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Appendix 1. Classification of Expansion and Non-Expansion States

Table A1. Classification of Expansion and Non-Expansion States

Expansion decision in 2014	Expansion States (32 states including D.C)	Non-Expansion States (19 states)
No early expansion	Alaska ¹ , Arizona, Arkansas, Illinois, Indiana ¹ , Kentucky, Louisiana ¹ , Maryland, Montana ¹ , New Hampshire ¹ , Nevada, New Mexico, Michigan ¹ , North Dakota, Ohio, Oregon, Pennsylvania ¹ , Rhode Island, West Virginia	Alabama, Florida, Georgia, Idaho, Kansas, Maine, Mississippi, Missouri, Nebraska, North Carolina, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Wisconsin, Wyoming
Full early expansion²	Delaware, District of Columbia, Massachusetts, New York, Vermont	
Partial early expansion³	California, Connecticut, Hawaii, Minnesota	
Limited early expansion⁴	Colorado, Iowa, New Jersey, Washington	

Source: Authors created based on classification of expansion states by Kaestner et al. 2015; Dworsky & Eibner (2016).

Note. ¹Michigan (4/1/2014), New Hampshire (8/15/2014), Pennsylvania (1/1/2015), Indiana (2/1/2015), Alaska (9/1/2015), Montana (1/1/2016), Louisiana (7/1/2016) had adopted the Medicaid expansion later than January 2014. ²Delaware, District of Columbia, Massachusetts, New York, and Vermont have provided childless adult with income at or above 100% FPL with full coverage equivalent with ACA Medicaid expansion before 2014. ³California, Connecticut, Hawaii, and Minnesota have provided more limited coverage through 1115 waiver or ACA Medicaid coverage for childless adults with much lower income threshold before 2014. ⁴Colorado, Iowa, New Jersey, Washington provided childless adults with a limited coverage.

Table A2. Changes in Medicaid Eligibility Income Level for Childless Adults in Expansion States under the Affordable Care Act from 2011 through 2016

Year	2011		2012		2013		2014	2015	2016
Program \ State	1115 waiver (Jobless/ working)	Medicaid	1115 waiver	Medicaid	1115 waiver	Medicaid	Medicaid	Medicaid	Medicaid
Alaska ¹	N/A	N/A	N/A	N/A	N/A	N/A	0%	138%	138%
Arizona ²	100/110 %	N/A	100/110% (closed)	N/A	N/A	100/100% (closed)	138%	138%	138%
Arkansas	NA/200 %	N/A	NA/200%	N/A	NA/200%	N/A	138%	138%	138%
California ³	200/200 %	N/A	200/200%	N/A	200/210%	N/A	138%	138%	138%
Colorado ⁵	N/A	N/A	N/A	N/A	N/A	10%/20% (closed)	138%	138%	138%
Connecticut ³	N/A	56%/ 73%	N/A	56%/72%	N/A	55%/70%	138%	138%	138%
Delaware ⁴	100/110 %	N/A	100/110%	N/A	N/A	100%/110%	138%	138%	138%
District of Columbia ⁴	200/211 %	133%/144%	200/211%	133%/144%	N/A	200%/211%	215%	215%	215%
Hawaii ³	200/200 %	N/A	200/200%	N/A	133/133%	N/A	138%	138%	138%
Illinois	N/A	N/A	N/A	N/A	N/A	N/A	138%	138%	138%
Indiana ¹	200/200 % (closed)	N/A	200/210% (closed)	N/A	200/210% (closed)	N/A	0%	138%	139%
Iowa ⁵	200/250 %	N/A	200/250%	N/A	200/250%	N/A	138%	138%	138%
Kentucky	N/A	N/A	N/A	N/A	N/A	N/A	138%	138%	138%
Louisiana ¹	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Maryland	116/128 %	N/A	116/128%	N/A	116/128%	N/A	138%	138%	138%
Massachusetts ^{4,6}	300/300 %	N/A	300/300%	N/A	300/300%	N/A	138%	138%	138%
Michigan	35/45% (closed)	N/A	35/45% (closed)	N/A	35/45% (closed)	N/A	138%	138%	138%
Minnesota ⁵	N/A	N/A	250/250%	75%	200/200%	75%	138%	138%	138%
Montana ¹	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	138%
Nevada	N/A	N/A	N/A	N/A	N/A	N/A	205%	138%	138%
New Hampshire ¹	N/A	N/A	N/A	N/A	N/A	N/A	138%	138%	138%
New Jersey ⁵	N/A	N/A	23/23%	N/A	23/23%	N/A	138%	138%	138%
New Mexico	200/414 % (closed)	N/A	200/414% (closed)	N/A	200/414% (closed)	N/A	138%	138%	138%
New York ⁴	100/100 %	N/A	100/100%	N/A	N/A	100%	138%	138%	138%
North Dakota	N/A	N/A	N/A	N/A	N/A	N/A	138%	138%	138%
Ohio	N/A	N/A	N/A	N/A	N/A	N/A	138%	138%	138%
Oregon	201/201 %	N/A	201/201%	N/A	100/201% (closed)	N/A	138%	138%	138%
Pennsylvania ¹	N/A	N/A	N/A	N/A	N/A	N/A	0%	138%	138%
Rhode Island	N/A	N/A	N/A	N/A	N/A	N/A	138%	138%	138%
Vermont ⁴	300/300 %	N/A	300/300%	N/A	300/353%	150%/160%	138%	138%	138%
Washington ⁵	N/A	N/A	133/133%	N/A	133/200% (closed)	N/A	138%	138%	138%
West Virginia	N/A	N/A	N/A	N/A	N/A	N/A	138%	138%	138%

Source: Authors created based on “Findings from a 50-state survey of eligibility, enrollment, renewal, and cost-sharing policies in Medicaid and CHIP” from 2011 to 2016, Kaiser Commission on Medicaid and the Uninsured (Heberlein et al., 2011, 2012, 2013; Brooks et al., 2015, 2016). We did not include state-funded programs. Note. ¹ Michigan (4/1/2014), New Hampshire (8/15/2014), Pennsylvania (1/1/2015), Indiana (2/1/2015), Alaska (9/1/2015), Montana (1/1/2016), and Louisiana (7/1/2016) had adopted the Medicaid expansion later than January 2014. ² On July 8, 2011, Arizona closed enrollment for childless adults in its waiver coverage (Heberlein et al., 2012). ³ California, Connecticut, Hawaii, and Minnesota have

provided more limited coverage through 1115 waiver or ACA Medicaid coverage for childless adults with much lower income threshold before 2014. California covers childless adults with income up to 200% FPL through the Medicaid Coverage Expansion (MCE) and the Health Care Coverage Initiative (HCCI) with more limited benefits than full Medicaid. Connecticut provides Medicaid to childless adults with income up to about 73 %FPL through the State Administered General Assistance (SAGA) as of April 2010 and overall expansion (Husky D) as of June 2013 (Sommers, Kenney, and Epstein, 2014). Hawaii had provided more limited coverage through the QUEST -ACE waiver program to childless adult with income up to 200% FPL and reduced eligibility to 133% FPL in 2013. Minnesota provides childless adults up to 75% FPL as of March 2011 (Heberlein et al., 2012).⁴ Delaware, District of Columbia, Massachusetts, New York, and Vermont have provided childless adult with income at or above 100% FPL with full coverage equivalent with ACA Medicaid expansion before 2014.⁵ Colorado, Iowa, New Jersey, and Washington provided childless adults with a limited coverage. Colorado provided Medicaid to 10,000 of adults with income up to 10 and 20 % of FPL through a waiver (Heberlein et al., 2013). Iowa covered adults with income up to 250 % FPL with more limited coverage through the IowaCare waiver program (Heberlein et al., 2011, 2012, 2013). New Jersey expanded Medicaid to childless adults up to 23 % FPL through a waiver since April 2011 (Heberlein et al., 2012). With limited coverage, Washington covered childless adults up to 200% FPL through state funded Basic Health program until 2011 and began to cover childless 133 % FPL under the section 1115 waiver in 2012 (Heberlein et al., 2012).⁶ In 2006, Massachusetts created the Commonwealth Care Health Insurance Program (Commonwealth Care) to provide subsidies for adults up to 300% FPL who are ineligible for MassHealth and established an individual mandate required all adults to purchase health insurance.

Table A3. Changes in Medicaid Eligibility Income Level for Childless Adults in non-Expansion States under the Affordable Care Act from 2011 through 2016

Childless	2011		2012		2013		2014	2015	2016
Program \ State	1115 waiver (Jobless/ working)	Medicaid	1115 waiver	Medicaid	1115 waiver	Medicaid	Medicaid	Medicaid	Medicaid
Alabama	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Florida	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Georgia	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Idaho	N/A/185%	N/A	N/A/185%	N/A	N/A/185%	N/A	0%	0%	0%
Kansas	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Maine¹	100% (closed)	N/A	100% (closed)	N/A	100% (closed)	N/A	0%	0%	0%
Mississippi	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Missouri	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Nebraska	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
North Carolina	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Oklahoma	200/200%	N/A	200/200%	N/A	N/A/200%	N/A	0%	0%	0%
South Carolina	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
South Dakota	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Tennessee	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Texas	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Utah	150(closed)150%	N/A	150(closed)150%	N/A	150(closed)200%	N/A	0%	0%	0%
Virginia	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%
Wisconsin²	200/200% (closed)	N/A	200/200% (closed)	N/A	200/200% (closed)	N/A	100%	100%	100%
Wyoming	N/A	N/A	N/A	N/A	N/A	N/A	0%	0%	0%

Source: Authors created based on “Findings from a 50-state survey of eligibility, enrollment, renewal, and cost-sharing policies in Medicaid and CHIP” from 2011 to 2016, Kaiser Commission on Medicaid and the Uninsured. (Heberlein et al., 2011, 2012, 2013; Brooks et al., 2015, 2016). Note. 1. Maine provide childless adults with income up to 100% FPL with more limited coverage under the MaineCare waiver program but enrollment is closed (Heberlein et al., 2011). 2. Simon et al. (2017) classified Wisconsin as an expansion state since Wisconsin provides childless adults with income up to 100% FPL through the BadgerCare program. Studies using adults with income 138% FPL defined Wisconsin as a non-expansion state because Wisconsin opted out the Medicaid expansion under the ACA. However, in 2014, Wisconsin began to provide childless adults with income 100% FPL with more comprehensive benefits to childless adults compared to the previous waiver program (the BadgerCare Plus Core Plan) through the BadgerCare Plus Standard Plan. Since we use same with 100% FPL, we classified Wisconsin as an expansion state.

Appendix 2. Outcome variables and Covariates

Table A4. Variable Specification and Questionnaire for Outcomes

Outcomes	Coding	Questionnaire
No insurance	1=yes; 0=no	Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?
No usual Source of care	1=yes (only one/ more than one); 0=no	Do you have one person you think of as your personal doctor or health care provider?
Unmet care needs due to cost	1=yes; 0=no	Was there a time in the past 12 months when you needed to see a doctor but could not because of the cost?
No annual check-up	1=check-up within a year 0=No annual check-up within a year	About how long has it been since you last visited a doctor for a routine check-up? [A routine check-up is a general physical exam, not an exam for a specific injury, illness, or condition.]
Fair or poor health status	1=fair or poor 0=excellent/very good/good	Would you say that in general your health is excellent/ very good/ good/ fair/ poor?
Poor physical health days	Number of days	Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good? (physical health)
Poor mental health days	Numbers of days	Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good? (mental health)
Days with health-related activity limitation	Number of days	During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation? (functional limitation)

Note. Authors coded all the outcomes negatively for convenience of interpretation. Respondents answered “don’t know/not sure”, refused, not asked or missing are coded as missing.

