English skills and labor market outcomes in Mexico*

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Abstract

In this paper, I study the prevalence of English skills and the labor market returns to English skills in Mexico. I use individual-level data from the 2014 Subjective Well-being Survey, which unlike other large nationally representative data sets includes a measure of English proficiency, to describe English-speaking ability in Mexico and to estimate the effect of English skills on labor market earnings. To address the concern that English skills may be endogenous in this relationship, I take advantage of policy changes in several Mexican states that introduced English instruction (as a subject) in public elementary schools in the 1990s. Using a staggered Difference-in-Differences strategy, I estimate the effect of these state policies introducing English instruction; this study is the first to evaluate these policies. I then use the variation in English skills arising from these policy changes to estimate the causal effect of English skills on labor market outcomes. These policies did not affect wages shifted workers out of physically-demanding occupations, and may have increased the likelihood of speaking English. Instrumental variables estimates suggest negative effects of speaking English on earnings; however, these estimates are imprecise and not significant at conventional levels of significance.

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Introduction

Given the use of English as a *lingua franca* in the global economy and Mexico's proximity to the United States (US), there could be an economic value to English skills in Mexico. In this context, there has been an unprecedented expansion of English programs to offer English instruction in the public education system of non-English speaking countries. This expansion has been usually motivated by the assumption that English instruction will increase English-language skills and, ultimately, improve labor market outcomes. Surprisingly, there is very little research on the prevalence of English skills and labor market returns to English skills in Mexico. Indeed, the existing literature has traditionally studied the effect of English abilities on earnings in English-speaking countries, while there is very little research in contexts where English is not the main language of communication. The first evidence was provided by Azam, Chin and Prakash (2013) in the context of India and Eriksson (2014) in South Africa.

Nevertheless, we do not know much about the effectiveness of exposure to English instruction on the acquisition of English abilities. Angrist, Chin and Godoy (2008) offered the first evidence that changing the medium of instruction (from English to Spanish) would not affect English proficiency of Puerto Ricans. On the other hand, Eriksson (2014) finds a positive effect on English proficiency when the medium of instruction changed from Afrikaans to English. However, most of the non-English speaking countries in the world have introduced English language as a subject and not as the medium of instruction. For example, in the first research that exploits a policy change in exposure to English instruction (as a subject), Chakraborty and Bakshi (2016) work with the probability of exposure to evaluate its effect on wages. However, they do not actually measure if this exposure leads to the acquisition of English skills. Likewise, although Gálvez-Soriano (2023) have a better measure of exposure (as weekly hours of English instruction), he cannot provide causal evidence that exposure leads to the formation of English abilities because of the lack of data needed for this purpose. Instead, he offers evidence that exposure does not affect other cognitive skills, suggesting that their findings are consistent with the acquisition of English abilities.

On the other hand, evidence on the returns to English skills is still scarce in the context of non-English speaking countries and very rare in Latin American economies. In particular, most of the existing research points out 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). This literature provides evidence that immigrants with English skills in the US have higher wages and better educational attainment. 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 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). Nevertheless, our understanding of the effects of English instruction on the acquisition of English abilities and the returns of these skills in non-English speaking countries is still limited.

To fill these gaps in the literature, I answer the following research question: What are the returns to English skills in a non-English speaking country? The context I study is Mexico,

an economy whose main language of communication is Spanish, but also one for which the value of English could be even more pronounced than in other developing countries because of its close relationship to the US in terms of trade and migration. Besides, the external validity of my context is potentially wider than in the case of India or South Africa, which are particularly different from most of the developing countries because of their status as former British colonies, where the upper-social class and government workers usually have English abilities.

To answer my research question, I take advantage of individual-level data from the 2014 Subjective Well-being Survey, which unlike other large nationally representative data sets includes a measure of English proficiency. Specifically, respondents are asked if they speak English. Even with a measure of English ability, it is still challenging to estimate the causal effect of English skills. One cannot interpret the difference in labor market outcomes of individuals who speak English and individuals who do not as the causal effect of English skill due to selection in who speaks English. English-speaking ability is likely correlated with other variables that also affect labor market outcomes. To estimate the causal effect of English skills on labor market outcomes, I exploit the implementation/expansion of seven state English programs in Mexico. In my identification strategy, I use state-by-cohort variation in exposure to English instruction (which was driven by the implementation of different state policies since the early 1990s) in a Difference-in-Differences (DiD) strategy. Then, I work with a more representative sample to perform an analysis of heterogeneous effects and to study occupational choices. To accomplish this latter, I offer estimates from a staggered Difference-in-Differences model, which pools the aforementioned Mexican states. Finally, I offer a causal estimate of the returns to English skills using an instrumental variables approach where I instrument the endogenous 'English skills' variable with the exogenous variation generated by the seven policy interventions.

Hence, in this paper, I provide the first empirical evidence that exposure to English instruction may lead to the formation of English skills in Mexico. The staggered DiD estimate from the first stage equation suggests that these English programs increase the likelihood of reporting speaking English by 2.8 percentage points. The average size of the intervention I study is relatively small. It increased exposure to English instruction, on average, by almost 20 minutes per week. Scaling this up, it would suggest that one additional hour of English instruction per week would increase the likelihood of speaking English by 8.5 percentage points.

Furthermore, I offer some of the first causal estimates on the returns to English skills and the effect of English programs on labor market outcomes in the context of a non-English-speaking country. The set of labor market outcomes I examine includes the likelihood of working for pay, wages and occupational choices. I find that the average intervention does not affect neither the likelihood of working for pay nor wages, although the point estimate for this latter is negative.

There are three related papers in the context of Mexico. Delgado Helleseter (2020) offered the first estimate on the returns to English abilities in the market of jobs posted online. He finds that the wages of Mexican English speakers are approximately 28 percent higher than those of non-English speakers. However, his sample is composed only of online advertisements from a single online job board, which implies concerns about the sample selection and the

external validity of his results. Second, Charles-Leija and Torres (2022) estimate the returns to English skills in Mexico using the same data set that I use in this paper. However, they do not address the concern about the endogeneity of English skills beyond controlling for some observable characteristics. Finally, Gálvez-Soriano (2023) provides the first empirical evidence that exposure to English instruction does not affect the wages of the mean worker in the Mexican formal sector. However, he does find a positive and significant effect on wages, only among high-achieving individuals.

The remaining of this paper proceeds as follows. In the first section, I offer a comprehensive description of the English abilities in Mexico. Then, in section 2, I explain the background of the policy changes I exploit in this paper. In section 3, I describe the database I use. In section 4, I explain the empirical strategy. In section 5, I first show the results of a naive estimate on the returns to English skills, then I offer an estimate of the effect of English programs on the acquisition of English abilities and causal evidence on the returns to these abilities. Section 6 provides robustness checks of my DiD models. Finally, section 7 summarizes with a discussion of my findings and a brief conclusion.

1 English language skills in Mexico

1.1 Five facts about the English skills of the Mexican population

In this subsection, I provide an overview of the Mexican population concerning their ability to speak English. This descriptive analysis is based on the English proficiency measure available in the 2014 Mexican Subjective Well-being Survey (BIARE, for its acronym in Spanish), which I describe more in the data section. The measure is based on survey respondents' response to the question of whether they speak English. Although this is not a detailed measure of English language skills, it is nonetheless a measure of English skills, and this makes it feasible to describe the prevalence of English skills in Mexico and analyze the relationship of English skills to labor market outcomes. Using this measure of English proficiency, I document five facts. First, there is a gender-English gap, with more men declaring to speak English. Second, more exposure to English instruction is associated with more English skills. Third, the ability to speak English increases with educational attainment. Fourth, indigenous people are behind in the process of learning English. Similarly, rural areas are falling behind in this learning process.

BIARE surveys only adults ages 18 and older, but I concentrate on the range 18-65 to capture mostly individuals that participate in the labor market (excluding retired workers). Additionally, I offer a comparison between Mexican states that implemented English programs in public primary schools and states that did not. Hence, this overview shows two important dimensions of heterogeneity in English abilities: among types of individuals and among regions.

The most spoken language in Mexico is Spanish and all official documents are written in this language. By the year 2014, about 7% of the Mexican adult population had the ability to speak English (see Table 1). Similarly, data from the population census suggest that 7% of Mexicans declared being able to speak an indigenous language. On the other hand, in this

first descriptive analysis, I document a positive correlation between English instruction and English abilities in Mexico. Indeed, using a comparison of regions I find that states, which have implemented English programs (to offer English instruction in primary schools) have a greater proportion of individuals with English skills than the other states.[1] Hence, it could be inferred that exposure to English instruction may improve the acquisition of English skills.[2]

I document the existence of a gender-English gap in Mexico, with more men declaring to speak English than women. About 9.5% of the male population in Mexico speaks English, while 5% of the female population does. Notice, however, that since the English skills variable is self-reported, it could potentially overstate the gender-English gap, with fewer women reporting having English abilities. On the other hand, as in the former finding (for the overall Mexican population), there are more men (and women) with English abilities in states that have offered English instruction in primary schools than in those that did not. This latter result motivates the research question of whether exposure to English instruction improves the acquisition of English abilities in the context of a non-English speaking country.

Young adults who have had more exposure to English instruction report more English skills than older ones. This fact is supported in two dimensions. First, young individuals (18-35 years old) are more likely to speak English than the elderly (51-65 years old). This could be a result of the recent English programs implemented in the early 1990s and in the early 2000s in Mexico that affected only the young birth cohorts (as I explain in section 2). Second, particularly among the young birth cohorts, there are significant differences in English abilities when we compare individuals living in states with English programs and individuals living in other states (without English programs). Once again, this finding supports the idea of English programs increasing the acquisition of English abilities.

The ability to speak English increases with educational attainment. The proportion of college graduates (and higher attainment individuals) with English-speaking skills in Mexico is more than three times the corresponding proportion for all Mexican adults. This proportion is about the same between individuals with upper secondary and the national figure. On the other hand, less than one percent of the individuals with incomplete primary school speak English. These results suggest that either most of the acquisition of English skills is held during higher education or that most individuals who can afford higher education are likely to learn English. Furthermore, this also points out the importance to include education in my empirical analysis as a non-linear variable. Indeed, in all models shown in section 4, I control for education fixed effects in order to capture the non-linear relationship between education and English skills.

I also document the existence of an ethnicity-English gap in Mexico, with nearly 7.3% of non-indigenous people with English skills and almost 2.5% of indigenous people who speak English. I claim that this is a result of the lack of English education in marginalized areas where indigenous people have settled. In fact, most of the efforts to teach indigenous people a second language are for them to learn Spanish than to learn a foreign language. Another piece of evidence is the fact that I do not find differences in English abilities between indigenous

[1] States with English programs are: Aguascalientes, Coahuila, Durango, Nuevo Leon, Sinaloa, Sonora and Tamaulipas. There are other Mexican states that have offered English instruction in public primary schools, but on an irregular basis, with a few beneficiary schools and/or with no expansion over time.

[2] Below, I provide empirical evidence about the effect of exposure to English instruction on English skills.

people living in states that have implemented English programs and indigenous people living in states without these programs, which may suggest that the state English programs have not reached the marginalized villages where indigenous people live.

Similarly, there is a considerable geographical variation in the prevalence of English skills in Mexico. In particular, I find an important difference in English ability between urban and rural areas, with the former having 8.3% of English speakers, while the latter have only 2.3%. Previous estimates by CIDAC (2008) suggested that this number was 6% for the urban adult population in Mexico. The story behind this difference between the urban and rural contexts is similar to the indigenous people case. Indeed, the state governments that have implemented English programs relegated rural and marginalized areas preventing their schools from implementing English programs. The reason is that most of the first English programs consisted of virtual courses because of the lack of English teachers, which means that schools without the equipment needed (computers, access to the Internet, projector, etc.) could not benefit from these programs. This has been the case for rural schools in Mexico.

1.2 Geographical heterogeneity of English skills

This subsection contributes by offering five facts regarding the English geographical heterogeneity in Mexico. First, the population with English abilities is concentrated in four Mexican states: Quintana Roo, Baja California, Aguascalientes, and Baja California Sur. Second, the less industrialized Mexican states (South and Southeast region) have a low proportion of English speakers. Third, English-speaking individuals are mainly present in urban areas. Four, the states with more exposure to English instruction are not necessarily those with more English speakers. Finally, administrative records suggest that seven out of 32 Mexican states have consistently offered English instruction in public primary schools during the early 1990s.

Half of the Mexican states have proportions of English-speaking individuals higher than the figure for the national level (6.99%), from which four states more than double this proportion (Quintana Roo, Baja California, Aguascalientes, and Baja California Sur). It is likely that Quintana Roo and Baja California Sur have more English speakers than the mean Mexican state because they are located in tourist regions with the two most famous destinations: Cancún and Los Cabos, respectively. On the other hand, Aguascalientes hosts international companies from the automotive assembly, auto parts manufacturing, industrial robotics, and electronics manufacturing, which are suppliers of Nissan, Mazda, Mercedes-Benz, GM, Honda, Infiniti, and Volkswagen, among others. Likewise, Baja California manufactures for international companies in the industries of aerospace, automotive, electronics, and medical device manufacturing. But also, because of its closeness with the US, some Mexican workers living in Tijuana commute every day to work in American companies located in Chula Vista and San Diego.

