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English skills and labor market outcomes in Mexico

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University of Houston
Department of Economics

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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 culture
    - Migration 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

- 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

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)

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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

- 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 it is Eng_{isc}, in second stage it is wages, ω_{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 (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

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Combining the policy changes (Staggered Difference in Differences)

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

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

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. Before cohorts with zero effect suggest parallel trends

▸ PTA

IV estimation

Equation of interest (structural equation):

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

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

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

Reduced form equation:

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

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

- Relevance condition
- Exclusion restriction

Data

Household survey (2014 BIARE)

- Individual level data
- 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: Effect of state policy changes (DD)
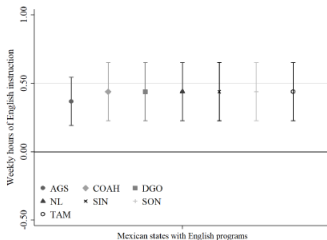
(a) Hours of English
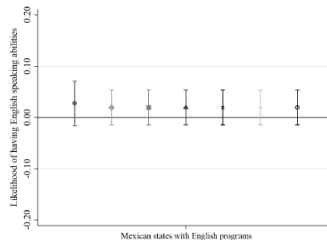
(b) English skills

(c) Paid work

(d) Wages

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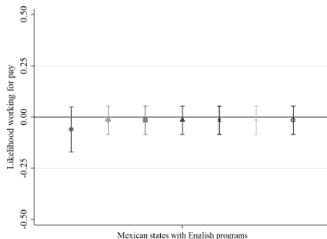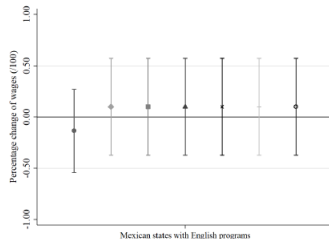
Results: Effect of the policies combined (SDD)

Table 8: 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
Panel B: 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 C: 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]	[0.954]	[0.522]	[0.004]	[0.058]	[0.204]

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Mechanisms: Occupational choices (SDD)

Table 10: ITT effect of offering English instruction at school on occupational decisions (SDD estimate)

	(1) Farming	(2) Elem	(3) Machine operator	(4) Crafts	(5) Customer service	(6) Sales	(7) Clerical support	(8) Prof/ Tech	(9) Mgmt	(10) Abroad
Panel A: Full sample										
Had Policy	0.006	-0.031	0.015	-0.020	-0.004	-0.017	0.015	0.025	0.013	-0.002
	(0.007)	(0.020)	(0.016)	(0.013)	(0.013)	(0.014)	(0.013)	(0.017)	(0.020)	(0.004)
Observations	13,131	13,131	13,131	13,131	13,131	13,131	13,131	13,131	13,131	13,131
Adjusted R^2	0.259	0.174	0.094	0.062	0.011	0.045	0.047	0.250	0.050	0.025
Panel B: Heterogeneous effects by gender										
Men (β^M)										
Had Policy	0.001	-0.028	0.019	-0.022	-0.007	-0.017	0.026*	0.012	0.021	-0.004
	(0.011)	(0.026)	(0.024)	(0.019)	(0.015)	(0.013)	(0.013)	(0.024)	(0.026)	(0.006)
Observations	8,008	8,008	8,008	8,008	8,008	8,008	8,008	8,008	8,008	8,008
Adjusted R^2	0.309	0.192	0.082	0.064	0.008	0.019	0.008	0.180	0.068	0.034
Women (β^W)										
Had Policy	0.006	-0.047*	0.010	-0.014	0.010	-0.010	0.001	0.050**	-0.008	0.003
	(0.007)	(0.027)	(0.021)	(0.017)	(0.023)	(0.028)	(0.031)	(0.025)	(0.028)	(0.004)
Observations	5,123	5,123	5,123	5,123	5,123	5,123	5,123	5,123	5,123	5,123
Adjusted R^2	0.370	0.234	0.119	0.059	0.013	0.071	0.048	0.343	0.026	0.050
$\beta^M = \beta^W$ [p-value]	[0.427]	[0.580]	[0.978]	[0.837]	[0.370]	[0.904]	[0.435]	[0.255]	[0.343]	[0.283]

