Impact of English instruction on labor market outcomes: The case of Mexico

Oscar Gálvez-Soriano*
University of Houston

August 2022

Abstract

In this paper I measure the effect of exposure to a foreign language in school on student achievement and labor market outcomes. I exploit a policy change in Mexico that introduced English instruction in elementary schools through the National English Program in Basic Education (NEPBE) in 2009. I construct a novel database, which contains nation-wide information of elementary school students linked to school panel data on characteristics like hours of English instruction as well as to their labor market records in adulthood. Using a Two-Way Fixed Effects (TWFE) model, I find that exposure to English instruction reduces the likelihood that an individual participates in formal sector employment. It is likely that this result is due to exposure to English instruction affecting enrollment in high school and college, as my analysis focuses on young adults aged 16-24. Focusing on a sub-sample that is unlikely to be enrolled by age 16, I find that the exposure to English instruction had no effect on wages. However, I do find a positive effect among high achieving individuals. On the other hand, exposure reduced men's mobility, but increased women's. This could be explained by the resulting mobility of workers in economic industries. In particular, men move from construction to manufacturing, while women move from agriculture to manufacturing industries. Furthermore, within the manufacturing industry I find a strong substitution of low-English intensive industries for high-English intensive ones. I also evaluate the effect of exposure to English instruction on students' achievement to determine if part of the effect on wages is due to a reallocation of resources towards English instruction in primary schools, which can potentially affect the formation of human capital. I find no effects on Language and Math test scores, which suggests that the estimated effect of exposure to English language on wages is not reflecting changes to general cognitive skills.

JEL Classification: I21, I28, J24, O15.

Keywords: Early Childhood Education, Education Reform, Skills, Education Policy.

*Department of Economics, 3623 Cullen Boulevard, office 250 McElhinney Hall. Houston, TX 77204. e-mail: ogalvezs@cougarnet.uh.edu

Introduction

In the context of a globalizing world in which English is the lingua franca, there has been a growing interest among developing countries in offering English instruction at school under the assumption that English instruction will increase English-language skills and ultimately improve labor market outcomes. While there is a large literature on the effect of English skills on earnings in English-speaking countries, there is very little research on the returns to English skills in non-English-speaking countries. I fill this gap in the literature providing the first estimate of exposure to English instruction on labor market outcomes in a Latin American economy and one of the first among non-English-speaking countries.

In this research, I offer some of the first empirical evidence on the effect of exposure to English instruction in primary school on labor market outcomes in the context of a non-English-speaking country. The set of labor market outcomes I examine include formal labor force participation, wages, and geographical mobility, while I explore the mechanisms on these latter by looking at the effects on student achievement and economic industries. To this purpose, I exploit the implementation of a program in Mexico (in 2009) that significantly expanded English instruction in Mexican public primary schools called the National English Program in Basic Education (NEPBE).

I construct a novel database, which contains all public-school students in Mexico linked to information about the elementary school they attended (including hours of English instruction) as well as to their labor market records in adulthood. Unlike the existing literature, I do observe exposure to English instruction measured in weekly hours. Thus, using these rich data, I document that after 2009 many English teachers were hired, and weekly hours of English instruction increased as a result of the program.

Unlike the existing literature, I do not evaluate English abilities because this is an unobservable variable in Mexico, instead I observe exposure to English instruction. Among this related literature, there is a consensus that English language skills are positively associated with immigrants' earnings in English-speaking countries (see Isphording (2014) and Chiswick and Miller (2015) for a review). In particular, this literature provides evidence that immigrants with English skills in the US have higher wages, better educational attainment (Chiswick, 1991; Bleakley and Chin, 2004; Chiswick and Miller, 2010) and also could change their social outcomes, such as marriage and fertility (Bleakley and Chin, 2010). Similar results on wages have been found in the context of immigrants to Australia and European countries (Dustmann, 1994; Chiswick and Miller, 1995; Dustmann and Soest, 2001; Hayfron, 2001; Shields and Price, 2002; Williams, 2011). Likewise, it has been found that the English premium among immigrants could vary depending on the workers' age and education, i.e. younger and more educated immigrants have greater returns to English at work (Lang and Siniver, 2009; Azam, Chin and Prakash, 2013). Although I do not observe English ability among the individuals in the administrative data I use in this paper, it is possible to argue that the effect of the English program on labor market outcomes is due to an improvement on English abilities and not through other skills that affect human capital, such as language

or mathematics. I evaluate this latter argument by analyzing the effect of the NEPBE on students achievement. My results suggest that this English program had no effect neither on language nor on Math test scores of Mexican students.

To my knowledge, this paper is the first research on the effect of exposure to English instruction (as a subject) at early stages of life on labor market outcomes in a Latin American economy. A related research was conducted by Chakraborty and Bakshi (2016), where the authors exploit a policy change that abolished English instruction (as a subject) in public primary schools of India. However, they measure exposure as the probability to be affected by the policy change, not as hours of English instruction as I do in this paper. Furthermore, the context of India is particularly different from most of the developing countries because of its status of former England colony, where the upper-social class and government workers usually have English abilities because of their close relationship to the United Kingdom. In the context of Mexico, Delgado Helleseter (2020) offered the first estimate of the returns to English abilities in the market of jobs posted online. Delgado Helleseter (2020) finds that the wage premium for Mexican English speakers is approximately 28 percent higher than for non-English speakers. However, his sample is composed only by online advertisements from a single online job board, which implies concerns about the selection bias and the external validity of his results.[1] Two other related papers are Azam, Chin and Prakash (2013) and Choi (2015) in the context of India and Korea, respectively. In both cases, the authors find that English-language skills are strongly positively associated with higher earnings.

This paper is also different from previous research where authors exploit policy changes in the language of instruction (Angrist and Lavy, 1997; Angrist, Chin and Godoy, 2008; Eriksson, 2014; Taylor and von Fintel, 2016). Indeed, I analyze a non-English speaking country, where the language of instruction has not changed but the exposure to English increases at early stages of life through the inclusion of English language as a subject in primary schools. Besides, the setting I study in this paper is Mexico, where the value of English language is even more pronounced than in other countries because of its close relationship with the United States (US) in terms of trade and migration. Likewise, this paper is different from previous research on the returns to bilingual education in Spain (Cappellari and Di Paolo, 2018) and in the US (Saiz and Zoido, 2005), because the English instruction in Mexico was introduced just as an additional subject in the regular curricula, which continues being taught in the native language (Spanish). Among this related literature, there is research on the effects of bilingual education on cognitive abilities (see Adesope et al. (2010) for a review). Recent evidence suggests that bilingualism does not affect students achievement (Chin, Daysal and Imberman, 2013; Anghel, Cabrales and Carro, 2016), which is consistent with my findings in this research.

Thus, in this paper I would like to determine if the inclusion of English in the regular curricula of primary schools could affect students achievement and, later in life, their labor

[1] I am also aware of a recent research in Mexico where Charles-Leija and Torres (2022) offer an estimate of the returns to English skills. However, their model has serious problems of identification because they do not solve the selection problem due to the differences between individuals who report being English speakers and those who do not.

market outcomes (in terms of formal labor force participation, wages, mobility and economic industries). Hence, my research question is: what is the effect of exposure to English instruction on labor market outcomes in a non-English speaking country? However, the way to answer this question is not trivial because of the selection and the omitted variables problem. Indeed, it could be the case that students who had exposure to English instruction studied in better schools or live in better neighborhoods. I get around this selection problem by exploiting the richness of my data set, controlling for school fixed effects (FE). Furthermore, I mitigate the omitted variables problem by controlling for abilities, measured as test scores in sixth grade (which is also possible due to the novel data set I built).

Indeed, using a Two-Way Fixed Effects (TWFE) model, which incorporates school FE, I control for time-invariant characteristics of schools and local neighborhoods that may be correlated with the exposure to English instruction for individuals and their labor market opportunities, I find that exposure to English instruction reduces the likelihood that an individual participates in formal sector employment. It is likely that this result is due to exposure to English instruction affecting enrolling in high school and college, as my analysis focuses on young adults aged 16-24 (the recency of the NEPBE means the affected cohorts are still young). These results also take into account the heterogeneity in cognitive abilities that vary among individuals.

Focusing on a subsample that is unlikely to be enrolled by age 16, I find that the exposure to English instruction has no effect on wages, while reduces men's geographical mobility and increases women's. This gender heterogeneity in mobility can be explained by a reallocation of workers in certain economic industries. For example, men substitute jobs in construction for manufactures, while women substitute jobs in agriculture for manufactures. In other words, women are moving from rural to more urban areas. Likewise, I show evidence that individuals who had exposure to English instruction move from low-English to high-English jobs in both, manufactures and services.

Furthermore, I found a heterogeneous wage effect by abilities. In particular, I show that exposure to English instruction increases wages among individuals with high cognitive abilities. Even though, my estimate for the highest ability quartile is downward biased because of the selection into the sample. This negative selection suggests that despite living in low-enrollment counties, high achievement individuals seek to pursue a college degree even despite the lack of educational opportunities. I did not find heterogeneous effects on geographical mobility by cognitive abilities.

I also evaluate the effect of exposure to English instruction on students' achievement to determine if part of the effect on wages is due to a reallocation of resources towards English instruction in primary schools, which can potentially affect the formation of human capital. I find no effects on Language and Math test scores, which suggests that the estimated effect of exposure to English language on wages is not reflecting changes to general cognitive skills. These findings are consistent with exposure to English instruction raising wages through increasing English language skills.

The remaining of this paper proceeds as follows. In the first section I explain the background of the policy. In section 2, I explain the empirical strategy I propose. In section 3, I describe the novel database I construct. In section 4, I show the results of the effect of the English program on labor market outcomes and on student achievement. Finally, section 4.2.2 summarizes with a discussion of my findings and a brief conclusion.

1 Background

1.1 The Mexican education system and labor force participation

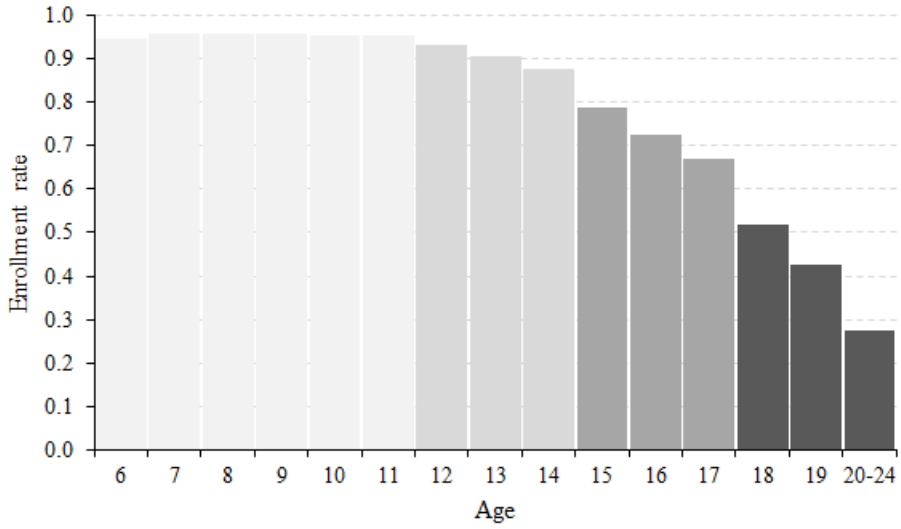
In Mexico, the basic education system is divided in two levels: elementary and middle school (or primary and lower secondary, respectively). The elementary schools comprise from first to sixth grade, while middle schools comprise from seventh to ninth grade. Both educational levels are part of the basic compulsory education system as it also is the high school (since 2013), which comprises from tenth to twelfth grade.

Regularly, students enrolled in elementary school range of ages from six to eleven years old (at the beginning of the second term of each academic year). Students enrolled in middle school are between 12 and 14 years of age, while students enrolled in high school are between 15 and 17 years old (at the beginning of the second term of each academic year as well). College students are usually between 18 and 21 years of age. All these ages may vary resulting in older students if they entered late the education system and/or if they failed one or more grades.

Unlike the American public education system, in Mexico parents can choose to send their kids to public schools that are located in geographical areas different from their home counties (or localities). This is particularly useful in metropolitan areas where parents can make a decision based on the distance and the quality of the school. However, in most of the rural areas, where the access to public schools is limited, parents choose schools mostly based on the distance criterion to minimize commuting costs. The access to elementary schools is particularly limited in marginalized areas, where the scarcity of teachers leads them to merge grades, which allows them to teach more students with the same resources. The access is even more limited for middle schools and high schools, this is one of the reasons why the enrollment rates are low at high educational levels.

Enrollment rates in primary school are close to one hundred percent, but in college the enrollment rate falls dramatically. In Figure 1 I plot enrollment rates by age using data from the 2020 Mexican population census. To interpret these data as enrollment rates per grade I assume that students who reported attending school are enrolled in the grade that corresponds to their age. Thus, the different bars colors represent different levels of education. There are several factors that could explain the decreasing enrollment rates in higher academic

Figure 1: Enrollment rates by age (based on 2020 Mexican census data).

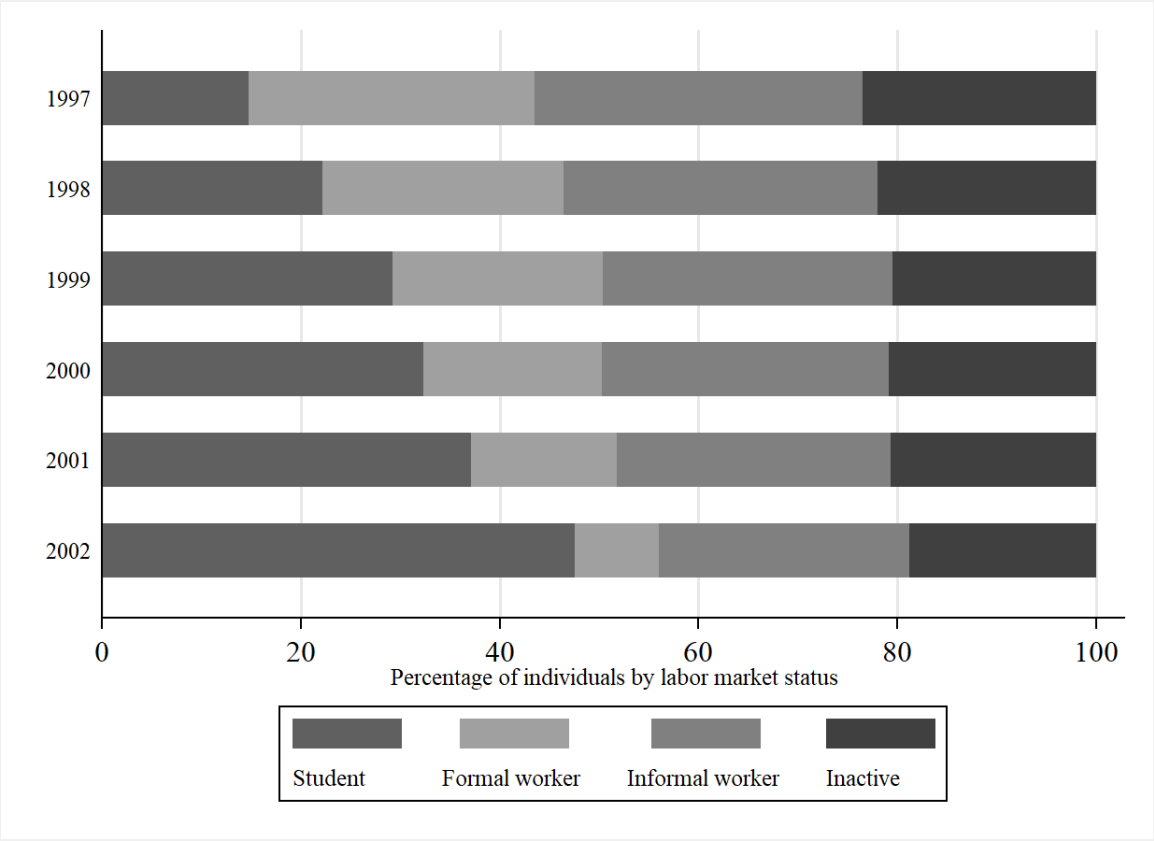


Note: Enrollment rates by age are plotted. I assume that students who reported attending school are enrolled in the grade that corresponds to their age. Hence, the first six light gray bars represent primary school enrollment, the next three darker bars represent middle school enrollment, then high school and, finally, the dark gray bars represent college and graduate degrees enrollment.

levels, such as the lack of schools or the opportunity cost of higher education. However, it is surprising that high school enrollment is quite low even despite of its character of compulsory (since 2013). This may be explain because the 2013 compulsory policy does not enforce parents to send their kids to school, but the schools to offer free education. In other words, the decision to attend high school is still self determined. Furthermore, the enrollment rates of the last two years of college education and the first grades of graduate school are just 27 percent. These numbers are consistent with higher educational costs and the lack of schools, where the existing ones are predominately in urban and suburban areas, which implies higher commuting costs for individuals living in a rural context.

