

Hull, Marie C.

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## What Divides the First and Second Generations? Family Time of Arrival and Educational Outcomes for Immigrant Youth

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*UNC Greensboro and IZA*

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**IZA – Institute of Labor Economics**

Schaumburg-Lippe-Straße 5–9  
53113 Bonn, Germany

Phone: +49-228-3894-0  
Email: [publications@iza.org](mailto:publications@iza.org)

[www.iza.org](http://www.iza.org)

## ABSTRACT

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# What Divides the First and Second Generations? Family Time of Arrival and Educational Outcomes for Immigrant Youth\*

In this paper, I develop a measure of host country experience, which I call “relative time of arrival,” to explore differences between first- and second-generation immigrants. This measure is finer than immigrant generation and expands on the widely used measures of years since migration and age at migration. It is scaled so that zero indicates that a child was born in the same year that the family migrated. I then use this measure to study the dividing line between the first and second generations, specifically, whether there are differences in educational outcomes between early-arriving first-generation immigrants and second-generation immigrants whose parents arrived shortly before birth. For most outcomes considered, I find that the transition between the first and second generations is relatively smooth, indicating that these groups are not as distinct as often thought. I also use the measure to assess whether parents’ host country experience before a child’s birth matters and generally find that it does not. Consistent with prior work, I show that outcomes measuring English knowledge are negatively related to age at arrival. Thus, observed differences between the first and second generations are driven by the lower performance of late-arriving first-generation children.

**JEL Classification:** I24, J13, J15

**Keywords:** children of immigrants, immigrant generation, age at arrival, educational attainment, achievement, parental inputs

**Corresponding author:**

Marie C. Hull  
Department of Economics  
University of North Carolina at Greensboro  
445 Bryan Building  
PO Box 26170  
Greensboro  
NC 27402-6170  
USA  
E-mail: [mchull2@uncg.edu](mailto:mchull2@uncg.edu)

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# 1 Introduction

Immigrants vary along many dimensions, and one important and often studied dimension is how long the immigrant, or the immigrant’s family, has lived in the receiving country. Host country experience, however it is measured, is expected to influence many important outcomes, such as language proficiency, social integration, education, and labor market prospects. Existing work centers on how outcomes among immigrants vary by immigrant generation<sup>1</sup> or by age at migration, which is sometimes framed as years since migration. Immigrant generation is by nature a rough measure: Individuals who are foreign born, or first generation, may have migrated as a child, during prime working years, or in old age, and consequently may have different experiences and outcomes. Similarly, second-generation immigrants include those whose parents arrived at a variety of ages. Importantly for this paper, the distinction between immigrants of different generations is somewhat arbitrary when we consider that first-generation immigrants who arrived at young ages may have experiences that are very similar to second-generation immigrants.<sup>2</sup> Age at migration measures host country experience more finely but only applies to first-generation immigrants. A handful of recent papers have used parents’ years since migration to differentiate second-generation immigrants whose parents have different amounts of host country experience (Nielsen and Rangvid, 2012; Smith, Helgertz, and Scott, 2016, 2019).

In this paper, I construct an expanded measure of host country of experience that I then use to investigate several empirical questions of interest. This measure, which I call *relative time of arrival*, gauges the family’s time in the host country relative to the child’s birth.<sup>3</sup> It effectively

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<sup>1</sup>Social scientists usually define first generation as foreign born, second generation as native born to one or more foreign-born parents, third generation as having one or more foreign-born grandparents, and so on. See the discussion in Sweetman and van Ours (2015) on terminology conventions around immigrant generation in economics and other social sciences.

<sup>2</sup>Rumbaut (2004), among others, formally acknowledged these distinctions with “decimal” generations, e.g., “1.5” generation.

<sup>3</sup>To my knowledge, Åslund, Böhlmark, and Skans (2015) were the first to use this variable in their study of social integration of immigrant children in Sweden. Their discussion focused on the positive side of the scale, and they

extends the scale of the commonly used age-at-arrival variable backward in time so that one can study both age-at-arrival effects as well as parents' host country experience before birth. Relative time of arrival is scaled so that positive values indicate the age at which a foreign-born child arrived in the host country, negative values indicate the number of years before the child was born that the mother migrated, and zero indicates that the child was born in the same year that the family arrived. The scale for this variable is depicted in Figure 1. A key feature of relative time of arrival is that it facilitates comparisons between second-generation immigrants whose parents arrived just before their birth and first-generation immigrants whose parents arrived just after their birth.

The first question I study is whether the first and second generations are distinct on the margin, which corresponds to a relative time of arrival of around zero. It is well established that these groups differ in their average levels of educational attainment and performance (Sweetman and van Ours, 2015). However, this may not be true as we zoom in to first-generation immigrants who arrived at very young ages and second-generation immigrants whose parents arrived shortly before their birth. From a theoretical perspective, we may or may not expect to see a discontinuity at a relative time of arrival of zero, or the dividing point between the first and second generations (at least as they are commonly defined in social science research). On one hand, both native-born children of recently arrived parents and foreign-born children who arrived at young ages would have spent virtually their entire lives in the host country. On the other hand, the U.S., among other countries, grants citizenship at birth, which may advantage the native born. I further discuss theoretical considerations in the next section.

Given the limited evidence on parents' host country experience, I also investigate whether it matters for a child's education. Theory is ambiguous on this question as well. Parents with more experience may be more established and familiar with customs and institutions, but it is also possible that these advantages have little to no effect by the time the children are older. Last, I examine the effect of age at arrival and expect to confirm prior findings that outcomes worsen with age at arrival.

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referred to the measure as age at arrival.

In light of the theoretical ambiguity, questions about the association between relative time of arrival and children's outcomes ultimately must be resolved empirically. To do so, this paper uses two U.S. data sources with large numbers of children of immigrants: (i) the decennial Census and American Community Survey (ACS) and (ii) the Children of Immigrants Longitudinal Study (CILS). The Census/ACS offers a larger, more representative sample while the CILS includes more outcomes of interest. I focus on high school-age youth since they are young enough to be linked to their parents' characteristics and old enough that early-arriving immigrant children have had some time to assimilate. I consider attainment outcomes, such as grade retention and high school graduation; achievement outcomes, such as test scores and grade point average; and English language proficiency. I also study mother's educational attainment, parent's English knowledge, and mother's age at arrival as key educational determinants.<sup>4</sup>

For most outcomes, I find that the transition between generations is smooth; that is, there is no evidence of a discontinuity at relative time of arrival equal to zero. While the confidence intervals are tighter with the Census/ACS data relative to the CILS due to sample size, I can still rule out large differences. For example, I can rule out differences in grade point average larger than 0.17 points in the CILS sample.<sup>5</sup> There are two exceptions: In the CILS, math scores are 5 percentiles lower among early-arriving first-generation immigrants relative to second-generation immigrants whose parents arrived shortly before birth. There is also a small but statistically significant difference of about 0.02 in the probability of speaking English very well in the Census/ACS sample. When I examine key educational determinants, I continue to find little evidence of a sharp discontinuity at the dividing point between generations.

Furthermore, I generally find that it does not matter how long a child's parent has been in the U.S. before the child was born; the evidence points toward a zero or small slope on relative time of arrival for native-born children. These results stand in contrast to the small set of published

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<sup>4</sup>Mother's education is a well-known determinant of child outcomes. Bleakley and Chin (2008) find that parent's English proficiency has a positive effect on children's English proficiency and educational attainment.

<sup>5</sup>For context, the average grade point average in the CILS sample is about 2.6.

papers examining the effect of parents' years since migration on children's outcomes—Nielsen and Rangvid (2012) and Smith, Helgertz, and Scott (2016, 2019) find a positive impact of parents' years since migration on achievement. Consistent with prior work, I show that some outcomes that measure English knowledge are decreasing in age at arrival; this pattern is present for attainment outcomes in the Census/ACS as well.

On balance, these results indicate that the first and second generations are not as distinct as previously thought. Large average differences between these two groups obscure smaller differences at the margin. Prior work had demonstrated that early-arriving immigrant children have better outcomes than later-arriving children and that these early-arriving children perform more similarly to second-generation children. However, the role for parents' host country experience for the second generation was less well established. My results show that average differences between first- and second-generation youth are mostly driven by poor outcomes for later-arriving first-generation immigrants.

The main contribution of this paper is to shed more light on the sources of observed differences between first- and second-generation immigrants, specifically whether these groups are different on the margin. No study to my knowledge has explicitly studied the dividing line between the first and second generations by more finely classifying the second generation, though prior literature has examined the appropriateness of grouping together first-generation immigrants with different ages of arrival, as well as whether the second generation may be grouped with the first.<sup>6</sup> In addition, this paper contributes to an emerging literature that examines the importance of parents' host country experience for child outcomes. The discrepancy between my results and prior work in this area may be due to the different contexts since Nielsen and Rangvid (2012) and Smith, Helgertz, and Scott (2016, 2019), use Scandinavian data. Thus, there is value in replication across different locations and time periods.

These results have implications for how future studies should group youth from immigrant families. My results support putting together first-generation immigrants who arrive at very young

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<sup>6</sup>See, for example, Oropesa and Landale (1997) and Rumbaut (2004).



ages with second-generation immigrants. For example, when the population under consideration is young, researchers may create a single category for children of immigrants, as Hull and Norris (2020) do when they study immigrant children starting at age 5. From a policy perspective, the results suggest that interventions or practices that work for early-arriving immigrant children would also be successful for native children with recently arrived parents, and vice versa.

In discussions of immigrants, there is sometimes confusion, among those inside and outside academia, about who is a member of the first generation versus the second generation. When young children migrate with their adult parents, the children are often thought of and referred to as second generation, even though they are technically foreign born. My results reinforce the fuzziness of the term “second generation”—in many educational inputs and outcomes, early-arriving first-generation immigrants are not truly distinct from second-generation immigrants.

The analysis in this paper is descriptive. I do not account for selection into migration or selection into the timing of migration relative to the birth of a child, though I discuss the latter when I analyze educational determinants. I take these decisions as given and investigate patterns in educational outcomes to figure out what we can learn about children from immigrant backgrounds who already reside in the U.S. I present differences in means and differences adjusted for demographics, socioeconomic status, and country of origin.

The next section reviews the conceptual background and the relevant literature. In Section 3, I provide a more detailed definition of relative time of arrival, and I describe the regression models and data sources. I present results on descriptive differences by immigrant generation in Section 4, differences in educational outcomes by relative time of arrival in Section 5, and differences in key educational inputs by relative time of arrival in Section 6. Section 7 concludes.

## **2 Conceptual background and relevant literature**

At the margin, what divides the first and second generations? As a thought exercise, consider a child born a few months before his parents migrated and a child born a few months after his parents

migrated. In many ways, these two children would be similar. Both would have spent virtually their entire lives in the receiving country, with no memory of living in their country of origin. Both sets of parents would have arrived during childbearing age, perhaps during early or mid-career. We might expect early-arriving first-generation immigrants to adapt to U.S. society in similar ways as second-generation youth; for example, they may experience segmented assimilation as described by Portes and Zhou (1993), among others.

One critical distinction in the U.S. is that children born in the U.S. or one of its territories automatically become citizens. Felfe, Rainer, and Saurer (2020) find that the switch to birthright citizenship in Germany positively affected the educational outcomes of immigrant children. In her study of Latino young adults in California, Patler (2018) finds that citizens are more likely to complete high school and enroll in college. Among noncitizens, permanent residents of the U.S. retain many of the same rights as citizens, and thus their experience may be distinct from those without documentation. Patler (2018) further finds that undocumented young adults complete high school and enroll in college at lower rates than citizens, but the differences between the undocumented and legal noncitizens are not statistically significant. Furthermore, undocumented immigrants may not be eligible for in-state college tuition, depending on their state of residence,<sup>7</sup> and they may have trouble obtaining gainful employment.

Why might an immigrant parent's host country experience before a child's birth matter? Parents who have resided in the receiving country for longer have more time to establish housing and an employment history, accumulate wealth, familiarize themselves with new customs and institutions, and learn a new language. Prior literature has established the importance of fetal conditions for later life outcomes (Almond and Currie, 2011; Lavy, Schlosser, and Shany, 2021). Thus, we might expect that children whose parents have resided in the receiving country longer would have better outcomes. However, it is also possible that all second-generation children have similar experiences regardless of when their parents arrived relative to their birth, or that any differences fade away as

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<sup>7</sup>Flores (2010a,b) provide evidence that undocumented students are more likely to attend college when they are eligible for in-state tuition, and Koohi (2017) further finds that these policies reduce high school dropout.

the children age.

