English skills and labor market outcomes in Mexico

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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 needed for communication
- How valuable is English for non-English speaking countries?

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 a non-English speaking country?

Strategy

- 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
  - 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
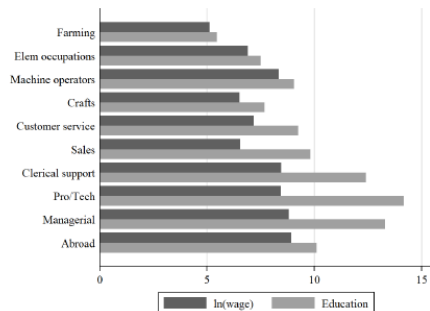
- 2.75% of Mexicans speak English

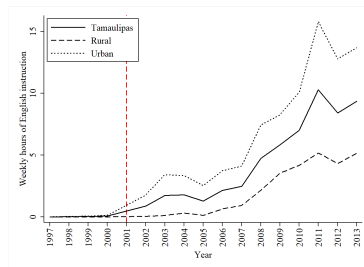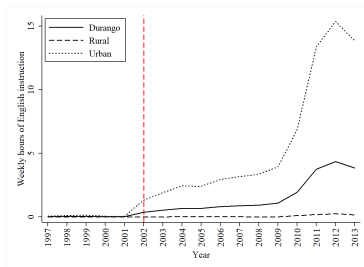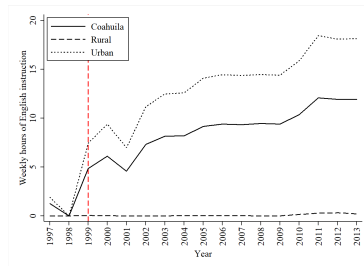# Where are the English speakers?

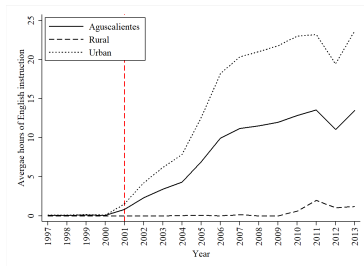# English abilities, wages and education by occupations
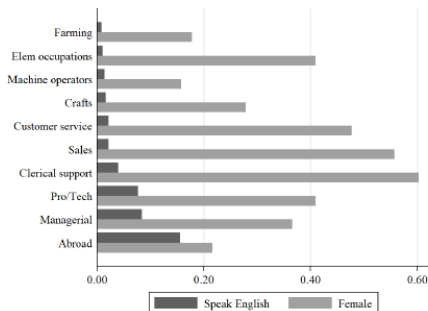
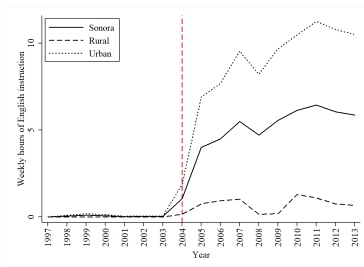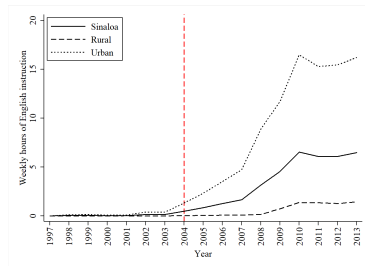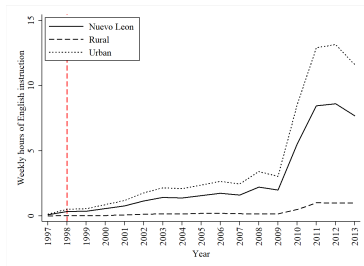(a) Proportion of female and English speakers

(b) Wages and education

Policy background

Policy background

Empirical framework

We want to estimate the effect of English skills, Eng_i, on 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 90's some Mexican states implemented English programs to offer English instruction in public primary schools

Estimating the effect of policy changes ⟨ ↦ States ⟩

- Use Difference in Differences to estimate the effect of these policies
- Simple illustration with one policy change:

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

- where y_{isc} is the outcome variable; in first stage equation $y_{isc} = Eng_{isc}$; in second stage $y_{isc} = \omega_{isc}$
- $after_c$: takes the value of one if the individual i belongs to one of the cohorts that had exposure to the policy
- $treatment_s$ 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 suggestive evidence on the validity of my identifying assumption using the following event study type specification:

$$y_{isc} = \phi + \sum_c \gamma_c \cdot I_{(treatment_{sc}=c)} + \delta \cdot treatment_s + \kappa_c + \boldsymbol{X_{isc}}\boldsymbol{\Gamma} + \varepsilon_{isc}$$