There is a substantial labor force participation rate among individuals finishing upper secondary school. In Figure 2 I show the labor participation rate in Mexico for the six cohorts that I study in this paper, using the 2020 Mexican population census. Individuals who were born between 1997 and 1999 (21-23 years old in 2020) had no exposure to English instruction in primary school, while individuals who were born between 2000 and 2002 (18-20 years old in 2020) had some exposure. The decreasing participation rate in younger cohorts is consistent with the fact that younger kids have higher enrollment rates. Furthermore, from the 48 percent of the 18 year old individuals not enrolled in school, 73 percent are employed. These data tell us that there is an important labor participation rate even for the youngest cohorts I will analyze in this paper, which suggests I will see them in the formal labor data even after considering that some will continue studying.

Figure 2: Composition of Mexican labor force by cohort (based on 2020 Mexican census data).



Note: Percentage of Mexicans in certain economic statuses (by cohort) are plotted. In the vertical axis I show age cohorts. For example, individuals who belong to the 2002 age cohort are 18 years old in 2020 and they have a labor participation rate of 33 percent, from which one seventh work in formal jobs. Almost 40 percent of the individuals in this cohort are still studying. The other extreme case is the 1997 age cohort where individuals are 23 years of age in 2020 and their labor participation rate is 54 percent, from which one third are working in the formal sector. Only 10 percent individuals in this oldest cohort are studying.

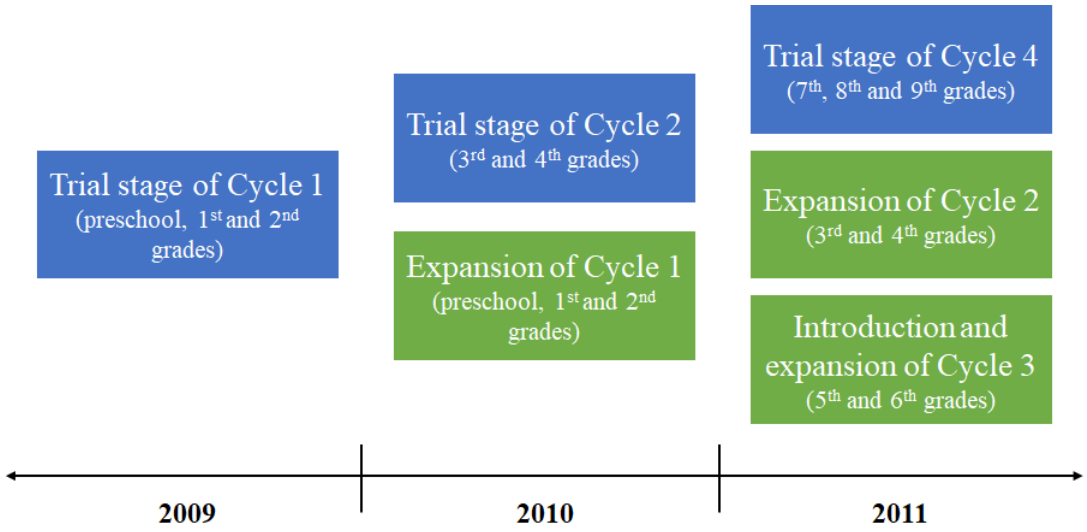
1.2 The National English Program in Mexico

The official language in Mexico is Spanish and, although there is no official estimation about the proportion of Mexicans who can speak and/or understand English, the reality is that just a few people have some kind of English knowledge in Mexico. For example, according to the English Proficiency Index (IPE) generated by the company Education First, Mexico is classified as a country with low proficiency in English. Indeed, in 2020 this index ranked Mexico in the place 82 out of 100 non-English speaking countries all over the world, and in the place 18 out of 19 Latin American countries.[2] Furthermore, according to the survey of human capital in Mexico held by CIDAC (2008), six percent of the urban population declared to be able to speak in English.

[2]All these results are available in the 2020 edition of the EF English Proficiency Index report, published by Education First (2020).

Knowing about the weakness among Mexicans to communicate in English, in 2009 the Mexican Ministry of Education (SEP, by its acronym in Spanish) launched a program called National English Program in Basic Education (NEPBE), which intended to introduce English instruction in all Mexican public elementary schools. Before this program, English instruction was somewhat generalized among middle schools (because English as a subject was included in the regular curricula of middle schools since 1993), but with the NEPBE English language education became compulsory since elementary school and it articulated the primary and secondary programs to give continuation of the English instruction between both educational levels.

Figure 3: The NEPBE implementation: trial and expansion stages



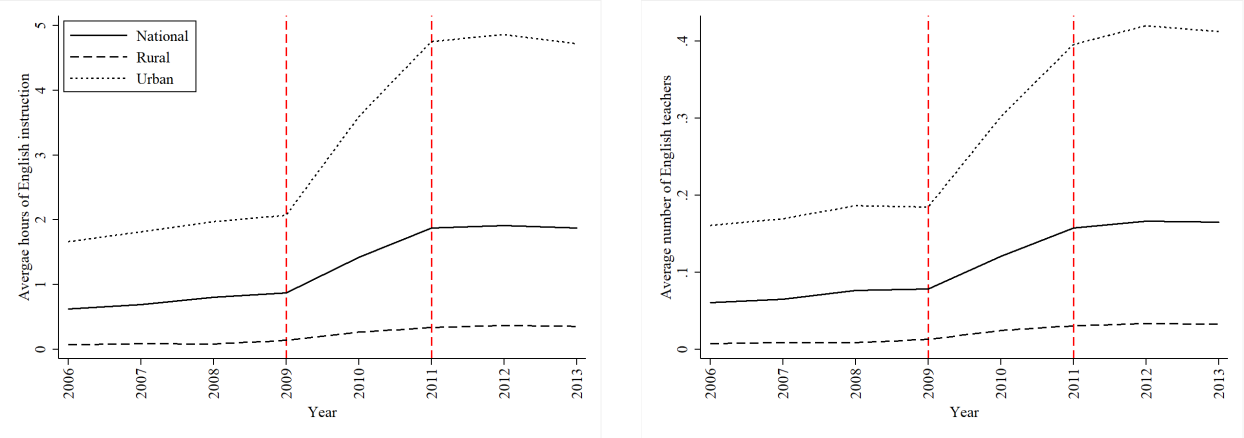
Note: The NEPBE was launched in 2009 as a trial stage with the so called Cycle 1. In 2010 the program continued the trial stage with Cycle 2 and expanded Cycle 1. Finally, in 2011 the program introduced and expanded Cycle 3, benefiting fifth and sixth graders.

Before the NEPBE, there were efforts to implement some kind of English instruction among elementary schools in 21 out of 32 Mexican states. In fact, in some of those states (Aguascalientes, Coahuila, Morelos, Nuevo Leon, Sinaloa, Sonora and Tamaulipas) the already initiated English programs had strong fundamentals and had exceptional coverage compared to the other Mexican states. However, the results were heterogeneous all around the country due to the differences in coverage, achievement levels, contents, English teachers supply and teaching hours. Hence, the NEPBE aimed to generalize the English instruction with the same content and with the same allocation of time. Nonetheless, the possibility of putting this program into practice has still been limited by the shortage of teachers trained for this purpose (Sayer, 2015*a*,*c*; Ramírez-Romero and Sayer, 2016).

The limitations faced by previous state English programs were dealt by the central Mexican government through the implementation of the national English program by cycles and not by school grades, which improved continuity and articulation among the different grades and levels of the Mexican basic education system. The so called Cycle 1 comprises the third

grade of preschool, as well as the first and second grades of elementary school; Cycle 2 includes third and fourth grades of elementary school; Cycle 3, comprises the fifth and sixth grades, while Cycle 4 includes all grades of middle school (SEP, 2011).

Figure 4: English instruction and English teachers over time (rural vs urban)



(a) Hours of English instruction

(b) Number of English teachers

Source: Own elaboration with data from Mexican school census, Ministry of Public Education (SEP).

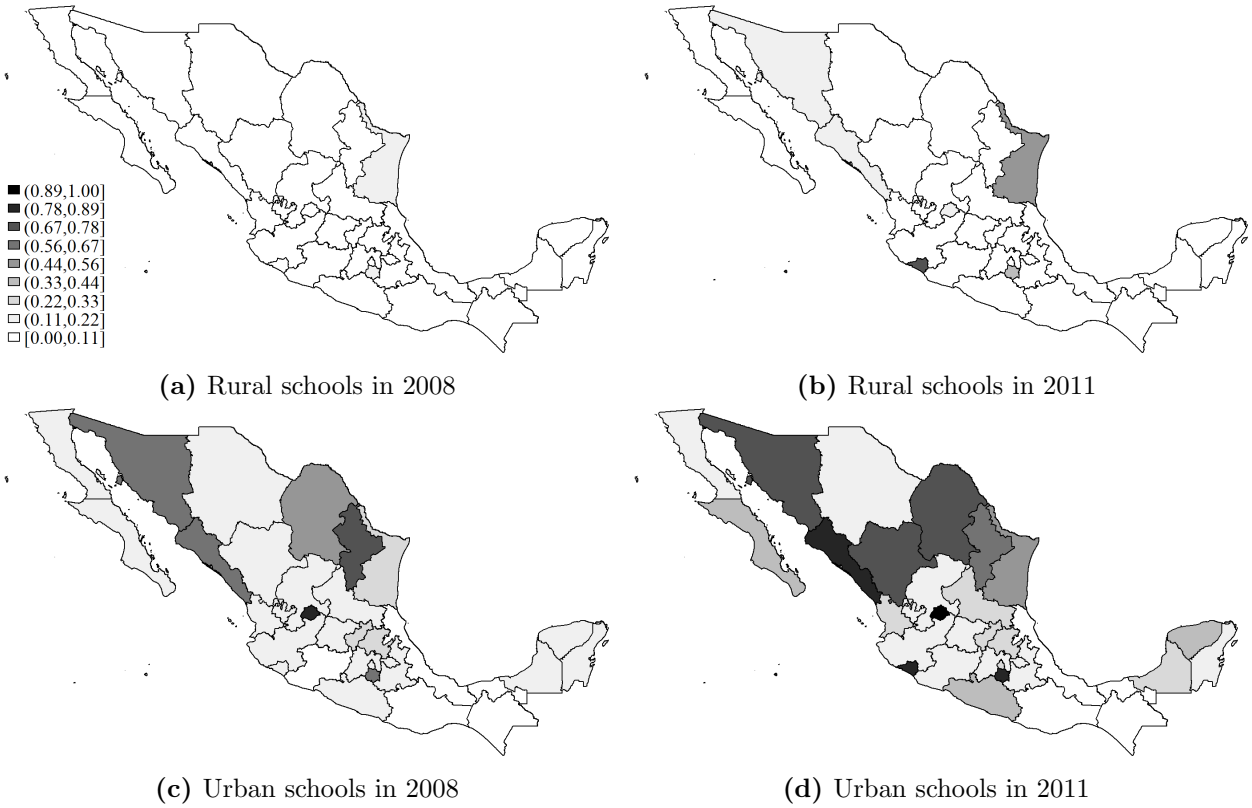
Note: Hours of English instruction are calculated dividing total hours in a school by total number of classes. Similarly, number of English teachers are calculated dividing total number of English teachers by total number of classes in a school. Vertical dotted line in 2009 highlights the implementation year of the NEPBE's trial stage, while the dotted line in 2011 highlights the expansion of the program.

The NEPBE was launched in 2009 (as a pilot stage), however, the program really expanded in 2011 because before then the Mexican government suggested to implement it only among the first four grades of primary education (from first to fourth grades) and in a few randomly assigned schools. Hence, in 2011, fifth and sixth graders had exposure for the first time to the English program, but also more schools became beneficiaries (see Figure 3). Likewise, due to changes in the central government political party, in 2014 the NEPBE was reallocated to be part of a wider program called Program to Strength the Quality of Basic Education, playing a secondary role in the national agenda. Finally, in 2017 the program changed again to a national relevance and since then it is know as the National English Program (or PRONI, for its acronym in Spanish).

Most of the beneficiary schools saw a real change in hours of English instruction and in the number of English teachers until the year 2011. Furthermore, there was no significant change in rural areas. This latter was mainly due to the operation rules of the program, which prevented poor and marginalized schools to implement the English program since they do not have the equipment needed and/or well established commuting roads (as I explain below). On the other hand, it is more evident that the English program actually increased the hours of English instruction and the number of English teachers in 2011 (see Figure 4).

Indeed, there are two interesting features that characterize the implementation of the

Figure 5: Proportion of Mexican primary schools with English instruction (urban vs rural)



(a) Rural schools in 2008 **(b)** Rural schools in 2011

(c) Urban schools in 2008 **(d)** Urban schools in 2011

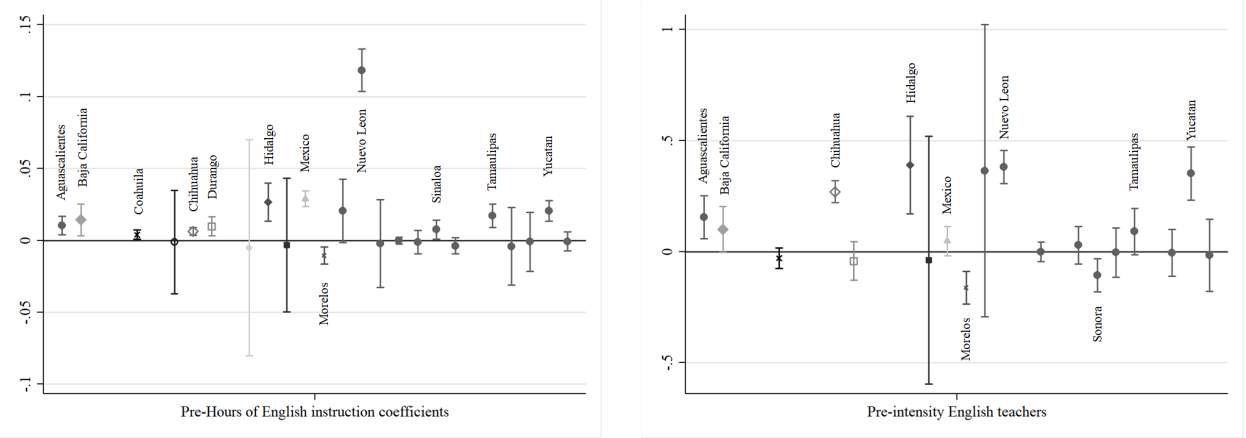
Note: Before the NEPBE, the English instruction was rare among rural schools. With the NEPBE, the proportion of rural schools with English instruction increased (between 2008 and 2011) in a few Mexican states: Colima, Morelos, Sinaloa and Tamaulipas. On the other hand, with the NEPBE, the proportion of urban schools with English instruction increased (between 2008 and 2011) in several northern (Baja California Sur, Coahuila, Durango, Nayarit, San Luis Potosi, Sinaloa, Sonora and Tamaulipas) and some southern (Campeche, Colima, Guerrero, Morelos and Yucatan) Mexican states.

NEPBE. First, elementary schools in rural areas were less affected by the English program. Among the Mexican states, only Aguascalientes, Colima, Morelos, Sinaloa and Tamaulipas increased English instruction (between 2008 and 2011) in terms of the proportion of rural schools with some kind of English instruction (see panels (a) and (b) of Figure 5). On the other hand, with the NEPBE the proportion of urban schools with English instruction increased (in the same period) in several northern (Baja California Sur, Coahuila, Durango, Nayarit, San Luis Potosi, Sinaloa, Sonora and Tamaulipas) and some southern (Campeche, Colima, Guerrero, Morelos and Yucatan) Mexican states (see panels (c) and (d) of Figure 5). This is consistent with the operation rules of the program.

Second, the relationship between pre-intensity and the change in the intensity of English instruction is positive for most of the Mexican states. This suggests that schools with less or no English exposure (before the English program) experienced a lower expansion of English instruction after the implementation of the NEPBE. In particular, this effect is substantial in the states of Nuevo Leon and Hidalgo (see panel (a) of Figure 6). Considering that the

hours of English instruction could be a noisy variable because it is reported at school level, I also show analogous results where the dependent variable is the number of English teachers. The results are quite similar in terms of the sign and the significance of the coefficients (see panel (b) of Figure 6).

Figure 6: Relationship between pre-intensity and change in intensity of English instruction



(a) Hours of English instruction

(b) Number of English teachers

Note: Coefficients of the pre-intensity of English instruction variable are plotted. These coefficients correspond to separate regressions per state, where the dependent variable is the change in the intensity of English instruction (panel (a)) or the number of English teachers (panel (b)).

1.3 Time allocation and beneficiary schools

One concern in this paper is that I do not observe variables that help me out to construct a human capital production function at individual or class level. However, I do know about the production function at school level in terms of the number of teachers and their schooling. Even though, it is not possible to know the allocation of time to each of the subjects. This latter is a limitation I solve by showing that the English program had no effect on other subjects in terms of test scores (see **??** for a detailed discussion of these results).

