migration can also be spontaneous and reactive. In contrast to the theory of stepwise migration (Paul 2011, Conway 1980) this perspective suggests that unfavorable social and political contexts at the destinations might compel immigrants to change their plans (Ahren et al. 2016, Giralt 2017). As such, subsequent migration might not be intended, but is instead a coping strategy for unfavorable conditions at the first destination. In a study of Latin American immigrants in Spain, McIlwaine (2012:43–44) finds many considered Spain their home and “left with a heavy heart” to other countries in the European Union because they experienced highly unfavorable conditions in Spain, which include loss of employment, depletion of social assistance through welfare, and potential housing and other economic debts. Among U.S.-educated immigrants, this perspective can manifest as an impact of economic conditions, such that *side-door stayers will leave their first study destination if the labor market condition is not favorable*. Further, unfavorable political condition manifested as *a restrictive immigration policy context at first study destination-states might increase out-migration as well*.

4.3 Data and Method

4.3.1 Data

In this chapter, I use data from the 2015 National Survey of College Graduates (NSCG), which is obtained through a restricted license with the U.S. Census and accessible only at a Census Research Data Center (RDC). As location variables are considered highly confidential, data access and analyses must be done in the RDC environment and outputs

must receive clearance before they can be shared. Due to restrictions in the RDC clearance process, the output formats are also limited: numbers in statistical results can only have up to four meaningful digits (for example, the number 14.99 contains four meaningful digits), sample sizes have to be rounded up according to size brackets (for example, sample sizes smaller than 9,999 have to be rounded up to the nearest 1,000), and limited descriptive statistics are allowed.

Technical restrictions aside, the NSCG provides a nationally-representative sample of the science, health, and engineering (SHE) workforce in the United States in the year 2015. Participants in the NSCG have all received at least a bachelor's degree and have at least one degree in science and engineering or are working in a science and engineering occupation (including those whose degree are not in science and engineering). The 2015 survey is the only available NSCG with detailed location variables at the state level.⁴¹

My analytical sample includes all foreign-born individuals who have at least one U.S. degree, who I called "U.S.-educated immigrants." The sample size is about 11,000. Among this group, I further identify side-door stayers with a similar identification strategy that I used in Chapter 3 (and described in detail in Section 3.2). To reiterate, I define side-door stayers as immigrants who attended schools while on a temporary visa

⁴¹ As an aside, I had hoped to get to a lower level of analysis, such as metropolitan areas, but it was not possible to do so. Respondent's location in 2015 is only available at the state level. In terms of first study location, it was possible to use the unique identification number associated with the school granting first degree to obtain more detailed location (such as zipcode). However, as I tried to match school with addresses using the unique identification number, I realized that many schools (about 30%) cannot be matched. There might be further underlying problems, for example, the identification number might change over time, or not being fully captured in the address file provided by the National Center for Education Statistics (NCES).

status. Front-door stayers, in contrast, attend U.S. schools while holding LPR status or naturalized citizenships. Among side-door stayers, I further separate the group into “Common stayers” and “Adjusted stayers,” to reflect their educational trajectory in the United States, which I have discussed in Chapter 3. Common stayers are those who take the relatively more normative route to go from education to employment and staying, while Adjusted stayers came to the United States first with a non-student temporary visa and then adjusted to student status to begin their trajectory as side-door student-stayers. Circular students are not included here because they do not have any U.S. degree in their education history. As I will be comparing the migration patterns of side-door stayers with front-door stayers, the results will help situate current policy efforts to retain international students in specific U.S. states and cities in a broader *baseline* understanding of how side-door stayers’ propensity for interstate migration is similar to front-door stayers.

4.3.2 Methods

My analysis focuses on two key dependent variables. The first is a binary variable indicating whether the respondent’s location (specific U.S. states) in 2015 is the same as their first study location. If the location is the same, the respondents are classified as “non-movers,”⁴² and if not, they are considered “movers.” This will get at long-term retention of U.S. educated individuals in the specific states that they went to school. The

⁴² I am aware that this does not capture migration in between, that is, a non-mover might have left and then returned to the same location. However, from a retention perspective, the respondent is still “retained” in the location, even if they have moved somewhere and returned.

second variable is categorical, with three outcomes to further distinguish types of moves: non-movers, movers to traditional destinations (which include big-five and second-tier states), and movers to non-traditional destinations (which include new destination and non-destination states).⁴³

I estimate two sets of models, one for each dependent variable. The first set of models is based on logistic regression predicting whether the respondent moves to a different U.S. state other than their first U.S. study destination. It takes the following form:

$$\ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 \text{Immigrant Type} + \beta_2 \text{FirstDestType} + \beta_3 \text{FirstDestIncome} \\ + \beta_4 \text{FirstDestUnemployment} + \beta_5 \text{FirstDestPolicy} + \beta_z \text{Controls}$$

(Equation 1)

where $\ln\left(\frac{p_i}{1-p_i}\right)$ represents the logged odds of out-migration from the first study destination, α is the intercept, β_1 is the coefficient representing variations over types of immigrants (front-door relative to Common and Adjusted side-door stayers), β_2 is the coefficient representing variations over four types of first study destination, β_3 and β_4 capture the economic conditions (income per capita and unemployment rate) at the first study destination, β_5 reflects the effect of restrictive policy context at the first study destination, β_z refers to the set of coefficients for the control variables.

⁴³ I condensed the destination types because there are not enough cases of movers into specific destination types (especially to non-destinations). Condensing the destination types also makes interpreting the results easier, and this practice is common in the new destination literature (e.g., see Kritz et al. 2013).

