English skills and labor market outcomes in Mexico

Oscar Gálvez-Soriano

University of Houston
Department of Economics

April, 2023

Motivation: Returns to English language abilities

- Language skills are a form of human capital
- English is valuable in the world economy
  - Globalization: trade, technology and information
  - Mobility and better occupations

- In English-speaking countries, English language is the primary language for communication
- Even in non-English-speaking countries, English skills could be useful
  - How valuable is English for workers in non-English-speaking countries?
  - I study the case of Mexico

Related literature

- English-speaking countries
    - Immigrants: Bleakley and Chin (2004); Chiswick and Miller (2015)
    - Former British colonies: Azam, Chin and Prakash (2013); Eriksson (2014); Chakraborty and Bakshi (2016)

- Non-English-speaking countries: Lang and Siniver (2009)

- English language skills in Mexico: McConnell and Leclere (2002); Flores-Yeffal (2019); Delgado-Helleseter (2020)

This paper in a nutshell

Research Question

- What are the returns to English language skills in Mexico?

What I do

- Describe the prevalence of English skills in Mexico

    - Take advantage of an unusual data set that measures English skills in Mexico

- Quantify the relationship between English skills and labor market outcomes in Mexico

    - Exploit state policy changes that give state-by-cohort variation in exposure to English instruction

Background

- Importance of English language for Mexico
  - Neighboring country with the US
  - Investment, trade and migration

- Very little is known about English language skills in Mexico
  - Who speaks English?
  - I use the 2014 Subjective Well-being Survey (BIARE) to describe English skills in Mexico

- Very little is known about returns to English skills in Mexico
  - Public schools spend money on English instruction
  - Some industries and occupations demand workers who speak English

English speaking ability: a rare skill in Mexico

- BIARE is a nationally representative survey with adult respondents 18 and older (ENIGH supplemental survey)

- I use the response to the following question to form a measure of English ability

    - Do you speak English?
    - I code it as one if the respondent says yes, and zero otherwise

- 2.75% of Mexicans speak English

Motivation
ooo

Background
oo●ooo

Empirical strategy
ooooooooo

Data
o

Results
ooooooooooooo

Conclusion
ooo

Appendix
oooooooooooooooooooooo

English speaking ability by gender, ethnicity and geographical context

Table 1: Adult English speaking ability in Mexico

Variable	Full Sample
All individuals ages 18-65	2.75
	(16.36)
By gender	
Male	3.44
	(18.22)
Female	2.13
	(14.45)
By ethnicity	
Indigenous	0.99
	(9.88)
Non-indigenous	2.87
	(16.69)
By geography	
Urban	3.24
	(17.71)
Rural	0.92
	(9.53)

English speaking ability by age and education
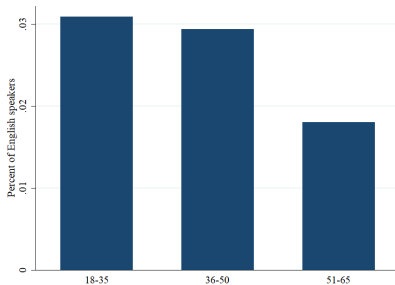
English speaking ability by age
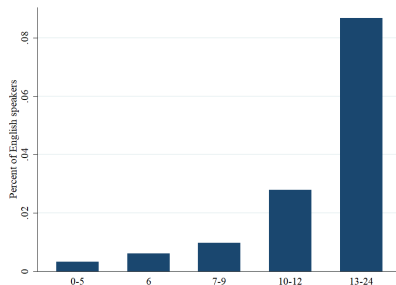
English speaking ability by education

Where are the English speakers?

(0.08,0.10]
(0.06,0.08]
(0.04,0.06]
(0.02,0.04]
[0.00,0.02]

