Result

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Descriptive Analysis

Table 1: Baseline Characteristics for states

Table 1 provides a baseline comparison of Non-Expansion and Expansion states before and after the implementation of the Affordable Care Act (ACA). The table displays mean values for three variables: State's Political Liberalism, Immigration Policy Climate, and State's Unemployment Rate.

Before the ACA went into effect, there were notable differences between Expansion and Non-Expansion states. In terms of State's Political Liberalism, Expansion states had a higher mean value (0.45) compared to Non-Expansion states (0.24), with a statistically significant difference ($p < 0.001$). This suggests that Expansion states tended to be more politically liberal.

For Immigration Policy Climate, Non-Expansion states exhibited a more negative mean value (-3) compared to Expansion states (-1), also with a statistically significant difference ($p < 0.01$). This indicates that Expansion states had less exclusionary immigration policies.

Regarding State's Unemployment Rate, Expansion states had a higher mean value (8.60) compared to Non-Expansion states (7.16), with a statistically significant difference ($p < 0.05$). This implies that Expansion states had higher levels of unemployment.

After the ACA went into effect, these variables did not show significant variations between the two groups. This suggests that the implementation of the ACA did not significantly impact the differences in State's Political Liberalism, Immigration Policy Climate, and State's Unemployment Rate between Expansion and Non-Expansion states.

Table 1: Baseline Comparison of States

Group	Variable	Expansion	Non Expansion	Difference
Pre-ACA	State's Political Liberalism	0.45 (0.17)	0.24 (0.09)	**0.22*** **
	Immigration Policy Climate	-1 (2)	-3 (1)	**2.1*** **
	State's Unemployment Rate	8.60 (1.64)	7.16 (2.02)	**1.4*** **
Post-ACA	State's Political Liberalism	0.47 (0.22)	0.23 (0.10)	**0.24*** **
	Immigration Policy Climate	0 (3)	-3 (1)	**2.8*** **
	State's Unemployment Rate	5.00 (1.14)	4.50 (1.15)	**0.50*** **

[1] Mean (SD)

[2] *p<0.05;* ***p<0.01;*** p<0.001

Table 2: Baseline Characteristics by Nativity

Table 2 provides a comprehensive summary of the demographic characteristics, insurance rates, and Medicaid coverage of the low-income adult sample prior to the implementation of the Affordable Care Act. It includes the pre-expansion means for age and proportions of various variables, specifically distinguishing between foreign-born and US-born individuals in states that expanded their Medicaid later and non-expansion states that did not expand their Medicaid until 2019.

Significant differences were observed across all demographic characteristics between foreign-born and US-born adults. However, while substantial disparities were found between native and foreign-born individuals in both expansion and non-expansion states, the discrepancies between native-born individuals in expansion and non-expansion states were relatively smaller in magnitude. The same trend was observed for foreign-born individuals.

For example, in the expansion state, the proportion of foreign-born individuals who identified as Hispanic was 68%, compared to 76% in non-expansion states. This reveals that the non-expansion states had approximately 6.7% more foreign-born Hispanics compared to the expansion state. Additionally, the proportion of US-born Hispanics in the expansion state was 11%, while this population was only 1% lower in non-expansion states. Notably, within both expansion and non-expansion states, the disparities between foreign-born and US-born individuals were more pronounced. Specifically, approximately 66% of the foreign-born population in the expansion state identified as Hispanic, while only 9.7% of the US-born population shared this heritage,

resulting in a significant difference of about 57%.

Table 2: Baseline Characteristics by Nativity

	expansion			Non-expansion		
Characteristic	**Foreign-born**, 11592215	**US-born**, 34946509	**p-value**	**Foreign-born**, 7113051	**US-born**, 26041282	**p-value**
Uninsured	6,473,288 (56%)	11,893,979 (34%)	<0.001***	4,995,253 (70%)	10,833,686 (42%)	<0.001***
Medicaid coverage	2,880,034 (25%)	13,241,734 (38%)	<0.001***	871,138 (12%)	7,688,863 (30%)	<0.001***
Age	41 (34, 50)	43 (33, 53)	<0.001***	40 (33, 49)	43 (33, 53)	<0.001***
Sex			<0.001***			<0.001***
Female	6,323,790 (55%)	19,813,110 (57%)		3,819,350 (54%)	15,057,504 (58%)	
Male	5,268,425 (45%)	15,133,399 (43%)		3,293,701 (46%)	10,983,778 (42%)	
Disability	1,136,618 (9.8%)	9,432,288 (27%)	<0.001***	663,792 (9.3%)	7,060,627 (27%)	<0.001***
Current employment status			<0.001***			<0.001***
Employed	6,188,727 (53%)	13,125,180 (38%)		4,037,034 (57%)	10,335,124 (40%)	
Not in labor force	4,083,199 (35%)	16,444,592 (47%)		2,376,172 (33%)	11,975,810 (46%)	
Unemployed	1,320,289 (11%)	5,376,737 (15%)		699,845 (9.8%)	3,730,348 (14%)	
Marital status	6,457,264 (56%)	9,635,900 (28%)	<0.001***	4,094,355 (58%)	8,063,391 (31%)	<0.001***
Education			<0.001***			<0.001***
College degree	797,858 (6.9%)	2,860,619 (8.2%)		470,230 (6.6%)	1,884,546 (7.2%)	
Graduate and beyond	319,853 (2.8%)	994,271 (2.8%)		172,679 (2.4%)	577,787 (2.2%)	
High school	2,822,810 (24%)	12,647,283 (36%)		1,833,018 (26%)	9,500,208 (36%)	
Less than high school	5,866,533 (51%)	6,839,940 (20%)		3,557,536 (50%)	5,819,385 (22%)	
Some college or Associate degree	1,785,161 (15%)	11,604,396 (33%)		1,079,588 (15%)	8,259,356 (32%)	
Race/ethnicity			<0.001***			<0.001***
Asian	1,704,788 (15%)	264,742 (0.8%)		518,213 (7.3%)	54,950 (0.2%)	
Black	501,427 (4.3%)	6,817,804 (20%)		563,959 (7.9%)	7,362,213 (28%)	
Hispanic	7,914,764 (68%)	3,998,364 (11%)		5,382,119 (76%)	2,731,265 (10%)	
Other	207,897 (1.8%)	1,512,924 (4.3%)		106,083 (1.5%)	838,658 (3.2%)	
White	1,263,339 (11%)	22,352,675 (64%)		542,677 (7.6%)	15,054,196 (58%)	
Federal poverty			<0.001***			<0.001***
Income 100 to 138% poverty	4,257,006 (37%)	10,820,459 (31%)		2,563,949 (36%)	8,447,926 (32%)	
Income below 100% poverty	7,335,209 (63%)	24,126,050 (69%)		4,549,102 (64%)	17,593,356 (68%)	

Table 2: Baseline Characteristics by Nativity *(continued)*

Characteristic	expansion			Non-expansion		
	Foreign-born, 11592215	**US-born**, 34946509	**p-value**	**Foreign-born**, 7113051	**US-born**, 26041282	**p-value**
Citizenship status			<0.001***			<0.001***
Born in US states	0 (0%)	34,498,962 (99%)		0 (0%)	25,729,677 (99%)	
Born in US Territories	0 (0%)	447,547 (1.3%)		0 (0%)	311,605 (1.2%)	
Naturalized-citizen	3,527,306 (30%)	0 (0%)		1,870,512 (26%)	0 (0%)	
Non-citizen	7,709,364 (67%)	0 (0%)		4,975,148 (70%)	0 (0%)	
US-citizen Born abroad	355,545 (3.1%)	0 (0%)		267,391 (3.8%)	0 (0%)	
Lifetime in US			<0.001***			<0.001***
<25%	2,074,736 (18%)	104,908 (23%)		1,476,453 (21%)	108,020 (35%)	
>25%	9,517,479 (82%)	342,639 (77%)		5,636,598 (79%)	203,585 (65%)	
Self-rated English proficiency			<0.001***			<0.001***
Not at all	1,867,518 (16%)	67,420 (0.2%)		1,192,569 (17%)	64,202 (0.2%)	
Not well	3,749,138 (32%)	232,892 (0.7%)		2,211,497 (31%)	183,085 (0.7%)	
Only english	1,047,881 (9.0%)	31,537,870 (90%)		758,922 (11%)	23,561,819 (90%)	
Very well	2,307,127 (20%)	2,677,630 (7.7%)		1,436,201 (20%)	1,883,887 (7.2%)	
Well	2,620,551 (23%)	430,697 (1.2%)		1,513,862 (21%)	348,289 (1.3%)	
Cultural clusters			<0.001***			<0.001***
African-Islamic	881,988 (7.6%)	0 (0%)		354,779 (5.0%)	0 (0%)	
Catholic Europe	211,276 (1.8%)	0 (0%)		68,188 (1.0%)	0 (0%)	
Confucian	719,929 (6.2%)	0 (0%)		172,880 (2.4%)	0 (0%)	
English-speaking	228,492 (2.0%)	34,946,509 (100%)		118,375 (1.7%)	26,041,282 (100%)	
Latin America	8,399,447 (72%)	0 (0%)		5,924,207 (83%)	0 (0%)	
Orthodox	257,099 (2.2%)	0 (0%)		70,909 (1.0%)	0 (0%)	
Protestant Europe	150,035 (1.3%)	0 (0%)		129,210 (1.8%)	0 (0%)	
South Asian	743,949 (6.4%)	0 (0%)		274,503 (3.9%)	0 (0%)	
Country/Region of birth			<0.001***			<0.001***
Canada	87,977 (0.8%)	0 (0%)		50,896 (0.7%)	0 (0%)	
Eastern Asia	586,211 (5.1%)	0 (0%)		145,699 (2.0%)	0 (0%)	