Table A5. Variable Specification and Descriptive Statistics for Covariates

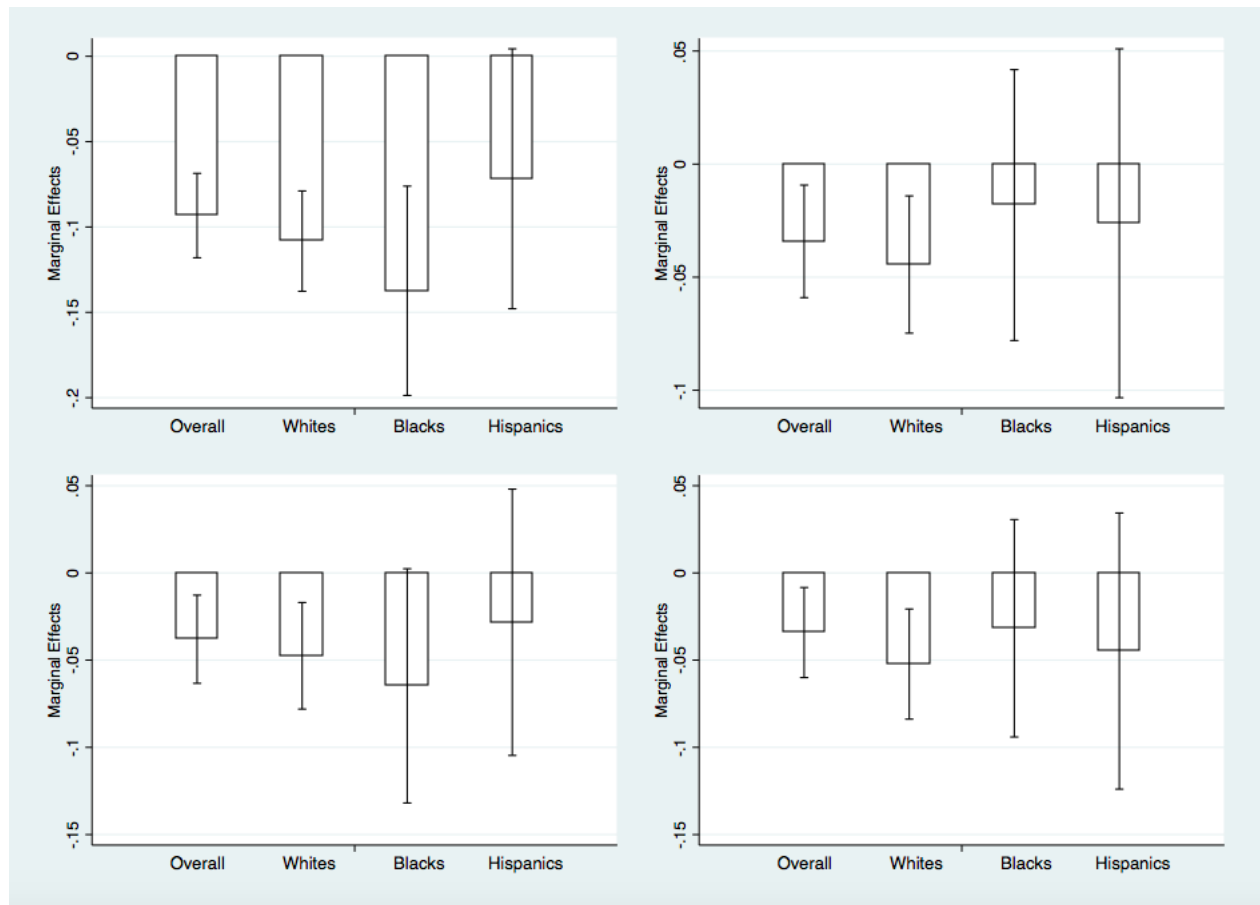
	Expansion States		Non-expansion States		Pre-Difference ¹	Coding
	Pre	Post	Pre	Post		
Observation	29,787	22,119	19,078	16,301		N =87,285
Age, mean (SD)	41.01 (14.79)	41.52 (0.2)	42.41 (14.5)	42.8 (14.84)	-1.40***	Number of years
Female	0.46 (0.5)	0.46 (0.01)	0.46 (0.5)	0.48 (0.5)	0.00	1 = female; 0 = male
White	0.5 (0.5)	0.46 (0.01)	0.52 (0.5)	0.48 (0.5)	-0.02	1 = yes; 0 = no
Black	0.18 (0.38)	0.14 (0)	0.23 (0.42)	0.24 (0.42)	-0.05***	1 = yes; 0 = no
Hispanic	0.21 (0.41)	0.28 (0.01)	0.18 (0.39)	0.22 (0.41)	0.03***	1 = yes; 0 = no
Others	0.11 (0.31)	0.13 (0)	0.07 (0.25)	0.07 (0.25)	0.04***	1 = non-Hispanic other race or multiracial
High school degree	0.6 (0.49)	0.6 (0.01)	0.64 (0.48)	0.64 (0.48)	-0.04***	1=Never attended school, Grade 1 through 12 (High school graduate); 0 = High school graduate, some college or technical school, college graduate
Married	0.15 (0.36)	0.19 (0.01)	0.19 (0.39)	0.22 (0.41)	-0.04***	1 = married 0 = divorced, widowed, separated, never married, or member of an unmarried couple
Self-employed	0.07 (0.26)	0.07 (0)	0.07 (0.26)	0.07 (0.25)	0.00	1 = yes; 0 = no
Employed for wage	0.23 (0.42)	0.26 (0.01)	0.23 (0.42)	0.24 (0.43)	0.00	1 = yes; 0 = no
Unemployed	0.7 (0.46)	0.66 (0.01)	0.7 (0.46)	0.69 (0.46)	0.00	1 = out of work for more than 1 year or less than 1 year, homemaker, student, retired, or unable to work; 0 = no
Chronic disease status	0.6 (0.49)	0.6 (0.01)	0.64 (0.48)	0.64 (0.48)	-0.04***	1 = heart attack, angina or coronary heart disease, stroke, asthma, skin cancer, cancer, COPD, arthritis, depressive disorder, kidney disease, diabetes 0 = no

	Expansion States		Non-expansion States		Pre-Difference ¹	Coding
	Pre	Post	Pre	Post		
Observation	29,787	22,119	19,078	16,301		N =87,285
Tobacco use	0.52 (0.5)	0.48 (0.01)	0.54 (0.5)	0.51 (0.5)	-0.02***	1 = have smoked at least 100 cigarettes in entire life; 0 = no
Hospital beds per 1,000 population	17.48 (7.82)	16.44 (0.1)	17.96 (6.85)	17.46 (6.58)	-0.48***	Annual number of hospital beds per 1,000 population by state
Physicians per 1,000 population	0.78 (0.09)	0.8 (0)	0.67 (0.08)	0.68 (0.08)	0.11***	Annual number of physicians per 1,000 population by state
Unemployment rate	4.15 (0.82)	2.82 (0.01)	3.75 (0.7)	2.53 (0.37)	0.40***	Annual unemployment rate by state
Per capita income	45342.43 (6358.25)	51030.61 (73.19)	39998.48 (3826.91)	43382.67 (3912.93)	5343.95***	Annual per capita income by state
Percent of White population	62.04 (16.96)	58.85 (0.22)	61.96 (12.35)	60.05 (12.42)	0.08	Annual percent of White population by state
Percent of Black population	10.39 (7.58)	9.26 (0.06)	16.94 (8.64)	17.39 (8.57)	-6.55***	Annual percent of Black population by state
Percent of Hispanic population	17.97 (13.77)	20.79 (0.18)	15.83 (12.71)	16.93 (13.16)	2.14***	Annual percent of Hispanic population by state
Congressional voting record ²	73.04 (29.27)	71.66 (0.29)	25.85 (23.08)	20.45 (23.8)	47.19***	ADA scores on congressional voting records of each member of the Senate.

Note. The means were weighted by BRFSS final survey weights. Standard deviation is in parentheses. ¹Difference of pre-Medicaid expansion between expansion and non-expansion states. ² Legislator's ideology rating is measured by the Americans for Democratic Action (ADA) scores on congressional voting records on a wide range of legislative issues for each U.S. senator from each state (Kitchener et al., 2003). Each state rating was produced by averaging senator's ratings for each state. COPD=chronic obstructive pulmonary disease, emphysema or chronic bronchitis. ADA=Americans for Democratic Action. ***p<0.01; **p<0.05; *p<0.1. Respondents answered "don't know/not sure", refused, not asked or missing are dropped from the sample.

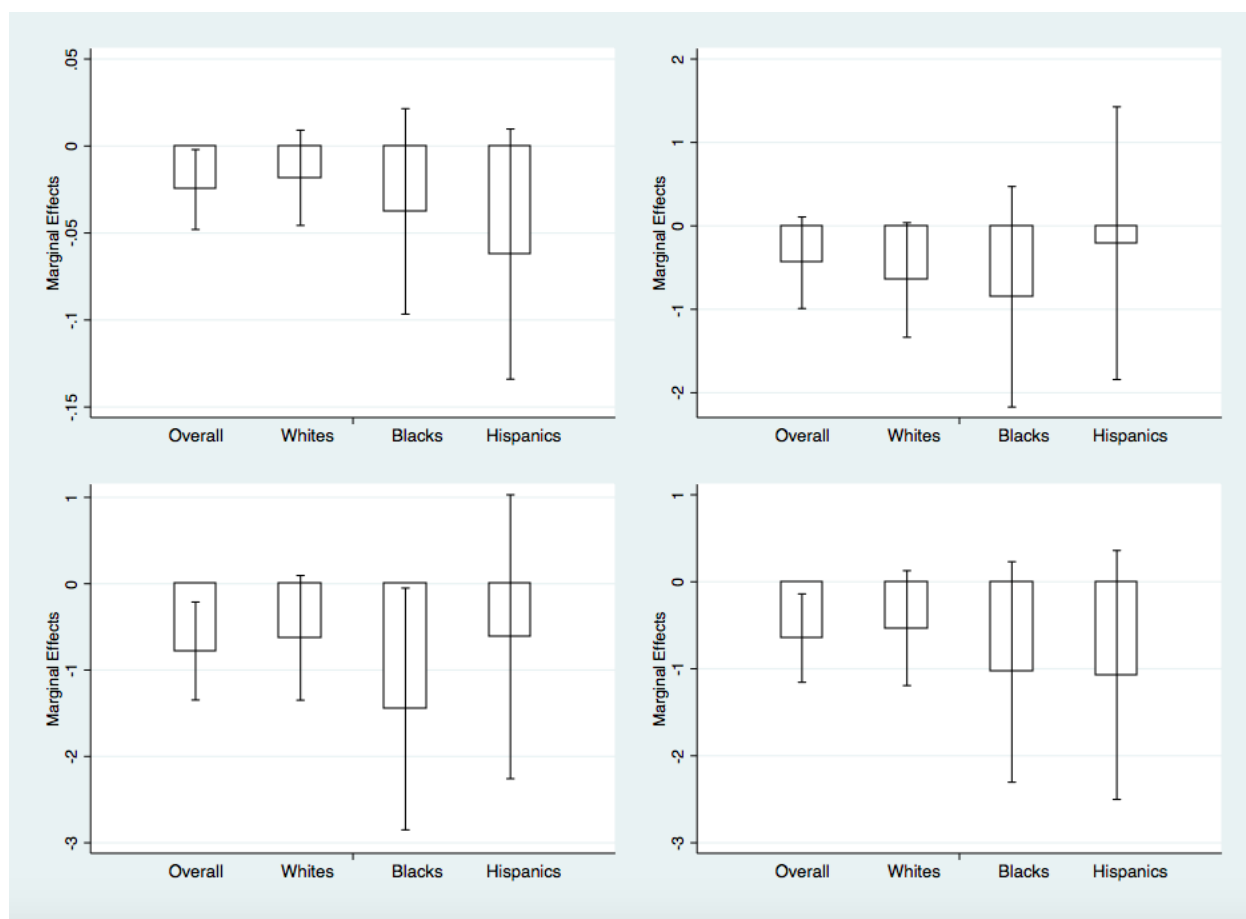
Appendix 3. Effects of the ACA Medicaid Expansion on Access and Health Outcomes

Figure A1. Effects of the ACA Medicaid Expansion on Access Outcomes among All Poor Childless Adults, and for Whites, Blacks, and Hispanics



Note. Bars show the effects of Medicaid expansion on access outcomes (Uninsured, No usual source of care, Unmet care needs due to cost, and No annual check-up) for each racial/ethnic subgroup. These results were obtained from difference in differences models. See Table 3.