The South and Southeast region of Mexico has a low proportion of English speakers except for the state of Quintana Roo. This region is well known for its high proportion of people in poverty condition. In fact, the seven states colored in light gray from panel (c) of Figure 1 are classified among the poorest Mexican states according to the biannual report of CONEVAL

(2020), except for the State of Mexico and Guanajuato, which are around the middle of the distribution (ranked in the place 12 and 17, respectively). Two potential reasons could explain the lack of English speakers in this region. First, the poor quality of education, with these states having the lowest average grades in the ENLACE test. And, second, the lack of incentives due to the poor economic activity, with this region contributing the least to the national economic activity (except for Tabasco, which contributes substantially to the sector with oil extraction).

Mexican rural areas have the lowest proportions of English speakers. There are seven exceptions: Aguascalientes, Baja California, Baja California Sur, Durango, Hidalgo, Nayarit and Zacatecas (see panel (d) of Figure 1). The first three states have a relatively higher proportion of English speakers for the aforementioned reasons (fact number one). Durango and Zacatecas are international migrant sender states (especially to the US) and the proportion of migrants is relatively greater in rural areas compared to the urban ones. Finally, the state of Hidalgo is a host of international companies in automotive, auto parts, technology, telecommunications, and transportation such as: GEMI International, Motorola Solutions, Grupo Marpa, and Transtell, among others, which are located in rural regions of the state; while Nayarit is known for exporting agricultural products (figs, pineapples, avocados, guava, mangoes, cantaloupes, watermelons and papayas) to the US, which may explain why there is a relatively high proportion of English speakers in the rural context.

The Mexican states with more exposure to English instruction are not necessarily those with more English speakers. Indeed, most of the states colored in darker gray in panel (c) of Figure 1, which have a high proportion of English speakers, are touristic, migrant senders, and/or hosts of international companies, as explained before. However, other states with lower proportions, such as Coahuila, Nuevo Leon, Sinaloa and Tamaulipas will probably catch up because of their efforts to offer English instruction at school. For the states that coincide in terms of exposure and proportion of English speakers (Aguascalientes, Sonora, Queretaro, Mexico City and Morelos) it is difficult to disentangle the reason for this high proportion, but I will explore some of them later in this paper. For the remaining states (Quintana Roo, Baja California, Baja California Sur, Nayarit, Chihuahua and San Luis Potosi) we could infer that the formation of English abilities is not directly explained by the exposure to English instruction.

Finally, administrative records suggest that seven out of 32 Mexican states have consistently offered English instruction in public primary schools during the early 1990s. Indeed, using historical administrative data from the Mexican school census, I find that the states of Aguascalientes, Coahuila, Durango, Nuevo Leon, Sinaloa, Sonora, and Tamaulipas have implemented state English programs, which increased substantially and/or consistently the weekly hours of English instruction offered in Mexican public schools (see Figure A.2 and Figure A.3 from the Appendix). However, below I document that only Aguascalientes, Coahuila, Nuevo Leon, and Sinaloa had a significant increase in terms of hours of English instruction as a result of their respective English programs implementation.

1.3 Occupations and English skills in Mexico

In this subsection, I provide a description of the economic occupations in which Mexican English speakers concentrate. I document four main facts. First, elementary and manual unskilled occupations do not "require" English abilities in Mexico. Second, clerical support, professionals, and managerial occupations concentrate most English speakers in Mexico. Third, occupations with more English speakers pay more to their workers, have a more even proportion of females, and these workers are more educated. And, fourth, the rank of occupations by English abilities does not change significantly when considering only low-educated workers.

The occupations that do not require English abilities in Mexico are: farming, elementary and crafts occupations (see the first categories in panel (a) of Figure 2).[3] This finding is not surprising because these types of occupations do not require a high level of communication skills and, instead, they are more manual-intensive. Thus, on average, in these occupations, only two out of a hundred workers speak English. It is likely that the English speakers in these occupations acquired their English abilities either in school or through a migration network. On the other hand, these occupations are among the worst paid. This may suggest a positive correlation between English skills and earnings. Notice, however, that individuals working as machine operators have also a low proportion of English speakers and still earn as much as clerical workers (who have a high proportion of English speakers). This exception will be particularly relevant in terms of occupational decisions of individuals who had exposure to English instruction, as I explain in subsection 5.3.

On the other hand, clerical support, professionals and managerial occupations concentrate most of the English speakers in Mexico (see the last four categories in panel (a) of Figure 2). In the case of clerical support, it is natural to have more English speakers since these types of occupations are intensive in communication skills. However, it is also true that most of these occupations, for example, assistants and secretariats are not required to have English abilities, except for executive positions or in tourist and international companies. On the other hand, professionals and technicians are more likely to have English abilities because, in upper secondary and professional education, the English language subject is compulsory and required to graduate with some degrees. Managerial occupations are the most likely to require English skills, with three times the national average proportion of English speakers. This is consistent with tasks requiring communication skills and public relations, especially in medium-size and large companies. Finally, 40% of the individuals working abroad have English skills, consistent with Mexicans who cross the US border every day to work in American companies. The remaining occupations (customer service and sales occupations) are below the average English skills in Mexico.

Among the occupations with more English speakers, workers are better paid, they are more educated, and there is a more even proportion of females. Indeed, the average monthly wage in Mexico is 6,262 pesos (for adults 18-65 years old in 2014 who work for pay), while the monthly wage in clerical support occupations is about 1.1 times higher, professionals and

[3]Notice, however, that it is strong to claim anything about English requirements because the proportion of English speakers is not the same as the demand for workers with English abilities, but there should be a high correspondence.

technicians earn 1.7 times the mean wage in Mexico, while the wage of managerial occupations is 2.4 times higher. This result suggests a positive correlation between English abilities and wages. Likewise, as previously noted in subsection 1.1, I find a positive correlation between English abilities and education. Finally, customer service, sales, and clerical support occupations have the evenest proportion of female workers.

Using a sub-sample of low-educated individuals, I find that there are no significant changes in the rank of occupations according to their proportion of English speakers (see Figure A.1). However, occupations in sales (which previously were the last category below the national mean of English speakers) are now the only ones below the average. I defined the sub-sample of low-educated individuals considering nine or fewer years of education. This sub-sample intends to capture Mexicans who, if exposed to English instruction in primary school will see an effect, which could potentially be directly attributable to exposure and not to spillover effects of the program. Hence, the occupations requiring English skills among low-educated individuals are: customer service, clerical support, professionals and managerial. Finally, for this sub-sample of low-educated individuals, schooling is more homogeneous among occupations, which suggests that differences in wages are more likely to be attributed to English abilities.

2 English programs in Mexican states

Starting in the early 1990s, several Mexican states implemented English programs to offer English instruction in public primary schools. An important motivation for these states was the recently signed North American Free Trade Agreement (NAFTA) in December 1992, which came into force on January 1, 1994. In particular, English instruction in public primary schools is meant to improve the acquisition of English skills to facilitate labor mobility from Mexico to the US and Canada. Indeed, before launching these state English programs, only private schools offered English instruction, but not the public ones, which used to leave unattended an important fraction of the population that potentially may benefit from NAFTA. As previously noted in subsection 1.3, using administrative data from the Mexican school census, I identified seven states that have implemented/expanded English programs in public primary schools, which have consistently increased the hours of English instruction offered in these schools. Hence, in this section, I will describe how was the implementation in most of these states. However, some of these do not have a publicly available registry of their English programs, which implies that my identification strategy would be mainly data-driven for those particular cases.

The first two Mexican states that offered English instruction in primary schools were Nuevo Leon and Sonora. The English program in the Mexican state of Nuevo Leon was launched in 1993 with one hundred randomly chosen elementary schools benefiting only high-achievement students of fourth, fifth and sixth grades.[4] However, it was until the year 1998 that the state English program implemented English instruction as part of the regular

[4]Elementary schools in Mexico comprise from first to sixth grade, middle schools comprise from seventh to ninth grade, while high school comprises from tenth to twelfth grade. All three educational levels are part of the basic compulsory education system.

curricula in the participant schools and only in sixth grade. This is the expansion that I exploit in this paper. Progressively, the state government increased the English program's coverage among elementary schools including some preschools. For example, in 2008 the program expanded the coverage to students in fifth grade in those schools that were already beneficiaries of the program in sixth grade. So that by 2008 the state English program covered around 60% of all elementary schools of Nuevo Leon.[5]

The state of Sonora also launched its English program in the year 1993 as a trial stage, but it was until the year 2004 that the English language was incorporated as a subject in the regular curricula of public primary schools. In the expansion of 2004, the program aimed to offer English instruction to only the first and second grades of 10 out of 72 counties. After that, the program gradually expanded the coverage to all grades that comprise primary school in Mexico (from first to sixth) and to more beneficiary counties, reaching a state coverage of almost 50% by the year 2010 (Reyes Cruz, Murrieta Loyo and Hernández Méndez, 2011).

The Mexican state of Coahuila followed the former two states with the implementation of an English program in 1995, benefiting 100 primary schools located in 11 (out of 38) counties. This program started offering English instruction only to the first grade of beneficiary schools. In the year 1998, this English program started a trial stage to offer English instruction in preschool and in 1999 the state government increased the coverage among preschools and primary schools. Since then, the program has progressively expanded among schools and grades. And, nowadays, the program benefits the three grades that comprise preschool in Mexico, the six grades that comprise primary school (from first to sixth), and the three grades that comprise middle school (from seventh to ninth). The current coverage includes 26 (out of 38) counties from the state.[6] The expansion that I exploit in this paper is the one of 1999.

Then, the state of Tamaulipas launched an English program in the 2001-2002 school year, offering English instruction to the fourth grade of urban primary schools in the state. This initial program benefited 44,777 students. For the 2003-2004 school year, the state English program expanded its coverage from fourth to sixth grade. Subsequently, in 2005, the program expanded to cover all six grades that comprise primary school in Mexico. In the 2011-2012 school year, all the preschools in the state were incorporated into the English program.[7] The Tamaulipas policy change that I exploit in this paper is the first time implementation of 2001.

For the remaining states; Aguascalientes, Durango and Sinaloa, there are not official sources indicating the process of implementation of their English programs. However, administrative data from the Mexican school census suggests that these states launched their English programs in 2001, 2002 and 2004, respectively (see Figure A.2 and Figure A.3). In fact, unofficial sources point out that the implementation of the English program in Durango was in 2002 as a pilot program, which operated for six years in a few public primary schools. In 2008, English instruction was incorporated into the regular curricula of the beneficiary primary schools. In 2009 the program reached a 20% coverage of the students enrolled in Durango primary schools.

[5] All this information is publicly available on the Nuevo Leon English program's website.
[6] All this information is publicly available on the Coahuila English program's website.
[7] All this information is publicly available on the Tamaulipas English program's website.

3 Data

My main source of information is the 2014 Mexican Subjective Well-being Survey (BIARE, for its acronym in Spanish). BIARE is a representative survey of the Mexican population at the national and state level. In 2014, this survey was conducted as part of the Mexican Household Income and Expenditure Survey (ENIGH), and as an annex of the Socioeconomic Conditions Module. This latter implies that it is possible to have variables that characterize the socioeconomic condition of individuals and households in the same database, which is currently used to measure poverty in Mexico.

The 2014 BIARE round is special because it asked for a unique occasion about individuals' English speaking abilities. Respondents of this survey are adults 18 years of age and older. And the survey concentrates only on one adult per household. This is why my sample size is smaller than in the ENIGH 2014 for the same age range. Interviews in BIARE survey are all face-to-face and it requires that the information be provided by the respondent only; not through a third party. Respondents are asked a set of questions regarding their demographic and economic characteristics, their perceived well-being, as well as their ability to speak English.

The second source of information I use is the Mexican school census (also known as Statistics 911). The school census allows for identifying the public schools that have offered English instruction in Mexico. This source of information is also key to construct a variable of exposure to English instruction, which allows me to identify the magnitude of the state English programs implemented in Mexico since the early 1990s. To construct this exposure variable I only consider public elementary schools in the morning shift, as the afternoon shifts are unstable because the same school may not provide both shifts every academic year.

I measure exposure, by cohort and by locality, as weekly hours of English instruction using the ratio of total weekly hours of English instruction in each school and the total number of classes.[8] Then, for each school-cohort, I take the average hours over the six years that comprise primary school in Mexico. Finally, I take the average, by cohort, of all schools in a given locality weighting by the number of students per school. Hence, the locality average is always smaller than the figure per school because most of the primary schools in Mexico do not offer English instruction.