Another important consideration is that timing of migration is not random, and fertility may influence the decision (Lindstrom and Giorguli Saucedo, 2007). Future parents may consider their fertility plans as they decide when to migrate. Parents who migrate before the birth of their child might be more forward-looking and more able to execute plans. Migrating with a young child is more expensive and complicated, so parents who arrive after the birth of their child may have better resources. Parents may also feel more compelled to migrate after the birth of a child, whether for economic opportunities or to escape violence in their country of origin. Although these considerations are important, this paper will not attempt to tackle directly the issue of selection into the timing of migration; all results presented here are descriptive in nature.

Figure 2 illustrates possible patterns of results when analyzing the effect of relative time of arrival on educational outcomes. In panel (a), the outcome does not vary by relative time of arrival at all; the trend is flat with no discontinuities. When researchers lump all individuals with an immigrant background together, they effectively assume this is the case. Panel (b) depicts a flat trend with a discontinuity at zero, the dividing point between the first and second generations. When researchers let an outcome vary by immigrant generation, they allow for this possibility. As discussed below, an outcome may also depend on age at arrival for first-generation immigrants. I illustrate this possibility in panels (c) and (d) with a negatively sloped line after a relative time of arrival of zero. In panel (c), the trend line is kinked at zero so that the outcome is very similar on either side of zero; in panel (d), there is a clear discontinuity at zero in addition to the negative slope after zero. Last, panels (e) and (f) allow for the possibility that parents' host country experience before birth matters. In panel (e), there is a smooth, negative relationship between relative time of arrival and the outcome. Panel (f) depicts a discontinuity at zero as well as a negative slope on both sides of zero.

The panels in Figure 2 reveal a variety of potential relationships between host country experience and outcomes of interest. Prior empirical literature has mostly focused on estimating how outcomes vary by immigrant generation and age at arrival; in Figure 2, these possibilities cor-

respond to panel (b) and panels (c) and (d), respectively. Less attention has been given to the relationship between outcomes and parents' host country experience before a child's birth. By contrasting the panels on the right and the left, we can see that a discontinuity may exist at the dividing point between the first and second immigrant generations, regardless of the slope on either side.

This paper extends the literature on the effects of immigrant generation, age at migration, and parents' years since migration on human capital accumulation. Chiswick and DebBurman (2004) find that second-generation immigrants have more years of schooling than first-generation immigrants and native individuals (native born with native-born parents). Furthermore, first-generation immigrants that arrive at younger ages attain more education and are more proficient in English (Gonzalez, 2003; Chiswick and DebBurman, 2004; Myers, Gao, and Emeka, 2009; Lee and Edmonston, 2011).<sup>8</sup> A series of papers by Bleakley and Chin show that age 9 is a critical age for acquiring a new language; individuals who arrive before this age attain more schooling, which in turn increases their wages (Bleakley and Chin, 2004). With sibling fixed effects models and various European data sets, Van den Berg et al. (2014), Hermansen (2017), and Lemmermann and Riphahn (2018) find a negative effect of age at arrival on educational attainment, suggesting a causal channel.<sup>9</sup> Nielsen and Rangvid (2012) examine the effect of parents' years since migration on the probability of dropping out of school; they find evidence that more time in the receiving country decreases the probability of dropout.

Some of these patterns change with an earlier measure of human capital accumulation: test scores. When test scores are measured at young ages, the first-generation youth studied are by

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<sup>8</sup>These results are mirrored in studies of labor market outcomes. In seminal work, Chiswick (1977) and Carliner (1980) find that second-generation immigrant men earn more than those from the first and third generations. Immigrants earn more as they gain U.S. labor market experience (Chiswick, 1978), even after accounting for cohort effects (Borjas, 1985). In more recent work, Gindelsky (2019) demonstrates that first-generation immigrants who arrive before age 8 have similar earnings to second-generation immigrants.

<sup>9</sup>Basu (2018) employs a similar strategy with U.S. Census data, but she has to restrict her sample to adult siblings who live together.

necessity all early-arriving immigrants. With administrative data from Florida, Figlio and Özek (2020a) find that first-generation immigrants score better than second-generation immigrants, who in turn outscore third-generation immigrants. With administrative data from North Carolina, Hull (2017) shows that second-generation Hispanic students outperform first-generation Hispanics, but that the first and second generations are on similar trajectories. In line with these mixed findings, Glick and White (2003) find that the pattern across generations may also vary by the cohort studied. Examining mechanisms, Kao and Tienda (1995) conclude that the second generation is best positioned to perform well academically because they speak English well but still benefit from high expectations from immigrant parents. As with educational attainment, first-generation students also tend to perform better on tests the earlier they arrive (Clotfelter, Ladd, and Vigdor, 2012; Figlio and Özek, 2020a). Using within-sibling designs, Böhlmark (2008) and Van den Berg et al. (2014) find a critical age of arrival of around 9, after which youth suffer in terms of their cognitive development. Böhlmark (2008) notes that estimates from the siblings analysis are similar to ones from a cross-sectional analysis controlling for parental education and country of origin. Nielsen and Rangvid (2012) and Smith, Helgertz, and Scott (2016) also use within-sibling designs, but they study the effect of parents' years since migration on test scores and grade point average. Both papers find that academic performance increases with parents' host country experience.

Theoretically, there are reasons to believe that the first and second generations might be similar or distinct in their outcomes, and that parents' host country experience may or may not matter for their native-born children's outcomes. Ultimately, these are empirical questions. Taken together, the prior empirical literature suggests that early-arriving first-generation immigrants and second-generation immigrants would be similar in their educational outcomes. The second generation tends to outperform the first generation, and early-arriving first-generation immigrants tend to have better outcomes than later-arriving immigrants. Since most studies focus on either the impact of immigrant generation or the impact of age at arrival within the first generation, comparisons between early-arriving first-generation immigrants and second-generation immigrants are rarely a

direct focus.<sup>10</sup>

To my knowledge, no prior work has explicitly studied the dividing line between the first and second generations, namely, early-arriving first-generation immigrants and second-generation immigrants with parents who arrived shortly before their birth.<sup>11</sup> The existing literature on the effect of parents' host country experience on child outcomes is small and relies entirely on register data from Scandinavian countries. Given the differences in the immigrant populations and experiences between Scandinavia and the U.S.,<sup>12</sup> we might expect to see different results with U.S. data.

### 3 Method and data

The data for this study come from two sources: (i) the Census and American Community Survey (ACS) and (ii) the Children of Immigrants Longitudinal Study (CILS). In this section, I first describe the construction of the relative time of arrival measure and how I use it in various regression models, and then I detail the data sources and the relative strengths and weaknesses of each.

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<sup>10</sup>Cortes (2004) finds that the test score gap between first- and second-generation children decreases the longer first generation has been in the U.S. Since the children in her data source were around the same age, time in the U.S. and age at arrival are approximately collinear. Thus, another way to state her result is that the test score gap between first- and second-generation children becomes smaller the younger the first generation arrived in the U.S.

<sup>11</sup>Oropesa and Landale (1997) and Rumbaut (2004) are similar in spirit to this paper in their use of “decimal” generations. Both studies use the terms 1.25, 1.5, and 1.75 generations to capture a first-generation immigrant's relative proximity to the second generation. Rumbaut (2004) uses 2.0 to describe native-born children with two foreign-born parents and 2.5 to describe children with one foreign-born parent and one native-born parent. Thus, his study differs from this paper in its categorization of second-generation children and is not suited to examine the dividing line between generations.

<sup>12</sup>For example, the top sending countries in the Swedish data in Nielsen and Rangvid (2012) are Turkey, Lebanon, and Pakistan. Most U.S. immigrants are from Latin America, particularly Mexico.

### 3.1 Constructing the measure of relative time of arrival

The key independent variable in this analysis is family time of arrival relative to the child's birth, which I shorthand as relative time of arrival. To construct it, I first create a variable that measures family's year of migration. For foreign-born children, this variable is equal to the year that the child arrived in the U.S. For children with a foreign-born mother, it is the year that the mother arrived in the U.S. To form the measure relative time of arrival, I then subtract the child's birth year from the family's year of migration. This variable has an easily interpretable scale where a positive value indicates the age at which a first-generation child migrated, a negative value indicates the number of years that a mother migrated before the child was born, and zero indicates that the child was born in the same year that the family migrated. As an example, suppose that a child was born abroad in 1980 and was then brought to the U.S. in 1983 at age 3. His family year of arrival would be 1983, his birth year 1980, so his relative time of arrival would be +3. As another example, take a mother who migrated in 1995 and then had a child in 2002, or 7 years after her arrival. The family year of arrival would be 1995 and the birth year 2002, so the relative time of arrival would be  $-7$ . An illustration of the scale is provided in Figure 1. An important feature of this variable is that it facilitates more nuanced comparisons between first- and second-generation immigrants. Specifically, it allows me to compare immigrant children whose parents arrived just before versus just after their birth.

### 3.2 Regression models

First, I model mean differences in outcomes and inputs for different relative times of arrival with the following equation:

$$Y_i = \sum_j \alpha_j \times 1[RTA_i = j] + \epsilon_i, \quad (1)$$

where  $Y$  is an outcome or input of interest and  $RTA$  is relative time of arrival. I denote the indicator function with  $1[\cdot]$ . Note that Eq. 1 does not include an intercept, so the coefficients  $\alpha_j$  give the mean of  $Y$  for relative time of arrival equals  $j$ . This specification lets me compare levels of outcomes

across relative time of arrival.

The  $\alpha_j$  parameters from Eq. 1 can be used to show how relative time of arrival relates to other statistics commonly reported in the immigration literature. The mean outcome for first-generation immigrants is a convex combination of the  $\alpha_j$  for  $j > 0$ ,

$$\mu_{1st\ gen} = \sum_{j>0} \theta_j \alpha_j, \quad (2)$$

where  $\theta_j$  are weights that correspond to the proportion of the first-generation population with relative time of arrival equal to  $j$ . Similarly, the mean outcome for the second generation can be defined as

$$\mu_{2nd\ gen} = \sum_{j<0} \omega_j \alpha_j, \quad (3)$$

where the  $\omega_j$  are weights.<sup>13</sup> Each  $\alpha_j$  where  $j > 0$  gives the mean outcome for age of arrival equal to  $j$ . Similarly, each  $\alpha_j$  where  $j < 0$  tells us the mean outcome for children whose parents had  $j$  years of host country experience before their birth.

When covariates are included, the model becomes:

$$Y_i = \sum_{j \neq 0} \alpha_j \times 1[RTA_i = j] + X_i \beta + \varepsilon_i. \quad (4)$$

Here, the omitted category is relative time of arrival equals zero, so each  $\alpha_j$  is estimated relative to children who arrived in the same year that they were born. Thus, this regression allows me to more directly test for a discontinuity at the generational divide. The specific covariates vary by the data set but generally include standard demographic, family, and socioeconomic controls that are known to correlate with educational outcomes. I also control for national origin. More information on the covariates and motivation for their inclusion is provided below.

In a supplementary analysis, I test for a discontinuity at zero allowing for trends on either side.

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<sup>13</sup>For simplicity, I ignore the case where the family migrates in the same year as the child was born.



Recall that foreign-born children have relative time of arrival greater than zero.<sup>14</sup>

$$Y_i = \delta_1 \text{foreignborn}_i + \delta_2 \text{RTA}_i + \delta_3 \text{foreignborn}_i \times \text{RTA}_i + X_i \beta + \varepsilon_i. \quad (5)$$

The coefficient  $\delta_1$  gives the discontinuity at zero. While I prefer the nonparametric specifications given in Eq. 1 and 4, they are more data intensive, and Eq. 5 lets me test for a discontinuity when it might not be otherwise apparent.

### 3.3 Census and American Community Survey

I analyze individual-level data from the 5% and 1% samples of the 2000 U.S. Census of Population and Housing and the 2001–2017 American Community Survey (ACS) samples (Ruggles et al., 2019). The 2000 Census and the ACS are unique in that they contain information on the exact year of arrival; earlier censuses gave response options in intervals. I limit the sample to youth aged 15–18 years whose mothers were foreign born and immigrated to the U.S. as adults (i.e., after age 18).<sup>15</sup> I further limit the sample to children born within ten years of their family’s arrival to the U.S.<sup>16</sup> Even after these sample restrictions, I am left with almost 300,000 observations of children of immigrants, which allow me to analyze outcomes by family time of arrival at a fine level. Person-level weights are used for all analyses.