Figure A2. Effects of the ACA Medicaid Expansion on Health Outcomes among All Poor Childless Adults, and for Whites, Blacks, and Hispanics



Note. Bars show the effects of Medicaid expansion on health outcomes (Fair or poor health status, Poor physical health days, Poor mental health days, and Days with health-related activity limitation) for each racial/ethnic subgroup. These results were obtained from difference in differences models. See Table 3.

Appendix 4. Absolute Disparities and Relative Disparities

The changes in relative disparities are manually calculated using following formula:

$$\frac{r_H + \Delta r_H}{r_W + \Delta r_W} - \frac{r_H}{r_W}.$$

where, r_H is the outcome for Hispanics (minorities), r_W is the outcome for Whites (reference group). Δr_H and Δr_W are changes in outcomes after the expansion for Hispanics and Whites, respectively.

The first term, $\frac{r_H + \Delta r_H}{r_W + \Delta r_W}$, is the relative disparities between Hispanics and Whites

after the expansion and the second term, $\frac{r_H}{r_W}$, is the relative disparities before the expansion. The

changes in Black-White relative disparities are calculated in a same way. Statistical significance

of the difference in relative disparities between pre- and post-ACA is estimated using *suest* and

lincom command in Stata.

Table A6. Comparison between effects of the ACA Medicaid expansion on absolute disparities and relative disparities among poor childless Whites, Blacks, and Hispanics

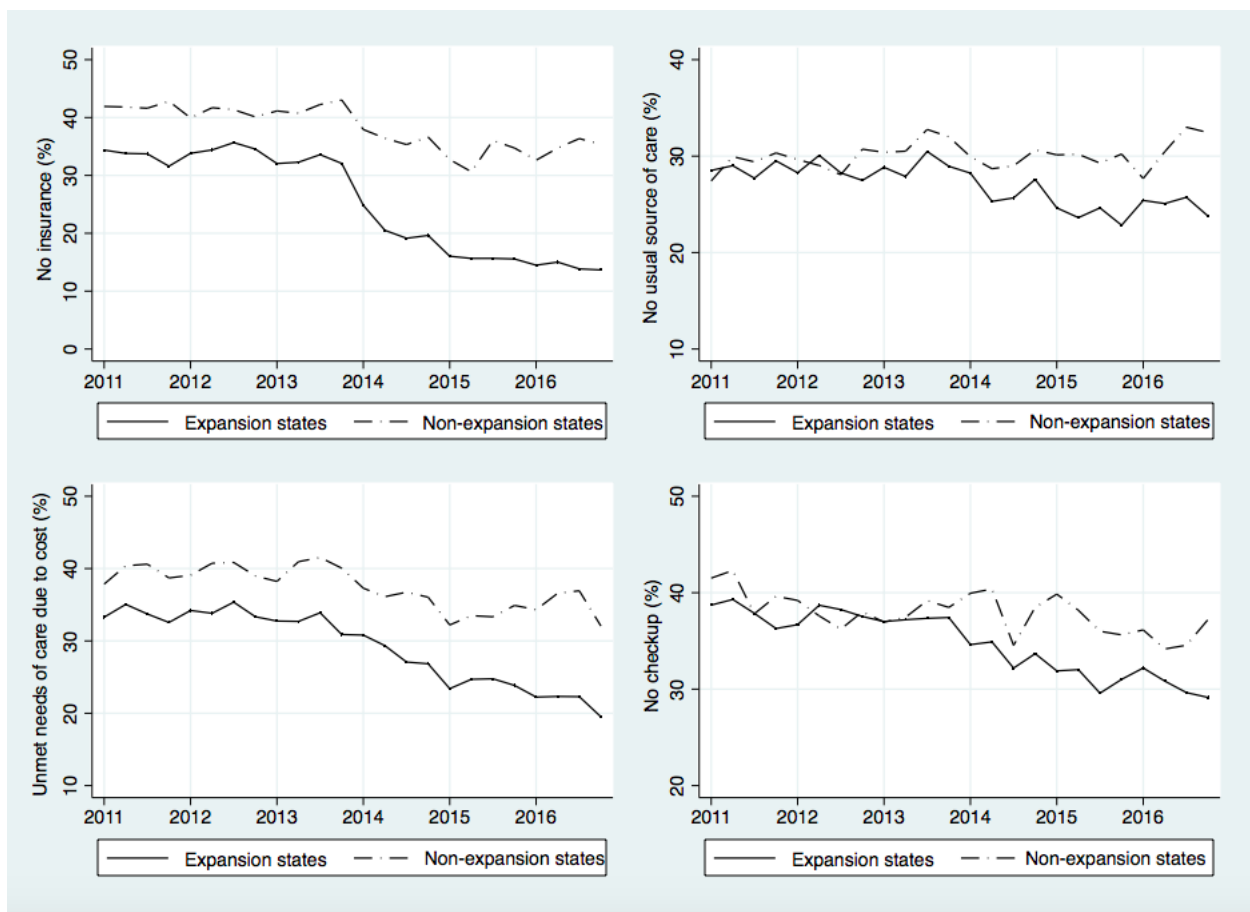
		Insurance	Access to Care				Health Status		
		No insurance	No usual Source of care	Unmet care needs due to cost	No annual check-up	Fair or poor health status	Poor physical health days	Poor mental health days	Days with health-related activity limitation
Change in the Absolute Disparities ¹	Blacks-Whites (1)	-0.029 (0.038)	0.026 (0.022)	-0.017 (0.035)	0.021 (0.04)	-0.019 (0.041)	-0.201 (0.612)	-0.824 (0.599)	-0.504 (0.499)
	Hispanics-Whites (2)	0.037 (0.037)	0.018 (0.027)	0.019 (0.027)	0.007 (0.043)	-0.044* (0.027)	0.441 (0.668)	0.013 (1.005)	-0.538 (0.911)
Change in the Relative Disparities ²	Blacks/Whites (3)	0.34* (0.199)	0.146 (1.31)	0.073 (0.092)	0.024 (0.111)	-0.112 (0.075)	0.041 (0.081)	-0.017 (0.111)	-0.096 (0.126)
	Hispanics/Whites (4)	-0.083 (0.157)	0.114 (1.37)	-0.048 (0.117)	0.018 (0.098)	-0.053 (0.114)	-0.038 (0.074)	-0.110* (0.066)	-0.078 (0.07)
Sample size (overall)		86,808	86,865	86,918	85,769	86,821	84,727	84,974	85,314

Notes: Panel 1 to 4 displays marginal effects and standard errors are in parentheses. The estimated changes in absolute disparities (Panel 1 and 2) are from panel 5 and 6 in Table 3. The changes in relative disparities are manually calculated by subtracting the ratio of Blacks (or Hispanics) to Whites before expansion from the ratio after expansion ($\frac{r_B + \Delta r_B}{r_W + \Delta r_W} - \frac{r_B}{r_W}$). All regressions control for age, gender, race, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects. We also control for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. ***p<0.01; **p<0.05; *p<0.1. ¹Absolute racial/ethnic disparities are simple differences in outcomes between minorities and a reference group. ²Relative racial/ethnic disparities are measured as the ratio of each minority group to Whites as the reference group.

Appendix 5. Trends in Outcomes

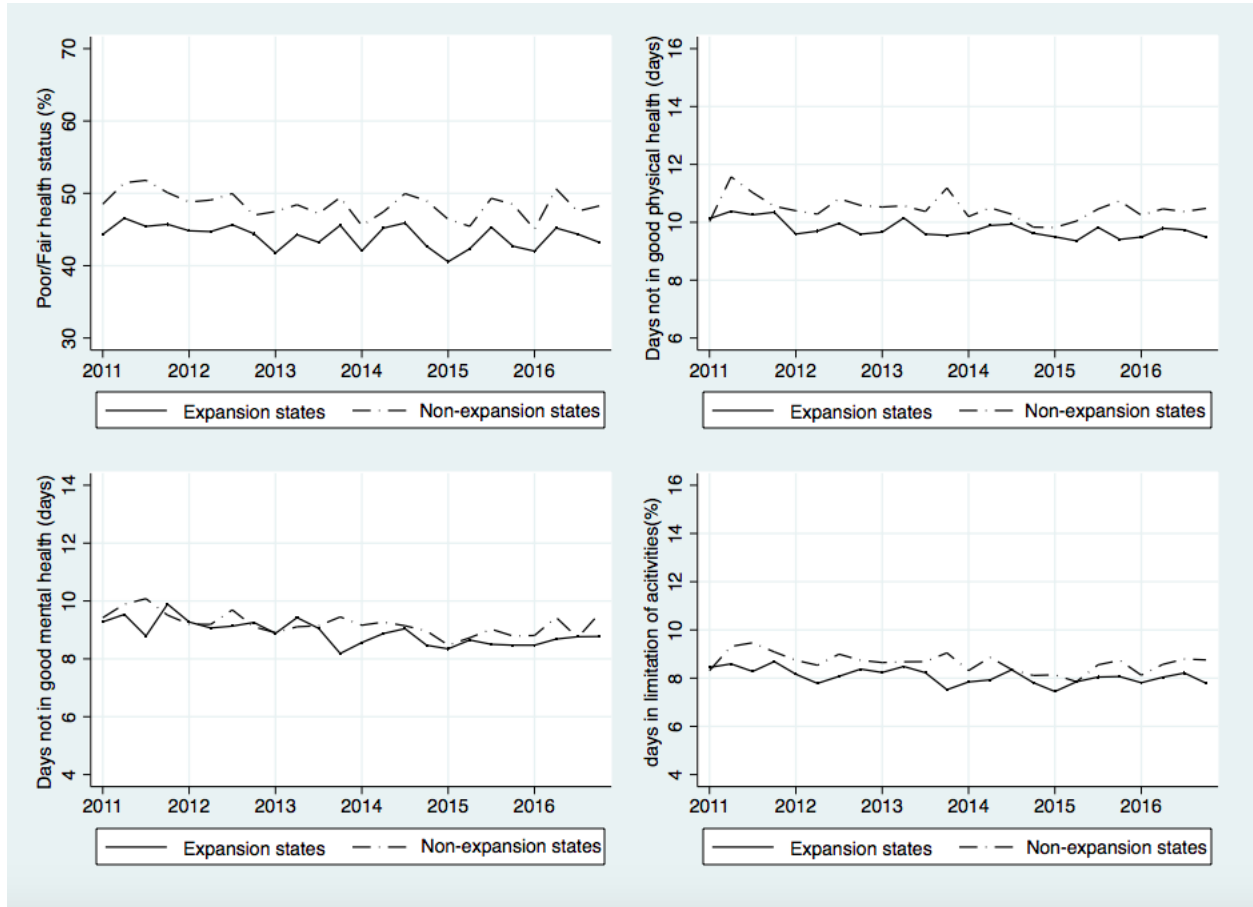
Figure A3. Trends in Outcomes for All Poor Childless Adults between Expansion and Non-expansion states

3.1. Unadjusted Rates of Access Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the access outcomes (Uninsured, No usual source of care, Unmet care needs due to cost, and No annual check-up) for all childless adults aged 19 to 64 with income below 100 % of the FPL.

