

# Returns to English abilities and occupational decisions in Mexico

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# Motivation: Returns to English language abilities

- Formation of human capital  $\Rightarrow$  Better labor market outcomes
  - Globalization: trade, technology and culture
  - Migration: national and international
- Large literature in returns to English language skills
- Most of this research on English speaking countries or former British colonies
- Very little research on non-English 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-Hellestetter (2020)

# This paper in a nutshell

## Research Question

- What are the returns to English language skills in a non-English speaking country?

**My contribution:** Measure returns to English skills with a representative survey

## Empirical approach

- Take advantage of an unusual data set that measures English skills in Mexico
- Exploit state by cohort variation in exposure to English instruction in Mexican primary schools

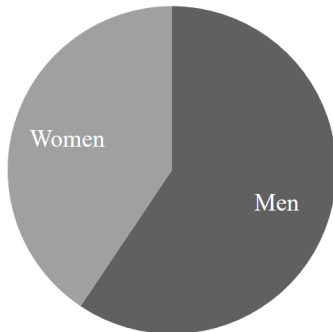
# Background

- Mexico borders the US
- Very little known about English language skills in Mexico
  - Availability of data that measures English skills
- Very little known about English speakers distribution
- Very little know about returns to English skills

## English speakers: more men than women

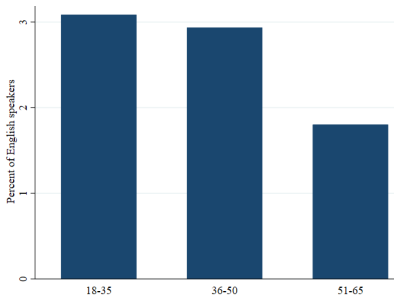


3 out of 100 Mexicans speak English

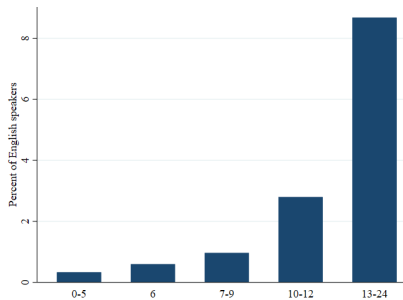


60% of English speakers are men

# English speakers: younger and more educated

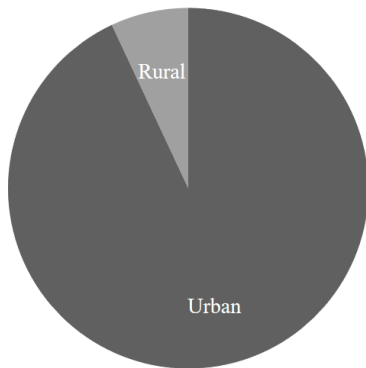


English speakers by age

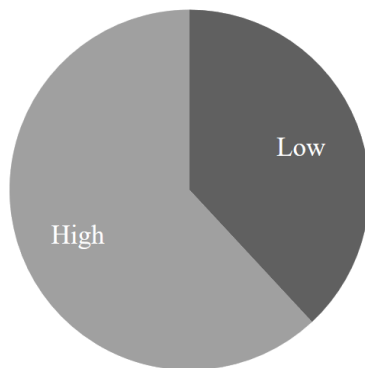


English speakers by years of schooling

# English speakers: wealthier and in urban context



93% of Eng speakers in urban areas



62% of Eng speakers belong to high SES



# More English speakers in northern states



# More English speakers in clerical support, professionals and managerial occupations

**Table 3:** English abilities by occupations

Occupation	(1) Speak English	(2) Wages (pesos/month)	(3) Female	(4) Education (years)	(5) Shares
Farming	0.009	2,798.57	0.18	5.46	0.072
Elementary occupations	0.011	3,129.83	0.41	7.50	0.242
Machine operators	0.014	5,733.63	0.16	9.05	0.093
Crafts	0.016	4,207.19	0.28	7.67	0.095
Customer service	0.021	4,883.57	0.48	9.24	0.076
Sales	0.022	5,057.22	0.56	9.81	0.124
Clerical support	0.040	6,446.08	0.60	12.39	0.066
Professionals/Technicians	0.077	9,916.23	0.41	14.18	0.152
Managerial	0.084	13,995.02	0.37	13.29	0.077
Abroad	0.156	12,686.43	0.22	10.09	0.003

# Structural equation

To estimate the effect of English skills,  $Eng_i$ , on wages,  $\omega_i$ , I propose the following structural equation:

$$\omega_i = \alpha + \beta \cdot Eng_i + \mathbf{X}_i \Delta + \epsilon_i$$

where  $\mathbf{X}_i$  is a vector of controls including: education, experience, gender, marital status, ethnicity, student status, cohort FE, geographical context (rural/urban), as well as gender, education and income of household head.