English speaking ability by occupations
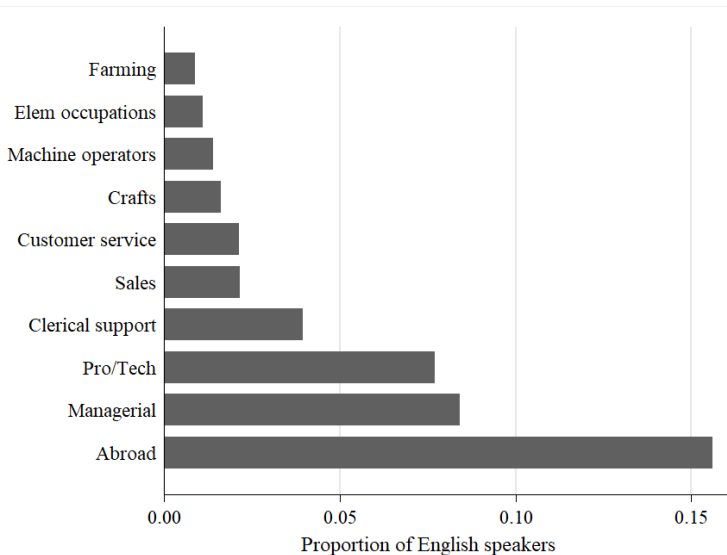
Empirical framework

We want to estimate the effect of English skills, Eng_i, on log-wages, ω_i, which can be approximated with the following equation:

$$\omega_i = \alpha + \beta \cdot Eng_i + \boldsymbol{X_i}\boldsymbol{\Pi} + \epsilon_i$$

where $\boldsymbol{X_i}$ is a vector of controls including: education, experience, gender, marital status, ethnicity, student status, cohort FE and geographical context (rural/urban)

Empirical challenges

- Concern that English skills, Eng_i, are endogenous in the wage equation
    - Omitted variables: abilities may be correlated with both English skills and wages
    - Measurement error of English skills variable

- OLS estimation would lead to a biased estimate of β

- Take advantage of state policy changes in English instruction to form an instrument for English skills to obtain a consistent estimate of β

- Since the early 1990's some Mexican states implemented English programs to offer English instruction in public primary schools

Policy changes in Mexican states   ↦ AGS

Table: Policy changes in Mexican states

Treatment state	Year of policy change	Comparison state
Nuevo Leon	1998	SLP
Sonora	2004	BC
Coahuila	1999	Chihuahua
Tamaulipas	2001	BC
Aguascalientes	2001	Zacatecas
Durango	2002	SLP
Sinaloa	2004	Nayarit

Estimating the effect of policy changes

- Use a Difference-in-Differences strategy to get the effect of these policies
- For each treatment use one neighboring state as the comparison group
- Simple illustration with one policy change:

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

- where y_{isc} is the outcome variable of individual i who lives in state s and belongs to cohort c
- $after_c$: takes the value of one if the individual i belongs to one of the cohorts that had exposure to the policy and zero otherwise
- $treatment_s$ takes the value of one if individual i lives in a treated state and zero otherwise

Parallel Trend Assumption (one policy change)

- Interpreting γ as the effect of the policy requires that the PTA holds
- I offer evidence on the validity of my identifying assumption using the following event study type specification:

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

where $I_{(k=c)}$ is an indicator function, which identifies if individual i potentially had exposure, depending on the cohort he/she belongs. The reference cohort is the one that just missed the policy

▸ PTA

Combining the policy changes (Staggered Difference in Differences)

Combining the policy changes (Staggered Difference in Differences)

Instead of looking at policies one by one, examine all these policies at once

$$y_{isc} = \theta + \psi\,HadPolicy_{sc} + \delta_s + \kappa_c + \boldsymbol{X_{isc}}\boldsymbol{\Psi} + \varepsilon_{isc}$$

where $HadPolicy_{sc}$ takes the value of one if individual i lives in a treated state and he/she belongs to one of the affected cohorts (zero otherwise)

Parallel Trend Assumption (combining all policies)

I use an event study specification to examine if pre-trends are present

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

where c_s^* denotes the first cohort affected by the intervention in state s, so $c - c_s^*$ is the time relative to c_s^* with negative values reflecting older cohorts not exposed to the policy. The omitted category is -1

↦ PTA

IV estimation

Equation of interest:

$$\omega_{isc} = \alpha + \beta \, Eng_{isc} + \delta_s + \kappa_c + \boldsymbol{X_{isc}\Psi} + \varepsilon_{isc}$$

Use $HadPolicy_{sc}$ to instrument for Eng_{isc}. First stage equation:

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

Reduced form equation:

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

Data ▸ Descriptive Stats

Household survey (2014 BIARE)

- Individual level data (18-38 years old)
- BIARE surveyed 44,518 households
  - Representative at national and state level
- Very rich questionnaire, including English skills