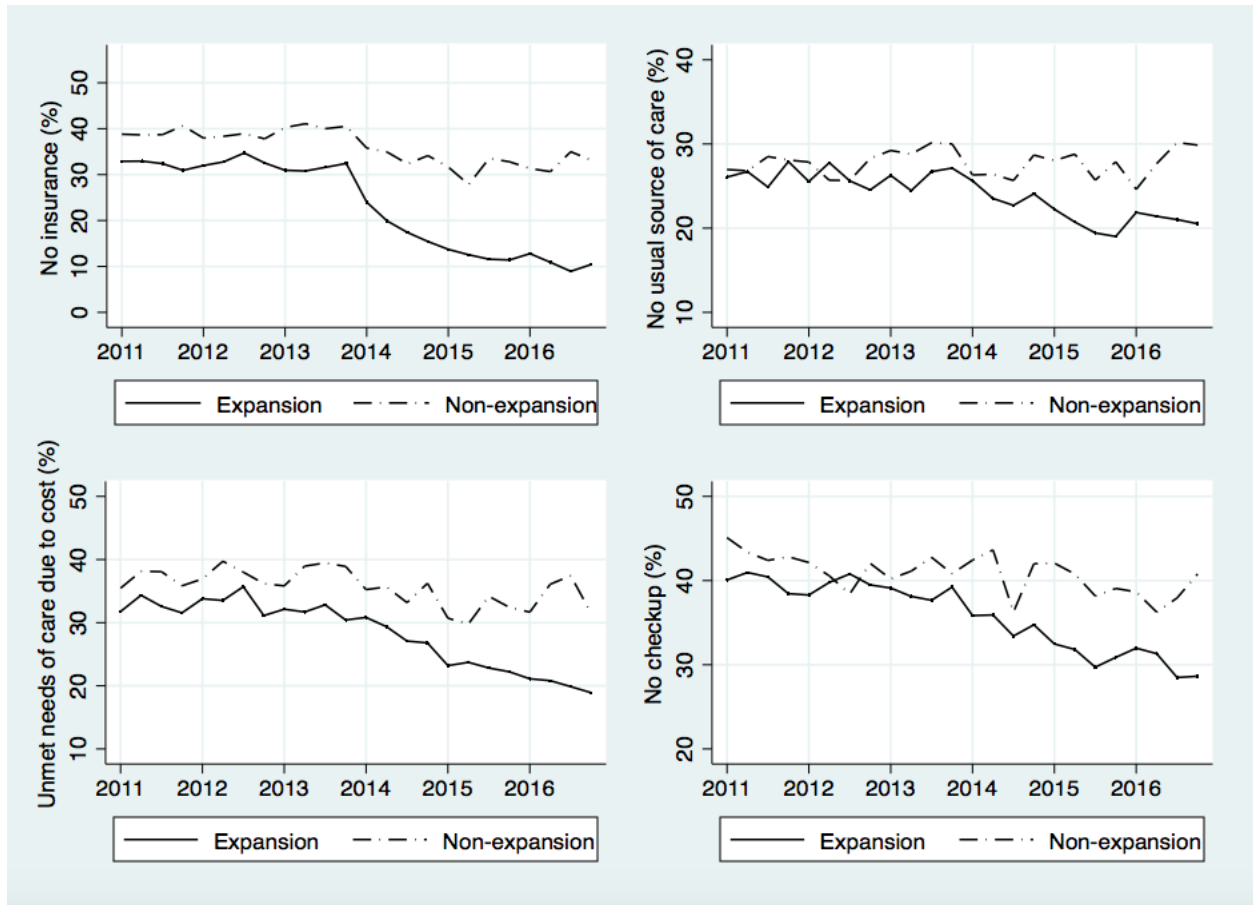
3.2. Unadjusted Rates of Health Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the health outcomes (Fair or poor health status, Poor physical health days, Poor mental health days, and Days with health-related activity limitation) for all childless adults aged 19 to 64 with income below 100 % of the FPL.

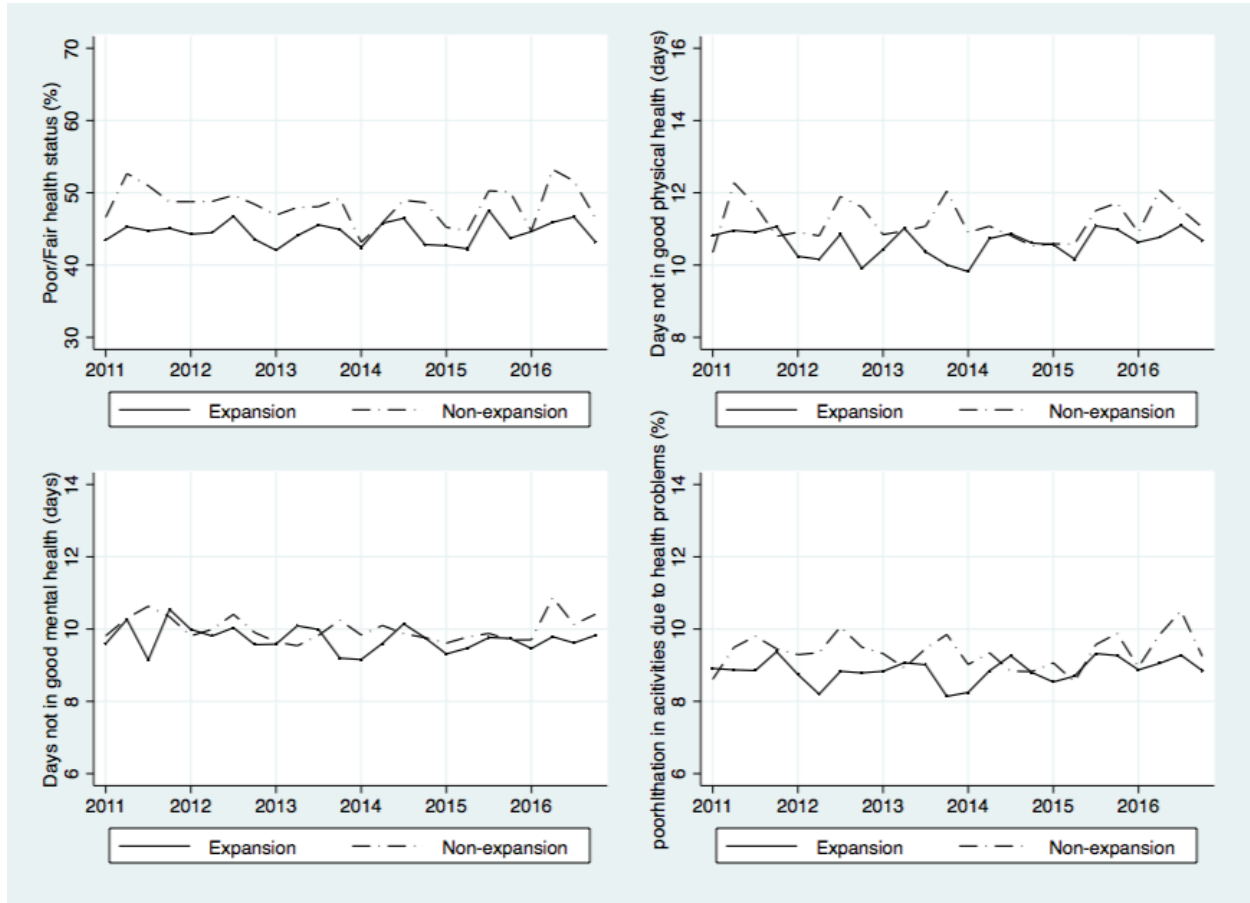
Figure A4. Trends in Outcomes for Poor Childless Adults for Whites between Expansion and Non-expansion states

4.1. Unadjusted Rates of Access Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the access outcomes (Uninsured, No usual source of care, Unmet care needs due to cost, and No annual check-up) for childless Whites aged 19 to 64 with income below 100 % of the FPL.

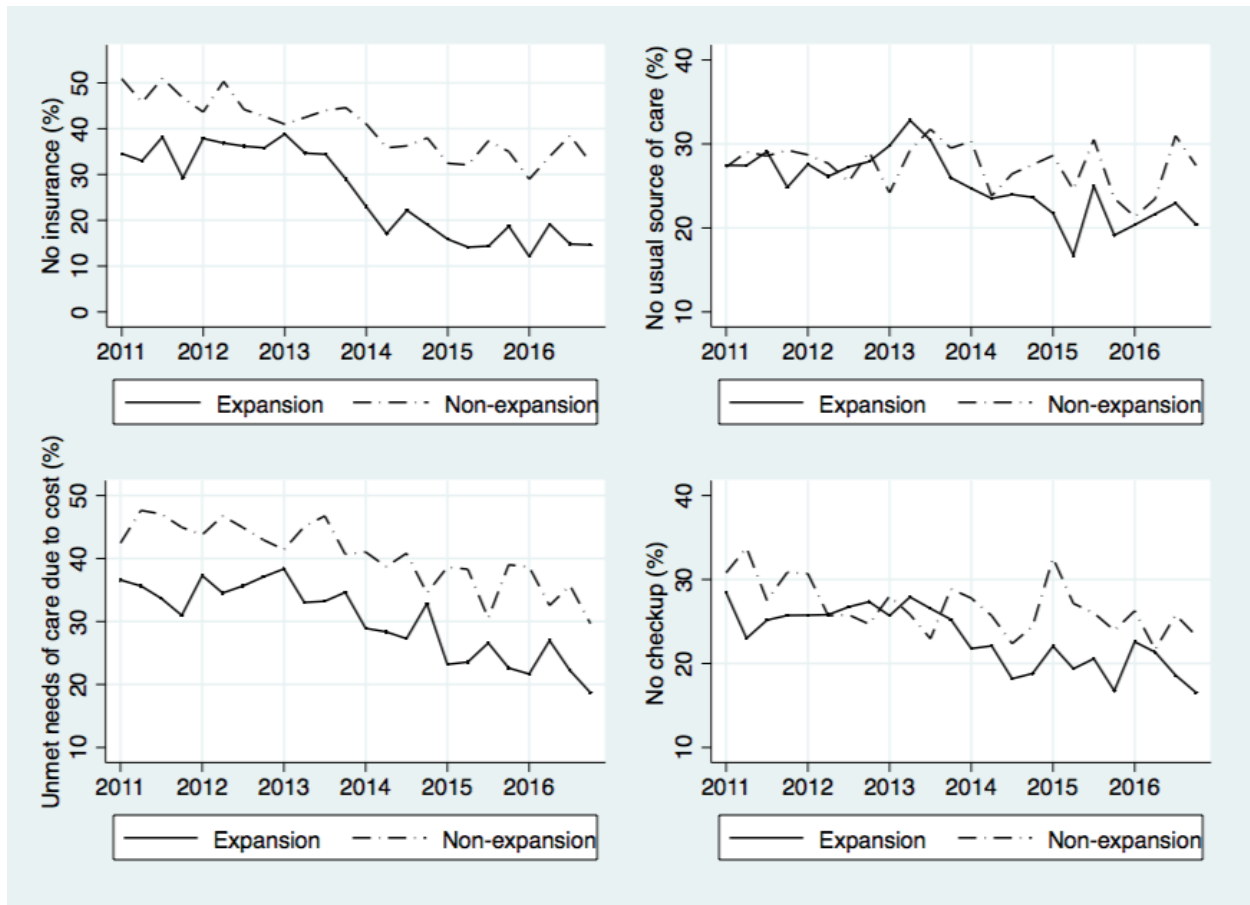
4.2. Unadjusted Rates of Health Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the health outcomes (Fair or poor health status, Poor physical health days, Poor mental health days, and Days with health-related activity limitation) for childless Whites aged 19 to 64 with income below 100 % of the FPL.

