Online Appendix: The Long-run Effects of Teacher Collective Bargaining

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Table A-1: Summary Statistics of Analysis Variables

	M	len	Wo	men
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Age	42.426	4.307	42.456	4.308
Asian	0.010	0.033	0.010	0.033
Black	0.128	0.096	0.144	0.106
Hispanic	0.064	0.088	0.063	0.088
Other	0.010	0.021	0.010	0.023
DTB	0.625	0.484	0.619	0.486
Years Exposed	6.055	5.366	5.980	5.5.369
Average EITC	0.001	0.011	0.001	0.011
Court-Ordered School Finance Reform	1.823	3.922	1.805	3.903
Legislative School Finance Reform	3.409	4.711	3.364	4.686
Food Stamp Exposure	0.625	0.325	0.621	0.326
Total Income	$54,\!295.50$	8,562.10	$30,\!332.68$	$4,\!561.59$
Hours Worked	38.964	2.112	29.552	1.685
Employed	0.822	0.046	0.730	0.043
Unemployed	0.057	0.025	0.048	0.020
Not in Labor Force	0.122	0.036	0.222	0.038
Years of Education	13.443	0.391	13.689	0.393
Occupational Skill Level	0.619	0.154	0.558	0.130
High School Degree	0.292	0.062	0.250	0.061
Some College	0.217	0.041	0.238	0.044
Associates Degree	0.081	0.023	0.109	0.026
Bachelors Degree	0.286	0.060	0.313	0.065

Notes: Authors' tabulations from 2005-2012 ACS data on 35-49 year old respondents. Tabulations are weighted by the number of individual observations that are used to calculate the averages in each state-cohort-year-gender cell.

Table A-2: Summary Statistics of Analysis Variables By Gender and Race/Ethnicity

	Blac	Black &	Whi	White &	Blac	Black &	Wh	White $\&$
	Hispan	anic Men	Asiar	Asian Men	Hispanic	Hispanic Women	Asian	Asian Women
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	42.039	4.319	42.506	4.300	42.100	4.336	42.537	4.298
Duty-to-Bargain Law	0.503	0.500	0.650	0.477	0.491	0.500	0.648	0.478
Years Exposed	4.820	5.348	6.311	5.334	4.675	5.322	6.275	5.335
Average EITC	0.000	0.007	0.001	0.012	0.000	0.006	0.001	0.012
Court-Ordered School Finance Reform	2.121	4.278	1.761	3.841	2.012	4.181	1.758	3.836
Legislative School Finance Reform	2.901	4.468	3.514	4.753	2.855	4.430	3.480	4.734
Food Stamp Exposure	0.665	0.317	0.617	0.326	0.654	0.321	0.613	0.327
Total Income	34,434.89	7,630.40	59,326.87	9,233.07	26,149.84	5,273.62	31,486.16	4,861.68
Hours Worked	33.196	3.863	40.386	1.948	29.990	3.100	29.420	1.907
Employed	0.704	0.089	0.851	0.042	0.704	0.075	0.737	0.046
Unemployed	0.085	0.052	0.049	0.024	0.074	0.045	0.041	0.019
Not in Labor Force	0.211	0.074	0.100	0.032	0.222	0.069	0.222	0.043
Occupational Skill Level	0.652	0.151	0.614	0.154	0.585	0.133	0.553	0.129
Years of Education	12.641	0.485	13.644	0.397	13.042	0.486	13.870	0.411
High School Degree	0.332	0.098	0.281	0.064	0.277	0.088	0.243	0.065
Some College	0.239	0.077	0.212	0.043	0.275	0.073	0.227	0.047
Associates Degree	0.072	0.043	0.083	0.025	0.098	0.047	0.112	0.028
Bachelors Degree	0.155	0.063	0.319	0.063	0.201	0.069	0.344	0.072

Notes: Authors' tabulations from 2005-2012 ACS data on 35-49 year old respondents. Tabulations are weighted by the number of individual observations that are used to calculate the averages in each state-cohort-year-gender cell.

