Online Appendix for Long-Term Gains from Longer School Days

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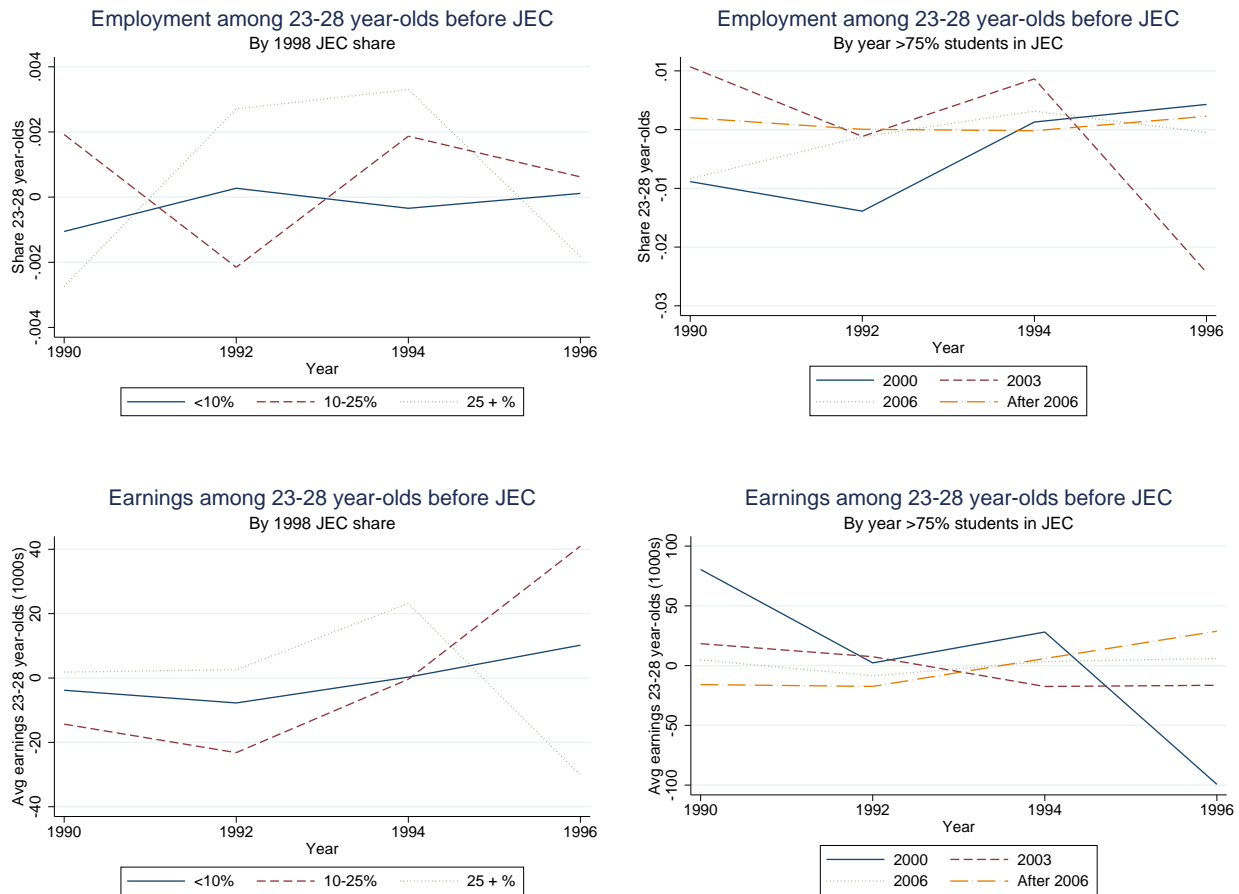[*]Corresponding author. Inter-American Development Bank. Email: patriciodo@iadb.org

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Appendix A   Additional Figures

Appendix Figures

Appendix Figure A1: Pre-JEC employment and earnings

Notes: Figure shows patterns in residualized municipal-level employment rates (top panel) and earnings (bottom panel) among individuals living outside the Santiago metropolitan region who were 23-38 years old from the 1990-96 CASEN surveys. Employment and earnings are residualized on vectors of region-by-year and municipality fixed effects. The sample is split into terciles based on the share of students enrolled in a JEC school in 1998 (left panel) and the first CASEN year in which at least 75 percent of students attended a JEC school (right). See text for details.