School data on exposure to English instruction in primary school

- Mexican School Census (1997-2007)
- Weekly hours of English instruction (exposure)
  - By school-cohort, average over primary school
  - By cohort, take locality average
- Merge English instruction measure to individual-level data (in BIARE) by locality and cohort

Results: OLS estimate of the returns to English abilities

Table : Returns to English abilities in Mexico

	Full sample		Low-education		High-education	
	ln(wage)	ln(wage)	ln(wage)	ln(wage)	ln(wage)	ln(wage)
Speak Eng	0.985***	-0.048	0.004	-0.364	0.586***	0.079
	(0.094)	(0.077)	(0.282)	(0.290)	(0.079)	(0.065)
Observations	49,884	49,884	29,043	29,043	20,841	20,841
Adjusted R^2	0.005	0.248	0.000	0.253	0.005	0.194
Basic controls	NO	YES	NO	YES	NO	YES
Education	NO	YES	NO	YES	NO	YES
Other controls	NO	YES	NO	YES	NO	YES
Locality FE	NO	YES	NO	YES	NO	YES

Summary thus far

- Large difference in earnings between English speakers and non-English speakers

- This difference disappears after controlling for demographic characteristics, education and locality FE

- Could still be concerned endogeneity

- Proceed to look at effects of policies expanding English instruction

Policy changes in Mexican states

Table: Policy changes in Mexican states

Treatment state	Year of policy change	Comparison state
Nuevo Leon	1998	SLP
Sonora	2004	BC
Coahuila	1999	Chihuahua
Tamaulipas	2001	BC
Aguascalientes	2001	Zacatecas
Durango	2002	SLP
Sinaloa	2004	Nayarit

Results: DiD estimate of the effect of each policy
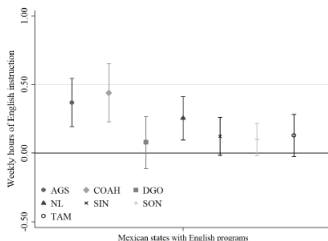
(a) Hours of English
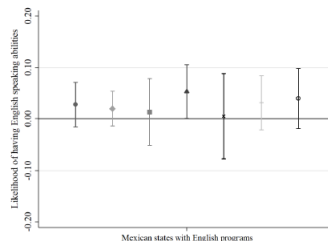
(b) English skills
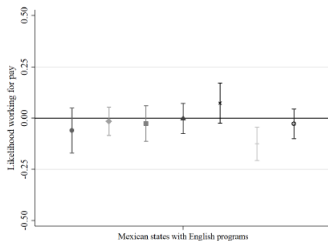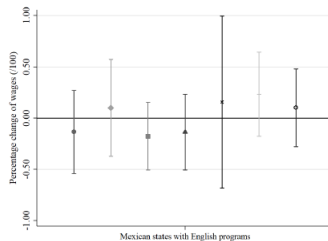
(c) Paid work

(d) Ln(wage)

Results: Effect of the policies combined (SDD)

Table   : Intention to treat effect of offering English instruction at school
(SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel A: Full sample					
Had Policy	0.308***	0.015**	0.019	-0.020	0.038***
	(0.046)	(0.008)	(0.080)	(0.013)	(0.014)
Observations	13,131	13,131	13,131	22,517	22,517
Adjusted R^2	0.596	0.075	0.153	0.219	0.370
Mean Dep. Var.	0.152	0.043	8.066	0.587	0.147

Results: Effect of the policies combined (SDD)

Table   : Intention to treat effect of offering English instruction at school
(SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel A: Full sample					
Had Policy	0.308***	0.015**	0.019	-0.020	0.038***
	(0.046)	(0.008)	(0.080)	(0.013)	(0.014)
Observations	13,131	13,131	13,131	22,517	22,517
Adjusted R^2	0.596	0.075	0.153	0.219	0.370
Mean Dep. Var.	0.152	0.043	8.066	0.587	0.147

Results: Effect of the policies combined (SDD)

Table : Intention to treat effect of offering English instruction at school (SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel A: Full sample					
Had Policy	0.308***	0.015**	0.019	-0.020	0.038***
	(0.046)	(0.008)	(0.080)	(0.013)	(0.014)
Observations	13,131	13,131	13,131	22,517	22,517
Adjusted R^2	0.596	0.075	0.153	0.219	0.370
Mean Dep. Var.	0.152	0.043	8.066	0.587	0.147

