

The Effects of English Proficiency among Childhood Immigrants: Are Hispanics Different?*

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ABSTRACT

We test whether the effect of English proficiency differs between Hispanic and non-Hispanic immigrants. Using 2000 Census microdata on childhood immigrants, we relate labor market, education, marriage and fertility variables to their age at arrival in the United States, and in particular whether that age fell within the “critical period” of language acquisition. We interpret the observed differences as an effect of English-language skills and construct an instrumental variable for English proficiency. Immigrants from both groups exhibit lower English proficiency if they arrive after the critical period, but this drop in English skill is larger for Hispanics. The effect of English skill on earnings and education is nevertheless quite similar across groups, while some differences are seen for marriage and fertility outcomes. (JEL J12, J13, J15, J24)

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I. Introduction

What is the impact of English-language skills on the education, labor market, marriage and fertility outcomes of U.S. immigrants? Does the impact differ between Hispanic and non-Hispanic immigrants? These are the questions we address in this paper.

The increase in immigration in recent decades has drawn attention to the process of immigrant assimilation in the U.S. In 1970, just 4.8% of the U.S. population was foreign-born, but by 2005 the figure had risen to 12.4%.¹ Increasingly, immigrants are coming from countries where English is not widely spoken, leading to a rise in the number of U.S. residents who are not fluent in English. In 2005, 23 million U.S. residents age 5 and over reported speaking English less than very well, which is 8.6% of this subpopulation. Among foreign-born age 5 and over, 52% spoke English less than very well. In this context, it is useful to understand the role that English proficiency plays in the process of immigrant assimilation. This knowledge may enable us to form policies that facilitate the adjustment to living in America for immigrants and their descendents. Such policies may be desirable because immigrants tend to be worse off educationally and economically compared to natives, and their disadvantages may be passed on to their U.S.-born offspring. Immigrants are more concentrated in the lowest parts of the education and wage distributions. For example, in 2005, 20.3% of immigrants have completed less than nine years of schooling (compared to 3.7% for natives), and 17.1% of immigrants live in poverty (compared to 12.8% of natives).

Hispanics accounted for 47% of the foreign-born population and 14.5% of the total population, making them the largest minority race/ethnicity in the U.S. on the one hand, and making Spanish the second most spoken language in the U.S. behind English on the other. Given the large numbers of Hispanics in the U.S. and their geographic concentration—although

¹ The 1970 figure is from the 1970 U.S. Census and the 2005 one is from the 2005 American Community Survey. Here and in the rest of this paragraph, we use tabulations of 2005 American Community Survey done by the Pew Hispanic Center (Fry and Hakimzadeh (2006a)).

the degree of concentration has been decreasing in the past decade, with recent immigrant choosing new areas to settle—it is possible that English-language skills may have different effects for Hispanics than non-Hispanics. For example, it may be more feasible for Hispanics to live mostly within the ethnic community, in which case English proficiency may have a reduced role to play in determining their outcomes. We therefore formally analyze whether Hispanic immigrants’ outcomes are indeed less sensitive to English proficiency compared to non-Hispanic immigrants’ outcomes below.

Simple comparison of immigrants’ outcomes and their English proficiency may capture more than just the causal effect of English proficiency. Measuring the effect of English proficiency might be complicated by the presence of omitted variables (i.e., English proficiency may be correlated with other variables that also affect outcomes), reverse causality or measurement error. In order to obtain a consistent estimate of the effect of English proficiency on outcomes, we take advantage of the psychobiological phenomenon that young children learn languages more easily than older children and adults. Thus, children who arrive in the U.S. at a younger age will have an easier time developing English-language skills compared to children arriving at a later age. Immigrants from English-speaking countries do not have to acquire a new language upon arrival in the U.S., but do have to adjust to other aspects of living in America—we use them to control for the non-language-related age-at-arrival effects. Thus our identification strategy is to use an instrumental variable for English proficiency which is an interaction between immigrants’ age at arrival and being born in a non-English-speaking country. (In Section II, we elaborate on our identification strategy, as well as describe our data and the related literature.)

In Section III, we document the strong relationship between age at arrival and English proficiency for immigrants from non-English-speaking countries. Immigrants who arrived

young in the U.S. from non-English-speaking countries show levels of English proficiency similar to that of comparable immigrants from English-speaking countries. For this latter group, age at first exposure to English did not depend on age at migration, and, accordingly, English proficiency is not strongly affected by age at arrival in the U.S. On the other hand, for the immigrants from non-Anglophone countries arriving at later ages, English skills decline as a function of age at arrival, coinciding with the closing of the critical period. Moreover, within this group, the drop in proficiency is around 2-3 times greater for Hispanics than non-Hispanics.

In Section IV, we consider the effect of English proficiency on social and economic outcomes. To do so, we implement our instrumental-variables strategy using individual-level data from the 2000 U.S. Census. For immigrants from non-English-speaking countries, English skills raise education and earnings, and in magnitudes that are similar for Hispanics and non-Hispanics. This suggests that some of gaps between these groups might be reduced by promoting better English skills among Hispanics. Both groups also exhibit evidence of an important impact of English on social outcomes (better proficiency reducing marriage, fertility, and exogamy), but the effects of English are generally more pronounced for non-Hispanics. We offer conclusion in Section V.

II. Background and Data

A. Related literature

A large number of studies has examined the correlation between English proficiency and immigrant earnings (e.g., McManus, Gould and Welch (1983), Kassoudji (1988), Tanier (1988) and Chiswick (1991)), education (e.g., Portes and MacLeod (1999) and Glick and White (1999)), marriage (e.g., Stevens and Swicegood (1987), Davila and Mora (2001), Meng and Gregory (2005)), and fertility (e.g., Sorenson (1988), Swicegood, Bean, Stephen and Opitz (1988)).

Some have focused on Hispanics in particular and others have examined all immigrants. However, OLS estimates of the effect of English proficiency are likely to be biased. Omitted variables are a likely culprit—for example, omitted ability, cultural attitudes or family background may be correlated with both English proficiency and the outcome. If we fail to control for the omitted variables, we would obtain a biased estimate of the effect of English proficiency; we would be mistakenly attributing the effect of ability on the outcome to English proficiency. Reverse causality and measurement error are additional sources of concern. Consequently, we cannot be confident that the OLS estimate provides the causal effect of English proficiency.

Only a small handful of studies have attempted to address the problem of endogeneity in language skills when estimating the effect of destination-country-language proficiency on earnings (e.g., Chiswick and Miller (1995), Angrist and Lavy (1997), Dustmann and van Soest (2002), and Bleakley and Chin (2004)), education (Bleakley and Chin (2004)), and marriage and fertility (Bleakley and Chin (2007)). Chiswick and Miller (1995) and Bleakley and Chin (2004, 2007) use data on U.S. immigrants, and neither addresses whether the effect of English proficiency differs between Hispanic and non-Hispanic immigrants.

This study uses the same identification strategy as Bleakley and Chin (2004, 2007). The main contribution of this study is to test whether the effects of English proficiency differ between Hispanic and non-Hispanic immigrants.

B. Empirical strategy

We are interested in the effect of the English on a variety of economic and social outcomes, and evaluating whether the effect differs by Hispanic origin. The relationship between English skill and the outcome might be approximated as

$$(1) \quad y_i = \alpha + \beta_1 \text{ENG}_i \times \text{Hispanic}_i + \beta_2 \text{ENG}_i \times (1 - \text{Hispanic}_i) + \mathbf{w}_i' \boldsymbol{\rho} + \varepsilon_i,$$

where y_i is the outcome for individual i , ENG_i is a measure of English-language skills, Hispanic_i is an indicator variable for being of Hispanic origin, and \mathbf{w}_i is a vector of exogenous explanatory variables (including age, sex, race and Hispanic_i). β_1 and β_2 are the parameters of interest, giving the effect of English proficiency on the outcome for Hispanics and non-Hispanics, respectively. Because English-language skills are endogenous, though, ordinary least squares estimates of Equation 3 will tend to give biased estimates of β_1 and β_2 .

To obtain a consistent estimate of the effect of English-language skills, we use an instrumental variable derived from second language acquisition theory. Simply stated, younger children acquire language skills more easily than older children and adults. There is a window of time in which it is easier to learn languages, and this window is known in psychology as the “critical period of language acquisition.”² It appears to be linked to physiological changes in the brain (Lenneberg (1967)): maturational changes starting just before puberty reduce a child’s ability to acquire second languages. If exposure to the language begins during the critical period, acquisition of the language up to native fluency is almost certain. If first exposure commences afterward, the individual’s language proficiency is less assured.

Immigrants from non-English-speaking countries will need to learn English to function in U.S. schools, workplace and other institutions. By virtue of how old they were when they entered the U.S., these immigrants will be assigned a lower or higher cost of learning English. Those who arrive at a younger age have an earlier age of first exposure to English, and therefore a language-learning advantage. But it is likely that younger arrivers and older arrivers differ in many ways besides only in the biological constraints that they face in second language acquisition. For example, it is easy to imagine that younger arrivers would be able to adjust

² See Newport (2002) for an overview of the theory and empirical evidence related to the critical period.

better to American institutions, which would lead to differences in outcomes between younger and older arrivers that have nothing to do with English proficiency. To control for these non-language-related age-at-arrival effects, we take advantage of the fact that immigrants from English-speaking countries to the U.S. have to adjust to American institutions just like all other immigrants, but they do not have to learn a new language. The addition of immigrants from English-speaking countries to our sample enables us to partial out the non-language effects of age at arrival. That is, we are not attributing the entire difference in outcome between younger and older arrivers from non-English-speaking countries to language. Instead, we are attributing only the portion that is over and above the difference from English-speaking countries to language. This is the intuition behind using an *interaction* between age at arrival and coming from a non-English-speaking country as an instrumental variable for English proficiency.