I link my exposure variable to the BIARE database by cohort and by locality. In the BIARE database, the birth cohort 1996 attended sixth grade (the last grade of primary school in Mexico) in 2007. Hence, the data I constructed for 2007 with the Mexican school census includes the average exposure from 2002 to 2007, for the cohort 1996. Since I impute the average exposure at the locality level, my estimate of the policy change on the exposure could be understated because this exposure variable includes schools with zero hours of English instruction. Nevertheless, this exposure measure is still informative. Furthermore, the final database I build in this paper is the first (in Mexico) to include both variables, exposure to English instruction and English skills.

[8] A 'locality' is the smallest geographical delimited area in Mexico. It could include as few as one single household in a rural context (*rancheria*) or more than 100,000 inhabitants in big Mexican cities. The next geographical size is the county (municipality), composed of several localities. Finally, states are subdivided by these counties.

I also explore the effect of the English programs on occupational choices as a potential mechanism that mediates the effect of wages. To this purpose, I use the International Standard Classification of Occupations (ISCO-08) from the International Labor Organization (ILO) at one digit code level (nine different occupations, plus individuals working abroad). The farming category includes agricultural, forestry, and fishery laborers. The category 'elementary' refers to cleaners, helpers, building construction laborers, transport and storage laborers, food preparation assistants, street sales workers, and garbage collectors. Machine operators comprise plant and machine operators, and assemblers in several economic industries (this category also includes locomotive, car, van, motorcycle, taxi, heavy truck, bus, mobile plant and ships operators). Most of the workers in the construction industry are classified in Crafts along with blacksmiths, toolmakers, machinery mechanics and repairers, and handicraft and printing workers. 'Customer service' comprises travel attendants, conductors, guides, cooks, waiters, bartenders, hairdressers, beauticians, personal care workers, and protective services workers. The 'sales' category includes salespersons, cashiers, and ticket clerks. 'Professionals' contains occupations of science, engineering, health, teaching, business and administration, information and communications technology, and legal, social, and cultural workers.

The final database allows for identifying what individuals have English abilities and the hours of English instruction they had exposure to in primary school. I only consider respondents between 18 and 65 years of age who work for pay, which helps to mitigate any potential sample selection by ruling out children and adolescents who are more likely to be enrolled in school and retired individuals. A preliminary analysis between Mexican English speakers and non-English speakers (shown in Table 2) suggests that the former are more educated probably because they are acquiring English abilities in school; they earn more, which is consistent with the generalized idea of the positive returns to English skills in non-English speaking countries; and most of the English speakers are located in urban areas. On the other hand, Mexican English speakers are younger, potentially because they were more likely to have exposure to the recently implemented English programs in Mexico. Finally, I also show that English speakers are less likely to be women, indigenous or married.

The descriptive analysis suggests that individuals who had more exposure to English instruction are more likely to have English abilities (see the second row of Table 2). This is consistent with my previous analysis in section 1, where I showed that younger individuals (who are more likely to have exposure to English instruction) have more English skills than older ones, and I also showed that there are significant differences in English abilities when we compare individuals living in states with English programs and individuals living in the other states (without English programs). Finally, the occupation variables are dummies and shown in ascending order by the proportion of English speakers in Table 2. For example, the 'Farming' variable takes the value of one if individual i works in a farming occupation and zero otherwise. The preliminary descriptive analysis suggests that English speakers are more likely to work in professional and managerial occupations, while non-English speakers are more likely to work in elementary occupations.

4 Empirical strategy

4.1 Returns to English skills

We can model the relationship between English skills, Eng_i, and earnings, ω_i, using the following equation:

$$\omega_i = \alpha + \beta\, Eng_i + \boldsymbol{X_i}\boldsymbol{\Pi} + \epsilon_i, \tag{1}$$

where ω_i is the log of wages, the English skills variable is Eng_i, which is binary; it takes the value of one if the individual i speaks English and zero otherwise. I also include a vector of controls, $\boldsymbol{X_i}$, with socio-demographic characteristics, such as: education, gender, marital status, ethnicity, student status, cohort FE and locality FE.

Notice, however, that the English skills variable could be endogenous in this wage equation. Two potential sources of endogeneity are: omitted variables and measurement error. First, the omitted variables issue is a result of not controlling for unobservable individuals' characteristics such as abilities, which could be correlated with both English skills and wages. Second, it is likely that my English skills variable has a measurement error as it captures a self-reported ability.

In this context, an OLS estimation would produce a biased estimate of β. Hence, to mitigate this issue, in next subsection I take advantage of state policy changes in English instruction to form an instrument for English skills to obtain a consistent estimate of β.

4.2 Empirical strategy using state English programs

4.2.1 Difference-in-Differences specification

In this subsection, I examine the state policy changes with Difference-in-Differences specifications for each Mexican state that introduced English instruction in public primary schools. As the comparison group, I use a single neighboring state that had not offered English instruction in public primary schools. However, to rule out concerns about ad-hock comparison states, I also offer estimates using different control groups as a robustness check. Table A.1 summarizes the moment of the intervention, the policy change I exploit, the cohorts affected by this policy, and the comparison states.

Let us consider y_{isc} as any of the main outcomes I study in this paper, observed by each individual i, who lives in state s and belongs to cohort c. The main outcomes of interest are: exposure to English instruction, English abilities, labor force participation and log of wages. I estimate the intention to treat effect of offering English instruction in primary schools on these outcomes, using the following specification:

$$y_{isc} = \phi + \gamma\,(treatment_s \times after_c) + \delta\, treatment_s + \kappa_c + \boldsymbol{X_{isc}}\boldsymbol{\Gamma} + \varepsilon_{isc},$$

where $treatment_s$ is a dummy variable that takes the value of one if individual i lives in a state that introduced an English program (treated state) and zero otherwise. Likewise,

$after_c$ is a dummy variable that takes the value of one if the individual i belongs to one of the cohorts that potentially had exposure to English instruction (either in the treated state or hypothetically in the comparison one), and zero for cohorts that had no exposure. Notice, that this specification is similar to Equation 1 without the 'English skills' variable but with controls for treatment, common cohort effects and the interaction term ($treatment_s \times after_c$).

The estimate γ gives the effect of the policy change on the outcomes of interest. However, if we want to interpret γ as the causal effect of the intervention, we need to assume that the Parallel Trend Assumption (PTA) holds, which means that the change in the outcomes of interest between pre-treatment and post-treatment cohorts would have been the same in the treatment and the comparison states had the English program not introduced/expanded in the states with English programs.

I offer suggestive evidence on the validity of my identifying assumption using the following event study type specification:

$$y_{isc} = \phi + \sum_k \gamma_c \, I_{(k=c)} \times treatment_s + \delta \, treatment_s + \kappa_c + \boldsymbol{X_{isc}\Gamma} + \varepsilon_{isc}, \tag{2}$$

where $I_{(k=c)}$ is an indicator function, which is equal to one if $k = c$. γ_c gives the cohort-specific DiD effect, using the cohort that just missed the policy as the reference cohort. In all models, the cohort before the intervention is the reference one (the cohort that just missed the policy). In order to support the validity of the parallel trend assumption, we should expect that the English program had no significant effect on pre-treatment cohorts. I show the results of estimating this equation in the online appendix.

4.2.2 Staggered Difference-in-Differences

In this subsection, I pool the states that introduced/expanded English programs in public primary schools to offer an average effect of these type of policies in Mexico. To this purpose, I use a staggered Difference-in-Differences specification. First, I start by defining $HadPolicy_{sc}$ as a dummy variable that takes the value of one if the individual i lives in a treatment state and he/she belongs to one of the affected cohorts, while it takes the value of zero otherwise. The first stage and reduced form equations are the following:

$$Eng_{isc} = \theta^{fs} + \psi^{fs} \, HadPolicy_{sc} + \delta_s^{fs} + \kappa_c^{fs} + \boldsymbol{X_{isc}\Psi^{fs}} + \varepsilon_{isc}^{fs} \tag{3}$$

$$\omega_{isc} = \theta^{rf} + \psi^{rf} \, HadPolicy_{sc} + \delta_s^{rf} + \kappa_c^{rf} + \boldsymbol{X_{isc}\Psi^{rf}} + \varepsilon_{isc}^{rf}, \tag{4}$$

where ψ^{fs} measures the effect of an English program in Mexico on exposure to English instruction, the acquisition of English abilities, and labor market outcomes. In these specifications, I fully control for state fixed effects, δ_s, common cohort effects, κ_c, and a vector of controls, $\boldsymbol{X_{isc}}$, with demographic and household characteristics as previously defined. Hence, this specification could also be categorized as a Two-Way Fixed Effects (TWFE) model.

Notice that the validity of my results will depend on the parallel trend assumption, which suggests that the change in the outcomes of interest between pre-treatment and post-treatment cohorts would have been the same in the treatment and the comparison states had

the English program not been introduced/expanded in the former. I will provide evidence that supports the validity of this assumption by analyzing the following event study-type equation:

$$y_{isc} = \theta + \sum_{k} \psi_{c-c_s^*} I_{(k=c-c_s^*)} + \delta_s + \kappa_c + \boldsymbol{X_{isc}\Psi} + \varepsilon_{isc},$$

where c_s^* denotes the first cohort affected by the intervention in state s. The difference $c - c_s^*$ is the time relative to c_s^*, with negative values reflecting older cohorts not exposed to the policy. $I_{(k=c-c_s^*)}$ is a dummy variable for $k = c - c_s^*$, so $\psi_{c-c_s^*}$ gives the effect of leads and lags of policy adoption. The omitted category is -1. Negative categories with zero effect validate the PTA. In Figure A.4, I provide suggestive evidence on the validity of this identifying assumption.

4.2.3 Instrumental variables estimation

We could be interested in measuring the effect of having English abilities, Eng_{isc}, on wages, ω_{isc}, instead of the effect of offering English instruction, as described by Equation 4. However, my estimate β could be biased because of a remaining omitted variables problem. Indeed, we should not compare individuals with English abilities and individuals without them because it is likely that the former come from a wealthier family, had more education, and/or live in better neighborhoods (as shown in Table 2). To overcome this problem, I propose to use an instrumental variables (IV) approach, where I take advantage of the exogenous variation caused by the seven states English programs to instrument the endogenous regressor, Eng_{isc}, in Equation 1.

The first stage and reduced form equations of my IV strategy are Equation 3 and Equation 4, respectively. Using two-stage least squares to estimate Equation 1, the second stage can be expressed as:

$$\omega_{isc} = \phi_0 + \phi_1 \widehat{Eng}_{isc} + \delta_s + \kappa_c + \boldsymbol{X_{isc}\Phi} + v_{isc}, \tag{5}$$

where $\widehat{Eng}_{isc}$ is the predicted value after estimating Equation 3 by OLS. Notice that, my results rely on two conditions: the relevance condition and the exclusion restriction. I provide evidence on the former by looking at the statistical significance of ψ^{fs} in the first stage equation (see Equation 3). On the other hand, I am aware that there is no formal test for the exclusion restriction. However, I claim that the exogenous change caused by the intervention affects wages only through the acquisition of English abilities. The supporting idea behind this claim is that English programs in Mexico do not affect other cognitive abilities (as recently shown by Gálvez-Soriano (2023)). Hence, we could think that any effect of English programs on labor market outcomes would be only through the acquisition of English abilities.

This IV estimate provides the Local Average Treatment Effect (LATE), which can be interpreted as the returns to English abilities among those individuals who reported having English skills after being offered English instruction at school.

5 Results

5.1 Returns to English skills in Mexico

In this subsection, I provide a first estimate of the returns to English skills in Mexico using Equation 1, which controls for observable characteristics and locality FE. I offer five estimates that progressively show how I mitigate the omitted variables problem by including more controls: first, a naive estimate (without controls); second, including cohort FE, gender and ethnicity; third, including education FE; fourth, including a rural and marital status dummy variables; and, finally, including locality FE. I also offer estimates using low-education and high-education samples. The former isolates the effect of English abilities on wages from spillover effects of education, experience, and unobserved abilities. The latter includes the complementarity between English and education. There are two main findings from this initial approach. First, the omitted variables problem is mostly due to education. And, second, English speakers do not earn more than non-English speakers.

Education accounts for about 67% of the selection bias due to the observable omitted variables problem. A naive estimate would suggest that English speakers earn 200% more than non-English speakers in Mexico (1.130 natural log points). However, this estimate contains confounding factors such as gender and age. Indeed, once I control for these variables the estimated effect reduces considerably to 146%. Furthermore, the most important factor that causes the omitted variables problem is education, reducing the estimate to 12%, but it is not statistically significant. Other important controls include socio-demographic characteristics. For example, for children living in urban areas, male and non-indigenous people are more likely to speak English. Hence, I further mitigate the omitted variables problem by controlling for these characteristics as shown in column (4) of Table 3. With this specification the bias got reduced even more, resulting in a negative point estimate, which is still not statistically significant. The remaining estimate (from column 5) reduces the bias by controlling for non-time-varying unobservable characteristics at the locality level.