Results: Effect of the policies combined (SDD)

Table   : Intention to treat effect of offering English instruction at school
(SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel A: Full sample					
Had Policy	0.308***	0.015**	0.019	-0.020	0.038***
	(0.046)	(0.008)	(0.080)	(0.013)	(0.014)
Observations	13,131	13,131	13,131	22,517	22,517
Adjusted R^2	0.596	0.075	0.153	0.219	0.370
Mean Dep. Var.	0.152	0.043	8.066	0.587	0.147

Results: Educational heterogeneous effects (SDD)

Table   : Intention to treat effect of offering English instruction at school
(SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel D: Low education sample (β^L)					
Had Policy	0.305***	0.010	-0.169	0.016	0.005
	(0.062)	(0.007)	(0.123)	(0.021)	(0.014)
Observations	6,624	6,624	6,624	10,898	10,898
Adjusted R^2	0.522	0.016	0.162	0.225	0.043
Panel E: High education sample (β^H)					
Had Policy	0.304***	0.019	0.227**	-0.025	0.031*
	(0.040)	(0.014)	(0.099)	(0.018)	(0.017)
Observations	6,507	6,507	6,507	11,619	11,619
Adjusted R^2	0.659	0.070	0.146	0.263	0.432
$\beta^L = \beta^H$ [p-value]	[0.973]	[0.590]	[0.005]	[0.119]	[0.224]

⇝ Gender   ⇝ Ethnicity   ⇝ Geographical context

Results: IV estimate of returns to English abilities

Table   : Returns to English abilities
(IV estimate)

	(1) Structural-OLS	(2) First Stage	(3) Reduced Form	(4) Structural-IV
Speak Eng	0.142			1.252
	(0.102)			(5.084)
Had Policy		0.015**	0.019	
		(0.008)	(0.080)	
Observations	13,131	13,131	13,131	13,131
Adjusted R^2	0.153	0.075	0.153	

Mechanisms

- Cognitive skills
  - Acquisition of English skills
  - No effect on other skills: Language and Mathematics (Gálvez-Soriano, 2023)

- Occupational choices
  - Move into occupations that require English skills
  - Better working conditions

Mechanisms: Occupational choices (SDD)   ↪ All
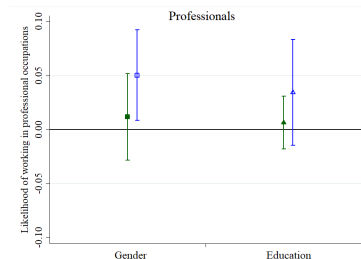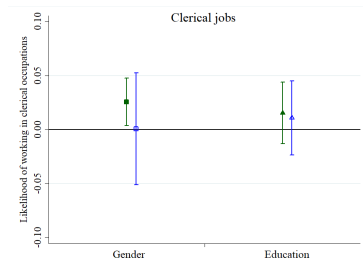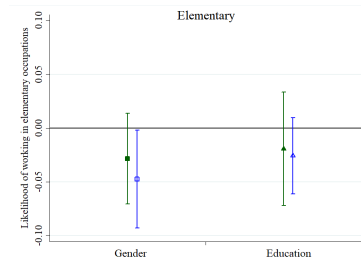
Robustness checks

- Concern about SDD estimator in the presence of heterogeneous treatment effects ⟐ SDD

- Different comparison group (all neighboring states) ⟐ DD

- Narrower cohorts ⟐ SDD

Conclusion

- On average: no effect on wages, shifts across occupations

- Highly-educated: rise in wages, shifts into professional occupations

- Low-educated: zero effect on wages, shifts into clerical jobs

- Acquisition of English abilities and increase in school enrollment

Discussion

These findings are remarkably similar to the findings in Chapter 1, which are:

- Exposure to English instruction affects outcomes of workers across the cognitive skills distribution
  - On average: no effect on wages, increase in mobility
  - High-skill workers: rise in wages, industry shifts
  - Low-skill workers: increase in mobility, industry shifts

- No effects on other cognitive skills; language and math

- English instruction changes employment opportunities

Motivation
○○○

Background
○○○○○○

Empirical strategy
○○○○○○○○○

Data
○

Results
○○○○○○○○○○○○○

Conclusion
○○●

Appendix
○○○○○○○○○○○○○○○○○○○○○

Thank you!