Table A-3: The Effect of Collective Bargaining Laws At 10 Years on Years of Education, 2008-2012 ACS Years Only

		Black &	White &		Black &	White &
		Hispanic	Asian	All	Hispanic	Asian
	All Men	Men	Men	Women	Women	Women
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-0.081**	-0.151	-0.066*	0.030	-0.107**	0.057
At 10 Tears	(0.040)	(0.094)	(0.036)	(0.060)	(0.048)	(0.075)

Notes: Authors' estimation of equation (1) as described in the text using 2008-2012 ACS data on 35-49 year old respondents. 10-year estimates from the full event study model are shown. Regressions are based on 6,000 birth state-cohort-year observations. All estimates include birth state, year, and birth cohort-by-year fixed effects as well as controls school finance reform, EITC and food stamp measures as described in the text. Estimates in columns (i) and (iv) include controls for race/ethnicity. Regressions are weighted by the number of individual observations that are used to calculate the averages in each state-cohort-year-gender cell. Standard errors clustered at the birth state level are in parentheses: *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table A-4: The Effect of Collective Bargaining Laws At 10 Years After Passage for Men – Robustness Checks

	Panel A: Exc	luding State	es that Allow	Teachers to St	rike	
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
A+ 10 V	-2303.25***	-0.561***	-0.012**	0.010**	-0.042	-0.002
At 10 Years	(668.61)	(0.196)	(0.005)	(0.004)	(0.038)	(0.002)
	,		,			,
F	Panel B: Contr	colling for Te	otal Union M	Tembership at A	Age 18	
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-2124.68***	-0.407**	-0.009*	0.008*	-0.051	-0.003
At 10 Tears	(603.01)	(0.185)	(0.005)	(0.004)	(0.037)	(0.002)
			_			
-	Panel C: Cont	_	Proportion Li	ving in Urban		0
	.	Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed		Education	Skill
Exposure Time	(i)		(iii)	(iv)	(v)	(vi)
At 10 Years	-2106.37***	-0.421**		0.008**	-0.048	-0.003
110 10 10015	(624.75)	(0.188)	(0.005)	(0.004)	(0.037)	(0.002)
	D 1D 6	7 4 111 (. D: /	W: 1 + D +		
	Panel D: C	Jontrolling 1 Hours	or Riots and	Violent Protes Not in	ts Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	-2162.89***	-0.421**		0.008**	-0.053	-0.003
At 10 Years	(590.13)		(0.005)	(0.008)	(0.037)	(0.003)
	(590.15)	(0.169)	(0.003)	(0.004)	(0.037)	(0.002)
Panel E:	Controlling for	or Current S	State Fixed E	ffects (Individu	al-level Data	.)
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	-2495.28***	-0.437**	-0.009**	0.008*	-0.072*	-0.004
10 Years	(561.39)	(0.185)	(0.005)	(0.004)	(0.040)	(0.002)
	()	()	()	()	()	()
	Panel F	: Including	Birth State-b	y-Year Effects		
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Voors	-2218.16***	-0.627**	-0.011**	0.012**	-0.068*	-0.003
At 10 Years	(690.71)	(0.253)	(0.005)	(0.005)	(0.037)	(0.002)
]	Panel G: Inclu		s Region-by-0	Cohort Fixed E		
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-2216.91***	-0.523**	-0.011**	0.010**	-0.054	-0.003
110 10 10015	(631.54)	(0.225)	(0.005)	(0.004)	(0.037)	(0.002)
T.	1 II. C "	l: C D		1 -f Ct + T	:_1_4	
Par	nei H: Control	_	nocratic Cont	rol of State Le	_	0
	E	Hours	T71 1	Not in	Years of	Occup.
E (II)	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
10 Years	-1926.84***	-0.334^*	-0.008	0.006	-0.044	-0.003
Notes: Authors' esti	(639.86)	(0.177)	(0.005)	(0.004)	(0.038)	(0.002)

Notes: Authors' estimation of equation (1) as described in the text using 2005-2012 ACS data on 35-49 year old respondents. 10-year estimates from the full event study model are shown. All estimates include birth state, year and birth cohort-by-year fixed effects. Occupational skill results and estimates in Panel E are based on individual data and control for race/ethnicity. Other outcomes are estimated using aggregated data and control for racial/ethnic composition of the state-cohort-year-gender cell. Regressions using aggregated data are weighted by the number of individual observations that are used to calculate the averages in each state-year-cohort-gender cell. The construction of each analysis sample and control variable is described in the text. Standard errors clustered at the birth state level are in-parentheses: *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table A-5: The Effect of Collective Bargaining Laws At 10 Years After Passage for Women – Robustness Checks