Appendix Figure A2: Placebo results: Effect of longer school days on untreated cohorts
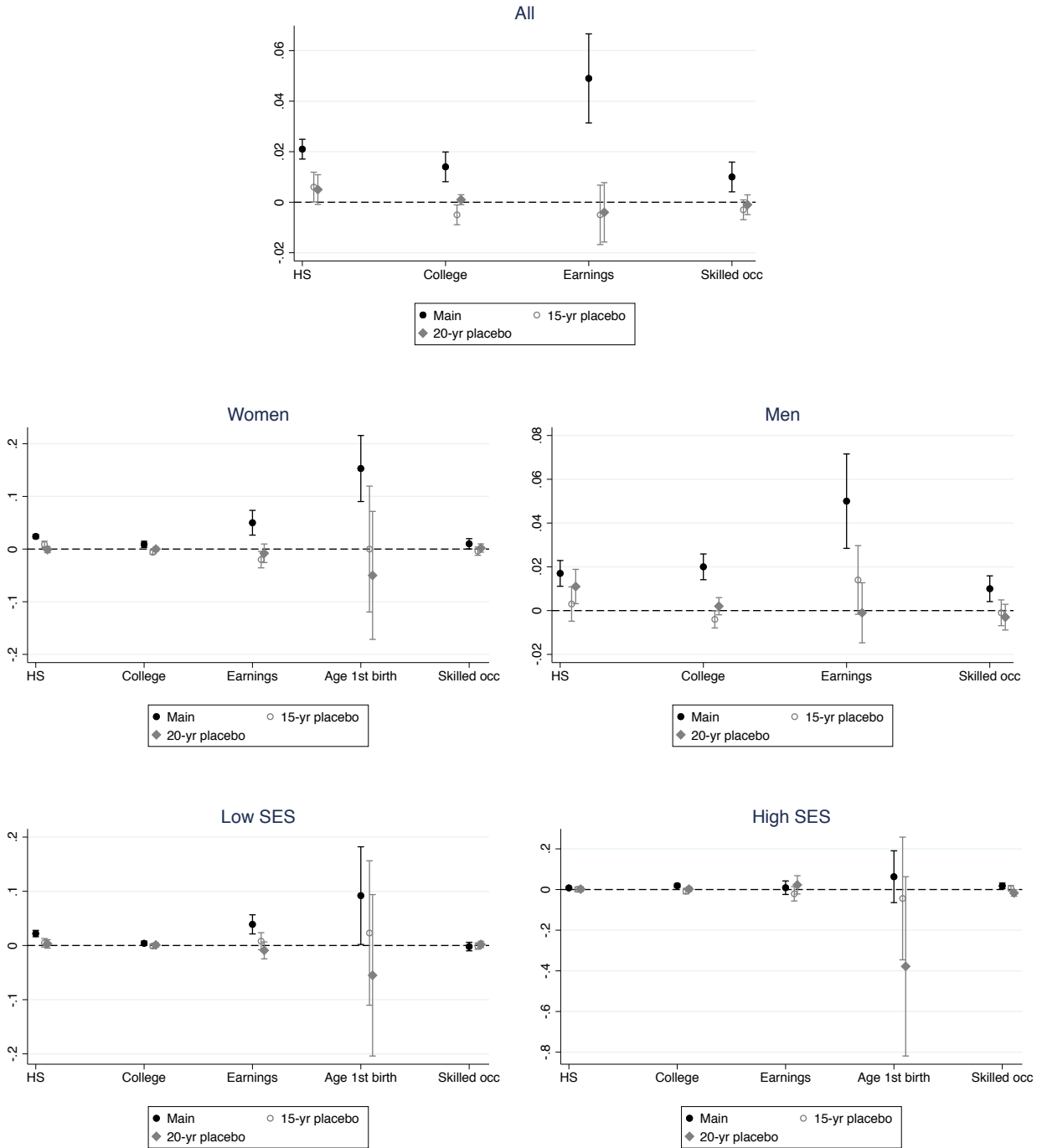
Notes: Dependent and control variables are as defined as in Tables 3- 10 for each outcome. Placebo $\widehat{JEC}$ is the expected years of full-day school attendance based on an individual's municipality of birth and the access to JEC for individuals born 15 or 20 years later in the same municipality (Equation 1). Sample is individuals born between 1959-77 outside the Santiago metropolitan region who were 38-58 years old at the time of survey. Vertical bars denote 95 percent confidence intervals clustered by municipality of birth.

Appendix B   Additional Tables

Appendix Table A1: JEC rollout pace and timing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Year $\widehat{JEC} \geq 1$		Year $\widehat{JEC} \geq 0.01$		Year $\widehat{JEC} = 12$		Length of implementation	
Pct ages < 18	871.357	1020.635	4.134	10.619	7.687	12.505	3.553	1.885
	(651.951)	(758.015)	(8.939)	(8.407)	(9.462)	(8.292)	(6.916)	(7.029)
Pct ages> 65	733.132	798.458	0.316	-0.412	8.690	4.235	8.374	4.647
	(571.044)	(617.842)	(6.997)	(7.066)	(7.993)	(7.442)	(5.041)	(5.790)
Pct in agriculture	142.203	264.039	-0.500	-1.292	1.128	0.298	1.628	1.590
	(163.575)	(203.284)	(1.611)	(1.590)	(1.719)	(1.804)	(1.300)	(1.590)
Literacy rate	-1175.472	-1175.358	-3.151	3.954	-17.985	-9.379	-14.835*	-13.333
	(1053.191)	(1138.364)	(9.348)	(10.130)	(9.288)	(10.168)	(6.717)	(7.452)
Log pop	-11.698	-33.936	-0.572	-0.806*	-0.149	-0.193	0.422	0.613
	(35.282)	(65.292)	(0.451)	(0.394)	(0.448)	(0.484)	(0.323)	(0.358)
Poverty rate	-89.896	-184.733	-3.305	-6.868**	2.614	-2.022	5.919*	4.846*
	(85.598)	(158.059)	(2.693)	(2.469)	(2.346)	(2.347)	(2.290)	(2.334)
Years of schooling	73.385	96.919	-0.310	-0.525	0.941	0.557	1.251**	1.082*
	(52.749)	(69.864)	(0.463)	(0.485)	(0.490)	(0.515)	(0.379)	(0.435)
Observations	152	152	152	152	152	152	152	152
FE	None	Region	None	Region	None	Region	None	Region
R2	0.023	0.127	0.076	0.244	0.038	0.208	0.195	0.273

Notes: Columns show relationships between baseline characteristics from the pooled 1990-96 CASEN surveys and the first year a birth cohort would be expected to have at least 1 year of full-day schooling (columns 1-2); the first year a birth cohort would be expected to have any access to full-day schooling (columns 3-4); the first year a birth cohort had full access to 12 years of full-day schooling (columns 5-6; the duration of the rollout period (year in columns (5-6) minus year in columns (3-4) in columns 7-8). $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1) from enrollment and JEC adoption data from the Ministry of Education; municipality variables from the 1990-96 CASEN. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** $= p < 0.01$, ** $= p < 0.05$, * $= p < 0.10$.