# Concern of endogeneity

- Omitted variables: abilities and other family background variables
- Biased estimate  $\beta$
- Propose to use policy changes to form an instrument
- Since the early 90's some Mexican states implemented English programs in response to the NAFTA

# Summary of policy backgrounds

Table A.3: 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.

# First stage and reduced form equations (by state)

First stage equation:

$$Eng_{isc} = \mu + \gamma \cdot (treatment_s \times after_c) + \delta \cdot treatment_s + \kappa_c + \mathbf{X}_{isc}\mathbf{\Gamma} + \varepsilon_{isc}$$

Reduced form equation:

$$\omega_{isc} = \mu + \gamma \cdot (treatment_s \times after_c) + \delta \cdot treatment_s + \kappa_c + \mathbf{X}_{isc}\mathbf{\Gamma} + \varepsilon_{isc}$$

- $after_c$ : takes the value of one if the individual  $i$  belongs to one of the cohorts that had exposure
- $treatment_s$  takes the value of one if individual  $i$  lives in a treated state and zero otherwise

# Parallel Trend Assumption (by state)

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

$$\omega_{isc} = \mu + \sum_c \gamma_c \cdot I_{(treatment_{sc}=c)} + \delta \cdot treatment_s + \kappa_c + \mathbf{X}_{isc} \mathbf{\Gamma} + \varepsilon_{isc}$$

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

►► PTA

# First stage and reduced form equations (SDD)

First stage equation:

$$Eng_{isc} = \theta + \psi \cdot HadPolicy_{sc} + \delta_s + \kappa_c + \mathbf{X}_{isc}\Psi + \varepsilon_{isc}$$

Reduced form equation:

$$\omega_{isc} = \theta + \psi \cdot HadPolicy_{sc} + \delta_s + \kappa_c + \mathbf{X}_{isc}\Psi + \varepsilon_{isc}$$

- $HadPolicy_{sc}$  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 (SDD)

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

$$\omega_{isc} = \theta + \sum_c \psi_c \cdot I_{(treatment_{sc}=c-c_s^*)} + \delta_s + \kappa_c + \mathbf{X}_{isc}\Psi + \varepsilon_{isc}$$

where  $c_s^*$  denotes the first cohort affected by the intervention in state  $s$

» PTA

## Second stage (IV estimate)

Second stage equation:

$$\omega_{isc} = \phi_0 + \phi_1 \cdot \widehat{Eng}_{isc} + \delta_s + \kappa_c + \mathbf{X}_{isc}\Phi + v_{isc}$$

The proposed instrument, *HadPolicy<sub>sc</sub>*, fulfills two conditions:

- Relevance condition: see results of first stage equation
- Exclusion restriction: the intervention has no effect on labor market outcomes other than through the acquisition of English abilities

# Data

## Household survey

- I use the 2014 Subjective Well-being Survey (BIARE)
- Representative at national and state level
- Individuals surveyed are 18 years of age and older
- Asks if the respondent knows how to speak English

## Linked to

- Mexican School Census (Statistics 911)
- Weekly hours of English instruction (exposure)
  - By school-cohort, average over primary school
  - Locality average, by cohort
- Use locality-cohort to match with BIARE