The NEPBE did not require rules compliance from beneficiary schools other than to allocate the resources only to the purposes of the English program. For example, in terms of time allocation, we know that the English program implementation was flexible. The Mexican government offered guided sequences of contents that enabled teachers to carry out the adaptations demanded by specific instances of the Mexican education system. This flexibility was responsible for the way each school incorporated the English language subject into the regular curricula, in response to schools' heterogeneity. In this sense, the English program has worked mainly through the provision of economic resources and educational materials to Mexican schools seeking to implement English instruction as a subject. However, this program does not require neither rules compliance nor minimum expected outcomes.

Before the implementation of the NEPBE, schools already had a free allocation time known as "curricular autonomy", which they could use to teach the most convenient subjects according to the students needs. With the implementation of the NEPBE some schools used part of their curricular autonomy to include English instruction. This means that the English program did not affect directly the minimum allocation of Spanish and Math instruction, but could have affected the support or bolster up of both subjects if a school used the curricular autonomy to help students with Math and Spanish.

Nowadays, SEP suggests that the English language subject represents one eight (2.5 hours) of the effective teaching (20 hours). Likewise, the Spanish and Math instruction represents one half (10 hours) of the effective teaching time (one quarter or 5 hours each). Additionally, schools have 2.5 hours of curricular autonomy. Nonetheless, although the effective number of hours of Math and Spanish instruction has not changed since SEP launched the NEPBE, each school has the right and the freedom to structure or change the curricula according to the students needs. However, it is also true that, traditionally, all teachers in elementary schools cover at least one daily hour of Spanish and one of Math instruction, which is difficult to change even with the inclusion of the English subject in the regular curricula.

The English program's target population are preschools, primary and lower-secondary public schools. However, only schools that already had "English materials" for students, English teachers or a minimum of resources (such as computers, access to internet and easily accessible commuting roads) were eligible to be beneficiaries of the program. This is consistent with the positive coefficients plotted in Figure 6, which refer to the pre-intensity effect on change in hours of English instruction.

Hence, the national English program was initially implemented only in the state capitals or other larger urban areas. But even nowadays, in most of the states, the program coverage continues to focus on state capitals or major cities, neglecting smaller populations and marginalized areas. Furthermore, in many cases, the program has only served students enrolled in the morning shift or it coincides with the school's beneficiaries of the full time school (FTS) program.

According to the English program's rules, the central government transfers the economic resources to beneficiary schools through the school districts (which in some cases are managed by the state governments). School districts request the funds to the central government depending on the number of applications they received from the primary schools' principals. The applications usually contain standard formats where schools present an annual plan for the school year with objectives and strategies that are aligned to the central government goals. These applications should also include a plan for the implementation of English instruction in their regular curricula.

Currently, the Mexican government provides the NEPBE resources to public elementary schools that fulfill at least one of the following criteria:

- Being located in one of the 401 cities identified as part of the National Urban System that elaborates the Mexican population institute (CONAPO, for its acronym in Spanish).
- Being located in a county with more than 2,500 inhabitants.
- Being located in a community with paved access roads.
- Being located within two kilometers away from the corresponding central business district.
- Being located in a county considered as predominantly indigenous.
- Being located in one of the 121 communities classified as "magic villages" by the ministry of tourism.
- The school has to have the necessary facilities to implement the English program such as: a modern electric system, and access to computers with WiFi.
- School located in the Mexican southern states will be prioritized.

These criteria along with the evidence shown in Figure 3 and Figure 4 support the idea that the NEPBE did not benefit rural areas, which provides a source of variation that could be potentially exploited in future research.

1.4 Does English exposure imply the acquisition of English abilities?

The NEPBE increased the exposure to English language instruction through the incorporation of English language as a subject in the regular curricula of Mexican primary schools. The program increased the exposure to English instruction in (at least) six years, however, I am aware that this does not imply necessarily the formation of English language skills. Nevertheless, this English exposure could have had an effect increasing the familiarity with this foreign language.

The issue is that this is still an open question because there is no formal research that has studied the effect of the NEPBE on English language abilities. Furthermore, there is no measure of English knowledge in Mexico, which makes it more difficult to evaluate the effect of the program in terms of English language skills. In an initial try to "answer" this question, Székely, O'Donoghue and Pérez (2015) conducted a survey in Mexico as an instrument to measure English abilities and documented their findings in a report. The results shown in their report suggest that only 21 percent of the Mexican students survey showed some English knowledge and only three percent reached the expected standards by the Mexican government.

Nonetheless, the evidence points out that the results found by Székely, O'Donoghue and Pérez (2015) represent a lower bound measuring English abilities in Mexico. First, the timing; the authors conducted a survey in 2014 to middle school graduates, which means that these students had little or no exposure to English instruction in primary school because they were at this educational level during the trial stage of the program (see Figure 3 and Figure 4). Second, the sample; Székely, O'Donoghue and Pérez (2015) surveyed students without distinguishing those who studied in schools with English instruction and those who did not. This means that their sample contains both type of students, underestimating the proportion of individuals with English abilities. Finally, the geographical location; most students in their sample live in states with low proportion of primary schools with English instruction (Baja California, Jalisco, Guanajuato, Mexico, Puebla, Chiapas and Mexico City, with less than 11 percent of schools with English instruction) and only two states of the sample with a considerable high proportion (Nuevo Leon and Sinaloa, see Figure 5).

My arguments are consistent with the findings of Sayer (2015*b*), who also suggests that not only the sample is erroneous to measure English ability post-NEPBE, but also the instrument was not appropriate and some of the questions were confusing to students. Hence, we do not know whether the exposure to English instruction (through the NEPBE) can be translated into English language abilities, but what we do know is that the results are likely less negative as those reported by Székely, O'Donoghue and Pérez (2015).

On the other hand, the only formal evidence regarding the effect of exposure to English instruction on the formation of English skills in Mexico was recently provided by Gálvez-Soriano (2022). Although this evidence does not correspond directly to the effect of the NEPBE, it sheds some light on the potential effect of this national program on English abilities. In particular, Gálvez-Soriano (2022) uses state by cohort variation exploiting the implementation of English programs in primary schools of some Mexican states (Aguascalientes, Nuevo Leon and Tamaulipas) in a Difference in Differences strategy. His results offer evidence that the exposure to English instruction in primary school favors the acquisition of English skills, which suggests that it is likely that the NEPBE had also contributed to the formation of English abilities in Mexico.

2 Empirical strategy

The main variables of interest in this paper are the labor market outcomes of individuals who had exposure to English instruction at early stages of life. In particular; the probability to work in the formal sector, wages, geographical mobility and economic industries. In order to better understand the reduced form effect of English exposure on labor market it is important to understand first how English exposure affects student achievement. This is particularly useful in our context where we do not have measures of English language abilities. Indeed, understanding the relationship between English exposure and student achievement helps determining if English instruction is a substitute or complement of other abilities that

contribute to the formation of human capital and, ultimately, to labor market outcomes.

In my analysis, I use school by cohort variation in exposure to English instruction in Mexican primary schools to uncover the causal relationship between English instruction and labor market outcomes. Much of this variation is driven by the policy change induced by the implementation of the NEPBE.

There are two potential issues in this paper: the selection problem and the omitted variables bias. First, there could be differences between students who went to different schools, which are not necessarily related to differences in English language instruction. To deal with these issues I exploit the richness of my data set using a school fixed effects approach in both models I explain in this section. Second, the other important concern is that we may obtain biased estimates because high ability students will be more likely to have better labor market outcomes. I mitigate this second issue by explicitly controlling for students abilities (measured as their language and math test scores in sixth grade).

2.1 Exposure to English instruction and labor market outcomes

Let us consider y_{isct} as the dependent variable, which can be any of the labor market outcomes of interest that characterize each individual i, who studied in school s, belongs to cohort $c = \{1997, 1998, 1999, 2000, 2001, 2002\}$ and whose labor market outcomes are observed in time $t = \{2018, 2019, 2020, 2021\}$. By the year 2021, all individuals in my sample had completed high school, which means that I am ruling out those students who decided to pursue a college or a graduate degree (as I explain below). However, this is not a concern because college and graduate enrollment rate is low in Mexico (about 27 percent in 2020, see Figure 1).

I concentrate my research on students who had exposure to English instruction during primary school due to the NEPBE. This means that students enrolled in fourth grade in 2011 (2002 cohort) had potentially five years of exposure in primary school and three more in lower secondary. Students enrolled in fifth grade in 2011 (2001 cohort) had three years of exposure in primary school (plus three years in lower secondary). Likewise, students enrolled in sixth grade in 2011 (2000 cohort) had exposure to only one year of English instruction in primary school (plus three in lower secondary). On the other hand, the three older age cohorts (1997-1999) had no exposure to the English instruction in primary school (see Figure 7). None of the 2000-2002 cohorts are expected to finish a college degree if they show up in the social security database between the years 2018 and 2021. However, the three oldest age cohorts (1997-1999) could have studied a college degree, so I restrict the age in the labor data to individuals who are 20 or younger in 2018, 21 or younger in 2019 and 22 or younger in 2020-2021, to avoid this potential issue. Notice that I still admit individuals who are 23 or 24 if they have been working in the formal sector since 2019 or 2018, respectively.

In order to exploit the variation in exposure to English language classes, I construct an

Figure 7: Exposure to English instruction by cohort

Cohort	Primary school						Secondary school						College			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1997	2003	2004	2005	2006	2007	2008	2009	2010	**2011**	2012	2013	2014	2015	2016	2017	2018
1998	2004	2005	2006	2007	2008	2009	2010	**2011**	2012	2013	2014	2015	2016	2017	2018	2019
1999	2005	2006	2007	2008	2009	2010	**2011**	2012	2013	2014	2015	2016	2017	2018	2019	2020
2000	2006	2007	2008	2009	2010	**2011**	2012	2013	2014	2015	2016	2017	2018	2019	2020	
2001	2007	2008	2009	2010	**2011**	2012	2013	2014	2015	2016	2017	2018	2019	2020		
2002	2008	2009	2010	**2011**	2012	2013	2014	2015	2016	2017	2018	2019	2020			

Note: The rows in the figure represent the cohorts and columns represent the school progression from primary to college (by grades). Cells market in dark gray suggest that those age cohorts had no exposure to English instruction in the indicated grades. Cells highlighted in light gray show the grades for which the cohorts would have had exposure to English instruction, according to the NEPBE (in bold the final year of expansion, 2011). Finally, white cells indicate grades in which traditionally any cohort has some kind of English instruction if they continue studying (upper secondary and college education).

exposure to English instruction variable, $ExpEng_{sc}$, which takes into account the variation in exposure by cohort and the variation in adoption among primary schools by averaging the number of hours of English instruction from first to sixth grade. Considering those two sources of variation: by school and by cohort, I propose the following Two-way Fixed Effects (TWFE) equation:

$$y_{isct} = \alpha + \beta \cdot ExpEng_{sc} + \boldsymbol{X_{isct}\gamma} + \zeta_c + \nu_s + \tau_t + \varepsilon_{isct} \tag{1}$$

where I control for common cohort trends, ζ_c, unobserved attributes like quality of school, neighborhood effects and growing up environment, ν_s and time fixed effects (FE), τ_t. I also include a set of control variables, $\boldsymbol{X_{isct}}$, which remove confounding effects of the exposure to English instruction on the dependent variable.

In particular, I control for cognitive abilities measured as language and math test scores in sixth grade. This enables me to control for the quality of the students if this is changing in time. Furthermore, my ability measure captures changes in neighborhood and students' composition. Additionally, I also control for gender, teacher's characteristics (in primary school), number of jobs, as well as age (as a proxy of experience) and its square as in the Mincer (1974) equation.

By including school FE I can deal with a lot of omitted variables problems, like those that are correlated to neighborhood and schools' characteristics, which are common characteristics of students within the same school. Hence, if we believe that the unobserved characteristics are constant over time, my empirical strategy will solve the selection problem and the estimator β will provide a causal interpretation of the effect of exposure to English instruction at early stages of life on labor market outcomes.

2.2 Mechanisms: English abilities, cognitive skills and economic industries

There are (many, but) three main mechanisms through which exposure to English instruction affects labor market outcomes are: the acquisition of English abilities, the effect on other cognitive abilities, and effects on economic industries decisions. The first mechanism suggests that the exposure to English instruction really had a positive effect on the acquisition of English language skills. Hence, this new skill could have an effect on the labor market outcomes by expanding the possibility of finding well paid jobs or simply due to an "English premium" on wages. Since there are no measures of English abilities in Mexico, it is difficult to test this mechanism (see subsection 1.3). However, I rely on Gálvez-Soriano (2022) findings, which suggests that exposure to English instruction leads to the acquisition of English skills in Mexico. Second, English instruction could affect other subjects (and, hence, other cognitive abilities), which could have implications on labor market outcomes. Indeed, adding time to English instruction could decrease the time allocated to language and/or Math subjects. Nonetheless, it could also be the case that English instruction strengthens language skills through a complementary between English and the native language, which is consistent with the existing research suggesting that taking foreign language classes increases language abilities. Finally, exposure to English instruction could affect individual's decision on the economic industry he/she will work in.

2.2.1 Cognitive skills: student achievement

Although I do not observe English abilities, I can argue that if English instruction does not have an effect on student achievement, the effect of English instruction on labor market outcomes is mainly through an improvement on English language skills. Indeed, as I discussed above, the introduction of English instruction in primary schools could affect the teaching time of other subjects. If this is the case, labor market outcomes would be affected by the NEPBE because of either the rivalry in time among subjects or by the complementary on language abilities. Thus, I would find it difficult to separate the effect of English abilities and other cognitive abilities on earnings if the NEPBE had significant effects on language and Math subjects because these are the basic skills needed and used in the labor market.

To evaluate the effect of English instruction on students achievement I propose to use a similar specification as in Equation 1. The difference is that now the dependent variable is a measure of student achievement for different cohorts of sixth graders (as shown in Figure 7). The main independent variable of interest is the measure of exposure to English language classes, $ExpEng_{sc}$, which I constructed exploiting the panel structure of my database as the average of the hours of English instruction over the six years that comprise primary school in Mexico (just as I explained above). The rest of the variables were previously explained in subsection 2.1.

Nevertheless, notice that using a regression of student achievement on English instruction would produce a biased estimator because of the selection problem. I solve this problem by proposing a TWFE regression, where I fully control for school FE, ν_s and common cohort trends, ζ_c. The selection bias is caused because beneficiary schools were not randomly assigned (after the trial stage). In this sense, we are concerned that better schools chose to adopt the NEPBE, i.e, schools with more information, better teachers or with more resources. Similarly, it could also be the case that these beneficiary schools are located in villages with wealthier neighborhoods and/or better access to services. This particular issue is solved when I control for school FE, which capture school and regional differences if we assume that those differences are constant over time. Finally, I also control for students and schools' characteristics, $\boldsymbol{X_{isc}}$.

Under this model, the effect of English exposure on student achievement is captured by ϕ in the following equation:

$$test\_score_{isc} = \theta + \phi \cdot ExpEng_{sc} + \boldsymbol{X_{isc}\gamma} + \zeta_c + \nu_s + \varepsilon_{isc} \tag{2}$$

where $test\_score_{isc}$ is the sixth grade standardized test score of student i, who goes to school s and belongs to cohort c.

The potential selection bias caused by unobserved variables associated to the schools that adopted the English program is accounted by the inclusion of school FE. Indeed, it could be the case that schools with more resources are precisely the ones that had more information about the program and, thus, decided to participate. Under these conditions it is natural to think that also in these schools students will perform better in the standardized tests. However, all these differences among schools, which usually do not change in time, will be accounted by my proposed model.

2.2.2 Economic industries

The effect of exposure to English instruction on wages can be better understood, as I mentioned before, by studying its first effect on students achievement. This analysis would increase our understanding of how taking foreign language classes affects the formation of human capital. However, a third mechanism operates directly in the labor market. Indeed, if we are willing to believe that individuals actually acquired English abilities after the exposure to English instruction, there should be effects on the likelihood to choose some economic industries over others.

I explore the third mechanism by looking at the economic industries in which the individuals, who had exposure, end up when they go to the labor market. I separate this analysis in two complementary parts. First, I study the likelihood to work in four main economic industries: Agriculture, Construction, Manufactures and Services. I use the North Ameri-

can Industry Classification System (NAICS) to classify jobs in their corresponding economic sectors. For example, Agriculture contains: agriculture, forestry, fishing and hunting. The economic industry I call Construction contains: mining, utilities and construction (codes 21, 22 and 23, respectively). Manufactures economic industry only contains manufacturing (codes 31-33). Finally, the economic sector I call Services contains all the services, from retail sale to public administration (codes 42-92).

In the second part of the analysis, I explore movements within manufactures and within services. In particular, I study these two sectors by classifying them in English intensive and non-English intensive industries. I construct the English intensity classification using the criteria recently established by Gálvez-Soriano (2022), where he defines an industry as English intensive if it is part of the highest two quartiles of the distribution of industries ordered according to the proportion of employees with English skills (see section A.3 for a detailed description of the high and low English intensive industries). In section A.4 I also explore the possibility that workers who had exposure ended up in export oriented industries. All my regressions use a similar specification as in Equation 1 and can be interpreted as the likelihood of working in a specific economic industry.