Once I control for observable and unobservable characteristics of the individuals and their socioeconomic context, I find that English speakers do not earn more than non-English speakers. This conclusion derives from my proposed model, which implies two main assumptions. First, the set of controls I include in the model account for most of the omitted variables. Second, the remaining unobservable factors that affect the acquisition of English abilities are constant over time and aggregated at the locality level. If we are willing to believe that these assumptions are valid, we may conclude that English speakers earn approximately the same as non-English speakers (see column 5 of Table 3). This result is different from previous findings of Delgado Helleseter (2020) and Charles-Leija and Torres (2022), who suggest that the wage premium of Mexican English speakers is 28% and 19.4%, respectively.

Finally, I do not find significant returns to English skills among low-educated individuals, but point estimate suggests positive returns for highly-educated men. Furthermore, Figure 3 provides evidence on the complementarity between English skills and education. Indeed, English speakers with high educational attainment (high school or more) earn approximately 2 percentage points more than English speakers with zero years of schooling.

5.2 Exposure to English instruction, English abilities and labor market outcomes

5.2.1 Intention to Treat Effect

In this subsection, I provide an alternative estimate of the returns to English skills in Mexico, which rules out concerns of remaining omitted variables bias. To this purpose, I use a DiD strategy where I use state-by-cohort variation in exposure to English instruction in primary school. With this strategy, I estimate the Intention to Treat (ITT) effect of offering English instruction in primary school. I study four main outcomes: exposure to English instruction, English abilities, paid work and log of wages.

By analyzing each state separately, I obtain three main findings on the effect of English programs on labor market outcomes. First, three out of seven states significantly increased the hours of English instruction they offered in primary schools as a result of the intervention. Second, point estimates suggest an increase in the acquisition of English abilities, particularly among individuals with high educational attainment. And, third, the state English programs had no effects on either paid work or wages (see Figure 4).

Not all states offered enough hours of English instruction to represent a statistically significant increase in exposure from the perspective of the individuals intended to be treated. In particular, Aguascalientes, Coahuila and Nuevo Leon had a significant increase in hours of English instruction with the implementation of their respective state English programs. Point estimates suggest that the remaining states (Durango, Sinaloa, Sonora and Tamaulipas) also increase the exposure to English instruction at school, but this increase was not statistically significant for individuals in my sample.

An increase in hours of English instruction may induce the acquisition of English skills but does not affect wages. Indeed, point estimates for all states that offered English instruction in primary schools suggest a positive effect on the English skills. However, none of these estimates are statistically significant. On the other hand, the state English programs had no effects on either labor force participation or wages. In particular, wages point estimates produce mixed results among the treated states; negative, zero and positive estimates.

Furthermore, I find that the acquisition of English abilities improves with the years of schooling (see the dark and light blue estimates of Figure 4, which corresponds to the high and low educational attainment samples, respectively).[9] Two potential mechanisms explain this result: familiarity with the English language at early stages of life and high-ability individuals learning better. First, early exposure may lead children to pick up the English language better than children without previous exposure. This would be consistent with the existing literature in language development (Lenneberg, 1967; Newport, 2002) and second-language acquisition (Bleakley and Chin, 2010). Second, it is likely that high-ability individuals are also the ones who learn English better and the ones who show higher educational attainment.

Panel A of Table 4 shows the main results of this paper, which are obtained from my staggered DiD specification. First, the zero effect on the likelihood of working for pay rules out issues of sample selection. Second, I do not find a significant effect on wages. Although,

[9]The low-education sample is composed of individuals who reported having nine years of education or less. High-education is the complement.

surprisingly, the point estimate is negative. Third, the effect on school enrollment is zero. However, the point estimate is positive. This result suggests that the potential effect of exposure to English instruction on wages may be positive in future research as the existing analysis may be excluding potentially high earners who are still enrolled in school.

Finally, I find that English programs may lead to the acquisition of English abilities. Indeed, these types of English programs increase English skills by 2.8 percentage points (see column (2) of Table 4). Furthermore, if we consider the hours of English instruction as an exogenous variable (due to the implementation/expansion of the English programs), we may argue that English programs in Mexico may have increased the acquisition of English skills by 8.5 percentage points (0.028/0.331).

In Table A.2) I show the results from four potential heterogeneous effects: gender, education, ethnicity and geographical context. However, I do not find any significant source of heterogeneity. In terms of point estimates, I find that the potentially negative effect on wages is driven by men and low-educational attainment individuals, while the effect on school enrollment is driven by women. This effect would potentially reduce the traditional role of women in Mexican households as caregivers of young children and elderly (Avila, Escamilla-Guerrero and Gálvez-Soriano, 2023). Second, English programs increased English skills only among non-indigenous people, with potentially positive effects on wages. Similarly, English programs increased English abilities only among individuals living in urban areas but not in rural ones.

5.2.2 Local average treatment effect of English skills on wages

Estimates shown in Table 4 suggest that English programs do not affect wages (according to the reduced form equation). If we are willing to assume that the English programs affect wages only through English skills, then I can obtain an estimate of the effect of English skills on wages. That is, I instrument the endogenous regressor, Eng_{isc}, with the policy change variable, $HadPolicy_{sc}$.

Table 5 reports the IV estimate along with the first stage and reduced form. For comparison, I report in column (1) the result of estimating the effect of English on wages using OLS (not accounting for the endogeneity of the English skills variable). I find that there is not a significant effect of English skills on wages, although the point estimate suggests a negative effect (see column (4) of Table 5). It can be noted that the estimate is very imprecise.

5.3 Mechanisms

Among the potential mechanisms that explain the non-significant effect of English skills on wages, occupational choices seem to provide a plausible explanation as there may be shifts across occupations, leaving earnings unaffected. On the other hand, although other cognitive skills may also explain the effect on wages, the existing literature has shown that exposure to English instruction has no effect on cognitive skills in Mexico (see Gálvez-Soriano (2023)).

The story behind the shifts across occupations suggests that English speakers may not find better-paid jobs, but better working conditions. This would be the case if they move

away from physically demanding occupations into less demanding jobs. My results support this potential mechanism.

Indeed, in Figure 5 I show that workers who had exposure to the intervention are less likely to work in elementary, crafts and sales. On the other hand, they are more likely to work as machine operators and professionals. These results suggest a substitution of physically demanding occupations for other types of jobs that require more cognitive abilities. In future versions of this research, I will test this implication directly, using the O*NET occupational information.

Furthermore, Figure 5 also provides evidence of educational heterogeneous effects on occupational choices. In particular, I show that individuals with high-educational attainment who had exposure to the intervention do not change their occupational choices concerning farming and elementary occupations because it is unlikely that these types of individuals perform these types of jobs. On the other hand, individuals with low-educational attainment who had exposure to English programs are now less likely to work in farming and elementary occupations. These workers with low education likely substitute these manual-intensive occupations for the machine operator and customer service jobs. Workers with high education, on the other hand, move away from customer service into machine operator, professional and managerial jobs.

6 Robustness Checks

In this section, I offer three robustness checks that respond to potential concerns regarding my specifications. First, I provide evidence that the estimates obtained from the individual DiD models (shown in Figure 4) are robust to changes in the comparison group. Then, using a narrower cohort span in my staggered DiD specification, I show that the effect of English skills on wages is still zero (but because of the very imprecise estimation). Third, I offer an alternative estimate in response to the recent critique on DiD models producing biased estimates in the presence of heterogeneous treatment effects (see De Chaisemartin and D'Haultfoeuille (2022) for a review). In particular, I explore the heterogeneity-robust DiD estimator proposed by Sun and Abraham (2021).

Figure 6 confirms that the English programs significantly increased the exposure to English instruction only in three out of seven states and that there is no significant effect on wages or English skills acquisition. These results provide evidence that my individual DiD specifications are robust to changes in the comparison group. In fact, I originally used one single comparison state per policy change, while now I am proposing to compare each treatment state with all neighboring states (always including the originally proposed comparison one). I do find that my original estimates are robust to changes in the comparison group. Furthermore, in the online appendix, I provide suggestive evidence on the validity of the parallel trend assumption for each one of the seven interventions even with the change in the comparison groups.

Second, in column (4) of Table 6 I provide robust evidence that English skills in Mexico do not have any effect on wages. Although the point estimate is again negative, it is important to notice that it is very imprecise. In this exercise, I address the potential concern that the

cohort span I study in this paper is pretty wide, by narrowing it. Notice, however, that the effect of English programs on English skills acquisition does not seem to be robust to changes in the cohort span. One of the potential reasons is that by excluding the younger cohorts we reduce the exposure to the intervention. And, still, the point estimate suggests a positive effect. Furthermore, I provide suggestive evidence on the validity of the parallel trend assumption in Figure A.4.

Finally, due to the recent critique in the literature to DiD models producing biased estimates in the presence of heterogeneous treatment effects (De Chaisemartin and D'Haultfoeuille, 2022), I provide a robust DiD estimate as proposed by Sun and Abraham (2021). The results shown in Table 7 suggest that my original estimates are robust in terms of sign, significance and very close in magnitude to changes in the specification, which mitigates the potential bias due to heterogeneity in treatment effects across cohorts by implementing what Sun and Abraham (2021) call the 'interaction weighted estimator'.

7 Conclusions

In this paper, I offer a description of the English abilities in Mexico, which had not been systematically done before due to the lack of data on English skills. Furthermore, I provide the first estimate on the causal effect of exposure to English instruction on the acquisition of English abilities as well as the returns to English skills in Mexico. This latter finding contributes to the existing literature, which has mostly offered evidence on the returns to English skills in the context of immigrants in English-speaking countries or the context of former British colonies (India and South Africa). My results provide some of the first estimates in the context of a non-English-speaking country and the first among Latin American economies.

In my descriptive analysis, I document five important facts. First, there is a gender-English gap in Mexico, with more men declaring to speak English. Second, more exposure to English instruction is associated with more English skills. Third, the ability to speak English increases with educational attainment. Fourth, indigenous people are way behind in the process of learning English. Similarly, rural areas are falling behind in this learning process. Additionally, I find that elementary and manual unskilled occupations do not require English abilities in Mexico. On the other hand, clerical support, professional, and managerial occupations concentrate most English speakers in Mexico. After the descriptive analysis, I explore the relationship between English skills and wages.

Using ordinary least squares estimation and controlling for a rich set of variables including education, I find that there are no effects of English skills on wages. Additionally, I find that the omitted variables problem, which produces a biased estimate, is mostly due to education. Furthermore, point estimates suggest that male English speakers earn more than women English speakers. Similarly, highly-educated English speakers earn more than low-educated individuals. However, we may still be concerned about an endogeneity problem due to omitted variables such as abilities. Furthermore, it may also be the case that my estimates are biased due to a measurement error in the English skills variable.

To provide an estimate with a causal interpretation, I exploit the implementation of sev-

eral state English programs that offered English instruction in public primary schools. First, I provide an estimate of the Intention to Treat (ITT) effect of offering English instruction at school. I obtain this estimate for each state that implemented/expanded an English program since the early 1990s or 2000s. Then I pool these states in a staggered DiD model. Finally, I offer an IV estimate, where I use the variation generated by the state English programs as an instrument. This estimate provides the Local Average Treatment Effect (LATE), which can be interpreted as the returns to English abilities among those individuals who reported having English skills after being offered English instruction at school.

My results suggest that the implementation of English programs does not have any effect on wages. However, the point estimate suggests a potentially negative effect. This zero effect on wages is not a result of changes in the accumulation of human capital through other cognitive skills (Gálvez-Soriano, 2023), but potentially through the acquisition of English skills. In fact, if I consider hours of English instruction as an exogenous variable (due to the implementation/expansion of the state English programs), we may argue that English instruction in Mexico could increase the acquisition of English skills by 8.5 percentage points (0.028/0.331).

Furthermore, my IV estimate provides evidence that English skills do not significantly affect wages in Mexico. However, this IV estimate is very imprecise, and the point estimate suggests a negative effect. Part of the explanation to this potentially negative effect is that English programs may increase school enrollment. If this is the case, the studied sample is systematically excluding individuals currently enrolled in school, who are also potentially high earners. Nevertheless, more research is needed on the effect of English programs on school enrollment.

Regarding the mechanisms, I find that individuals who had exposure to the intervention are less likely to work in elementary and crafts occupations, but more likely to work as machine operators and professionals. These results suggest that although English instruction may not affect wages, it may expand employment opportunities. Indeed, individuals are moving out of occupations that require more physical effort to occupations more intensive in cognitive skills. A revealed preference argument suggests they cannot be worse off, as they could still choose the traditionally manual occupations if they wished.