# Results: structural equation (all Mexican states)

Table 6: Returns to English abilities in Mexico

	(1) ln(wage)	(2) ln(wage)	(3) ln(wage)	(4) ln(wage)	(5) ln(wage)
<i>Panel A: Men and Women</i>					
Speak Eng	1.430*** (0.098)	0.688*** (0.095)	0.403*** (0.079)	0.360*** (0.076)	0.276*** (0.076)
Observations	83,630	83,630	83,630	83,630	83,630
Adjusted $R^2$	0.004	0.077	0.238	0.242	0.264
<i>Panel B: Men (<math>\beta^M</math>)</i>					
Speak Eng	0.833*** (0.108)	0.428*** (0.094)	0.496*** (0.082)	0.462*** (0.082)	0.405*** (0.085)
Observations	39,801	39,801	39,801	39,801	39,801
Adjusted $R^2$	0.003	0.144	0.240	0.249	0.297
<i>Panel C: Women (<math>\beta^W</math>)</i>					
Speak Eng	1.577*** (0.204)	0.488** (0.202)	0.377** (0.173)	0.334** (0.168)	0.221 (0.175)
Observations	43,829	43,829	43,829	43,829	43,829
Adjusted $R^2$	0.004	0.070	0.166	0.173	0.218
$\beta^M = \beta^W$ [p-value]	[0.002]	[0.002]	[0.001]	[0.001]	[0.002]
Mincer controls	NO	YES	YES	YES	YES
Other controls	NO	NO	YES	YES	YES
State FE	NO	NO	NO	YES	NO
Locality FE	NO	NO	NO	NO	YES

# Results: first stage and reduced form equations

Table 7: Intention to Treat effect of offering English instruction at school (DD estimate by state)

	(1) Hrs Eng	(2) Speak Eng	(3) LFP	(4) ln(wage)
<i>Panel A: Aguascalientes</i>				
After×Treat	0.372*** (0.095)	0.054*** (0.016)	-0.014 (0.054)	0.019 (0.332)
Observations	1,425	1,425	1,425	1,425
Adjusted $R^2$	0.927	0.016	0.234	0.182
<i>Panel B: Coahuila</i>				
After×Treat	0.771*** (0.190)	0.022* (0.013)	0.001 (0.030)	0.374 (0.269)
Observations	2,123	2,123	2,123	2,123
Adjusted $R^2$	0.627	0.044	0.247	0.244
<i>Panel C: Durango</i>				
After×Treat	0.075 (0.075)	-0.011 (0.013)	-0.038 (0.060)	-0.184 (0.346)
Observations	1,711	1,711	1,711	1,711
Adjusted $R^2$	0.690	0.021	0.280	0.215
<i>Panel E: Nuevo Leon</i>				
After×Treat	0.090 (0.064)	0.025 (0.016)	0.003 (0.040)	0.075 (0.253)
Observations	1,897	1,897	1,897	1,897
Adjusted $R^2$	0.780	0.050	0.221	0.202

# Results: first stage and reduced form equations

Table 7: Intention to Treat effect of offering English instruction at school (DD estimate by state)

	(1) Hrs Eng	(2) Speak Eng	(3) LFP	(4) ln(wage)
<i>Panel F: Sinaloa</i>				
After×Treat	0.113 (0.069)	0.016 (0.023)	0.020 (0.051)	0.469 (0.468)
Observations	1,112	1,112	1,112	1,112
Adjusted $R^2$	0.917	0.009	0.223	0.161
<i>Panel G: Sonora</i>				
After×Treat	0.091 (0.058)	-0.019 (0.017)	0.003 (0.040)	0.129 (0.303)
Observations	1,438	1,438	1,438	1,438
Adjusted $R^2$	0.716	0.035	0.218	0.224
<i>Panel H: Tamaulipas</i>				
After×Treat	0.177** (0.086)	0.072*** (0.026)	0.045 (0.032)	0.551** (0.229)
Observations	1,807	1,807	1,807	1,807
Adjusted $R^2$	0.842	0.033	0.222	0.230

# Results: first stage and reduced form equations (SDD)

Table 8: Intention to Treat effect of offering English instruction at school  
(SDD estimate)