Appendix Table A2: Student demographic characteristics and JEC exposure

| | (1) | (2) | (3) | (4) |
| | | | Mom has | Mom has |
	Female	Indigenous	< HS	≥ BA
$\widehat{JEC}$	0.001	-0.001	-0.001	-0.001
	(0.003)	(0.002)	(0.003)	(0.006)
Observations	157698	157698	127853	48642
DV mean	0.517	0.104	0.440	0.212
E($\widehat{JEC}$)	2.020	2.020	1.756	2.086

Notes: Dependent variables are a series of indicators equal to one if a respondent reports a given demographic or socioeconomic characteristic at the time of the CASEN survey. All specifications include municipality of birth, survey year, and birth year-by-region fixed effects. $\widehat{JEC}$ is the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1) from enrollment and JEC adoption data from the Ministry of Education; demographic characteristics from adults in our sample at the time of the 2006-17 CASEN surveys. Sample limited to individuals born between 1979-92 outside the Santiago metropolitan region who were 19-38 years old at the time of survey. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A3: Robustness: Longer school days and high school graduation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Panel a: All				
$\widehat{JEC}$	0.013***	0.017***	0.020***	0.020***	0.021***	0.015***	0.015***
	(0.003)	(0.006)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	151806	96729	248535	248535	248535	317260	317260
DV mean	0.826	0.744	0.794	0.794	0.794	0.812	0.812
Pct change	0.0159	0.0230	0.025	0.026	0.0258	0.019	0.018
E($\widehat{JEC}$)	4.471	0.485	2.925	2.925	2.925	2.845	2.845
			Panel b: Women				
$\widehat{JEC}$	0.014***	0.022***	0.023***	0.024***	0.024***	0.017***	0.017***
	(0.003)	(0.008)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Observations	76729	50200	126929	126929	126929	161733	161733
DV mean	0.843	0.753	0.808	0.808	0.808	0.825	0.825
Pct change	0.0165	0.0295	0.029	0.030	0.0297	0.021	0.021
E($\widehat{JEC}$)	4.475	0.480	2.902	2.902	2.902	2.823	2.823
			Panel c: Men				
$\widehat{JEC}$	0.013***	0.012	0.017***	0.017***	0.017***	0.013***	0.013***
	(0.004)	(0.010)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	75077	46529	121606	121606	121606	155527	155527
DV mean	0.807	0.733	0.779	0.779	0.779	0.798	0.798
Pct change	0.0156	0.0168	0.022	0.022	0.0221	0.017	0.016
E($\widehat{JEC}$)	4.466	0.491	2.949	2.949	2.949	2.868	2.868

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Panel d: Low SES				
$\widehat{JEC}$	0.015***	0.025***	0.023***	0.022***	0.022***	0.021***	0.020***
	(0.004)	(0.008)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	64434	48738	113172	113172	113172	136569	136569
DV mean	0.742	0.647	0.701	0.701	0.701	0.715	0.715
Pct change	0.0200	0.0390	0.033	0.032	0.0307	0.029	0.029
E($\widehat{JEC}$)	4.461	0.487	2.757	2.757	2.757	2.645	2.645
			Panel e: High SES				
$\widehat{JEC}$	0.006**	0.009	0.006***	0.008***	0.008***	0.004*	0.004**
	(0.003)	(0.008)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	53690	25479	79169	79169	79169	109949	109949
DV mean	0.929	0.920	0.926	0.926	0.926	0.928	0.928
Pct change	0.00630	0.0102	0.006	0.008	0.00830	0.005	0.005
E($\widehat{JEC}$)	4.405	0.483	3.083	3.083	3.083	3.002	3.002
HS graduation years	1998-02	2003-16	1998-16	1998-16	1998-16	1998-16	1998-16
Region X cohort FE	X	X		X	X	X	X
Municipality of birth trends					X		
Includes Santiago						X	X
Baseline trends	X	X					X

Notes: Dependent variable is an indicator if the respondent had completed high school at the time of the CASEN survey. All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, and maternal education, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample is individuals ages 19-38 who were born between 1979-92. Columns 1-3 omit trends in baseline educational attainment, population, poverty, and employment rates; column 1 additionally replaces region-by-cohort fixed effects with cohort fixed effects. Columns 3-4 include respondents born in the Santiago metropolitan region. Panel b and c limit the sample to women and men, and panels d and e limit the sample to individuals whose mothers had less than a high school education or at least a high school education, respectively. Individuals not reporting maternal educational attainment are excluded from panels d-e. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A4: Robustness: Longer school days and college graduation

	(1)	(2)	(3)	(4)	(5)
	Panel a: All				
$\widehat{JEC}$	0.012***	0.013***	0.008***	0.007	0.008
	(0.002)	(0.003)	(0.002)	(0.005)	(0.006)
Observations	172681	172681	79169	220786	220786
DV mean	0.182	0.182	0.926	0.203	0.203
E($\widehat{JEC}$)	1.958	1.958	3.083	1.898	1.898
	Panel b: Women				
$\widehat{JEC}$	0.007***	0.008***	0.007**	0.004	0.005
	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)
Observations	88972	88972	88972	113695	113695
DV mean	0.199	0.199	0.199	0.217	0.217
E($\widehat{JEC}$)	1.944	1.944	1.944	1.890	1.890
	Panel c: Men				
$\widehat{JEC}$	0.016***	0.019***	0.022***	0.011**	0.011*
	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)
Observations	83709	83709	83709	107091	107091
DV mean	0.164	0.164	0.164	0.188	0.188
E($\widehat{JEC}$)	1.973	1.973	1.973	1.906	1.906
	Panel d: Low SES				
$\widehat{JEC}$	0.003	0.004*	0.003	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	77796	77796	77796	93942	93942
DV mean	0.099	0.099	0.099	0.105	0.105
E($\widehat{JEC}$)	1.768	1.768	1.768	1.679	1.679
	Panel e: High SES				
$\widehat{JEC}$	0.015***	0.019***	0.016***	0.003	0.002
	(0.005)	(0.005)	(0.005)	(0.011)	(0.012)
Observations	52510	52510	52510	73447	73447
DV mean	0.309	0.309	0.309	0.327	0.327
E($\widehat{JEC}$)	2.041	2.041	2.041	1.986	1.986
Region X cohort FE		X	X	X	X
Municipality of birth trends			X		
Includes Santiago				X	X
Baseline trends					X