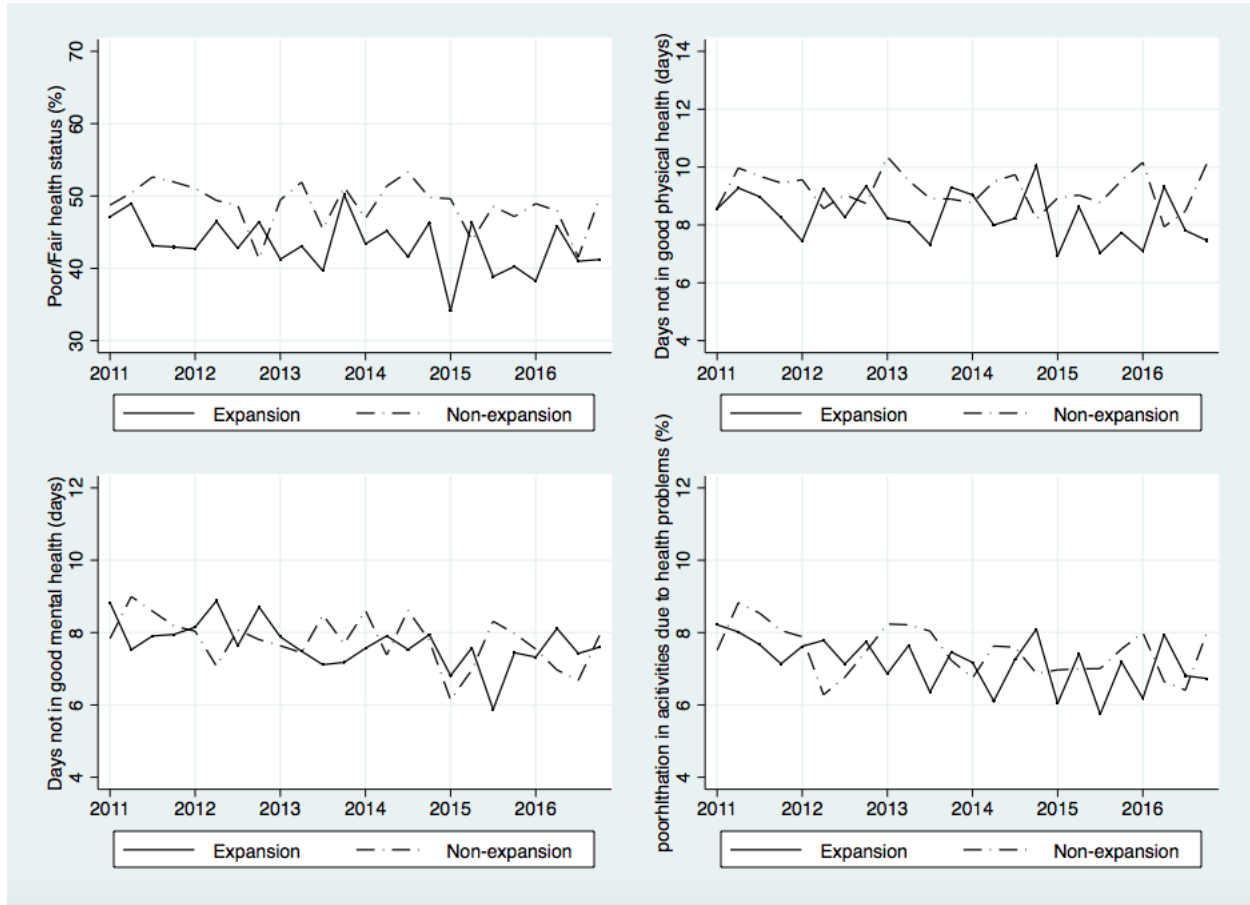
Figure A5. Trends in Outcomes for Poor Childless Adults for Blacks between Expansion and Non-expansion states

5.1. Unadjusted Rates of Access Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the access outcomes (Uninsured, No usual source of care, Unmet care needs due to cost, and No annual check-up) for childless Blacks aged 19 to 64 with income below 100 % of the FPL.

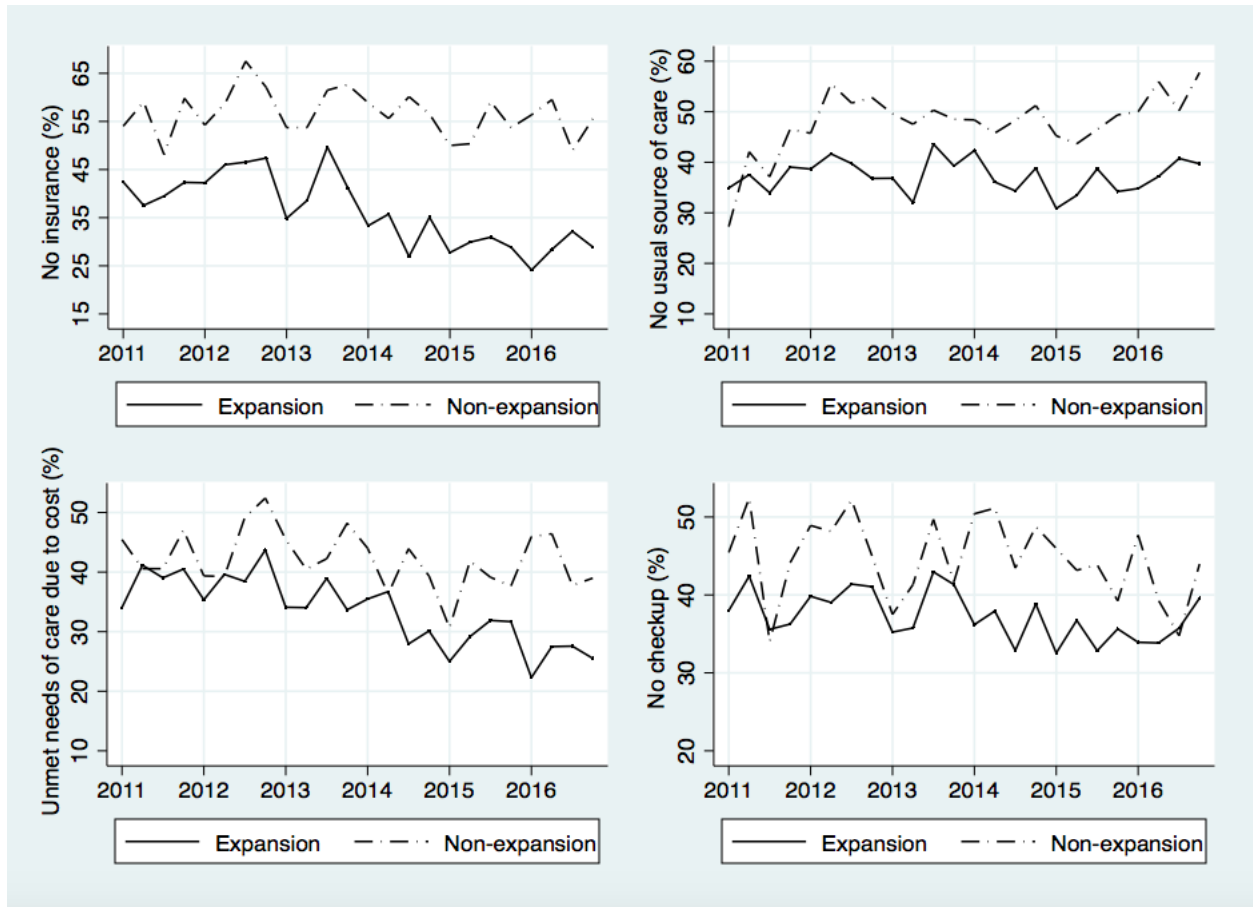
5.2. Unadjusted Rates of Health Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the health outcomes (Fair or poor health status, Poor physical health days, Poor mental health days, and Days with health-related activity limitation) for childless Blacks aged 19 to 64 with income below 100 % of the FPL.