3 Data

I use three sources of data: school census, standardized test scores (in elementary schools) and formal labor market data.[3] I construct a novel database using these three sources of information because I am able to link each student to their primary schools and to their jobs when they go to the labor market. Indeed, I can observe each student in time since they are in third grade and then ten years later if they find a job in the formal sector. In this section I will explain how I use each data set.

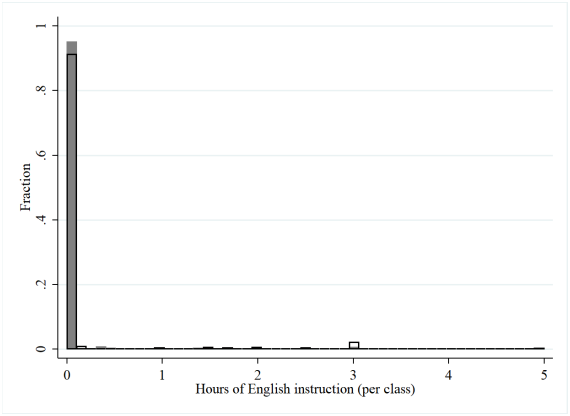
3.1 Mexican school census

The first source of information I use in this research is the Mexican school census (also known as Statistics 911). The school census allows for identifying the schools that have offered English instruction before and after the implementation of the NEPBE. This is necessary because there are no official statistics about the list of beneficiary schools of this program, at least not before 2017. It is worth to mention that I exclude from the analysis those schools that are beneficiaries of the full time school (FTS) program for two reasons.[4] First,

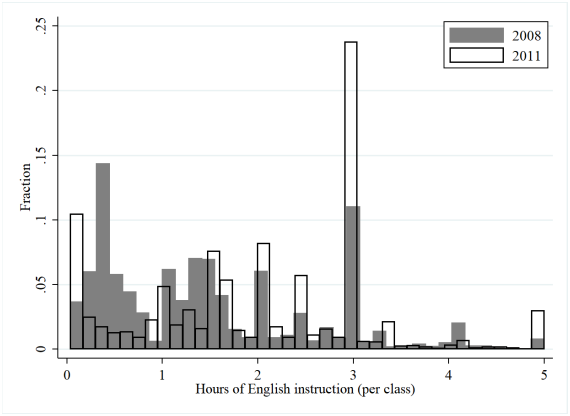
[3] As I explain below, I have access to administrative records of more than 90 percent of all Mexican workers in the formal sector, but I do not observe those individuals who are inactive, students or those that work in the informal sector.

[4] The full time school program was launched in 2007 with the objective of increasing the number of hours students spend at school. The trial phase of the program was implemented in 500 elementary and middle schools, located in 15 out of 32 Mexican states (Cabrera-Hernández, 2020).

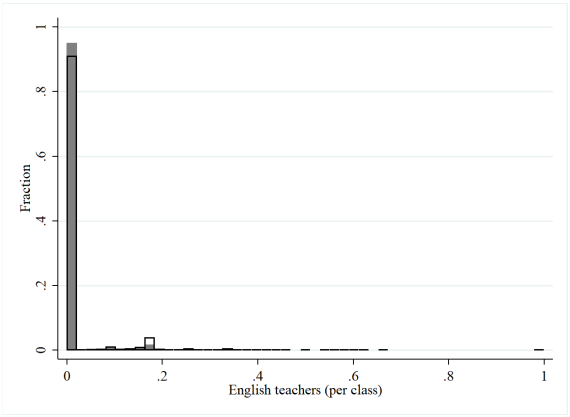
Figure 8: Hours of English instruction and English teachers distributions (2008 vs. 2011)



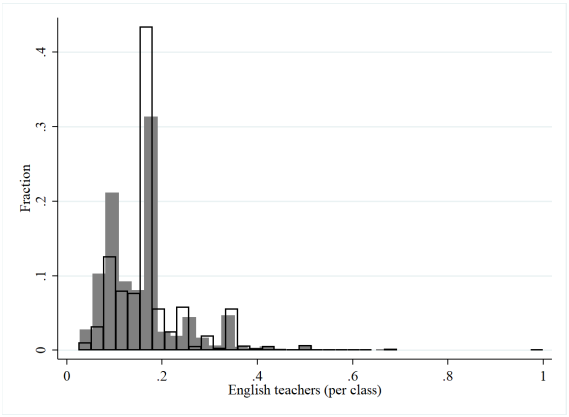
(a) Hours of English instruction



(b) Hours of English instruction (w/o zeros)



(c) Number of English teachers



(d) Number of English teachers (w/o zeros)

Note: Density of the indicated variables are plotted. Histograms at the right do not show zeros, which capture most of the distribution. Hours of English instruction are calculated dividing total hours in a school by total number of classes. Similarly, number of English teachers are calculated dividing total number of English teachers by total number of classes in a school.

students' test scores could be positively affected by the FTS program. Second, the schools that participated in the FTS program were more likely to implement the English instruction in all grades (from first to sixth) and with more weekly hours. Furthermore, I only consider public elementary schools in the morning shift. Hence, removing all these aforementioned schools from my database let me obtain a cleaner effect of English instruction on labor market outcomes (and on school achievement).

Between the years 2008 and 2011, the distribution of weekly hours of English instruction and the number of English teachers shifted to the right, making evident the introduction of the NEPBE in Mexico. Indeed, as I explained in section 1, the trial stage of the NEPBE started in 2009 and progressively expanded from first to sixth grade. Thus, the English program reached out the planned expansion to all grades of primary school in 2011. In Figure 8, I compare the distribution of weekly hours and number of English teachers between 2008 and 2011 (i.e., one year before the implementation of the program and at the year of

the final expansion).

I measure weekly hours of English instruction as the ratio of total weekly hours of English instruction in each school and the total number of classes. For example, in a school where the reported weekly hours is 30, but the total number of classes is six (one section per grade), there are actually five weekly hours of English instruction per class (30/6 hrs.). In a similar example, another school also reports 30 hours of English instruction, but has two sections per grade. This latter school offers actually 2.5 weekly hours of English instruction per class (30/12 hrs.).

Most of the distribution of hours of English instruction concentrates at zero, suggesting that most of the Mexican schools do not offer English instruction. With the implementation of the program the density of zeros decreased (see panel (a) of Figure 8). In panel (b) of Figure 8 I show the distribution of weekly hours of English instruction before and after the implementation of the NEPBE, but without the zero values from the distribution. This figure suggests that some of the schools that had zero hours of English instruction in 2008 had a positive amount in 2011. Furthermore, many schools offered an amount of English instruction around at three hours (close to the suggested 2.5 hours by the Mexican government).

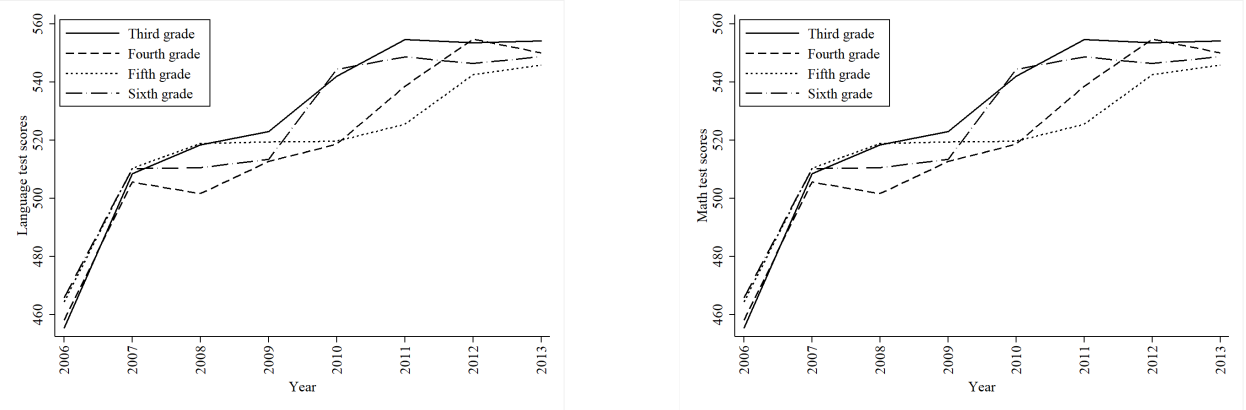
English teachers are a scarce resource in Mexico. Hence, in many Mexican schools there is only one English teacher. I measure the number of English teachers as the ratio of teachers and classes. Following the examples of hours of English instruction, in a school with one teacher and six classes, the number of English teachers will be 0.16 (1/6), or 0.08 if the school has 12 classes (two sections per grade). In panel (d) of Figure 8, I show the distribution of English teachers between 2008 and 2011 without the zero values from the distribution. The distribution of English teachers moved to the right after the implementation of the NEPBE. Indeed, in 2008 the distribution concentrated between zero and 0.2 English teachers per class, while with the English program the distribution concentrated roughly between 0.08 and 0.38 English teachers per class.

3.2 ENLACE test scores

The second source of information is a standardized test known as ENLACE (National Evaluation of School Achievement in Educational Centers). ENLACE is a nation-wide standardized test that used to be applied to all students enrolled in public and private elementary and middle Mexican schools. This test was designed to examine student's Mathematics and Language (Spanish) achievement. This test was first applied in 2006 and discontinued in 2014, but replaced by the National Plan for the Learning Evaluation (PLANEA, for its acronym in Spanish).

I standardize test scores, ts_{isct}, of each student i in school s at time t using the following formula:

Figure 9: Language and Math test scores over time and by grade



(a) Language test scores

(b) Math test scores

Note: Language and Math test scores are plotted over time and by grade. Two things can be noted from the graphs. First, test scores are increasing over time. Second, test scores of third graders are, on average, higher than fourth, fifth or sixth graders' test scores, every year.

$$test\_score_{ist} = \frac{ts_{isct} - \mu_t}{\sigma_t}$$

where $test\_score_{ist}$ is the standardized test score, while μ_t and σ_t are the mean and standard deviation of test scores, respectively, pooling all Mexican students by grade and by each observed year. This standardization takes into account that the test difficulty is different among grades and that it could change over time (as shown in Figure 9, test scores increase over time and differ by grade).

3.3 Social Security data

The third source of information corresponds to the labor data obtained from the Mexican Institute of Social Security (IMSS).[5] IMSS provides medical services and a contributory pension scheme to more than 90 percent of the formal workforce in Mexico (and nearby 40 percent of all Mexican workers).[6] This means that my estimates consider only individuals who work in the formal sector, which rises concerns for a second selection problem (selection into the sample). In section 4 I provide evidence of this problem, as well as a solution to obtain unbiased estimates. It is also worth mentioning that I am using the universe of

[5]The data was accessed through the Econlab at Banco de México. The EconLab collected and processed the data as part of its effort to promote evidence-based research and foster ties between Banco de México's research staff and the academic community. Inquiries regarding the terms under which the data can be accessed should be directed to: econlab@banxico.org.mx.

[6]I estimate this percentages based on total IMSS affiliated workers (reported by IMSS itself) divided by the total formal employed workers (measured with the Mexican Labor Survey [ENOE]).

Mexican students and almost the universe of formal workers (except for civil servants and the military), which provides more reliability of my proposed solution to the selection into the sample.

I use IMSS data from years 2018-2021, so there is enough time for individuals in my data set to enter into the labor market if they had exposure to the policy during the basic education. Indeed, we have already discussed that the NEPBE was first implemented in 2009 (as a pilot program) and expanded progressively with an important number of beneficiary schools in 2011. By the year 2011, three age cohorts had exposure to English language instruction: 2000, 2001 and 2002. In particular, students who were born in 2002 had exposure to a minimum of three years of English instruction in primary school, and potentially five years (see Figure 7). Next three older cohorts (1997-1999) had no exposure to English language instruction in primary school. Furthermore, none of these age cohorts could have finished college if I observe them in the labor market data and if I restrict age to individuals who are 22 or younger (and allowing older individuals if they entered the labor market before age 22).

IMSS database is rich and complex. The data frequency is monthly, and each month could have more than one observation for the same worker because some workers have more than one job (in different or the same economic sector). To deal with this heterogeneity, I make some transformations to the data:

1. First, I take the average of the wages reported along one year, by worker, by economic sector and by employer.
2. Second, when a worker has multiple jobs, I drop the jobs with the lowest wages if those are non-permanent jobs.
3. Then, if there are individuals with permanent and non-permanent jobs, I use the information only of the permanent job.
4. Finally, for individuals who have more than one job with the same wage I choose the job in which they have worked most part of the year.

Wages reported in IMSS database are daily and before taxes. Furthermore, there is no information on the number of hours or days worked, but I assume that an employee works 30 days, on average. Hence, earnings reported in this paper correspond to a monthly wage (before taxes).

3.4 Descriptive statistics

The final data set, which contains the match between elementary school students and their labor market outcomes when employed in the formal sector, contains more than four million

observations. This represents about one third of the total number of Mexican students in the six cohorts I study in this paper (1997-2002). The matched database includes individuals' characteristics, schools' characteristics and labor market variables such as wages, number of jobs in a year, number of permanent jobs, distance and company size (see Table 1).

In the matched database, almost four of each 10 individuals are women and they are, on average, 20.9 years old. There are a lot of variation in terms of cognitive abilities (language and math), but the average individual is slightly to the left of the distribution of language and math test scores. The average school offers to each class about 14 minutes of English instruction per week (0.23*60=14). This last measure considers the zero hours of instruction offered by most of the Mexican primary schools, which explains the "short" average English instruction time. There are almost 29 students per class and more than 2/3 of the schools are located in urban localities.

Table 1: Descriptive statistics

Variable	Mean	SD	Min	Max
Individual characteristics				
Female	0.39	0.49	0	1
Age	20.88	1.51	16	24
Language test score	-0.06	0.97	-2.84	3.53
Math test score	-0.04	0.97	-2.69	3.40
School characteristics				
Hours of English instruction	0.23	0.60	0	9.41
English teachers	0.02	0.05	0	1
Number of students (6th grade)	28.87	9.49	1	119
Number of teachers with college	0.87	0.20	0	2.15
Number of teachers with masters	0.05	0.07	0	0.91
Rural	0.27	0.44	0	1
Labor market characteristics				
Wage (monthly pesos)	6,586	3,383	2,510	67,215
Permanent job	0.81	0.39	0	1
Number of jobs (in a year)	1.48	0.83	1	17
Number of permanent jobs	1.20	0.83	0	14
Company size (workers)	1,922	5,456	1	92,972
Distance home-work (km)	107	265	0	2,029
Observations	4,055,434			

Note: These summary statistics correspond to the sample of students who were matched to their labor market outcomes. Furthermore, these statistics represent averages of all individuals in the sample (including all six cohorts) and also over the four years of labor data (2018-2021).

Regarding labor market characteristics, the average worker earns a wage of 6,586 pesos per month, which is almost three times the poverty line in Mexico. Most of the workers in

the formal sector (eight out of 10) have permanent jobs and the average worker has 1.5 jobs per year. This latter result could be associated to the fact that I observe young workers (between 16 and 24 years of age) with a lot of mobility in their first years participating in the labor market, but also because some workers in my sample have multiple jobs. Finally, the average company size is 1,922 workers, but there is a lot of variation, going from one single worker to about 93 thousand employees.