P	Panel A: Exc		ates that Allo	ow Teachers to		
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-377.26	-0.510*	-0.013**	0.008	-0.034	-0.001
nt 10 Tears	(430.54)	(0.292)	(0.005)	(0.007)	(0.035)	(0.002)
Par	nel B: Conti	colling for	Total Union	Membership at	Age 18	
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
*	-205.10	-0.434	-0.011**	0.007	-0.017	-0.002
At 10 Years	(344.29)	(0.276)	(0.005)	(0.006)	(0.033)	(0.002)
$\mathbf{p}_{\mathbf{a}}$	nel C: Cont	rolling for	Proportion 1	Living in Urbai	n Areas	
1 0	inci C. Cont	Hours	1 Toportion	Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Exposure Time	-206.96	-0.433	-0.011**	\ /	-0.016	. ,
At 10 Years				0.007		-0.002
	(355.69)	(0.264)	(0.005)	(0.006)	(0.032)	(0.002)
	Panel D: 0	_	for Riots an	d Violent Prot		
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-237.42	-0.442	-0.011**	0.007	-0.017	-0.002
no io icais	(369.05)	(0.272)	(0.005)	(0.006)	(0.033)	(0.002)
Panel E: C	ontrolling for	or Current	State Fixed	Effects (Individ	dual-level Da	ta)
	J	Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	-342.45	-0.413	-0.011**	0.008	-0.032	-0.001
At 10 Years	(323.43)	(0.263)	(0.005)	(0.006)	(0.033)	(0.002)
	Panel F	· Including	r Birth State	-by-Year Effect	· s	
	1 taner 1	Hours	5 Direit State	Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Exposure Time	-235.67	-0.466	-0.011*	0.010	-0.015	-0.002
At 10 Years	(389.14)	(0.317)	(0.006)	(0.007)	(0.035)	(0.002)
	(000.11)	(0.011)	(0.000)	(0.001)	(0.000)	(0.002)
Pa	nel G: Inclu	_	sus Region-by	v-Cohort Fixed		
	_	Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-272.98	-0.460	-0.011**	0.008	-0.013	-0.002
At 10 Tears	(378.26)	(0.286)	(0.005)	(0.007)	(0.033)	(0.002)
	H. Control	ling for De	emocratic Co	entrol of State I	Legislature	
Panel		J				
Panel	iii cominoi			Not in	Years of	Occup.
Panel		Hours	Employed	Not in Labor Force		Occup. Skill
	Earnings	Hours Worked	Employed (iii)	Labor Force	Education	Skill
Exposure Time	Earnings (i)	Hours Worked (ii)	(iii)	Labor Force (iv)	Education (v)	Skill (vi)
	Earnings	Hours Worked	/>	Labor Force	Education	Skill

Notes: Authors' estimation of equation (1) as described in the text using 2005-2012 ACS data on 35-49 year old respondents. 10-year estimates from the full event study model are shown. All estimates include birth state, year and birth cohort-by-year fixed effects. Occupational skill results and estimates in Panel E are based on individual data and control for race/ethnicity. Other outcomes are estimated using aggregated data and control for racial/ethnic composition of the state-cohort-year-gender cell. Regressions using aggregated data are weighted by the number of individual observations that are used to calculate the averages in each state-year-cohort-gender cell. The construction of each analysis sample and control variable is described in the text. Standard errors clustered at the birth state level are in parentheses: *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table A-6: The Correlation of Duty-to-Bargain Exposure with Fixed Individual Characteristics and State Observables Unrelated to Collective Bargaining

		P	anel A: Mer	1			
					Other	Fraction	Fraction
	Age $(x100)$	Black	Hispanic	Asian	Race	Homeowner	State Male
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Relative Years to DTB	-0.0000**	0.0028***	0.0012	0.0005***	-0.0000	0.0002	-0.0011***
Relative Tears to DTD	(0.0000)	(0.0010)	(0.0016)	(0.0002)	(0.0002)	(0.0006)	(0.0003)
I(DTB)	0.0000**	0.0104**	-0.0008	-0.0008	-0.0008	0.0021	0.0030***
I(DTB)	(0.0000)	(0.0040)	(0.0062)	(0.0011)	(0.0007)	(0.0024)	(0.0010)
Relative Years to DTB)	0.0000	-0.0005	0.0008	-0.0002	0.0001	-0.0002	0.0009**
*I(DTB)	(0.0000)	(0.0010)	(0.0011)	(0.0001)	(0.0001)	(0.0006)	(0.0003)