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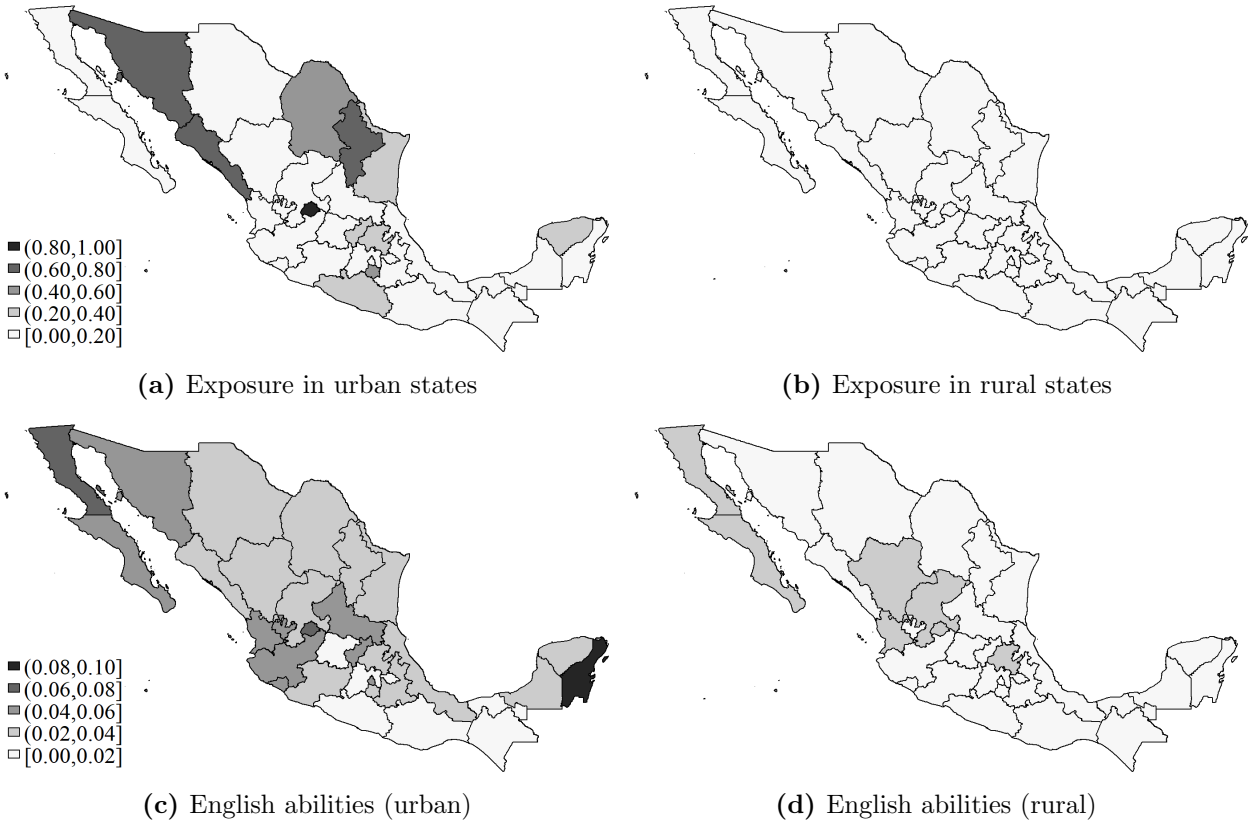
Figures and tables

Figure 1: Exposure to English instruction and English abilities in Mexican states



(a) Exposure in urban states

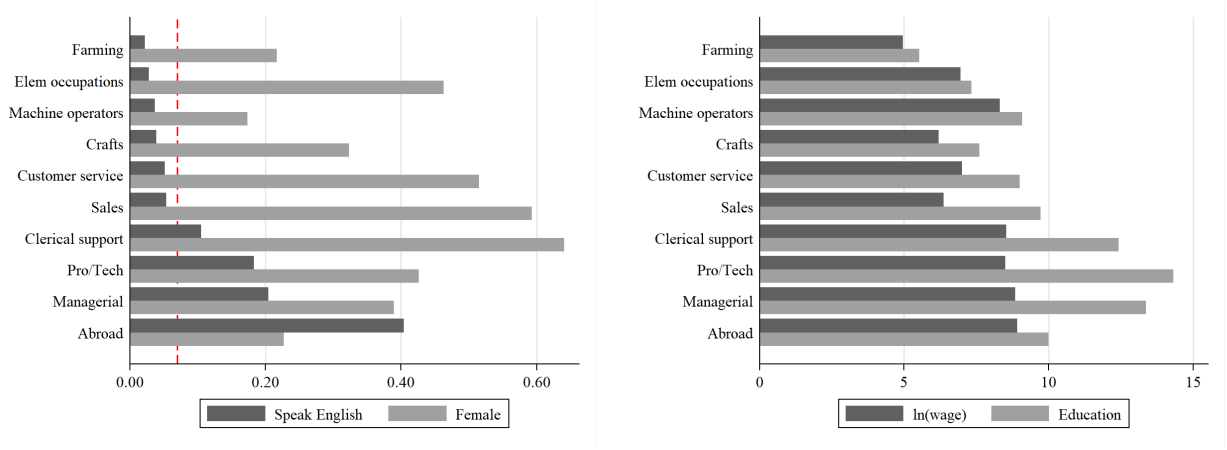
(b) Exposure in rural states

(c) English abilities (urban)

(d) English abilities (rural)

Note: Maps in upper panels (a) and (b) represent the proportion of Mexican public elementary schools that offered English instruction in a given state, in 2008. Maps in lower panels (c) and (d) represent the proportion of individuals aged 16–65 who self-reported their ability to speak English, using data from the 2014 Mexican Subjective Well-being Survey (BIARE).

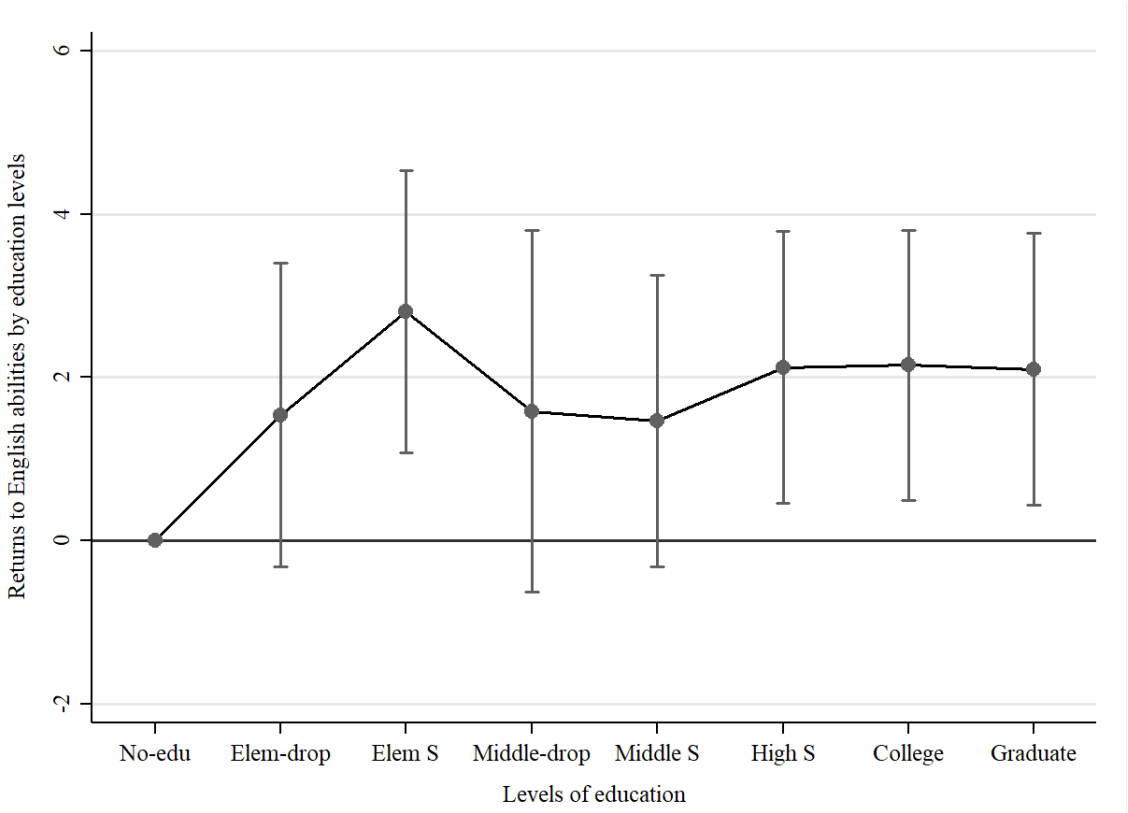
Figure 2: English abilities, wages and education by occupations



(a) Proportion of female and English speakers **(b)** Wages and education

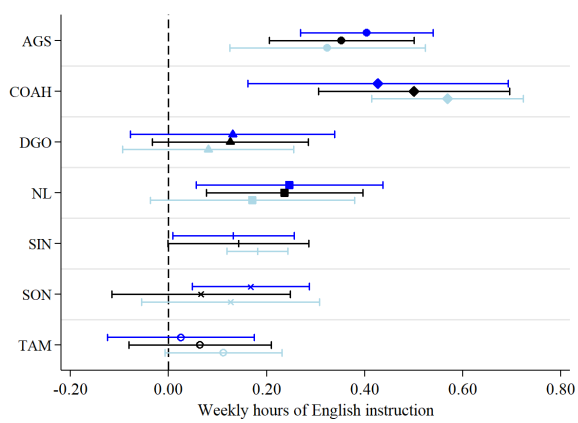
Note: This figure shows the percentage of individuals who have English speaking abilities, mean wages, percentage of women and their mean schooling, by aggregates of occupations in Mexico. The occupations were determined using the International Standard Classification of Occupations (ISCO-08) from the International Labor Organization (ILO) at one digit code level. The managerial category includes supervisors from other occupations. The 'abroad' category contains individuals who reported working abroad, but it is a mix of all other categories. The sample contains Mexicans ages 18–65 who self-reported their ability to speak in English. The vertical dotted line represents the mean of English speakers in this sample 0.0699 (6.99%).

Figure 3: Returns to English abilities and educational attainment

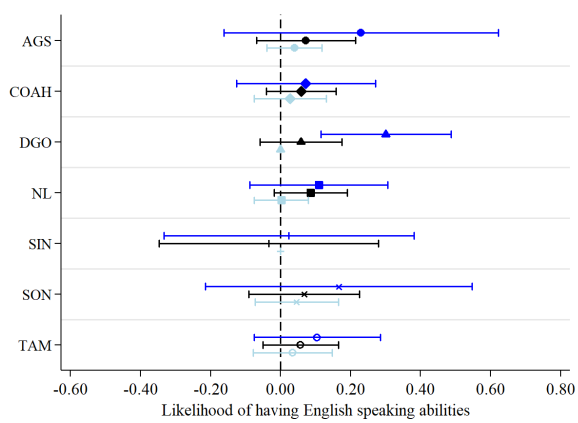


Note: This figure shows the coefficients from the interaction between having English speaking abilities and years of schooling. The sample consists of Mexicans ages 16–65 who reported being able or not to speak in English. The omitted educational attainment group is 0 years of schooling completed. Confidence intervals at 90% level.