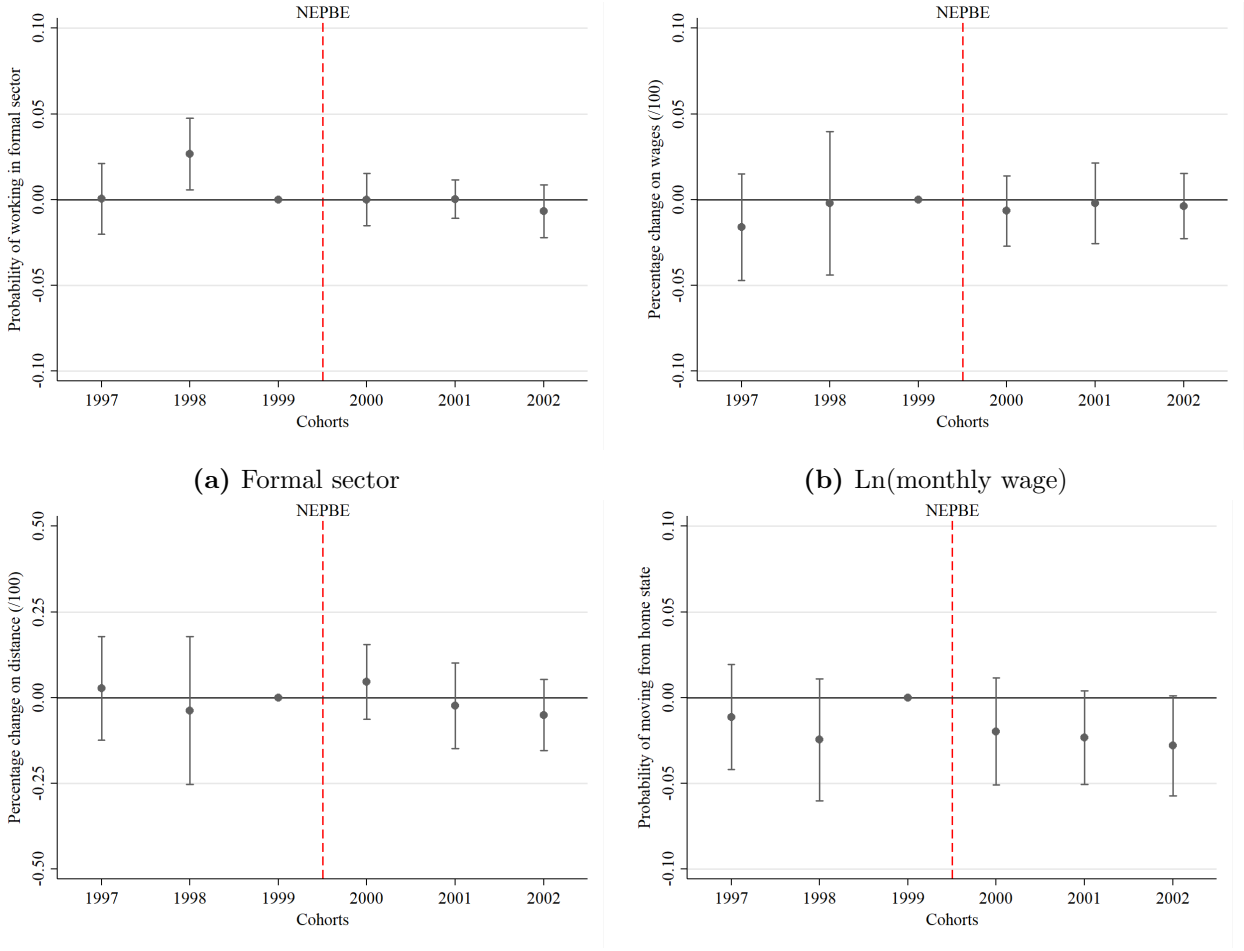
4 Results

In this section I offer evidence that exposure to English instruction at early stages of life does not have a significant effect on wages for the average worker, but it does have a positive effect among high ability individuals. I also show that exposure leads workers to substitute jobs in agriculture and construction for jobs in manufacturing industries. Furthermore, within manufacturing and services, individuals who had exposure are more likely to work in high-English intensive jobs. These results are based on a TWFE approach (relying on school FE), where I am able to match students who had exposure to English language instruction to their labor market outcomes around 10 years after finishing primary school.

I also provide evidence that exposure had no effect on other cognitive skills. This suggests that the effects I found on the labor market outcomes could be explained due to the acquisition of English abilities. These latter results are based on a TWFE model, in which I no longer need to link individuals to their labor market outcomes because in this analysis I am interested in studying their test scores at school. Using the school FE enables me to control for differences among schools that could generate a selection bias problem when estimating the effect of exposure to English instruction on labor market outcomes and student achievement.

In all my results, the usage of a school FE strategy allows me to solve the positive selection problem associated to the better characteristics of beneficiary schools over those that did not adopt the English program. This can be confirmed comparing columns 1-3 with column 4 of Table A.1 (from the appendix), where the estimate is smaller once we mitigate the selection problem. Furthermore, in both specifications I control for abilities, which enables me to control for the quality of the students if this is changing in time. In the appendix, I also offer robustness checks of my main results changing the measure of exposure to English instruction. Under this change, estimates have the same direction and significance (see Panels C and D of Table A.1).

Figure 10: Pre-trends test for main labor market outcomes



(a) Formal sector

(b) Ln(monthly wage)

(c) Distance home-job county

(d) Moves from home county

Note: Plotted estimates represent the interaction terms between the exposure variable and an indicator function for each cohort (1997-2002) in an event study type regression. The omitted cohort is 1999. The vertical dotted line indicates the introduction of the English program in Mexican primary schools. The no statistically significant estimates at the left of the vertical dotted line suggest parallel trends before the policy implementation.

4.1 English instruction and labor market outcomes

The exposure to English instruction at early stages of life could had changed the young students' human capital accumulation in several ways (which I discuss in the next subsection) and, hence, their labor market outcomes. If we compare students from the same schools, same ages and same backgrounds, but different exposure to English instruction, we could say something about the effect of this latter on labor market outcomes. The strategy I use to compare students with similar characteristics is to rely on a schools FE approach and to control for individuals' abilities (which usually is an unobservable variable). I have access to both, the school FE approach and the ability variable as a control, because of the richness

of my database.

My proposed model relies on two identifying assumptions. First, I assume that the unobservable characteristics that contribute to determine which schools are beneficiaries of the program from non-beneficiary schools, are fixed over time. I claim that this assumption is not very strong because those characteristics (better teachers, wealthier neighborhoods, schools with more resources and more information) do not actually change (much) over time. Second, I assume that there are not different pre-trends between the cohorts that had some exposure to English instruction and those who had no exposure. I provide suggestive evidence of this latter assumption in Figure 10, where I show the estimates of the interaction between each cohort and the English exposure variable.[7] The only exception is the 'formal sector' outcome variable, which makes sense since I cannot control for the observables in the labor market as I do not observe individuals who are not in the formal sector.

There is one additional issue that cannot be solved with my identification strategy: the selection into the sample. Although I am able to match primary school students to their labor market outcomes, I can only observe students who decided to work in the formal sector when they participate in the labor market. This caveat causes an additional selection problem (selection into the formal sector sample). I show evidence of this selection problem in panel A, column (1) of Table 2. My results suggest that one additional hour of English instruction reduces the probability of working in the formal sector by (more than) one percentage point. It is likely that this negative selection is explained by educational decisions of young individuals, who are still enrolled in school.

Due to this latter selection problem, we are worried that the estimates are downward bias, so we cannot interpret the exposure to English instruction on labor market outcomes as the real effect (see columns 2-4 of panel A). The intuition is that the potential high earners are being excluded from the formal labor sample. Thus, I only observe low skilled and low earners who would not had studied anyway, even after the exposure to English instruction.

To solve the selection into the (formal sector) sample I propose to use a sub-sample of individuals living in counties with low enrollment rates. From the previous analysis derived in Figure 2 of subsection 1.1, we know that if an individual is not working in the formal sector, he/she could be involved in one of three potential statuses: inactive, working in the informal sector or studying. Furthermore, we also noted that the proportion of people who are inactive and those working in the informal sector is pretty homogeneous among the cohorts I study in this paper. However, the variation among different cohorts is potentially generated because the younger individuals are still studying. Hence, since the selection into the sample is potentially caused by children who decide to pursue a high school or college degree, we could mitigate this selection problem by considering a sub-sample of individuals working in counties with low college enrollment rates.

[7] These plotted estimates correspond to those shown in panel B of Table 2, where I use a sub-sample of my data to solve a second selection problem (selection into the sample).

I construct this sub-sample using the 2020 Mexican population census. In particular, I define a variable that identifies counties[8] with low-enrollment rates in the year 2020 as follows:

1. I concentrate only on the youngest cohort (2002), which corresponds to the first year of college when observed in 2020.
2. I identify the employment status of each individual: inactive, student or worker.
3. I create a variable for those individuals who are students, but not workers.
4. By county, I take the ratio of students to population (in the cohort 2002).
5. I create a variable that identifies counties with 38 or less percentage of individuals enrolled in college (freshmen).[9]

Considering these criteria, I end up with a sub-sample of individuals with similar proportions of employment statuses among cohorts (see Figure A.2), which represents 6.4 percent of the original data. This new "low-enrollment sample" solves the selection into the sample problem. I provide evidence that this issue is solved in panel B, column (1) of Table 2, where I do not find any effect of English instruction on the probability of working in the formal sector.

Using this low-enrollment sample I find that the exposure to one additional hour of English instruction per week does not have any significant effect on wages. However, the point estimate suggests that the effect could be negative and close to two percent for women, while zero for men. Nevertheless, these estimated coefficients are not statistically different (see the t-test at the end of Table 2). On the other hand, although this sub-sample helps to overcome the selection into the sample, I find that in these low-enrollment counties men are less likely to work in the formal sector than women. This latter result may suggest that there are more men enrolled in school than women in these type of counties.

I also document that the exposure to English instruction reduces geographical mobility of male Mexican workers, while increases women's [10]. Indeed, point estimates suggest that exposure reduces men's mobility by 13 percent while increases women's by 6 percent, although both estimates are not statistically different. Furthermore, I find that the exposure to English instruction increases significantly women's likelihood of working on a state different from their home state, which suggests that women workers who had exposure to English instruction in primary school find more labor opportunities outside their home states. Men, on the other

[8] I use counties instead of localities (the smallest geographical area in Mexico) in order to not violate the confidentiality of individuals living in localities with a few households, which are easily identifiable.

[9] I choose this percentage of enrollment based on a sensibility analysis that I summarize in Figure A.1.

[10] I measure geographical mobility as the distance in miles from the individual's home county to his/her working county.

Table 2: Exposure to English instruction and labor market outcomes (Social Security data)

	(1) Formal Sector	(2) ln(wage)	(3) ln(distance)	(4) Move State
Panel A: Full sample				
Hrs English	-0.013***	-0.015***	-0.035***	-0.004***
	(0.001)	(0.002)	(0.008)	(0.001)
Observations	16,938,183	4,055,434	4,055,434	4,055,434
Adjusted R^2	0.105	0.270	0.477	0.555
Panel B: Low enrollment sample				
Hrs English	-0.012	-0.005	-0.058	0.015**
	(0.008)	(0.011)	(0.044)	(0.007)
Observations	1,554,827	259,666	259,666	259,666
Adjusted R^2	0.123	0.312	0.677	0.727
Panel C: Low enrollment sample (Men)				
Hrs English (β^M)	-0.016	-0.002	-0.130**	0.004
	(0.011)	(0.016)	(0.057)	(0.012)
Observations	750,812	166,165	166,165	166,165
Adjusted R^2	0.149	0.315	0.680	0.729
Panel D: Low enrollment sample (Women)				
Hrs English (β^W)	-0.010	-0.022	0.063*	0.033**
	(0.010)	(0.015)	(0.034)	(0.012)
Observations	804,015	93,501	93,501	93,501
Adjusted R^2	0.107	0.363	0.700	0.756
$\beta^M = \beta^W$ [p-value]	[0.012]	[0.448]	[0.190]	[0.090]
State of work FE	NO	YES	YES	YES

Note: This table shows the effect of the exposure to English instruction on labor market outcomes. The sample contains all Mexican workers who belong to the cohorts 1997-2002, who are less than 25 and who are employed in the formal sector. All regressions include controls. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

hand, are employed in places that are closer to their home counties within the same home state (see columns (3) and (4) of panels C and D in Table 2).

On the other hand, the lack of effect of exposure on wages conceals a subtle ability heterogeneity. In fact, I show that high ability students who had exposure to English instruction saw an increase on their wages when they enter the labor market, compared to those that had no exposure. To measure ability I use the Math test score in sixth grade. I classify individuals according to their abilities by quartiles. The quartile of reference includes low ability students at the bottom of the distribution (first quartile). Then I use the same specification as in Equation 1, but with interactions of each indicator variable per quartile and the exposure variable to capture the effect of exposure by ability.

My results suggest that exposure to English instruction has positive effects on wages of high ability students. In particular, one additional hour of exposure increases wages of individuals in the third quartile by 3.1 percent (with respect of those with low abilities) and has no significant effect on geographical mobility. However, I find that the sample of individuals in the fourth quartile (top ability students) still has a selection problem, which understates the wages estimate (even though, point estimate is positive). This persistent selection problem may suggest that individuals with highest abilities who had exposure are more likely to keep enrolled in school despite the lack of opportunities in their home counties. No further interpretation should be done for the geographical mobility of individuals in top quartile due to the remaining selection problem. On the other hand, individuals in the second quartile are not affected by exposure of English instruction (neither on wages nor on geographical mobility). This maybe due to the fact that low ability students do not take advantage of their English courses or that they are not acquiring English skills.

Most of the positive effect on wages in the third quartile is driven by men, who see a four percent increase in wages if they had exposure to English instruction in primary school. The effect on women is about two percent. As in the joint sample (men and women), there are no differences in the effect on geographical mobility by men quartiles, although women in the second quartile are less likely to move from their home state.

4.2 Mechanisms: Economic industries and cognitive abilities

In this subsection I present results from two out of the three main potential mechanisms: economic industries and cognitive abilities (measured with student achievement). First, I show that individuals who had exposure to English instruction substitute jobs in agriculture and construction for manufacturing industries. Furthermore, within manufacturing and services industries, I find movements from low-English intensive to high-English intensive jobs.

Table 3: Exposure to English instruction and labor market outcomes by abilities (Social Security data)

	(1) Formal Sector	(2) ln(wage)	(3) ln(distance)	(4) Move State
Panel A: Low enrollment sample				
Hrs English	-0.007	-0.013	-0.079	0.021**
	(0.009)	(0.012)	(0.049)	(0.010)
Eng×Q2	-0.003	-0.003	-0.018	-0.011
	(0.006)	(0.009)	(0.047)	(0.008)
Eng×Q3	-0.005	0.031***	0.012	-0.017
	(0.006)	(0.009)	(0.036)	(0.011)
Eng×Q4	-0.013**	0.012	0.106***	0.001
	(0.006)	(0.012)	(0.040)	(0.012)
Observations	1,554,827	259,666	259,666	259,666
Adjusted R^2	0.123	0.312	0.677	0.727
Panel B: Low enrollment sample (Men)				
Hrs English	-0.014	-0.010	-0.145**	0.008
	(0.012)	(0.018)	(0.064)	(0.014)
Eng×Q2	0.007	-0.001	-0.023	-0.005
	(0.009)	(0.011)	(0.060)	(0.010)
Eng×Q3	-0.006	0.040***	0.008	-0.014
	(0.011)	(0.014)	(0.049)	(0.012)
Eng×Q4	-0.013	0.010	0.104*	-0.001
	(0.011)	(0.017)	(0.058)	(0.014)
Observations	750,812	166,165	166,165	166,165
Adjusted R^2	0.149	0.315	0.680	0.729
Panel C: Low enrollment sample (Women)				
Hrs English	-0.007	-0.030*	0.029	0.042**
	(0.010)	(0.016)	(0.084)	(0.017)
Eng×Q2	-0.006	-0.007	-0.002	-0.024**
	(0.007)	(0.012)	(0.065)	(0.012)
Eng×Q3	-0.000	0.017*	0.017	-0.020
	(0.006)	(0.010)	(0.087)	(0.017)
Eng×Q4	-0.008	0.017	0.109	0.004
	(0.007)	(0.017)	(0.080)	(0.019)
Observations	804,015	93,501	93,501	93,501
Adjusted R^2	0.107	0.363	0.701	0.756
State of work FE	NO	YES	YES	YES

Note: This table shows the effect of the exposure to English instruction on labor market outcomes by quartiles of abilities. All regressions include controls. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2.1 English instruction and economic industries

One of the mechanisms that explains the results shown previously is the type of jobs that the individuals find when they enter the labor market. In this subsection I describe the effect of exposure to English instruction on the likelihood to work in different economic industries. Since the industries classification sums to one, opposite signs can be interpreted as substitutions.

Table 4: Exposure to English instruction and economic industries (Social Security data)

	(1) Agri-culture	(2) Con-struction	(3) Manu-facture	(4) Serv-ices
Panel A: Full sample				
Hrs English	-0.005***	-0.005***	0.000	0.010***
	(0.001)	(0.001)	(0.002)	(0.002)
Observations	4,055,434	4,055,434	4,055,434	4,055,434
Adjusted R^2	0.316	0.175	0.231	0.261
Panel B: Low enrollment sample				
Hrs English	-0.012**	-0.025**	0.040**	-0.003
	(0.006)	(0.010)	(0.017)	(0.016)
Observations	259,666	259,666	259,666	259,666
Adjusted R^2	0.402	0.388	0.342	0.292
Panel C: Low enrollment sample (Men)				
Hrs English (β^M)	-0.005	-0.026*	0.040**	-0.010
	(0.008)	(0.014)	(0.020)	(0.020)
Observations	166,165	166,165	166,165	166,165
Adjusted R^2	0.424	0.424	0.352	0.273
Panel D: Low enrollment sample (Women)				
Hrs English (β^W)	-0.024***	-0.006	0.043**	-0.012
	(0.008)	(0.006)	(0.021)	(0.024)
Observations	93,501	93,501	93,501	93,501
Adjusted R^2	0.446	0.139	0.383	0.383
$\beta^M = \beta^W$ [p-value]	[0.955]	[0.000]	[0.003]	[0.974]
Shares	0.04	0.08	0.35	0.53

Note: This table shows the effect of the exposure to English instruction on economic industries. The sample contains all Mexican workers who belong to the cohorts 1997-2002, who are less than 25 and who are employed in some economic industry. All regressions include controls. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I show that individuals who had exposure to English instruction substitute jobs in agriculture and construction for jobs in manufacturing industries. In particular, I find that men

substitute jobs in construction for jobs in manufacturing, which may explain why their mobility got reduced. This is because the construction type jobs (mining, utilities and construction itself) are usually located in the suburbs or in less populated areas outside the central business districts (CBD), while manufacturing type jobs are located in more populated areas or within the CBD (see columns (2) and (3) of panel C in Table 4). Similarly, women substitute agriculture jobs for manufacturing jobs, which geographically means a movement from rural areas to a more urban context. This explains why women who had exposure become more mobile and they are more likely to move from their home counties (see columns (1) and (3) of panel D in Table 4).