The second set of models is based on multinomial logistic regression that predicts the odds of moving into traditional destinations and into non-traditional destinations, relative to not moving. The multinomial set-up is consistent with prior research predicting types of move away from new destinations (e.g., see Kritz et al. 2013). It takes the following form:

$$\ln \frac{P(Y_i = m)}{P(Y_i = 1)} = \alpha + \beta_1 \text{Immigrant Type} + \beta_2 \text{FirstDestType} + \beta_3 \text{FirstDestIncome} \\ + \beta_4 \text{FirstDestUnemployment} + \beta_5 \text{FirstDestPolicy} + \beta_z \text{Control}$$

(Equation 2)

where $\ln \frac{P(Y_i=m)}{P(Y_i=1)}$ represents the logged odds for outcome m , where $m = 2$ represents moving to a traditional destination (big-five or second-tier), and $m = 3$ represents moving to a non-traditional destination (new destination or non-destination), relative to the baseline outcome $m = 1$, which is not moving. The set of independent variables and control variables are identical to Equation 1 above.

As I have discussed earlier, the second independent variable indicates the *type of first U.S. study destination*, which distinguishes between big-five destination states, second-tier destination states, new destinations, and non-destinations. The typology serves as a proxy for capturing the destination's history with immigration, which further differentiates their desirability to immigrants as an ideal destination. Combining insights from new destination research and the theory of stepwise migration, I have proposed earlier that big-five destination states are most ideal, while non-destinations are least ideal.

The third and fourth independent variables capture the economic condition at the first study destination in the year when the respondent finished their first U.S. degree. These include state's income per capita and state's unemployment rate. These variables will allow me to consider expectations from view of onward migration as a coping strategy for unfavorable conditions at destination (Ahrens et al. 2016; Giralt 2017). Income per capita gives a sense of relative wage in the area, and unemployment rate captures the extent to which employment opportunities is available. Both variables have been found to impact internal migration pattern of immigrants in the U.S., such that high income per capita and low unemployment rate will lower out-migration probability (Bartel 1989; Bartel and Koch 1991; Gurak and Kritz 2000; Kritz et al. 2011). I use these two variables to consider expectations from research on onward migration as a reactive strategy. These variables are obtained from the Correlates of State Policy database (Jordan and Grossmann 2017).

The fourth independent variables capture aspect of the immigration policy context at the first study destination. While state's activities with respect to immigration policies only started to gain momentum in 2005, it is possible that actual policy adoption is reflective of a general policy environment that is not immigrant-friendly (Hopkins 2010; Ramakrishnan and Wong 2010; Steil and Vasi 2014). Accordingly, I use a binary variable indicating whether the first study destination state eventually adopted an Omnibus Immigration Legislation (OIL). This policy, which I have discussed at further length in Chapter 2, is consider the "toughest" in immigration enforcement (Archibold 2010), and is linked to intimidating and racialized immigration enforcement practices. As such, I expect that states which later adopt OIL to have a more restrictive policy context,

which means U.S.-educated immigrants will be more likely to move from such states. Information for state's OIL are obtained from the National Conference of State Legislature (NCSL 2016)

Further, I include a set of control variables in each model. Following Chapter 3, it is possible that individuals who experience a different national policy context at entry have different feeling about remaining in their first study destinations. As such, I include two variables to account for variations over *entry cohorts* and *years since entry*. Entry cohorts reflect the timing and policy context when the individual first came to the United States (Elder 1975; Ryder 1965), and years since entry indicates the years an individual has been exposed to American society and culture (Yang 1994). Side-door immigrants who are in the United States longer (more years since entry) also have a greater chance of obtaining LPR status or naturalized citizenship, given that both processes take several years. Further, following the previous chapter's focus on educational history, I include a variable to account for the individual's *type of first U.S. degree*, with the idea that those who came with a lower degree might have developed more attachment to their first study location. In Chapter 3, I found that side-door stayers whose first U.S. degree is a High school diploma are more likely to naturalize.

Other control variables include individual's gender, place of birth, age, education attainment, and two additional characteristics of the first study location: U.S. Census regions and percent foreign-born in the state population. Due to the absence of previous research on migrant retention at the state level, the rationales for including control variables are drawn from broader related studies. I control for *gender* as studies of long-term migration has indicated that female immigrants are more likely to migrate long-

term, including taking up permanent status such as LPR or naturalized citizenship (e.g., see Yang 1994). *Place of birth* is a proxy to understand ethnic relations and possible racial tensions that the individuals might experience in a specific destination. As prior research on new destinations have noted intense migration patterns of Latin American immigrants into and out of new destinations (Szkupinski Quiroga et al. 2014; Winders 2005; Zúñiga and Hernández-León 2005), it is possible that place of birth might explain some variations in the dependent variables. The models control for *age*, as younger immigrants tend to be more likely to move (Bartel 1989; Gurak and Kritz 2000; Kritz et al. 2011). Education attainment, which is measured by one's highest degree, has been found to influence internal migration patterns as well. The relationship is such that more highly-educated people are more likely to move into and remain in new destinations (Bartel and Koch 1991; Gurak and Kritz 2000; Kritz and Nogle 1994). Evidence to date only considers education level up to college; therefore, it is unclear how qualification beyond a Bachelor's degree will impact migration patterns.

In terms of location characteristics, the Models further control for the U.S. Census region (namely Midwest, Northeast, South, and West) of the original destination. These capture broader cultural factors that may shape the choice of destination for international students and migrants. States in the Northeast and the West are considered more open and diverse (Kritz et al. 2013). Finally, I also include the size of a location's foreign-born population as a proxy for existing immigrant community, a characteristic which has been found to reduce immigrant's risk of outmigration (Bachmeier 2013; Gurak and Kritz 2000; Hernández-León and Zúñiga 2000).

4.4 Results

4.4.1 Descriptive results

Do U.S.-educated immigrants remain in U.S. states where they first came for education? To answer this question, I compare their first study location and their location in 2015 and show the patterns of movement in Figure 4.1. At first blush, the distribution of student-stayers across four destination types seems remarkably stable: about 52% of U.S.-educated immigrants in SHE fields had their first degrees in a big-five destination state, and about 54% of them resided in a big-five destination state in 2015. The same pattern is observed for the other three types of destinations: second-tier, new destination, and not immigrant destination.

