

# Impact of English instruction on labor market outcomes

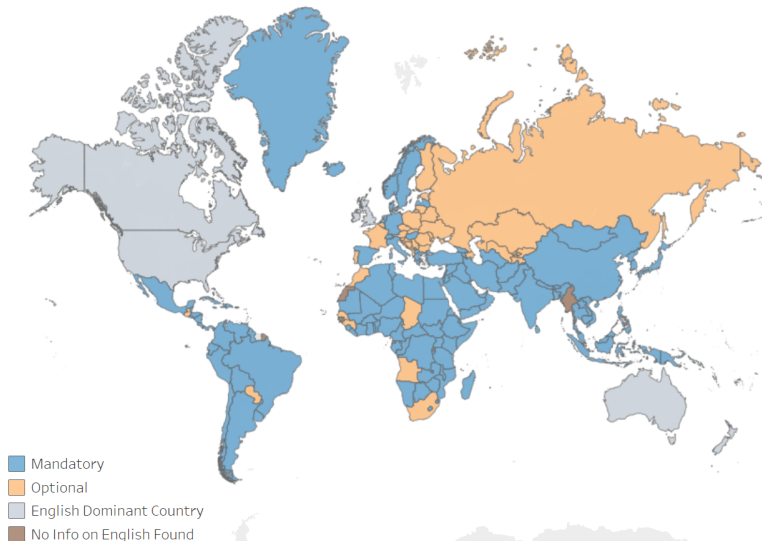
## The case of Mexico

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# Motivation: Global English education policy



Source: Ives, P., Bale, J., and Haque, E. (2020). How States Promote Global English: Shifting Priorities in Education Policy. Social Sciences and Humanities Research Council of Canada.



# Motivation

The value of English language skills in developing non-English speaking countries

- Globalization: trade and culture (internet, news, social media, etc.)
- Migration and labor market outcomes

I will study the expansion of English instruction in Mexico

# Related Literature

- Returns to English language skills
  - In English-speaking countries: Bleakley and Chin (2004); Chiswick and Miller (2015)
  - In non English-speaking countries: Lang and Siniver (2009); Azam, Chin and Prakash (2013)
- English instruction in schools
  - Policy change in the medium of instruction: Angrist, Chin and Godoy (2008); Eriksson (2014)
  - Exposure to English instruction as a subject: Chakraborty and Bakshi (2016)

I study English instruction as a subject in Mexican public primary schools

# Main contributions of this paper

## Research Question

- What is the effect of exposure to English instruction on labor market outcomes in a non-English speaking country?

## Empirical strategy

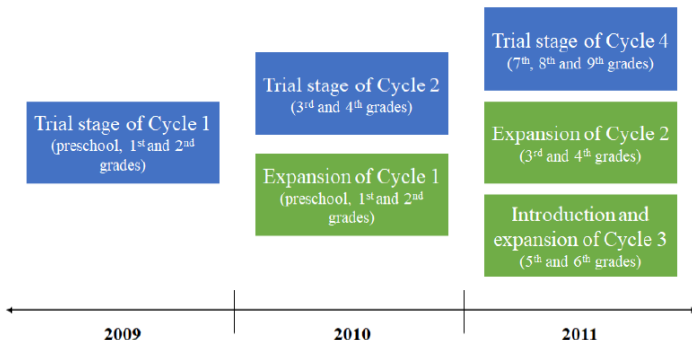
- Variation in exposure driven by a policy change in Mexico
- Rich data connecting individuals in primary school to their labor market outcomes
- Use school by cohort variation in exposure to English instruction in Mexican primary schools

# Policy background

National English Program in Basic Education (NEPBE)  
launched in 2009 in Mexico

- Introduced English instruction in public primary schools
- Funded by the central government
- Implemented gradually

# Policy background: English program stages



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

» data

# Empirical strategy

- Challenging to estimate the effect of exposure to English instruction on labor market outcomes
- Key concern: schools that offered English instruction are systematically different from those that did not
  - Likely to have positive selection bias, e.g., schools offering English instruction located in richer neighborhoods
- I address this by using a school FE approach
  - Data of the universe of primary school students, able to connect to their labor market outcomes
  - Intuition: compare students from the same school, some with more English instruction and some with less