Table 2: Baseline Characteristics by Nativity *(continued)*

Characteristic	expansion			Non-expansion		
	Foreign-born, 11592215	**US-born**, 34946509	**p-value**	**Foreign-born**, 7113051	**US-born**, 26041282	**p-value**
Eastern Europe	273,831 (2.4%)	0 (0%)		72,756 (1.0%)	0 (0%)	
Latin America	8,152,177 (70%)	0 (0%)		5,872,570 (83%)	0 (0%)	
Middle East	442,380 (3.8%)	0 (0%)		129,256 (1.8%)	0 (0%)	
Oceania and at Sea	67,785 (0.6%)	0 (0%)		16,732 (0.2%)	0 (0%)	
South & Centeral Asia	307,477 (2.7%)	0 (0%)		138,250 (1.9%)	0 (0%)	
South East Asia	954,859 (8.2%)	0 (0%)		279,316 (3.9%)	0 (0%)	
Sub-Saharan Africa	338,734 (2.9%)	0 (0%)		158,722 (2.2%)	0 (0%)	
United States	0 (0%)	34,946,509 (100%)		0 (0%)	26,041,282 (100%)	
Western Europe	380,784 (3.3%)	0 (0%)		248,854 (3.5%)	0 (0%)	

[1] n (%); Median (IQR)

[2] *p<0.05;* ***p<0.01;*** p<0.001

Table 3: Uninsured and Medicaid coverage rate before and after ACA for expansion and non-expansion state by characteristics

The table provides a comparison of the uninsured rate and Medicaid coverage rate among different groups based on their characteristics, such as age, income, ethnicity, and education level. It shows how these rates have changed before and after the ACA in both expansion and non-expansion states.

By examining the values in the table, one can observe the impact of the ACA on uninsured and Medicaid coverage rates across various demographic and socioeconomic groups, providing insights into the effectiveness of the ACA in expanding health insurance coverage.

The "NA" values in the table indicate that certain variables did not apply to US-born individuals, and therefore, there were no recorded data for those specific categories.

Table 3: Uninsured/Medicaid Rate by charachterstics, expansion vs non-expansion

	Uninsured Rate				Medicaid Coverage			
	Expansion		Non-expansion		Expansion		Non-expansion	
Characteristic	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Citizenship status								

Table 3: Uninsured/Medicaid Rate by charachterstics, expansion vs non-expansion *(continued)*

	Uninsured Rate				Medicaid Coverage			
	Expansion		Non-expansion		Expansion		Non-expansion	
Characteristic	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Born in US states	15%	33%	30%	40%	55%	38%	34%	30%
Born in US Territories	12%	23%	27%	36%	68%	57%	39%	37%
Naturalized-citizen	15%	35%	33%	50%	54%	35%	24%	21%
Non-citizen	45%	63%	67%	76%	36%	22%	11%	9.7%
US-citizen Born abroad	17%	36%	34%	45%	49%	31%	25%	23%
Lifetime in US								
<25%	31%	56%	49%	70%	45%	26%	19%	12%
>25%	32%	51%	53%	65%	44%	28%	17%	15%
Unknown	88,065	106,526	127,764	97,425	316,536	122,694	145,240	74,807
Race/ethnicity								
Asian	16%	37%	30%	51%	48%	31%	19%	14%
Black	15%	31%	27%	37%	60%	46%	40%	36%
Hispanic	31%	51%	52%	64%	47%	30%	20%	18%
Other	22%	37%	37%	45%	58%	43%	35%	32%
White	15%	33%	30%	40%	53%	35%	32%	27%
Sex								
Female	16%	34%	32%	42%	56%	40%	34%	30%
Male	22%	42%	37%	48%	48%	30%	27%	23%
Current employment status								
Employed	22%	43%	38%	50%	43%	23%	18%	14%
Not in labor force	15%	28%	28%	34%	60%	47%	43%	41%
Unemployed	26%	52%	50%	63%	58%	33%	29%	23%
Marital status	19%	37%	34%	45%	48%	31%	25%	22%
Education								
College degree	14%	32%	24%	37%	39%	21%	19%	15%
Graduate and beyond	13%	26%	20%	31%	32%	16%	16%	13%
High school	19%	38%	35%	45%	55%	36%	32%	28%
Less than high school	27%	44%	44%	52%	57%	41%	35%	32%
Some college or Associate degree	15%	33%	29%	40%	54%	36%	31%	26%
Federal poverty								
Income 100 to 138% poverty	19%	37%	30%	41%	45%	27%	24%	21%
Income below 100% poverty	19%	38%	36%	46%	57%	40%	34%	31%
Self-rated English proficiency								
Not at all	45%	62%	68%	77%	43%	28%	16%	14%
Not well	37%	56%	61%	73%	46%	29%	16%	14%
Only english	15%	33%	29%	39%	55%	37%	34%	30%
Very well	21%	40%	39%	51%	51%	34%	24%	22%
Well	30%	49%	49%	63%	46%	29%	19%	16%
Country/Region of birth								
Canada	18%	34%	31%	42%	39%	20%	19%	16%
Eastern Asia	18%	45%	31%	52%	44%	23%	15%	12%
Eastern Europe	22%	42%	37%	50%	48%	31%	20%	16%
Latin America	42%	61%	60%	72%	39%	24%	15%	12%
Middle East	14%	33%	32%	50%	63%	44%	29%	26%
Oceania and at Sea	18%	31%	42%	49%	43%	35%	12%	9.6%
South & Centeral Asia	16%	36%	33%	57%	52%	35%	18%	13%
South East Asia	14%	33%	29%	48%	53%	38%	23%	18%
Sub-Saharan Africa	20%	37%	36%	51%	51%	35%	22%	16%
United States	15%	33%	30%	40%	55%	38%	34%	30%
Western Europe	17%	36%	30%	43%	44%	25%	24%	21%
Disability	8.6%	20%	20%	26%	71%	58%	53%	51%
Cultural clusters								

Table 3: Uninsured/Medicaid Rate by charachterstics, expansion vs non-expansion *(continued)*

	Uninsured Rate				Medicaid Coverage			
	Expansion		Non-expansion		Expansion		Non-expansion	
Characteristic	Pre	Post	Pre	Post	Pre	Post	Pre	Post
African-Islamic	16%	35%	35%	53%	59%	42%	25%	20%
Catholic Europe	22%	41%	30%	44%	41%	23%	19%	17%
Confucian	18%	43%	32%	51%	44%	24%	15%	12%
English-speaking	15%	33%	30%	40%	55%	38%	34%	30%
Latin America	41%	60%	60%	71%	40%	24%	15%	12%
Orthodox	17%	37%	36%	52%	55%	39%	23%	19%
Protestant Europe	15%	35%	29%	42%	47%	28%	27%	23%
South Asian	14%	33%	29%	52%	56%	41%	21%	17%

Table 4: Uninsured/Medicaid Coverage Rate by Socio-Demographic Factors, Across Citizenship Status

Table 4 presents the uninsured and Medicaid coverage rates categorized by socio-demographic factors across different citizenship statuses. The table provides a comparison of the rates among various groups based on factors such as age, income, ethnicity, and education level, focusing specifically on their citizenship status.

By examining the uninsured and Medicaid coverage rates across citizenship status, the table offers insights into the disparities in health insurance coverage among different groups of individuals. This information can help understand the impact of citizenship status on access to healthcare.