---FIGURE 4.1 HERE---

Also indicated in Figure 4.1, the relatively stable proportion masks a great deal of transitions. About 18.5% percent of U.S.-educated immigrants who had their first U.S. degrees in a big-five destination state left for another destination type. There are sizeable proportions of movers in all four destination types, yet the proportions of movers are largest among new destinations and non-destination states. As shown in Figure 4.1, about 44% of U.S.-educated immigrants who started in a new destination state and about 52.5% of those who started in a non-destination state left for other destination types.

In Table 4.2, I display further descriptive statistics of the sample. Movers (i.e., U.S.-educated immigrants who moved to a different state) are the majority, as 58% of the immigrants in the U.S. SHE workforce are in a different state than their first study location. About 36% moved to a traditional destination, which includes big-five and

second-tier destination states, and about 22% moved to a non-tradition destination, which includes new destination and non-destination states.

---TABLE 4.2 HERE---

Those who attended schools in the United States while on temporary visa status, or side-door stayers, which I have examined in Chapter 3, made up about 33% of this group. With respects to their education trajectory types, about 25% are Common student-stayers and about 8% are Adjusted student-stayers. More than half of U.S.-educated immigrants in SHE fields obtained their first U.S. degree in a big-five destination state, while 14% had their first U.S. degree from schools in a second-tier state and 26% from a new destination state. Only about 8% of these immigrants had their first degrees in a non-destination state.

With respects to the control variables, more U.S.-educated immigrants are from older entry cohorts, as 36% came before 1986, 29% came between in the 1987-1996 period. The latter two entry cohorts, 1997-2002 and post-2002 each made up 17 and 18 percent of all U.S.-educated immigrants in SHE fields, respectively. On average, they have been in the United States for about 24.5 years. Close to half started their U.S. education with a High school diploma, 26% started with a Bachelor's degree, 23% started with a Master's degree, and not surprisingly, only about 4% started with a Doctorate Professional degree. This group is very balanced in terms of gender, as about 51% are women. The average age is 41.4 years old.

4.4.2 Statistical analysis

Are those in less established destination states more likely to leave? I use logistic regressions to estimate the relative odds of leaving the first study location for another U.S. state. The results are displayed in Table 4.3. Model 1 includes all control variables and a variable indicating types of foreign-born. In Model 2, I add a variable for types of first destination and a variable that indicates the state immigrant policy context. In Model 3, I include variables that capture the economic conditions at the first study location for the year in which respondents receive their first U.S. degrees.

---TABLE 4.3 HERE---

Across all three models, the estimates show that side-door stayers are more likely to out-migrate from their initial study destination, compared to front-door stayers. Net of all other factors, as shown in Model 3, Common student-stayers have 97.2% higher odds⁴⁴ of leaving their first study destinations compared to front-door stayers. Similar, Adjusted student-stayers have about 80.3% higher odds⁴⁵ of leaving. This indicates that side-door stayers are indeed more mobile than front-door stayers. This result refutes the idea of a “study-migration pathway” to specific U.S. states in which international students are assumed to desire migration to their initial study destinations.

The next set of coefficients evaluates variations across types of first study destination. As shown in Model 2, relative to those in the big-five destination states, U.S.-educated immigrants in second-tier destination, new destination, and non-destination are significantly more likely to move. However, after controlling for economic conditions at the first study destination, Model 3 indicates that only those who

⁴⁴ $97.2\% = (1.972 - 1) \times 100$

⁴⁵ $80.3\% = (1.803 - 1) \times 100$

started at a new destination state are significant more likely to leave. Net of all other factors, U.S.-educated immigrants at new destinations are 70% more likely to move to a different state. The coefficient indicates that those in second-tier destinations and non-destinations are more likely to move as well, but the coefficient for second-tier destinations is only marginally significant at $p < 0.1$, and the coefficient for non-destinations is not statistically significant. This partially supports the idea that those in new destinations are more likely to leave, although it is a little surprising that those in non-destination states are not more likely to leave. This result partially supports the idea from stepwise migration theory (Paul 2011) that new destination states are a temporary stop, such that people come into new destination with a more flexible mindset and gaining relevant capital for moving to elsewhere. As non-destination states are neither known for economic opportunities nor particularly prestigious education, it is possible that immigrants at non-destination states are a selected group who are there due to other attachments (such as family), and as such, they are less likely to leave.

The variable indicating whether first location adopts OIL in later years has a positive relationship with the odds of out-migration, which is consistent with my expectation. However, the coefficient is only marginally significant in Model 2, and in Model 3, after controlling for economic conditions, the coefficient becomes insignificant. It means that the relationship is not stable. I will revisit this finding in the Discussions section.

The variables that capture the first location's economic conditions work as expected, such that higher income per capital reduces the odds of moving (not statistically significant), and higher unemployment rate increases the odds of moving.

Unemployment rate explains a lot of variation in moving, such that one percentage increase in unemployment rate is associated with a 114% increase in the odds of moving. This supports the idea that onward migration is a strategy to cope with unfavorable conditions at the first destination.

Where do movers move to? To answer this question, I use multinomial logistic regressions to predict the odds of moving into traditional (which include big-five and second-tier) and non-traditional (which include new and non-) destination states, relative to not moving. The results are displayed in Table 4.4. Model 1 includes immigrant types, first U.S. destination types, and control variables. In Model 2, I add variables for economic conditions and policy context at the first U.S. destination state.

---TABLE 4.4 HERE---

The results indicate that side-door stayers have higher odds of migrating into traditional destinations, compared to front-door stayers. This result hold for both Common and Adjusted student-stayers, yet the coefficient for Adjusted student-stayers' move to traditional destinations are insignificant after controlling for economic and political context in Model 2. As I discussed in Chapter 3, Adjusted student-stayers might have other connections in the United States, such as family members who move with them, and in this respect, they maybe more similar to a front-door stayer who came into the United States for non-education reasons.