In Equation 1, there are two endogenous regressors: the English-language skills of Hispanics and the English-language skills of non-Hispanics. We will therefore need at least two instruments in order to identify the parameters in the equation. Below, we will use two instruments that are interactions between age at arrival and being born in a non-English-speaking country, but one is further interacted with $Hispanic_i$ and the other is interacted with $(1 - Hispanic_i)$. In Section III, we document the relationship between age at arrival and English proficiency using U.S. Census microdata and discuss the specific parameterization of our two instruments.

C. Data and descriptive statistics

We implement our empirical strategy using individual-level data from the 2000 U.S. Census of Population and Housing.³ The 2000 Census contains a question on English-speaking

³ Specifically, we combine the 1% and 5% samples from Integrated Public Use Microsample Series (IPUMS) (Ruggles et al. (2004)).

ability, and we use the responses to this question to construct a measure of English-language skills.⁴ In particular, we form an ordinal measure of English-speaking ability as follows: 0 = speaks English not at all, 1 = speaks English not well, 2 = speaks English well and 3 = speaks English very well or speaks only English. The 2000 Census is a general-purpose survey, and enables us to look at a variety of outcomes. We will be examining the following types of outcomes: wages, labor market participation, educational attainment, marital status, spousal characteristics and number of children.

Our analysis is conducted using childhood immigrants currently aged 25 to 55.⁵ We define a childhood immigrant as an immigrant who was under age 15 upon arrival in the U.S. For these immigrants, age at arrival is not a choice variable since they did not time their own immigration but merely come with their parents to the U.S.⁶ This is the same sample that we used in Bleakley and Chin (2007).

We divide our sample into three mutually exclusive language categories: individuals from non-English-speaking countries of birth, countries of birth with English as an official language that have English as the predominant language, and other countries of birth with English as an official language.⁷ The first category is our “treatment” group and the second is

⁴ The Census question based on which the English-ability measure in this paper is constructed is: “How well does this person speak English?” with the four possible responses “very well,” “well,” “not well” and “not at all.” This question is only asked of individuals responding affirmatively to “Does this person speak a language other than English at home?” We have coded immigrants who do not answer “Yes” to speaking another language as speaking English “very well.”

⁵ For the purposes of the empirical analysis immigrant is defined as someone born outside the fifty states and the District of Columbia. This means that a person born in Puerto Rico is considered an immigrant, although legally he/she is a U.S. citizen at birth.

⁶ According to the U.S. Citizenship and Immigration Services, immigrating parents may bring any unmarried children under age 21. We use a more restricted set of childhood immigrants: immigrants who were under 15 upon arrival (i.e., maximum age at arrival is 14). Using this lower age at arrival cutoff should mitigate the concern that many low-educated young men migrate on their own to the U.S. from Mexico and Central America to look for work, which makes age at arrival a choice variable and makes it less plausible that the non-language age-at-arrival effects estimated using immigrants from English-speaking countries apply to immigrants from non-English-speaking countries.

⁷ We used *The World Almanac and Book of Facts, 1999*, to determine whether English was an official language of each country. Recent adult immigrants from the 1980 Census were used to provide empirical evidence of the prevalence of English in countries with English as an official language. English-speaking countries are defined as

our “control” group. The last category is omitted from the main analysis, since we are not sure how much exposure to the English language immigrants from these countries would have had before immigrating. Appendix Table 1 shows the decomposition of the sample by country of birth, and also presents our classification of countries by English-speaking status. Appendix Table 2 provides the descriptive statistics for the treatment and control groups, with decompositions by age at arrival and Hispanic origin.⁸

III. Age at Arrival and English Proficiency

Among childhood immigrants from non-English-speaking countries in our sample, the relationship between age at arrival and English-language skills is strong. This can be seen in Figure 1, which plots for each age at arrival the mean English-speaking ability in adulthood for three categories of childhood immigrants: those from non-English-speaking countries who report being Hispanic, those from non-English-speaking countries who do not report being Hispanic, and those from English-speaking countries. Not surprisingly for immigrants from English-speaking countries, there is no relationship between age at arrival and English skill; they would have been exposed to English early whether they grew up in their country of birth or the U.S., and consequently they are able to speak very well irrespective of their age at arrival in the U.S. For immigrants from non-English-speaking countries on the other hand, there is no relationship between age at arrival and English skill for early ages of arrival and an inverse relationship for later ages at arrival. In particular, people who arrived at age nine or earlier from non-English-

those countries from which more than half the recent adult immigrants did not speak a language other than English at home. The remaining countries with English as an official language are excluded from the main analysis. We made two exceptions to this procedure. First, despite the fact that Great Britain was not listed as having an official language, we included it in the list of English-speaking countries. Second, we classified Puerto Rico as non-English speaking even though English is an official language due to its colonial history.

⁸ The Census question based on which the Hispanic origin dummy variable used in this paper is constructed is: “Is this person Spanish/Hispanic/Latino?” People responding “No” are coded as zeros, and everyone responding “Yes” are coded as ones; the “Yes” responders are comprised of “Mexican, Mexican American, Chicano”, “Puerto Rican”, “Cuban” and “Other Spanish/Hispanic/Latino”.

speaking countries speak English at least as well as their counterparts from English-speaking countries. After age at arrival nine, people from non-English-speaking countries have significantly lower English-speaking proficiency, and indeed the disadvantage increases almost linearly with age at arrival. This disadvantage is noticeably larger for Hispanics than non-Hispanics—after the initial flat portion, the graph is much more steeply downward sloping for Hispanics than non-Hispanics.

These results are consistent with the critical period hypothesis of language acquisition discussed in the previous section. For childhood immigrants arriving well within the critical period of language acquisition, a slightly later arrival does not depress English proficiency in the long run. On the other hand, those who arrived as their critical period was coming to a close attained significantly worse eventual English skills.

There is no reason the biological constraints to new language acquisition by age should differ between Hispanics and non-Hispanics, so it appears puzzling that we observe a stronger age at arrival-English skill relationship for Hispanics. The puzzle can be resolved by recognizing that compared to Hispanic immigrants from non-English-speaking countries, non-Hispanic immigrants from non-English-speaking countries likely have had more exposure to English prior to arriving in the U.S. Hispanic immigrants to the U.S. in our sample originate primarily from Mexico, Puerto Rico, and Cuba, and to a lesser extent countries in Central America and South America. These countries are nearer to the U.S., and it is feasible for more people to emigrate to the U.S. from these countries. On the other hand, it is on average more difficult to enter the U.S. from the countries that non-Hispanic immigrants tend to originate. Emigrants from these countries might therefore be more selected on average. For example, they may be from wealthier households, have attended private schools that teach in English or at least teach English as a subject, or have American expatriate parents. Thus, although people

everywhere face a similar age disadvantage in new language acquisition due to human biology, the empirical relationship between age at arrival and English skill may differ among different groups to the extent that some groups have a larger share of immigrants with pre-U.S.-entry exposure to English than other groups.⁹

Figure 1 suggests not only that there exists a distinct relationship between age at arrival and English proficiency, but also that there is a parsimonious way to parameterize the relationship as we move to more formal statistical analysis. In particular, we impose the restriction that the difference between childhood immigrants from non-English-speaking countries and childhood immigrants from English-speaking countries is zero up through age at arrival nine, but has a linear relationship with age at arrival thereafter. This captures much of the co-movement between age at arrival and English-language skills displayed in Figure 1. Symbolically, we use the following parameterization for age at arrival:

$$(2) \quad k_{ija} = \max(0, a-9) \times I(j \text{ is a non-English-speaking country})$$

where a is age at arrival, $I()$ is the indicator function, and j is country of birth.¹⁰

We estimate the relationship between English skill and age at arrival in the following equation:

$$(3) \quad \text{ENG}_{ija} = \alpha_1 + \pi_1 k_{ija} + \delta_{1a} + \gamma_{1j} + \mathbf{w}_{ija}' \boldsymbol{\rho}_1 + \varepsilon_{1ija}.$$

in which δ_{1a} and γ_{1j} are dummy variables for age at arrival and country of birth, respectively, and \mathbf{w}_{ija} is a vector of demographic controls. Because there are no endogenous variables on the right-hand side, Equation 3 can be consistently estimated using OLS. Table 1, Column 1 displays the results of estimating Equation 3. There is a significant negative effect of k_{ija} on English skill: for

⁹ This explanation for the weaker relationship between age at arrival and English skill for non-Hispanics compared to Hispanics finds corroboration in two other observations. First, for immigrants born in countries with English as an official but non-dominant language, there is also a weaker relationship than for immigrants born in countries without English as an official language. Second, for non-Mexican Hispanic immigrants from non-English-speaking countries, there is also a weaker relationship compared to Mexican immigrants from non-English-speaking countries.