Table 4: Uninsured/Medicaid Rate by Socio-Demographic Factors, Across Citizenship Status

	Non-citizen		Naturalized-citizen		Citizen born abroad		Born in US states		Born in territories	
Characteristic	Uninsured	Medicaid	Uninsured	Medicaid	Uninsured	Medicaid	Uninsured	Medicaid	Uninsured	Medicaid
	59%	23%	28%	39%	30%	35%	27%	42%	22%	52%
Sex										
Female	57%	26%	27%	41%	28%	38%	24%	45%	20%	57%
Male	62%	19%	30%	37%	32%	32%	30%	37%	27%	45%
Disability	42%	43%	17%	59%	19%	55%	16%	61%	11%	71%
Current employment status										
Employed	61%	18%	29%	33%	32%	26%	30%	29%	28%	36%
Not in labor force	56%	29%	24%	47%	24%	45%	20%	52%	15%	65%
Unemployed	64%	25%	40%	39%	45%	33%	44%	39%	37%	49%
Married	59%	22%	27%	39%	27%	33%	24%	36%	21%	47%
Education										
College degree	48%	19%	25%	32%	24%	26%	21%	27%	22%	33%
Graduate and beyond	35%	15%	22%	27%	20%	21%	17%	22%	22%	28%
High school	59%	22%	30%	39%	33%	37%	29%	43%	24%	52%
Less than high school	63%	23%	30%	44%	38%	41%	30%	52%	20%	65%
Some college or Associate degree	51%	23%	26%	39%	27%	36%	25%	41%	23%	46%
Race/ethnicity										

Table 4: Uninsured/Medicaid Rate by Socio-Demographic Factors, Across Citizenship Status *(continued)*

	Non-citizen		Naturalized-citizen		Citizen born abroad		Born in US states		Born in territories	
Characteristic	Uninsured	Medicaid	Uninsured	Medicaid	Uninsured	Medicaid	Uninsured	Medicaid	Uninsured	Medicaid
	59%	23%	28%	39%	30%	35%	27%	42%	22%	52%
Asian	35%	30%	22%	41%	25%	35%	22%	31%	21%	30%
Black	46%	25%	28%	37%	29%	36%	26%	47%	33%	35%
Hispanic	64%	21%	33%	37%	38%	32%	30%	43%	22%	54%
Other	43%	27%	25%	42%	27%	39%	31%	48%	21%	44%
White	41%	27%	23%	43%	27%	35%	26%	40%	27%	38%
Federal poverty										
Income 100 to 138%	57%	20%	27%	34%	27%	29%	25%	34%	23%	40%
poverty										
Income below 100%	61%	24%	29%	42%	31%	38%	28%	46%	22%	58%
poverty										
Lifetime in US										
<25%	58%	21%	28%	42%	33%	33%	NA%	NA%	24%	51%
>25%	60%	23%	28%	39%	29%	35%	NA%	NA%	22%	53%
Self-rated English										
proficiency										
Not at all	65%	25%	31%	50%	44%	37%	49%	35%	18%	69%
Not well	63%	23%	29%	47%	42%	34%	36%	41%	21%	63%
Only english	48%	23%	26%	32%	27%	36%	26%	42%	26%	42%
Very well	50%	22%	27%	35%	31%	33%	31%	42%	23%	48%
Well	59%	21%	28%	40%	35%	35%	37%	40%	22%	53%
Cultural clusters										
African-Islamic	38%	35%	23%	50%	26%	40%	NA%	NA%	NA%	NA%
Catholic Europe	43%	25%	24%	32%	27%	32%	NA%	NA%	NA%	NA%
Confucian	37%	26%	24%	37%	25%	34%	NA%	NA%	NA%	NA%
English-speaking	34%	23%	22%	31%	28%	35%	27%	42%	22%	52%
Latin America	63%	21%	32%	36%	36%	32%	NA%	NA%	NA%	NA%
Orthodox	40%	35%	23%	47%	26%	35%	NA%	NA%	NA%	NA%
Protestant Europe	34%	23%	21%	32%	28%	37%	NA%	NA%	NA%	NA%
South Asian	33%	35%	22%	45%	23%	38%	NA%	NA%	NA%	NA%
Country/Region of										
birth										
Canada	31%	21%	24%	29%	30%	34%	NA%	NA%	NA%	NA%
Eastern Asia	37%	25%	24%	37%	25%	34%	NA%	NA%	NA%	NA%
Eastern Europe	46%	29%	25%	42%	29%	33%	NA%	NA%	NA%	NA%
Latin America	64%	21%	33%	36%	38%	31%	NA%	NA%	NA%	NA%
Middle East	35%	41%	21%	54%	23%	44%	NA%	NA%	NA%	NA%
Oceania and at Sea	32%	30%	17%	42%	32%	28%	NA%	NA%	NA%	NA%
South & Centeral	37%	27%	23%	43%	23%	43%	NA%	NA%	NA%	NA%
Asia										
South East Asia	33%	37%	21%	44%	25%	36%	NA%	NA%	NA%	NA%
Sub-Saharan Africa	41%	29%	24%	43%	28%	32%	NA%	NA%	NA%	NA%
United States	NA%	NA%	NA%	NA%	NA%	NA%	27%	42%	22%	52%
Western Europe	36%	24%	23%	32%	28%	36%	NA%	NA%	NA%	NA%

Finding Causal Diagram

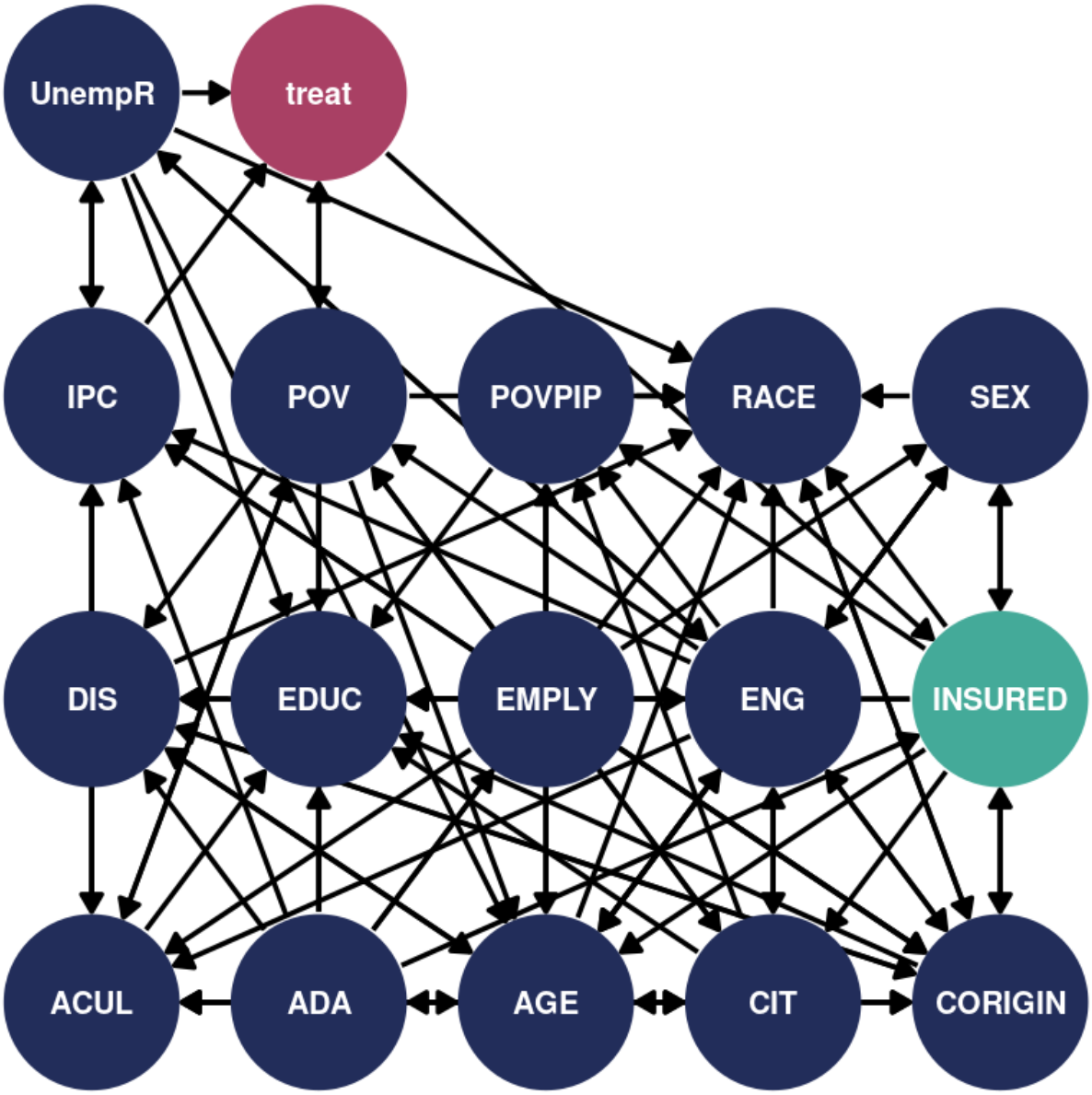
Causal Structure Discovery

I utilized causal structure discovery techniques to accurately represent the data generating process and unveil the underlying causal relationships among the variables. The causal structure discovery approach identifies potential causal relationships based on patterns and dependencies observed in the data. The resulting

Directed Acyclic Graph (DAG) from the causal discovery is capturing the complex interplay between the variables, accounting for confounding factors and potential biases, and providing credible evidence for the causal effects of medicaid expansion on medicaid take-up and uninsured rate.