The Census/ACS offers two measures of academic outcomes, though they are rough. Following Bleakley and Chin (2008), I construct variables for school attainment and age-for-grade for older teens. I classify teens as high school dropouts if they do not have a high school diploma and are not

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<sup>14</sup>I drop observations with relative time of arrival equal to zero for these analyses.

<sup>15</sup>Due to the structure of the Census/ACS, this means that I must limit the sample to children whose mother is present in the household.

<sup>16</sup>In Appendix Figure A.1, I present a histogram of relative time of arrival using the Census/ACS data. More of the Census/ACS observations come from children who were born before their parents migrated; specifically, more come from children whose families migrated 2–6 years before the child was born. The shape could be due in part to the sample inclusion criteria, specifically the requirement that the mother was at least 18 years old when she migrated.

currently attending school. Teens are considered to be below the age-appropriate grade if they are 15 years and below 9th grade, 16 years and below 10th grade, etc. I also analyze whether the youth speaks English very well or only. For educational determinants, I analyze mother's educational attainment, namely, whether she graduated high school and college; whether the mother reports speaking English well, very well, or only; and mother's age at migration.

For the analysis with controls, I include dummies for child age, sex, father presence, dummies for mother's age at birth, dummies for family size, multigenerational household, a quadratic of the income-to-poverty line ratio, dummies for mother's educational attainment, dummies for mother's age at migration, dummies for each country of origin, dummies for survey year, and missing indicators where necessary.

### **3.4 Children of Immigrants Longitudinal Study**

The Children of Immigrants Longitudinal Study (CILS) was designed to study the adaptation processes of children of immigrants and targeted U.S.-born children with at least one foreign-born parent and foreign-born children brought to the U.S. at an early age (Portes and Rumbaut, 2018).<sup>17</sup> The first wave included 8th and 9th graders attending school in the Miami/Ft. Lauderdale, FL, and San Diego, CA, metro areas in 1992. It contains baseline demographic and family characteristics as well as early educational outcomes, such as math and reading test scores. The second wave occurred three years later when the respondents were about to graduate high school; a random subsample of parents was also surveyed at this time. The third wave was fielded in 2001–2003 when the respondents were around 24 years old and had reached early adulthood.

Follow-up rates were high considering the mobility of the target population. The second wave successfully followed 81.5% respondents. Intact families are somewhat overrepresented in the second wave, but otherwise, the samples are similar. The third wave successfully followed 84% of respondents from the second wave. Portes and Rumbaut (2005) find that attrition in the third wave is correlated with certain respondent characteristics but that means adjusted for nonresponse are

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<sup>17</sup>For a more thorough description of the CILS, see Portes and Rumbaut (2005).

not substantially different from unadjusted means.

In several ways, these data are ideally suited to studying children of immigrants. The CILS by design only includes children of immigrants, whereas other commonly used surveys would yield much fewer members of the population of interest. The questionnaires were written to gather information particularly relevant for immigrant children, like the respondent's facility in speaking, understanding, reading, and writing English. In addition, the parent questionnaire was translated into and administered in six different languages to reach as many parents as possible. Importantly for this study, the CILS asked for the exact year of arrival for respondents and parents.

Perhaps the main drawback of the CILS is that it is not nationally representative. Instead, samples were drawn from two communities that were heavily affected by new immigration. Although this sampling design was more cost-effective, the resulting sample may not adequately represent experiences of immigrant families that settled outside of enclaves. Furthermore, some ethnic groups and national origins were over- or under-represented in the CILS relative to the population. Another limitation of the CILS data is that it only contains one cohort, and so it is more difficult to disentangle cohort effects with the effect of relative time of arrival. Last, the exact probabilities of inclusion into the sample are not known; the survey team in each location used its knowledge of the area to select schools that would cover a range of nationalities.

Like the Census/ACS sample, I limit the CILS sample to children born within ten years of their family's arrival to the U.S. Unlike the Census/ACS sample, I do not explicitly restrict the sample to children whose mothers arrived as adults. Mother's age is missing for about 20% of observations that are otherwise valid. Of the children with non-missing mother's age, only 10% of mothers arrived in the U.S. before age 18. Thus, the two samples are mostly comparable in terms of sample restrictions.<sup>18</sup>

I analyze several educational outcomes drawn from the first and third survey waves. I measure achievement with national percentile scores on the Stanford math and reading achievement tests and grade point average (GPA). Since most students obtain the highest possible value on the mea-

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<sup>18</sup>Appendix Figure A.2 gives a histogram of relative time of arrival using the CILS data.

sure of knowledge of English, I create a dummy variable that equals one if the student obtained the highest score and analyze it. I also analyze the students' aspirations and expectations to finish college at the first survey wave. I use educational attainment questions to create dummy variables for whether the respondent graduated high school and received a bachelor's degree by the third survey wave. For educational inputs, I analyze mother's educational attainment as reported by the student in the first wave, whether the respondent to the parent survey reports have a good or very good knowledge of English, and mother's age at migration.

The controls used for the analysis of the CILS data are dummies for child age, sex, father presence, mother's age at birth, household size, parents' socioeconomic status, survey site, mother's age at migration, dummies for mother's education level, dummies for each country of origin, and missing indicators where necessary. Note that the CILS groups some low-frequency countries of origin into continents or world regions, and I use those when so constrained. Since the CILS only contains one cohort, there is concern that estimates of relative time of arrival would pick up changes in cohort quality; thus, it is especially important to check the sensitivity of results to the inclusion of controls for this data set.

## **4 Descriptive differences between the first and second generations**

This section establishes the differences between first-generation and second-generation immigrant youth in the analytic samples used in this paper. Here, the mean for first-generation youth groups together immigrants with different ages of arrival, as seen in Eq. 2. Similarly, the mean for second-generation immigrants lumps together youth with parents of varying amounts of host country experience, as in Eq. 3.

## 4.1 Census/ACS

In Table 1, I compare the mean characteristics for children of immigrants in the Census/ACS data. The first column gives means for children born after their mother migrated, or second-generation immigrants, and the next column does the same for children born before their mother migrated, or first-generation immigrants. I also provide mean characteristics for children with a native-born mother.

In terms of educational outcomes and determinants, I replicate the finding in prior literature that the second generation is better off than the first generation. Children born after their families migrated are 6.4 percentage points less likely to be below grade level relative to children born beforehand. This difference is relative to a base of about 30% below grade level for children born after their family migrated. While this difference is substantial, it may have been advantageous for these students to repeat a grade: Figlio and Özek (2020b) present evidence that English language learners, particularly foreign-born students, benefit from grade retention in terms of their human capital development when retention is coupled with instructional support.<sup>19</sup> Among native children, 38% are below grade level. I also find that children born after their family migrated are 1.6 percentage points less likely to have dropped out of high school, which is a two-thirds increase from the baseline of children born afterward. They are 7.1 percentage points more likely to speak English only or very well.

I examine mother's education attainment, English speaking, and age at migration as key determinants of children's education outcomes. Children born after their families migrated are 1.8 and 1.5 percentage points more likely, respectively, to have a mother who has a high school diploma and a bachelor's degree relative to children born beforehand. They are 8.4 percentage points more likely to have a mother who speaks English well, very well, or only. Thus, youth born after their families migrated are at a slight advantage in terms of maternal human capital. In this sample, second-generation children had mothers who were on average 24.2 years old when they arrived in

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<sup>19</sup>Note that their results only apply for marginal students since the effect is identified using regression discontinuity design.

the U.S.; for first-generation children, the average age was 30.4 years.

When I compare other demographic characteristics in Table 1, I find that many differences are statistically significant but practically small. One notable exception is that 49% percent of children born outside the U.S. are citizens but virtually all native-born children report U.S. citizenship. Children born after their families migrated have higher family incomes relative to their family's needs, as represented by the family income as a percent of the poverty line for their family size. I also note small differences in national origin by immigrant generation.

## **4.2 CILS**

Table 2 presents descriptive statistics for the CILS data. Again, I find that second-generation immigrant youth generally have better educational outcomes and inputs relative to first-generation youth. They score 9 percentile points higher in math and 12 percentile points higher in reading. The difference in GPA is not statistically significant. They are 24 percentage points more likely to know English very well. In the first wave (mostly grades 8 and 9), the likelihood that they aspire to graduate college is 5 percentage points higher, and for expectations to graduate college, it is 10 percentage points higher. Note that both of these differences are relative to high baselines. The difference in obtaining a high school diploma is small and statistically insignificant, while youth born after their family's migration are 7 percentage points more likely to have obtained a bachelor's degree by the third wave.

I find more substantial differences in mother's educational attainment for the CILS data compared to the Census/ACS data: Second-generation children are 7 percentage points more likely to have a mother with a high school diploma compared to first-generation children, but the difference in the probability that the mother has a college degree is statistically insignificant. The gap in parent's knowledge of English is large with 70% of U.S.-born children having a parent with good or very good knowledge of English compared to 41% for foreign-born children. Like the Census/ACS, I find that second-generation children have mothers who on average arrived in the U.S. at younger ages compared to first-generation children. Only 39% of children brought to

the U.S. at young ages had attained citizenship by the first wave; virtually all children born after their families migrated report U.S. citizenship. In addition, virtually all children in the sample have a foreign-born mother, but children born abroad are more likely to have a foreign-born father. Second-generation children are advantaged in terms of other socioeconomic measures.

Last, there are large differences in the distribution of national origin. Specifically, second-generation children are more likely to be Mexican, Cuban, or Filipino; first-generation children are comparatively more likely to be Central American or from a nation in Southeast Asia besides the Philippines. Though these differences can largely be explained by historical migration trends,<sup>20</sup> they do have implications for my research design, as I do not want confuse variation across relative time of arrival with changes in cohort quality (see Borjas, 1985). Thus, for results using the CILS data, it will be important to control for national origin as a proxy for cohort.

## **5 Differences in educational outcomes by relative time of arrival**

In the next set of results, I document how educational outcomes vary by family's time of arrival relative to the child's birth, or relative time of arrival. Recall that relative time of arrival is scaled so that a negative value is the number of years the mother was in the U.S. before the child was born and a positive value is the age at which the child migrated. A value of zero indicates that the family migrated in the same year that the child was born. The scale is depicted in Figure 1. In the figures described below, I show the effect of relative time of arrival after controlling for

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<sup>20</sup>Note that the CILS respondents were born in or around 1978. The Cuban Revolution in 1959 spurred an exodus that slowed in the 1980s; a large number of Cuban immigrants from that period settled in Miami. A civil war in Nicaragua in the 1980s led to a diaspora, with many Nicaraguans fleeing to the U.S., and to Miami specifically. In Southeast Asia, the end of the Vietnam War along with civil unrest in nearby countries led to a wave of refugees from Vietnam, Laos, and Cambodia in the late 1970s and 1980s. Many of these refugees settled in California, as did many Filipino immigrants.

demographic variables, socioeconomic variables, and national origin; these results come from estimating Eq. 4. The appendix contains figures with means of outcomes by relative time of arrival, which are estimated from Eq. 1.

For most outcomes, I do not find evidence of a discontinuity at relative time of arrival of zero, indicating that the first and second generations are not so different on the margin. The precision of this result as well as exceptions are discussed in further detail below. With regard to parents' host country experience, I show evidence that it has a small effect or no effect on educational outcomes.

## 5.1 Census/ACS

In panel (a) of Figure 3, I plot the regression-adjusted probability that a high school-age teen is below grade level by relative time of arrival. Bars give the 95% confidence intervals. For context, youths who were born in the same year that their family migrated (i.e., relative time of arrival is zero, the omitted category) have a 0.35 probability of being below grade.<sup>21</sup> From examining the negative side of the scale, we see that children are more likely to be below grade as their mothers have less host country experience before birth. However, the benefits of mother's host country experience are small and precisely estimated. Right around zero, the trendline appears smooth. From the positive side of the scale, children who arrive in the U.S. before age 5 have similar probabilities of being below grade level. After that, the probability increases by 4 percentage points but then stays constant. A potential explanation for this jump is that students new to the U.S. at school entry are more likely to be held out of school for a year or are more likely to repeat a grade.<sup>22</sup>

I plot results for dropping out of high school in panel (b) of Figure 3. There is little evidence

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<sup>21</sup>See Appendix Figure A.3 for means by relative time of arrival.