¹⁰ The specific parameterization of the instrument does not materially affect instrumental-variables results below.

each year past age at arrival 9, English skill declines by a tenth of a unit. In Column 2, we allow the effect of k_{ija} to vary by Hispanic origin. As was seen in Figure 1, the effect of age at arrival is stronger among Hispanic immigrants from non-English-speaking countries: for each year past age at arrival 9, English skill declines by 0.135 units for Hispanics but 0.048 units for non-Hispanics. But for both groups, the effect is significantly different from zero.

In this paper, we are interested in the question of whether the effect of English differs between Hispanics and non-Hispanics. Therefore, our empirical work will divide the English skill measure into two categories: English skill of Hispanic immigrants and English skill of non-Hispanic immigrants. Not surprising based on Column 2 results, $k_{ija} \times \text{Hispanic}_{ija}$ and $k_{ija} \times (1 - \text{Hispanic}_{ija})$ are jointly significant predictors of English skill of Hispanics (Column 3) and English skill of non-Hispanics (Column 4).¹¹ In the estimates of the effects of English skill by Hispanic origin that we present below, we will be relying on the variation in English skill provided by $k_{ija} \times \text{Hispanic}_{ija}$ and $k_{ija} \times (1 - \text{Hispanic}_{ija})$ to identify the causal effects of English skill of Hispanics and English skill of non-Hispanics.

IV. Effects of English Proficiency for Hispanics and non-Hispanics

A. Main results

We estimate the relationship between English skill and the outcome in the following equation, which is a modified version of Equation 1 (modified to better convey the empirical strategy we use):

$$(4) \quad y_{ija} = \alpha + \beta_1 \text{ENG}_{ija} \times \text{Hispanic}_{ija} + \beta_2 \text{ENG}_{ija} \times (1 - \text{Hispanic}_{ija}) + \delta_a + \gamma_j + \mathbf{w}_{ija}' \boldsymbol{\rho} + \varepsilon_{ija}.$$

for individual i born in country j arriving in the U.S. at age a . y_{ija} is the outcome, ENG_{ija} is the measure of English proficiency, Hispanic_{ija} is a dummy for being Hispanic, δ_a is a set of age-at-

¹¹ Columns 3 and 4 are the first stage regressions that underlie the two-stage least squares regressions estimated in the next section.

arrival dummies, γ_j is a set of country-of-birth dummies and w_{ija} is a vector of exogenous explanatory variables (including age, sex, race and Hispanic_{ija}). Because English-language skills are endogenous, OLS estimates of Equation 4 will tend to be biased. To obtain consistent estimates of the parameters in Equation 4, we will use two-stage least squares (2SLS) estimation, with $k_{ija} \times \text{Hispanic}_{ija}$ and $k_{ija} \times (1 - \text{Hispanic}_{ija})$ as the excluded instruments for the English proficiency of Hispanics and the English proficiency of non-Hispanics. We can then proceed to test whether the effect of English skill for Hispanics significantly differs from the effect for non-Hispanics by performing an F-test where the null hypothesis is that $\beta_1 = \beta_2$.

In Table 2, we present results of estimating Equation 4 for several labor market outcomes. Here and below, we will focus our discussion on the 2SLS estimates in Columns 4-6, since they provide consistent parameter estimates whereas the OLS estimates do not necessarily.¹² The main result of Table 2 is that English skill raises wages for both Hispanics and non-Hispanics, with the return to English being similar for the two groups.¹³ Thus the value of a unit of English skill (e.g., moving from speaks not well to speaks well, or speaks well to speaks very well) is the same across all immigrants. This is consistent with the idea that employers give the same reward for English skill to all immigrants; English skills do not hurt or enhance the wages of one group more.

However, the effect of English on other labor market outcomes does appear to differ between Hispanics and non-Hispanics. First, it can be noted in Row B of Table 2 that English does raise the probability that a childhood immigrant works, and this effect is significantly stronger for non-Hispanics than Hispanics (the p-value in Column 6 is 0.0391, which means the difference is significant at the 3.91 level of significance). It turns out that all the effects on

¹² As we have found in Bleakley and Chin (2004, 2007), the 2SLS estimates of the effect of English skill tend to be of greater magnitude than the OLS estimates. Analysis in Bleakley and Chin (2004) suggests that while there does appear to be upward bias due to omitted variables-type stories, the downward bias from classical measurement error more than offset it for an overall downward bias in the OLS estimate.

¹³ Our measure of wages is from the “wage and salary income” item in the IPUMS Census data.

employment status reported in Row B derives from women (Row C); male employment is not sensitive to English skill (Row D). Hispanic women have both lower levels of employment (see Appendix Table 2) and lower sensitivity to English at the extensive margin of labor supply than non-Hispanic women. Second, self employment status of non-Hispanic immigrants is also more sensitive to English proficiency than that of Hispanic immigrants: there is a 10.2 percentage point reduction in being self-employed for non-Hispanics and no effect for Hispanics. Perhaps this lower sensitivity for Hispanics is due to the larger Hispanic community in America (which may make operating an ethnic business more attractive for Hispanics), or due to the smaller improvements in job quality as a result of raising English proficiency for Hispanics (Hispanic immigrants are more likely to be undocumented and not have a college education, both which may limit access to the attractive jobs outside self-employment).

In Table 3, we examine whether the effect of English proficiency on schooling outcomes differs by Hispanic origin. Columns 4-6 show that a unit increase in English skill raises years of schooling by about three years for both Hispanics and non-Hispanics—there is no significant difference in the effect. However, it is interesting to note that the three years of extra schooling appear to be coming from different parts of the educational distribution for the two groups. In particular, Rows B-D suggests that there is more increase at the high school diploma margin for Hispanics compared to non-Hispanics, for whom the largest gain is registered at the college level. Of course the only significant difference is in Row D, for attaining a Bachelor’s degree or higher.

In Panel A of Table 4, we estimate the impact of English skills on current marital status. We find that English proficiency reduces the probability of being currently married for both Hispanics and non-Hispanics, with the effect being larger for non-Hispanics. This effect derives both from a higher likelihood of being divorced and a lower likelihood of having ever married.

In Panel B of Table 4, we examine the effect on spousal attributes. This analysis is restricted to childhood immigrants who are currently married and living with their spouse. We find that increasing English skill of the childhood immigrant significantly increases his/her spouse's level of English proficiency and the probability that the spouse is U.S.-born. The flip side of being more likely to marry a native is the lower likelihood of marrying someone with the same country of birth; marrying immigrants from other countries seems to play a negligible role. It is interesting to note that although childhood immigrants with better English are less likely to marry a fellow countryman, there is a less dramatic decline in the propensity to marry someone of the same primary ancestry at least for Hispanics.¹⁴ Indeed, Hispanic childhood immigrants are not significantly more likely to marry outside their primary ancestry though they are significantly more likely to marry a native, reflecting the fact that some of them are marrying natives of the same ancestry (e.g., a Mexican immigrant marrying a U.S.-born person of Mexican ancestry).

Another thing to note is that the marriage outcomes in Panel B of Table 4 are significantly more sensitive to English proficiency for non-Hispanics than Hispanics. One possible explanation for the differential effects on marriage outcomes is that though both Hispanics and non-Hispanics have similar preferences for assortative mating by ethnicity and maintaining "traditional" values at the outset, non-Hispanics may have a reduced opportunity to do so due to their smaller ethnic group size in the U.S. Due to the larger Hispanic community in America, there is a greater potential to find a spouse who not only satisfies the usual criteria for a spouse (e.g., age, educational attainment, personality), but also is of the same cultural heritage. In contrast, a non-Hispanic childhood immigrant may have to marry outside his/her country of birth or ancestry in order to find someone with the usual criteria. Another possible explanation

¹⁴ Our measure of primary ancestry is from the "ancestry, first response" item (the 3-digit version) in the IPUMS Census data. Often, the ancestry reflects the country where a person or his ancestors were born, but some countries have more detailed categories. For example, there are several distinct codes for people of Mexican ancestry: Mexican, Mexican American, Chicano/Chicana, Nuevo Mexicano and Californio.

for the differential effects is that Hispanic and non-Hispanic childhood immigrants have different preferences for assortative mating by ethnicity and maintaining “traditional” family values. These two explanations are unlikely to be independent. For example, it is plausible that ethnic group size might itself shape individual preferences. Perhaps growing up in an ethnic enclave causes one to retain more traditional values even as one acquires English-language skills. Although all immigrant groups have their enclaves, enclaves may be more numerous and larger among Hispanics compared to non-Hispanics due to the former’s larger population size in the U.S.

In Table 5, we examine a final set of outcomes: fertility. Our measure of fertility is the number of children currently living in the same household.¹⁵ We find that an increase in English proficiency reduces the number of children, especially for non-Hispanics (Row A). For Hispanics, there is no effect on the extensive margin of having any children (Row B), but there is an effect on the number of children conditional on having at least one. For non-Hispanics, there is a significant reduction both in the probability of having any children and the number of children. The effect on the extensive margin shown in Row B appears to come entirely from the effects of English skill on marital status. Restricting the sample only to married couples, we find there is no significant effect on having any children for both Hispanics and non-Hispanics (Rows C and D).