Panel B: Women

					Other	Fraction	Fraction
	Age $(x100)$	Black	Hispanic	Asian	Race	Homeowner	State Male
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Relative Years to DTB	-0.0000*	0.0034*	0.0007	0.0004**	0.0000	0.0002	-0.0010***
Relative Tears to DTD	(0.0000)	(0.0018)	(0.0015)	(0.0001)	(0.0002)	(0.0003)	(0.0003)
I(DTB)	0.0000**	0.0063	0.0003	0.0008	-0.0013*	-0.0039	0.0034***
I(DTB)	(0.0000)	(0.0042)	(0.0051)	(0.0014)	(0.0007)	(0.0028)	(0.0009)
Relative Years to DTB)	0.0000	-0.0012	0.0010	-0.0001	0.0001	-0.0001	0.0008**
*I(DTB)	(0.0000)	(0.0018)	(0.0010)	(0.0001)	(0.0002)	(0.0003)	(0.0003)

Notes: Authors' estimation of equation (2) as described in the text using 2005-2012 ACS data on 35-49 year old respondents. Relative Years to DTB Law is the number of years relative to the passage of a duty-to-bargain law when each cohort was 6 years old, which is set to zero for states that never pass such a law. I(DTB Law) is an indicator for whether a duty-to-bargain law has been passed in the state when each cohort was 6 years old. All estimates include state, year and birth cohort-by-year fixed effects. Regressions are weighted by the number of individual observations that are used to calculate the averages in each state-cohort-year-gender cell. State-specific outcomes are averaged over the individual ACS observations, which is why the male and female estimates differ numerically for these outcomes. Standard errors clustered at the birth state level are in parentheses: *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table A-7: The Effect of Collective Bargaining Laws At 10 Years on Long-Run Outcomes for Men – Accounting for Mobility

P	anel A: Dropp	ing Those	Who do not	Live in State of	of Birth	
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-2206.06**	-0.604*	-0.007	0.010*	-0.080	-0.005**
At 10 Tears	(1060.57)	(0.303)	(0.006)	(0.005)	(0.049)	(0.002)
	Panel	B: Weighti	ng by Childl	nood Mobility		
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-1817.32***	-0.163	-0.004	0.003	-0.037	
At 10 Tears	(653.11)	(0.181)	(0.003)	(0.003)	(0.038)	

Notes: Authors' estimation of equation (1) as described in the text using 2005-2012 ACS data on 35-49 year old respondents. 10-year estimates from the full event study model are shown. All estimates include state, year and birth cohort-by-year fixed effects, as well as controls for the racial/ethnic composition of the state-cohort-year-gender cell, exposure to school finance reforms, average state EITC and average food stamp availability during school years. Regressions are weighted by the number of individual observations that are used to calculate the averages in each state-cohort-year-gender cell. In Panel (A), we exclude the 37.7% of respondents who do not live in their state of birth. In Panel (B), we expand the data to be at the state of birth-cohort-potential migration state level and weight each observation by the proportion of 17 year olds in the 1990 census who were born in the birth state and lived in the migration state. All variables are defined using the migration state. Standard errors clustered at the birth state level in Panel (A) and two-way clustered at the birth state and migration state in Panel (B) are in parentheses: *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table A-8: The Effect of Collective Bargaining Laws At 10 Years on Long-Run Outcomes for Women – Accounting for Mobility

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Pai	nel A: Drop	ping Those	e Who do no	t Live in State	of Birth	
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-133.99	-0.368	-0.013**	0.009	-0.003	-0.0001
At 10 fears	(377.78)	(0.298)	(0.006)	(0.007)	(0.048)	(0.003)
	Panel	B: Weight	ing by Child	hood Mobility		
		Hours		Not in	Years of	Occup.
	Earnings	Worked	Employed	Labor Force	Education	Skill
Exposure Time	(i)	(ii)	(iii)	(iv)	(v)	(vi)
At 10 Years	-442.57	-0.252	-0.005	0.003	-0.014	
At 10 Tears	(369.62)	(0.219)	(0.004)	(0.005)	(0.029)	