Notes: Dependent variable equals to one if the respondent had received a university degree at the time of the CASEN survey. All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, and maternal education, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample is individuals ages 23-38 who were born between 1979-92 . Columns 1-3 omit trends in baseline educational attainment, population, poverty, and employment rates; column 1 additionally replaces region-by-cohort fixed effects with cohort fixed effects. Columns 3-4 include respondents born in the Santiago metropolitan region. Panel b and c limit the sample to women and men, and panels d and e limit the sample to individuals whose mothers had less than a high school education or at least a high school education, respectively. Individuals not reporting maternal educational attainment are excluded from panels d-e. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A5: Robustness: Longer school days and employment in the previous month

	(1)	(2)	(3)	(4)	(5)
	Panel a: All				
$\widehat{JEC}$	0.010***	0.009***	0.013***	0.006*	0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	157696	157696	157696	201983	201983
DV mean	0.655	0.655	0.631	0.675	0.675
Pct change	0.015	0.014	0.020	0.008	0.009
E($\widehat{JEC}$)	2.021	2.021	2.021	1.947	1.947
	Panel b: Women				
$\widehat{JEC}$	0.012***	0.013***	0.016***	0.008*	0.008*
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Observations	81210	81210	81210	103958	103958
DV mean	0.542	0.542	0.512	0.576	0.576
Pct change	0.021	0.024	0.032	0.014	0.015
E($\widehat{JEC}$)	2.008	2.008	2.008	1.945	1.945
	Panel c: Men				
$\widehat{JEC}$	0.008**	0.005*	0.009***	0.003	0.004
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Observations	76486	76486	76486	98025	98025
DV mean	0.776	0.776	0.759	0.780	0.780
Pct change	0.010	0.007	0.013	0.004	0.005
E($\widehat{JEC}$)	2.034	2.034	2.034	1.949	1.949

	(1)	(2)	(3)	(4)	(5)
		Panel d: Low SES			
$\widehat{JEC}$	0.013***	0.011***	0.009**	0.006*	0.006*
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Observations	70419	70419	70419	85113	85113
DV mean	0.649	0.649	0.629	0.667	0.667
Pct change	0.019	0.016	0.015	0.008	0.009
E($\widehat{JEC}$)	1.872	1.872	1.872	1.766	1.766
		Panel e: High SES			
$\widehat{JEC}$	-0.006	-0.008	-0.002	-0.009**	-0.009**
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Observations	48641	48641	48641	68129	68129
DV mean	0.651	0.651	0.620	0.676	0.676
Pct change	-0.010	-0.012	-0.004	-0.013	-0.013
E($\widehat{JEC}$)	2.086	2.086	2.086	2.020	2.020
Region X cohort FE		X	X	X	X
Municipality of birth trends			X		
Includes Santiago				X	X
Baseline trends					X

Notes: Employment defined as having income at least 30,000 pesos (approximately \$50) in the past month. All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, household size, maternal education, marital status and number and presence of children, interacted with gender, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample is individuals born between 1979-92 who were 23-38 years old at the time of survey. Columns 1-3 omit trends in baseline educational attainment, population, poverty, and employment rates; column 1 additionally replaces region-by-cohort fixed effects with cohort fixed effects. Columns 3-4 include respondents born in the Santiago metropolitan region. Panel b and c limit the sample to women and men, and panels d and e limit the sample to individuals whose mothers had less than a high school education or at least a high school education, respectively. Individuals not reporting maternal educational attainment are excluded from panels d-e. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A6: Robustness: Longer school days and log monthly earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	IHS(earn)	Earnings (level)			Log(earn)		
Panel a: All							
$\widehat{JEC}$	0.147***	21403.846***	0.048***	0.047***	0.054***	0.029**	0.030**
	(0.037)	(3480.931)	(0.010)	(0.009)	(0.010)	(0.014)	(0.014)
Observations	157696	157696	157696	157696	157696	201983	201983
DV mean (level, 1000s pesos)	318.596	318.596	318.596	318.596	318.596	352.110	352.110
E($\widehat{JEC}$)	2.021	2.021	2.021	2.021	2.021	1.947	1.947
Panel b: Women							
$\widehat{JEC}$	0.181***	15599.096***	0.044***	0.048***	0.053***	0.030*	0.031*
	(0.053)	(3861.751)	(0.012)	(0.011)	(0.012)	(0.016)	(0.016)
Observations	81210	81210	81210	81210	81210	103958	103958
DV mean (level, 1000s pesos)	233.708	233.708	233.708	233.708	233.708	267.879	267.879
E($\widehat{JEC}$)	2.008	2.008	2.008	2.008	2.008	1.945	1.945

Appendix Table A6: (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	IHS(earn)	Earnings (level)			Log(earn)		
			Panel d: Low SES				
$\widehat{JEC}$	0.142***	12322.685***	0.044***	0.038***	0.039***	0.023**	0.024**
	(0.046)	(2788.483)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Observations	70419	70419	70419	70419	70419	85113	85113
DV mean (level, 1000s pesos)	246.378	246.378	246.378	246.378	246.378	260.551	260.551
E($\widehat{JEC}$)	1.872	1.872	1.872	1.872	1.872	1.766	1.766
			Panel e: High SES				
$\widehat{JEC}$	-0.065	16078.416*	0.010	0.009	0.010	-0.014	-0.014
	(0.068)	(8658.092)	(0.020)	(0.018)	(0.019)	(0.023)	(0.024)
Observations	48641	48641	48641	48641	48641	68129	68129
DV mean (level, 1000s pesos)	414.115	414.115	414.115	414.115	414.115	455.890	455.890
E($\widehat{JEC}$)	2.086	2.086	2.086	2.086	2.086	2.020	2.020
Region X cohort FE	X	X		X	X	X	X
Municipality of birth trends					X		
Includes Santiago						X	X
Baseline trends	X	X					X