The main findings are that while English proficiency has the same impact on wages and years of schooling for Hispanic and non-Hispanic childhood immigrants, it has significantly larger-size effects on marital status, spousal ethnicity and nativity, and fertility for non-Hispanics. Since the price of English language skills and education are set by the broad labor market, it is not surprising that there is no differential effect on wages. There are no market

¹⁵ The 2000 Census does not contain information on the number of children ever born, a better measure of fertility, but we verified in Bleakley and Chin (2007) using 1990 Census data that there are similar estimated effects of English using either fertility measure.

constraints that force the effect on other outcomes to be equal between Hispanics and non-Hispanics, however, and it turns out in our empirical analysis that they are not equal.

B. Robustness checks

Central to our ability to interpret the 2SLS estimates presented in the previous section as the causal effects of English-language skills is the assumption that non-language age-at-arrival effects are identical for immigrants from English-speaking countries and from non-English-speaking countries. In this subsection, we consider alternative explanations, and adjust our specifications or samples to test whether indeed these alternative explanations are driving our results. To preview the results of this section, it turns out that the estimated effects of English on Hispanics and non-Hispanics, and the difference in effects between the two groups do not change much when control for these other explanations, which supports the assumption and therefore the interpretation of the 2SLS estimates as being related to English proficiency. Since the results do not change much in these robustness checks, below we only describe these tests and do not provide tables of these results.

One potential concern is that immigrants from non-English-speaking countries are on average from poorer countries than immigrants from English-speaking countries, which may generate stronger age-at-arrival effects for the immigrants from non-English-speaking countries. That is, richer countries may have better education systems and more modern institutions, so the transition to living in the U.S. would be easier for immigrants from richer countries than poorer countries. To address this concern, we incorporate data on per capita GDP in 1980 from the Penn World Tables (Summers and Heston, 1988). We include an interaction between age at arrival and per capita GDP in the country of birth as a control variable. Intuitively, we are allowing immigrants from richer countries to have different age-at-arrival effects than poorer

countries, and using the variation in the instruments that still remains to identify the effects of English proficiency. This specification yields results very similar to the base specification.

A second concern is that while assimilation to U.S. norms would typically involve a decrease in the fertility rate for immigrants from poorer countries, it would involve an increase for immigrants from some richer countries. A handful of studies on fertility have noted that the U.S., with a total fertility rate of 2.1, is at the high end of the range among the most industrialized nations (Weil (2005)). This is similar to the first concern and undoubtedly controlling for an origin-country income and age at arrival at least partly addresses. However, fertility and income are not perfectly correlated, and it would be desirable to address this second concern more directly. We do this by including as a control variable an interaction between age at arrival and total fertility rate in the country of birth.¹⁶ This specification generates results that are similar to the baseline estimates.

Third, differences in distance to the U.S. among English-speaking countries, non-English-speaking countries where Hispanics tend to come from, and non-English-speaking countries where non-Hispanics tend to come from might cause differential non-language age-at-arrival effects among these three country groups for immigrants. Greater proximity to the U.S. might make it more likely that the immigrant retain close ties to his or her country of origin. The cost of going to the U.S. is lower, which might permit more frequent trips to the origin country and separately, expand the pool of potential spouses to include more people in the home country, and invite migrants who do not intend to settle in the U.S. permanently. Thus, all else equal, we might expect immigrants from nearer origins to have more muted age-at-arrival effects because their “dosage” of exposure to American life is less since they spend less cumulative time in the

¹⁶ We incorporate data on total fertility rate in 1982 from the *World Development Indicators* CD-ROM (World Bank (2005)).

U.S. To account for this issue, we add as a control variable an interaction between age at arrival and distance from Topeka, Kansas to the origin country capital.^{17,18} Results are similar.

Finally, we have dropped from our control group of immigrants from English-speaking countries those with countries of origin that may be especially similar culturally or institutionally to the U.S. First, we have dropped Canadian immigrants from the sample and obtained similar results. Canadian immigrants account for the largest number of immigrants from English-speaking countries in our sample, but they may be poor controls for the age at arrival effects of other immigrants because of Canada's geographic proximity to the U.S. and cultural and institutional similarities to the U.S. Second, we have dropped immigrants from Canada, United Kingdom, Australia and New Zealand and also obtained similar effects.

The robustness checks discussed in this subsection raise our confidence that the 2SLS coefficients for English proficiency obtained using interactions between age at arrival and coming from a non-English-speaking country as instruments really can be interpreted as the causal effects of English proficiency.

C. Why might the effect of English differ between Hispanics and non-Hispanics?

We have shown that except for wages and years of schooling, English skill tends to have effects of greater magnitude for non-Hispanics than Hispanics. In this subsection, we explore two reasons that we ex ante thought could be responsible for the observed difference in effect of English between Hispanics and non-Hispanics.

One potential reason for the differential effects on marriage and fertility outcomes is that English proficiency affects the two groups at different parts of the education distribution. As discussed above, an improvement in English skill tends to raise years of schooling at the high

¹⁷ We have chosen Topeka, Kansas because it is near the center of U.S. mainland, and so would provide a reasonable measure of distance to the U.S. no matter which direction the immigrant's approach.

¹⁸ We obtained data on distance from <http://www.timeanddate.com/worldclock/distance.html>.

school level for Hispanics and at the college level for non-Hispanics. Attending college could affect outcomes beyond raising years of schooling. People are more likely to leave their hometown or at least their childhood home in order to attend college. By changing the place of residence, attending college could change the pool of potential spouses and reduce the influence of the family and ethnic community. But to the extent that English skill is only raising schooling at the high school level (e.g., from dropping out at grade 9 or 10 to completing high school), then the three extra years of schooling associated with a unit increase in English proficiency is unlikely to change the potential pool of spouses and relevant community. To assess this education story for differential effects, we started with Equation 4 and added dummies for each level of educational attainment measured by the 2000 Census.¹⁹ When we do this, we still find similar differences in effects of English proficiency between Hispanics and non-Hispanics as in the base specification. However, as far as the levels of the effects of English skill for Hispanics and non-Hispanics are concerned, it is notable that the effect on wages declines drastically, mirroring the Bleakley and Chin (2004) finding that much of the effect of English proficiency on wages is mediated through years of schooling.²⁰ The effect decreases more for non-Hispanics than Hispanics, which is consistent with mechanisms besides educational attainment mattering more for Hispanics.²¹

A second potential reason for the differential effects on marriage and fertility outcomes is the large size of the Hispanic population in the U.S. Hispanic immigrants share a common language, Spanish, and can associate with each other even if they are born in different countries.

¹⁹ There are 14 educational categories altogether: no schooling, completing 1st-4th grade, completing 5th-8th grade, 9th grade, 10th grade, 11th grade, 12th grade without diploma, high school graduate or GED, some college without degree, associate degree in occupational program, Bachelor's degree, Master's degree, professional degree and doctorate degree.

²⁰ In other words, childhood immigrants with higher English proficiency get more schooling, and this extra schooling accounts for most of the increase in wages.

²¹ The effect on wages controlling for the education dummies for non-Hispanics is about one-third of the original 2SLS estimate reported in Table 2 and is statistically insignificant, and for Hispanics is about one-half of the original estimate and still statistically significant. The difference in effect between the two groups remains insignificant.

Even if Hispanic immigrants did not associate with people born in other countries, there would be large ethnic communities by country of birth anyhow, due to their relative large numbers and geographic concentration. For example, Mexicans (both immigrants and U.S.-born) make up 9% of the U.S. population and are still relatively concentrated in the Southwest, although they are increasingly settling outside the traditional areas. So on average, Hispanic immigrants are more likely to live in ethnic enclaves, and their ethnic social networks are larger than non-Hispanic immigrants. This may impact the role of English in economic and social assimilation. One can imagine that the existence of a large and diverse ethnic community may create opportunities that are not available to all immigrants, and even an immigrant who becomes English-proficient may have a desire to continue participating in this community. For example, this immigrant may participate in the broader society for school and work, but his social life is spent in the ethnic community. Thus, it is plausible that the muted effects of English proficiency on marriage and fertility outcomes for Hispanics could be the result of the larger Hispanic community.

To assess this second reason, we did the following. First, we added super-Public Use Microdata Area (PUMA) of residence fixed effects as an attempt to control for neighborhood characteristics. Some neighborhoods may be heavily concentrated ethnically and others more diverse, and adding super-PUMA fixed effects would control for any fixed features (such as ethnic diversity) of the super-PUMA. Considering a super-PUMA contains about 400,000 people, it is really quite a rough measure of one's community, so perhaps not surprisingly results did not change at all after allowing for super-PUMA fixed effects. Second, we controlled for a variable measuring the fraction of one's PUMA's population with the same country of birth. A PUMA is an area containing about 100,000 people.²² A larger fraction from the same foreign country may be associated with being in a larger ethnic community and greater likelihood of

²² The PUMA is smallest geographic area we are able to identify using the public-use Census microdata. More detailed geographic identifiers are not made available for confidentiality reasons.

living in an ethnic enclave. Adding this fraction as a control did not change any of the results. Finally, we controlled for a variable measuring the fraction of one's PUMA's population with the same primary ancestry. The idea is the same as before, but recognizing that one's ethnic community is comprised not only of immigrants but natives as well. Thus, for example, both Mexican immigrants and U.S.-born Mexicans are incorporated in this measure whereas only immigrants entered the previous measure. Again, the differential effects between Hispanics and non-Hispanics remained as they were in the base results.