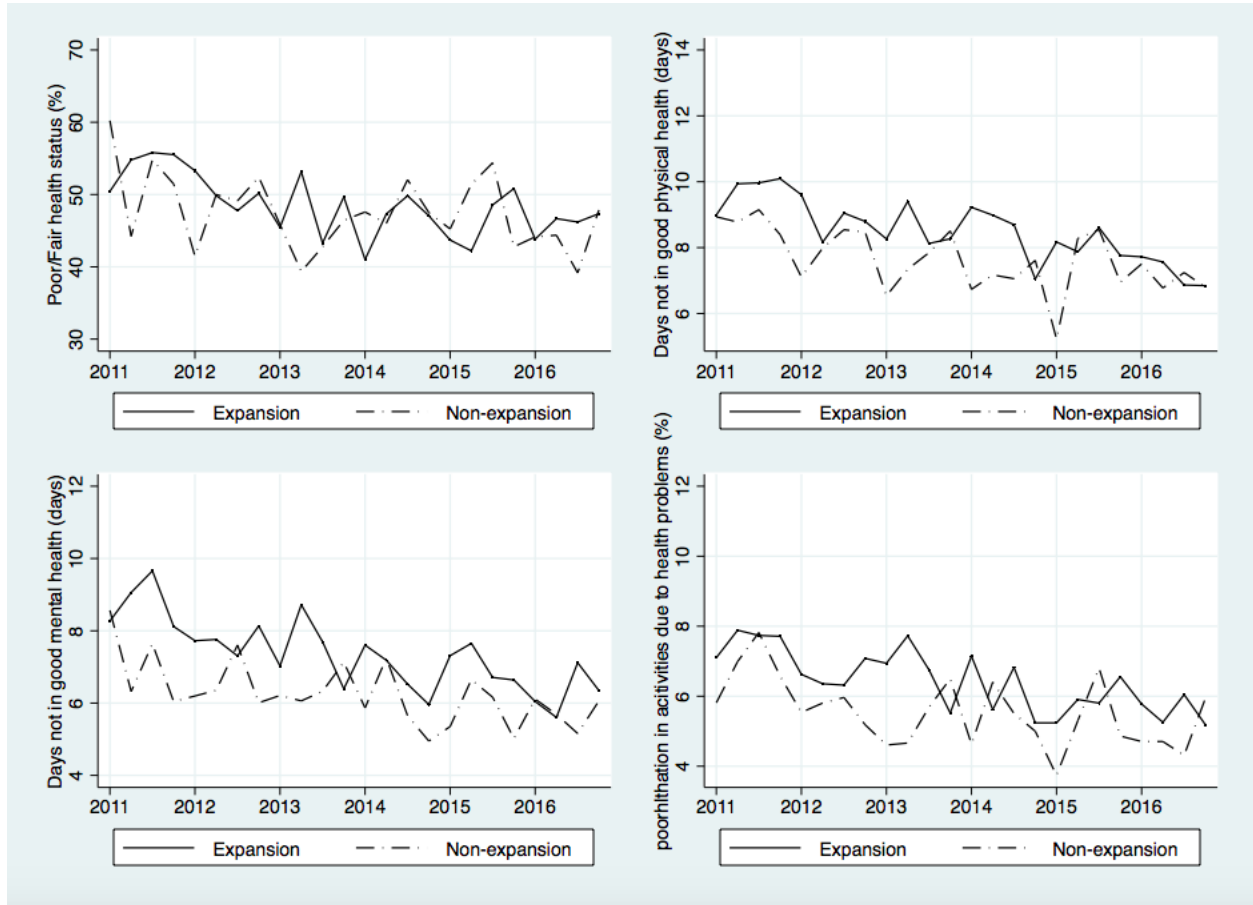
Figure A6. Trends in Outcomes for Poor Childless Adults for Hispanics between Expansion and Non-expansion states

6.1. Unadjusted Rates of Access Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the access outcomes (Uninsured, No usual source of care, Unmet care needs due to cost, and No annual check-up) for childless Hispanics aged 19 to 64 with income below 100 % of the FPL.

6.2. Unadjusted Rates of Health Outcomes



Note. Figures show the quarterly trends of the unadjusted rates of the health outcomes (Fair or poor health status, Poor physical health days, Poor mental health days, and Days with health-related activity limitation) for childless Hispanics aged 19 to 64 with income below 100 % of the FPL.

Appendix 6. Parallel Trend Assumption Test

$$Y_{ist} = \beta_0 + \beta_1 Treatment*2011 + \beta_2 Treatment*2012 + \beta_3 Treatment*2014 + \beta_4 Treatment*2015 + \beta_5 Treatment*2016 + \lambda_t + \gamma_s + \beta_6 X_{ist} + \beta_7 X_{st} + \varepsilon_{ist} \quad (2)$$

where Y_{ist} is the outcome for individual i in state s with a survey date in year t . *Treatment* is a dummy variable equal to one for individuals residing in an expansion state, and zero otherwise. *2011, 2012, 2014, 2015, and 2016* are year dummies and *2013* is the omitted reference group year dummy variable. λ_t are quarterly time fixed effects from January 2011 through December 2016, and γ_s are state fixed effects. Unconditional treatment and post-period dummy variables are not specified in the models since their effects are captured by quarter and state fixed effects. X_{ist} is a vector of demographic, socioeconomic, and health risk factors of individual respondents (e.g., age, gender, education) and X_{st} is a vector of state time-varying contextual environmental factors that may influence outcomes (e.g., physician supply, unemployment rate).

Table A7. Parallel trends between treatment and control groups during pre-reform period for all poor childless adults

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health-related activity limitation
Yr2011_Treat ment	0.020 (0.025)	0.026 (0.022)	0.014 (0.025)	-0.026 (0.023)	-0.001 (0.016)	0.176 (0.363)	0.408 (0.539)	-0.072 (0.415)
Yr2012_Treat ment	0.034 (0.023)	0.008 (0.015)	0.009 (0.018)	-0.038** (0.019)	-0.021 (0.013)	-0.027 (0.362)	-0.207 (0.382)	-0.622 (0.457)
Yr2014_Treat ment	-0.058* (0.030)	-0.001 (0.020)	-0.031 (0.021)	-0.055*** (0.016)	-0.030* (0.017)	-0.116 (0.420)	-0.756* (0.388)	-0.799* (0.408)
Yr2015_Treat ment	-0.072** (0.028)	-0.025 (0.019)	-0.020 (0.021)	-0.056*** (0.021)	-0.040** (0.018)	-0.125 (0.456)	-0.639 (0.432)	-0.533 (0.435)
Yr2016_Treat ment	-0.092*** (0.027)	-0.017 (0.020)	-0.045 (0.030)	-0.044 (0.028)	-0.003 (0.014)	-0.573 (0.481)	-0.222 (0.528)	-0.698 (0.506)
F-Statistic for (Yr2011_Treat =Yr2012_Treat =0)	1.09 (0.34)	0.68 (0.51)	0.19 (0.83)	2.04 (0.14)	2.09 (0.13)	0.21 (0.81)	1.07 (0.35)	1.86 (0.17)

Notes. Panel 1 to 5 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, race, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects. We also control for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records.

***p<0.01; **p<0.05; *p<0.1. F-statistic displays in panel 6 and p-values are in parentheses.

Table A8. Parallel trends between treatment and control groups during pre-reform period for poor childless adults for Whites

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health-related activity limitation
Yr2011_Treatm ent	-0.001 (0.029)	0.034 (0.031)	-0.011 (0.029)	-0.011 (0.027)	-0.019 (0.016)	0.298 (0.700)	0.592 (0.555)	0.548 (0.528)
Yr2012_Treatm ent	0.044** (0.017)	0.017 (0.023)	0.012 (0.020)	-0.008 (0.027)	-0.008 (0.019)	0.191 (0.527)	-0.134 (0.560)	-0.339 (0.558)
Yr2014_Treatm ent	-0.055 (0.034)	0.004 (0.023)	-0.019 (0.023)	-0.042 (0.027)	-0.012 (0.020)	0.028 (0.583)	-0.383 (0.559)	-0.283 (0.513)
Yr2015_Treatm ent	-0.093*** (0.033)	-0.035 (0.023)	-0.061** (0.027)	-0.065** (0.032)	-0.043* (0.022)	-0.484 (0.599)	-0.666 (0.535)	-0.487 (0.425)
Yr2016_Treatm ent	-0.117*** (0.024)	-0.022 (0.022)	-0.070*** (0.022)	-0.053 (0.033)	-0.006 (0.021)	-0.559 (0.555)	0.136 (0.782)	0.076 (0.577)
F-Statistic for (Yr2011_Treat =Yr2012_Treat =0)	4.08 (0.02)	0.67 (0.51)	0.28 (0.76)	0.09 (0.92)	0.65 (0.53)	0.09 (0.91)	1.52 (0.23)	1.89 (0.16)

Note. Panel 1 to 5 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects. We also control for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. ***p<0.01; **p<0.05; *p<0.1. F-statistic displays in panel 6 and p-values are in parentheses.

Table A9. Parallel trends between treatment and control groups during pre-reform period for poor childless adults for Blacks

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health-related activity limitation
Yr2011_Treat ment	-0.049 (0.045)	-0.017 (0.041)	0.015 (0.043)	-0.124** (0.052)	0.018 (0.055)	0.755 (0.956)	0.721 (1.122)	-0.428 (0.793)
Yr2012_Treat ment	0.004 (0.040)	0.009 (0.046)	0.032 (0.055)	-0.066 (0.041)	0.028 (0.038)	0.076 (0.804)	0.809 (1.434)	0.362 (1.221)
Yr2014_Treat ment	-0.142** (0.065)	-0.010 (0.038)	-0.059 (0.052)	-0.082** (0.034)	-0.027 (0.057)	-0.798 (1.075)	-1.016 (0.895)	-0.687 (0.886)
Yr2015_Treat ment	-0.140** (0.057)	-0.018 (0.028)	-0.040 (0.039)	-0.094* (0.047)	-0.036 (0.058)	-0.546 (1.071)	-1.278 (0.788)	-1.407* (0.767)
Yr2016_Treat ment	-0.147*** (0.042)	0.014 (0.044)	-0.084 (0.056)	-0.096** (0.046)	0.012 (0.044)	-1.072 (1.172)	-0.287 (0.910)	-1.269 (1.070)
F-Statistic (Yr2011_Treat =Yr2012_Treat =0)	1.7 (0.19)	0.18 (0.84)	0.18 (0.84)	3.36 (0.04)	0.29 (0.75)	0.36 (0.7)	0.24 (0.79)	0.34 (0.71)

Note. Panel 1 to 5 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects. We also control for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. ***p<0.01; **p<0.05; *p<0.1. F-statistic displays in panel 6 and p-values are in parentheses.

Table A10. Parallel trends between treatment and control groups during pre-reform period for poor childless adults for Hispanics

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health-related activity limitation
Yr2011_Treatm ent	0.121** (0.047)	0.010 (0.050)	0.138** (0.052)	0.025 (0.038)	0.049 (0.041)	-0.420 (0.562)	1.590 (1.003)	-0.554 (0.436)
Yr2012_Treatm ent	0.076 (0.053)	-0.082* (0.041)	0.096*** (0.034)	-0.065 (0.042)	-0.065** (0.029)	-1.288* (0.650)	0.215 (1.419)	-2.136** (0.826)
Yr2014_Treatm ent	-0.016 (0.048)	-0.034 (0.039)	0.032 (0.033)	-0.067 (0.045)	-0.072** (0.030)	-0.748 (0.818)	0.051 (0.624)	-2.147** (0.952)
Yr2015_Treatm ent	0.001 (0.075)	-0.042 (0.056)	0.099** (0.048)	-0.061 (0.084)	-0.066 (0.049)	-0.646 (0.925)	0.104 (0.931)	-1.222 (1.249)
Yr2016_Treatm ent	-0.005 (0.046)	-0.062 (0.055)	0.021 (0.060)	-0.009 (0.062)	-0.030 (0.048)	-1.949 (1.301)	-0.201 (0.828)	-2.534* (1.388)
F-Statistic for (Yr2011_Treat =Yr2012_Treat =0)	3.3 (0.04)	3.15 (0.05)	5.83 (0.01)	3.24 (0.05)	4.96 (0.01)	2.14 (0.13)	1.57 (0.22)	3.51 (0.04)

Note. Panel 1 to 5 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects. We also control for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. ***p<0.01; **p<0.05; *p<0.1. F-statistic displays in panel 6 and p-values are in parentheses.

Appendix 7. Robustness Check

We estimate four robustness checks of the empirical results, reported in Tables A11 through A17 in Appendix 7. First, we tested their robustness to changes in the specification individual and state-level control variables for all nonelderly childless adults and for each racial/ethnic subgroup (Table A11-A14). Selected individual and state-level covariates were specified in our fully-specified model to control for potential correlation between unobserved variables and the treatment of Medicaid expansion. We compared the results of models that include: (1) the full sets of individual and state time-varying controls, (2) only individual-level controls, (3) individual controls plus state unemployment rates, and (4) the full sets of individual and state time-varying controls except physician/1000 population. We also estimated models that include the full sets of individual and exclude other state time-varying control and found the results were robust with the exclusion of each time-varying control. The additional results are available on request.