For more about me and my research, please scan here:

Policy background in Aguascalientes ⟜Back

The Mexican state of Aguascalientes introduced an English program in 2001 to offer English instruction in elementary schools

- Cohorts 1990-1996 had exposure to Eng instruction in elementary schools of Aguascalientes
- Same cohorts in Zacatecas had no exposure

Policy background in Aguascalientes · Back
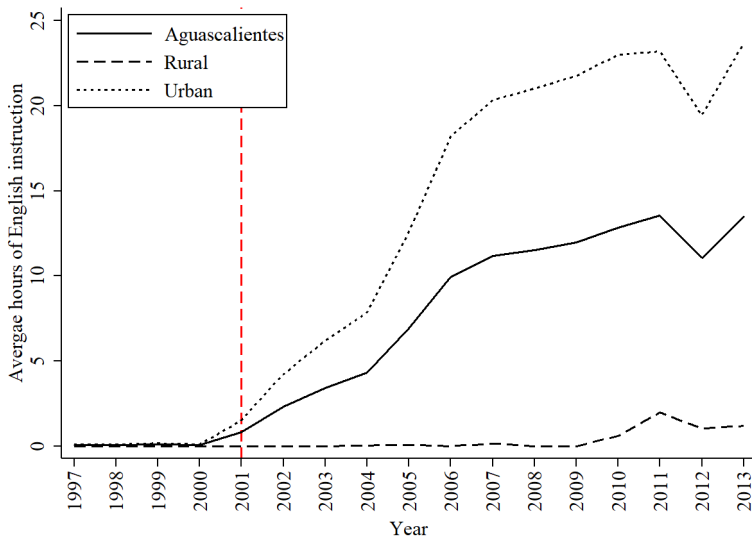
English speakers different from non-Eng speakers ➤ Back

Table : Descriptive statistics

Variable	Full Sample	Speak English (a)	Don't spk English (b)	Diff. (a-b)
Dependent variable				
Wages (monthly pesos)	6,222.40	15,032.45	5,939.54	9,092.91***
Independent variables				
English (speaking ability)	0.03	1.00	0.00	-
Hrs English	0.08	0.12	0.07	0.05***
Age (years)	39.05	38.31	39.08	-0.76**
Education (years)	9.67	14.02	9.53	4.49***
Female (%)	0.38	0.33	0.38	-0.05***
Indigenous (%)	0.06	0.02	0.06	-0.04***
Married (%)	0.66	0.58	0.66	-0.08***
Rural (%)	0.20	0.08	0.20	-0.12***
Observations	49,884	1,664	48,220	49,884