The three empirical tests described in the previous paragraph do not provide evidence in favor of the ethnic enclave story for why effects tend to be lower for Hispanics, but they are rather weak tests. On the one hand, we probably do not have a good measure of each individual's relevant community. PUMAs are still rather large areas, and two PUMAs with a similar fraction of own group may nonetheless differ in the degree of ethnic segregation across neighborhoods within the PUMA. On the other hand, perhaps there is a nonlinear effect of ethnic community size wherein the ethnic community does not have effects until it reaches a certain size, and currently we do not have precise enough measures of ethnic community size to account for this. Thus, we should not yet dismiss the ethnic enclave story.

It is apparent from this subsection that we do not know why the effects of English on marriage and fertility outcomes differ between Hispanics and non-Hispanics. Undoubtedly there are reasons besides the education and ethnic enclave explanations offered here. As well, better measures of one's relevant community would enable a better assessment of the ethnic enclave explanation than what we have done. The role of ethnic enclaves in mediating the effects of English-language skills merits more research, as do other potential explanations for the differential effects between Hispanics and non-Hispanics.

D. Does the effect of English for Mexicans differ?

Compared to other non-English-speaking countries, Mexico borders the U.S., is closer in distance to the U.S. and supplies many more immigrants to the U.S. For example, in 2005, 31% of the foreign-born population in the U.S. was born in Mexico, and foreign-born and U.S.-born Mexicans together made up 9% of the U.S. population and 64% of the Hispanic U.S. population (Fry and Hakimzadeh (2006a, 2006b)). Thus, the degree of self-selection among immigrants from Mexico may differ from other source countries, and moreover the environment in the U.S. in which immigrants from Mexico may differ due to their larger ethnic group size. Therefore, it is interesting to ask whether the effects of English differ for Mexican immigrants. We do this by modifying Equation 4 as follows:

$$(5) \quad y_{ija} = \alpha + \beta_3 \text{ENG}_{ija} \times \text{Mexican Hispanic}_{ija} + \beta_4 \text{ENG}_{ija} \times \text{non-Mexican Hispanic}_{ija} \\ + \beta_5 \text{ENG}_{ija} + \delta_a + \gamma_j + \mathbf{w}_{ija}'\boldsymbol{\rho} + \varepsilon_{ija}.$$

where we have divided Hispanics into two mutually exclusive groups: born in Mexico (Mexican Hispanic) and born elsewhere (non-Mexican Hispanic). Our identifying instruments are now $k_{ija} \times \text{born in Mexico}_j \times \text{Hispanic}_{ija}$, $k_{ija} \times \text{not born in Mexico}_j \times \text{Hispanic}_{ija}$ and $k_{ija} \times (1 - \text{Hispanic}_{ija})$. We are interested in testing whether the effect of English for the two Hispanic groups is the same as that for non-Hispanics (i.e., whether $\beta_3=0$ and $\beta_4=0$ since β_3 and β_4 give the differential effect for Mexicans and non-Mexican Hispanics, respectively), as well as whether the effects for the two Hispanic groups are equal (which reduces to whether $\beta_3=\beta_4$).

In Table 6, we report the results of estimating Equation 5 with all the outcomes we have used earlier in the paper. The last column reports the difference in effect between Mexicans and non-Mexican Hispanics. Generally speaking, the effects of English for the two groups tend not to differ significantly. The only outcome for which the difference in effect is significant at the

5% level is wages, where we find that non-Hispanic Mexicans get a larger return to English-language skills than Mexican Hispanics (and indeed than non-Hispanics). If we focus just on point estimates, it can be said that for most outcomes the effect for non-Mexican Hispanics tends to fall between the effect for non-Hispanics and the effect for Mexican Hispanics, though notably none of the fertility outcomes. For non-Mexican Hispanics, English proficiency raises the educational attainment at the college level just like for non-Hispanics, and in contrast to the Mexican Hispanics whose improvements are at the high school level. Non-Mexican Hispanics are more likely to intermarry (marry outside one's nativity or ancestry) than Mexican Hispanics, though not more than non-Hispanics. Yet, there appears to be no significant reductions in fertility for non-Mexican Hispanics, while there are for both Mexican Hispanics and non-Hispanics. Thus, even though non-Mexican Hispanics are more prone to intermarry when their English proficiency increases compared to Mexican Hispanics, they are not reducing their fertility as much as Mexican Hispanics. Intermarriage and reduction in fertility to the U.S. norm apparently do not go hand in hand as a rule.

V. Discussion

In this paper, we used an instrumental-variables strategy based on the psychological phenomenon that younger children learn languages more easily than older children to identify the causal effect of English-language skills for Hispanic childhood immigrants and non-Hispanic childhood immigrants. For both Hispanics and non-Hispanics, an increase in English proficiency significantly increases wages, educational attainment, intermarriage and divorce, and significantly decreases being currently married, being ever married and fertility. The sensitivity of wage and schooling to English proficiency was the same for Hispanics and non-Hispanics, but English tended to have significantly larger effects on the marriage and fertility outcomes for non-

Hispanics than non-Hispanics. Additional analysis suggests that among Hispanics, Mexican Hispanics' outcomes tend to be less sensitive to English proficiency than non-Mexican Hispanics' outcomes, although these differences tend not to be significant and with the exception of the fertility outcomes.

If policymakers wish to close the education and earnings gap between Hispanics and natives, it seems possible to accomplish this by directing resources at raising the English proficiency of Hispanics. Both Hispanic and non-Hispanic immigrants' schooling and earnings exhibit the same responsiveness to a unit change in English proficiency, but Hispanics have on average lower levels of English proficiency. It seems logical, then, to raise the level of English proficiency for Hispanics. Had we found that Hispanics' schooling and wages were not sensitive to English proficiency, then this would not be a viable way to achieve the policy objective.

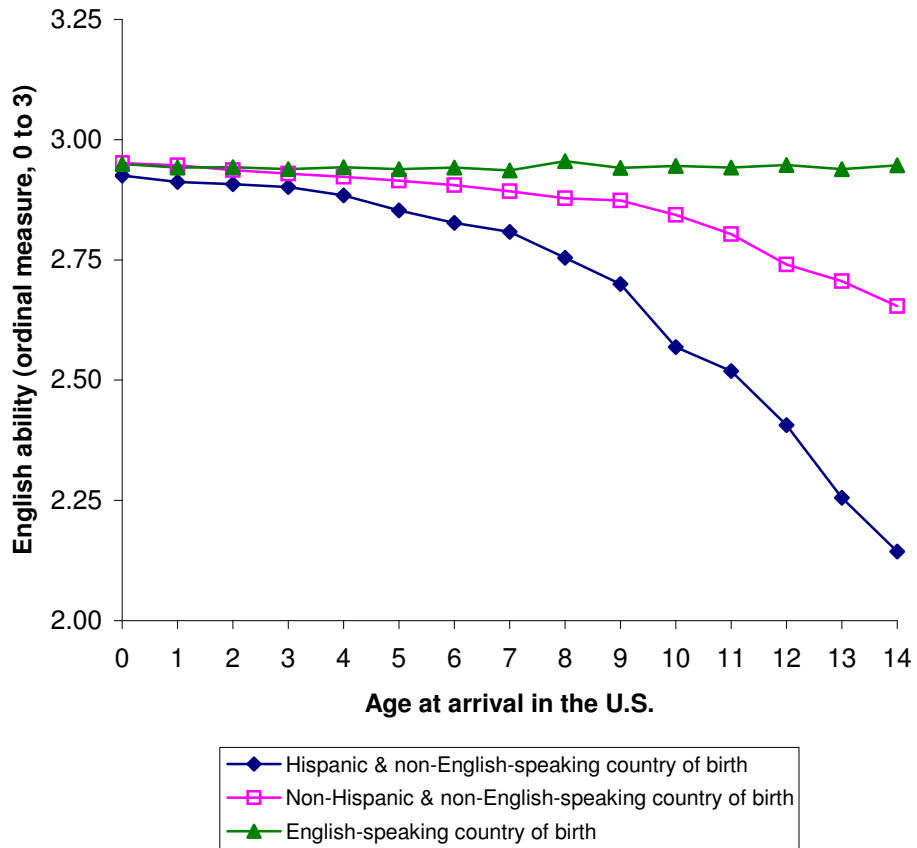
Some advocate English classes for immigrants not so much to help immigrants raise their schooling and wages but to assimilate them into the mainstream culture. A recent *Washington Post* article reports on the debate over whether the U.S. government should be more pro-active in promoting assimilation into the mainstream culture such as through English classes (Brulliard (2007)). Without taking a position on this debate, this paper suggests that English-language proficiency does not automatically lead to social assimilation. That the effects of English-proficiency on marriage and fertility outcomes differ between Hispanics and non-Hispanics suggests that ethnic forces are at least in part moderating the role of English proficiency. It is conceivable that the two groups are taking different lengths of time to reach U.S. norms, or that one or both groups will never reach the U.S. norm and instead set their own cultural norm for living in the U.S.