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Results: IV estimate on wages

Table 9: 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	

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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

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Results: Gender heterogeneous effects

Table 8: 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
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]	[0.269]	[0.940]	[0.172]	[0.276]	[0.396]

Heterogeneous treatment effects: Sun, Liyang and Sarah Abraham (2021)

Table 9: 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
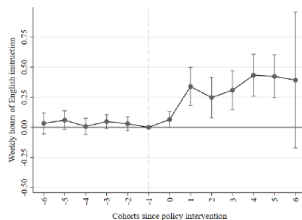
(a) Hours of English

(b) Speak English

(c) Paid work

(d) Ln(wage)

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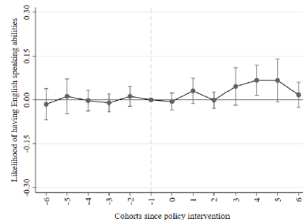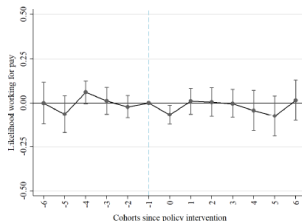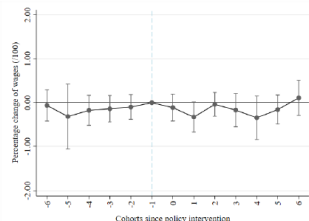
Robustness check: Narrower cohort window

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	0.086			-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

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

	(1) Hrs Eng	(2) Speak Eng	(3) Paid work	(4) ln(wage)
Panel A: Aguascalientes				
After×Treat	0.392***	0.002	-0.053	0.037
	(0.076)	(0.009)	(0.046)	(0.106)
Observations	2,163	2,163	4,138	2,163
Adjusted R^2	0.789	0.001	0.196	0.152
Panel B: Coahuila				
After×Treat	0.437***	0.015	-0.030	0.022
	(0.103)	(0.014)	(0.030)	(0.190)
Observations	2,541	2,541	4,578	2,541
Adjusted R^2	0.549	0.007	0.227	0.167
Panel C: Durango				
After×Treat	0.060	0.031	-0.002	-0.114
	(0.099)	(0.027)	(0.027)	(0.156)
Observations	1,991	1,991	4,083	1,991
Adjusted R^2	0.546	0.005	0.192	0.146
Panel E: Nuevo Leon				
After×Treat	0.232***	0.032*	-0.010	0.056
	(0.067)	(0.017)	(0.033)	(0.188)
Observations	2,152	2,152	4,038	2,152
Adjusted R^2	0.724	0.025	0.226	0.152

Robustness check: Different control groups

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

	(1) Hrs Eng	(2) Speak Eng	(3) Paid work	(4) ln(wage)
Panel F: Sinaloa				
After×Treat	0.097**	0.013	-0.018	-0.013
	(0.039)	(0.025)	(0.040)	(0.234)
Observations	1,477	1,477	3,493	1,477
Adjusted R^2	0.554	0.043	0.212	0.185
Panel G: Sonora				
After×Treat	-0.020	0.008	-0.129***	0.151
	(0.055)	(0.017)	(0.039)	(0.224)
Observations	1,059	1,059	2,702	1,059
Adjusted R^2	0.711	0.075	0.218	0.179
Panel H: Tamaulipas				
After×Treat	0.138*	0.020	-0.037	0.211
	(0.075)	(0.020)	(0.032)	(0.185)
Observations	2,755	2,755	5,440	2,755
Adjusted R^2	0.818	0.033	0.208	0.157

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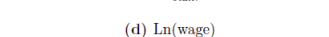# Parallel Trend Assumption (Aguascalientes) ↪ Back