	(1)	(2)	(3)	(4)
	Hrs Eng	Speak Eng	LFP	ln(wage)
<i>Panel A: All states</i>				
Had Policy	0.293*** (0.049)	0.018** (0.007)	-0.017 (0.015)	0.229** (0.115)
Observations	22,517	22,517	22,517	22,517
Adjusted $R^2$	0.561	0.071	0.243	0.223
<i>Panel B: Heterogeneous effects by gender</i>				
<b>Men (<math>\beta^M</math>)</b>				
Had Policy	0.293*** (0.049)	0.015 (0.011)	-0.032* (0.019)	0.163 (0.134)
Observations	11,021	11,021	11,021	11,021
Adjusted $R^2$	0.563	0.063	0.254	0.281
<b>Women (<math>\beta^W</math>)</b>				
Had Policy	0.303*** (0.054)	0.024*** (0.008)	0.012 (0.023)	0.371** (0.175)
Observations	11,496	11,496	11,496	11,496
Adjusted $R^2$	0.553	0.066	0.129	0.180
$\beta^M = \beta^W$ [p-value]	[0.494]	[0.080]	[0.000]	[0.000]

# Results: reduced form equations for occupational decisions (SDD)

**Table 9:** ITT effect of offering English instruction at school on occupational decisions (SDD estimate)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Farming	Elem	Machine operator	Crafts	Customer service	Sales	Clerical support	Prof/ Tech	Mgmt	Abroad
<i>Panel A: Full sample</i>										
Had Policy	0.005 (0.004)	-0.023** (0.011)	0.006 (0.008)	-0.007 (0.007)	-0.005 (0.008)	-0.011 (0.008)	0.008 (0.007)	0.014 (0.011)	0.004 (0.011)	0.001 (0.002)
Observations	22,517	22,517	22,517	22,517	22,517	22,517	22,517	22,517	22,517	22,517
Adjusted $R^2$	0.153	0.118	0.084	0.059	0.007	0.026	0.025	0.207	0.055	0.014
<i>Panel B: Heterogeneous effects by gender</i>										
<b>Men (<math>\beta^M</math>)</b>										
Had Policy	0.008 (0.008)	-0.021 (0.018)	0.000 (0.015)	-0.009 (0.012)	-0.003 (0.010)	-0.002 (0.011)	0.014 (0.011)	-0.006 (0.018)	0.002 (0.016)	0.001 (0.005)
Observations	11,021	11,021	11,021	11,021	11,021	11,021	11,021	11,021	11,021	11,021
Adjusted $R^2$	0.250	0.166	0.094	0.069	0.012	0.020	0.007	0.161	0.068	0.027
<b>Women (<math>\beta^W</math>)</b>										
Had Policy	0.002 (0.003)	-0.020 (0.013)	0.011 (0.009)	-0.002 (0.007)	-0.005 (0.009)	-0.017 (0.012)	0.003 (0.012)	0.037*** (0.013)	0.002 (0.011)	0.001 (0.001)
Observations	11,496	11,496	11,496	11,496	11,496	11,496	11,496	11,496	11,496	11,496
Adjusted $R^2$	0.143	0.105	0.056	0.038	0.002	0.030	0.031	0.264	0.028	0.026
$\beta^M = \beta^W$ [p-value]	[0.003]	[0.089]	[0.221]	[0.000]	[0.612]	[0.452]	[0.642]	[0.001]	[0.167]	[0.527]



# Results: IV estimate on wages

**Table 10:** Returns to English abilities  
(IV estimate)

	(1) Structural-OLS	(2) First Stage	(3) Reduced Form	(4) Structural-IV
Speak Eng	0.366*** (0.130)			12.580 (8.552)
Had Policy		0.018** (0.007)	0.229** (0.115)	
Observations	22,517	22,517	22,517	22,517
Adjusted $R^2$	0.223	0.069	0.223	
F statistic	107.071	18.691	105.566	

# Next steps

- Robustness checks
  - Synthetic control method
- SDD with heterogeneous treatment effects
  - Goodman-Bacon, Andrew (2021)
  - Sun, Liyang and Sarah Abraham (2021)
  - Callaway, Brantly and Pedro H. C. Sant'Anna (2021)

# Robustness checks: Different control groups

Table 11: ITT effect of offering Eng instruction (DD estimate with multiple comparison groups)