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

▸ PTA

Combining the policy changes (Staggered Difference in Differences)

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

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

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

$$
y_{isc} = \theta + \sum_c \psi_c \cdot I_{(treatment_{sc} = c - c_s^*)} + \delta_s + \kappa_c + \boldsymbol{X_{isc}\Psi} + \varepsilon_{isc}
$$

where c_s^* denotes the first cohort affected by the intervention in
state s, 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. Before cohorts with zero effect suggest parallel
trends

⟶ PTA

IV estimation

Equation of interest (structural equation):

$$\omega_{isc} = \alpha + \beta \cdot Eng_{isc} + \boldsymbol{X_{isc}}\boldsymbol{\Pi} + \epsilon_{isc}$$

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

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

Reduced form equation:

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

The proposed instrument, $HadPolicy_{sc}$, fulfills two conditions:

- Relevance condition
- Exclusion restriction

Data ▸ Descriptive Stats

Household survey (2014 BIARE)

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

School data on exposure to Eng 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 estimation of structural equation

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

Results: Effect of state policy changes (DD)
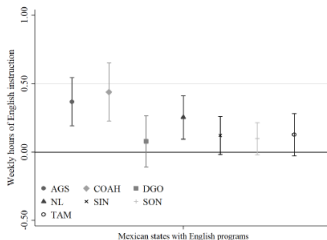
(a) Hours of English
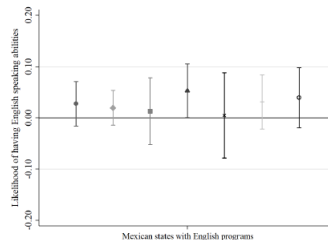
(b) English skills

(c) Paid work

(d) Wages

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

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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]

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]

⟫ Ethnicity   ⟫ Geographical context

Results: IV estimate on wages

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 (Galvez-Soriano, 2023)

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

Mechanisms: Occupational choices (SDD) ⟲ All
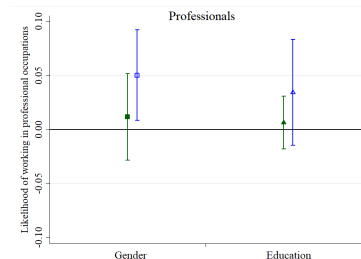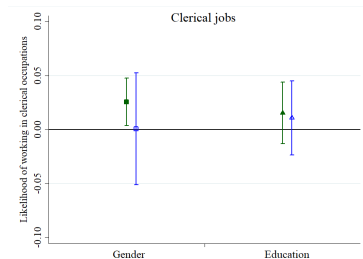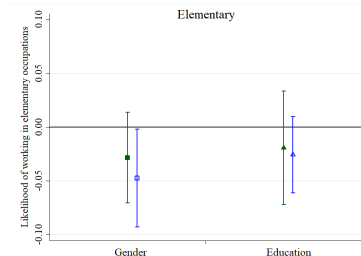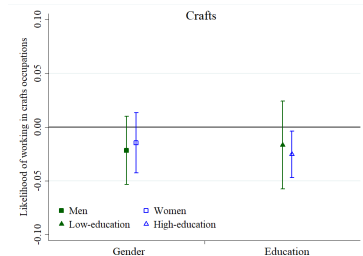
Robustness checks

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

- Different comparison group (all neighboring states) ⟐ DD

- Narrower cohorts ⟐ SDD

Discussion

- No returns to English skills in Mexico
    - Young adults (18-24) are still enrolled in school
    - Potentially high-earners

- However, exposure to English instruction...
    - Leads to the acquisition of English abilities
    - Increases school enrollment
    - Improves working conditions

Policy changes in Mexican states ↪ Back

Table A.3: Policy changes in Mexican states

State	Year of impl.	Policy change	Cohorts affected	Hrs of English Before policy	Hrs of English After policy	Policy details	Comparison state
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.