# Measure of exposure to English instruction

Cohort	Primary school					
	1st	2nd	3rd	4th	5th	6th
1997	2003	2004	2005	2006	2007	2008
1998	2004	2005	2006	2007	2008	2009
1999	2005	2006	2007	2008	2009	2010
2000	2006	2007	2008	2009	2010	2011
2001	2007	2008	2009	2010	2011	2012
2002	2008	2009	2010	2011	2012	2013

- Using the Mexican school census, I calculate weekly hours of English instruction (per class), for each school-year
- For each school-cohort, I average the hours of English instruction from 1st to 6th grade
  - I assume students enter school at age 6 and had normal progression until grade 6th

# Impact on labor market outcomes

I estimate the following equation to get the effect of exposure to English instruction on labor market outcomes:

$$y_{isc} = \alpha + \beta \cdot ExpEng_{sc} + \mathbf{X}_{isc}\boldsymbol{\gamma} + \zeta_c + \nu_s + \tau_t + \varepsilon_{isc}$$

where  $y_{isc}$  is the labor market outcome of individual  $i$ , who attended school  $s$  and belongs to cohort  $c$

# Mechanisms

Potential mechanisms of the effect of exposure to English instruction on labor market outcomes:

- English language abilities
- Other skills
  - Language (Spanish)
  - Mathematics
- Jobs requiring English skills

# Data

I use three main sources of data:

- Social Security data (2018-2021)
  - Worker level
  - Formal sector
  - Individuals between 16-25 years old
- ENLACE (2006-2013): Nationwide test (Math and Language)
  - Student level
  - From 3rd to 6th grade
- Mexican school census (2003-2013)
  - School level
  - School characteristics: weekly hours of English instruction

# Data: Labor market outcomes

I investigate the effect of exposure to English instruction on four main labor market outcomes:

- ① Probability of working in formal sector
  - Dummy for being in social security data among the universe of students
- ② Wages (average monthly wage)
- ③ Geographical mobility (distance from home county to working county)
- ④ Economic industries (NAICS) [» codes](#)

# Estimation results: sample selection

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

	(1)	(2)	(3)	(4)
	In SS Data	ln(wage)	ln(distance)	Move State
<i>Panel A: Full sample</i>				
Hrs English	-0.013*** (0.001)	-0.015*** (0.002)	-0.035*** (0.008)	-0.004*** (0.001)
Observations	16,938,183	4,055,434	4,055,434	4,055,434
Adjusted $R^2$	0.105	0.270	0.477	0.555

- Concern about selection into social security data
- Possibly because individuals are still enrolled in school
- Use counties where it is less likely that they are enrolled

►► Statuses

# Proposed solution: Construction of low-enrollment sample

- ① Using the 2020 Mexican Population Census, I construct a county-enrollment rate variable
  - Enrollment rates in first year of college (2002 cohort)
- ② I keep the data with 38 percent (or less) of individuals enrolled in school

» How?

# Labor market outcomes with low-enrollment sample

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

	(1)	(2)	(3)	(4)
	In SS Data	ln(wage)	ln(distance)	Move State
<i>Panel B: Low enrollment sample</i>				
Hrs English	-0.012 (0.008)	-0.005 (0.011)	-0.058 (0.044)	0.015** (0.007)
Observations	1,554,827	259,666	259,666	259,666
Adjusted $R^2$	0.123	0.312	0.677	0.727
<i>Panel C: Low enrollment sample (Men)</i>				
Hrs English ( $\beta^M$ )	-0.016 (0.011)	-0.002 (0.016)	-0.130** (0.057)	0.004 (0.012)
Observations	750,812	166,165	166,165	166,165
Adjusted $R^2$	0.149	0.315	0.680	0.729
<i>Panel D: Low enrollment sample (Women)</i>				
Hrs English ( $\beta^W$ )	-0.010 (0.010)	-0.022 (0.015)	0.063* (0.034)	0.033** (0.012)
Observations	804,015	93,501	93,501	93,501
Adjusted $R^2$	0.107	0.363	0.700	0.756
$\beta^M = \beta^W$ [p-value]	[0.012]	[0.448]	[0.190]	[0.090]
State of work FE	NO	YES	YES	YES