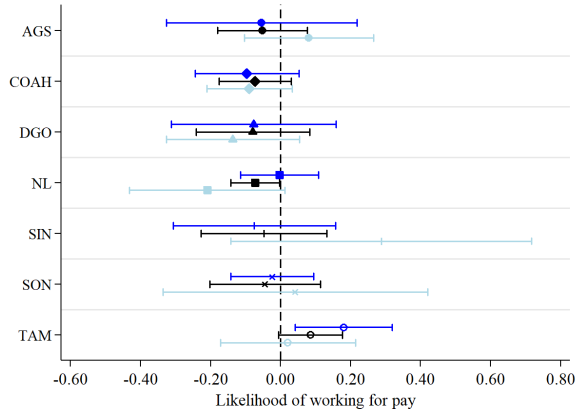
Figure 4: Effect of English programs by state
(DiD estimates)



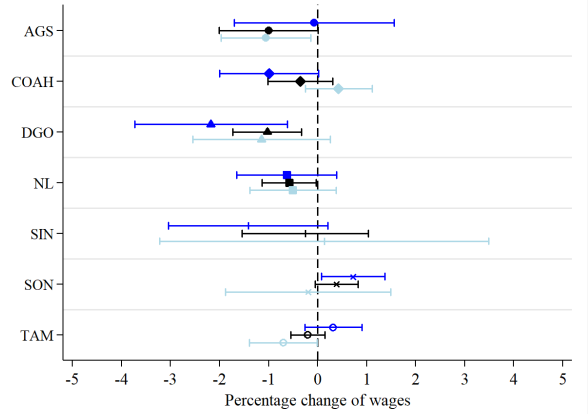
(a) Hours of English



(b) English skills



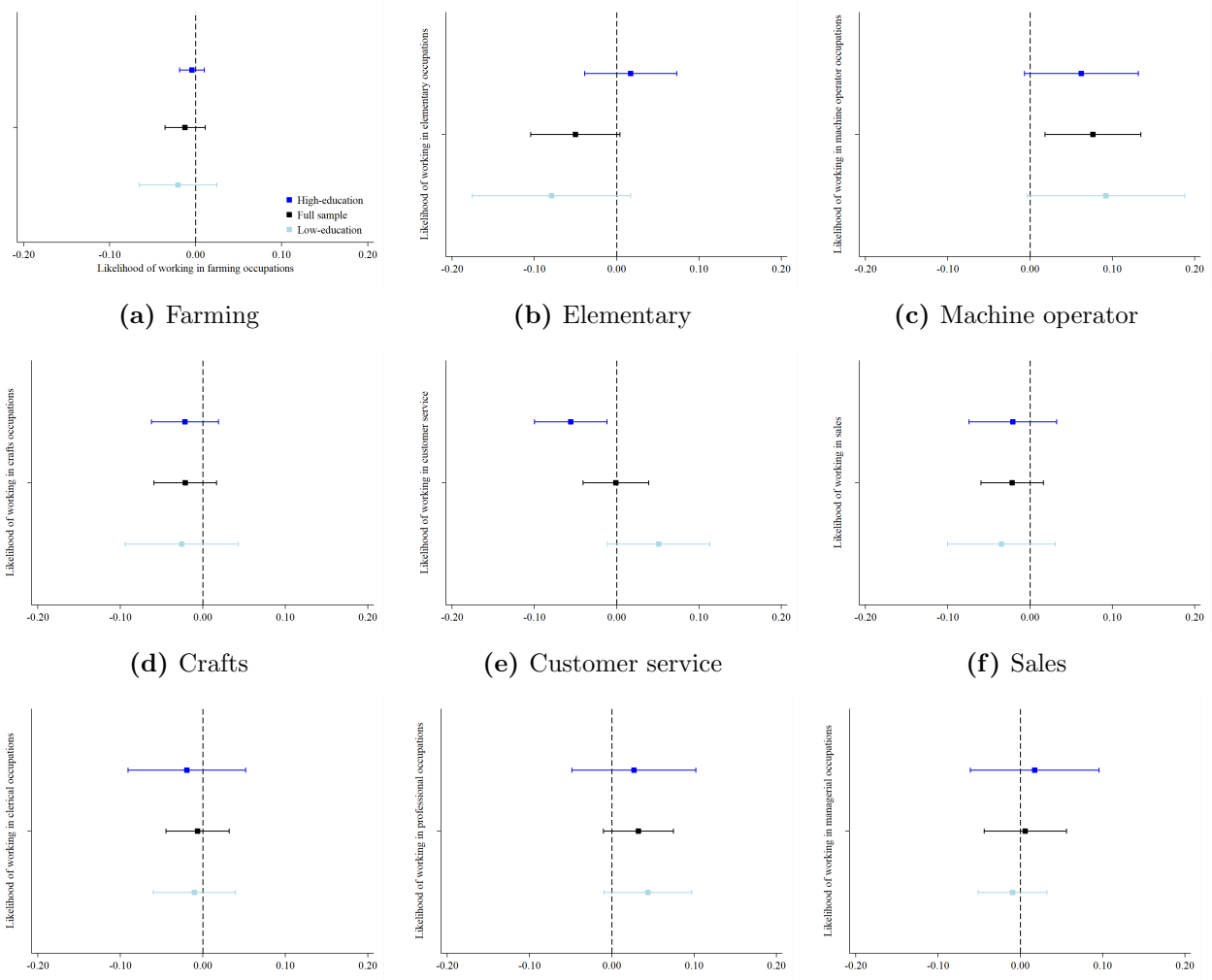
(c) Paid work



(d) Ln(wage)

Note: This figure shows the effect of several state English programs on exposure to English instruction, the acquisition of English skills, paid work, and wages. Each plotted estimate corresponds to a different equation per state. The full sample consists of Mexicans ages 18–39, which corresponds to the cohorts affected by the policy change and those that were not affected by the intervention. Dark blue estimates correspond to the high-educational attainment sample (more than nine years of schooling). Black estimates correspond to the full sample. Light blue estimates correspond to the low-educational attainment sample (nine years of schooling or less). Confidence intervals at 90% level.

Figure 5: Effect of English programs on occupational choices (staggered DiD)



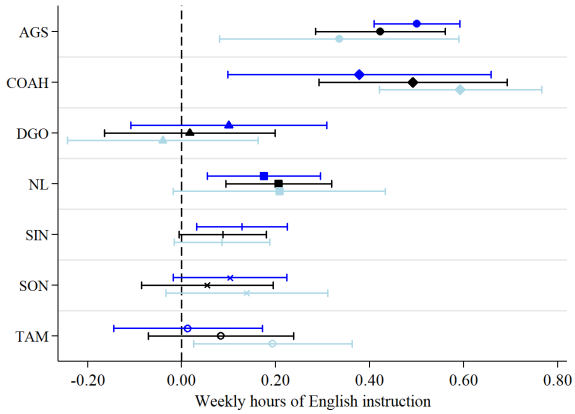
(a) Farming **(b)** Elementary **(c)** Machine operator

(d) Crafts **(e)** Customer service **(f)** Sales

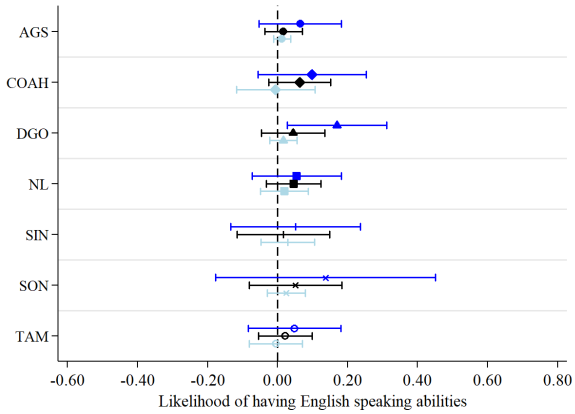
(g) Clerks **(h)** Professionals **(i)** Managerial

Note: This figure shows the effect of several state English programs on occupational decisions. Each plotted estimate corresponds to a different equation for men, women, low and high education. The sample consists of Mexicans ages 18–39, which corresponds to the cohorts affected by the policy change and those that had no exposure to the intervention. Confidence intervals at 90% level.

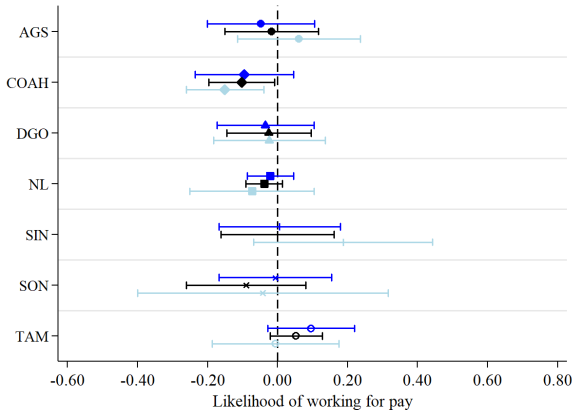
Figure 6: Effect of English programs by state with multiple comparison groups (DiD estimates)



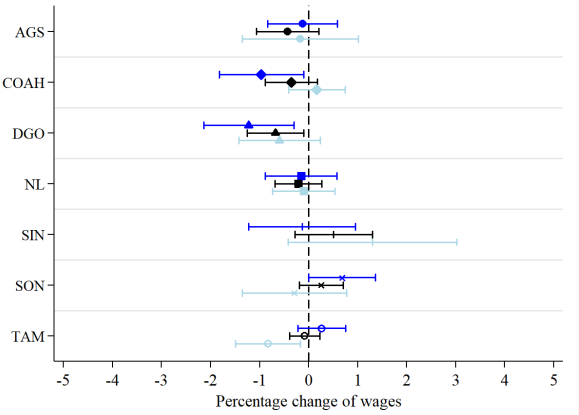
(a) Hours of English



(b) English skills



(c) Paid work



(d) Ln(wage)

Note: This figure shows the effect of several state English programs on exposure to English instruction, the acquisition of English skills, paid work, and wages. Each plotted estimate corresponds to a different equation per state. The sample consists of Mexicans ages 18–39, which corresponds to the cohorts affected by the policy change and those that just missed the intervention. Confidence intervals at 90% level.

Table 1: Adult English speaking ability in Mexico

Variable	Full Sample	States w/ English (a)	States wo/ English (b)	Diff. (a-b)
All individuals ages 18-65	6.99	8.25	6.70	1.56***
By gender				
Male	9.48	10.69	9.19	1.50**
Female	5.05	6.28	4.77	1.52***
By age				
18-35	8.27	10.73	7.74	2.99***
36-50	7.01	7.91	6.79	1.12
51-65	4.46	4.35	4.48	-0.14
By educational attainment				
Incomplete primary (0-5 years)	0.82	0.43	0.88	-0.44*
Primary school (6 years)	1.48	1.64	1.45	0.19
Lower secondary (7-9 years)	2.41	2.68	2.35	0.33
Upper secondary (10-12 years)	7.43	6.90	7.56	-0.66
College or higher (13-24 years)	21.93	24.58	21.21	3.37**
By ethnicity				
Indigenous	2.46	2.68	2.43	0.25
Non-indigenous	7.28	8.51	6.99	1.52***
By geography				
Urban	8.26	9.16	8.03	1.13**
Rural	2.29	2.63	2.24	0.39

Note: The sample consist of Mexicans ages 18–65 who self-reported their ability to speak English, using the 2014 Mexican Subjective Well-being Survey (BIARE). The full sample is composed by 33,512 observations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Descriptive statistics

Variable	Full Sample	Speak English (a)	Don't spk English (b)	Diff. (a-b)
Dependent variable				
Wage (monthly pesos)	6,261.81	15,042.61	5,529.11	9,513.50***
Farming	0.07	0.02	0.08	-0.06***
Elementary	0.23	0.08	0.24	-0.16***
Machine operators	0.09	0.04	0.10	-0.05***
Crafts	0.10	0.05	0.11	-0.06***
Customer service	0.08	0.05	0.08	-0.03***
Sales	0.12	0.08	0.12	-0.04***
Clerical support	0.06	0.08	0.06	0.02**
Professionals	0.16	0.37	0.14	0.23***
Managerial	0.08	0.21	0.07	0.14***
Abroad	0.00	0.02	0.00	0.01***
Independent variables				
English (speaking ability)	0.08	1.00	0.00	-
Hrs English	0.07	0.12	0.06	0.05***
Age (years)	39.54	38.35	39.64	-1.29***
Education (years)	9.68	14.02	9.31	4.71***
Female (%)	0.41	0.33	0.42	-0.09***
Indigenous (%)	0.06	0.02	0.07	-0.04***
Married (%)	0.63	0.58	0.63	-0.06***
Rural (%)	0.20	0.08	0.21	-0.13***
Observations	20,492	1,658	18,834	20,492

Note: These summary statistics consist of Mexicans ages 18–65 who work for pay and self-reported their ability to speak in English. Statistics shown in this table are obtained considering the survey weights. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Returns to English abilities in Mexico

	Full sample					Low-education		High-education	
	(1) ln(wage)	(2) ln(wage)	(3) ln(wage)	(4) ln(wage)	(5) ln(wage)	(6) ln(wage)	(7) ln(wage)	(8) ln(wage)	(9) ln(wage)
Panel A: Men and Women									
Speak Eng	1.130***	0.899***	0.112	-0.040	-0.047	0.127	-0.331	0.689***	0.122
	(0.095)	(0.092)	(0.082)	(0.083)	(0.081)	(0.284)	(0.293)	(0.087)	(0.079)
Observations	20,492	20,492	20,492	20,492	20,492	11,849	11,849	8,643	8,643
Adjusted R^2	0.014	0.092	0.160	0.190	0.300	0.000	0.321	0.014	0.286
Panel B: Men (β^M)									
Speak Eng	0.863***	0.735***	0.129	0.057	0.027	-0.201	-0.199	0.657***	0.156
	(0.115)	(0.111)	(0.105)	(0.107)	(0.114)	(0.305)	(0.300)	(0.101)	(0.115)
Observations	11,896	11,896	11,896	11,896	11,896	7,097	7,097	4,799	4,799
Adjusted R^2	0.013	0.067	0.130	0.174	0.351	0.000	0.387	0.019	0.377
Panel C: Women (β^W)									
Speak Eng	1.423***	1.230***	0.166	-0.076	-0.069	-0.050	-0.349	0.632***	-0.018
	(0.178)	(0.177)	(0.159)	(0.162)	(0.174)	(0.849)	(0.654)	(0.168)	(0.167)
Observations	8,596	8,596	8,596	8,596	8,596	4,752	4,752	3,844	3,844
Adjusted R^2	0.013	0.073	0.154	0.197	0.386	0.000	0.430	0.007	0.370
$\beta^M = \beta^W$ [p-value]	[0.010]	[0.012]	[0.834]	[0.637]	[0.670]	[0.868]	[0.538]	[0.906]	[0.903]
Basic controls	NO	YES	YES	YES	YES	NO	YES	NO	YES
Education	NO	NO	YES	YES	YES	NO	YES	NO	YES
Other controls	NO	NO	NO	YES	YES	NO	YES	NO	YES
Locality FE	NO	NO	NO	NO	YES	NO	YES	NO	YES