<sup>22</sup>In a supplementary analysis not reported here, I estimated this regression with the sample of youth with an English-speaking country of origin. Although the reduced sample size yielded noisier estimates, there was no visual jump at the relative time of arrival of 5. These results are consistent with the explanation that non-English-speaking children need to repeat a grade or are placed into a lower grade.



that mother’s host country experience before birth matters for high school dropout. Starting at a relative time of arrival of  $-2$ , a smooth, upward trend in the probability of high school dropout appears. The increase in probability of dropout between relative time of arrival of  $-2$  and  $10$  is  $0.020$ , which is substantial considering that the dropout rate among second-generation immigrants is  $0.024$  (see Table 1).

Results for English speaking are in panel (c) of Figure 3. They reveal a small discontinuity at zero of about 2 percentage points. From Appendix Figure A.3, native-born children have very high rates of speaking English only or very well. This rate varies slightly by how long the mother was in the U.S. before the child was born. There is a statistically significant but practically small drop in English speaking ability for children brought to the U.S. at ages 0–3, and then English speaking ability declines as age at arrival increases.

With these results, I find little evidence of a sharp discontinuity at zero, the transition between the second and first generations. However, the trends on either side of zero are different. Interestingly, it appears that mother’s U.S. experience prior to the child’s birth makes little to no difference for her child’s educational outcomes. If anything, these results suggest that whether a child’s family arrives before the start of formal schooling is key. Circling back to the possible patterns of results in Figure 2, the evidence from the Census/ACS is most consistent with panels (c) and (e), where there is no discrete jump at zero. Still, these are rough measures of human capital accumulation, and results from Figlio and Özek (2020b) suggest that retention for immigrant students could be beneficial on balance.

## 5.2 CILS

With the CILS, I examine a wider set of outcomes, but I collapse relative time of arrival into ranges due to the smaller sample size.<sup>23</sup> Relative time of arrival between  $-3$  and  $0$  is the omitted category. Results for outcomes in the CILS are presented across several panels of Figure 4; Appendix

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<sup>23</sup>Children whose families arrived in the U.S. in the same year that they were born are assigned to  $[-3,0]$  or  $[0,3]$  depending on whether they were born in the U.S. or abroad.

Figure A.4 contains the corresponding means. With only one cohort in the CILS, a potential problem is that I will conflate variation in relative time of arrival with changes in cohort quality; the inclusion of controls helps mitigate this concern.

Panels (a) and (b) of Figure 4 graph math and reading percentile scores by relative time of arrival. For math percentile scores, there is a clear discontinuity at zero. Youth whose families migrated shortly after they were born score 5.1 percentiles below youth whose families migrated short before they were born. However, the slopes on either side of zero appear flat. For reading, percentile scores are not statistically different for relative time of arrival of  $-10$  through  $6$ , and so there is no evidence of a discontinuity at zero. Visually, it appears that reading scores begin to decrease after zero, but only the coefficient on the highest relative time of arrival category is statistically significant. Here, I find that children with relative time of arrival in the range  $[7, 10]$  have reading scores 9.2 percentiles lower compared to the omitted category. This drop is consistent with prior literature that finds that age 9 is a critical age for cognitive development. With the GPA results presented in panel (c), I find no consistent relationship with relative time of arrival. The confidence intervals rule out effect sizes larger than 0.17 points, which are relative to a mean GPA of about 2.6. Panel (d) displays results for English knowledge. Although there is no jump at relative time of arrival at zero, I find a kink at zero. The probability that a youth reports knowing English very well is similar among second-generation immigrants. Among first-generation immigrants, there is a negative age-at-arrival effect. Youth who were age 7- to 10-years-old at arrival are 22.3 percentage points less likely to speak English very well than youth whose families arrived within 3 years of their birth.

The remaining panels of Figure 4 focus on views on educational attainment at high school entry and actual attainment 10 years later. From Table 2, we know that aspirations to finish college, measured in the first wave, are above 90% for both first and second generation immigrants. In panel (e), we see that mother's host country experience before birth does not matter for college aspirations. Then, there is a jump at the zero threshold that is marginally statistically significant ( $p = 0.082$ ). Aspirations to finish college remain 4 to 5 percentage points lower at relative time of

arrival increases from zero. Results for expectations to finish college are shown in panel (f). Like aspirations, there is a discontinuity of about 5 percentage points at the zero threshold; however, this difference is not statistically significant at conventional levels ( $p = 0.114$ ). For college aspirations and expectations, it appears that there is some potential for relative time of arrival to matter, but the confidence intervals are too wide to say definitively.

At the third follow-up when students were about 24 years old, almost all respondents report receiving a high school diploma, regardless of relative time of arrival.<sup>24</sup> In panel (g) of Figure 4, there is no evidence that the high school completion rate varies by relative time of arrival. Visually, there does not appear to be any trendlines or discontinuities, and the confidence intervals rule out effect sizes larger than 6 percentage points. For bachelor's degree receipt in panel (h), I also do not observe differences by relative time of arrival after adjusting for covariates.<sup>25</sup> Though the trendline is visually flat, the confidence intervals are quite wide and include effect sizes that would be of interest.

Given the smaller sample size in the CILS data, and the need to bin relative time of arrival, it is more difficult to detect patterns. Thus, I estimate regressions allowing for linear trends on either side of zero and an intercept at zero; see Eq. 5.<sup>26</sup> These results are displayed in Appendix Table A.2. The coefficient estimates are consistent with the patterns described above: For math scores, there is a jump at zero, but no trends on either side of zero. For reading scores and English knowledge, there is no discontinuity at zero, but there is a negative trend for foreign-born youth.

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<sup>24</sup>This pattern is different from the Census/ACS results on high school dropout. In addition to all the previously mentioned differences between these data sources, this disparity could arise because of how the variables are defined. The CILS variable is measured retrospectively when the respondents are in their early 20s; the Census/ACS variable is constructed from reports on whether teenagers are enrolled in school if they have not already graduated.

<sup>25</sup>From Appendix Figure A.4, there is a discontinuity at zero in the raw probability of bachelor's degree receipt.

<sup>26</sup>Appendix Table A.1 similarly shows results for outcomes in the Census/ACS data. The estimates for below grade level and high school dropout are generally consistent with the nonparametric analysis. However, the estimates for speaking English very well appear inconsistent. When I allow for a quadratic curve on either side of zero, which better matches the plot in panel (f) of Figure 3, I find a small negative discontinuity at zero.

For all other outcomes, including aspirations and expectations to finish college, I find no evidence of a discontinuity or trendlines on either side of zero.

With a single cohort in the CILS, it is possible that differences across relative time of arrival merely reflect changes in cohort quality. If this was true, we might expect the pattern of results to change with the inclusion of controls. Comparing Appendix Figure A.4 (means only) and Figure 4 (regression-adjusted differences), we see that patterns are similar. This similarity also helps assuage concerns about the endogeneity of controls. To further address the concern about cohort quality, I also explore heterogeneity by country of origin. While the sample sizes by national origin are too small to conduct this analysis country-by-country, I create two broad groupings: Latin America and Asia. These results appear in Appendix Figure A.5. For most outcomes, the patterns of results are similar across national origin groupings. The exception is the probability that the youth aspires to finish college, displayed in panel (e). For youth from Latin America, there is a discontinuity at zero, but for youth from Asia, there is not. In addition, I conduct a heterogeneity analysis by socioeconomic status (SES), splitting the sample using the parent SES index provided by the CILS. Appendix Figure A.6 contains these results. I do not detect major differences by socioeconomic status, though I note that the confidence intervals are quite wide in some cases. On balance, these results mitigate the concern that the CILS results are driven by changes in cohort quality.

In sum, the results from the CILS suggest that there is a meaningful divide between the first and second generations for math scores but not for any of the other seven outcomes considered. For reading scores and English ability, I find that outcomes trend negatively with age at arrival, which is consistent with prior literature. Across all outcomes, I find no relationship between child's education and mother's time in the U.S. before the child's birth. Returning to the possible patterns in Figure 2, the results from the CILS look the most like the panels (a) and (c), which show no discontinuity. The pattern of math score results appear like panel (b) with flat slopes on either side of zero but a discrete jump at zero.

## 6 Differences in key educational determinants by relative time of arrival

In this section, I consider whether there is a discontinuity in key educational determinants by relative time of arrival, as well as whether there are any other patterns of note. This exercise is intended as an exploration of how background characteristics vary across relative time of arrival; these variables are included as controls in the main analysis in Section 5. While many background characteristics might be considered inputs to the educational production function in some sense, here I focus on mother's educational attainment, a well-known predictor of child outcomes; parent's knowledge of English, which influences children's human capital (Bleakley and Chin, 2008); and mother's age at migration.<sup>27</sup>

For the most part, I find no discontinuities in inputs across the generational threshold. Although there may be selection into the timing of migration, these results suggest that there is not a discrete jump in this selection.

### 6.1 Census/ACS

Figure 5 shows results for mother's educational attainment in the Census/ACS.<sup>28</sup> Panel (a) plots the probability that an immigrant mother has graduated high school by relative time of arrival, and panel (b) does the same for obtaining a bachelor's degree. I do not find any strong patterns, except that there is a slightly higher chance that the mother has finished college as she has *less* host country experience before birth. I plot mother's English speaking ability in panel (c). There appears to be a constant decrease in the probability that the mother speaks English well over relative time arrival, though the slope flattens around zero. Panel (d) shows results for mother's age at migration. This variable is increasing across relative time of arrival, but there does not appear to be a larger jump at relative time of arrival equals zero than any other time. While there are sometimes different

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<sup>27</sup>Note that I exclude the determinant under consideration from the list of controls.

<sup>28</sup>Appendix Figure A.7 displays means by relative time of arrival.

slopes on either side of zero, the transition across the zero threshold is relatively smooth for all educational determinants considered.

## 6.2 CILS

Figure 6 similarly plots regression results for key determinants in the CILS.<sup>29</sup> As shown in panel (a), I find no statistically significant differences in the probability that the mother graduated high school across relative time of arrival. Results for the probability of mother's college graduation are similar in the CILS and Census/ACS: Panel (b) shows no discontinuity at zero but a small upward trend to the left of zero, indicating a higher probability of college completion with *less* host country experience before birth. For parent's knowledge of English in panel (c), there is a jump at the generational divide that is statistically significant at the 10% level. Like the Census/ACS, there is a higher probability that the parent knows English well as the mother has more host country experience. With mother's age at migration, there is again a similar pattern similar to the Census/ACS: It is increasing across relative time of arrival. Although there is a statistically significant jump at zero, it does not appear to be larger than the jumps across any other threshold. With both data sources, I find little evidence of sharp discontinuities in educational determinants.

## 7 Conclusion

This paper develops a measure of host country experience based on the year a family arrived relative to the child's year of birth. I then use this measure to investigate (i) whether early-arriving immigrant children have different educational outcomes from children whose mothers arrived shortly before birth and (ii) the importance of mother's time in the receiving country before the child's birth. I find that the transition between the first and second generations is relatively smooth for most outcomes considered, as well as key educational inputs. Like prior work, I show that outcomes related to English knowledge are decreasing in age at arrival. Perhaps surprisingly, I find

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<sup>29</sup>Appendix Figure A.8 plots means.

that mother's time in the U.S. before the the child's birth has little influence on the child's educational outcomes; this finding stands in contrast to prior work using Scandinavian register data (Nielsen and Rangvid, 2012; Smith, Helgertz, and Scott, 2016). Thus, overall differences between the first and second generations are driven by comparisons between the second generation and later-arriving first-generation children. Note that this paper is descriptive, and no adjustments are made to account for selection into the timing of migration.

When grouping youth from immigrant backgrounds, my results suggest that children of immigrants could be placed together when the first-generation immigrants in the sample are very young. For outcomes related to language proficiency, it is important to control for age at arrival for first-generation immigrants. These findings also support placing all second-generation immigrants in a single category without regards to their parents' host country experience. Age-at-arrival controls and a single group for second-generation immigrants are common practices in the literature, but this paper confirms that these practices are correct.