	(1) Hrs Eng	(2) Speak Eng	(3) LFP	(4) ln(wage)
<i>Panel A: Aguascalientes</i>				
After×Treat	0.422*** (0.086)	0.026*** (0.009)	-0.044 (0.044)	0.232 (0.250)
Observations	4,138	4,138	4,138	4,138
Adjusted $R^2$	0.818	0.016	0.229	0.172
<i>Panel B: Coahuila</i>				
After×Treat	0.759*** (0.185)	0.013 (0.011)	-0.012 (0.030)	0.078 (0.232)
Observations	4,578	4,578	4,578	4,578
Adjusted $R^2$	0.595	0.032	0.254	0.210
<i>Panel C: Durango</i>				
After×Treat	0.003 (0.077)	0.007 (0.015)	-0.053 (0.042)	-0.374 (0.244)
Observations	4,083	4,083	4,083	4,083
Adjusted $R^2$	0.601	0.048	0.235	0.165
<i>Panel E: Nuevo Leon</i>				
After×Treat	0.067 (0.053)	0.013 (0.014)	0.000 (0.031)	0.303 (0.242)
Observations	4,038	4,038	4,038	4,038
Adjusted $R^2$	0.761	0.045	0.235	0.195

# Robustness checks: Different control groups

Table 11: ITT effect of offering Eng instruction (DD estimate with multiple comparison groups)

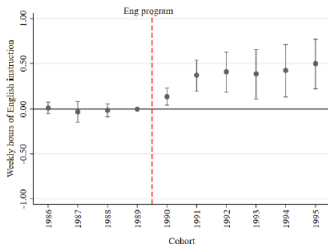
	(1)	(2)	(3)	(4)
	Hrs	Speak	LFP	ln(wage)
	Eng	Eng		
<i>Panel F: Sinaloa</i>				
After×Treat	0.095*** (0.036)	0.016 (0.017)	0.015 (0.037)	0.708** (0.317)
Observations	3,493	3,493	3,493	3,493
Adjusted $R^2$	0.663	-0.002	0.217	0.194
<i>Panel G: Sonora</i>				
After×Treat	-0.016 (0.054)	-0.017 (0.018)	-0.030 (0.040)	0.010 (0.248)
Observations	2,702	2,702	2,702	2,702
Adjusted $R^2$	0.725	0.019	0.212	0.170
<i>Panel H: Tamaulipas</i>				
After×Treat	0.184** (0.083)	0.049*** (0.017)	0.024 (0.027)	0.494** (0.200)
Observations	5,440	5,440	5,440	5,440
Adjusted $R^2$	0.791	0.027	0.229	0.209

# Robustness checks: Narrower comparison groups

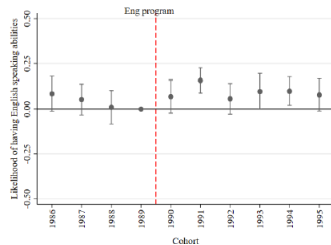
**Table 12:** Returns to English abilities  
(IV estimate with narrower comparison group)

	(1) Structural-OLS	(2) First Stage	(3) Reduced Form	(4) Structural-IV
Speak Eng	0.404** (0.169)			4.802 (10.065)
Had Policy		0.014* (0.007)	0.066 (0.140)	
Observations	12,740	12,740	12,740	12,740
Adjusted $R^2$	0.202	0.031	0.202	

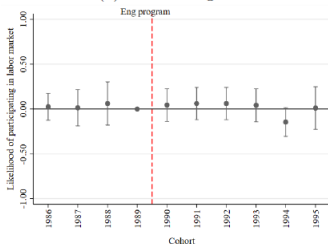
# Parallel Trend Assumption (Aguascalientes) ► Back



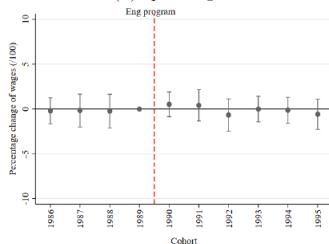
(a) Hours of English



(b) Speak English

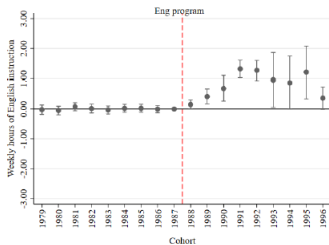


(c) Labor force

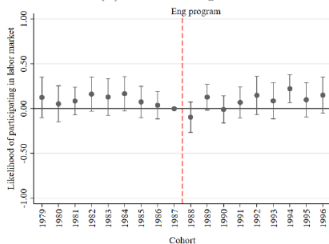


(d) Ln(wage)