Parallel Trend Assumption (Aguascalientes)   ↪ Back
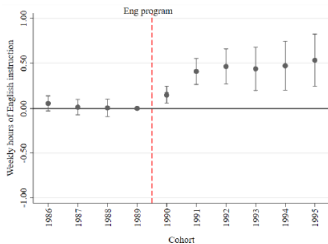
(a) Hours of English
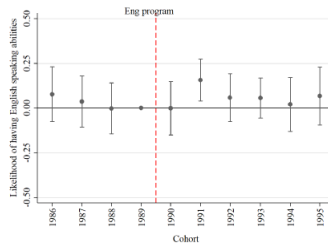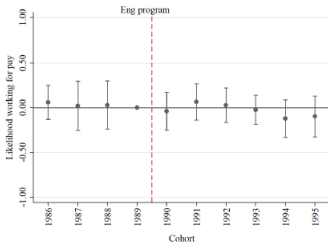
(b) Speak English
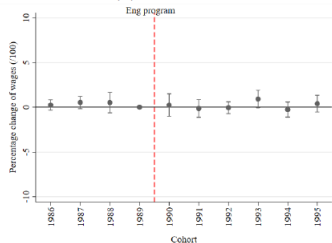
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Coahuila)
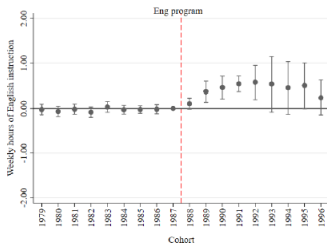
(a) Hours of English
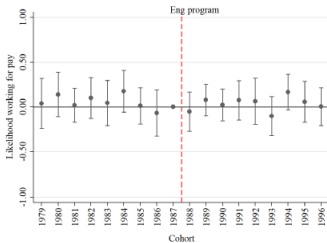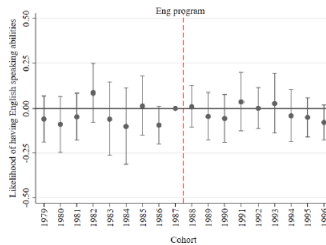
(b) Speak English
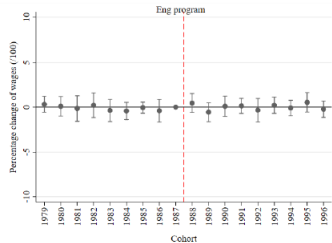
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Durango)
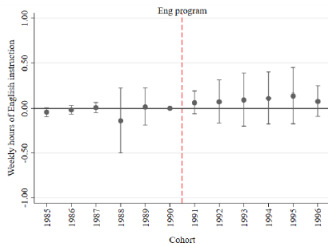
(a) Hours of English
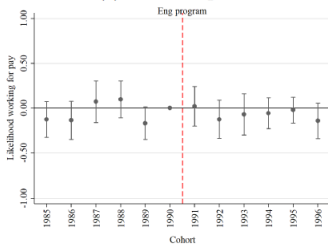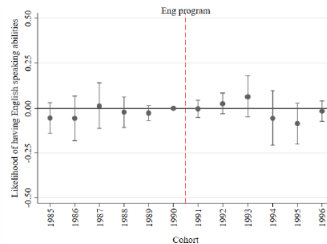
(b) Speak English
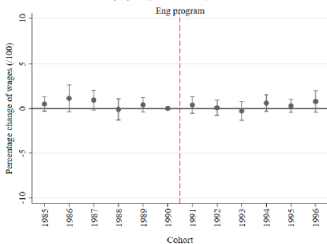
(c) Paid work

(d) Ln(wage)

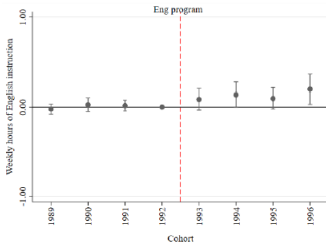# Parallel Trend Assumption (Nuevo Leon)
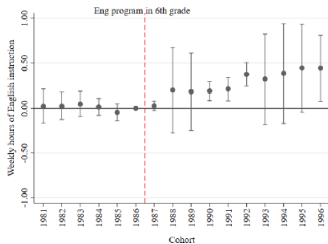
(a) Hours of English
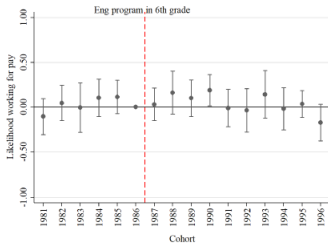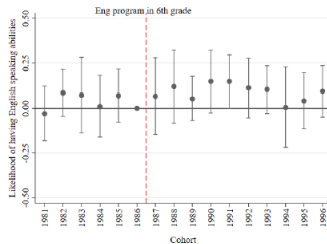
(b) Speak English
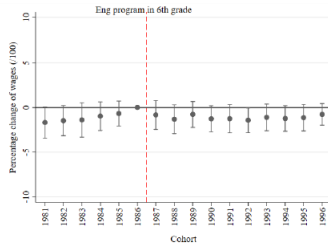
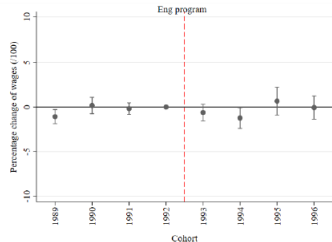(c) Paid work

(d) Ln(wage)

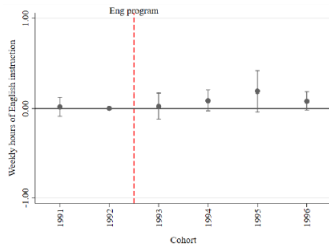# Parallel Trend Assumption (Sinaloa)
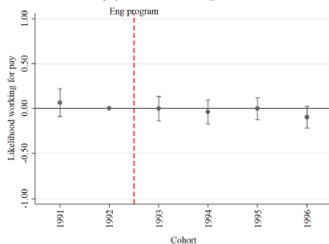