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
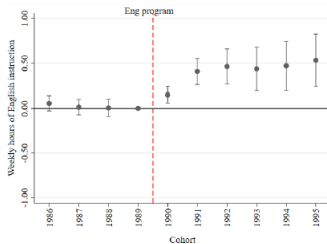
(a) Hours of English
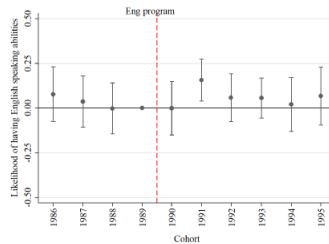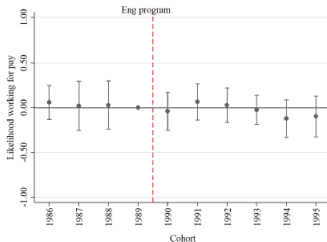
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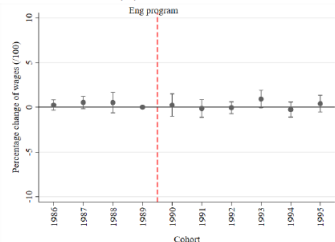
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Coahuila)
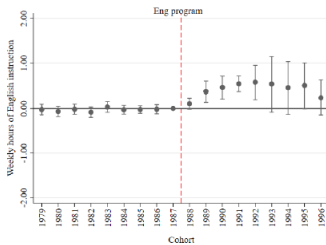
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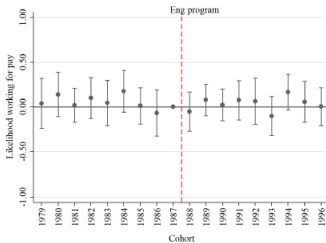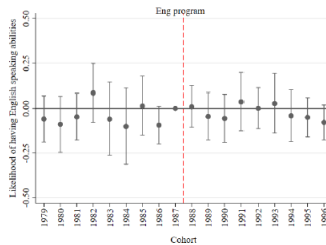
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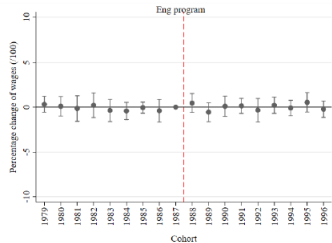
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Durango)
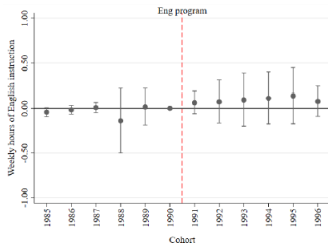
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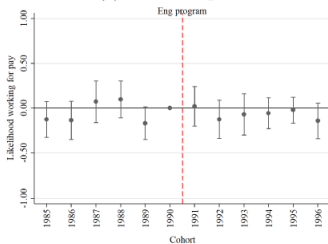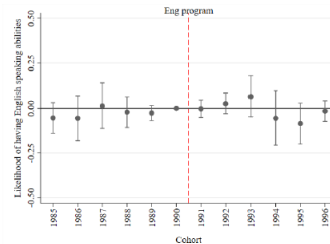
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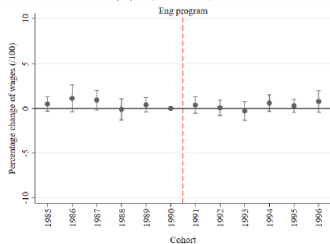
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(d) Ln(wage)