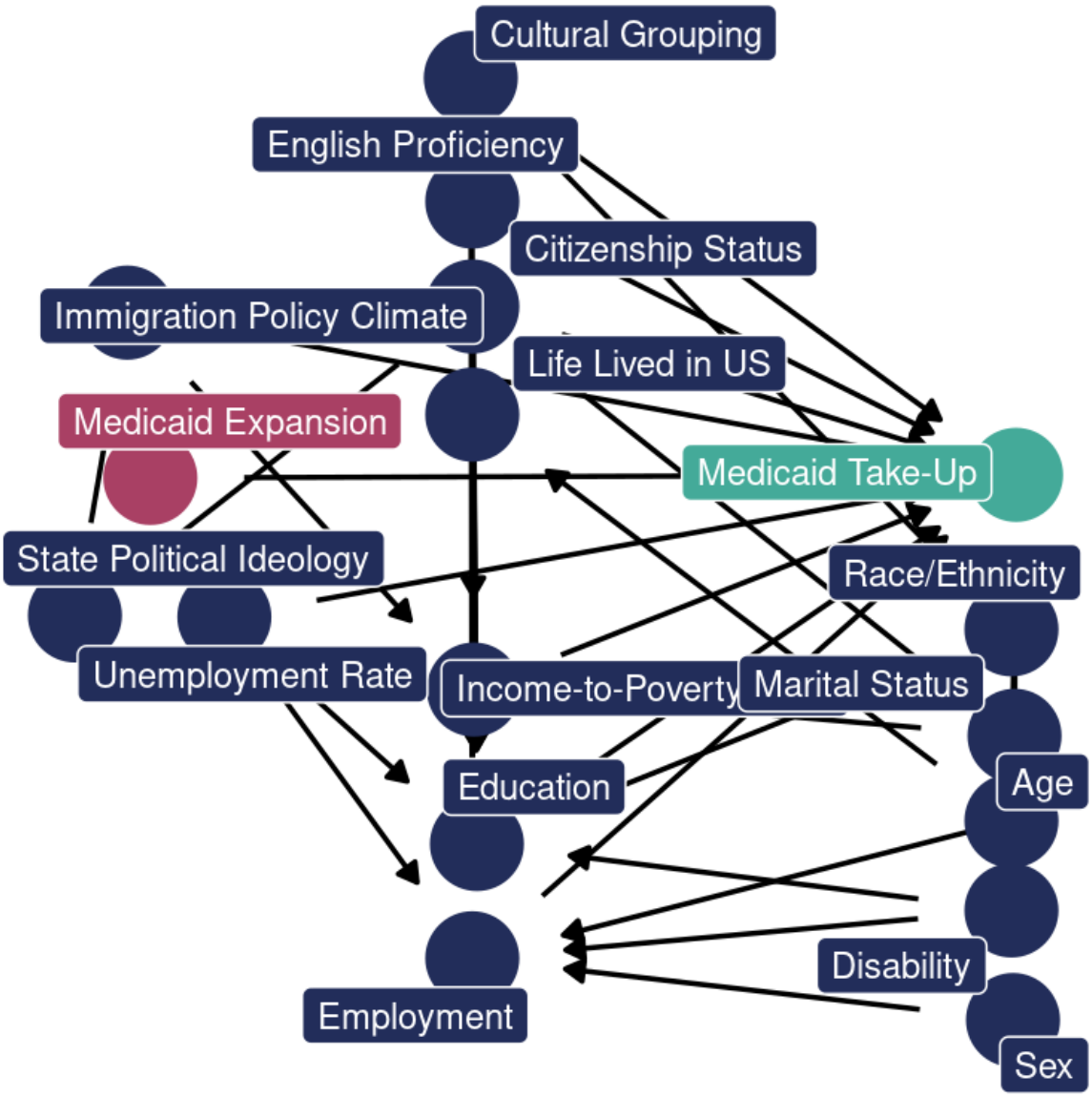
By utilizing the DAG obtained through the causal discovery approach, I can conduct backdoor and front door analyses, enabling the identification of the minimal adjustment set. The minimal adjustment set represents the smallest subset of variables that must be controled for to obtain unbiased estimates of causal effects.

In the initial phase of our analysis, a DAG , as shown in Graph 1, was generated using multiple constraint-based and score-based algorithms including GDS algorithms, Greedy Equivalence Search (GES), Peter-Clark (PC) algorithm, and Fast Causal Inferences (FCI). To integrate the information obtained from these algorithms, following Joe et al.(2023) I employed a majority voting approach. This involved considering each edge and determining its presence in the final graph based on whether it appeared in more than 50% of the cases, indicating agreement among the majority of the algorithms.



Revised casual graph

To enhance the accuracy of the causal relationships represented in the DAG, I carefully reviewed and manually edited the graph by removing paths that contradicted my domain knowledge or appeared implausible within the context. By applying these revisions, the resulting DAG, illustrated in graph 2, aligns more closely with my expertise in the field and provides a more trustworthy representation of the underlying causal structure in my analysis.



Minimal adjustment set

The identified causal relationship between Medicaid expansion and Medicaid take-up in the revised DAG provides compelling evidence that changes in the treatment variable directly influence changes in the outcome variable. This finding suggests that interventions targeting the treatment variable, such as expanding Medicaid coverage, can potentially have a substantial impact on improving the rate of Medicaid take-up.

by conducting backdoor analysis I identified the necessary adjustment set, revealing that variables Citizenship Status, Immigration Policy Climate, Unemployment Rate need to be controlled for to accurately estimate

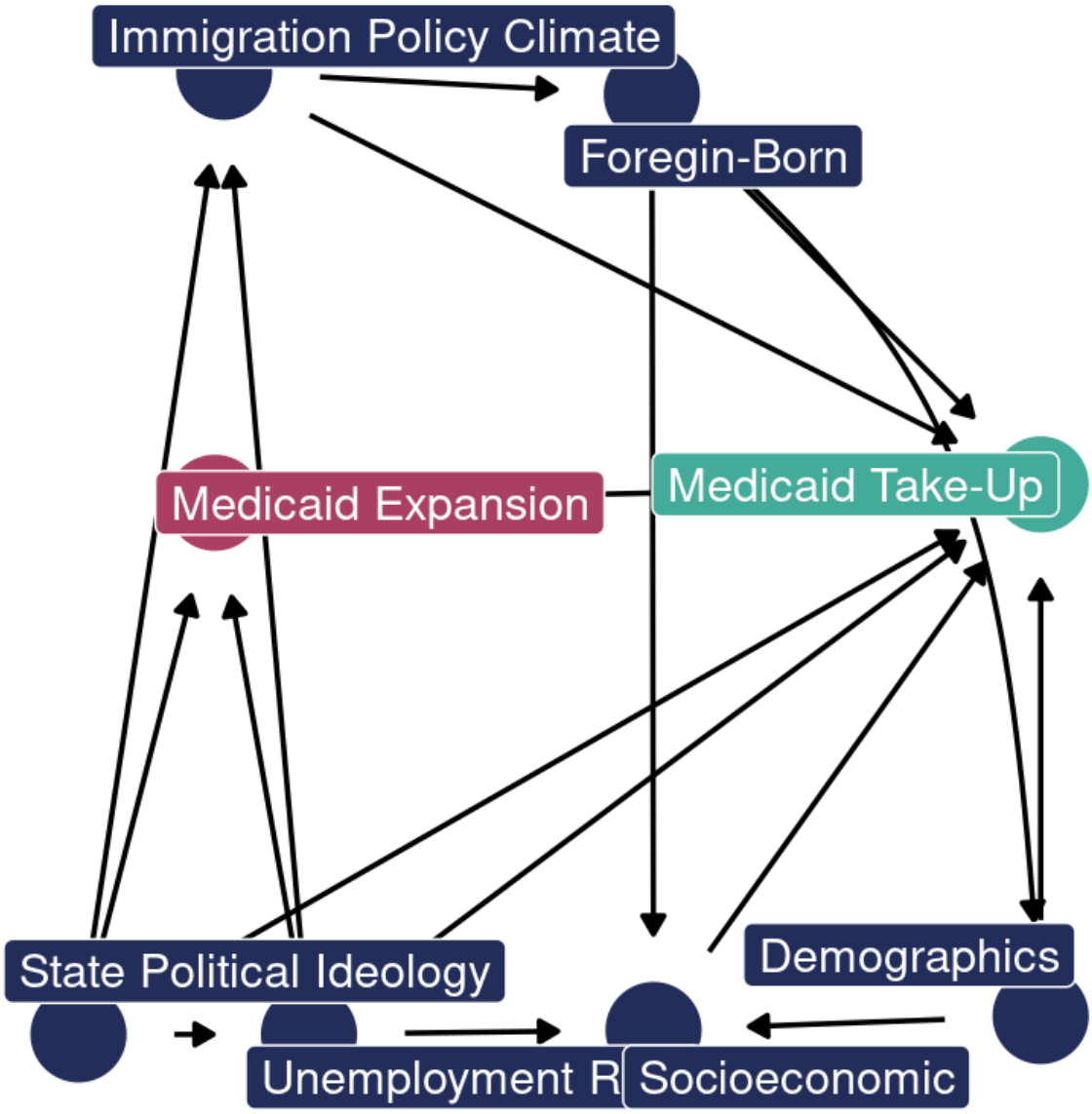
the causal effect between Medicaid expansion and Medicaid take-up.

```
adjustmentSets(findag)
```

```
## { Citizenship Status, Immigration Policy Climate, Unemployment Rate }
## { State Political Ideology, Unemployment Rate }
```