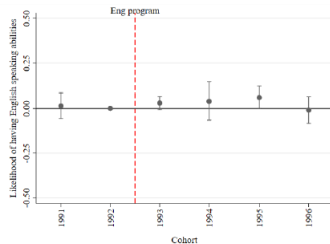(a) Hours of English
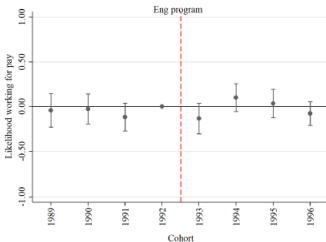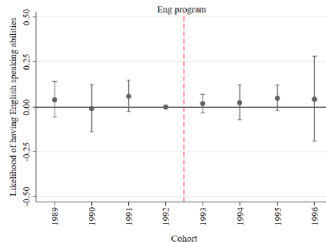
(b) Speak English

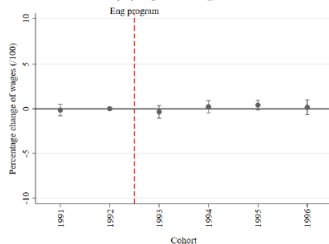(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Sonora)

(a) Hours of English

(b) Speak English
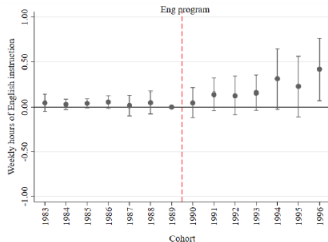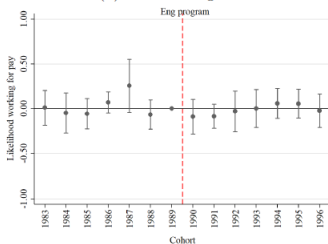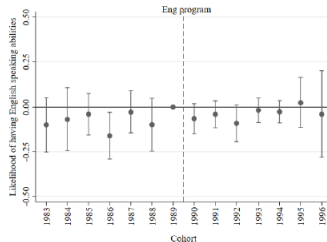
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Tamaulipas) ↪ Back

(a) Hours of English
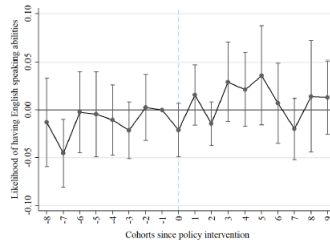

(b) Speak English
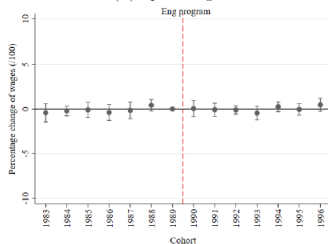
(c) Paid work

(d) Ln(wage)

PTA Staggered DiD: All states ⏴ Back
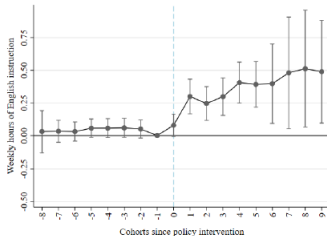
(a) Hours of English
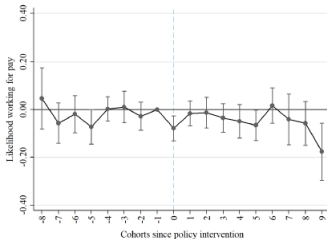
(b) Speak English
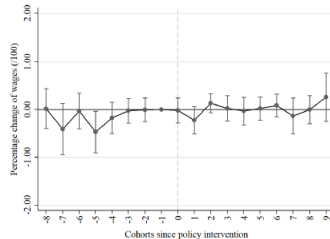
(c) Paid work

(d) Ln(wage)

Results: Gender heterogeneous effects (SDD)

Table : Intention to treat effect of offering English instruction at school (SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel B: Men (β^M)					
Had Policy	0.295***	0.016	-0.044	-0.023	0.044***
	(0.046)	(0.011)	(0.069)	(0.018)	(0.017)
Observations	8,008	8,008	8,008	11,021	11,021
Adjusted R^2	0.581	0.069	0.186	0.313	0.408
Panel C: Women (β^W)					
Had Policy	0.331***	0.014	0.152	-0.003	0.031*
	(0.057)	(0.014)	(0.152)	(0.023)	(0.017)
Observations	5,123	5,123	5,123	11,496	11,496
Adjusted R^2	0.604	0.056	0.150	0.158	0.326
$\beta^M = \beta^W$ [p-value]	[0.208]	[0.870]	[0.182]	[0.443]	[0.445]