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State of work FE	NO	YES	YES	YES

# Labor market outcomes by abilities

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

	(1) In SS Data	(2) ln(wage)	(3) ln(distance)	(4) Move State
<i>Panel A: Low enrollment sample</i>				
Hrs English	-0.007 (0.009)	-0.013 (0.012)	-0.079 (0.049)	0.021** (0.010)
Eng×Q2	-0.003 (0.006)	-0.003 (0.009)	-0.018 (0.047)	-0.011 (0.008)
Eng×Q3	-0.005 (0.006)	0.031*** (0.009)	0.012 (0.036)	-0.017 (0.011)
Eng×Q4	-0.013** (0.006)	0.012 (0.012)	0.106*** (0.040)	0.001 (0.012)
Observations	1,554,827	259,666	259,666	259,666
Adjusted $R^2$	0.123	0.312	0.677	0.727

►► Distribution

# English instruction and economic industries

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

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

# Exploring mechanisms

- Mechanism 1: English abilities
  - Exploiting the implementation of state English programs before the NEPBE
  - Galvez-Soriano (2022) shows that exposure to English instruction increases the acquisition of English skills
- Mechanism 2: Cognitive abilities
  - Test score data
- Mechanism 3: Jobs requiring English skills
  - Social security data

## Mechanism 2: Cognitive abilities

Effect of exposure to English instruction on student achievement:

$$test\_score_{isc} = \theta + \phi \cdot ExpEng_{sc} + \mathbf{X}_{isc}\boldsymbol{\gamma} + \zeta_c + \nu_s + \varepsilon_{isc}$$

where  $test\_score_{isc}$  is the 6th grade test score of student  $i$ , who attended school  $s$  and belongs to cohort  $c$

» Data

# Estimation results: exposure to Eng and test scores

**Table 7:** Exposure to English instruction and student achievement

	(1)	(2)	(3)	(4)
	Language 6th	Language 6th	Math 6th	Math 6th
<i>Panel C: Low enrollment sample</i>				
Hrs English	0.0476 (0.0470)	0.0548 (0.0867)	0.0094 (0.0344)	0.0128 (0.0652)
Observations	259,666	259,666	259,666	259,666
Adjusted $R^2$	0.351	0.444	0.381	0.478
<i>Panel D: Low enrollment sample (Men)</i>				
Hrs English ( $\beta^M$ )	0.0637 (0.0531)	0.0824 (0.0928)	0.0147 (0.0386)	0.0104 (0.0794)
Observations	166,165	166,165	166,165	166,165
Adjusted $R^2$	0.310	0.426	0.369	0.481
<i>Panel E: Low enrollment sample (Women)</i>				
Hrs English ( $\beta^W$ )	0.0162 (0.0385)	-0.0085 (0.0968)	-0.0003 (0.0325)	0.0080 (0.0673)
Observations	93,501	93,501	93,501	93,501
Adjusted $R^2$	0.371	0.487	0.398	0.521
$\beta^M = \beta^W$ [p-value]	[0.3015]	[0.4168]	[0.9693]	[0.9358]
State FE	YES	NO	YES	NO
School FE	NO	YES	NO	YES

## Mechanism 3: Are workers moving to jobs requiring English abilities?

- Mexican Subjective Well-being Survey (BIARE) has information of English abilities in 2014
- Using BIARE, I construct an index of English skills by economic industries
  - These industries are classified according to the North American Industry Classification System (NAICS) at four-digit code
- I classify industries in “high English” and “low English” intensive jobs



# Estimation results: industries requiring English skills

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

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

# Takeaway

- Exposure to English instruction
  - Does not have an overall effect on wages
  - But may have positive returns among high ability individuals
  - Increases women's mobility, because they are moving from agriculture to manufacturing industries
- Results on labor market outcomes could be explained for the acquisition of English skills
  - Evidence from previous state English programs (Galvez-Soriano, 2022)
  - No effect on other cognitive skills
- Exposure increases the likelihood to choose jobs in industries requiring English abilities