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Figure 1. English-Speaking Ability by Age at Arrival



Notes: Data are from the 2000 IPUMS. Sample size is 191,534 (composed of people who immigrated to the U.S. before age 15 and are currently aged 25-55, and with nonmissing English variable). Displayed for each age at arrival is mean English-speaking ability. Means are weighted by IPUMS weights, and regression-adjusted for age, race, Hispanic origin and sex dummies. The race categories used were White, Black, Asian & Pacific Islander, Multiracial and Other. English-speaking ability is measured on an ordinal scale as follows: 0 = no English, 1 = not well, 2 = well and 3 = very well.

Table 1. First Stage Results

	Endogenous regressor:			
	English ability (1)	English ability (2)	English ability× Hispanic (3)	English ability× non-Hispanic (4)
Identifying instruments:				
Max (0, age at arrival - 9)×non-English-speaking country of birth	-0.104 *** (0.029)			
Max (0, age at arrival - 9)×non-English-speaking country of birth×Hispanic		-0.135 *** (0.027)	-0.136 *** (0.027)	0.0010 (0.0010)
Max (0, age at arrival - 9)×non-English-speaking country of birth×non-Hispanic		-0.048 *** (0.009)	-0.001 (0.002)	-0.047 *** (0.008)
F-statistic associated with test of joint significance of identifying instruments (p-value)	13.14 0.0004	21.38 <0.0001	13.75 <0.0001	21.59 <0.0001

Notes: The sample is as described in Figure 1 notes. Each column is from a separate OLS regression that is weighted by IPUMS weights and contains dummies for age at arrival, country of birth, age, sex, race (White, Black, Asian, Multiracial and Other), Hispanic origin and Hispanic×non-English-speaking country of birth. The country-of-birth dummies are based on IPUMS detailed birthplace codes. Standard errors adjusted for country of birth clusters are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). English-speaking ability is measured on an ordinal scale as follows: 0 = no English, 1 = not well, 2 = well and 3 = very well.

Table 2. Effect of English on Labor Market Outcomes by Hispanic Origin

	OLS			2SLS		
	Effect of English for Hispanics (1)	Effect of English for non-Hispanics (2)	p-value of test of equality (3)	Effect of English for Hispanics (4)	Effect of English for non-Hispanics (5)	p-value of test of equality (6)
A. Log annual wages	0.249 *** (0.011)	0.204 *** (0.027)	0.1235	0.377 *** (0.063)	0.354 ** (0.170)	0.8571
B. Worked last year	0.077 *** (0.012)	0.066 *** (0.007)	0.4335	0.070 *** (0.014)	0.152 *** (0.044)	0.0391
C. Worked last year, females only	0.118 *** (0.006)	0.075 *** (0.008)	<0.0001	0.140 *** (0.013)	0.280 *** (0.062)	0.0120
D. Worked last year, males only	0.036 ** (0.015)	0.056 *** (0.009)	0.2712	-0.011 (0.019)	-0.030 (0.050)	0.6260
E. Is self-employed	0.004 *** (0.001)	-0.006 (0.005)	0.0462	-0.008 (0.009)	-0.102 *** (0.037)	0.0057

Notes: The sample is as described in Figure 1 notes. In each lettered row, Columns 1-3 report the coefficient for English ability for Hispanics, coefficient for English ability for non-Hispanics, and p-value of test of equality of the two aforementioned coefficients, respectively, from an equation estimated using OLS, and Columns 4-6 reports the same from an equation estimated using 2SLS. All regressions are weighted by IPUMS weights and contain dummies for age at arrival, country of birth, age, sex, race, Hispanic origin and Hispanic×non-English-speaking country of birth. The identifying instruments when 2SLS is used are $\max(0, \text{age at arrival} - 9) \times \text{non-English-speaking country} \times \text{Hispanic}$ and $\max(0, \text{age at arrival} - 9) \times \text{non-English-speaking country} \times (1 - \text{Hispanic})$. Standard errors adjusted for country of birth clusters are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01).

Table 3. Effect of English on Schooling Outcomes by Hispanic Origin

	OLS			2SLS		
	Effect of English for Hispanics (1)	Effect of English for non-Hispanics (2)	p-value of test of equality (3)	Effect of English for Hispanics (4)	Effect of English for non-Hispanics (5)	p-value of test of equality (6)
A. Years of schooling	1.971 *** (0.036)	1.366 *** (0.128)	<0.0001	3.374 *** (0.192)	3.089 *** (0.772)	0.6836
B. Has high school diploma	0.234 *** (0.008)	0.127 *** (0.012)	<0.0001	0.400 *** (0.018)	0.306 *** (0.091)	0.2727
C. Has any college or more	0.175 *** (0.016)	0.171 *** (0.020)	0.8663	0.289 *** (0.041)	0.383 *** (0.136)	0.4059
D. Has Bachelor's degree or more	0.052 *** (0.010)	0.146 *** (0.023)	0.0003	0.092 ** (0.042)	0.313 *** (0.111)	0.0087

Notes: The sample is as described in Figure 1 notes. In each lettered row, Columns 1-3 report the coefficient for English ability for Hispanics, coefficient for English ability for non-Hispanics, and p-value of test of equality of the two aforementioned coefficients, respectively, from an equation estimated using OLS, and Columns 4-6 reports the same from an equation estimated using 2SLS. All regressions are weighted by IPUMS weights and contain dummies for age at arrival, country of birth, age, sex, race, Hispanic origin and Hispanic×non-English-speaking country of birth. The identifying instruments when 2SLS is used are $\max(0, \text{age at arrival} - 9) \times \text{non-English-speaking country} \times \text{Hispanic}$ and $\max(0, \text{age at arrival} - 9) \times \text{non-English-speaking country} \times (1 - \text{Hispanic})$. Standard errors adjusted for country of birth clusters are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01).

Table 4. Effect of English on Marriage Outcomes by Hispanic Origin

	OLS			2SLS		
	Effect of English for Hispanics (1)	Effect of English for non-Hispanics (2)	p-value of test of equality (3)	Effect of English for Hispanics (4)	Effect of English for non-Hispanics (5)	p-value of test of equality (6)
Panel A: Marital Status						
A. Is currently married with spouse present	0.008 (0.012)	0.009 (0.009)	0.9361	-0.070 ** (0.027)	-0.318 *** (0.076)	<0.0001
B. Is currently divorced	0.013 *** (0.002)	-0.001 (0.003)	0.0006	0.046 *** (0.011)	0.090 ** (0.037)	0.1137
C. Has ever married	-0.001 (0.008)	-0.005 (0.007)	0.7258	-0.044 ** (0.017)	-0.227 *** (0.055)	0.0001
Panel B: Spouse's Ethnicity and Nativity (conditional on being married with spouse present)						
A. Spouse's English-speaking ability ordinal measure	0.524 *** (0.010)	0.463 *** (0.039)	0.1354	0.753 *** (0.032)	1.198 *** (0.099)	<0.0001
B. Spouse is US-born	0.097 *** (0.006)	0.138 *** (0.014)	0.0172	0.246 *** (0.082)	0.800 *** (0.263)	0.0073
C. Spouse has the same country of birth	-0.113 *** (0.005)	-0.150 *** (0.013)	0.0179	-0.272 *** (0.080)	-0.846 *** (0.264)	0.0048
D. Spouse has the same ancestry	-0.065 *** (0.007)	-0.126 *** (0.013)	0.0002	-0.095 (0.072)	-0.737 *** (0.230)	0.0004

Notes: The sample is as described in Figure 1 notes. In each lettered row, Columns 1-3 report the coefficient for English ability for Hispanics, coefficient for English ability for non-Hispanics, and p-value of test of equality of the two aforementioned coefficients, respectively, from an equation estimated using OLS, and Columns 4-6 reports the same from an equation estimated using 2SLS. All regressions are weighted by IPUMS weights and contain dummies for age at arrival, country of birth, age, sex, race, Hispanic origin and Hispanic×non-English-speaking country of birth. The identifying instruments when 2SLS is used are max(0, age at arrival - 9)×non-English-speaking country×Hispanic and max(0, age at arrival - 9)×non-English-speaking country×(1-Hispanic). Standard errors adjusted for country of birth clusters are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01).