(a) Hours of English

(b) Speak English
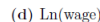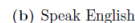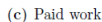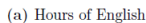
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Coahuila)
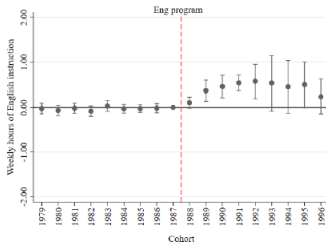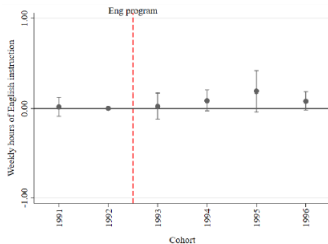

(a) Hours of English
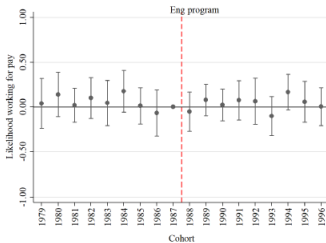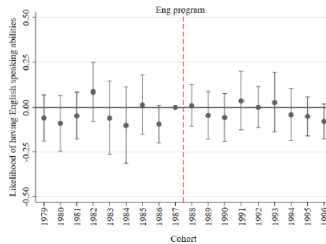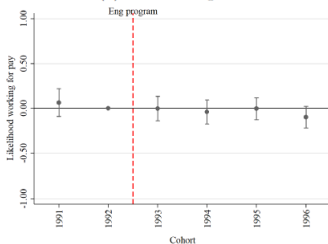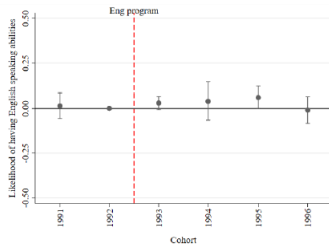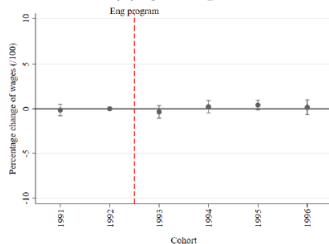
(b) Speak English
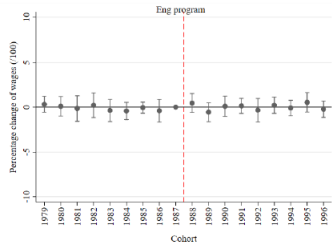
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Durango)

(a) Hours of English

(b) Speak English

(c) Paid work

(d) Ln(wage)

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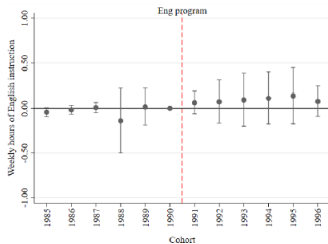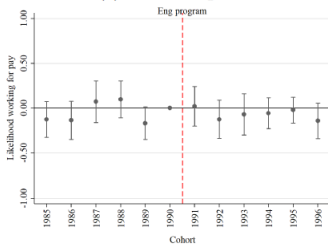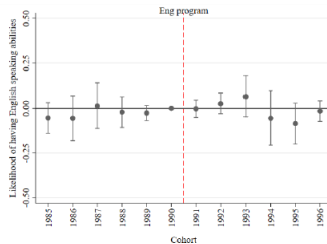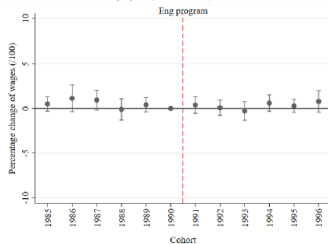
Parallel Trend Assumption (Nuevo Leon)
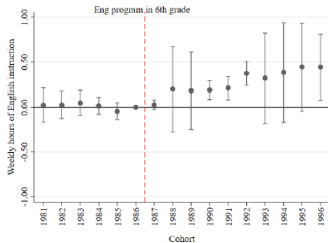
(a) Hours of English
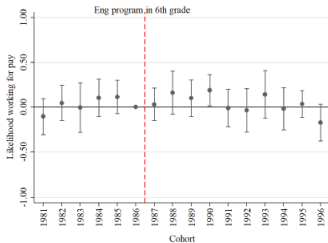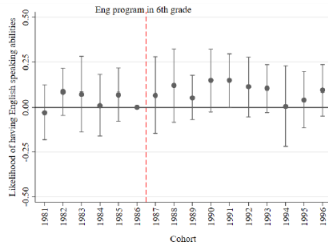
(b) Speak English
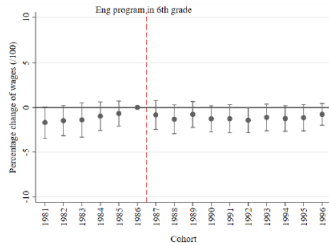
(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Sinaloa)
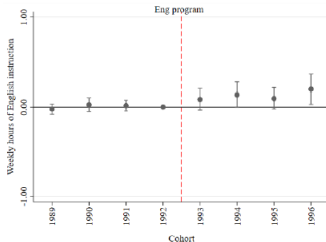
(a) Hours of English
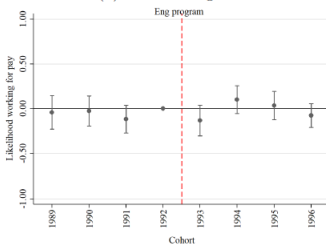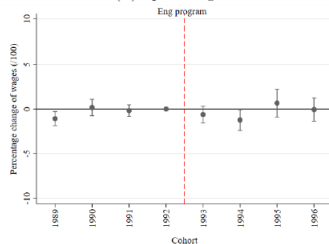
(b) Speak English