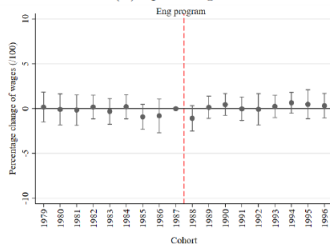
# Parallel Trend Assumption (Coahuila)



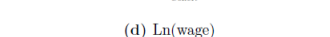
(a) Hours of English



(b) Speak English

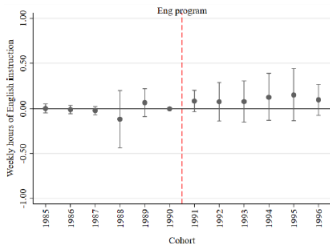


(c) Labor force

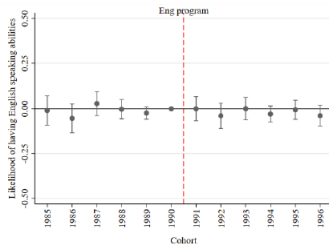


(d) Ln(wage)

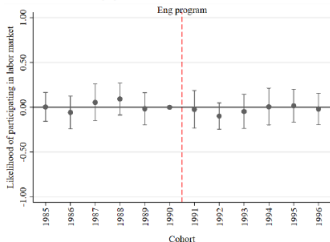
# Parallel Trend Assumption (Durango)



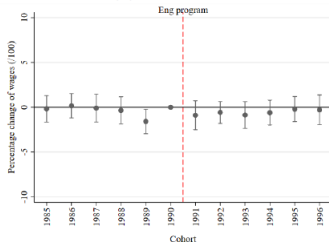
(a) Hours of English



(b) Speak English



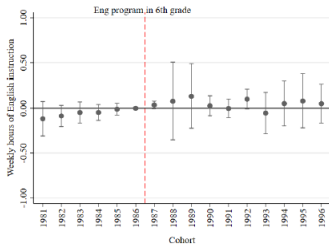
(c) Labor force



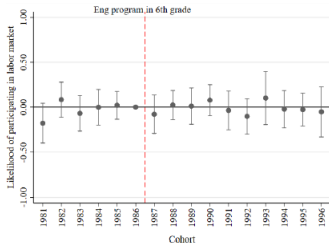
(d) Ln(wage)



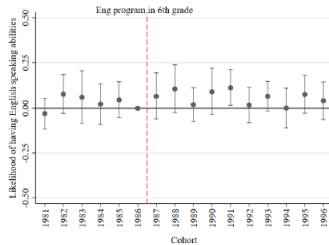
# Parallel Trend Assumption (Nuevo Leon)



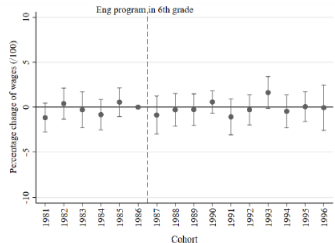
(a) Hours of English



(c) Labor force

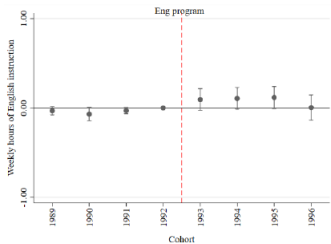


(b) Speak English

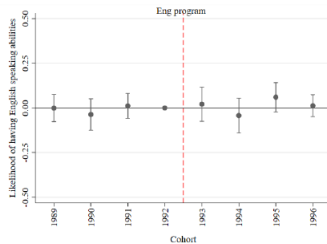


(d) Ln(wage)

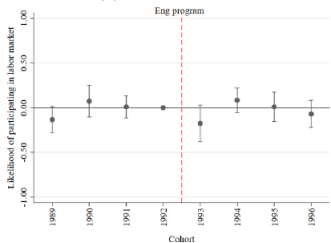
# Parallel Trend Assumption (Sinaloa)