Notes: Column 1 transforms real earnings by the inverse hyperbolic sine; column 2 reports income in levels; and columns 3-6 report $log(earnings + 1)$. All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, household size, maternal education, marital status and number and presence of children, interacted with gender, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample limited to individuals born between 1979-92 who were 23-38 years old at the time of survey. Columns 1-2 include region-by-cohort fixed effects and survey year trends in baseline educational attainment, population, poverty, and employment rates. Columns 3-5 omit these trends; column 3 replaces region-by-cohort fixed effects with cohort fixed effects. Columns 5-6 include respondents born in the Santiago region. Panel b and c limit the sample to women and men, and panels d and e limit the sample to individuals whose mothers had less than a high school education or at least a high school education, respectively. Individuals not reporting maternal educational attainment are excluded from panels d-e. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A7: Robustness: Longer school days and log monthly earnings among workers

	(1)	(2)	(3)	(4)	(5)
Panel a: All					
$\widehat{JEC}$	0.034***	0.036***	0.034***	0.022**	0.021**
	(0.006)	(0.006)	(0.006)	(0.009)	(0.009)
Observations	101839	101839	101839	132667	132667
DV mean (level, 1000s pesos)	486.183	486.183	486.183	521.441	521.441
E($\widehat{JEC}$)	1.904	1.904	1.904	1.829	1.829
Panel b: Women					
$\widehat{JEC}$	0.031***	0.032***	0.026***	0.017*	0.016*
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
Observations	42245	42245	42245	56082	56082
DV mean (level, 1000s pesos)	430.530	430.530	430.530	464.728	464.728
E($\widehat{JEC}$)	1.910	1.910	1.910	1.846	1.846
Panel c: Men					
$\widehat{JEC}$	0.036***	0.037***	0.039***	0.024**	0.024**
	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)
Observations	59594	59594	59594	76585	76585
DV mean (level, 1000s pesos)	527.866	527.866	527.866	565.991	565.991
E($\widehat{JEC}$)	1.900	1.900	1.900	1.816	1.816

Appendix Table A7: (continued)

	(1)	(2)	(3)	(4)	(5)
		Panel d: Low SES			
$\widehat{JEC}$	0.021***	0.019***	0.020***	0.015***	0.014**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Observations	44852	44852	44852	54941	54941
DV mean (level, 1000s pesos)	379.556	379.556	379.556	390.543	390.543
E($\widehat{JEC}$)	1.824	1.824	1.824	1.707	1.707
		Panel e: High SES			
$\widehat{JEC}$	0.041***	0.043***	0.040***	0.017	0.017
	(0.012)	(0.013)	(0.013)	(0.017)	(0.017)
Observations	31351	31351	31351	45011	45011
DV mean (level, 1000s pesos)	635.665	635.665	635.665	673.798	673.798
E($\widehat{JEC}$)	1.883	1.883	1.883	1.834	1.834
Region X cohort FE		X	X	X	X
Municipality of birth trends			X		
Includes Santiago				X	X
Baseline trends					X

Notes: Dependent variable is defined as $log(earnings+1)$ in 2017 pesos. All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, household size, maternal education, marital status and number and presence of children, interacted with gender, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample limited to individuals born between 1979-92 who were 23-38 years old at the time of survey and who report earnings $\geq$ 30,000 pesos in the past month. Columns 1-3 omit trends in baseline educational attainment, population, poverty, and employment rates; column 1 additionally replaces region-by-cohort fixed effects with cohort fixed effects. Columns 3-4 include respondents born in the Santiago metropolitan region. Panel b and c limit the sample to women and men, and panels d and e limit the sample to individuals whose mothers had less than a high school education or at least a high school education, respectively. Individuals not reporting maternal educational attainment are excluded from panels d-e. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A8: Robustness: Longer school days and domestic migration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Moved to Santiago	Log(Avg muni residence income)			Moved		
			Panel a: All				
$\widehat{JEC}$	-0.002	0.015***	0.001	0.000	0.002	0.000	-0.001
	(0.002)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	157696	157696	157696	157696	157696	201983	201983
DV mean	0.110	0.082	0.357	0.357	0.357	0.418	0.418
Pct change	-0.014		0.003	0.001	0.007	0.000	-0.003
E($\widehat{JEC}$)	2.021	2.021	2.021	2.021	2.021	1.947	1.947
			Panel b: Women				
$\widehat{JEC}$	0.000	0.016***	0.001	0.001	0.004	0.001	-0.000
	(0.003)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	81210	81210	81210	81210	81210	103958	103958
DV mean	0.112	0.081	0.365	0.365	0.365	0.428	0.428
Pct change	-0.003		0.002	0.002	0.011	0.003	0.001
E($\widehat{JEC}$)	2.008	2.008	2.008	2.008	2.008	1.945	1.945
			Panel c: Men				
$\widehat{JEC}$	-0.003	0.013**	0.001	-0.000	0.000	-0.001	-0.003
	(0.003)	(0.006)	(0.003)	(0.003)	(0.004)	(0.005)	(0.004)
Observations	76486	76486	76486	76486	76486	98025	98025
DV mean	0.108	0.083	0.349	0.349	0.349	0.408	0.408
Pct change	-0.027		0.004	-0.001	0.001	-0.003	-0.006
E($\widehat{JEC}$)	2.034	2.034	2.034	2.034	2.034	1.949	1.949