↦ Back

Results: Ethnicity heterogeneous effects

Table : Heterogeneous effects of offering English instruction at school
(SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel A: By ethnicity					
Indigenous (β^I)					
Had Policy	0.110	-0.034	0.309	0.076	0.286**
	(0.160)	(0.091)	(1.202)	(0.187)	(0.126)
Observations	188	188	188	340	340
Adjusted R^2	0.929	0.410	0.193	0.380	0.329
Non-Indigenous (β^N)					
Had Policy	0.306***	0.015*	0.030	-0.020	0.036***
	(0.046)	(0.008)	(0.081)	(0.013)	(0.014)
Observations	12,943	12,943	12,943	22,177	22,177
Adjusted R^2	0.593	0.076	0.148	0.219	0.371
$\beta^I = \beta^N$ [p-value]	[0.348]	[0.208]	[0.212]	[0.819]	[0.011]

↣ Back

Results: Geographical context heterogeneous effects

Table : Heterogeneous effects of offering English instruction at school (SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Panel B: By geographical context					
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	2,171	2,171	2,171	4,208	4,208
Adjusted R^2	0.003	0.062	0.227	0.262	0.310
Urban (β^U)					
Had Policy	0.338***	0.018**	0.078	-0.016	0.030**
	(0.050)	(0.009)	(0.084)	(0.014)	(0.014)
Observations	10,960	10,960	10,960	18,309	18,309
Adjusted R^2	0.623	0.088	0.131	0.219	0.385
$\beta^R = \beta^U$ [p-value]	[0.000]	[0.235]	[0.072]	[0.514]	[0.779]

▸ Back

Mechanisms: Occupational choices (SDD)   ⟳ Back

(a) Farming

(b) Elementary

(c) Machine operator

(d) Crafts

(e) Customer service

(f) Sales

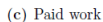(g) Clerks

(h) Professionals

(i) Managerial

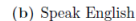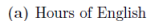# SDD correction: Sun and Abraham (2021) ↬ Back

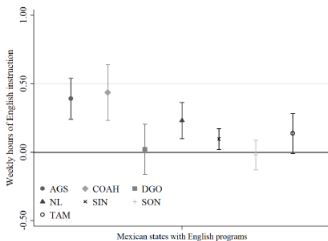**Table** : Intention to Treat effect of offering English instruction at school (SDD estimate)

	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Had Policy	0.323***	0.015**	0.021	-0.015	0.035***
	(0.045)	(0.007)	(0.081)	(0.012)	(0.013)
Observations	13,063	13,063	13,063	22,493	22,493
Adjusted R^2	0.616	0.073	0.148	0.219	0.371

Robustness check: Narrower cohort window ↩ Back

(a) Hours of English

(b) Speak English

(c) Paid work

(d) Ln(wage)

Robustness check: Narrower cohort window   » Back

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

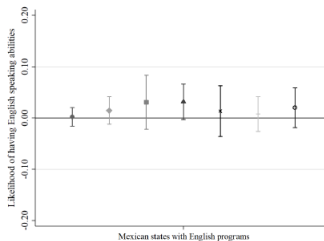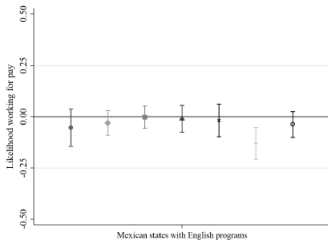|	(1) Structural-OLS	(2) First Stage	(3) Reduced Form	(4) Structural-IV
Speak Eng	0.086			-4.081
	(0.156)			(6.348)
Had Policy		0.018*	-0.073	
		(0.010)	(0.111)	
Observations	5,926	5,926	5,926	5,926
Adjusted R^2	0.159	0.050	0.159	

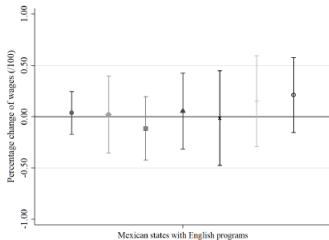# Robustness check: Different control groups ↪ Back

(a) Hours of English

(b) English skills

(c) Paid work

(d) Ln(wage)