Simplified causal graph

To enhance the clarity and interpretability of the graph, I employed a strategy to simplify its complexity. This involved grouping related variables into single nodes, such as combining 'education,' 'income,' and 'employment' into a unified node labeled 'Socioeconomic.' The streamlined representation of the underlying relationships can be observed in Graph 3.



Although utilizing causal discovery algorithms has limitations, such as assuming the adequacy of observed variables and relying on the absence of unobserved confounders, efforts were made to include relevant variables in the analysis. However, it is possible that unmeasured confounders may exist, potentially introducing biases into the identified causal relationships. Therefore, the obtained graph may not precisely represent the true underlying causal structure..

Due to these limitations, I do not solely rely on this graph and its suggested adjustment set for estimating causal effects in my analysis. Nonetheless, the DAG derived from the causal discovery approach serves as a valuable tool for generating hypotheses and guiding the modeling process, as well as informing the selection

of control variables in my DID approach analysis.

Event Study and Parallel Trend Assumption

The main assumption of the Difference-in-Differences (DiD) methodology relies on the presence of parallel trends before the policy implementation.We examine the event-study estimates for uninsured rates and Medicaid take-up to assess the impact of Medicaid expansion on low-income individuals aged 26-64 and assess the validity of parallel trend assumption.

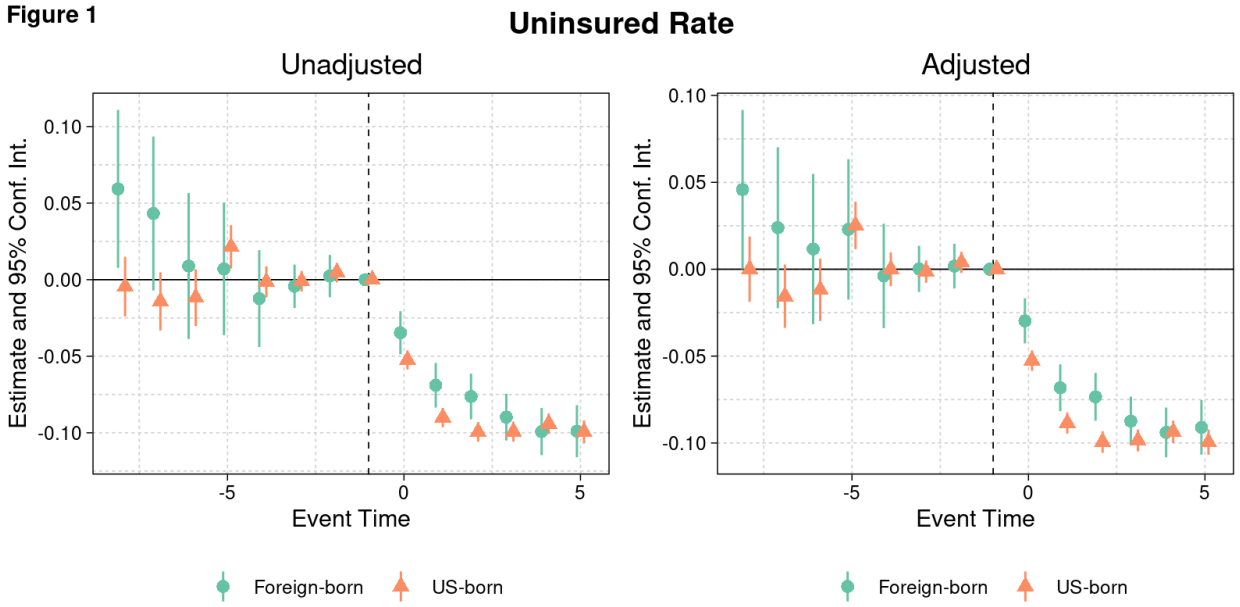
Effect of the ACA Medicaid Expansions on Uninsured: Accounting for Variation in Treatment Timing

Figure 1 displays the event-study estimates for both unconditional and conditional parallel trends for uninsured. In Panel (a), the focus is on the effects of the expansion on uninsured without any control variables for both US-born and foreign born individuals, while Panel (b) examines this effects while controlling for covariates. The green line with circles in both panels represents the foreign-borns, while the orange line with triangle represents the US-born. For the corresponding estimation coefficients, please refer to Table 1.

As shown in Figure 1, there are no significant pre-trend differences for US-born individuals living in expansion states compared to non-expansion states, as the coefficients are not significantly different from zero. Similarly, for foreign-born individuals, the coefficients for the interaction terms between year and the indicator for the pre-treatment period are also small and not statistically significant, indicating no significant pre-trend differences in the uninsured rates between foreign-born individuals in expansion states and non-expansion states. Moreover, when controlling for characteristics, the coefficients exhibit minimal changes and remain small, further supporting the parallel trend assumption. Additionally, these coefficients do not attain statistical significance, indicating that the characteristics accounted for do not significantly impact the parallel trends assumption.

Transitioning to the post-expansion years, we observe notable and statistically significant declines in the overall uninsured rates for both foreign-born and US-born individuals. The coefficients associated with the indicator variables representing the post-expansion years are negative and demonstrate statistical significance for both groups. However, the change in the lead coefficients for the foreign born is less than native suggesting that there exist disparities among native and foreign -born.

Figure 1



Overall, the event study presented in Figure 1 indicates significant improvements in insurance coverage within the expansion states compared to the non-expansion states following the implementation of Medicaid expansion. However, the observed divergence in uninsured trends and the smaller reduction in the uninsured rate for foreign-born individuals highlight potential disparities in healthcare access. Table 5, presents the result of event study.