# Measuring hours of English instruction



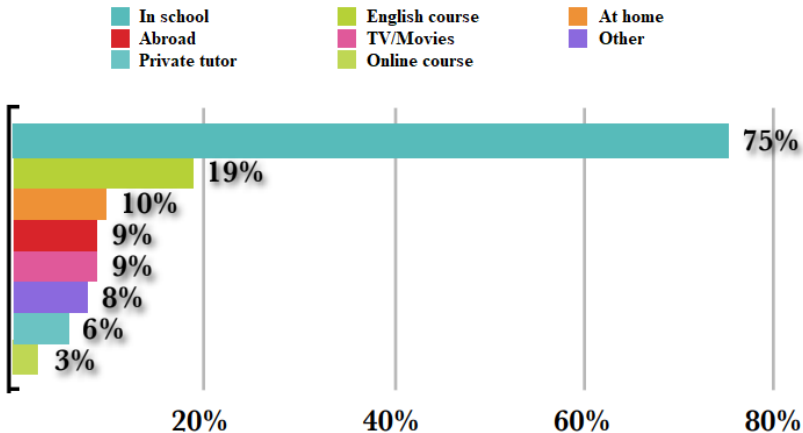
Benito Juarez Elementary School

Weekly hours of English instruction	18
Number of classes	6
Hours of English instruction (per class)	3

» Eng over time

» Data

# Where did you learn English?

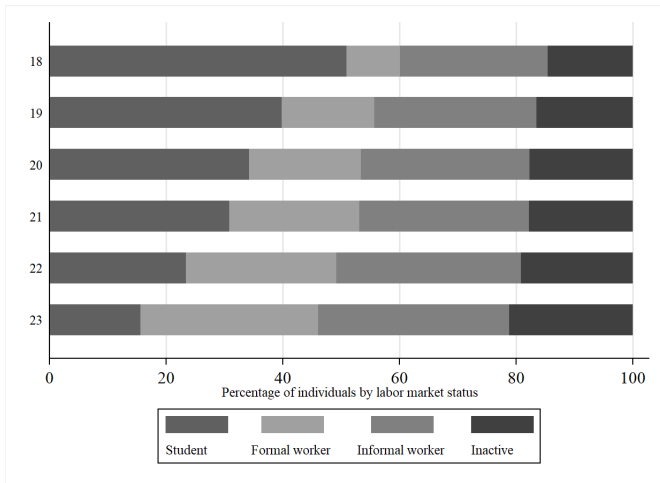


*Note:* This question was answered only by individuals who reported having English abilities. The answers are independent, i.e. do not sum 100 percent.

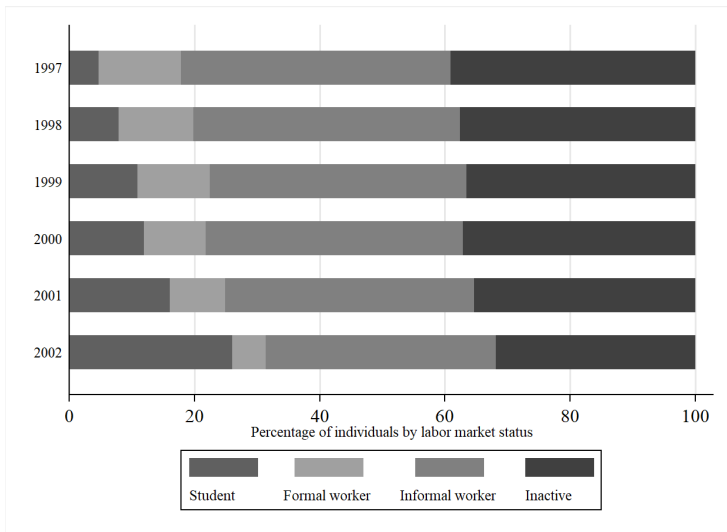
*Source:* CIDAC (2008). Encuesta CIDAC sobre Capital Humano en México. México.