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Figure 1: Scale for relative time of arrival

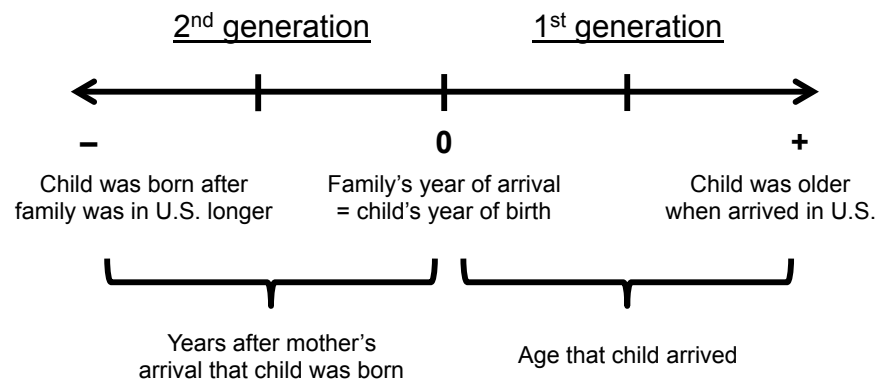


Figure 2: Possible patterns of results

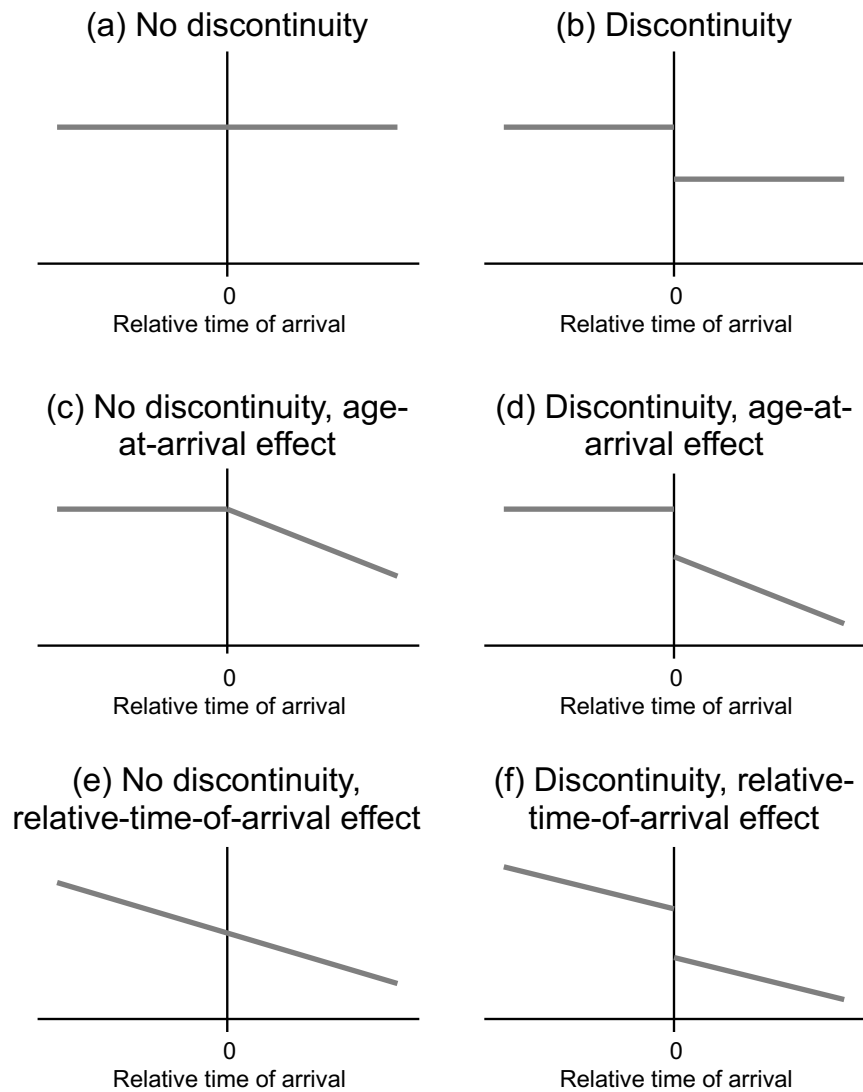
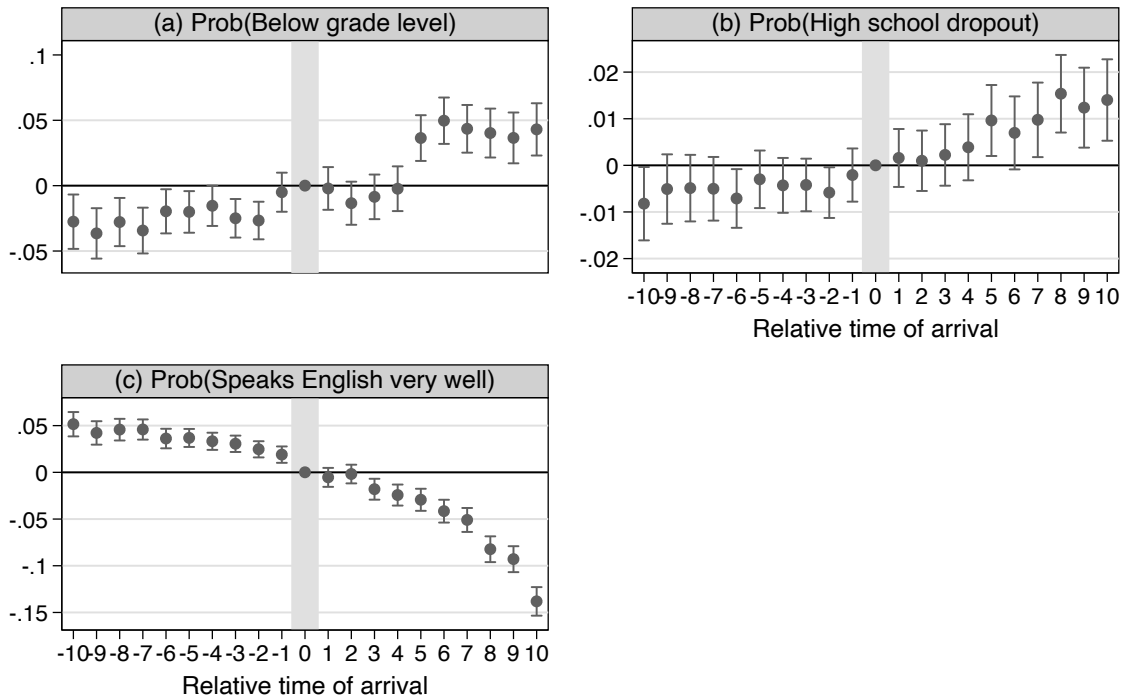
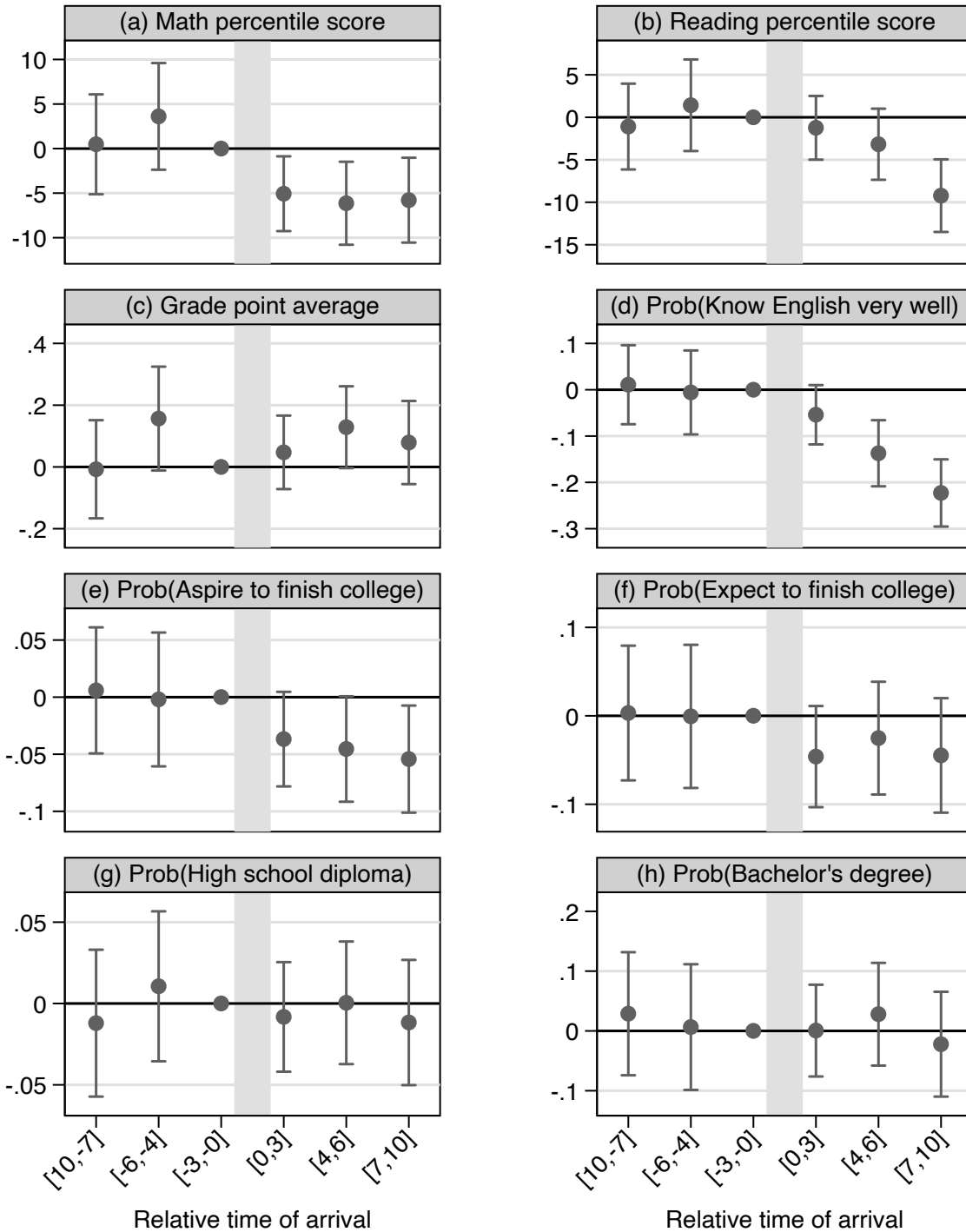


Figure 3: The effect of relative time of arrival on educational outcomes, Census/ACS data



*Notes:* Each panel plots point estimates and 95% confidence intervals for the effect of relative time of arrival adjusted for dummies for child age, sex, father presence, dummies for mother's age at birth, dummies for family size, multi-generational household, a quadratic of the income-to-poverty line ratio, dummies for mother's educational attainment, dummies for mother's age at migration, dummies for each country of origin, dummies for survey year, and missing indicators where necessary. Relative time of arrival equal to zero is the omitted category. See Eq. 4.

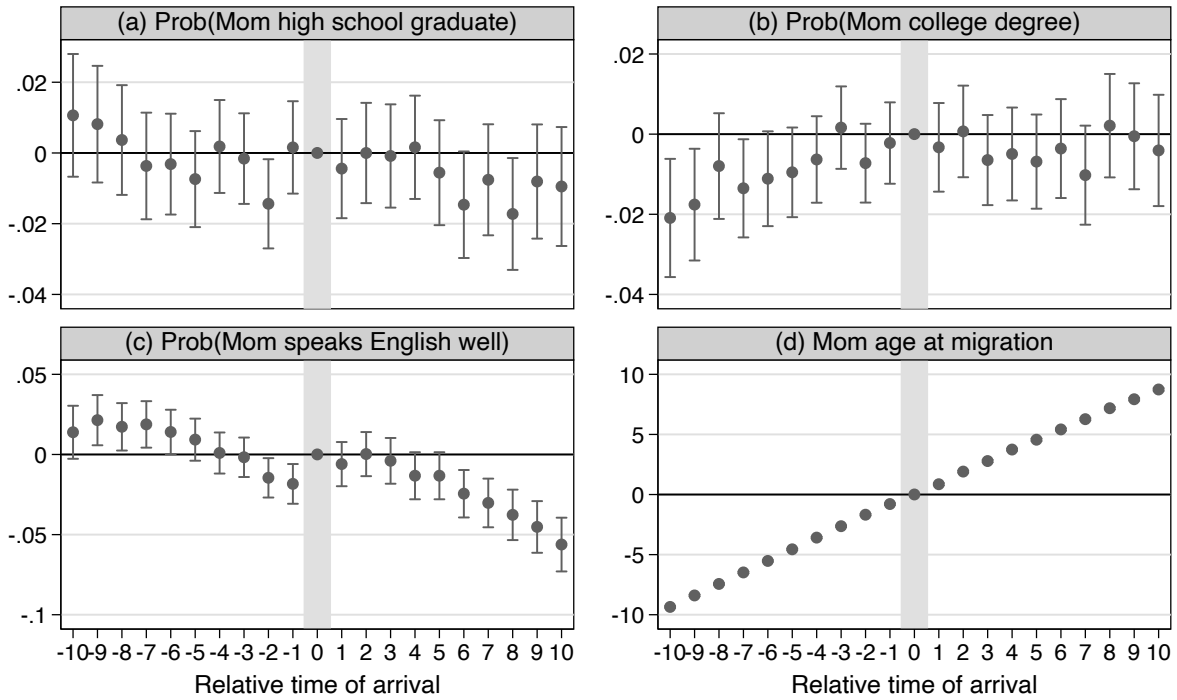
Figure 4: The effect of relative time of arrival on educational outcomes, CILS data



Notes: Each panel plots point estimates and 95% confidence intervals for the effect of relative time of arrival adjusted for dummies for child age, sex, father presence, mother's age at birth, household size, parents' socioeconomic status, survey site, mother's age at migration, dummies for mother's education level, dummies for each country of origin, and missing indicators where necessary. The omitted category is relative time of arrival between  $-3$  and  $0$ . See Eq. 4.