Table 5: The Impact of Medicaid Expansion on Uninsured Rate

	US-born		Foreign-Born	
Variables	(1)	(2)	(3)	(4)
expansion year = -8	-0.005	3.95×10^{-5}	0.059*	0.046
	(0.021)	(0.023)	(0.030)	(0.028)
expansion year = -7	-0.014	-0.015	0.043	0.024
	(0.025)	(0.026)	(0.028)	(0.025)
expansion year = -6	-0.012	-0.012	0.009	0.012
	(0.019)	(0.021)	(0.026)	(0.026)
expansion year = -5	0.021*	0.025**	0.007	0.023
	(0.011)	(0.011)	(0.018)	(0.016)
expansion year = -4	-0.001	-2.61×10^{-5}	-0.012	-0.004
	(0.017)	(0.017)	(0.016)	(0.017)
expansion year = -3	-0.001	-0.001	-0.004	0.0002
	(0.004)	(0.005)	(0.010)	(0.009)
expansion year = -2	0.005	0.004	0.002	0.002
	(0.003)	(0.004)	(0.008)	(0.007)
expansion year = 0	-0.052***	-0.053***	-0.035***	-0.030**
	(0.005)	(0.005)	(0.008)	(0.011)
expansion year = 1	-0.090***	-0.088***	-0.069**	-0.068**
	(0.008)	(0.008)	(0.024)	(0.024)
expansion year = 2	-0.100***	-0.100***	-0.076**	-0.073**
	(0.009)	(0.009)	(0.026)	(0.027)
expansion year = 3	-0.099***	-0.099***	-0.090**	-0.087**
	(0.008)	(0.008)	(0.028)	(0.028)
expansion year = 4	-0.094***	-0.094***	-0.099**	-0.094**
	(0.009)	(0.009)	(0.030)	(0.030)
expansion year = 5	-0.100***	-0.100***	-0.099***	-0.091**
	(0.009)	(0.009)	(0.026)	(0.027)
State FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Controls		yes		yes
Observations	1,585,639	1,585,639	389,955	389,955
R^2	0.05930	0.11985	0.08577	0.21524
Within R^2	0.00286	0.06704	0.00172	0.14309

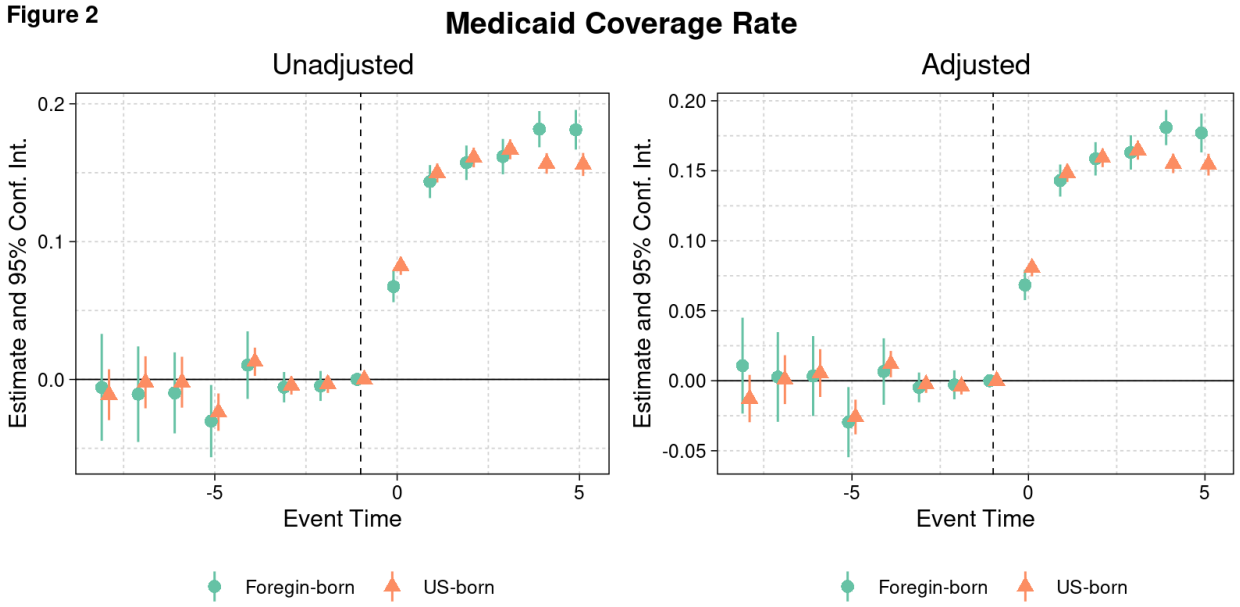
Clustered (State & Year) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Effect of the ACA Medicaid Expansions on Medicaid Coverage: Accounting for Variation in Treatment Timing

Figure 2 and Table 2 present the event-study estimates for the unconditional and conditional parallel trends concerning Medicaid take-up. According to the data presented in Figure 2,prior to the implementation of Medicaid expansion, there is no significant pre-trend difference in Medicaid take-up between expansion and non-expansion states for both low-income US-born and foreign-born individuals aged 26-64.

For the US-born sub-sample, Model 2 includes control variables, while Model 1 serves as a baseline model. The coefficients for the interaction terms between year and the indicator for the pre-treatment period were generally small and statistically insignificant in both models. This suggests that there is no significant pre-trend difference in uninsured rates between expansion and non-expansion states for US-born individuals.

Figure 2



Similarly, for the foreign-born sub-sample,As shown in the table 6. model 4 includes control variables, while model 3 serves as a baseline model. The coefficients for the interaction terms were also small and statistically insignificant in both models, suggesting no significant pre-trend difference in uninsured rates between expansion and non-expansion states for foreign-born individuals.

Furthermore, the coefficients for the interaction terms representing the post-treatment periods (years 0 to 5 after the implementation of Medicaid expansion) were positive and statistically significant in all models, indicating an increase in medicaid coverage for both US-born and foreign-born individuals in expansion states compared to non-expansion states during those years. Hpwever, a notable pattern emerges regarding the Medicaid take-up between foreign-born and US-born individuals following the expansion. Initially, during the first three years after the expansion, the Medicaid take-up for foreign-born individuals was similar to that of US-born individuals; but, from year 4 onwardsa we observe that the take-up rate among foreign-born individuals increased. This suggests that over time, foreign-born individuals were able to overcome some of the barriers and obstacles they initially encountered, leading to a higher participation in Medicaid. It is likely that various factors contributed to this trend. Changes in immigration policies, targeted outreach efforts aimed at foreign-born populations, or the implementation of programs specifically designed to enhance healthcare access for immigrants could have played a role in facilitating the increased participation among foreign-born individuals. Further investigation into the specific policies and initiatives implemented during this period would provide a deeper understanding of the factors influencing the changing Medicaid take-up rates among foreign-born individuals.

NOTE:

It is surprising to me see a higher Medicaid take-up rate for foreign-born individuals during the fourth and fifth years after expansion, since it aligns with the years 2018 and 2019 when stricter immigration policies were implemented under the Trump administration.

Table 7: The Impact of Medicaid Expansion on Medicaid Coverage

	US-born		Foreign-Born	
Variables	(1)	(2)	(3)	(4)
expansion year = -8	-0.011	-0.013	-0.006	0.011
	(0.029)	(0.031)	(0.009)	(0.008)
expansion year = -7	-0.002	0.0008	-0.011	0.003
	(0.031)	(0.031)	(0.013)	(0.011)
expansion year = -6	-0.002	0.005	-0.010	0.003
	(0.021)	(0.024)	(0.011)	(0.011)
expansion year = -5	-0.024	-0.026*	-0.030***	-0.030***
	(0.014)	(0.013)	(0.008)	(0.007)
expansion year = -4	0.013	0.012	0.010	0.007
	(0.015)	(0.015)	(0.017)	(0.015)
expansion year = -3	-0.004	-0.003	-0.006	-0.005
	(0.003)	(0.003)	(0.006)	(0.006)
expansion year = -2	-0.003	-0.004	-0.005	-0.003
	(0.004)	(0.004)	(0.007)	(0.007)
expansion year = 0	0.082***	0.081***	0.067***	0.068***
	(0.004)	(0.005)	(0.002)	(0.004)
expansion year = 1	0.150***	0.148***	0.144***	0.143***
	(0.011)	(0.011)	(0.013)	(0.014)
expansion year = 2	0.161***	0.159***	0.157***	0.159***
	(0.011)	(0.012)	(0.017)	(0.018)
expansion year = 3	0.167***	0.165***	0.162***	0.163***
	(0.011)	(0.012)	(0.017)	(0.016)
expansion year = 4	0.157***	0.155***	0.182***	0.181***
	(0.010)	(0.010)	(0.018)	(0.020)
expansion year = 5	0.156***	0.154***	0.181***	0.177***
	(0.011)	(0.011)	(0.017)	(0.020)
State FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Controls		yes		yes
Observations	1,585,639	1,585,639	389,955	389,955
R^2	0.06514	0.18789	0.10655	0.18046
Within R^2	0.00628	0.13676	0.00837	0.09041

Clustered (State & Year) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

These findings demonstrate the effectiveness of Medicaid expansion in improving access to healthcare, especially among foreign-born individuals. The absence of significant pre-trend differences and the subsequent increase in Medicaid take-up rates following the expansion highlight the positive impact of the expansion in reducing the uninsured population and promoting healthcare coverage for both US-born and foreign-born individuals in expansion states compared to non-expansion states.These findings demonstrate the effectiveness of Medicaid expansion in improving access to healthcare, especially among foreign-born individuals. The absence of significant pre-trend differences and the subsequent increase in Medicaid take-up rates following

the expansion highlight the positive impact of the expansion in reducing the uninsured population and promoting healthcare coverage for both US-born and foreign-born individuals in expansion states compared to non-expansion states.