Appendix Table A8: (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Panel d: Low SES				
$\widehat{JEC}$	0.002	0.006	0.003	0.001	0.002	-0.006	-0.007*
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	70419	70419	70419	70419	70419	85113	85113
DV mean	0.075	-0.049	0.295	0.295	0.295	0.348	0.348
Pct change	0.026		0.009	0.005	0.006	-0.019	-0.021
E($\widehat{JEC}$)	1.872	1.872	1.872	1.872	1.872	1.766	1.766
			Panel e: High SES				
$\widehat{JEC}$	-0.002	0.024***	0.001	0.003	0.003	0.004	0.001
	(0.003)	(0.008)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Observations	48641	48641	48641	48641	48641	68129	68129
DV mean	0.142	0.235	0.410	0.410	0.410	0.477	0.477
Pct change	-0.017		0.003	0.006	0.007	0.009	0.004
E($\widehat{JEC}$)	2.086	2.086	2.086	2.086	2.086	2.020	2.020
Region X cohort FE	X	X		X	X	X	X
Municipality of birth trends					X		
Includes Santiago						X	X
Baseline trends	X	X					X

Notes: Dependent variable is an indicator if the respondent currently lives in a municipality in the Santiago region (column 1); a standardized index of municipality per-capita income multiplied by whether the individual lives in a municipality other than his/her municipality of birth (col umn 2); or an indicator = 1 whether the respondent lives in a municipality other than his/her municipality of birth (columns 3-6). All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, household size, maternal education, marital status and number and presence of children, interacted with gender, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample is individuals born between 1979-92 who were 23-38 years old at the time of survey. Columns 1-2 include region-by-cohort fixed effects and survey year trends in baseline educational attainment, population, poverty, and employment rates. Columns 3-5 omit these trends; column 3 replaces region-by-cohort fixed effects with cohort fixed effects. Columns 5-6 include respondents born in the Santiago region. Panel b and c limit the sample to women and men, and panels d and e limit the sample to individuals whose mothers had less than a high school education or at least a high school education, respectively. Individuals not reporting maternal educational attainment are excluded from panels d-e. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A9: Robustness: Longer school days and childbearing patterns

	(1)	(2)	(3)	(4)	(5)
	Pr(teen mother)		Age at first birth		
Panel a: All Women					
$\widehat{JEC}$	-0.007***	0.198***	0.195***	0.107***	0.108***
	(0.002)	(0.042)	(0.047)	(0.039)	(0.038)
Observations	95874	28036	28036	67430	67430
DV mean	0.113	21.02	21.02	21.18	21.18
E($\widehat{J\widetilde{EC}}$)	3.332	2.797	2.797	2.391	2.391
Panel b: Low SES					
$\widehat{JEC}$	-0.005*	0.180***	0.199***	0.062	0.058
	(0.003)	(0.050)	(0.058)	(0.046)	(0.047)
Observations	37940	13173	13173	25511	25511
DV mean	0.130	20.72	20.72	20.66	20.66
E($\widehat{J\widetilde{EC}}$)	3.159	2.607	2.607	2.066	2.066
Panel c: High SES					
$\widehat{JEC}$	0.001	0.094	0.097	0.061	0.059
	(0.003)	(0.084)	(0.089)	(0.087)	(0.086)
Observations	33378	9964	9964	21220	21220
DV mean	0.0808	21.50	21.50	21.58	21.58
E($\widehat{J\widetilde{EC}}$)	3.471	2.892	2.892	2.263	2.263
Region X cohort FE	X		X	X	X	X
Municipality of birth trends				X	
Includes Santiago				X	X
Baseline trends	X				X

Notes: Dependent variable equals one if a woman gave birth before age 19 (column 1) or is the age in years a woman gave birth to her first child (columns 2-5). All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, and maternal education, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample is women born between 1979-92 who had given birth to at least one child at the time of the survey. Columns 2-4 omit trends in baseline educational attainment, population, poverty, and employment rates; column 2 additionally replaces region-by-cohort fixed effects with cohort fixed effects. Columns 4-5 include respondents born in the Santiago metropolitan region. Panel b limits the sample to women whose mothers had less than a high school education; panel c limits the sample to women whose mothers had at least a high school education. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Appendix Table A10: Robustness: Longer school days and occupational upskilling

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(avg occ wage)	Skilled occupation				
		Panel a: All				
$\widehat{JEC}$	0.014***	0.010***	0.010***	0.011***	0.007	0.007
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.004)
Observations	96211	101209	101209	101209	131792	131792
DV mean	487.765	0.292	0.292	0.292	0.325	0.325
Pct change		0.0356	0.0347	0.0361	0.022	0.020
E($\widehat{JEC}$)	1.976	1.894	1.894	1.894	1.822	1.822
		Panel b: Women				
$\widehat{JEC}$	0.013**	0.011*	0.010*	0.007	0.008	0.008
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Observations	40175	42220	42220	42220	56060	56060
DV mean	473.531	0.379	0.379	0.379	0.391	0.391
Pct change		0.028	0.026	0.0194	0.020	0.021
E($\widehat{JEC}$)	1.975	1.899	1.899	1.899	1.839	1.839
		Panel c: Men				
$\widehat{JEC}$	0.014***	0.009***	0.010***	0.013***	0.006	0.006
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Observations	56036	58989	58989	58989	75732	75732
DV mean	498.647	0.226	0.226	0.226	0.273	0.273
Pct change		0.041	0.043	0.0557	0.023	0.020
E($\widehat{JEC}$)	1.976	1.890	1.890	1.890	1.808	1.808

Appendix Table A10: (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
			Panel d: Low SES			
$\widehat{JEC}$	-0.004	0.001	-0.000	-0.003	-0.001	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	41867	44828	44828	44828	54882	54882
DV mean	417.984	0.179	0.179	0.179	0.195	0.195
Pct change		0.008	-0.001	-0.0144	-0.003	-0.011
E($\widehat{JEC}$)	1.909	1.812	1.812	1.812	1.703	1.703
			Panel e: High SES			
$\widehat{JEC}$	0.030***	0.015**	0.017**	0.018***	0.009	0.010
	(0.007)	(0.006)	(0.007)	(0.007)	(0.008)	(0.007)
Observations	29671	30829	30829	30829	44296	44296
DV mean	597.607	0.456	0.456	0.456	0.484	0.484
Pct change		0.034	0.036	0.0400	0.019	0.020
E($\widehat{JEC}$)	1.949	1.874	1.874	1.874	1.823	1.823
Region X cohort FE	X		X	X	X	X
Municipality of birth trends				X		
Includes Santiago					X	X
Baseline trends	X					X