Notes: Authors' estimation of equation (1) as described in the text using 2005-2012 ACS data on 35-49 year old respondents. 10-year estimates from the full event study model are shown. All estimates include state, year and birth cohort-by-year fixed effects, as well as controls for the racial/ethnic composition of the state-cohort-year-gender cell, exposure to school finance reforms, average state EITC and average food stamp availability during school years. Regressions are weighted by the number of individual observations that are used to calculate the averages in each state-cohort-year-gender cell. In Panel (A), we exclude the 37.7% of respondents who do not live in their state of birth. In Panel (B), we expand the data to be at the state of birth-cohort-potential migration state level and weight each observation by the proportion of 17 year olds in the 1990 census who were born in the birth state and lived in the migration state. All variables are defined using the migration state. Standard errors clustered at the birth state level in Panel (A) and two-way clustered at the birth state and migration state in Panel (B) are in parentheses: *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table A-9: The Relationship Between Duty-to-Bargain Laws and School Resources

		Depende	nt Variable: Log	of	
	Teacher	Administrative	Other	Teacher-	Operating
	Salary	Salary	Salary	Student	Expenditures
	Expenditures	Expenditures	Expenditures	Ratio	per Student
Independent Variable	(i)	(ii)	(iii)	(iv)	(v)
Relative Years to DTB	-0.038***	-0.064	0.053***	-0.005	-0.005
Relative Tears to DTD	(0.011)	(0.038)	(0.012)	(0.003)	(0.020)
I(DTB)	0.080	0.470^{*}	-0.196***	0.044	0.057
I(D1B)	(0.066)	(0.269)	(0.066)	(0.031)	(0.059)
(Relative Years to DTB)	0.038***	0.089**	-0.043***	-0.005	0.008
*I(DTB)	(0.010)	(0.022)	(0.007)	(0.009)	(0.019)

Notes: Authors' estimation of equation (2) as described in the text using 1972-1991 Census/Survey of Governments Data. The data vary at the state-year level and all estimates include state and year fixed effects. Regressions are weighted by total enrollment in each state. Relative Years to DTB Law is the number of years relative to the passage of a duty-to-bargain law, which is set to zero for states that never pass such a law. I(DTB Law) is an indicator for whether a duty-to-bargain law has been passed in the state. All outcome variables are in logs, and salary expenditures reflect total expenditures on each category including part-time and full-time teachers. Standard errors clustered at the state level are in parentheses: *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Figure A-1: Event Study Estimates by Gender and Race/Ethnicity - Hours Worked

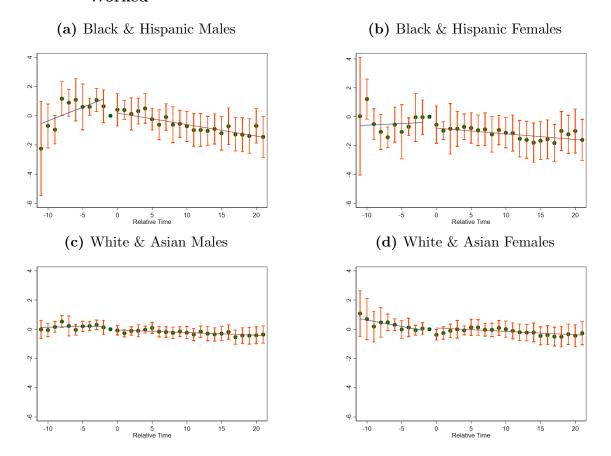


Figure A-2: Event Study Estimates by Gender and Race/Ethnicity - Employment

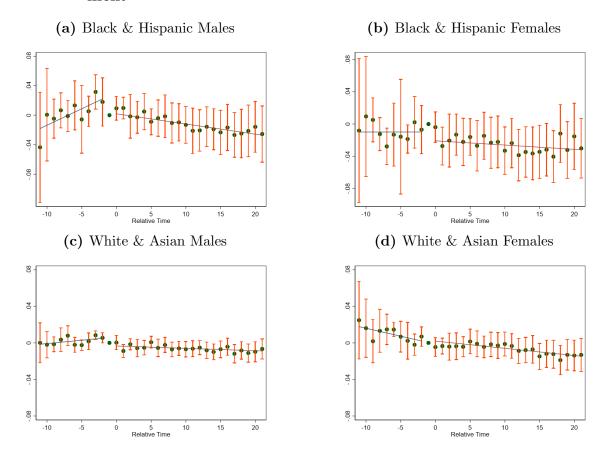


Figure A-3: Event Study Estimates by Gender and Race/Ethnicity - Not in Labor Force