Note: This table shows the effect of having English abilities on wages in Mexico. The sample consists of Mexicans ages 18–65 who work for pay. Basic controls include: cohort fixed effects, gender and indigenous dummy. Other controls include: geographical context (rural/urban), marital status and state fixed effects. Standard errors clustered at locality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Effect of English programs (staggered DiD)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel A: Full sample					
Had Policy	0.331***	0.028*	-0.093	-0.002	0.019
	(0.058)	(0.017)	(0.129)	(0.023)	(0.021)
Observations	5,437	5,437	5,437	8,979	8,979
Adjusted R^2	0.573	0.177	0.172	0.230	0.342
Mean Dep. Var.	0.119	0.106	7.972	0.606	0.120

Note: This table shows the effect of several state English programs on exposure to weekly hours of English instruction (column 1), English abilities (column 2), labor force participation and wages (columns 3 and 4, respectively). The sample consists of Mexicans ages 18–39. Controls include: gender, indigenous people dummy, education, cohort fixed effects and locality fixed effects. Standard errors clustered at locality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Returns to English abilities
(IV estimate)

	(1) Structural-OLS	(2) First Stage	(3) Reduced Form	(4) Structural-IV
Speak Eng	0.061			-3.285
	(0.110)			(4.548)
Had Policy		0.028*	-0.093	
		(0.017)	(0.129)	
Observations	5,437	5,437	5,437	5,437
Adjusted R^2	0.172	0.177	0.172	

Note: This table shows the structural equation (column 1), first stage (column 2), reduced form and IV estimates (columns 3 and 4, respectively). The sample consists of Mexicans ages 18–39. Controls include: gender, indigenous people dummy, years of schooling of household head, education fixed effects, cohort fixed effects and locality fixed effects. Standard errors clustered at locality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Returns to English abilities
(IV estimate with narrower comparison group)

	(1) Structural-OLS	(2) First Stage	(3) Reduced Form	(4) Structural-IV
Speak Eng	0.011			-11.824
	(0.190)			(14.160)
Had Policy		0.022	-0.257	
		(0.029)	(0.189)	
Observations	2,283	2,283	2,283	2,283
Adjusted R^2	0.171	0.147	0.173	

Note: This table shows the structural equation (column 1), first stage (column 2), reduced form and IV estimates (columns 3 and 4, respectively). The sample consists of Mexicans ages 18–33. Controls include: gender, indigenous people dummy, years of schooling of household head, education fixed effects, cohort fixed effects and locality fixed effects. Standard errors clustered at locality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

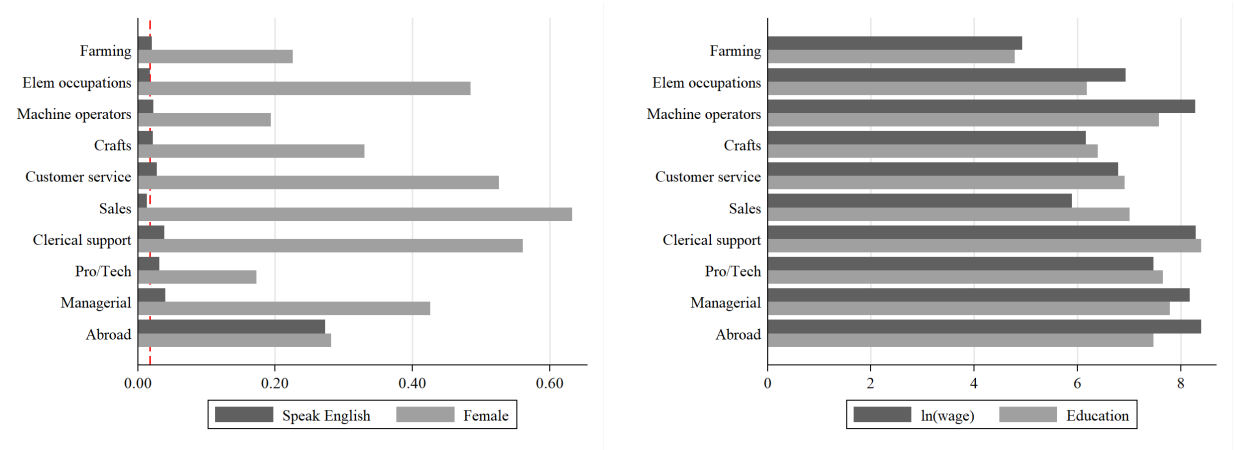
Table 7: Effect of English programs
(Robust staggered DiD)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Sun and Abraham (2021) interaction weighted estimator					
Had Policy	0.336***	0.028*	-0.096	0.000	0.014
	(0.055)	(0.015)	(0.123)	(0.021)	(0.019)
Observations	5,339	5,339	5,339	8,917	8,917
Adjusted R^2	0.600	0.176	0.159	0.229	0.348

Note: This table shows the effect of several state English programs on exposure to weekly hours of English instruction (column 1), English abilities (column 2), labor force participation and wages (columns 3 and 4, respectively). The sample consists of Mexicans ages 18–39. Controls include: gender, indigenous people dummy, education, cohort fixed effects and locality fixed effects. Standard errors clustered at locality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix

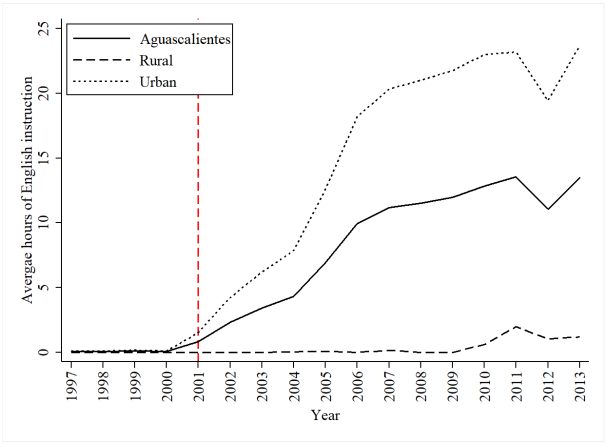
Figure A.1: English abilities, wages and education by occupations (low education)



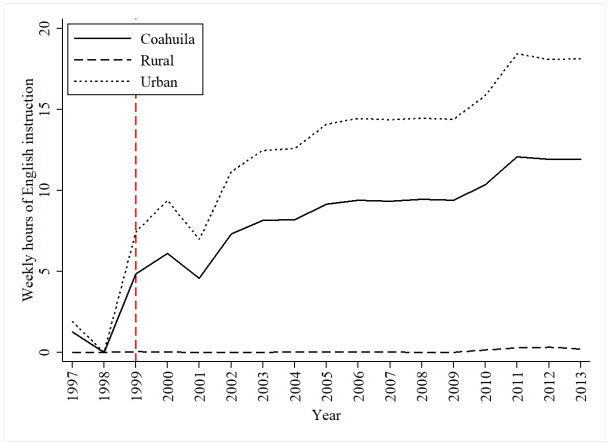
(a) Proportion of female and English speakers **(b)** Wages and education

Note: This figure shows the percentage of individuals who have English speaking abilities, mean wages, percentage of women and their mean schooling, by aggregates of occupations in Mexico. The occupations were determined using the International Standard Classification of Occupations (ISCO-08) from the International Labor Organization (ILO) at one digit code level. The managerial category includes supervisors from other occupations. The abroad category contains individuals who reported working abroad, but it is a mix of all other categories. The sample contains Mexicans ages 18–65 who self-reported their ability to speak in English and who have nine years of education or less. The vertical dotted line represents the mean of English speakers in this sample 0.0176 (1.76%).

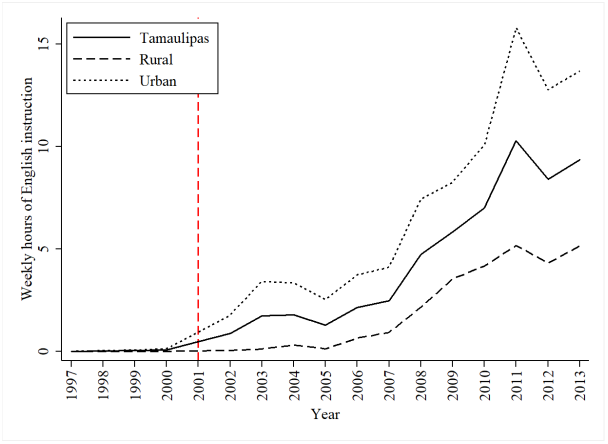
Figure A.2: Mexican states with an increase of English instruction in primary schools



(a) Aguascalientes



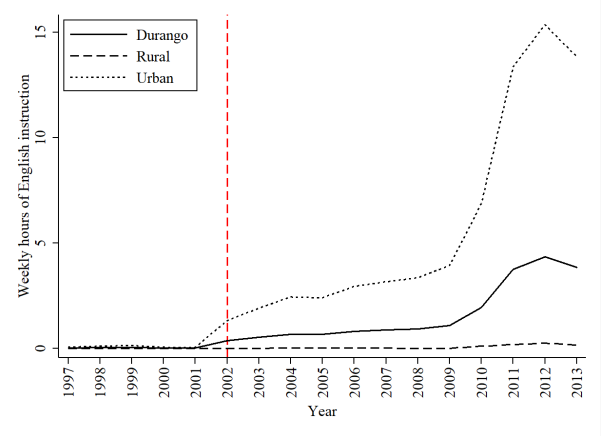
(b) Coahuila



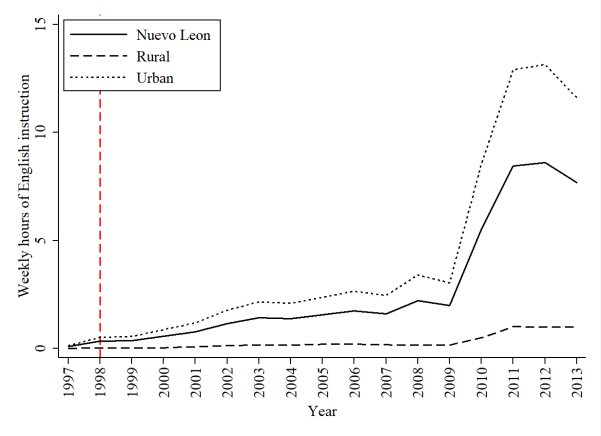
(c) Tamaulipas

Note: Average weekly hours of English instruction are plotted. The data used comes from the administrative records in the Mexican school census (also known as Statistics 911). The vertical dotted lines represent the first year of implementation/expansion of the state English program. The four states shown in this figure represent only the Mexican states that had a significant increase in hours of English instruction during the implementation/expansion of their respective English programs.