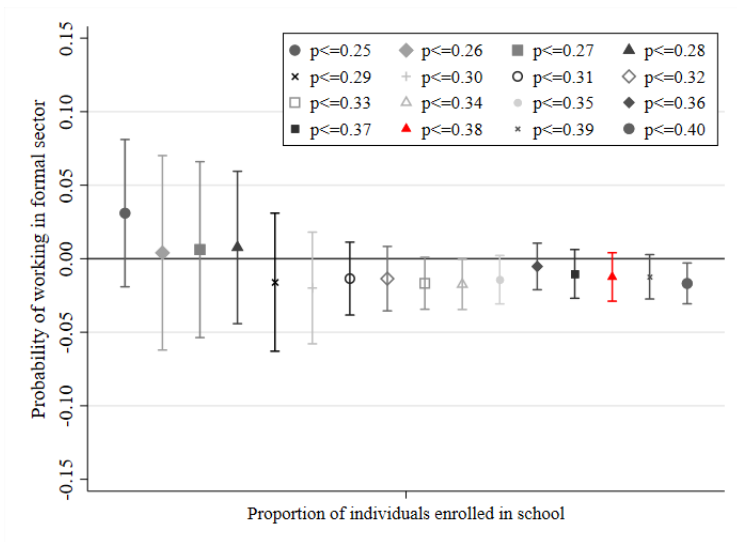
Potential problem: many 16-22 year olds are enrolled in school (2020 Mexican census)



# Statuses with low-enrollment sample

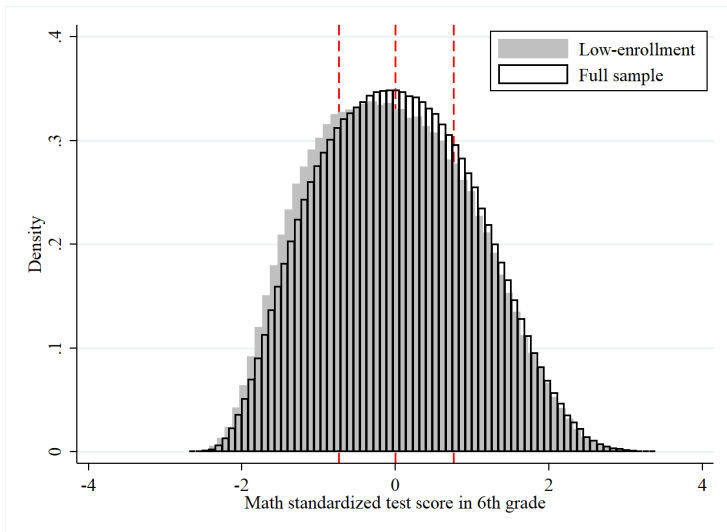


# How I chose the 38 percent enrollment rate?





# Abilities distribution (full vs. low-enrollment sample)



# High-English intensive manufacturing industries

Table A.6: Economic Manufacturing Industries

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

# Services that require English abilities

Table A.7: Economic Services Industries

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

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# Data: Student achievement

- 1 I look at test scores as one of the mechanisms
- 2 I standardize test scores,  $ts_{isct}$ , of each student  $i$  in school  $s$  at time  $t$  using the following formula:

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

where  $test\_score_{ist}$  is the standardized test score, while  $\mu_t$  and  $\sigma_t$  are the mean and standard deviation of test scores, respectively, pooling all Mexican students by grade and by each observed year

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# Estimation results: exposure to Eng and test scores

Table 7: Exposure to English instruction and student achievement

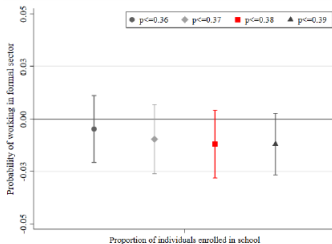
	(1)	(2)	(3)	(4)
	Language 6th	Language 6th	Math 6th	Math 6th
<i>Panel A: Full sample in ENLACE database</i>				
Hrs English	0.0335*** (0.0033)	0.0099* (0.0054)	0.0155*** (0.0036)	-0.0081 (0.0062)
Observations	16,938,183	16,938,183	16,938,183	16,938,183
Adjusted $R^2$	0.426	0.472	0.429	0.482
<i>Panel B: Full sample in Social Security data</i>				
Hrs English	0.0284*** (0.0033)	-0.0015 (0.0075)	0.0105*** (0.0037)	-0.0225*** (0.0086)
Observations	4,055,434	4,055,434	4,055,434	4,055,434
Adjusted $R^2$	0.404	0.453	0.413	0.470