Notes: Dependent variable is the average wage in a 4-digit occupation (column 1) or an indicator if the respondent works in a managerial, technical, or professional occupation (columns 2-5). All specifications include municipality of birth and survey year fixed effects. Control variables include current municipality of residence employment and poverty rates, gender, a quadratic in age, indigenous identity, household size, maternal education, marital status and number and presence of children, interacted with gender, as well as linear survey year trends in baseline educational attainment, population, poverty, and employment rates by municipality of birth from the 1996 CASEN. $\widehat{JEC}$ defined as the expected years of full-day school attendance based on an individual's municipality and year of birth (Equation 1). Sample limited to individuals born between 1979-92 who were 23-38 years old at the time of survey. Military members and respondents without valid occupation codes are excluded. Column 1 includes region-by-cohort fixed effects and survey year trends in baseline educational attainment, population, poverty, and employment rates. Columns 2-4 omit these trends; column 2 replaces region-by-cohort fixed effects with cohort fixed effects. Columns 4-5 include respondents born in the Santiago region. Panel b and c limit the sample to women and men, and panels d and e limit the sample to individuals whose mothers had less than a high school education or at least a high school education, respectively. Individuals not reporting maternal educational attainment are excluded from panels d-e. Robust standard errors clustered by municipality of birth; all specifications weighted using regionally-representative weights. See text and data appendix for details. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$.

Data Appendix

Measuring JEC Exposure

Beginning with the 2013 school year, the Chilean Ministry of Education has reported enrollment at the school-grade level for all publicly funded schools (public and voucher schools), as well as the year each grade in each school adopted JEC. We first exclude schools reporting zero or one student in a particular grade and then estimate JEC access as the enrollment-weighted average of JEC implementation at the municipality-grade-year level for each year 1997 through 2015.

We then sum across the years a student would be expected to enroll in grades 1-12 for cohorts born between 1979-92, assuming no grade retention or drop-out behavior. For example, the 1990 cohort is expected to enroll in grade 1 in 1996, before JEC implementation. Beginning in 1997, some schools had implemented JEC for second graders, and so on, through 2008 when respondents born in this cohort were expected to have completed secondary schooling. More formally, we calculate exposure to JEC as (Equation 1):

$$(\widehat{JEC_{cm}}) = \frac{1}{N_{cm}} \sum_{s \in m} \sum_{g=1}^{12} \mathbb{1} \left\{ JEC_{scgm} \right\} * N_{sgcm}$$

As we note in the text, the CASEN labor market data include respondents' birth years but not birth months. The Chilean school year begins in March, and children who turn five through June are eligible to enroll that year. Accordingly, each starting class is approximately half five-year-olds and half six-year-olds. (McEwan and Shapiro (2008) provide a full description of Chilean enrollment cutoffs). We define age in first grade based on a child's year of birth plus six; accordingly, for children born in January through June, our approach assigns them the JEC exposure of an younger cohort (i.e..: weakly greater years of full-day schooling than they actually had access to). This approach errs on the side of under-estimating JEC exposure, thereby providing a lower-bound on the actual exposure effect.

Outcome and Control Variables

The CASEN is Chile's biennial national household survey and includes a rich set of demographic and economic characteristics at the household and individual level. Here, we briefly summarize the key variables; a comprehensive data description is available from the Ministry of Finance: `https://www.hacienda.cl/english/documents/statistics/casen-survey.html`.

Sample selection Our main sample includes CASEN respondents born between 1979-92 and graduating high school between 1997 (the first year of JEC) and 2010 (the year by which all schools were originally required to have adopted JEC). All of these individuals were born before the policy was announced; therefore, municipality of birth is unlikely to be correlated with access to full-day schooling, conditional on region-specific time effects and time-invariant municipality effects. We estimate all results in a weighted least squares generalized differences-in-differences framework (Equation 3), using regionally representative weights in order to provide the most comprehensive coverage of the population.[1]

Individual characteristics

- **Municipality of birth:** Starting with the 2006 survey, the CASEN inquired where respondents' mothers were living at birth, whether in the current municipality of residence or a different one (and if the latter, which municipality). With this information, we identify the municipality of birth for approximately 98 percent of respondents. The unmatched observations result from respondents reporting their mothers' residences at birth at a higher level of aggregation than the municipality (e.g.: the region or the province). We do not include earlier CASEN waves (2000, 2003) in our analyses as we are not able to identify municipality of birth for respondents in these years.

- **Socioeconomic status:** We proxy for the economic conditions a child experienced while growing up by maternal education. Our "Low SES" sample includes respondents

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[1]In results available upon request, our findings are qualitatively unchanged when using municipal-("comuna") level weights or without weighting.

whose mothers have no more than 12 years of education (approximately 37 percent of the sample); the "High SES" sample includes respondents whose mothers have at least a high school education (approximately 39 percent of the sample). We first construct this variable using the direct question about mother's educational attainment from the CASEN ("Cuál fue el nivel de educacion más alto alcanzado por su madre –o figura materna?") About 55 percent respond to this question, and for another 20 percent of individuals, we obtain maternal educational attainment based on the education level of a female head of household who has a child who is (a) in our sample and (b) in the same household. At both stages, there are more respondents with missing values in the 2017 wave than in previous surveys. Our results do not meaningfully change when excluding the 2017 survey (available upon request).

- **Employment status:** Employment status is defined as having earnings from employment of at least 30,000 pesos (approximately $50) in the last month. Results are similar when using self-reported employment status in the previous week.