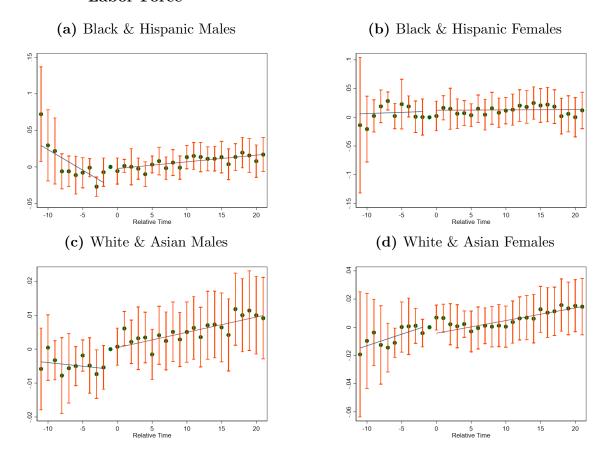


Figure A-4: Event Study Estimates by Gender and Race/Ethnicity - Occupational Skill

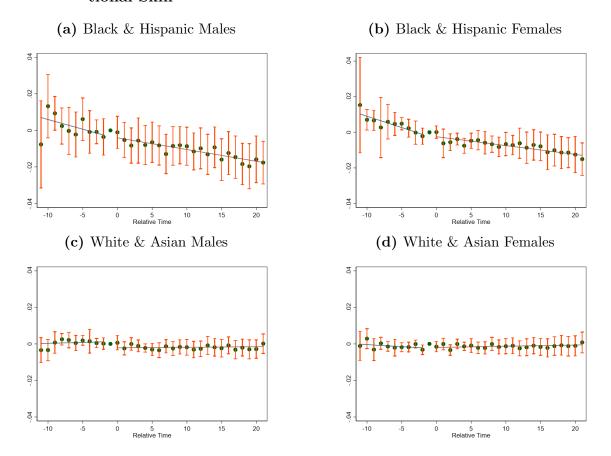


Figure A-5: Event Study Estimates by Gender and Race/Ethnicity - Years of Education

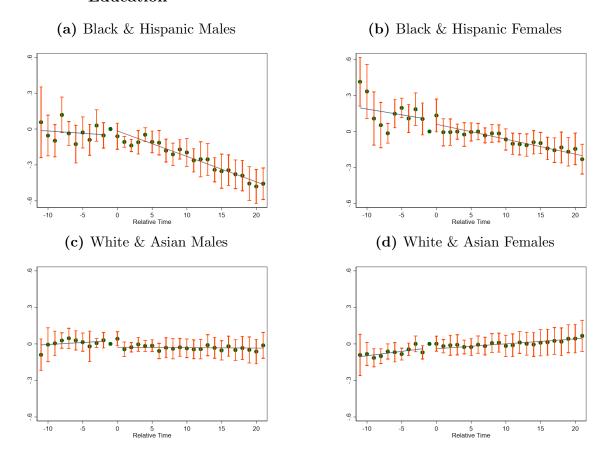
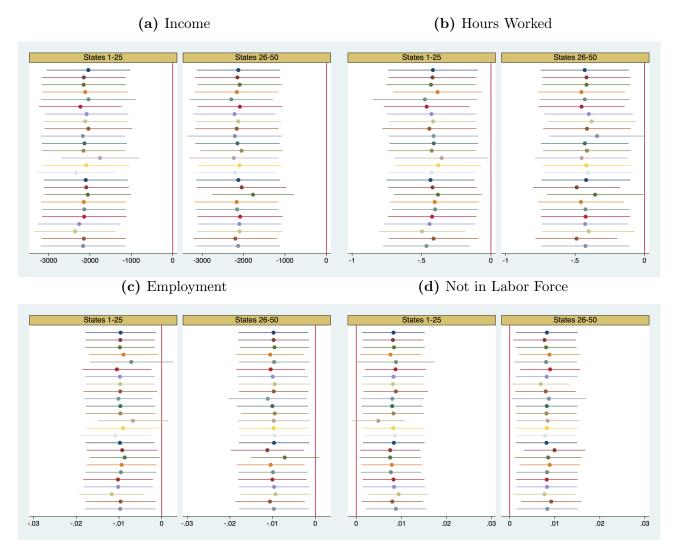


Figure A-6: Sensitivity of Results to Excluding Each State - Men



Notes: Authors' estimation of equation (1) as described in the text using 2005-2012 ACS data on 35-49 year old respondents. Each point represents a point estimate excluding a given state from the regression and the lines extending from each point show the 95% confidence interval calculated using standard errors that are clustered at the state level.