Parallel Trend Assumption (Nuevo Leon)
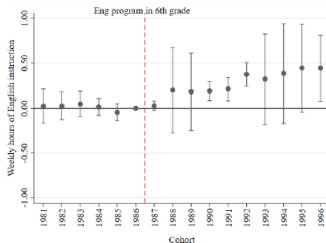
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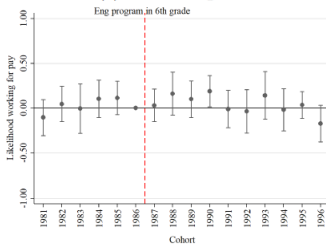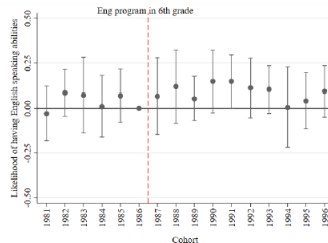
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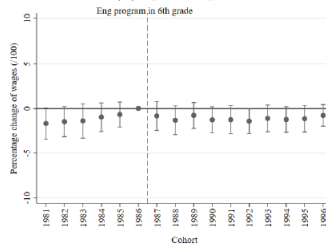
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Sinaloa)
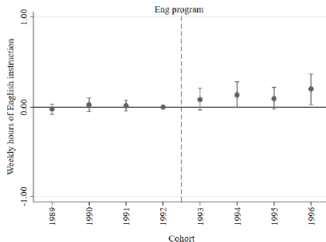
(a) Hours of English
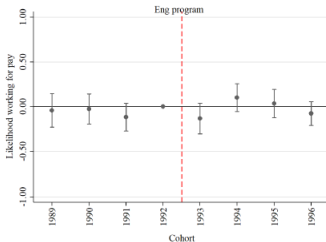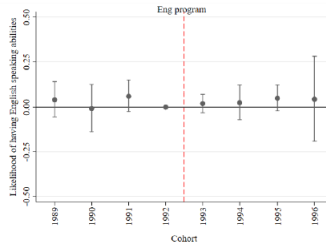
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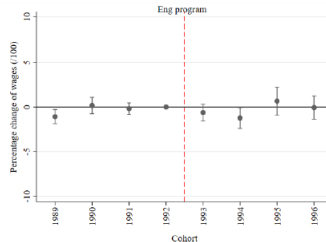
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Sonora)
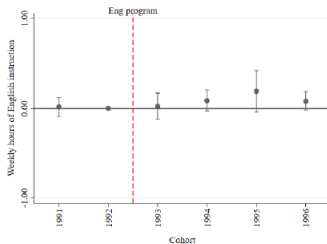
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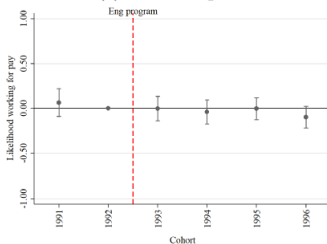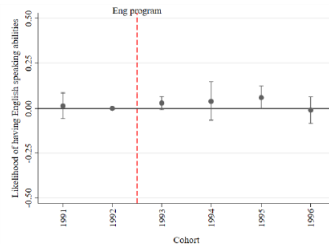
(b) Speak English
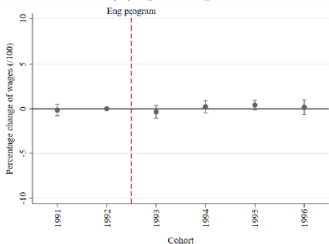
(c) Paid work

(d) Ln(wage)

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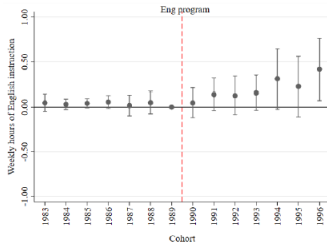
(a) Hours of English
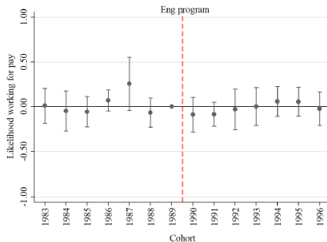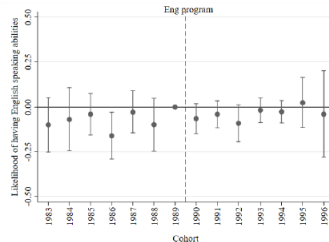
(b) Speak English
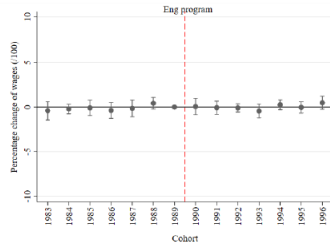
(c) Paid work

(d) Ln(wage)

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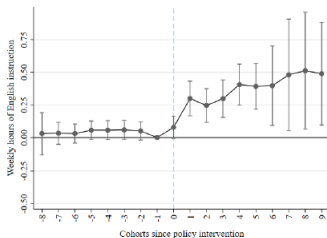
(a) Hours of English
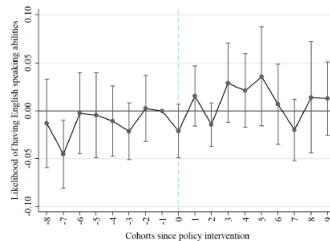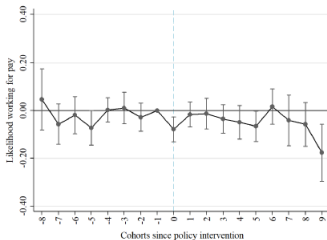
(b) Speak English
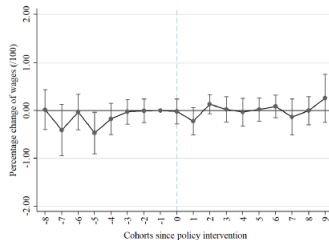
(c) Paid work

(d) Ln(wage)