In the second set of sensitivity analyses, we examined whether our fully-specified DD model results were robust with respect to the exclusion of certain states which expanded Medicaid before January 2014 and after Jan 2016 from the estimation sample (Table A15). Tables A2 and A3 in Appendix 1 show which states expanded their Medicaid programs with more limited coverage under Section 1115 waivers prior to January 2014. In their study of the ACA Medicaid expansion on nonelderly childless adults Dworsky and Eibner (2016) excluded 13 states which extended eligibility any Medicaid coverage to some childless adults prior to 2014. We assigned these states into early full expansion states (DE, DC, MA, NY, VT) partial expansion states (CA, CT, HI, MN) and limited expansion states (CO, IA, NJ, WA) depending upon the income limits that were set for Medicaid eligibility and limitations on Medicaid

coverage (Table A1, Appendix 1). Our fully-specified DD model was re-estimated several times, each time excluding states one of these subgroups, and then again with all 13 states excluded. We also tested the sensitivity of our results to use of the expansion state assignments employed by Simon et al (2016) by re-assigning Wisconsin to be an expansion state. Lastly, we excluded two late expanders, Montana (Jan. 2016) and Louisiana (July. 2016) from the estimation sample and re-estimated fully-specified DD model.

In the third set of sensitivity analyses, we examined the effects of ACA Medicaid expansion under different definitions for low income: 1) income below 100% of the FPL (baseline); and 2) income below 138 % of the FPL. As noted earlier we restricted our estimation sample to childless adults with incomes below 100 % of the FPL because individuals with income between 100 to 138 % of the FPL are eligible for subsidies for the purchase of health insurance in the ACA marketplace in non-expansion states. If these subsidies induced childless adults in this income subgroup in non-expansion states to purchase insurance in the Marketplace after January 2014, then smaller ACA Medicaid expansion impacts are expected for this income subgroup. Table A16 in Appendix 7 contains estimates of Medicaid expansion impacts on outcomes for nonelderly childless adults in the two income subgroups defined above.

In our fourth set of sensitivity analyses, we compared the estimation results from stratified DD and DDD models (Table A17). The DDD model specification is shown in equation (3).

$$\begin{aligned}
Y_{ist} = & \beta_0 + \beta_1 \text{Expansion}_{st} * \text{Hispanics} + \beta_2 \text{Expansion}_{st} * \text{Black} + \beta_3 \text{Expansion}_{st} * \text{Other} \\
& + \beta_4 \text{Expansion}_{st} + \beta_5 \text{Hispanics} + \beta_6 \text{Black} + \beta_7 \text{Other} \\
& + \beta_8 \lambda_t * \text{Hispanics} + \beta_9 \lambda_t * \text{Black} + \beta_{10} \lambda_t * \text{Other} \\
& + \lambda_t + \gamma_s + \beta_{11} X_{ist} + \beta_{12} X_{st} + \varepsilon_{ist}
\end{aligned} \tag{3}$$

The key difference between the DDD model and the more general stratified DD models is that the DDD coefficients for all control variables are constrained to be invariant across all race/ethnic groups. As shown in Table A17, these two models showed differences in statistical significance and sign in Hispanic-White disparities in health outcomes. In the stratified DD model, there was a modest empirical evidence that Hispanic-White disparity in fair or poor health status decreased, while the DDD model found increases in the Hispanic-White disparities in fair or poor health status, poor physical and mental health days, and days with health-related activity limitation.

Table A11. Effects of ACA Medicaid expansion on outcomes for all poor childless adults by covariate specification

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
Full set of state time- varying covariates	-0.093*** (0.018)	-0.034*** (0.012)	-0.038*** (0.013)	-0.034** (0.014)	-0.025*** (0.009)	-0.442 (0.321)	-0.779*** (0.244)	-0.647** (0.251)
Only individual controls	-0.093*** (0.020)	-0.040*** (0.013)	-0.039*** (0.011)	-0.038** (0.015)	-0.028*** (0.008)	-0.594*** (0.217)	-0.828*** (0.234)	-0.820*** (0.229)
Individual controls & State unemployment rate	-0.087*** (0.020)	-0.037*** (0.013)	-0.036*** (0.011)	-0.033** (0.015)	-0.027*** (0.008)	-0.537** (0.231)	-0.759*** (0.215)	-0.837*** (0.236)
Full set of controls & No physician/1000	-0.098*** (0.017)	-0.034*** (0.012)	-0.038*** (0.012)	-0.035** (0.014)	-0.024*** (0.009)	-0.443 (0.322)	-0.755*** (0.220)	-0.647** (0.242)
Pre-treatment Mean in Expansion States	0.385 (0.487)	0.381 (0.486)	0.35 (0.477)	0.428 (0.495)	0.385 (0.487)	8.035 (11.15)	8.265 (11.004)	6.802 (10.57)
Sample size	86,808	86,865	86,918	85,769	86,821	84,727	84,974	85,314

Notes. Panel 1 to 4 displays marginal effects and standard errors are in parentheses. Panel 1 shows the baseline model controlling for age, gender, race, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects, as well as controlling for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. Panel 2 shows estimates without controlling for any state-year covariates. Panel 3 shows estimates without controlling for state-year covariates except unemployment rate. Panel 4 shows estimates controlling for the full set of individual and state time-varying controls except the number of physician/1000 population. Pre-treatment means are the weighted means of outcomes before ACA Medicaid expansion was implemented in expansion states and standard deviations are in parentheses. ***p<0.01; **p<0.05; *p<0.1.

Table A12. Effects of ACA Medicaid expansion on outcomes for poor White childless adults by covariate specification

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
Full set of state time- varying covariates	-0.108*** (0.021)	-0.044*** (0.012)	-0.048*** (0.013)	-0.052*** (0.019)	-0.018** (0.009)	-0.649** (0.325)	-0.627** (0.285)	-0.533* (0.291)
Only individual controls	-0.110*** (0.018)	-0.036** (0.015)	-0.048*** (0.012)	-0.048*** (0.017)	-0.024** (0.012)	-0.720*** (0.278)	-0.671** (0.300)	-0.699** (0.292)
Individual controls & State unemployment rate	-0.104*** (0.018)	-0.031** (0.014)	-0.046*** (0.011)	-0.045*** (0.017)	-0.025** (0.013)	-0.764*** (0.278)	-0.641** (0.305)	-0.725** (0.298)
Full set of controls & No physician/1000	-0.113*** (0.021)	-0.043*** (0.013)	-0.049*** (0.013)	-0.055*** (0.019)	-0.020** (0.009)	-0.654** (0.316)	-0.586** (0.268)	-0.521* (0.278)
Pre-treatment Mean in Expansion States	0.349 (0.529)	0.327 (0.52)	0.346 (0.527)	0.446 (0.551)	0.376 (0.537)	8.893 (12.899)	9.285 (12.637)	7.487 (12.224)
Sample size	53,490	53,549	53,585	52,762	53,529	52,304	52,406	52,588

Notes. Panel 1 to 4 displays marginal effects and standard errors are in parentheses. Panel 1 shows baseline model controlling for age, gender, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects, as well as controlling for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. Panel 2 shows estimates without controlling for any state-year covariates. Panel 3 shows estimates without controlling for state-year covariates except unemployment rate. Panel 4 shows estimates controlling for the full set of individual and state time-varying controls except the number of physician/1000 population. Pre-treatment means are the weighted means of outcomes before ACA Medicaid expansion was implemented in expansion states and standard deviations are in parentheses. ***p<0.01; **p<0.05; *p<0.1.

Table A13. Effects of ACA Medicaid expansion on outcomes for poor Black childless adults by covariate specification

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
Full set of state time- varying covariates	-0.137*** (0.037)	-0.018 (0.018)	-0.065** (0.030)	-0.032 (0.038)	-0.038 (0.038)	-0.850 (0.664)	-1.450** (0.568)	-1.036** (0.495)
Only individual controls	-0.116*** (0.042)	-0.037* (0.022)	-0.055** (0.023)	-0.049* (0.030)	-0.046* (0.024)	-0.918 (0.564)	-0.795 (0.627)	-1.599*** (0.461)
Individual controls & State unemployment rate	-0.108*** (0.041)	-0.039* (0.023)	-0.050** (0.023)	-0.038 (0.031)	-0.043* (0.023)	-0.761 (0.489)	-0.759 (0.593)	-1.599*** (0.449)
Full set of controls & No physician/1000	-0.141*** (0.036)	-0.011 (0.019)	-0.059** (0.029)	-0.026 (0.037)	-0.038 (0.038)	-0.946 (0.637)	-1.313** (0.583)	-1.139** (0.480)
Pre-treatment Mean in Expansion States	0.378 (0.433)	0.371 (0.431)	0.368 (0.43)	0.331 (0.421)	0.384 (0.434)	7.366 (9.434)	7.429 (9.511)	6.964 (9.451)
Sample size	13,820	13,823	13,812	13,713	13,791	13,427	13,495	13,578

Notes. Panel 1 to 4 displays marginal effects and standard errors are in parentheses. Panel 1 shows baseline model controlling for age, gender, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects, as well as controlling for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. Panel 2 shows estimates without controlling for any state-year covariates. Panel 3 shows estimates without controlling for state-year covariates except unemployment rate. Panel 4 shows estimates controlling for the full set of individual and state time-varying controls except the number of physician/1000 population. Pre-treatment means are the weighted means of outcomes before ACA Medicaid expansion was implemented in the expansion states and standard deviations are in parentheses. ***p<0.01; **p<0.05; *p<0.1.

Table A14. Effects of ACA Medicaid expansion on outcomes for poor Hispanic childless adults by covariate specification

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
Full set of state time- varying covariates	-0.072** (0.030)	-0.026 (0.025)	-0.028 (0.026)	-0.045 (0.033)	-0.062** (0.026)	-0.207 (0.709)	-0.614 (0.868)	-1.071 (0.832)
Only individual controls	-0.082** (0.039)	-0.060*** (0.021)	-0.023 (0.035)	-0.037 (0.026)	-0.037 (0.023)	-0.467 (0.456)	-0.902** (0.418)	-0.618 (0.542)
Individual controls & State unemployment rate	-0.082** (0.040)	-0.062*** (0.022)	-0.023 (0.034)	-0.053** (0.022)	-0.032 (0.028)	-0.202 (0.581)	-0.691 (0.578)	-0.699 (0.604)
Full set of controls & No physician/1000	-0.075** (0.031)	-0.034 (0.024)	-0.034 (0.022)	-0.043 (0.036)	-0.053** (0.025)	-0.131 (0.729)	-0.928 (0.948)	-0.994 (0.858)
Pre-treatment Mean in Expansion States	0.495 (0.381)	0.497 (0.381)	0.365 (0.367)	0.462 (0.379)	0.456 (0.379)	7.526 (8.156)	6.97 (7.814)	5.686 (7.398)
Sample size	10,220	10,214	10,221	10,118	10,196	9,908	9,975	9,999

Notes. Panel 1 to 4 displays marginal effects and standard errors are in parentheses. Panel 1 shows baseline model controlling for age, gender, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects, as well as controlling for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. Panel 2 shows estimates without controlling for any state-year covariates. Panel 3 shows estimates without controlling for state-year covariates except unemployment rate. Panel 4 shows estimates controlling for the full set of individual and state time-varying controls except the number of physician/1000 population. Pre-treatment means are the weighted means of outcomes before ACA Medicaid expansion was implemented in expansion states and standard deviations are in parentheses. ***p<0.01; **p<0.05; *p<0.1.