Difference-in-Differences Model Results

We first examine the effect of Medicaid expansion on the uninsured rate. Table 7, presents the primary findings of the difference-in-differences (DD) analysis, which includes sample weights and adjusts for covariates. The first seven columns display estimates from the fixed effect linear probability model, while the second seven columns show results from the fixed effect logit model. Each specification controls for state and year fixed effects. Column 2 includes controls for state political ideology and state unemployment rate, which were identified as the minimal adjustment set based on the result of the directed acyclic graph (DAG) causal discovery. Column 3 additionally controls for region-by-year fixed effects, while column 4 controls for state-specific linear time trends. The full model with all the control variables added is presented in columns 5-7, where column 6 includes region-by-year fixed effects and column 7 includes state-specific linear time trends.

Among FE OLS models, the estimated effect of Medicaid expansion on the uninsured ranges from -0.044 to -0.092 across different specifications (columns 1 to 7). These estimates suggest that Medicaid expansion reduces the probability of being uninsured by approximately 4.4% to 9.2%. Among FE LOGIT model, the estimated effect ranges from -0.333 to -0.629 across different specifications (columns 8 to 14). Since the FE LOGIT model estimates the effect in terms of odds ratios, the estimates suggest that Medicaid expansion reduces the odds of being uninsured by approximately 33.3% to 62.9%. Furthermore, the models indicate that being foreign-born is associated with an increase in the probability of being uninsured in the FE OLS model, while it increases the odds of being uninsured in the FE LOGIT model. Both models show a negative and statistically significant interaction term, indicating that the effect of Medicaid expansion on the uninsured rate is smaller for foreign-born individuals compared to the US-born population. To assess the goodness of fit of the models, we consider the adjusted R-squared for the FE OLS model and the Pseudo R-squared and BIC for both models. The FE OLS model in column 7 exhibits the highest adjusted R-squared value of 0.17830 and the lowest BIC value of 2,206,836.9. For the FE LOGIT model, column 14 has the highest Pseudo R-squared value of 0.15066 and the lowest BIC value of 240,927,239.1.These measures help evaluate the fit of the models to the data, with higher adjusted R-squared and Pseudo R-squared values indicating better fit, and lower BIC values suggesting better model performance.

To DO Shadi:

The BIC and Pseudo R-squared are off check why is that. Given that LOGIT is prefered over PLM should I choose col 14 as my prefered model? should I add or remove any specificaiton?

Table 9: The Effect of Medicaid Expansion on Uninsured Rate (Difference-in-Differences Estimation)

	FE OLS							FE LOGIT						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Medicaid Expansion	-0.075***	-0.071***	-0.085***	-0.044***	-0.081***	-0.092***	-0.053***	-0.568***	-0.549***	-0.572***	-0.333***	-0.612***	-0.629***	-0.384***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.009)	(0.009)	(0.012)	(0.015)	(0.009)	(0.012)	(0.015)
Foreign-Born	0.244***	0.243***	0.243***	0.244***	-0.229***	2.27	-0.064***	1.03***	1.02***	1.02***	1.03***	-0.389***	-0.406***	9.60***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.008)	(2.17)	(0.015)	(0.006)	(0.006)	(0.006)	(0.006)	(0.083)	(0.083)	(0.228)
Medicaid Expansion × Foreign-Born	-0.031***	-0.029***	-0.028***	-0.031***	0.0004	0.004*	0.0009	0.170***	0.186***	0.199***	0.180***	0.222***	0.253***	0.240***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)
State Unemployment Rate		0.004***	0.005***	0.002**					0.021***	0.023***	0.010**			
		(0.0006)	(0.0007)	(0.0010)					(0.003)	(0.003)	(0.005)			
State Political Ideology		-0.011	0.015*	-0.044***					-0.162***	-0.026	-0.271***			
		(0.008)	(0.009)	(0.012)					(0.044)	(0.047)	(0.062)			
Controls					yes	yes	yes					yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Region-Year FE			yes			yes				yes			yes	
State-Specific Linear Time Trends				yes			yes				yes			yes
Convergence	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
Standard-Errors	Heteroskedasticity-robust													
Observations	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594
R^2	0.10174	0.10180	0.10226	0.10282	0.17730	0.17502	0.17836							
Adjusted R^2	0.10172	0.10177	0.10222	0.10278	0.17726	0.17496	0.17830							
Pseudo R^2	0.99202	0.99202	0.99203	0.99203	0.99257	0.99256	0.99258	0.08279	-105.71	-105.66	0.08385	-97.947	-97.888	0.15066
AIC	2,370,925.9	2,370,831.8	2,370,046.4	2,368,702.0	2,207,430.9	2,211,565.1	2,205,087.4	260,176,660.9	260,157,000.2	260,034,591.5	259,874,375.8	241,235,358.9	241,091,334.3	240,925,477.2
BIC	2,371,638.2	2,371,581.6	2,371,233.5	2,370,014.1	2,208,630.5	2,213,214.6	2,206,836.9	260,177,373.2	260,157,750.0	260,035,778.6	259,875,687.9	241,236,546.0	241,092,958.8	240,927,239.1

Heteroskedasticity-robust standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

We then shift our focus to analyzing the impact of Medicaid expansion on Medicaid coverage using Table 8. This table follows a similar structure to Table 7, with the FE Linear probability model estimates in the first seven columns and the FE logit model estimates in the second seven columns. Both models include state and year fixed effects to account for potential confounding factors.In the FE OLS model, the estimated effect of Medicaid expansion on the Medicaid coverage rate ranges from 0.085 to 0.148 across different specifications (columns 1 to 7). These estimates suggest that Medicaid expansion increases the probability of individuals being covered by Medicaid by approximately 8.5% to 14.8%. Similarly, in the FE logit model, the estimated effect ranges from 0.305 to 0.660 (columns 8 to 14), indicating that Medicaid expansion increases the odds of being covered by Medicaid. We also examine the impact of foreign-born status on the Medicaid coverage rate. In the FE OLS model, being foreign-born is associated with a decreased probability in having Medicaid coverage, while in the FE logit model, it decreases the odds of being covered by Medicaid.Moreover, the interaction term between Medicaid expansion and foreign-born status shows a significant relationship in both models. However, the magnitude and direction of this interaction term vary across different models and specifications. In columns 5, 6, and 7 of the table, negative coefficients are observed for the interaction term between Medicaid expansion and foreign-born status. This indicates that in those specific model specifications, the effect of Medicaid expansion on the Medicaid coverage rate is smaller for foreign-born individuals compared to the US-born population. For example, in column 1 and 5, the coefficient of the interaction term is positive but small in magnitude, suggesting that Medicaid expansion has a small positive effect on the probability of foreign-born individuals being covered compared to US-born individuals. However, as additional covariates are included in the model, the coefficient becomes negative in columns 6 and 7, indicating a smaller effect of Medicaid expansion for foreign-born individuals. In the FE logit model specifications, the odds of being covered by Medicaid due to Medicaid expansion are positive for foreign-born individuals but decrease as additional covariates are included. In our preferred model (column 14), the odds are estimated to be 16%, indicating a substantial increase in the likelihood of Medicaid coverage for foreign-born individuals due to Medicaid expansion.

Similar to Table 7, we assess the goodness of fit using R-squared, adjusted R-squared, pseudo R-squared, AIC, and BIC. In the FE OLS model, the R-squared ranges from 0.08522 to 0.19483, and the adjusted R-squared ranges from 0.08520 to 0.19477 (columns 1 to 7). For the FE logit model, the pseudo R-squared ranges from -104.05 to 0.15944 (columns 8 to 14). Lower AIC and BIC values indicate better model performance. Based on these measures, the preferred model specifications in Table 8 may be column 7 in the FE OLS model and column 14 in the FE logit model. These specifications exhibit higher R-squared, adjusted R-squared, and pseudo R-squared values, as well as lower AIC and BIC values, indicating better fit and performance.