The results also indicate that both Common and Adjusted student-stayers have higher odds of migrating to a non-traditional destination state, compared to front-door stayers. This result is stable across both Model 1 and Model 2. The difference between

side-door and front-door stayers implies that side-door stayers are more willing to consider non-traditional destination, perhaps due to their status as side-door immigrants (which I have discussed in Chapter 2). Given the difficulty of staying in the United States after graduation, side-door stayers could be more willing to relocate to a non-traditional destination to obtain sponsorship for their work visas.

With respects to destination types, Model 1 indicates that those in second-tier destinations, new destinations, and non-destinations are all more likely to move to both traditional and non-traditional destinations. However, after controlling for state economic conditions and policy context in Model 3, the results indicate that only those in new destinations are significantly more likely to move into a traditional destination (or=2.210, $p<0.01$). This finding is consistent with the new destination literature that the direction of move tends to be from new destinations and towards traditional destination (Hempstead 2007; Kritz et al. 2013), indicating that established destinations still have their pulls, likely because of the existing social, cultural, and political settings that are more favorable for immigrants. Those in non-destination states, after controlling for economic conditions, do not have significantly higher odds of moving to either traditional or non-traditional destination states. Similar to my discussion of Table 4.3 above, those in non-destination states could be a selected group that came into non-destinations for family reasons and thus have stronger attachment to the place.

Model 3 itself reveals some interesting patterns, such that unfavorable state economic conditions, indicated by high unemployment rates and low income per capita, are only associated with higher odds of moving to a traditional destination. This indicates that U.S.-educated immigrants' moves into traditional areas are influenced by economic

conditions, but their moves to non-traditional areas are not. Non-economic reasons, such as moving with families or seeking sponsorship for a skilled immigrant visa, might be impacting the move towards non-traditional areas, and this relationship needs to be evaluated with further research.

Policy context, measured by whether the first location eventually adopted OIL, does not have a significant effect on the odds of moving to either destination types. I will unpack this relationship further in the Discussions section.

4.5 Discussion

In this chapter, I considered whether U.S.-educated immigrants stay in the location where they obtain their first U.S. degrees, where they tend to migrate to, and considered different factors that might impact their migration patterns beyond the first study destination. I find that there is significant inter-state migration beyond the first study destination, such that about 58% of U.S.-educated immigrants in SHE fields moved to a different state other than the place where they obtained their first U.S. degrees. Among this group, I find that former international students, or side-door stayers, are more likely to move, compared to front-door stayers. In terms of their subsequent destinations, I find that both Common and Adjusted student-stayers are more likely to move into a non-traditional destination state. These results indicate that side-door stayers are a highly mobile population, and that they might move because of non-economic reasons, such as to obtain sponsorship for skilled immigrant visas.

With respects to destination types, I find that U.S.-educated immigrants in second-tier and new destination states are more likely to move to a different U.S. state, net of other factors. This lends partial support to the theory of stepwise migration (Paul 2011, Conway 1980) which views the first study destination as stepping stones to get elsewhere. However, I also find that immigrants who had their first U.S. degree in a non-destination states are not more likely to leave, compared to those started in big-five destination states. There could be other selection mechanisms, for example, those who started in a non-destination area, knowing the location's strength and weaknesses, are more likely to think of their first study destination as a long-term destination. It is also possible that those who came to non-destination areas but could not move to a different area eventually leave the country (thus they do not show up as "stayers"). This point requires further investigation, such as by comparing relative enrollment rates at non-destination areas compared to other states.

With respects to the direction of the move, I find that immigrants who obtained their first degrees at new destination states have significantly higher odds of moving to a traditional destination (which includes both big-five and second-tier destination states). This echoes existing research that traditional destinations remains attractive to immigrants due to the established history with immigration (Kritz et al. 2013, Hempstead 2007). Further, this finding partially supports the theory of stepwise migration, such that a new destination could just be a stepping stone for immigrants to move towards their ideal destination, which, in this case, is a traditional destination state.

Economic conditions, particularly unemployment rate, explain a lot of variation in the odds of leaving the first study destination. Restrictive policy context, measured by

whether the first destination state adopts OIL in later years, is associated with higher odds of out-migration, yet this relationship become insignificant after controlling for economic conditions. Thus, it remains inconclusive if restrictive policy context impacts out-migration. There are two possible explanations for this. First, similar to what I have examined in Chapter 2, OIL might only affect side-door stayers, and it might not have the same impact on front-door stayers. Another possible explanation, similar to the case of immigrant in non-destination states, is that immigrants who started in states with restrictive policy context could be more likely to leave the United States after graduation. Taken together, these results partially support the perspective that onward migration is a reactive strategy to cope with unfavorable conditions, such as high unemployment rate at the first destination (Ahren et al. 2016). More research is needed to fully understand the relationship between policy context and onward migration.

Migration into non-traditional destinations, in contrast, is not explained by the economic factors included in my multinomial logistic regressions. Worse economic conditions at the first study location do not make U.S.-educated immigrants more likely to move into a non-traditional destination, relative to not moving. This indicates that moving into non-traditional destinations might be driven by non-economic factors, such as by the move of family members or by the need to secure sponsorship for an employment's visa.

The work in this chapter has three main limitations. First, just like Chapter 3, this is a study of stayers; it cannot capture how different factors, such as poor economic conditions or restrictive policy context, might have forced U.S.-educated immigrants to leave the country after graduation. My exploration is thus limited to the subsequent

migration patterns of stayers, and it shows that many stayers move to a different U.S. state after graduation. Second, the variable that I used to capture restrictive policy context does not have a stable relationship with out-migration patterns. As I discussed earlier, the alternative explanations for policy effect will require future investigations to fully unpack. This brings us to the third limitation of this chapter, which is that I chose to focus solely on U.S.-educated immigrants to establish a baseline understanding of side-door stayers' lifetime mobility patterns. This analysis could be strengthened by adding native-born Americans as a comparison group, which would generate insights about the relative role of immigrant retention for human capital development in new destinations. As my work with the data is very restricted because of strict disclosure rules for extracting research outputs out of the RDC environment, I plan to perform these additional analyses in the coming months and years.