Table 5. Effect of English on Fertility by Hispanic Origin

	OLS			2SLS		
	Effect of English for Hispanics (1)	Effect of English for non-Hispanics (2)	p-value of test of equality (3)	Effect of English for Hispanics (4)	Effect of English for non-Hispanics (5)	p-value of test of equality (6)
A. Number of children living in same household	-0.112 *** (0.022)	-0.078 ** (0.036)	0.4398	-0.374 *** (0.070)	-0.814 *** (0.201)	0.0129
B. Has a child living in same household	-0.003 (0.005)	-0.013 (0.009)	0.3405	-0.044 (0.027)	-0.236 *** (0.083)	0.0022
C. Number of children living in same household, only individuals married with spouse present	-0.178 *** (0.011)	-0.173 *** (0.051)	0.9288	-0.351 *** (0.052)	-0.765 *** (0.207)	0.0250
D. Has a child living in same household, only individuals married with spouse present	-0.015 *** (0.002)	-0.037 *** (0.007)	0.0020	0.008 (0.017)	-0.099 (0.067)	0.0622

Notes: The sample is as described in Figure 1 notes. In each lettered row, Columns 1-3 report the coefficient for English ability for Hispanics, coefficient for English ability for non-Hispanics, and p-value of test of equality of the two aforementioned coefficients, respectively, from an equation estimated using OLS, and Columns 4-6 reports the same from an equation estimated using 2SLS. All regressions are weighted by IPUMS weights and contain dummies for age at arrival, country of birth, age, sex, race, Hispanic origin and Hispanic×non-English-speaking country of birth. The identifying instruments when 2SLS is used are $\max(0, \text{age at arrival} - 9) \times \text{non-English-speaking country} \times \text{Hispanic}$ and $\max(0, \text{age at arrival} - 9) \times \text{non-English-speaking country} \times (1 - \text{Hispanic})$. Standard errors adjusted for country of birth clusters are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01).

Table 6. Effect of English for Three Groups (Mexican Hispanics, non-Mexican Hispanics, non-Hispanics)

	Effect of English for non-Hispanics (1)	Additional effect for Mexican Hispanics relative to (1) (2)	Additional effect for non-Mexican Hispanics relative to (1) (3)	Mexican Hispanic effect minus non-Mexican Hispanic effect (4)
Panel A: Labor Market Outcomes				
A. Log annual wages	0.393 ** (0.188)	-0.084 (0.160)	0.217 ** (0.109)	-0.301 ** (0.134)
B. Worked last year	0.160 *** (0.050)	-0.105 ** (0.044)	-0.046 (0.041)	-0.058 * (0.032)
C. Worked last year, females only	0.281 *** (0.063)	-0.144 ** (0.058)	-0.134 ** (0.055)	-0.010 (0.026)
D. Worked last year, males only	-0.022 (0.056)	0.000 (0.050)	0.049 (0.053)	-0.049 (0.069)
E. Is self-employed	-0.102 *** (0.038)	0.096 *** (0.035)	0.088 ** (0.036)	0.008 (0.026)
Panel B: Schooling Outcomes				
A. Years of schooling	2.982 *** (0.790)	0.582 (0.726)	-0.166 (0.678)	0.747 * (0.427)
B. Has high school diploma	0.294 *** (0.091)	0.125 (0.087)	0.046 (0.085)	0.079 * (0.040)
C. Has any college or more	0.398 *** (0.143)	-0.136 (0.126)	-0.030 (0.123)	-0.106 (0.104)
D. Has Bachelor's degree or more	0.333 *** (0.118)	-0.276 *** (0.100)	-0.138 (0.101)	-0.137 (0.111)
Panel C: Marital Status				
A. Is currently married with spouse present	-0.310 *** (0.081)	0.227 *** (0.067)	0.280 *** (0.052)	-0.054 (0.057)
B. Is currently divorced	0.091 ** (0.039)	-0.048 (0.033)	-0.040 (0.027)	-0.008 (0.023)
C. Has ever married	-0.226 *** (0.058)	0.181 *** (0.051)	0.187 *** (0.055)	-0.006 (0.052)
Panel D: Spouse's Ethnicity and Nativity (conditional on being married with spouse present)				
A. Spouse English-speaking ability ordinal measure	1.238 *** (0.111)	-0.524 *** (0.112)	-0.330 ** (0.142)	-0.195 (0.153)
B. Spouse is US-born	0.857 *** (0.292)	-0.667 *** (0.253)	-0.391 ** (0.193)	-0.277 (0.200)
C. Spouse has the same country of birth	-0.877 *** (0.288)	0.636 *** (0.245)	0.484 *** (0.170)	0.152 (0.170)
D. Spouse has the same ancestry	-0.778 *** (0.244)	0.726 *** (0.209)	0.502 *** (0.168)	0.224 (0.162)
Panel E: Fertility				
A. Number of children living in same household	-0.777 *** (0.203)	0.340 * (0.179)	0.587 *** (0.185)	-0.248 (0.152)
B. Has a child living in same household	-0.231 *** (0.086)	0.179 ** (0.071)	0.212 *** (0.065)	-0.033 (0.060)
C. Number of children living in same household, only individuals married with spouse present	-0.717 *** (0.202)	0.318 * (0.187)	0.553 *** (0.196)	-0.235 (0.148)
D. Has a child living in same household, only individuals married with spouse present	-0.083 (0.068)	0.076 (0.062)	0.154 ** (0.068)	-0.078 (0.055)

Notes: The sample is as described in Figure 1 notes. In each lettered row, Columns 1-3 report the coefficient for English ability for non-Hispanics, differential effect for Mexican Hispanics relative to non-Hispanics and differential effect for non-Mexican Hispanics relative to non-Hispanics. Column 4 reports the difference in effect for Mexican Hispanics and non-Mexican Hispanics. These results come from an equation estimated using 2SLS that is weighted by IPUMS weights and contain dummies for age at arrival, country of birth, age, sex, race, Hispanic origin, Hispanic×non-English-speaking country of birth, and Mexican×Hispanic×non-English-speaking country of birth. The identifying instruments are $\max(0, \text{age at arrival} - 9) \times \text{non-English-speaking country}$, $\max(0, \text{age at arrival} - 9) \times \text{born in Mexico} \times \text{Hispanic}$ and $\max(0, \text{age at arrival} - 9) \times \text{born in non-English-speaking country other than Mexico} \times \text{Hispanic}$. Standard errors adjusted for country of birth clusters are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01).

Appendix Table 1. Individuals by Country of Birth

Panel A. English-speaking countries (=Control Group)

Rank by N	country	N	% of group
1	Canada	8,962	34.6%
2	England	6,121	23.6%
3	Jamaica	3,180	12.3%
4	United Kingdom, ns	1,242	4.8%
5	Trinidad & Tobago	1,014	3.9%
6	Guyana/British Guiana	991	3.8%
7	Scotland	803	3.1%
8	Ireland	565	2.2%
9	Australia	543	2.1%
10	South Africa (Union of)	308	1.2%
11	Barbados	297	1.1%
12	Bermuda	283	1.1%
13	Bahamas	258	1.0%
14	U.S. Virgin Islands	256	1.0%
15	Belize/British Honduras	251	1.0%
16	New Zealand	131	0.5%
17	Antigua-Barbuda	112	0.4%
18	St. Vincent	90	0.3%
19	Liberia	84	0.3%
20	Grenada	82	0.3%
21	St. Kitts-Nevis	73	0.3%
22	Wales	71	0.3%
23	Northern Ireland	69	0.3%
24	Zimbabwe	63	0.2%
25	St. Lucia	59	0.2%
26	British Virgin Islands	1	0.0%
27	Anguilla	1	0.0%
<i>Total English-spking obs</i>		<u>25,910</u>	<u>100.0%</u>

Panel B. Non-English-speaking countries (=Treatment Group)

Rank by N	country	N	% of group
1	Mexico	47611	28.7%
2	Germany	19445	11.7%
3	Puerto Rico	13203	8.0%
4	Cuba	9389	5.7%
5	Vietnam	6334	3.8%
6	Italy	5642	3.4%
7	Japan	5475	3.3%
8	Korea	3926	2.4%
9	El Salvador	3233	2.0%
10	Dominican Republic	3103	1.9%
11	France	2466	1.5%
12	Portugal	2390	1.4%
13	Colombia	2266	1.4%
14	Taiwan	1987	1.2%
15	China	1854	1.1%
16	Laos	1668	1.0%
17	Poland	1499	0.9%
18	Haiti	1468	0.9%
19	Guatemala	1452	0.9%
20	Greece	1427	0.9%
21	Panama	1415	0.9%
22	South Korea	1344	0.8%
23	Ecuador	1316	0.8%
24	Iran	1314	0.8%
25	Spain	1207	0.7%
26	Netherlands	1188	0.7%
27	Nicaragua	1186	0.7%
28	Cambodia (Kampuchea)	1081	0.7%
29	Israel/Palestine	983	0.6%
30	Peru	933	0.6%
31	Argentina	926	0.6%
32	Thailand	818	0.5%
33	Honduras	801	0.5%
34	Austria	781	0.5%
35	Brazil	751	0.5%
36	Africa, ns/nec	680	0.4%
37	Venezuela	644	0.4%
38	Lebanon	637	0.4%
39	Hungary	550	0.3%
40	Turkey	544	0.3%
41	Azores	492	0.3%
42	Yugoslavia	487	0.3%
43	Costa Rica	466	0.3%
44	Chile	465	0.3%
45	Egypt/United Arab Rep.	454	0.3%
46	Iraq	443	0.3%
47	Other USSR/Russia	416	0.3%
48	Belgium	392	0.2%
49	Romania	358	0.2%
50	Indonesia	358	0.2%
subtotal, top 50 countries		<u>159,268</u>	<u>96.1%</u>
subtotal, other (91) countries		<u>6,397</u>	<u>3.9%</u>
<i>Total non-Eng-spking obs</i>		<u>165,665</u>	<u>100.0%</u>

Notes: Information on each country's official languages is from the World Almanac. Recent adult immigrants from the 1980 IPUMS were used to divide English-official countries into English-speaking (at least 50% of recent adult immigrants did not speak a language other than English at home) or Other. The countries in the "Other" category are the Philippines, India, Hong Kong, Guam, Pakistan, Nigeria, American Samoa, Fiji, Tonga, Ghana, Kenya, Singapore, Dominica, Tanzania, Uganda, Sierra Leone, Senegal, Malta, Zambia, Micronesia, Marshall Islands, Papua New Guinea, Kiribati, Palau, Gambia, Malawi, Mauritius and Swaziland; people from these countries have been dropped from the empirical analysis. Above tabulations by country of birth use following sample: individuals from the 2000 1% and 5% PUMS files who are currently aged 25-55, immigrated to the U.S. before age 15 and has nonmissing age, year of immigration, country of birth and English variables. Country refers to IPUMS detailed birthplace code.