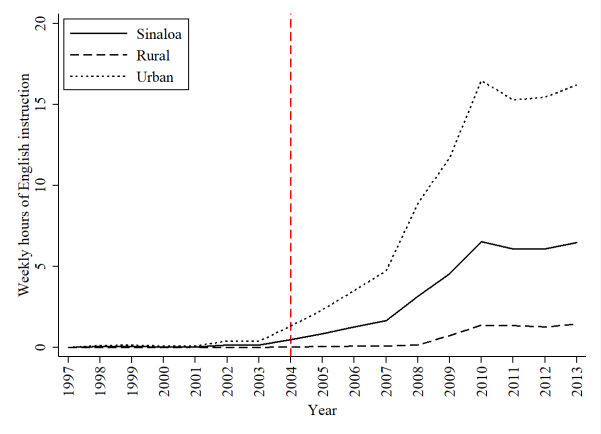
Figure A.3: Mexican states with some English instruction in public primary schools



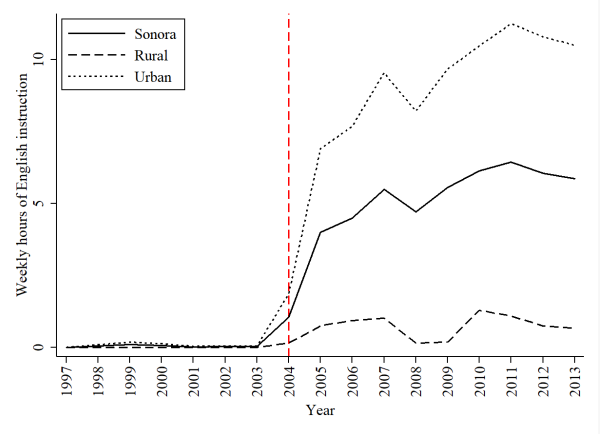
(a) Durango



(b) Nuevo Leon



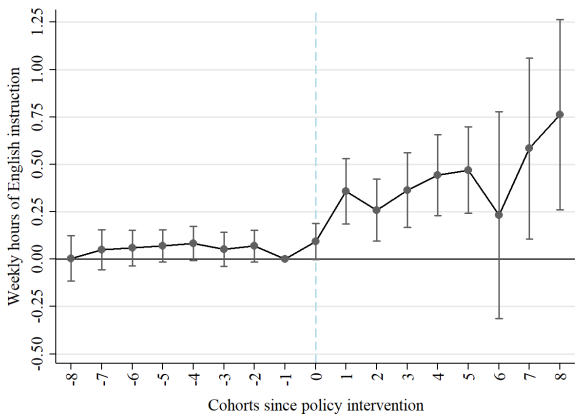
(c) Sinaloa



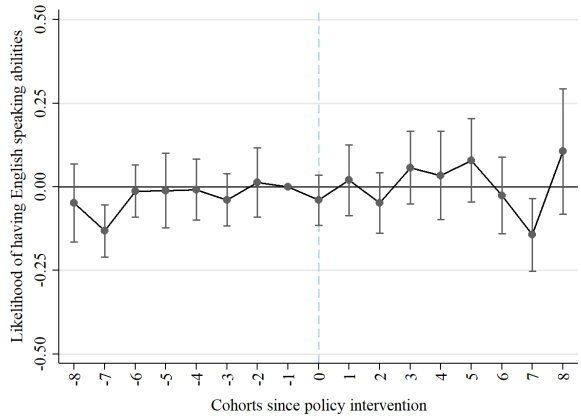
(d) Sonora

Note: Average weekly hours of English instruction are plotted. The data used comes from the administrative records in the Mexican school census (also known as Statistics 911). The vertical dotted lines represent the first year of implementation/expansion of the state English program. The four states shown in this figure represent only the Mexican states that implemented some English program, but offered it to a small number of schools and/or to some selected grades, resulting in an insignificant increase in hours of English instruction.

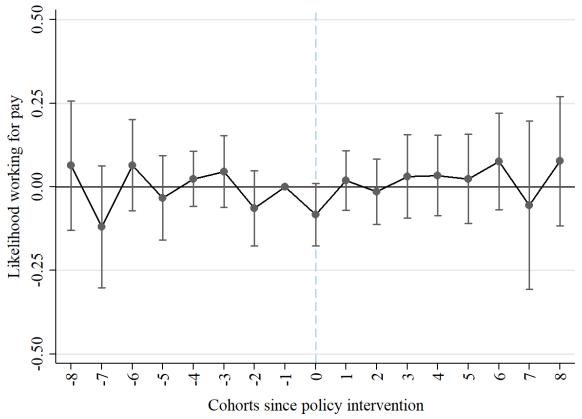
Figure A.4: Pre-trends test pooling all states (staggered DiD)



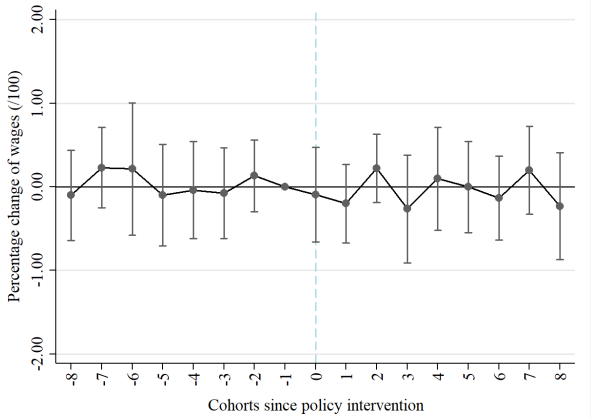
(a) Hours of English



(b) Speak English



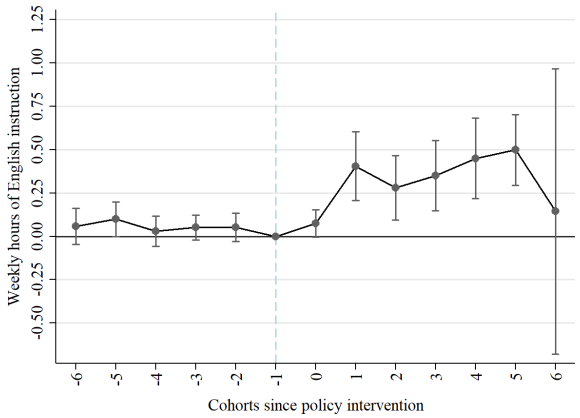
(c) Paid work



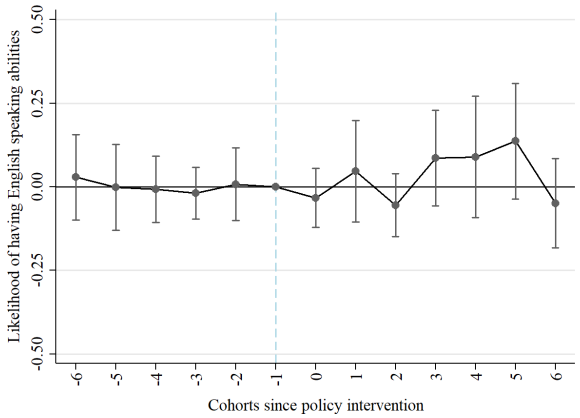
(d) Ln(wage)

Note: Plotted estimates represent the interaction terms between the treatment variable and an indicator function for each cohort since the policy intervention, in an event study type regression. The omitted cohort is one year before the state English programs. The vertical dotted lines indicate the moment of the intervention. The no statistically significant estimates at the left of the vertical dotted line suggest parallel trends before the policy. Confidence intervals at 95% level.

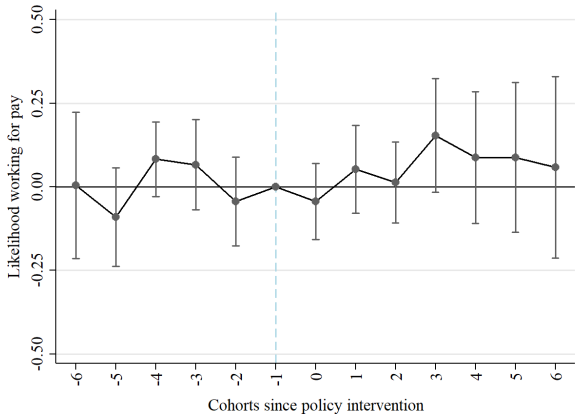
Figure A.5: Pre-trends test pooling all states (staggered DiD with a narrower comparison group)



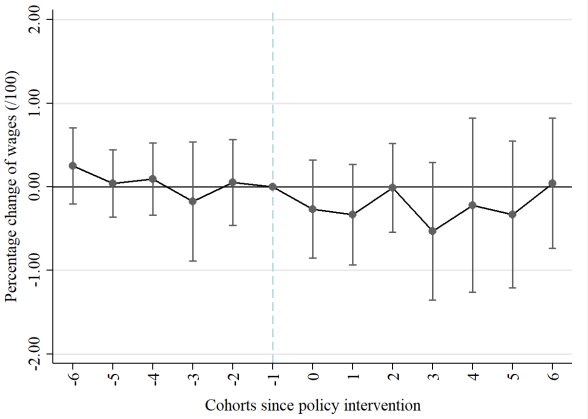
(a) Hours of English



(b) Speak English



(c) Paid work



(d) Ln(wage)

Note: Plotted estimates represent the interaction terms between the treatment variable and an indicator function for each cohort since the policy intervention, in an event study type regression. The omitted cohort is one year before the state English programs. The vertical dotted lines indicate the moment of the intervention. The no statistically significant estimates at the left of the vertical dotted line suggest parallel trends before the policy. Confidence intervals at 95% level.

Table A.1: Policy changes in Mexican states

State	Year of impl.	Policy change	Cohorts affected	Hrs of English		Policy details	Comparison state
				Before policy	After policy		
Nuevo Leon	1993	1998	1981-1996	0.97	2.75	Only sixth grades	SLP
Sonora	1993	2004	1989-1996	1.64	5.52	Only 1st and 2nd grades	BC
Coahuila	1995	1999	1979-1996	2.73	9.09	Started w/trial stage	Chihuahua
Tamaulipas	2001	2001	1983-1996	1.21	2.89	Only fourth grades	BC
Aguascalientes	2001	2001	1986-1995	2.36	8.13	No info. available	Zacatecas
Durango	2002	2002	1985-1996	0.33	1.00	Started w/trial stage	SLP
Sinaloa	2004	2004	1989-1996	0.70	1.86	No info. available	Nayarit

Note: These summary statistics consist of Mexicans ages 18–65 who self-reported their ability to speak English.
Source: I computed the hours of English instruction using the Mexican school census (Statistics 911). Policy details from Nuevo Leon, Sonora, Coahila and Tamaulipas were obtained from their respective websites (see section 2 for the original sources). Details from Durango were obtained from an unofficial source. There are not information available for the state English programs of Aguascalientes and Sinaloa. However, for all states, the information provided from the data in the school census coincides with official and unofficial sources in terms of the release year of each state English program.

Table A.2: Heterogeneous effects of English programs (staggered DiD)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
By gender					
Panel A: Men (β^M)					
Had Policy	0.300***	0.042	-0.121	0.018	0.001
	(0.050)	(0.029)	(0.151)	(0.027)	(0.026)
Observations	3,135	3,135	3,135	4,004	4,004
Adjusted R^2	0.580	0.175	0.198	0.291	0.393
Panel B: Women (β^W)					
Had Policy	0.385***	0.003	-0.021	-0.028	0.036
	(0.103)	(0.037)	(0.303)	(0.037)	(0.029)
Observations	2,302	2,302	2,302	4,975	4,975
Adjusted R^2	0.580	0.118	0.183	0.159	0.292
$\beta^M = \beta^W$ [p-value]	[0.283]	[0.417]	[0.693]	[0.355]	[0.323]
By educational attainment					
Panel C: Low education sample (β^L)					
Had Policy	0.353***	0.008	-0.185	-0.021	0.003
	(0.076)	(0.018)	(0.185)	(0.040)	(0.024)
Observations	2,757	2,757	2,757	4,511	4,511
Adjusted R^2	0.535	0.046	0.186	0.245	0.053
Panel D: High education sample (β^H)					
Had Policy	0.282***	0.020	-0.004	0.025	-0.005
	(0.055)	(0.031)	(0.197)	(0.031)	(0.026)
Observations	2,680	2,680	2,680	4,468	4,468
Adjusted R^2	0.661	0.158	0.187	0.274	0.435
$\beta^L = \beta^H$ [p-value]	[0.239]	[0.674]	[0.547]	[0.417]	[0.782]

Table A.2 (continued): Heterogeneous effects of English programs (staggered DiD)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
By ethnicity					
Panel E: Indigenous (β^I)					
Had Policy	-0.029	-0.071	13.784***	0.496	-0.023
	(0.602)	(7.654)	(1.295)	(0.817)	(0.154)
Observations	81	81	81	141	141
Adjusted R^2	0.980	-0.554	-3.452	0.438	0.751
Panel F: Non-Indigenous (β^N)					
Had Policy	0.332***	0.026	-0.080	-0.004	0.017
	(0.059)	(0.017)	(0.132)	(0.023)	(0.021)
Observations	5,356	5,356	5,356	8,838	8,838
Adjusted R^2	0.573	0.180	0.170	0.228	0.342
$\beta^I = \beta^N$ [p-value]	[0.243]	[0.201]	[0.003]	[0.517]	[0.117]
By geographical context					
Panel G: Rural (β^R)					
Had Policy	-0.025	-0.004	-0.394	0.008	0.034
	(0.024)	(0.013)	(0.240)	(0.035)	(0.026)
Observations	872	872	872	1,680	1,680
Adjusted R^2	-0.219	0.212	0.285	0.291	0.157
Panel H: Urban (β^U)					
Had Policy	0.353***	0.032*	-0.058	0.004	-0.001
	(0.061)	(0.018)	(0.136)	(0.022)	(0.021)
Observations	4,565	4,565	4,565	7,299	7,299
Adjusted R^2	0.611	0.196	0.145	0.225	0.377
$\beta^R = \beta^U$ [p-value]	[0.000]	[0.299]	[0.312]	[0.917]	[0.073]

Note: This table shows the heterogeneous effects of several state English programs on exposure to weekly hours of English instruction (column 1), English abilities (column 2), labor force participation and wages (columns 3 and 4, respectively). The sample consists of Mexicans ages 18–39. Controls include: gender, indigenous people dummy, education, cohort fixed effects and locality fixed effects. Low education sample includes individuals with nine or less years of education. High education sample is composed by individuals with more than nine years of education. Standard errors clustered at locality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$