Bracketing these limitations, this chapter provides important empirical foundations for understanding retention patterns of U.S.-educated immigrants across different types of destinations. It contributes insights to new destination research in considering how education can serve as a channel to attract skilled immigrants, an area which has been overlooked in prior studies. My work in this chapter is also relevant for state's and city's policies that seek to retain its own international students. I have shown that side-door stayers are much more likely to move into non-traditional destinations, relative to front-door stayers, even after controlling for economic conditions. This implies that side-door stayers could be more willing to move for non-economic reasons, such as to obtain a temporary skilled work visa. As such, policies at new destinations which help international students transition into employment and subsequent permanent migration

status could be effective. There could also be potential for new-destinations to attract side-door stayers from other destination. At the same time, my finding that U.S.-educated immigrants in general are more likely to leave a new destination state for a traditional destination implies that traditional destinations, with its established history of incorporating immigrants, will continue to have their prominence among these highly-educated immigrants.

Figure 4.1. Location change between first U.S. study destination and current location among U.S.-educated foreign-born SHE population

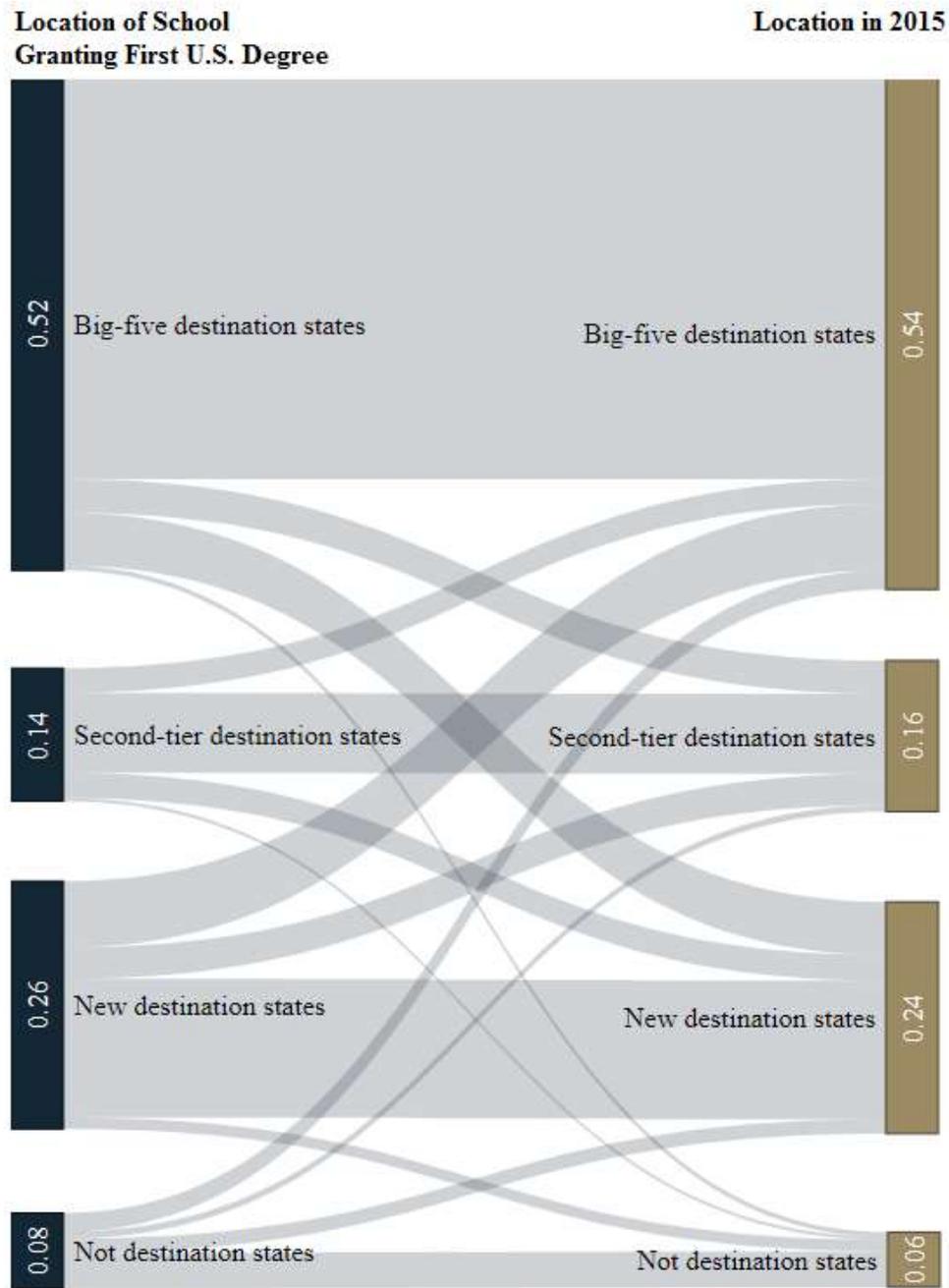


Table 4.1. Type of immigrant destinations

Traditional destinations	Big-five destinations	California, New York, Texas, Florida, Illinois
	Second-tier destinations	New Jersey, Massachusetts, Washington, Virginia, Maryland
Non-traditional destinations	New destinations	Arizona, Colorado, Connecticut, Georgia, Hawaii, Indiana, Kansas, Louisiana, Michigan, Minnesota, Missouri, Nevada, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, Wisconsin, Washington D.C.*
	Not immigrant destinations	Alaska, Alabama, Arkansas, Delaware, Iowa, Idaho, Kentucky, Maine, Mississippi, Montana, North Dakota, Nebraska, New Hampshire, New Mexico, Oklahoma, South Carolina, South Dakota, Vermont, West Virginia, Wyoming

Sources: Massey and Capoferro 2008, see also Singer et al. 2004.

Notes: Similar to Chapter 2, I consider Washington D.C. a unique destination equivalent to a U.S. state.