The substitution of agriculture and construction for manufacturing industries is heterogeneous by abilities (consistently with the results of subsection 4.1). First, I find that the substitution of agriculture for manufacturing industries is driven by individuals in the middle of the abilities distribution (second and third quartiles). This is maybe due to the fact that low ability individuals are not able to learn English, resulting unaffected by the exposure. On the other hand, it is likely that individuals in the top of the abilities distribution show no effect because of the selection problem; in other words, they are still enrolled in school. Second, the substitution of construction for manufacturing industries is driven by low-ability individuals (first and second quartiles), while the overall effect for high-ability individuals is not statistically different from zero, although point estimate is still negative (see panel A of Table 5).

In general, all women are better off moving away from agriculture, but only a few high ability men decide to move from construction to manufactures when the conditions are favorable (such as better wages, better work conditions or closer work place). Indeed, women move away from agriculture for all ability-types, with a stronger effect in the second quartile, but men have a significant substitution only for high ability individuals (see panels B and C of Table 5). Likewise, high-ability men (in the third quartile) behave differently from individuals in the rest of the abilities distribution when moving away from construction (with a smaller effect). These two latter results may explain why we found a significant increase of wages only for these type of individuals. In other words, high-ability individuals move away from agriculture but, although only men move away from construction, the effect on high-ability men is less strong in the substitution of construction for manufacturing industries. This heterogeneity driven by high ability individuals conciliates their increase of wages.

Furthermore, it is interesting to understand what is making more attractive the manufacturing industry and why there is not apparent change in services. There are two potential stories. First, that the exposure to English instruction increased the probability of working in jobs requiring English abilities, such as telecommunications and professionals or, second, that this exposure increased the probability of working in companies that are mainly export-oriented. I provide evidence that the first story is more plausible than the second one (see Panel B of Table 6 and Table 7). Notice that the estimates in panel A of Table 4 are biased because there is a (negative) selection into the sample, plus individuals could choose different

Table 5: Exposure to English instruction and economic industries by abilities (Social Security data)

	(1) Agri-culture	(2) Con-struction	(3) Manu-facture	(4) Serv-ices
Panel A: Low enrollment sample				
Hrs English	-0.005	-0.035***	0.049***	-0.008
	(0.007)	(0.010)	(0.018)	(0.018)
Eng×Q2	-0.014***	0.006	-0.010	0.017
	(0.004)	(0.005)	(0.011)	(0.011)
Eng×Q3	-0.011*	0.020***	-0.008	-0.001
	(0.006)	(0.006)	(0.012)	(0.012)
Eng×Q4	-0.005	0.022***	-0.022*	0.004
	(0.006)	(0.007)	(0.013)	(0.010)
Observations	259,666	259,666	259,666	259,666
Adjusted R^2	0.402	0.388	0.342	0.292
Panel B: Low enrollment sample (Men)				
Hrs English	0.002	-0.036***	0.041*	-0.006
	(0.010)	(0.014)	(0.022)	(0.020)
Eng×Q2	-0.011	0.004	0.007	0.001
	(0.007)	(0.007)	(0.012)	(0.013)
Eng×Q3	-0.016**	0.023***	-0.009	0.002
	(0.007)	(0.008)	(0.015)	(0.015)
Eng×Q4	-0.004	0.029***	-0.004	-0.021
	(0.009)	(0.011)	(0.018)	(0.014)
Observations	166,165	166,165	166,165	166,165
Adjusted R^2	0.424	0.424	0.352	0.273
Panel C: Low enrollment sample (Women)				
Hrs English	-0.018**	-0.008	0.062**	-0.036
	(0.009)	(0.006)	(0.028)	(0.028)
Eng×Q2	-0.018*	0.003	-0.029	0.044**
	(0.010)	(0.007)	(0.024)	(0.018)
Eng×Q3	-0.005	0.000	0.000	0.004
	(0.011)	(0.004)	(0.022)	(0.021)
Eng×Q4	-0.006	0.003	-0.052**	0.054***
	(0.009)	(0.005)	(0.022)	(0.020)
Observations	93,501	93,501	93,501	93,501
Adjusted R^2	0.446	0.139	0.384	0.383
Shares	0.04	0.08	0.35	0.53

Note: This table shows the effect of the exposure to English instruction on economic industries, by abilities. The sample contains all Mexican workers who belong to the cohorts 1997-2002, who are less than 25 and who are employed in some economic industry. All regressions include controls. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

types of economic industries when working in the formal sector than in the informal sector. Indeed, I show evidence of this bias problem by comparing estimates of panel A and B.

Table 6: Exposure to English instruction and economic industries (Social Security data)

	(1)	(2)	(3)	(4)
	Manufactures		Services	
	High English	Low English	High English	Low English
Panel A: Full sample				
Hrs English	0.006***	-0.008***	0.016***	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
Observations	4,055,434	4,055,434	4,055,434	4,055,434
Adjusted R^2	0.098	0.128	0.092	0.099
Panel B: Low enrollment sample				
Hrs English	0.060***	-0.026**	0.046***	-0.039***
	(0.013)	(0.012)	(0.014)	(0.011)
Observations	259,666	259,666	259,666	259,666
Adjusted R^2	0.175	0.189	0.145	0.116
Panel C: Low enrollment sample (Men)				
Hrs English (β^M)	0.075***	-0.035**	0.033**	-0.035**
	(0.016)	(0.016)	(0.015)	(0.014)
Observations	166,165	166,165	166,165	166,165
Adjusted R^2	0.175	0.202	0.163	0.111
Panel D: Low enrollment sample (Women)				
Hrs English (β^W)	0.038*	-0.011	0.047*	-0.039*
	(0.020)	(0.018)	(0.027)	(0.023)
Observations	93,501	93,501	93,501	93,501
Adjusted R^2	0.226	0.229	0.191	0.173
$\beta^M = \beta^W$ [p-value]	[0.058]	[0.070]	[0.454]	[0.594]
Shares	0.17	0.17	0.29	0.24

Note: This table shows the effect of the exposure to English instruction on economic industries according to their requirements to English abilities. The sample contains all Mexican workers who belong to the cohorts 1997-2002, who are less than 25 and who are employed in the formal sector. All regressions include controls. Shares are obtained from the low-enrollment sample and are expressed with respect to the universe of economic industries. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First, I explore the possibility that individuals who had exposure are more likely to work in jobs requiring English abilities by using the classification proposed by Gálvez-Soriano (2022). This classification shows what are the industries with more proportion of workers with English skills. Although the original classification is expressed at two-digit NAICS code, it is possible to have a finer classification using four-digit NAICS code. On the other hand,

I am aware that this proportion does not necessarily mean that those industries actually require English abilities but there should be some correspondence.

Using this classification I define a manufacturing industry as high-English intensive if the proportion of workers with English skills is greater than 0.8 percent (which corresponds to the highest quartile of the distribution of industries by proportion of this type of workers). Industries in this classification include: Animal food manufacturing, Beverage and tobacco industries, Apparel manufacturing, Leather and hide tanning, Wood industry, Paper industry, Chemical industry, Nonmetallic mineral products, Metal products, Manufacturing of computer and communications equipment, Electric appliances, and Transportation equipment. The complement of this group constitutes the low-English intensive manufacturing industries.

Similarly, services with high proportion of English speakers include: Wholesale trade of groceries, Wholesale trade of industrial machinery, Retail trade in self-service shops, Retail trade of health care items, Retail trade of perfumery and jewelry products, Retail trade of household furniture, Retail trade of automotive parts and accessories, Freight truck transportation, Warehousing services, Telecommunications, Commercial and industrial machinery and equipment rental, Administrative and support services, Artistic, cultural and sporting services, Traveler accommodation, Special food services, Drinking places, Personal and household goods repair and maintenance, Religious organizations, Personal and household goods repair and maintenance, and Justice, public order, and safety activities. I classify these industries if they have more than 0.8 percent of workers with English skills. The complement of these services industries constitute the low-English intensive jobs in services.[11]

My results suggest that workers who had exposure to English instruction in primary school substitute jobs in low-English intensive industries for high-English intensive industries. Indeed, individuals who had exposure to English instruction are more likely to find jobs in high-English manufacturing industries than in low-English ones. In particular, I show that one additional hour of English instruction increases the probability that they end up in this type of industries by six percent. On the other hand, one additional hour of English instruction in primary school makes individuals 4.6 percent more likely to find a high-English intensive service-industry job, and less likely to find a low-English intensive one.

Substitutions within manufacturing industries are driven by men, while within services there are not significant differences between men and women. This may suggest that despite men reduce their geographical mobility (as shown in Table 2), they found potentially better opportunities within the same industry, while women are facing more obstacles to do so (even though they increased their geographical mobility). Indeed, although point estimates suggest that women move from high to low English intensive jobs, these estimates are barely significant. Furthermore, this substitution is double the size for men. On the other hand, men have a very significant substitution between high and low English intensive services

[11] In the appendix A.1, Table A.3 and Table A.4, I provide a detailed description of the economic industries classified as high-English intensive using a four-digit NAICS code.

industries (in favor of the former) and, although point estimates suggest a larger effect for women, these estimates are barely statistically different from zero and there is not statistical difference between men and women estimates.

Table 7: Exposure to English instruction and manufacturing industries (Social Security data)

	(1) High-export share	(2) Low-export share
Panel A: Full sample		
Hrs English	0.001	-0.004**
	(0.002)	(0.002)
Observations	4,055,434	4,055,434
Adjusted R^2	0.155	0.117
Panel B: Low enrollment sample		
Hrs English	0.001	0.030**
	(0.016)	(0.015)
Observations	259,666	259,666
Adjusted R^2	0.249	0.182
Panel C: Low enrollment sample (Men)		
Hrs English (β^M)	-0.004	0.035**
	(0.020)	(0.017)
Observations	166,165	166,165
Adjusted R^2	0.246	0.192
Panel D: Low enrollment sample (Women)		
Hrs English (β^W)	0.006	0.025
	(0.019)	(0.025)
Observations	93,501	93,501
Adjusted R^2	0.302	0.227
$\beta^M = \beta^W$ [p-value]	[0.001]	[0.171]
Shares	0.12	0.23

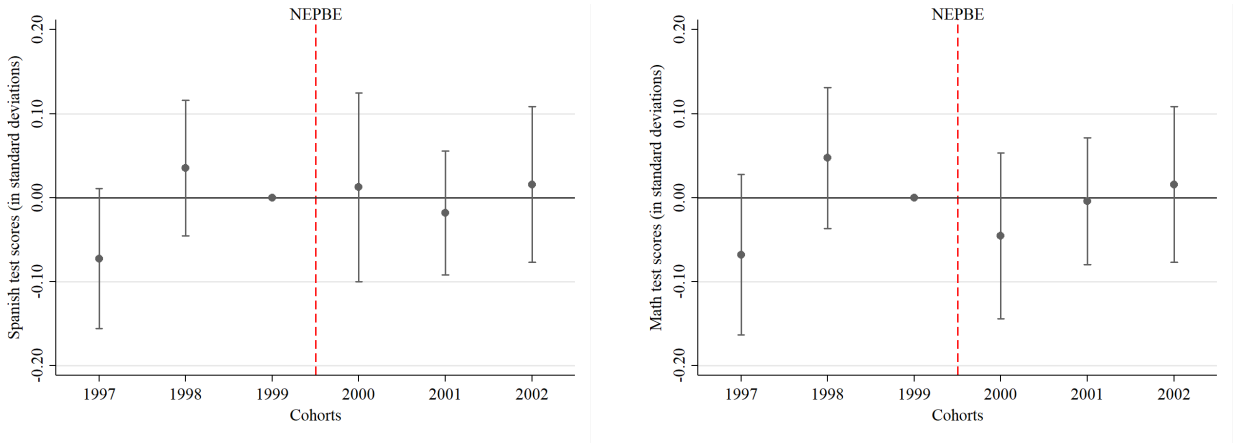
Note: This table shows the effect of the exposure to English instruction on economic industries. The sample contains all Mexican workers who belong to the cohorts 1997-2002, who are less than 25 and who are employed in the formal sector. All regressions include controls. Shares are obtained from the low-enrollment sample. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

On the other hand, I found that high ability men (who are positively affected by English instruction in terms of wages) have a weaker substitution of low-English intensive manufacturing jobs than low ability men. This may suggest that some of the occupations for English speakers in manufacturing industries are less intensive in communication skills. Furthermore, I found that English abilities payoff more in the services industry. And, high ability women

have a stronger substitution effect within manufacturing industries, in favor of high English intensive jobs. On the other hand, these high ability women have a weaker substitution in the services industries (relative to men), resulting in a worse allocation of their potentially acquired English abilities (see Table A.2).

In the second part of the analysis I explore the idea that individuals who had exposure to English instruction find jobs in export oriented industries. I concentrate on manufacturing industries to make sense of the potential export story. My results suggest that workers who took English classes in primary school substitute jobs in export industries for jobs in non-export industries. Furthermore, I find that women are more likely to work in export industries than men (see Panels C and D of Table 7). This latter result also helps to explain why women who had exposure find more labor opportunities farther from their home towns while men tend to stay. I offer a detailed explanation on how I define an export industry in the appendix, section A.4.

Figure 11: Pre-trends test for student achievement



(a) Spanish test scores

(b) Math test scores

Note: Plotted estimates represent the interaction terms between the exposure variable and an indicator function for each cohort (1997-2002) in an event study type regression. The omitted cohort is 1999. The vertical dotted line indicates the introduction of the English program in Mexican primary schools. The no statistically significant estimates at the left of the vertical dotted line suggest parallel trends before the policy implementation.

4.2.2 English instruction and student achievement

Results from estimating Equation 2 provide evidence that the English program had no effect on test scores. Indeed, I find that the NEPBE had no effect on neither Language nor Math test scores. This result suggests that the effects on the labor market outcomes (explained previously) are consistent with the acquisition of English abilities. In other words, although it is not possible to test directly the first stage effect of exposure to English instruction (due to the NEPBE) on English skills, I provide suggestive evidence that the English program did

not affect other cognitive skills. As I explained in subsection 2.2, school FE in this model account for most of the selection bias problem, which provides more reliability of my findings.

Table 8: Exposure to English instruction and student achievement

	(1) Language 6th	(2) Language 6th	(3) Math 6th	(4) Math 6th
Panel A: Full sample in Social Security data				
Hrs English	0.0313***	-0.0147*	0.0157***	-0.0191**
	(0.0033)	(0.0083)	(0.0036)	(0.0093)
Observations	4,055,434	4,055,434	4,055,434	4,055,434
Adjusted R^2	0.404	0.453	0.413	0.470
Panel B: Low enrollment sample				
Hrs English	0.0436	0.0281	0.0071	-0.0091
	(0.0429)	(0.0880)	(0.0328)	(0.0682)
Observations	259,666	259,666	259,666	259,666
Adjusted R^2	0.351	0.444	0.381	0.478
Panel C: Low enrollment sample (Men)				
Hrs English (β^M)	0.0569	0.0467	0.0106	-0.0136
	(0.0491)	(0.0977)	(0.0367)	(0.0858)
Observations	166,165	166,165	166,165	166,165
Adjusted R^2	0.310	0.426	0.369	0.481
Panel D: Low enrollment sample (Women)				
Hrs English (β^W)	0.0169	-0.0263	-0.0012	0.0050
	(0.0349)	(0.0954)	(0.0323)	(0.0753)
Observations	93,501	93,501	93,501	93,501
Adjusted R^2	0.371	0.487	0.398	0.521
$\beta^M = \beta^W$ [p-value]	[0.3686]	[0.4690]	[0.9547]	[0.9794]
State FE	YES	NO	YES	NO
School FE	NO	YES	NO	YES

Note: This table shows the effect of exposure to English instruction on test scores. All regressions include controls and school FE. The sample contains students who later in life will work in the formal sector and who studied primary school in counties where the upper-secondary and college enrollment rates are low. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I show the results of estimating my TWFE model exploiting the panel structure of my database in Table 8. To obtain the results of this table, I am using the same age cohorts I examined with the labor market outcomes model, so we can think about this as analyzing the Spanish and Math skills at the end of primary school due to the English exposure for those same individuals I examine their labor market outcomes later in life.

There are three interesting things to notice from Table 8. First, there is selection into which schools offer English instruction in Mexico. Second, I find no effect of English instruction on test scores (neither language nor mathematics). And, third, the nonexistent effect on

student achievement rules out the potential second mechanism, which suggested a possible effect on other cognitive skills.

As noted previously, there is selection into which schools offer English instruction. Indeed, when I control for school FE, taking care of many time invariant characteristics of schools and neighborhoods, the estimated coefficient associated to the exposure to English instruction variable goes down. To see this implication compare columns (1) and (2) of panel A in Table 8, for language abilities, and columns (3) and (4) for mathematics abilities. I obtain similar results in Table A.1, for the main labor market outcomes.