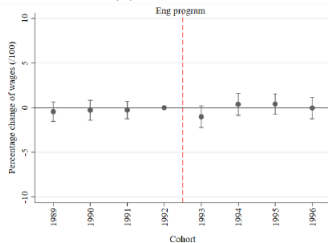
(a) Hours of English



(b) Speak English

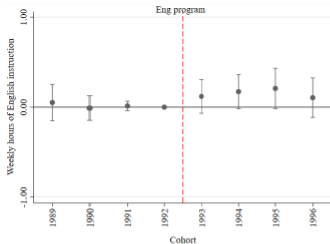


(c) Labor force

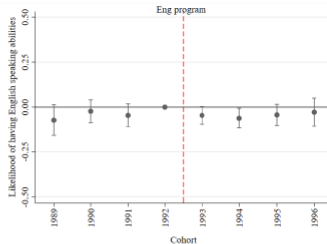


(d) Ln(wage)

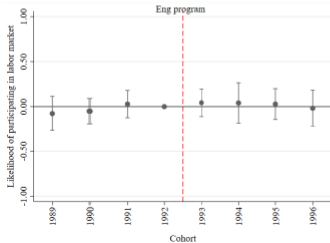
# Parallel Trend Assumption (Sonora)



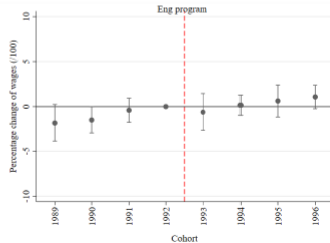
(a) Hours of English



(b) Speak English

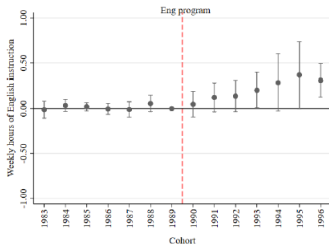


(c) Labor force

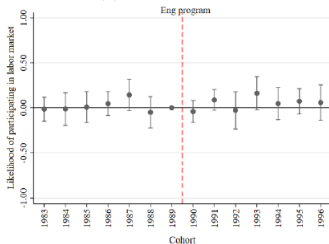


(d) Ln(wage)

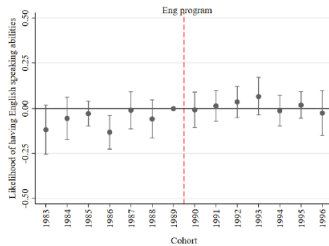
# Parallel Trend Assumption (Tamaulipas)

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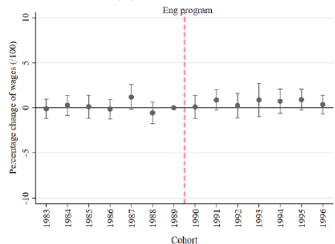
(a) Hours of English



(c) Labor force

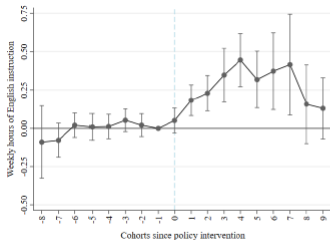


(b) Speak English

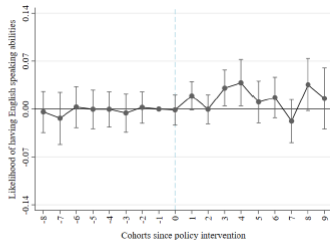


(d) Ln(wage)

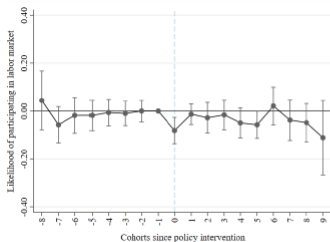
# PTA Staggered DiD: All states

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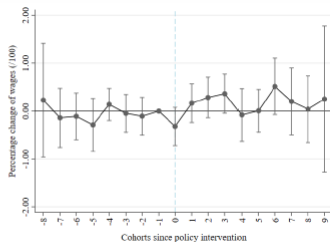
(a) Hours of English



(b) Speak English



(c) Labor force



(d) Ln(wage)