# Robustness Checks: different exposure variable

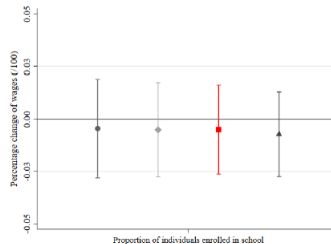
Table 8: English instruction and labor market outcomes (Alternative exposure variable)

	(1)	(2)	(3)	(4)
	In SS Data	ln(wage)	ln(distance)	Move State
<i>Panel B: Low enrollment sample</i>				
Eng Teachers	-0.202*	-0.127	-0.772	0.072*
	(0.120)	(0.196)	(0.751)	(0.040)
Observations	1,554,827	259,666	259,666	259,666
Adjusted $R^2$	0.123	0.312	0.677	0.727
<i>Panel C: Low enrollment sample (Men)</i>				
Eng Teachers ( $\beta^M$ )	-0.140	-0.290	-1.644*	-0.086
	(0.173)	(0.294)	(0.983)	(0.226)
Observations	750,812	166,165	166,165	166,165
Adjusted $R^2$	0.149	0.315	0.680	0.729
<i>Panel D: Low enrollment sample (Women)</i>				
Eng Teachers ( $\beta^W$ )	-0.273*	0.078	0.866	0.295*
	(0.149)	(0.306)	(1.106)	(0.169)
Observations	804,015	93,501	93,501	93,501
Adjusted $R^2$	0.107	0.363	0.700	0.756
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State of work FE	NO	YES	YES	YES

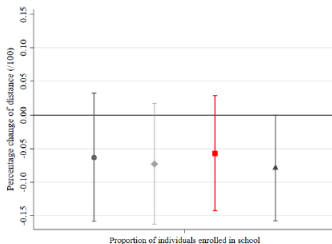
# Robustness Checks: solution to sample selection



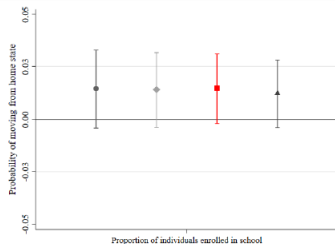
(a) Formal sector



(b) Ln(monthly wage)



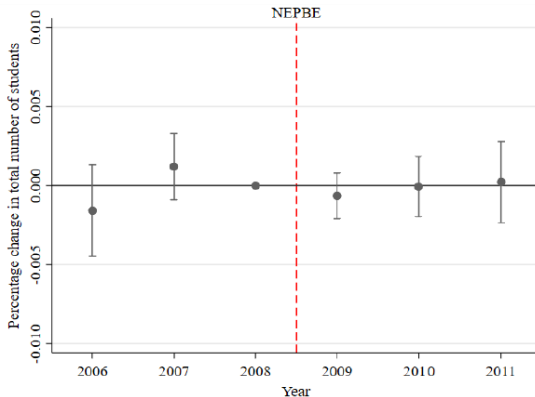
(c) Distance home-job county



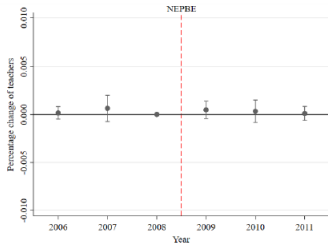
(d) Moves from home county



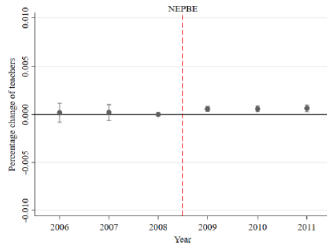
# Robustness Checks: no-changes in private school enrollment



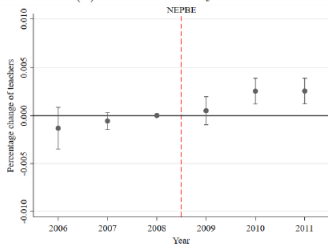
# Robustness Checks: changes in number of teachers



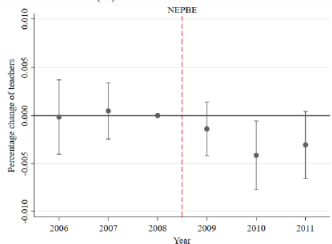
(a) With elementary school



(b) With middle school



(c) With high school



(d) With college degree