I find no effect of English instruction on test scores. This means that English instruction did not reduce neither language (Spanish) nor mathematics skills, as feared if more time is devoted to English at the expense of other subjects. On the other hand, it did not increase language skills either, suggesting no complementarities between English and Spanish in the context of Mexico.

This nonexistent effect on math and language abilities suggests is consistent with exposure increasing the acquisition of English skills. In other words, it is likely that the previously discussed estimates, regarding the effect of English instruction on labor market outcomes, are not driven by learning in other subjects, so it could be primarily interpreted as the direct effect of the acquisition of English language skills.

Conclusions and discussion

In this paper I evaluate the effect of exposure to English instruction at early stages of life on labor market outcomes, in the context of a non-English speaking country. For this purpose, I construct a novel database in which I observe primary school students of all Mexican schools, their student achievement and their labor market outcomes around 10 years after graduation from primary school. I exploit school by cohort variation of exposure to English language instruction in a TWFE model. My proposed specification relies on a school FE approach and a explicit control for individuals abilities, both of which intend to mitigate the selection problem.

I face a selection bias problem caused by schools that self-selected to participate in the NEPBE and because of a potential bias for omitted unobservable variables (cognitive abilities). The self-selection would result in an unfair comparison between schools with more information, more resources, better teachers or located in better neighborhoods with schools that did not participate in the English program because of the lack of information and resources. I solved this selection problem by controlling for school FE, which allowed me to compare students within the same school, but with different exposure to English instruction (different cohorts). Additionally, I explicitly control for individual's abilities (using test scores in sixth grade), which is usually an unobservable variable in the literature.

I deal with a second selection problem: selection into the sample. Indeed, I find that exposure to English instruction reduces the likelihood that an individual participates in formal sector employment. It is likely that this result is due to exposure to English instruction affecting enrolling in high school and college, as my analysis focuses on young adults aged 16-24 (the recency of the NEPBE means the affected cohorts are still young). I propose to analyze a low-enrollment sample to solve this second selection problem. Indeed, since the selection into the sample is potentially caused by children who decide to pursue a high school or college degree, we could mitigate this selection problem by considering a sub-sample of individuals living in counties with low college enrollment rates.

Focusing on a sub-sample that is unlikely to be enrolled by age 16, I find that exposure to English instruction did not affect wages, but individuals who had exposure are better-off because they are moving to jobs that require less physical work. Indeed, I find that exposure to English instruction has not average effect on wages, but individuals who had exposure substitute jobs in agriculture and construction for jobs in manufacturing industries. Furthermore, I offer evidence that men who had exposure only substitute construction for manufacturing industries, which are closer to their home counties. On the other hand, women substitute agriculture for manufacturing industries, moving from rural to urban areas (they work farther from their home counties and they are more likely to move from their home states).

Although I do not find wages improvements after exposure to English instruction, for the average worker, I do find a positive effect on wages of high ability individuals. This finding is result of an analysis of heterogeneity by abilities, where I document that individuals in the third quartile of the abilities distribution have higher wages if they had exposure in primary school. This effect is driven by men, although women have also a positive effect after exposure. Furthermore, there is a persistent selection problem among individuals in the top quartile, suggesting that even despite the lack of schools in their home counties, these high ability individuals keep enrolled in school.

Gender heterogeneity and the improvement of wages among high ability individuals could be due to gender wage gap affecting in two main ways: unequal substitution among economic industries and unequal substitution within the same industries. First, it is likely that the gender wage gap creates incentives for women to substitute agriculture for manufacturing industries, no matter the ability level. Namely, only high ability women are looking for fairer labor conditions. On the other hand, due to the lack of incentives generated by the gender wage gap among men, only high ability men substitute in the same direction as women, while their substitution of construction for manufacturing industries is weaker than for low ability men. This latter result suggests that a few high ability men decide to move from construction to manufacturing industries only when the labor conditions are more favorable in this latter (such as better wages, better work conditions or closer work place). Second, high ability men have a weaker substitution of low-English intensive manufacturing jobs than low ability men. This may suggest that some of the occupations for English speakers within manufacturing industries are less intensive in communication skills. Furthermore, I found that English abilities payoff more in the services industry. And, high ability women

have a stronger substitution effect within manufacturing industries, in favor of high English intensive jobs. On the other hand, these high ability women have a weaker substitution in the services industries (relative to men), resulting in a worse allocation of their potentially acquired English abilities

It is likely that these effects on labor market outcomes are consistent with exposure increasing the acquisition of English abilities. It is not possible, however, to test this implication directly due to the lack of measures of English abilities in Mexico. Instead, I evaluate whether exposure had an effect on other cognitive abilities. Thus, I identify two potential effects: 1) a positive effect because of a potential complementarity between English and Spanish, and 2) a negative effect as a consequence of rivalry among subjects due to a change in teaching time allocation. My results suggest that there is selection into which schools offer English instruction, confirming the selection problem we were concerned. Furthermore, I find no effects on Language and Math test scores, which suggests that the estimated effect of exposure to English language on wages is not reflecting changes to general cognitive skills. These findings are consistent with exposure to English instruction affecting labor market outcomes.

References

Adesope, Olusola O, Tracy Lavin, Terri Thompson, and Charles Ungerleider. 2010. "A systematic review and meta-analysis of the cognitive correlates of bilingualism." *Review of Educational Research*, 80(2): 207–245.

Anghel, Brindusa, Antonio Cabrales, and Jesus M Carro. 2016. "Evaluating a bilingual education program in Spain: The impact beyond foreign language learning." *Economic Inquiry*, 54(2): 1202–1223.

Angrist, Joshua, Aimee Chin, and Ricardo Godoy. 2008. "Is Spanish-only schooling responsible for the Puerto Rican language gap?" *Journal of Development Economics*, 85(1-2): 105–128.

Angrist, Joshua D, and Victor Lavy. 1997. "The Effect of a Change in Language of Instruction on the Returns to Schooling in Morocco." *Journal of Labor Economics*, 15(1, Part 2): S48–S76.

Atkin, David. 2016. "Endogenous skill acquisition and export manufacturing in Mexico." *American Economic Review*, 106(8): 2046–85.

Azam, Mehtabul, Aimee Chin, and Nishith Prakash. 2013. "The returns to English-language skills in India." *Economic Development and Cultural Change*, 61(2): 335–367.

Banco de México, BM. 2021. "Correspondencia de actividades dentro de la base de micro datos del IMSS con el Sistema de Clasificación Industrial de América del Norte 2018." Mexico City, Mexico, Dirección de Análisis Sobre Precios, Economía Regional e Información, Banco de México.

Bleakley, Hoyt, and Aimee Chin. 2004. "Language skills and earnings: Evidence from childhood immigrants." *Review of Economics and statistics*, 86(2): 481–496.

Bleakley, Hoyt, and Aimee Chin. 2010. "Age at arrival, English proficiency, and social assimilation among US immigrants." *American Economic Journal: Applied Economics*, 2(1): 165–92.

Cabrera-Hernández, Francisco. 2020. "Does Lengthening the School Day Increase School Value-Added? Evidence from a Mid-Income Country." *The Journal of Development Studies*, 56(2): 314–335.

Cappellari, Lorenzo, and Antonio Di Paolo. 2018. "Bilingual schooling and earnings: Evidence from a language-in-education reform." *Economics of Education Review*, 64: 90–101.

Chakraborty, Tanika, and Shilpi Kapur Bakshi. 2016. "English language premium: Evidence from a policy experiment in India." *Economics of Education Review*, 50: 1–16.

Charles-Leija, Humberto, and Aldo Josafat Torres. 2022. "English Proficiency and Salary in Mexico." *Analisis Económico*, 30(94): 167–180.

Chin, Aimee, N Meltem Daysal, and Scott A Imberman. 2013. "Impact of bilingual education programs on limited English proficient students and their peers: Regression discontinuity evidence from Texas." *Journal of Public Economics*, 107: 63–78.

Chiswick, Barry R. 1991. "Speaking, reading, and earnings among low-skilled immigrants." *Journal of labor economics*, 9(2): 149–170.

Chiswick, Barry R, and Paul W Miller. 1995. "The endogeneity between language and earnings: International analyses." *Journal of labor economics*, 13(2): 246–288.

Chiswick, Barry R, and Paul W Miller. 2010. "Occupational language requirements and the value of English in the US labor market." *Journal of Population Economics*, 23(1): 353–372.

Chiswick, Barry R., and Paul W. Miller. 2015. "International Migration and the Economics of Language." In *Handbook of the Economics of International Migration*. Vol. 1 of *Handbook of the Economics of International Migration*, , ed. Barry R. Chiswick and Paul W. Miller, 211–269. North-Holland.

Choi, Yool. 2015. "The effects of English training abroad on labor market outcomes in Korea." *Research in Social Stratification and Mobility*, 41: 11–24.

CIDAC. 2008. *CIDAC survey about human capital in Mexico.* Mexico City:Centro de Investigacion para el Desarrollo, A.C.

Delgado Helleseter, Miguel Antonio. 2020. "English Skills and Wages in a Non-English Speaking Country: Findings from Online Advertisements in Mexico." *The International Journal of Interdisciplinary Global Studies*, 15(3): 13–27.

Dustmann, Christian. 1994. "Speaking fluency, writing fluency and earnings of migrants." *Journal of Population economics*, 7(2): 133–156.

Dustmann, Christian, and Arthur van Soest. 2001. "Language fluency and earnings: Estimation with misclassified language indicators." *Review of Economics and Statistics*, 83(4): 663–674.

Education First, EF. 2020. *EF English Proficiency Index: A Ranking of 100 Countries and Regions by English Skills.* United States:Education First.

Eriksson, Katherine. 2014. "Does the language of instruction in primary school affect later labour market outcomes? Evidence from South Africa." *Economic History of Developing Regions*, 29(2): 311–335.

Gálvez-Soriano, Oscar. 2022. "Returns to English abilities and occupational decisions in Mexico." *Unpublished Manuscript. University of Houston*, 1–30.

Hayfron, John E. 2001. "Language training, language proficiency and earnings of immigrants in Norway." *Applied Economics*, 33(15): 1971–1979.

Isphording, Ingo E. 2014. "Language and labor market success."

Lang, Kevin, and Erez Siniver. 2009. "The return to English in a non-English speaking country: Russian immigrants and native Israelis in Israel." *The BE Journal of Economic Analysis & Policy*, 9(1).

Mincer, Jacob. 1974. "Schooling, earnings and experience." *National Bureau of Economic Research*.

Ramírez-Romero, José Luis, and Peter Sayer. 2016. "The teaching of English in public primary schools in Mexico: More heat than light?" *education policy analysis archives*, 24: 84.

Saiz, Albert, and Elena Zoido. 2005. "Listening to what the world says: Bilingualism and earnings in the United States." *Review of Economics and Statistics*, 87(3): 523–538.

Sayer, Peter. 2015*a*. "Expanding global language education in public primary schools: The national English programme in Mexico." *Language, Culture and Curriculum*, 28(3): 257–275.

Sayer, Peter. 2015*b*. "A response to the Sorry report on the state of the PNIEB and English language education in Mexican public schools." *Mextesol Journal*, 39(4): 1–11.

Sayer, Peter. 2015*c*. ""More & earlier": Neoliberalism and primary English education in Mexican public schools." *L2 Journal*, 7(3).

SEP. 2011. *National English Program in Basic Education. Second Language: English.* Mexico:Secretaria de Educacion Publica.

Shields, Michael A, and Stephen Wheatley Price. 2002. "The English language fluency and occupational success of ethnic minority immigrant men living in English metropolitan areas." *Journal of population Economics*, 15(1): 137–160.

Székely, M, JL O'Donoghue, and H Pérez. 2015. "El estado del aprendizaje del inglés en México." In *Sorry: el aprendizaje del inglés en México.* , ed. Jennifer L. O´Donoghue, 83–97. Mexico:Mexicanos Primero.

Taylor, Stephen, and Marisa von Fintel. 2016. "Estimating the impact of language of instruction in South African primary schools: A fixed effects approach." *Economics of Education Review*, 50: 75–89.

Williams, Donald R. 2011. "Multiple language usage and earnings in Western Europe." *International Journal of Manpower*.

Appendix

A.1 Solving two selection problems

In this research I face two selection problems. The first selection problem is caused by schools that self-selected to participate in the NEPBE. This self-selection resulted in an unfair comparison between schools with more information, more resources, better teachers or located in better neighborhoods with schools that did not participate in the program because the lack of information and resources. As explained in subsection 2.1, I solved this selection problem using a school FE approach (see Table A.1), which allowed me to compare students within the same school, but with different exposure to English instruction (different cohorts).

Table A.1: English instruction and the selection problem (Social Security data)

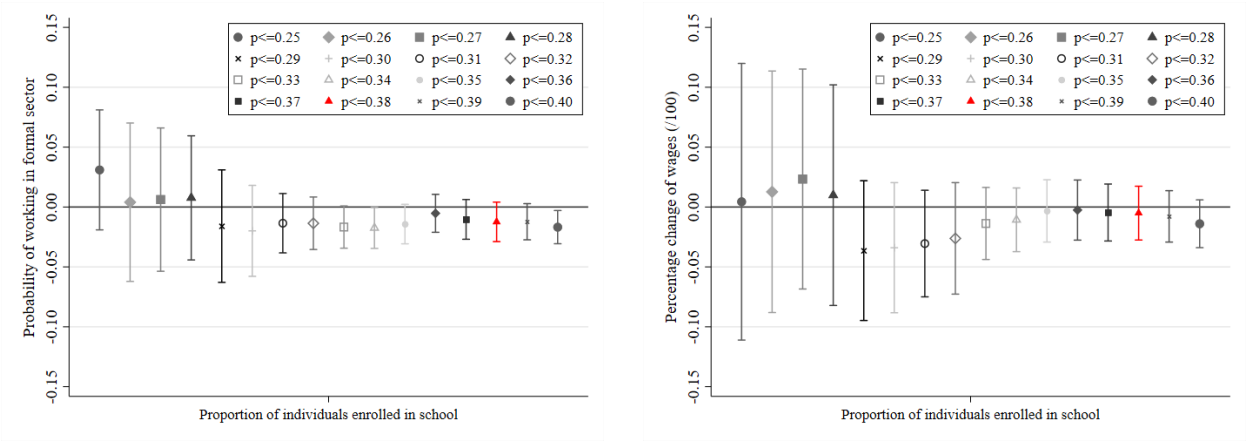
	(1) ln(wage)	(2) ln(wage)	(3) ln(wage)	(4) ln(wage)
Panel A: Hours of English instruction				
Hrs English	-0.005**	-0.009***	-0.008***	-0.015***
	(0.002)	(0.001)	(0.001)	(0.002)
Observations	4,055,434	4,055,434	4,055,434	4,055,434
Adjusted R^2	0.227	0.252	0.265	0.270
Panel B: Hours of English instruction (low enrollment)				
Hrs English	0.001	-0.006	-0.002	-0.005
	(0.007)	(0.007)	(0.008)	(0.011)
Observations	259,666	259,666	259,666	259,666
Adjusted R^2	0.234	0.268	0.308	0.312
State FE	YES	NO	NO	NO
County FE	NO	YES	NO	NO
Locality FE	NO	NO	YES	NO
School FE	NO	NO	NO	YES

Note: This table shows the effect of the exposure to English instruction on wages under different fixed effects levels to see how the selection problem is solved using school FE. The sample contains all Mexican workers who belong to the cohorts 1997-2002, who are less than 25 and who are employed in the formal sector. All regressions include controls. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The second selection problem is caused because individuals in my sample data self-selected to participate in the formal sector: selection into the sample. Indeed, since I can only match kids to their labor registers if they work in the formal sector, I might consistently lose certain type of individuals who decide not to participate in the formal labor market. It is likely

that the individuals I do not observe in the social security data are high ability individuals or potentially high earners who decided to continue being enrolled in school. This latter conclusion derives from two facts. First, individuals in my sample are still young (16-24 years of age), which makes them more likely to be enrolled in school. Second, among the cohorts I study in this paper, most of the variation in economic statuses is due to education and formal work (see Figure 2).

Figure A.1: Effect of exposure to English instruction on wages (by proportion of enrollment)



(a) Formal sector **(b)** Wages

Source: Own elaboration with data from Mexican Social Security data.