Table 4.2. Descriptive statistics of variables used in analysis

Variable name	Mean/Proportion	Standard Errors
<i><u>Dependent variables</u></i>		
Mover (yes/no)	0.58	
Type of move		
Move to traditional destination	0.36	
Move to non-traditional destination	0.22	
<i><u>Independent variables</u></i>		
Immigrant Type		
Front-door stayer	0.67	
Common stayer	0.25	
Adjusted stayer	0.08	
Type of first study location		
Big-five destinations	0.52	
Second-tier destinations	0.14	
New destinations	0.26	
Not destinations	0.08	
First location's unemployment rate (logged)	2.43	0.02
First location's later OIL adoption (yes/no)	0.07	
<i><u>Control variables</u></i>		
Cohort of Entry		
Before 1986	0.36	
1987-1996	0.29	
1997-2002	0.17	
After 2002	0.18	
Years since entry	24.50	0.38
Type of first US degree		
High school	0.48	
Bachelor's	0.26	
Master's	0.23	
Doctorate or Professional	0.04	
Female	0.51	
Age	41.41	0.41
Place of birth		
China	0.08	
India	0.11	
Europe	0.15	
Other Asia	0.31	

North America & Oceania	0.04	
Latin America	0.24	
Africa	0.07	
Highest degree		
Bachelor's	0.49	
Master's	0.37	
Doctorate/Professional	0.14	
First location's U.S. region		
Northeast	0.30	
Midwest	0.15	
South	0.29	
West	0.26	
First location's % foreign-born	13.15	0.28
Sample size^	11,000	

^ Sample sizes are rounded to the nearest 1000

Table 4.3. Logistic regression predicting the odds of moving out from first study location (U.S. state)

	Model 1	Model 2	Model 3
Immigrant Type (ref= Front-door stayer)			
Common stayer	2.969*** (0.432)	2.668*** (0.421)	1.972*** (0.340)
Adjusted stayer	2.154*** (0.485)	2.304*** (0.553)	1.803* (0.419)
Type of first U.S. destination (Ref= Big-five)			
Second tier destination		1.916*** (0.350)	1.442+ (0.292)
New destination		2.635*** (0.437)	1.697* (0.443)
Not immigrant destination		2.501** (0.752)	1.308 (0.513)
First location's Income per capita (logged)			0.726 (0.226)
First location's unemployment rate (logged)			2.140** (0.552)
First location's later OIL adoption		1.506+ (0.371)	1.477 (0.362)
<i>Control variables:</i>			
Age	1.006 (0.008)	0.995 (0.011)	0.969* (0.015)
Female	0.907 (0.106)	0.908 (0.109)	0.921 (0.112)
Highest degree (Ref=Bachelor's)			
Master's	1.592*** (0.206)	1.564** (0.234)	1.492** (0.220)
Doctorate or Professional	2.667*** (0.440)	2.612*** (0.543)	2.503*** (0.511)
Place of birth (Ref=China)			
India	1.390 (0.397)	1.052 (0.223)	1.017 (0.204)
Philippine	1.140 (0.424)	1.280 (0.468)	1.371 (0.480)
Mexico	0.402* (0.147)	0.497* (0.168)	0.488* (0.165)
Europe	0.976 (0.281)	0.757 (0.171)	0.790 (0.170)

Other Asia	0.795 (0.213)	0.793 (0.162)	0.799 (0.153)
North America	0.760 (0.314)	0.726 (0.286)	0.754 (0.302)
Other Latin America	0.931 (0.267)	0.880 (0.214)	0.923 (0.221)
Africa	1.168 (0.362)	0.919 (0.251)	0.954 (0.253)
Oceania	1.302 (0.888)	1.620 (1.502)	1.872 (1.840)
Cohort of Entry (Ref=Before 1986)			
1987-1996	0.858 (0.185)	0.825 (0.175)	0.711 (0.156)
1997-2002	0.943 (0.284)	0.887 (0.269)	0.689 (0.218)
After 2002	0.901 (0.326)	0.835 (0.303)	0.666 (0.256)
Years since entry	1.016 (0.012)	1.029* (0.014)	0.999 (0.016)
Region of entry (Ref= Midwest)			
Northeast		0.846 (0.178)	1.122 (0.267)
South		0.695+ (0.141)	0.726 (0.152)
West		0.408*** (0.099)	0.569* (0.159)
Type of first US degree (ref= High school)			
Bachelor's		1.257 (0.257)	1.988** (0.449)
Master's		1.423 (0.320)	2.358** (0.634)
Doctorate or Professional		1.193 (0.380)	2.502* (1.014)
First location's percent foreign-born			0.953* (0.020)
Sample size [^]	11,000	11,000	11,000
F-statistics	10.12	11.29	11.01
Model p-value	0.000	0.000	0.000

Notes: Table showing exponentiated coefficients; standard errors in parentheses; ^ Sample sizes are rounded to the nearest 1,000

+ p<0.1; * p<0.05; ** p<0.01; *** p<0.001

Table 4.4. Multinomial logistic models predicting the odds of moving into traditional and non-traditional states.

(Note that traditional states include big-five and second-tier destinations, non-traditional states include new destination and not destinations, the odds are relative to staying in one's first U.S. destination state.)