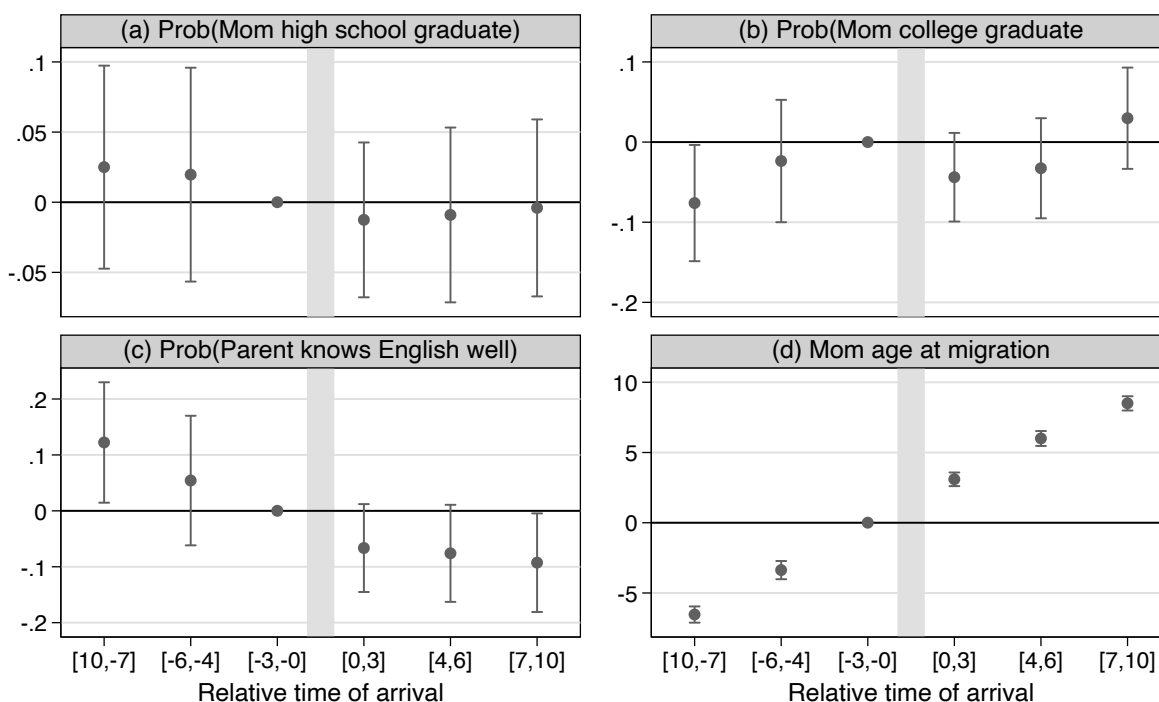


Figure 5: The effect of relative time of arrival on educational determinants, Census/ACS data



*Notes:* Each panel plots point estimates and 95% confidence intervals for the effect of relative time of arrival adjusted for dummies for child age, sex, father presence, dummies for mother's age at birth, dummies for family size, multigenerational household, a quadratic of the income-to-poverty line ratio, dummies for mother's educational attainment, dummies for mother's age at migration, dummies for each country of origin, dummies for survey year, and missing indicators where necessary. The determinant under consideration is excluded from the set of covariates when appropriate. Relative time of arrival equal to zero is the omitted category. See Eq. 4.

Figure 6: Educational determinants by relative time of arrival, CILS data



*Notes:* Each panel plots point estimates and 95% confidence intervals for the effect of relative time of arrival adjusted for dummies for child age, sex, father presence, mother's age at birth, household size, parents' socioeconomic status, survey site, mother's age at migration, dummies for mother's education level, dummies for each country of origin, and missing indicators where necessary. The determinant under consideration is excluded from the set of covariates when appropriate. The omitted category is relative time of arrival between  $-3$  and  $0$ . See Eq. 4.

Table 1: Descriptive statistics, Census/ACS data

	Born after mother migrated (2nd generation)	Born before mother migrated (1st generation)	Difference (After – Before) (2nd – 1st)	Native-born mother
Below grade	0.304	0.368	-0.064***	0.379
High school dropout	0.024	0.040	-0.016***	0.033
Speaks English very well	0.926	0.856	0.071***	0.986
Mother HS graduate	0.613	0.595	0.018***	0.915
Mother college graduate	0.208	0.193	0.015***	0.271
Mother speaks English well	0.615	0.531	0.084***	0.997
Mother age at arrival	24.25	30.40	-6.41***	
Age (years)	16.40	16.45	-0.05***	16.41
Female	0.489	0.483	0.006**	0.487
U.S. citizen	0.994	0.486	0.507***	0.999
Father not present	0.208	0.202	0.006***	0.262
Father foreign born	0.858	0.898	-0.041***	0.051
Mother age at birth	28.84	26.17	2.67***	27.44
Family size	4.72	4.94	-0.21***	4.23
Multigenerational household	0.124	0.116	0.008***	0.078
Income-to-poverty line ratio	2.49	2.21	0.28***	3.11
Mexican	0.370	0.380	-0.010***	
Cuban	0.007	0.015	-0.008***	
Caribbean, except Cuban	0.095	0.107	-0.012***	
Central American	0.082	0.059	0.024***	
South American	0.053	0.063	-0.010***	
Filipino	0.052	0.040	0.012***	
Southeast Asian, except Filipino	0.059	0.043	0.017***	
Other Asian	0.141	0.112	0.030***	
Middle Eastern/African	0.052	0.055	-0.003**	
European/Canadian/Oceanian	0.088	0.127	-0.039***	
Other/Not specified	0.001	0.001	-0.000**	
Observations (unweighted)	160,988	132,551		2,283,602

Notes: \*  $p < .1$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table 2: Descriptive statistics, CILS data

	Born after mother migrated (2nd generation)	Born before mother migrated (1st generation)	Difference (After – Before) (2nd – 1st)
Math percentile score	62.06	52.99	9.07***
Reading percentile score	50.41	38.73	11.69***
Grade point average	2.61	2.65	-0.04
Know English very well	0.820	0.578	0.242***
Aspire to finish college	0.943	0.895	0.048***
Expect to finish college	0.866	0.767	0.099***
High school diploma	0.969	0.963	0.007
Bachelor's degree	0.331	0.264	0.068***
Mother has HS diploma	0.711	0.634	0.077***
Mother has college degree	0.253	0.226	0.027
Parent knows English well	0.702	0.413	0.288***
Mother age at arrival	21.29	29.80	-8.51***
Age (years)	14.11	14.33	-0.22***
Female	0.540	0.539	0.001
U.S. citizen	0.995	0.386	0.609***
U.S. citizen missing	0.009	0.175	-0.165***
Father not present	0.281	0.258	0.023
Father foreign born	0.845	0.972	-0.127***
Mother foreign born	1.000	0.992	0.008***
Mother age at birth	26.80	25.88	0.92***
Household size	3.93	4.51	-0.58***
Parent SES index	0.086	-0.192	0.279***
Mexican	0.135	0.088	0.048***
Cuban	0.291	0.156	0.135***
Caribbean, except Cuban	0.095	0.100	-0.004
Central American	0.043	0.159	-0.116***
South American	0.103	0.087	0.016
Filipino	0.192	0.128	0.065***
Southeast Asian, except Filipino	0.065	0.247	-0.182***
Other Asian	0.049	0.027	0.022**
Middle Eastern/African	0.008	0.005	0.002
European/Canadian	0.018	0.004	0.014**
Miami/Ft. Lauderdale metro	0.572	0.516	0.056**
Present in Wave 3	0.709	0.682	0.027
Maximum observations	650	1,827	