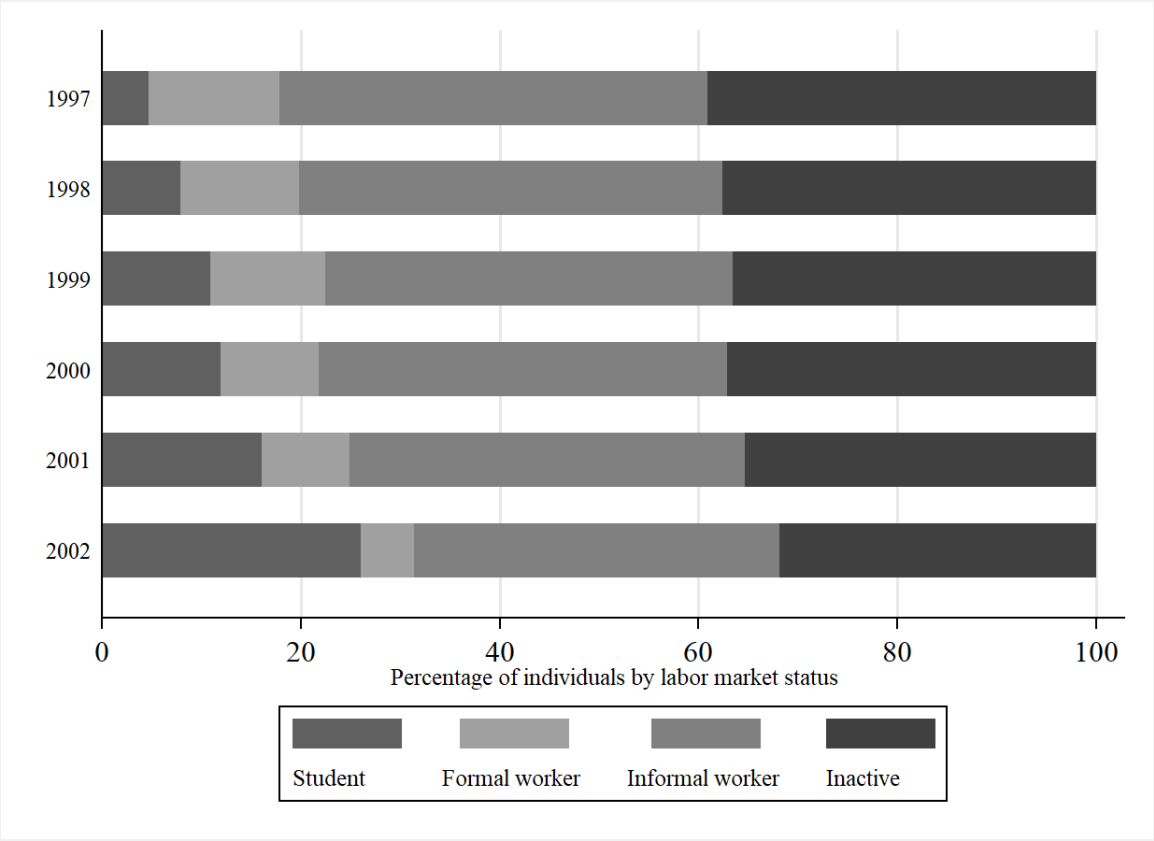
Note: Estimates from different regressions are plotted, where the difference comes from the samples used. Most of the estimates where the proportion of individuals enrolled in school is less than 0.39 are unbiased.

To solve the selection into the sample problem I propose to use a sub-sample of individuals living in counties with low-enrollment rates. The idea behind this potential solution is that if individuals have no chance to continue studying due to the lack of opportunities in their home counties, it will be more likely that the exposure to English instruction does not affect their decision to participate in the labor market.

To determine the counties with low-enrollment rates I use a sensibility analysis. Indeed, for different enrollment rates, I estimate the effect of exposure on formal labor force participation. These different enrollment rates are inclusive. In other words, a 0.25 rate includes counties with 0.25 enrollment rate or less, and so on. Figure A.1 shows a graphical representation of this exercise of sensibility. Each point estimate plotted represent a single regression with a particular enrollment rate.

Results from this exercise suggest to use enrollment rates around 0.38 where the effect of exposure on labor force participation is not statistically different from zero (see panel (a) of Figure A.1). Panel (b) complements the analysis by showing the same sensibility analysis, but for wages as the dependent variable. Notice how the estimate is biased for samples in which the selection problem is a determinant. Using this low-enrollment sample, economic statuses look more homogeneous among the cohorts I study in this paper (see Figure A.2).

Figure A.2: Composition of Mexican labor force by cohort (low-enrollment sample).



Note: Percentage of Mexicans in certain labor market statuses (by cohort) are plotted. Notice that, in this sub-sample, the proportion of individuals performing certain occupations is relatively homogeneous across cohorts, but there is still some variation in school enrollment.

A.2 Manufacturing and services industries with low and high English intensive requirements (by abilities)

In subsection 4.1 I showed that exposure to English instruction increased wages of high ability individuals. This positive effect on wages can be explained because both, men an women in the high part of the abilities distribution, substitute jobs in agriculture for manufacturing industries. On the other hand, only men substituted construction for manufacturing industries, although this substitution is less strong for high-ability men. Likewise, I found that men who had exposure reduced their geographical mobility (the opposite is true for women). However, men found potentially better opportunities within the same industry, while women are facing more obstacles to do so (even though they increased their geographical mobility).

Furthermore, I documented that withing manufacturing and services industries, there is

Table A.2: Exposure to English instruction and economic industries by abilities (Social Security data)

	(1)	(2)	(3)	(4)
	Manufactures		Services	
	High English	Low English	High English	Low English
Panel A: Low enrollment sample				
Hrs English	0.065***	-0.020	0.040***	-0.037***
	(0.014)	(0.015)	(0.015)	(0.012)
Eng×Q2	0.001	-0.012	0.021*	-0.005
	(0.009)	(0.010)	(0.011)	(0.008)
Eng×Q3	-0.007	0.000	0.001	-0.003
	(0.011)	(0.011)	(0.010)	(0.007)
Eng×Q4	-0.012	-0.014	0.004	0.000
	(0.011)	(0.014)	(0.009)	(0.008)
Observations	259,666	259,666	259,666	259,666
Adjusted R^2	0.175	0.189	0.145	0.116
Panel B: Low enrollment sample (Men)				
Hrs English	0.083***	-0.041**	0.031**	-0.031**
	(0.018)	(0.018)	(0.015)	(0.013)
Eng×Q2	-0.002	0.005	0.015	-0.006
	(0.011)	(0.012)	(0.012)	(0.007)
Eng×Q3	-0.024**	0.019	0.009	-0.008
	(0.010)	(0.013)	(0.012)	(0.007)
Eng×Q4	-0.014	0.006	-0.011	-0.005
	(0.014)	(0.016)	(0.013)	(0.011)
Observations	166,165	166,165	166,165	166,165
Adjusted R^2	0.175	0.202	0.163	0.111
Panel C: Low enrollment sample (Women)				
Hrs English	0.025	0.022	0.036	-0.046*
	(0.024)	(0.026)	(0.029)	(0.026)
Eng×Q2	0.017	-0.042*	0.024	-0.001
	(0.019)	(0.022)	(0.020)	(0.015)
Eng×Q3	0.034	-0.032	-0.010	0.006
	(0.022)	(0.021)	(0.020)	(0.016)
Eng×Q4	-0.001	-0.055**	0.031	0.019
	(0.018)	(0.027)	(0.022)	(0.021)
Observations	93,501	93,501	93,501	93,501
Adjusted R^2	0.226	0.229	0.192	0.174
Shares	0.17	0.17	0.29	0.24

Note: This table shows the effect of the exposure to English instruction on economic industries, by abilities. The sample contains all Mexican workers who belong to the cohorts 1997-2002, who are less than 25 and who are employed in some economic industry. All regressions include controls. Standard errors clustered at school level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

a strong substitution between low and high English intensive jobs in favor of the latter. This effect is stronger for men than for women. In this section I provide evidence that high ability individuals benefited more from exposure to English instruction than other individuals in the distribution for a different substitution than the aforementioned one.

High ability men (in the third quartile of the abilities distribution) have a weaker substitution of low-English intensive manufacturing jobs than low ability men. This may suggest that some of the occupations for English speakers in manufacturing industries are less intensive in communication skills. Thus it is likely that these occupations are more manual intensive such as machine operators. This story make sense due to the substitution between construction and manufacturing industries that men do, since similar manual skills are required.

English abilities payoff more in the services industry. Indeed, men around the the middle of the abilities distribution (including the third quartile) have a stronger substitution of low-English intensive services jobs for high-English intensive ones. The story behind this result is that English abilities payoff more in the services industry because occupations in this industry are more likely to require communication skills.

The weaker effect of exposure on women's wages could be explain by an opposite substitution behavior. In other words, high ability women have a stronger substitution effect within manufacturing industries, in favor of high English intensive jobs. On the other hand, these high ability women have a weaker substitution in the services industries (relative to men), resulting in a worse allocation of their potentially acquired English abilities.

A.3 High-English intensive industries

In this section I show a detailed description of the industries I classified as high-English intensive using the classification recently proposed by Gálvez-Soriano (2022). The data source to construct this classification is the Mexican subjective well-being survey (BIARE, for its acronym in Spanish). BIARE is a representative survey at national and state level, it asks adults (18 and older) for their English skills. In particular, the survey asks: Do you speak English? BIARE database contains a comprehensive description of the economic industries for all Mexican who reported to actively participate in the labor force.

Economic industries are classified using the NIACS classification system at four-digit detail. On the other hand, social security data (from IMSS) reports its own economic industries classification. I paired the IMSS classification with the NAICS system using the match proposed by Banco de México (2021). However, this latter has a detail of two-digit NAICS code. Hence, I expanded this original match using pairing the descriptions reported in both, IMSS and NAICS system.

Table A.3: Economic Manufacturing Industries

4-digit code	Industry name	5-digit code	Industry name
3110	Animal food manufacturing	31131	Sugar and confectionery product manufacturing
		31141	Fruit and vegetable preserving manufacturing
		31151	Dairy product manufacturing
		31161	Animal slaughtering and processing
3120	Beverage and tobacco industries	31211	Beverage manufacturing
3150	Apparel manufacturing	31511	Apparel knitting mills
		31521	Cut and sew apparel manufacturing
3160	Leather and hide tanning and finishing	31611	Leather and hide tanning and finishing
		31621	Footwear manufacturing
3220	Paper industry	32211	Pulp, paper, and paperboard mills
3250	Chemical industry	32511	Basic chemical manufacturing
		32521	Resin, synthetic rubber, and artificial and synthetic fibers
		32541	Pharmaceutical and medicine manufacturing
		32551	Paint, coating, and adhesive manufacturing
		32591	Other chemical product and preparation manufacturing
3270	Nonmetallic mineral products	32711	Clay product and refractory manufacturing
		32731	Cement and concrete product manufacturing
3320	Metal products manufacturing	33241	Boiler, tank, and shipping container manufacturing
		33251	Hardware manufacturing
		33281	Coating, engraving, heat treating, and allied activities
3340	Manufacturing of computer	33461	Manufacturing and reproducing magnetic and optical media
3350	Electric appliances and electric power generation	33511	Electric lighting equipment manufacturing
		33521	Household appliance manufacturing
		33531	Electrical equipment manufacturing
3360	Transportation equipment	33611	Motor vehicle manufacturing
		33641	Aerospace product and parts manufacturing
		33651	Railroad rolling stock manufacturing
		33661	Ship and boat building
3370	Household furniture	33710	Nonupholstered wood household furniture manufacturing

Note: Manufacturing industries with high shares of workers with English abilities. This classification was obtained from Gálvez-Soriano (2022), using 2014 BIARE survey.

Table A.4: Economic Services Industries

4-digit code	Industry name	5-digit code	Industry name
4310	Wholesale trade of groceries, food, beverages and tobacco	43111	Grocery merchant wholesalers
		43112	Tobacco and alcoholic beverage merchant wholesalers
4350	Wholesale trade of industrial machinery and equipment	43522	Wholesale trade of manufacturing machinery and equipment
		43541	Computer and software merchant wholesalers
4620	Retail trade in self-service shops and department stores	46211	Retail trade in self-service shops
		46221	Retail trade in department stores
4641	Retail trade of health care items	46412	Optical goods and other health care stores
4651	Retail trade of perfumery and jewelry	46511	Cosmetics, beauty supplies, and perfume stores
4661	Retail trade of household furniture	46611	Furniture stores
4682	Automotive parts and accessories	46821	Automotive parts, accessories, and tire stores
4841	Freight truck transportation	48410	General freight trucking
4931	Warehousing services	49310	Warehousing and storage
5170	Telecommunications	51731	Wired and wireless telecommunications carriers
5324	Commercial and industrial machinery	53242	Office machinery and equipment rental and leasing
5610	Administrative and support services	56160	Investigation and security services
		56170	Services to buildings and dwellings
7100	Artistic, cultural and sporting services	71121	Spectator sports
		71311	Amusement parks and arcades
7211	Traveler accommodation	72111	Hotels and motels
7223	Special food services	72231	Food and beverage preparation services
7224	Drinking places (alcoholic beverages)	72241	Nightclubs, bars and similar drinking places
8114	Personal and household goods repair	81140	Personal and household goods repair and maintenance
8131	Religious organizations	81311	Religious organizations
9314	Justice, public order, and safety	93141	Justice, public order, and safety activities

Note: Services industries with high shares of workers with English abilities. This classification was obtained from Gálvez-Soriano (2022), using 2014 BIARE survey.

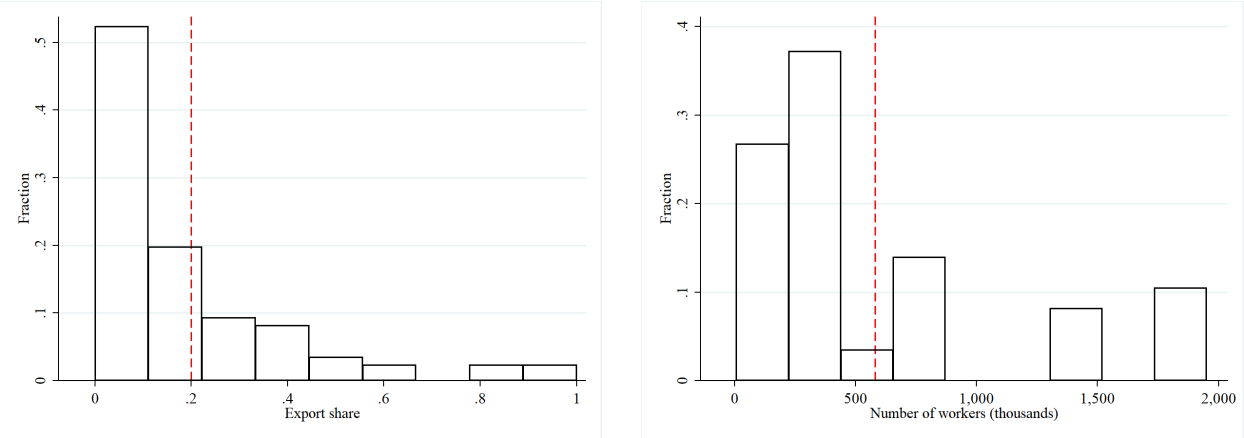
After matching both data sets, I classified an industry as high-English intensive if the proportion of workers in this industry is greater than 0.8 percent. Notice that most of the English speakers distribution concentrates at zero. Table A.3 and Table A.4 report the resulting classification using industries at four-digit NAICS code for manufacturing and services, respectively.

A.4 Export oriented industries

With the rapid growth of globalization among developing countries and the establishment of international companies in these economies looking for cheap labor force, it is tempting to argue that the formation of English abilities among some selected individuals could increase their likelihood to find more labor opportunities in export-oriented industries. This could be the case of maquiladoras in Mexico.

To study this mechanism, I construct a variable that categorizes the economic industries reported in IMSS data using a similar method as the one proposed by Atkin (2016). First, I use the "correlation table" between the Law on General Import and Export Taxes (LIGIE) and the North American Industrial Classification System (NAICS), published by INEGI in 2021, to classify each of the products exported from Mexico in the NAICS system. Then, I took the ratio between the value of the exports in each NAICS industry and the GDP in that same industry (both expressed at a quarterly frequency and in constant pesos).

Figure A.3: Exports share and number of workers in manufacturing industries



(a) Exports share **(b)** Number of workers

Note: Distributions of exports share and number of workers are plotted. Each observation in the distribution corresponds to an economic industry in the sub-sector of manufactures. I use the North American Industry Classification System (NAICS) at four-digit code to classify each industry, which means that I work with a total of 86 different economic industries.

I define an industry as export-oriented if more than 20 percent of the GDP in that indus-

try is exported and, if this industry has more workers than the mean industry in Mexico (see Figure A.3). The resulting export industries are: Air-Conditioning Equipment, Computer and Peripheral Equipment, Commercial and Service Industry Machinery, Communications Equipment, Electric Lighting Equipment, Forging and Stamping, Furniture, Hardware Manufacturing, Industrial Machinery, Magnetic and Optical Media, Measuring and Control Instruments, Medical Equipment and Supplies, Metalworking Machinery, Motor Vehicle, Other Electrical Equipment, Seafood Product and Packaging, and Ship and Boat Building.

The remaining manufacturing industries are classified as non-export industries. To accomplish this task I paired the IMSS classification with the NAICS system using the match proposed by Banco de México (2021). Indeed, I show that workers who took English classes in primary school substitute jobs in export industries for jobs in non-export industries.

Although my results are not statistically different from zero, point estimates suggest that workers (that studied in low-enrollment counties) who had exposure to English instruction in primary school are more likely to work in non-export industries. Furthermore, I find that women are more likely to work in export industries than men (see Panels C and D of Table 7). This latter result could explain why women who had exposure to English instruction find more labor opportunities farther from their home towns while men tend to stay.