(c) Paid work

(d) Ln(wage)

Parallel Trend Assumption (Sonora)

(a) Hours of English

(b) Speak English

(c) Paid work

(d) Ln(wage)

Motivation
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Background
oo

Empirical strategy
ooooooo

Data
ooooo

Next steps
o

Appendix
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Parallel Trend Assumption (Tamaulipas) ↪ Back

(a) Hours of English

(b) Speak English

(c) Paid work

(d) Ln(wage)

Motivation
○○○

Background
○○

Empirical strategy
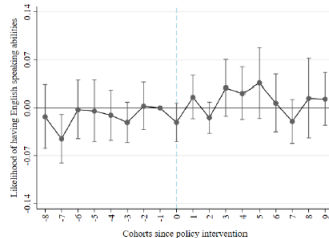○○○○○○○

Data
○○○○○

Next steps
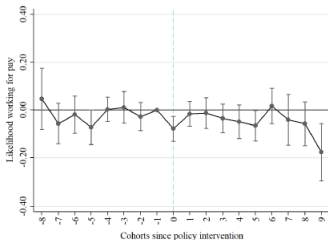○

Appendix
○○○○○○○○○○○○○●
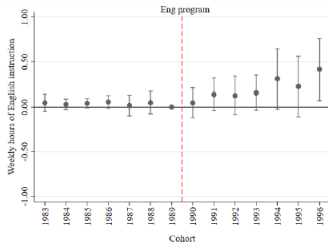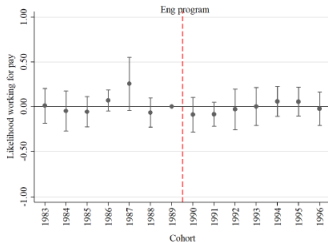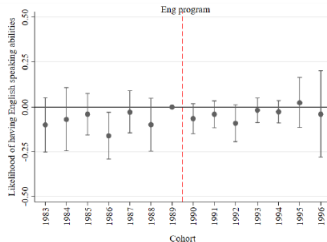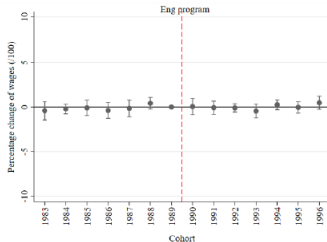
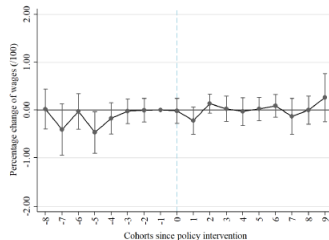# PTA Staggered DiD: All states ⟲ Back

(a) Hours of English

(b) Speak English

(c) Paid work

(d) Ln(wage)