Notes: \*  $p < .1$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

# Appendix

Figure A.1: Histogram of relative time of arrival, Census/ACS data

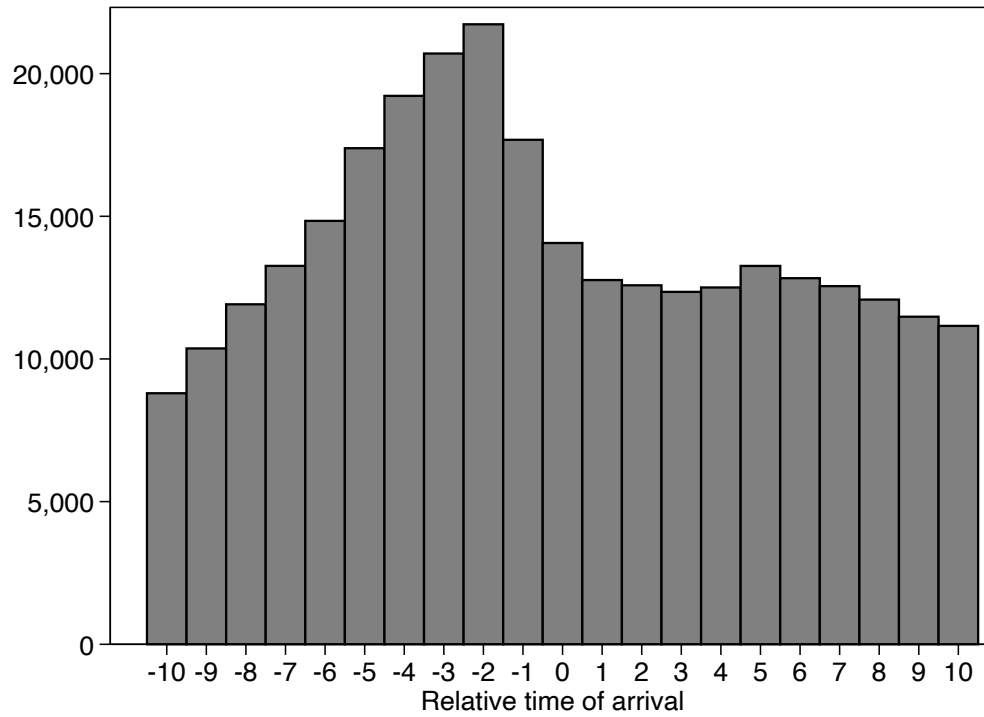


Figure A.2: Histogram of relative time of arrival, CILS data

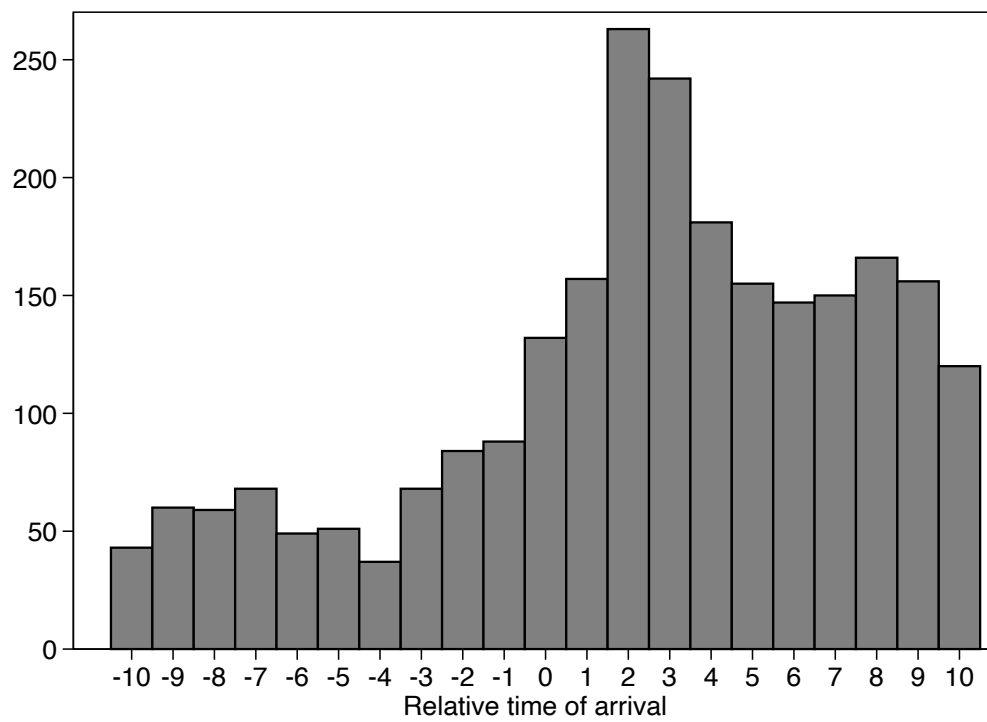
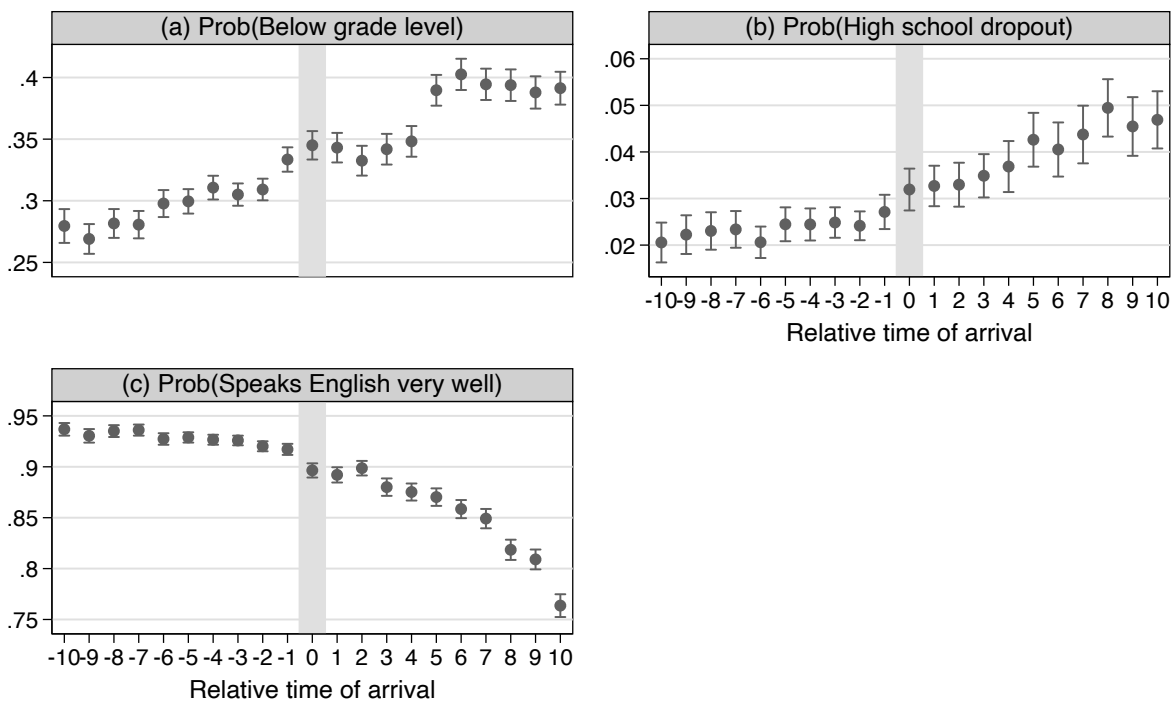
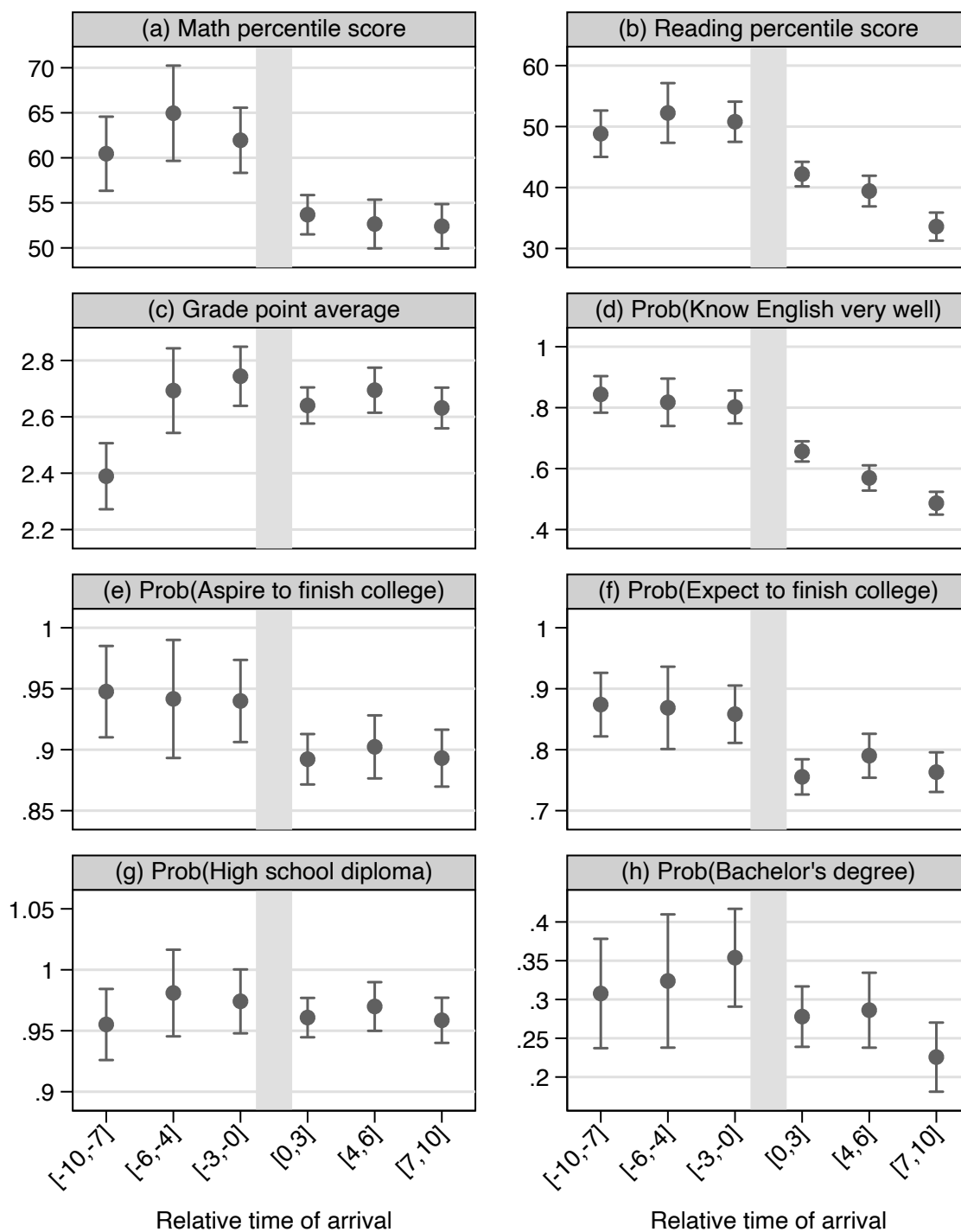


Figure A.3: Means of educational outcomes by relative time of arrival, Census/ACS data



Notes: Each panel plots point estimates and 95% confidence intervals for the mean of an educational outcome by relative time of arrival; see Eq. 1 in the text.

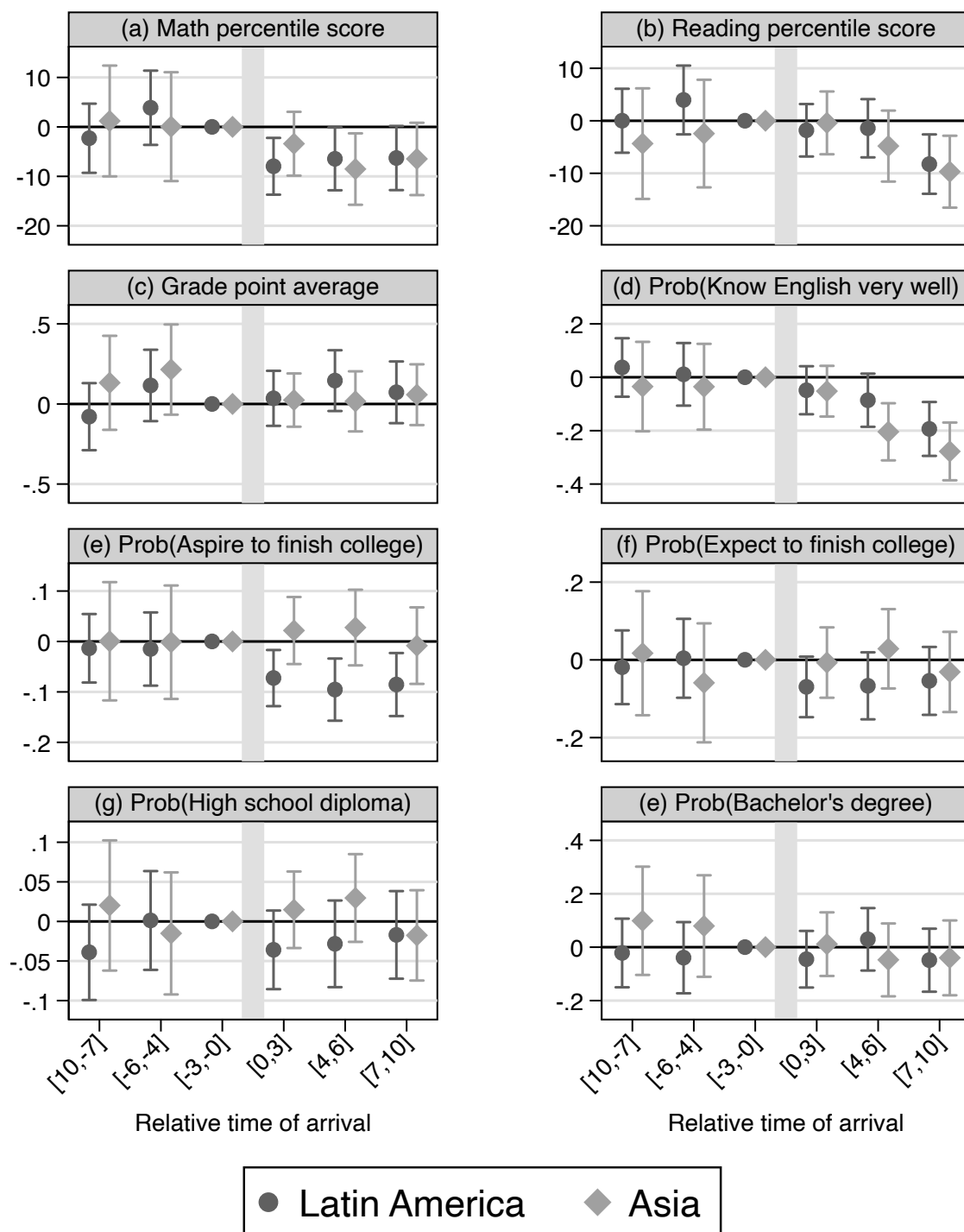
Figure A.4: Means of educational outcomes by relative time of arrival, CILS data



Notes: Each panel plots point estimates and 95% confidence intervals for the mean of an educational outcome by relative time of arrival; see Eq. 1 in the text.