	Model 1		Model 2	
	Traditional	Non-traditional	Traditional	Non-traditional
Immigrant Type (ref=Front-door stayer)				
Common stayer	3.059*** (0.542)	2.156*** (0.412)	2.016*** (0.385)	1.887** (0.411)
Adjusted stayer	2.245** (0.590)	2.381** (0.720)	1.596 (0.409)	2.096* (0.618)
First US destination (Ref= Big-five)				
Second tier	1.853** (0.357)	2.668*** (0.641)	1.411 (0.311)	1.619 (0.432)
New destination	3.266*** (0.562)	2.441*** (0.533)	2.210** (0.641)	1.147 (0.378)
Not destination	2.893*** (0.908)	2.697** (0.908)	1.589 (0.638)	0.960 (0.458)
First location's Income per capita (logged)			0.480* (0.147)	1.290 (0.539)
First location's unemployment rate (logged)			2.226** (0.580)	1.922 (0.683)
First location's later OIL adoption	1.394 (0.361)	1.572 (0.460)	1.400 (0.365)	1.533 (0.437)
Cohort of Entry (Ref=Before 1986)				
1987-1996	0.801 (0.188)	0.807 (0.223)	0.657 (0.158)	0.757 (0.221)
1997-2002	0.772 (0.261)	0.972 (0.382)	0.540 (0.188)	0.908 (0.377)
After 2002	0.572 (0.228)	1.217 (0.569)	0.380* (0.159)	1.265 (0.627)
Years since entry	1.020 (0.016)	1.040* (0.018)	0.978 (0.017)	1.027 (0.020)

First US degree type (ref= High school)				
Bachelor's	1.237 (0.303)	1.315 (0.307)	2.215** (0.581)	1.713* (0.466)
Master's	1.311 (0.332)	1.610 (0.470)	2.567*** (0.712)	2.123* (0.773)
Doctorate or Professional	1.142 (0.419)	1.351 (0.489)	3.036** (1.268)	2.004 (1.012)
Age	0.992 (0.012)	0.996 (0.013)	0.955** (0.014)	0.984 (0.019)
Female	0.945 (0.124)	0.899 (0.144)	0.951 (0.124)	0.905 (0.145)
Highest degree (Ref=Bachelor's)				
Master's	1.840*** (0.314)	1.239 (0.244)	1.754*** (0.292)	1.200 (0.235)
Doctorate or Professional	3.178*** (0.748)	1.920** (0.467)	3.060*** (0.700)	1.849* (0.451)
Place of birth (Ref=China)				
India	1.154 (0.253)	0.975 (0.251)	1.103 (0.234)	0.935 (0.225)
Philippine	1.497 (0.589)	1.046 (0.527)	1.648 (0.659)	1.059 (0.487)
Mexico	0.440* (0.169)	0.580 (0.257)	0.430* (0.163)	0.552 (0.248)
Europe	0.759 (0.186)	0.737 (0.212)	0.782 (0.186)	0.770 (0.212)
Other Asia	0.877 (0.184)	0.717 (0.192)	0.884 (0.179)	0.712 (0.178)
North America & Oceania	0.893 (0.374)	0.724 (0.297)	0.929 (0.404)	0.717 (0.290)
Other Latin America	0.788 (0.198)	1.022 (0.325)	0.834 (0.209)	1.052 (0.322)
Africa	0.986 (0.305)	0.856 (0.284)	1.050 (0.315)	0.860 (0.279)
Region of entry (Ref= Midwest)				
Northeast	1.119 (0.234)	0.567* (0.163)	1.429 (0.332)	0.870 (0.273)
South	0.737	0.515*	0.795	0.573*

	(0.149)	(0.139)	(0.161)	(0.155)
West	0.284***	0.391***	0.412**	0.693
	(0.060)	(0.107)	(0.112)	(0.236)
First location's % foreign-born			0.960	0.929**
			(0.020)	(0.025)
Sample size [^]	11000		11000	
F-statistics	8.449		8.231	
Model p-value	0.000		0.000	

Notes: The baseline category is not moving (from one's first U.S. destination state).

Table shows exponentiated coefficients; standard errors in parentheses

+ p<0.1; * p<0.05; ** p<0.01; *** p<0.001

[^] Sample sizes are rounded to the nearest 1000

Chapter 5. Conclusions

The major motivation of this project is to connect the study of international students to the broader field of migration research. With three empirical chapters, I have shown that the fluid nature of the international student status, such that they do not fit neatly into any category of immigrants, provides important opportunities to recognize and remedy existing gaps in our current understanding of immigration and immigration policies.

Specifically, I bridged the conceptual gap between international student research and the broader study of migration with the “side door of immigration” framework. Breaking from the polarized understanding of immigration policies that put immigrants in either the “desirable” or “undesirable” categories (Borjas 2016; Chiswick 1999), my framework suggests that international students holding temporary immigrant statuses occupy the space in-between these categories. This conceptual framework emphasizes the transitional nature of the international student status, which have been captured by existing concepts such as “study-migration” or “learning-to-migrate” (Findlay et al. 2016; Hawthorne and To 2014; Robertson 2013), and it further prioritizes the identity of international students as immigrants in their chosen destinations *while pursuing an education*, regardless of their intention for long-term stay. Building on this concept, I further argued that the uncertainties associated with being a “side door” immigrants for several year contribute to their vulnerability of enforcement policies under a crimmigration regime, which punishes immigrants harshly for minor law (Beckett and Evans 2015; Stumpf 2008). Vulnerability on the basis on their status as “side-door” immigrants may impact international students’ migration patterns in the United States,

including their choice of a U.S. state as their study location and their subsequent migration pathways after graduation.

In three analyses, I have provided empirical evidences to consider whether and how the U.S. crimmigration regime at different levels of analysis impacts international students' migration patterns into and beyond the side door of immigration. In Chapter 2, I found that the adoption of harsh immigration enforcement policies at the U.S. state level is linked to lower international student enrollments, which implies that students are avoiding these places. Further, as I focus on the historical transition of U.S. immigration policy as it evolved into a hyper-enforcement system over several decades, my work in Chapter 3 revealed that international student-stayers who experienced a more restrictive policy context when they first entered the United States transition into legal permanent resident (LPR) status much quicker than those who experience a less restrictive policy context. This implies a defensive response from the students, as they affirm their right to stay with permanent migration status in volatile times. In the final empirical chapter, I found that international student-stayers are much more likely to leave their initial study destinations, compared to other U.S.-educated immigrants, net of all other factors. This finding indicates that international students' unique experience as "side door" immigrants impacts their subsequent migration within the United States, such that they are more willing to move so as to seek relevant sponsorship to transition towards a more permanent immigrant status.