Appendix Table 2. Descriptive Statistics

	Born in non-English-speaking country						Born in English-speaking country		
	Hispanics			non-Hispanics			total	arrived aged 0-9	arrived aged 10-14
	total	arrived aged 0-9	arrived aged 10-14	total	arrived aged 0-9	arrived aged 10-14			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Panel A: Regressors									
English-speaking ability (ordinal measure, 0 to 3)	2.567 (0.747)	2.793 (0.530)	2.282 (0.874)	2.883 (0.375)	2.938 (0.285)	2.729 (0.523)	2.980 (0.167)	2.981 (0.167)	2.979 (0.170)
Age	35.871 (7.987)	35.983 (8.052)	35.729 (7.902)	37.285 (8.476)	37.546 (8.536)	36.560 (8.267)	38.403 (8.367)	38.906 (8.387)	37.014 (8.153)
Female	0.496 (0.500)	0.515 (0.500)	0.472 (0.499)	0.504 (0.500)	0.509 (0.500)	0.488 (0.500)	0.528 (0.499)	0.513 (0.500)	0.569 (0.495)
White	0.477 (0.499)	0.492 (0.500)	0.457 (0.498)	0.638 (0.481)	0.706 (0.456)	0.449 (0.497)	0.666 (0.472)	0.766 (0.424)	0.390 (0.488)
Black	0.017 (0.130)	0.018 (0.134)	0.015 (0.123)	0.045 (0.206)	0.041 (0.198)	0.055 (0.229)	0.247 (0.432)	0.164 (0.370)	0.478 (0.500)
Asian/Pacific Islander	0.003 (0.052)	0.003 (0.054)	0.002 (0.048)	0.253 (0.435)	0.190 (0.393)	0.427 (0.495)	0.028 (0.164)	0.024 (0.153)	0.038 (0.192)
Other single race	0.455 (0.498)	0.437 (0.496)	0.477 (0.499)	0.007 (0.083)	0.007 (0.082)	0.008 (0.087)	0.019 (0.136)	0.016 (0.124)	0.028 (0.164)
Multiracial	0.049 (0.215)	0.049 (0.216)	0.048 (0.215)	0.058 (0.233)	0.057 (0.231)	0.060 (0.238)	0.040 (0.196)	0.031 (0.173)	0.066 (0.248)
Panel B: Labor Market Outcomes									
Log annual wages	9.993 (0.919)	10.062 (0.916)	9.898 (0.916)	10.281 (0.964)	10.282 (0.966)	10.280 (0.958)	10.288 (0.956)	10.299 (0.965)	10.257 (0.929)
Worked last year	0.829 (0.376)	0.840 (0.367)	0.816 (0.387)	0.878 (0.327)	0.887 (0.317)	0.854 (0.353)	0.891 (0.312)	0.894 (0.308)	0.882 (0.323)
Worked last year, females only	0.750 (0.433)	0.777 (0.416)	0.711 (0.453)	0.823 (0.381)	0.836 (0.371)	0.787 (0.409)	0.849 (0.358)	0.847 (0.360)	0.855 (0.352)
Worked last year, males only	0.908 (0.289)	0.907 (0.291)	0.910 (0.287)	0.934 (0.248)	0.940 (0.237)	0.918 (0.274)	0.938 (0.242)	0.944 (0.230)	0.917 (0.275)
Is self-employed	0.064 (0.244)	0.059 (0.236)	0.069 (0.254)	0.099 (0.299)	0.093 (0.291)	0.116 (0.320)	0.089 (0.284)	0.095 (0.293)	0.071 (0.256)
Panel C: Schooling Outcomes									
Years of schooling	11.882 (3.608)	12.691 (3.071)	10.844 (3.963)	14.485 (2.712)	14.621 (2.548)	14.104 (3.095)	14.527 (2.452)	14.593 (2.446)	14.342 (2.459)
Has high school diploma	0.640 (0.480)	0.738 (0.439)	0.513 (0.500)	0.922 (0.269)	0.941 (0.235)	0.867 (0.340)	0.940 (0.237)	0.948 (0.222)	0.920 (0.272)

Notes: The table continues on the next page.

Appendix Table 2. Descriptive Statistics (Continued)

	Born in non-English-speaking country						Born in English-speaking country		
	Hispanics			non-Hispanics			total	arrived aged 0-9	arrived aged 10-14
	total	arrived aged 0-9	arrived aged 10-14	total	arrived aged 0-9	arrived aged 10-14			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Has any college or more	0.406 (0.491)	0.486 (0.500)	0.303 (0.460)	0.730 (0.444)	0.750 (0.433)	0.672 (0.469)	0.746 (0.435)	0.756 (0.430)	0.721 (0.448)
Has Bachelor's degree or more	0.133 (0.340)	0.164 (0.370)	0.093 (0.290)	0.403 (0.491)	0.410 (0.492)	0.383 (0.486)	0.375 (0.484)	0.384 (0.486)	0.349 (0.477)
Panel D: Marital Status									
Is currently married with spouse present	0.605 (0.489)	0.581 (0.493)	0.636 (0.481)	0.602 (0.489)	0.594 (0.491)	0.625 (0.484)	0.561 (0.496)	0.584 (0.493)	0.497 (0.500)
Is currently divorced	0.094 (0.292)	0.105 (0.306)	0.080 (0.272)	0.099 (0.299)	0.109 (0.312)	0.072 (0.259)	0.120 (0.325)	0.123 (0.328)	0.112 (0.315)
Has ever married	0.786 (0.410)	0.769 (0.422)	0.809 (0.393)	0.747 (0.435)	0.747 (0.435)	0.748 (0.434)	0.736 (0.441)	0.755 (0.430)	0.680 (0.466)
Panel E: Spouse's Ethnicity and Nativity (conditional on being married with spouse present)									
Spouse English-speaking ability ordinal measure	2.356 (0.908)	2.556 (0.776)	2.124 (0.992)	2.839 (0.456)	2.919 (0.327)	2.623 (0.643)	2.979 (0.170)	2.981 (0.164)	2.973 (0.189)
Spouse is US-born	0.346 (0.476)	0.455 (0.498)	0.220 (0.414)	0.654 (0.476)	0.774 (0.418)	0.337 (0.473)	0.804 (0.397)	0.859 (0.348)	0.622 (0.485)
Spouse has the same country of birth	0.536 (0.499)	0.430 (0.495)	0.658 (0.474)	0.239 (0.426)	0.133 (0.340)	0.518 (0.500)	0.094 (0.292)	0.055 (0.228)	0.223 (0.416)
Spouse has the same ancestry	0.646 (0.478)	0.593 (0.491)	0.707 (0.455)	0.426 (0.494)	0.343 (0.475)	0.633 (0.482)	0.245 (0.430)	0.218 (0.413)	0.331 (0.471)
Panel F: Fertility									
Number of children living in same household	1.468 (1.418)	1.355 (1.358)	1.612 (1.478)	1.005 (1.219)	0.965 (1.182)	1.117 (1.310)	0.974 (1.178)	0.969 (1.175)	0.986 (1.187)
Has a child living in same household	0.645 (0.478)	0.620 (0.485)	0.677 (0.468)	0.510 (0.500)	0.500 (0.500)	0.539 (0.498)	0.506 (0.500)	0.502 (0.500)	0.518 (0.500)
Number of children living in same household, only individuals married with spouse present	1.997 (1.325)	1.874 (1.279)	2.140 (1.362)	1.479 (1.243)	1.427 (1.211)	1.617 (1.316)	1.421 (1.208)	1.400 (1.208)	1.487 (1.203)
Has a child living in same household, only individuals married with spouse present	0.855 (0.352)	0.837 (0.370)	0.877 (0.328)	0.734 (0.442)	0.721 (0.448)	0.767 (0.423)	0.715 (0.451)	0.703 (0.457)	0.755 (0.430)

Notes: The sample consists of individuals from the 2000 1% and 5% PUMS files who are currently aged 25-55, immigrated to the U.S. before age 15 and has nonmissing own age, year of immigration, country of birth and English variables. Total number of observations is 191534 for the English variable, with Columns 1-9 containing 86387, 48195, 38192, 79241, 58695, 20546, 25906, 19217 and 6689 observations, respectively. Statistics are weighted by IPUMS weights. The English-speaking ability ordinal measure is defined as: 0 = no English, 1 = not well, 2 = well and 3 = very well.