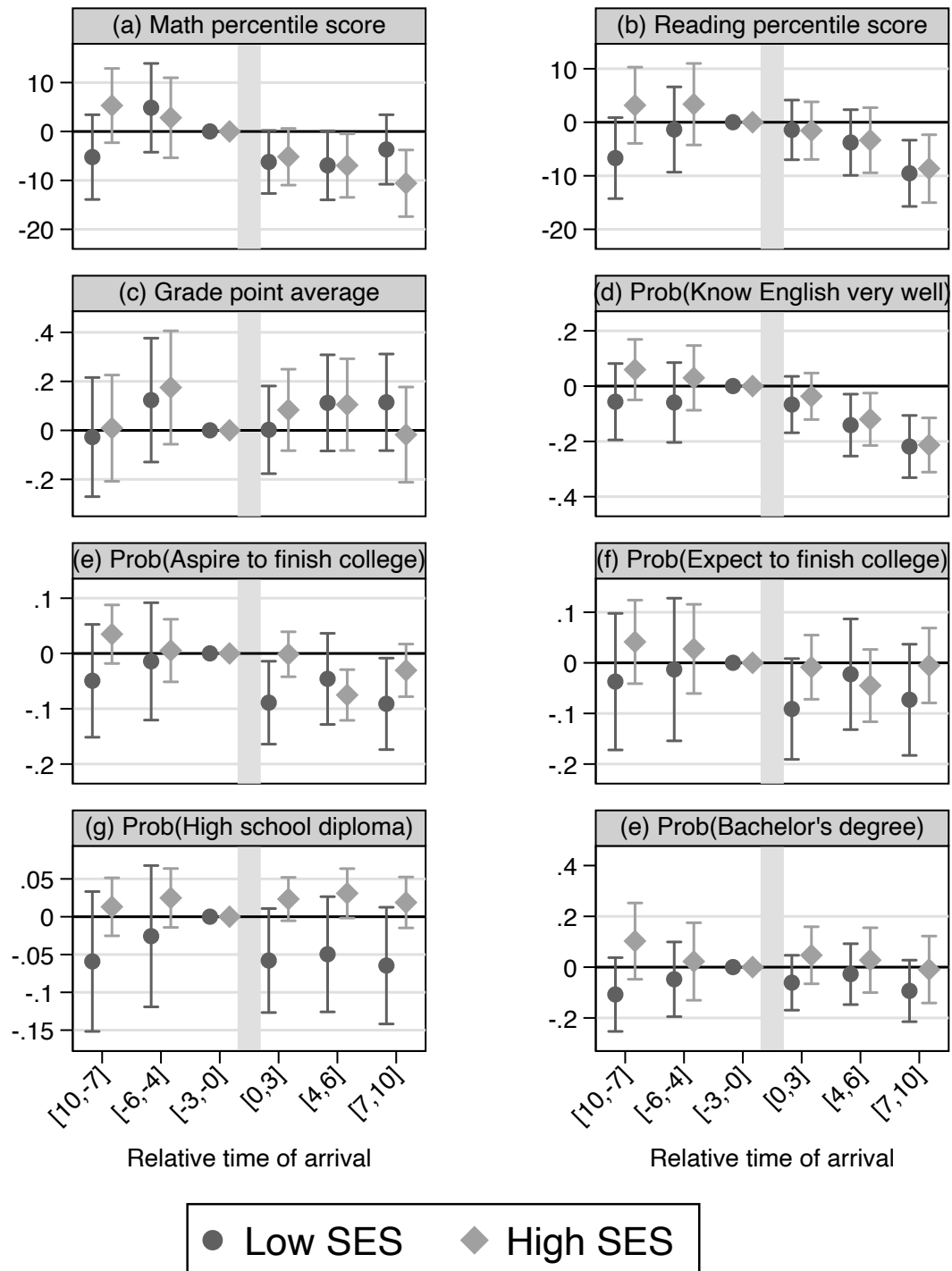


Figure A.5: The effect of relative time of arrival on educational outcomes by national origin, CILS data



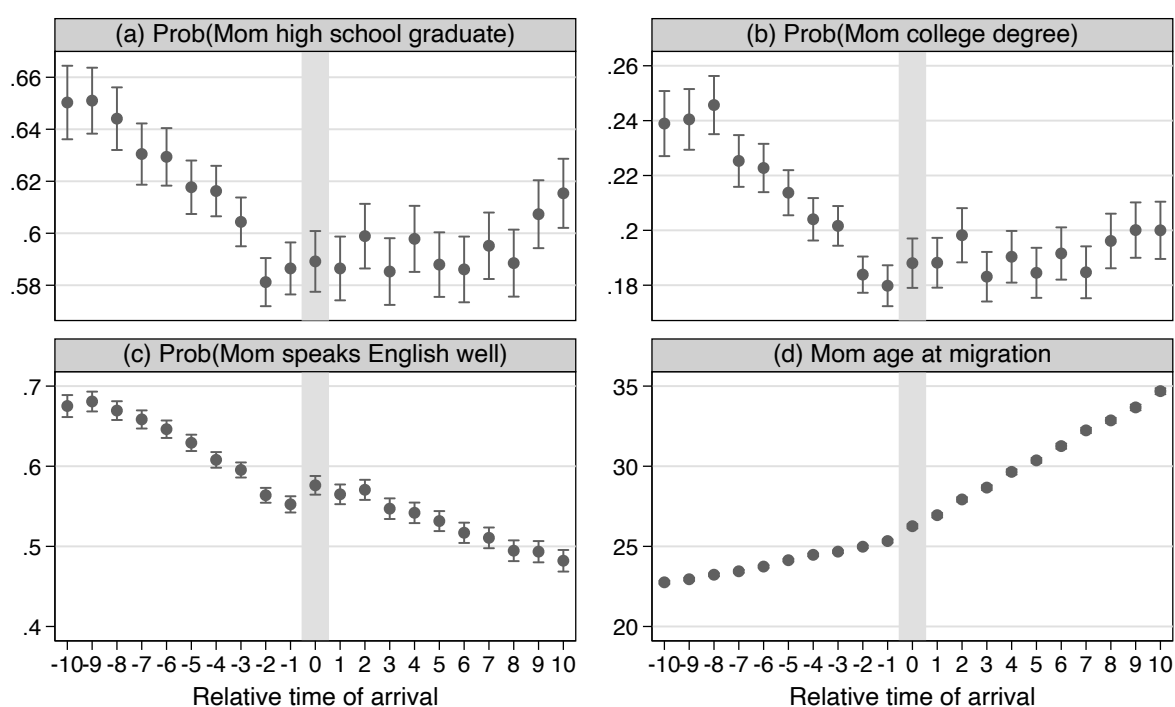
Notes: Each panel plots point estimates and 95% confidence intervals for the effect of relative time of arrival by national origin adjusted for dummies for child age, sex, father presence, mother's age at birth, household size, parents' socioeconomic status, survey site, mother's age at migration, dummies for mother's education level, dummies for each country of origin, and missing indicators where necessary. The omitted category is relative time of arrival between -3 and 0. See Eq. 4.

Figure A.6: The effect of relative time of arrival on educational outcomes by socioeconomic status, CHS data



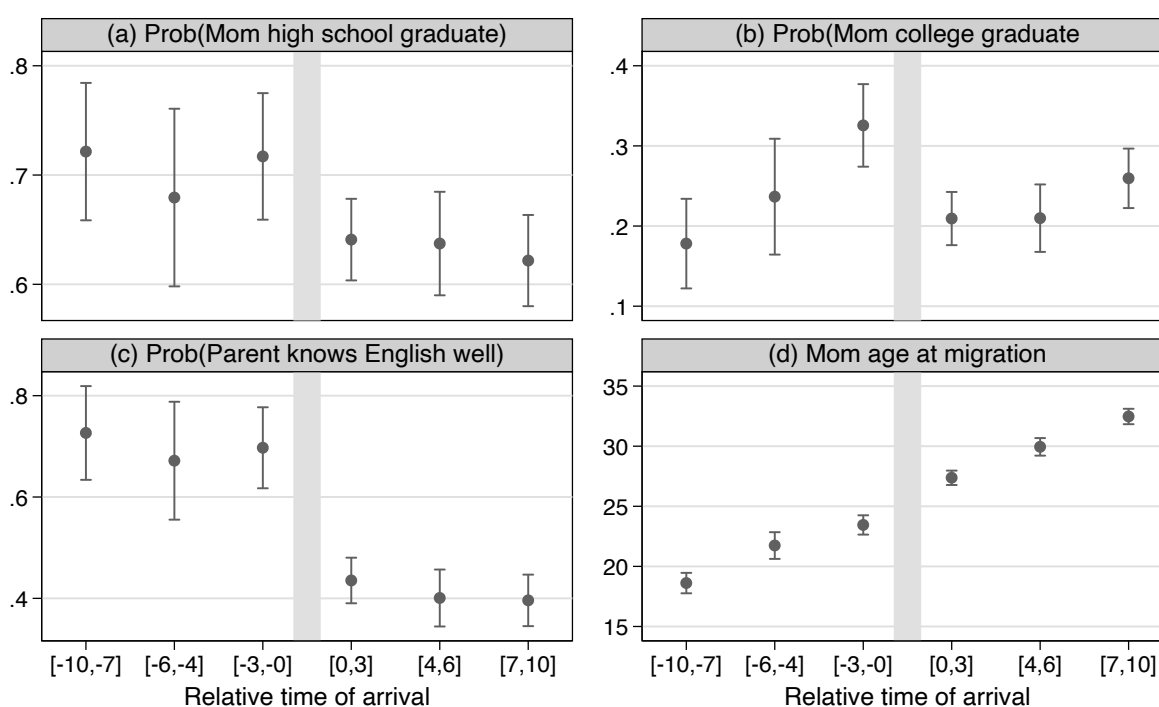
Notes: Each panel plots point estimates and 95% confidence intervals for the effect of relative time of arrival by socioeconomic status adjusted for dummies for child age, sex, father presence, mother's age at birth, household size, parents' socioeconomic status, survey site, mother's age at migration, dummies for mother's education level, dummies for each country of origin, and missing indicators where necessary. The omitted category is relative time of arrival between -3 and 0. See Eq. 4.

Figure A.7: Means of educational determinants by relative time of arrival, Census/ACS data



Notes: Each panel plots point estimates and 95% confidence intervals for the mean of an educational determinant by relative time of arrival; see Eq. 1 in the text.

Figure A.8: Means of educational determinants by relative time of arrival, CILS data



Notes: Each panel plots point estimates and 95% confidence intervals for the mean of an educational determinant by relative time of arrival; see Eq. 1 in the text.

Table A.1: Regression discontinuity results, Census/ACS

	Below grade	HS dropout	Good English	Good English
Foreign born	-0.0040 (0.0055)	0.0018 (0.0021)	0.0070** (0.0034)	-0.0239*** (0.0057)
Relative time of arrival (RTA)	0.0022** (0.0009)	0.0004 (0.0003)	-0.0040*** (0.0006)	-0.0060*** (0.0015)
Foreign born X RTA	0.0051*** (0.0010)	0.0013*** (0.0004)	-0.0099*** (0.0006)	0.0099*** (0.0025)
RTA-squared				-0.0002 (0.0001)
Foreign born X RTA-sq				-0.0014*** (0.0002)
Observations	279474	279474	279474	279474
$R^2$	0.046	0.033	0.061	0.062

Notes: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Regressions include dummies for child age, sex, father presence, dummies for mother's age at birth, dummies for family size, multigenerational household, a quadratic of the income-to-poverty line ratio, dummies for mother's educational attainment, dummies for mother's age at migration, dummies for each country of origin, dummies for survey year, and missing indicators where necessary. See Eq. 5 in the text.

Table A.2: Regression discontinuity results, CILS

	Math	Reading	GPA	Good English	Aspire	Expect	HS diploma	BA degree
Foreign born	-6.173** (2.857)	-0.177 (2.535)	0.042 (0.080)	0.033 (0.043)	-0.016 (0.028)	-0.015 (0.039)	-0.004 (0.023)	0.022 (0.053)
Relative time of arrival (RTA)	-0.069 (0.445)	0.235 (0.398)	-0.006 (0.013)	-0.002 (0.007)	-0.000 (0.004)	-0.001 (0.006)	0.002 (0.004)	-0.001 (0.008)
Foreign born X RTA	-0.118 (0.482)	-1.647*** (0.431)	0.009 (0.014)	-0.027*** (0.007)	-0.003 (0.005)	-0.000 (0.007)	-0.005 (0.004)	-0.002 (0.009)
Observations	2081	2116	2316	2344	2338	2337	1589	1596
$R^2$	0.226	0.294	0.251	0.245	0.121	0.143	0.044	0.146

Notes: \*  $p < .1$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ . Regressions dummies for child age, sex, father presence, mother's age at birth, household size, parents' socioeconomic status, survey site, mother's age at migration, dummies for mother's education level, dummies for each country of origin, and missing indicators where necessary. See Eq. 5 in the text.