Beyond the specific topics that I have discussed in each chapter, the "side door of immigration" framework extends immigration policy research by challenging the assumption that there are discrete categories of "desirable" versus "undesirable"

immigrants. Prior research has noted how immigration policies of our time are increasingly sophisticated (Czaika and de Haas 2013) and focused on specific targets: to attract only desirable immigrants and deter undesirable ones. By destabilizing the discrete categorization of immigrants, the “side door” framework facilitates future efforts to theorize and analyze unintended, or spillover, policy effects (e.g., see Aranda et al. 2014). This is essential for understanding the experiences of all temporary immigrants at the side door relative to policy change. Addressing the experience of temporary immigrants, in turn, close narrows the gap between research and the reality that temporary immigrants are indeed the fastest growing group of immigrant the past few decades (Castles 2000; Findlay et al. 2012; Lowell 2001).

My work also facilitates the incorporation of immigrants’ agency and their complex life-course transition in quantitative analyses. Research suggests that these are important steps to move away from the historical obsession with the economic and political dimensions of migration (Findlay et al. 2016; Hollifield et al. 2008; King 2002) and to prioritize immigrants’ lived experiences. In this project, I drew on qualitative research to generate indicators of uncommon educational trajectories, relative to the common lockstep of education-graduation-employment. My effort thus reiterates the importance of agency, and my hope is that future quantitative studies can incorporate other nuanced dimensions of the student-migrant’s experience, such as the transition to marriage.

This work also has important policy implication. Here, I have intentionally focused on immigrants considered most desirable: international students who contribute an important income for higher education, and the most coveted student-stayers who

remain in the U.S. science, health, and engineering workforce. This group of immigrants represents the rare common ground amidst the highly polarized field of immigration enforcement, such that highly skilled immigrants are considered universally valuable for the U.S. economy and society (Cerna 2014; Hainmueller and Hiscox 2010; Lowell 2001). As my findings have exposed the complex implications of restrictive immigration policies on this group of immigrants, they provide incentives for reconciling the polarized ends of immigration policy. Starting with recognizing the vulnerability and the human dimensions of this desirable, skilled immigrant workforce, my hope is that this will encourage conversations about human rights alongside concerns over economic gains and law enforcement in immigration policy-making.

In this endeavor, I have tried to obtain the best available data, including administrative data on student's visa through a Freedom of Information Act (FOIA) request and two restricted data licenses. Even so, my work is limited by the disconnect between those who come (enrollment) and those who stay (retention), as I do not have any information about those who leave. In all three empirical chapters, I have treated the data as-is, and interpreted the results with caveats about the missing parts of the equations.

One possible extension of this work is to incorporate indirect estimation retention rates, using demographic techniques such as life tables and multiregional models. From my experience with FOIA data, I have become aware of administrative data sources that capture short-term retention at the population level, which includes transition to Optional Practical Training, H1-B visas, and to some limited extents, LPR statuses (Peri et al. 2015; Rissing and Castilla 2014; Ruiz and Budiman 2018). In future research projects, I

hope to generate population-level estimates of retention rates at different junctures and use them to contextualize the work that I have done in this dissertation.

Another limitation of this project is that it has focused entirely on the case of the United States. Arguably, the United States is a special case in many ways. First, with respect to immigration policies at multiple levels, the country's unique history and legacy of federalism have given U.S. states much more autonomy in developing and implementing state immigration laws relative to other sub-national units in other countries (Stumpf 2007). Second, as the United States has a long history of hosting the largest share of international students globally (Findlay 2011; Kritz 2006), this historical advantage might continue to draw international students to come and stay, despite the presence of restrictive immigration policies. Another fruitful extension of this work thus could involve a comparative study that examines the relationship between international student migration and multi-level of immigration policies in multiple destination countries, which can include established destinations such as Canada and new destination countries like China. Such an effort will generate a more complete picture of the global and local interconnections with respects to immigration policies and their implications.

A broader conversation that I have yet to address directly in this work concerns the big picture of globalization and the highly unequal global exchanges in both migration and international education. By developing a study that considers different levels of policies and highlights the experiences of students in new destinations, my dissertation is a small step towards recognizing how the unequal exchanges extends beyond the global-versus-national divide and into finer subnational units: regions, states,

cities. The challenge for future research and policy-making effort, as such, is to recognize the nexus of local changes that can result in global impacts.

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Appendix

Appendix A. Sensitivity analysis for Model 1 and Model 2 in Table 2.2.

(Analyses of international student enrollment flows when OIL are coded to exclude the years after the law are legally challenged and retracted.)

	Model 1	Model 2
IEC	0.040+ (0.022)	0.039+ (0.023)
OIL	-0.138*** (0.035)	-0.143*** (0.039)
IEC x OIL		0.049 (0.062)
Destination tertiary enrollments (log)	0.246* (0.107)	0.246* (0.107)
Destination unemployment rate (log)	-0.146** (0.055)	-0.148** (0.056)
Destination cost of living (log)	0.682* (0.339)	0.682* (0.339)
Destination % foreign-born (log)	-0.522*** (0.092)	-0.524*** (0.092)
Destination population (log)	1.134*** (0.242)	1.134*** (0.242)
Origin US import values (log)	0.031** (0.011)	0.031** (0.011)
Origin US export values (log)	-0.026+ (0.015)	-0.026+ (0.015)
Origin GDP per capita (log)	0.254*** (0.033)	0.254*** (0.033)
Origin tertiary-age population (log)	1.355*** (0.072)	1.355*** (0.072)
Origin currency exchange rate to USD (log)	-0.067* (0.032)	-0.067* (0.032)
Dispersion parameter (theta)	-0.276*** (0.024)	-0.276*** (0.024)
Observations	86,445	86,445
Pseudo R-squared	0.2095	0.2095

Notes: Negative binomial models, table shows raw coefficients, robust SE in parentheses, both models include fixed effects for origins, destinations, and years.
+p<0.1; *p<0.05; **p<0.01; ***p<0.001