Table A15. Effects of the ACA Medicaid expansion on outcomes for poor childless adults by excluding states with prior-expansion or late expanders

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
Baseline (1)	-0.093*** (0.018)	-0.034*** (0.012)	-0.038*** (0.013)	-0.034** (0.014)	-0.025*** (0.009)	-0.442 (0.321)	-0.779*** (0.244)	-0.647** (0.251)
Pre-treatment Mean in Expansion States	0.385 (0.487)	0.381 (0.486)	0.35 (0.477)	0.428 (0.495)	0.385 (0.487)	8.035 (11.15)	8.265 (11.004)	6.802 (10.57)
Sample size	86,808	86,865	86,918	85,769	86,821	84,727	84,974	85,314
No Full expansion (2)	-0.110*** (0.018)	-0.040*** (0.012)	-0.046*** (0.012)	-0.044*** (0.014)	-0.025*** (0.009)	-0.508 (0.336)	-0.928*** (0.245)	-0.689** (0.260)
Pre-treatment Mean in Expansion States	0.404 (0.491)	0.395 (0.489)	0.359 (0.48)	0.445 (0.497)	0.391 (0.488)	8.189 (11.258)	8.416 (11.076)	6.935 (10.645)
Sample size	79,333	79,384	79,437	78,346	79,362	77,475	77,699	77,996
No Partial expansion (3)	-0.110*** (0.019)	-0.034*** (0.012)	-0.039*** (0.013)	-0.037** (0.017)	-0.025** (0.009)	-0.603* (0.353)	-0.849*** (0.241)	-0.698** (0.270)
Pre-treatment Mean in Expansion States	0.385 (0.487)	0.351 (0.477)	0.361 (0.48)	0.411 (0.492)	0.396 (0.489)	8.514 (11.432)	8.584 (11.257)	7.138 (10.837)
Sample size	77,691	77,743	77,780	76,706	77,677	75,697	75,939	76,264
No Full or Partial expansion (4)	-0.134*** (0.018)	-0.040*** (0.012)	-0.046*** (0.013)	-0.049*** (0.018)	-0.025** (0.010)	-0.742** (0.353)	-0.986*** (0.256)	-0.777*** (0.281)
Pre-treatment Mean in Expansion States	0.413 (0.492)	0.365 (0.481)	0.376 (0.485)	0.432 (0.495)	0.407 (0.491)	8.844 (11.632)	8.875 (11.405)	7.407 (10.99)
Sample size	70,216	70,262	70,299	69,283	70,218	68,445	68,664	68,946

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
No any expansion (5)	-0.145*** (0.020)	-0.047*** (0.012)	-0.048*** (0.013)	-0.053** (0.020)	-0.029*** (0.009)	-0.999*** (0.346)	-1.010*** (0.261)	-0.869*** (0.306)
Pre-treatment Mean in Expansion States	0.414 (0.493)	0.361 (0.48)	0.38 (0.485)	0.427 (0.495)	0.416 (0.493)	9.064 (11.709)	9.043 (11.476)	7.601 (11.083)
Sample size	63,356	63,398	63,432	62,524	63,345	61,737	61,932	62,183
Wisconsin as a treatment (6)	-0.094*** (0.018)	-0.032*** (0.012)	-0.039*** (0.013)	-0.031** (0.014)	-0.030*** (0.008)	-0.453 (0.314)	-0.845*** (0.247)	-0.760*** (0.244)
Pre-treatment Mean in Expansion States	0.385 (0.487)	0.379 (0.485)	0.35 (0.477)	0.427 (0.495)	0.385 (0.487)	8.043 (11.154)	8.275 (11.005)	6.819 (10.584)
Sample size	86,808	86,865	86,918	85,769	86,821	84,727	84,974	85,314
Drop Montana & Louisiana (7)	-0.089*** (0.018)	-0.031** (0.012)	-0.038*** (0.013)	-0.036** (0.014)	-0.025** (0.009)	-0.483 (0.335)	-0.808*** (0.254)	-0.657** (0.266)
Pre-treatment Mean in Expansion States	0.382 (0.486)	0.382 (0.486)	0.347 (0.476)	0.431 (0.495)	0.382 (0.486)	7.982 (11.12)	8.228 (10.977)	6.739 (10.527)
Sample size	83,578	83,631	83,684	82,589	83,587	81,560	81,809	82,139

Notes. Shaded panel 1 to 7 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, race, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects, as well as controlling for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. Panel 1 shows baseline model using 32 states as an expansion states, 19 states as a non-expansion states (See Appendix 1). Panel 2 shows estimates after excluding full expansion states (DC, DE, MA, NY, VT). Panel 3 shows estimates after excluding partial expansion states (CA, CT, HI, MN). Panel 4 shows estimates after excluding both full and partial expansion states (DC, DE, MA, NY, VT, CA, CT, HI, MN). Panel 5 shows estimates after excluding any state with prior-expansion experience (DC, DE, MA, NY, VT, CA, CT, HI, MN, CO, IA, NJ, WA). Panel 6 shows estimates after switching Wisconsin into an expansion state from baseline model. Panel 7 shows estimates after excluding late expanders in 2016, Montana and Louisiana. Pre-treatment means are the weighted means of outcomes before ACA Medicaid expansion was implemented in expansion states and standard deviations are in parentheses. ***p<0.01; **p<0.05; *p<0.1.

Table A16. Effects of the ACA Medicaid expansion on the changes in outcomes for childless adults by income

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
Income less than 100% FPL(Baseline) (1)	-0.093*** (0.018)	-0.034*** (0.012)	-0.038*** (0.013)	-0.034** (0.014)	-0.025*** (0.009)	-0.442 (0.321)	-0.779*** (0.244)	-0.647** (0.251)
Pre-treatment Mean and standard deviation of Outcome	0.385 (0.487)	0.381 (0.486)	0.35 (0.477)	0.428 (0.495)	0.385 (0.487)	8.035 (11.15)	8.265 (11.004)	6.802 (10.57)
Sample size	86,808	86,865	86,918	85,769	86,821	84,727	84,974	85,314
Income less than 138% FPL (2)	-0.077*** (0.014)	-0.032*** (0.009)	-0.035*** (0.010)	-0.032*** (0.010)	-0.011* (0.006)	-0.131 (0.211)	-0.637*** (0.167)	-0.425*** (0.131)
Pre-treatment Mean and standard deviation of Outcome	0.385 (0.487)	0.369 (0.483)	0.342 (0.474)	0.427 (0.495)	0.359 (0.48)	7.48 (10.903)	7.592 (10.687)	6.069 (10.132)
Sample size	160,479	160,542	160,614	158,670	160,477	156,946	157,444	158,038

Notes. Shaded panel 1 and 2 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, race, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects, as well as controlling for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. Panel 1 shows baseline model using childless adults with income below 100 % FPL. Panel 2 shows estimates using childless adults with income at or below 138 % FPL. Pre-treatment means are the weighted means of outcomes before ACA Medicaid expansion was implemented in expansion states and standard deviations are in parentheses. ***p<0.01; **p<0.05; *p<0.1.

Table A17. Comparison between stratified models with difference-in-difference-in-differences in estimated effects of the ACA Medicaid expansion on disparities in outcomes among poor childless Whites, Blacks, and Hispanics

		No insurance	No usual Source of care	Unmet care needs due to cost	No annual check-up	Fair or poor health status	Poor physical health days	Poor mental health days	Days with health-related activity limitation
Stratified DD Model	Blacks- Whites (1)	-0.029 (0.038)	0.026 (0.022)	-0.017 (0.035)	0.021 (0.04)	-0.019 (0.041)	-0.201 (0.612)	-0.824 (0.599)	-0.504 (0.499)
	Hispanics- Whites (2)	0.037 (0.037)	0.018 (0.027)	0.019 (0.027)	0.007 (0.043)	-0.044* (0.027)	0.441 (0.668)	0.013 (1.005)	-0.538 (0.911)
DDD Model	Blacks- Whites (3)	-0.024 (0.023)	0.002 (0.025)	-0.022 (0.020)	-0.002 (0.025)	-0.004 (0.031)	0.153 (0.495)	-0.203 (0.516)	0.131 (0.456)
	Hispanics- Whites (4)	0.036 (0.051)	-0.028 (0.030)	0.042 (0.026)	0.012 (0.021)	0.073** (0.035)	2.106*** (0.730)	0.874* (0.447)	1.412** (0.586)
Sample size (overall)		86,808	86,865	86,918	85,769	86,821	84,727	84,974	85,314

Notes: Panel 1 to 4 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, race, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects. We also control for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records.

***p<0.01; **p<0.05; *p<0.1.

Appendix 8. Falsification Test

Table A18. Effects of the ACA Medicaid expansion on the changes in outcomes for poor childless elderly and high income childless adults

	Uninsured	No usual Source of care	Unmet care needs due to cost	No annual check-up	Self- reported Fair or poor health status	Poor physical health days	Poor mental health days	Days with health- related activity limitation
Low-income adults older than 65 (1)	0.004 (0.007)	-0.022** (0.010)	-0.007 (0.016)	0.006 (0.012)	-0.010 (0.019)	-0.370 (0.335)	0.501 (0.364)	0.227 (0.364)
Pre-treatment Mean and standard deviation of Outcome	0.04 (0.196)	0.103 (0.303)	0.124 (0.33)	0.162 (0.368)	0.508 (0.5)	9.182 (11.587)	4.676 (9.019)	5.305 (9.873)
Sample size	40,483	40,412	40,355	39,750	40,271	38,213	38,955	39,133
High-income adults aged 19 to 64 (2)	0.007* (0.004)	0.001 (0.006)	0.003 (0.005)	-0.004 (0.005)	0.001 (0.003)	0.040 (0.076)	0.036 (0.099)	0.048 (0.036)
Pre-treatment Mean and standard deviation of Outcome	0.062 (0.241)	0.155 (0.362)	0.065 (0.247)	0.309 (0.462)	0.078 (0.269)	2.467 (6.438)	2.738 (6.453)	1.46 (4.97)
Sample size	414,558	414,232	414,556	412,392	414,261	412,137	412,109	413,641

Notes. Shaded panel 1 to 2 displays marginal effects and standard errors are in parentheses. All regressions control for age, gender, race, education, marital status, employment status, chronic diseases status, tobacco use, state-fixed effects, and quarter/year-fixed effects, as well as controlling for state-year variables including the number of hospital beds and physicians per 1,000 population, unemployment rate, per capita income, racial/ethnic composition, and Senate voting records. Panel 1 shows estimates using childless adults older than 65-year-old with income below 100 % FPL. Panel 2 shows estimates using childless adults with income more than 400 % FPL. Pre-treatment means are the weighted means of outcomes before ACA Medicaid expansion was implemented in expansion states and standard deviations are in parentheses. ***p<0.01; **p<0.05; *p<0.1.