- **Earnings:** Earnings are defined as self-reported earnings from employment in the previous month. We adjust all measures for inflation using the Consumer Price Index, available at `https://fred.stlouisfed.org/series/CHLCPIALLMINMEI`, and report all amounts in 2017 pesos. For results estimating the semi-elasticity of earnings with respect to an additional year of full-day schooling access (Table 7, Figure 7, and Appendix Tables A6 and A7), we define log monthly earnings as $log(earnings + 1)$ in order to account for respondents without earned income. Appendix Table A6 additionally reports results where the dependent variable is the inverse hyperbolic sine of monthly earnings (column 1) or monthly earnings in pesos (column 2).

- **Autonomous income:** In Table 1, we explore the relationship between the pace of JEC adoption and average per-capita autonomous income. Autonomous income is defined as income from all household sources, primarily earnings, but also sources such as rental income.

- **Skilled occupation:** Following ILO, we define skilled occupations as working as a manager, professional, or technician/associate professional (ISCO major codes 1, 2, 3), as the primary occupation reported in the CASEN. Individuals in the armed forces, out of the labor force, and without a valid occupation are considered neither skilled nor unskilled.

- **Occupational prestige:** Defined as the log earnings of other workers j in the same 4-digit occupation o as worker i for a measure of occupation-average wages, excluding own earnings:

$$\overline{w_{io}} = \frac{\sum_j w_{j \neq i}}{\sum_j N_{jo} - 1} \tag{1}$$

Occupational prestige is not defined for military members and those with a missing occupation. By this definition, a value of 1,000 indicates *expected* earnings of an additional 1,000 pesos based on peer earnings.

- **Area socioeconomic opportunity:** We calculate the per-capita autonomous income (earnings, rent and other sources) as the leave-out mean among individuals j other than survey respondent i in a municipality-survey year as:

$$\overline{y_{io}} = \frac{\sum_j y_{j \neq i}}{\sum_j N_{jo} - 1} \tag{2}$$

And normalize the measure to have a mean of 0 and standard deviation of one across all municipalities and survey years so that a value of 1 indicates an area that has per-capita income 1 standard deviation higher than the average municipality. We multiply this index by an indicator equal to 1 if an individual moved in order to capture migration to higher-income areas.

Municipality and region characteristics

- **Employment rate baseline trends:** Baseline employment rate trends are calculated as the share of individuals ages 18 and older who were employed in the 1996 CASEN in

each respondent's municipality of birth, multiplied by the survey year. Municipalities with no baseline information (approximately 25 percent of the sample) have a separate trend on an indicator for whether baseline employment is missing.

- **Poverty rate baseline trends:** Baseline poverty rate trends are calculated as survey year linear trends in the share of households living in poverty in 1996 in each respondent's municipality of birth. Poverty status is reported in the 1996 CASEN as an absolute threshold defined as 1.75 (some rural areas) or 2 (urban and other rural areas) times the cost of a basic food basket. The food bundle cost is estimated using data from the Family Budget Survey. Municipalities with no baseline information (approximately 25 percent of the sample) have a separate trend on an indicator for whether baseline poverty is missing.

- **Educational attainment baseline trends:** Baseline educational attainment trends are calculated as survey year linear trends in the average number of years individuals ages 18 and older attended school in 1996 in each respondent's municipality of birth. Municipalities with no baseline information (approximately 25 percent of the sample) have a separate trend on an indicator for whether baseline educational attainment is missing.

- **Population baseline trends:** Baseline (log) population trends are calculated as survey year linear trends in the natural log of 1996 population in each respondent's municipality of birth.

- **Contemporaneous employment rate:** Contemporaneous employment rate for each individual's current municipality of residence is calculated as the share of individuals 18 and older working in the previous month from the full CASEN sample. Our main specifications include this variable as a control.

- **Contemporaneous poverty rate:** Contemporaneous poverty rate for each individual's current municipality of residence is calculated as the share of households living in poverty

in the full CASEN sample. Poverty is calculated as an absolute measure as 1.75 (some rural areas) or 2 (urban and other rural areas) times the cost of a basic food basket. The food bundle cost is estimated using data from the Family Budget Survey. Our main specifications include this variable as a control.

- **Contemporaneous per-capita income:** Contemporaneous per-capita income for each individual's current municipality of residence is calculated as per-person autonomous income (earnings and rental income) among the full CASEN sample. Our main specifications include this variable as a control.

- **Percent in agriculture:** Agricultural share (Appendix Table A1) is defined as the share of workers employed in the agricultural sector in each municipality between 1990 and 1996 (pooled CASEN years).

- **Literacy rate:** The adult literacy rate (Appendix Table A1) is defined as the share of individuals ages 18 and older in each municipality between 1990 and 1996 (pooled CASEN years) who report being able to read and write.

Data Appendix Table DA1 presents summary statistics for the municipality-level variables from the CASEN for both the pre- (1990-96) and analysis (2006-17) period. Between one-quarter (employment rate) and two-thirds (poverty rate) of the cross-municipality variation in each control variable is between regions.

Data Appendix Table DA1: Summary statistics: Municipality-level characteristics

Panel (a): CASEN variables 2006-2017	
Per-capita autonomous income (1000s pesos)	355.525 (152.640)
Years education	8.260 (1.334)
Average household size	3.860 (0.296)
Employment rate	0.912 (0.044)
Poverty rate	0.257 (0.117)
Log population	6.530 (0.485)

Panel (b): CASEN variables 1990-1996	
% < age 18	0.371 (0.034)
% > age 65	0.082 (0.045)
% in agriculture	0.334 (0.242)
Literacy rate	0.914 (0.049)
Employment rate	0.929 (0.032)
Poverty rate	0.397 -0.105
Log population	6.395 (0.492)

Notes: Table presents means and standard deviations (in parentheses) for the municipality-level characteristics in Table 1 from the 2006-17 (panel a) and 1990-96 (panel b) CASEN surveys. See text for details.

References

McEwan, P. J. and Shapiro, J. S. (2008). The benefits of delayed primary school enrollment discontinuity estimates using exact birth dates. *Journal of human Resources*, 43(1):1–29.