Results: 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
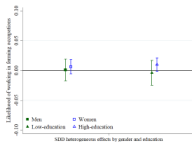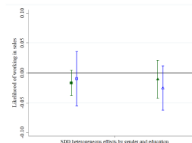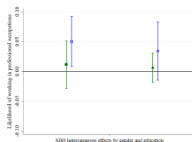

(a) Farming
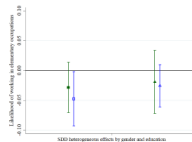
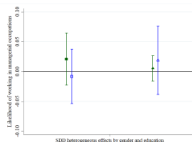(b) Elementary
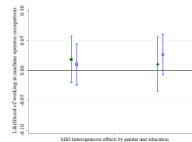
(c) Machine operator
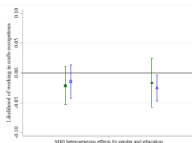
(d) Crafts
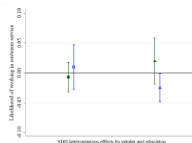
(e) Customer service

(f) Sales

(g) Clerks

(h) Professionals

(i) Managerial

SDD correction: Sun, Liyang and Sarah Abraham (2021) ↪ Back

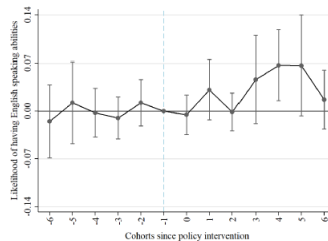**Table** : Intention to Treat effect of offering English instruction at school (SDD estimate)

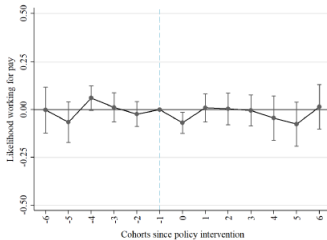|	(1) Hrs Eng	(2) Speak Eng	(3) ln(wage)	(4) Paid work	(5) Student
Had Policy	0.323***	0.015**	0.021	-0.015	0.035***
	(0.045)	(0.007)	(0.081)	(0.012)	(0.013)
Observations	13,063	13,063	13,063	22,493	22,493
Adjusted R^2	0.616	0.073	0.148	0.219	0.371

Robustness check: Narrower cohort window   ↪ Back
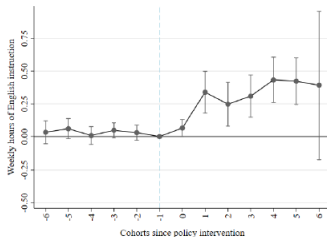
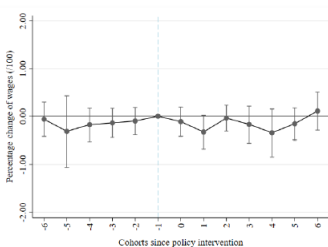(a) Hours of English
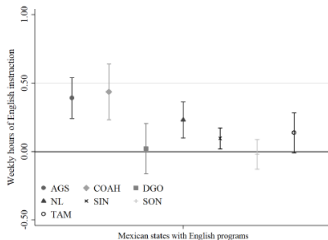

(b) Speak English

(c) Paid work

(d) Ln(wage)

Robustness check: Narrower cohort window ⟩ Back
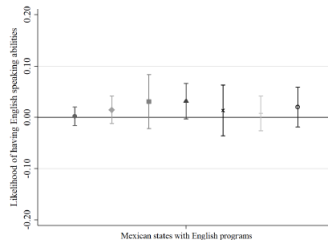
Table   : Returns to English abilities
(IV estimate with narrower comparison group)

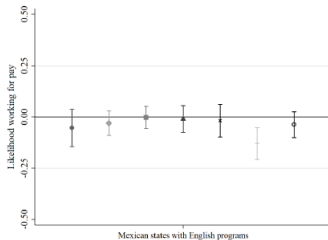|	(1) Structural-OLS	(2) First Stage	(3) Reduced Form	(4) Structural-IV
Speak Eng	0.086			-4.081
	(0.156)			(6.348)
Had Policy		0.018*	-0.073	
		(0.010)	(0.111)	
Observations	5,926	5,926	5,926	5,926
Adjusted R^2	0.159	0.050	0.159	

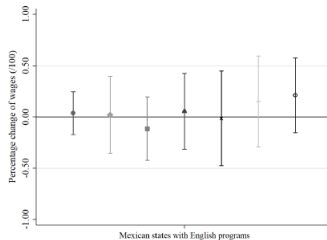# Robustness check: Different control groups ⤵ Back

(a) Hours of English

(b) English skills

(c) Paid work

(d) Wages