Table 10: The Effect of Medicaid Expansion on Medicaid Covergare Rate (Difference-in-Differences Estimation)

	FE OLS							FE LOGIT						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Medicaid Expansion	0.136***	0.134***	0.144***	0.085***	0.140***	0.148***	0.092***	0.498***	0.493***	0.554***	0.305***	0.591***	0.660***	0.390***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.008)	(0.009)	(0.011)	(0.013)	(0.009)	(0.011)	(0.013)
Foreign-Born	-0.158***	-0.158***	-0.157***	-0.159***	0.086***	-0.634	-0.002	-0.862***	-0.863***	-0.859***	-0.869***	-0.034	-0.021	-0.035
	(0.001)	(0.001)	(0.001)	(0.001)	(0.007)	(2.47)	(0.015)	(0.007)	(0.007)	(0.007)	(0.007)	(0.082)	(0.082)	(0.082)
Medicaid Expansion × Foreign-Born	0.007***	0.007***	0.005**	0.009***	-0.012***	-0.016***	-0.012***	0.239***	0.241***	0.233***	0.256***	0.151***	0.136***	0.163***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
State Unemployment Rate		-0.003***	-0.003***	-0.003***					-0.011***	-0.014***	-0.015***			
		(0.0006)	(0.0007)	(0.0010)					(0.003)	(0.003)	(0.005)			
State Political Ideology		-0.035***	-0.074***	0.025**					-0.201***	-0.368***	0.082			
		(0.009)	(0.009)	(0.012)					(0.040)	(0.043)	(0.056)			
Controls					yes	yes	yes					yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Region-Year FE			yes			yes				yes			yes	
State-Specific Linear Time Trends				yes			yes				yes			yes
Convergence	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Standard-Errors	Heteroskedasticity-robust													
Observations	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594	1,975,594
R^2	0.08522	0.08525	0.08589	0.08677	0.19330	0.19379	0.19483							
Adjusted R^2	0.08520	0.08522	0.08585	0.08672	0.19326	0.19374	0.19477							
Pseudo R^2	0.99160	0.99160	0.99161	0.99161	0.99240	0.99240	0.99241	0.06642	-104.05	-104.00	0.06752	-93.720	-93.669	0.15944
AIC	2,625,715.2	2,625,657.5	2,624,691.9	2,622,755.7	2,377,784.4	2,376,890.4	2,374,515.4	278,454,421.5	278,448,734.1	278,318,864.0	278,125,737.5	251,077,717.7	250,941,054.9	250,708,901.3
BIC	2,626,427.5	2,626,407.3	2,625,879.1	2,624,067.8	2,378,984.1	2,378,539.9	2,376,264.9	278,455,133.8	278,449,483.9	278,320,051.2	278,127,049.6	251,078,904.8	250,942,679.5	250,710,650.8

Heteroskedasticity-robust standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Sensitivity and Robustness Check

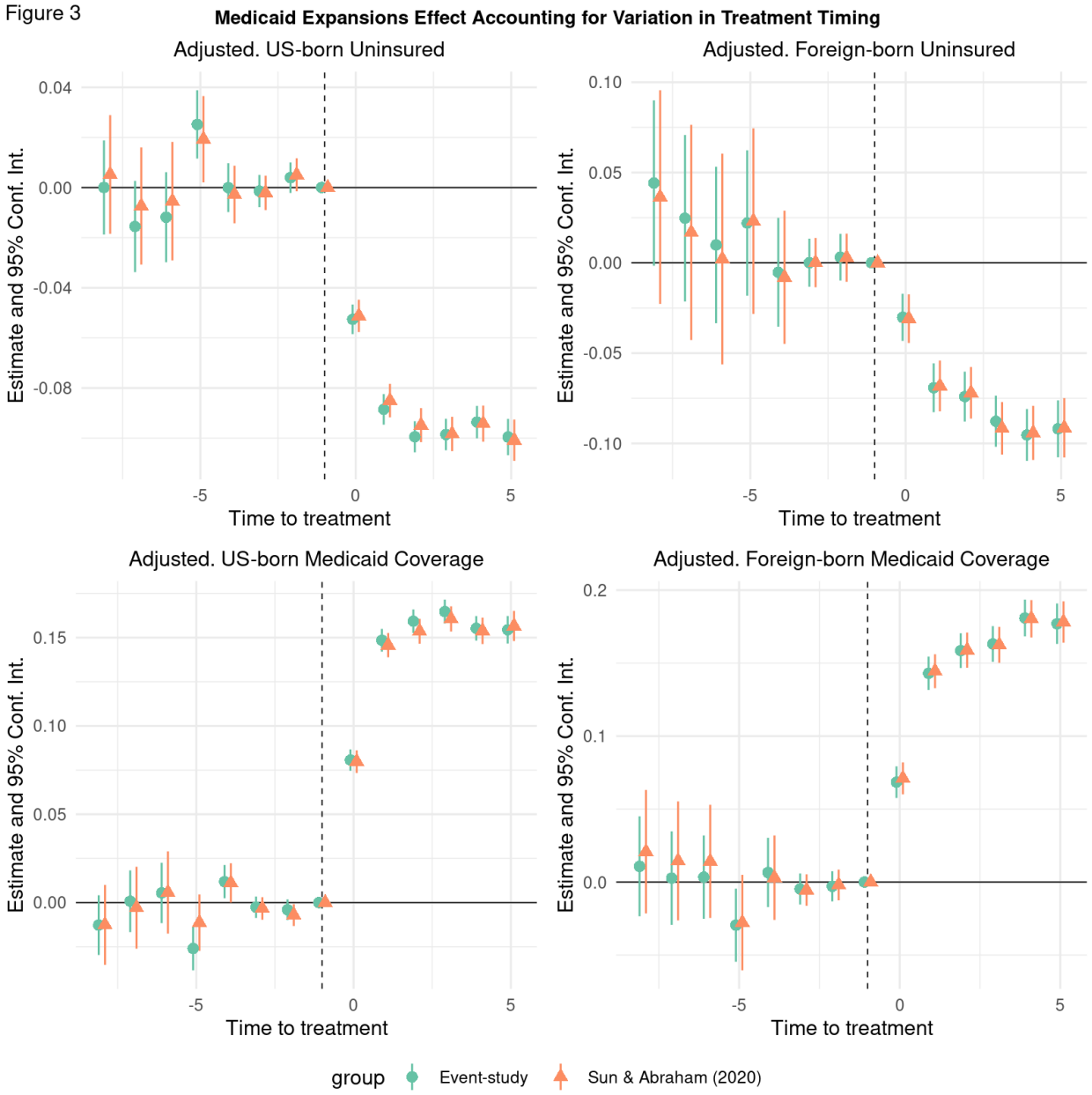
Heterogeneous Treatment Effects: Sun & Abraham (2020)

Since 2018, there has been a growing body of literature examining the validity of staggered Difference-in-Differences (DID) models and event study designs. Noteworthy studies in this field include Goodman-Bacon (2018), Callaway and Sant'anna (2020), de Chaisemartin and D'aualtfoeuille (2020), Deshpande and Li (2019), Imai and Kim (2021), and Baker et al. (2021). Sun and Abraham (2021) highlight the challenges that can arise when different treatment cohorts exhibit varying treatment effects over time.

To address these concerns and assess the sensitivity of our event study estimates to heterogeneous treatment effects, we adopt the interaction-weighted (IW) event study estimator proposed by Sun and Abraham (2021). This estimator is robust to variations in treatment effects across cohorts. We estimate event study coefficients separately for each group and outcome, and then aggregate these coefficients using the fraction of the treated sample in each group as weights for the relevant period. Importantly, the results of this analysis align with our main findings.

We find no evidence of differential pre-trends, leading us to conclude that our results are robust and not unduly influenced by variations in treatment profiles across different cohorts.

Figure 3



Difference-in-Differences Estimate: Bacon Decomposition theorem

Employing Goodman-Bacon's (2018) methodology, we performed a decomposition analysis utilizing two-way fixed effects Difference-in-Differences (DID) estimators. This analysis provides significant insights into the treatment effects and timing groups, as outlined in Table 9.

Table 11: Bacon Decomposition

Comparison	Coefficient	Weight
Uninsured		
Earlier vs Later Treated	-0.09309	0.11871
Later vs Earlier Treated	-0.05521	0.08771
Treated vs Untreated	-0.08462	0.79358
Medicaid		
Earlier vs Later Treated	0.14610	0.11871
Later vs Earlier Treated	0.08782	0.08771
Treated vs Untreated	0.14452	0.79358

The analysis involves comparing timing groups to units that never received treatment, allowing us to evaluate the relative treatment effects at different timings. Notably, a majority of the estimated treatment effect can be attributed to the comparisons between treated and untreated units, rather than comparisons between states with different treatment times.

Furthermore, when we exclude the variation arising from comparisons of states with different treatment times, the Difference-in-Differences (DD) estimate remains highly consistent with the main DD estimate. In simpler terms, the magnitude of the treatment effect produced by the 2014 wave is comparable to the effects observed in subsequent waves. This robustness analysis strengthens our findings and affirms the reliability of the estimated treatment effect.

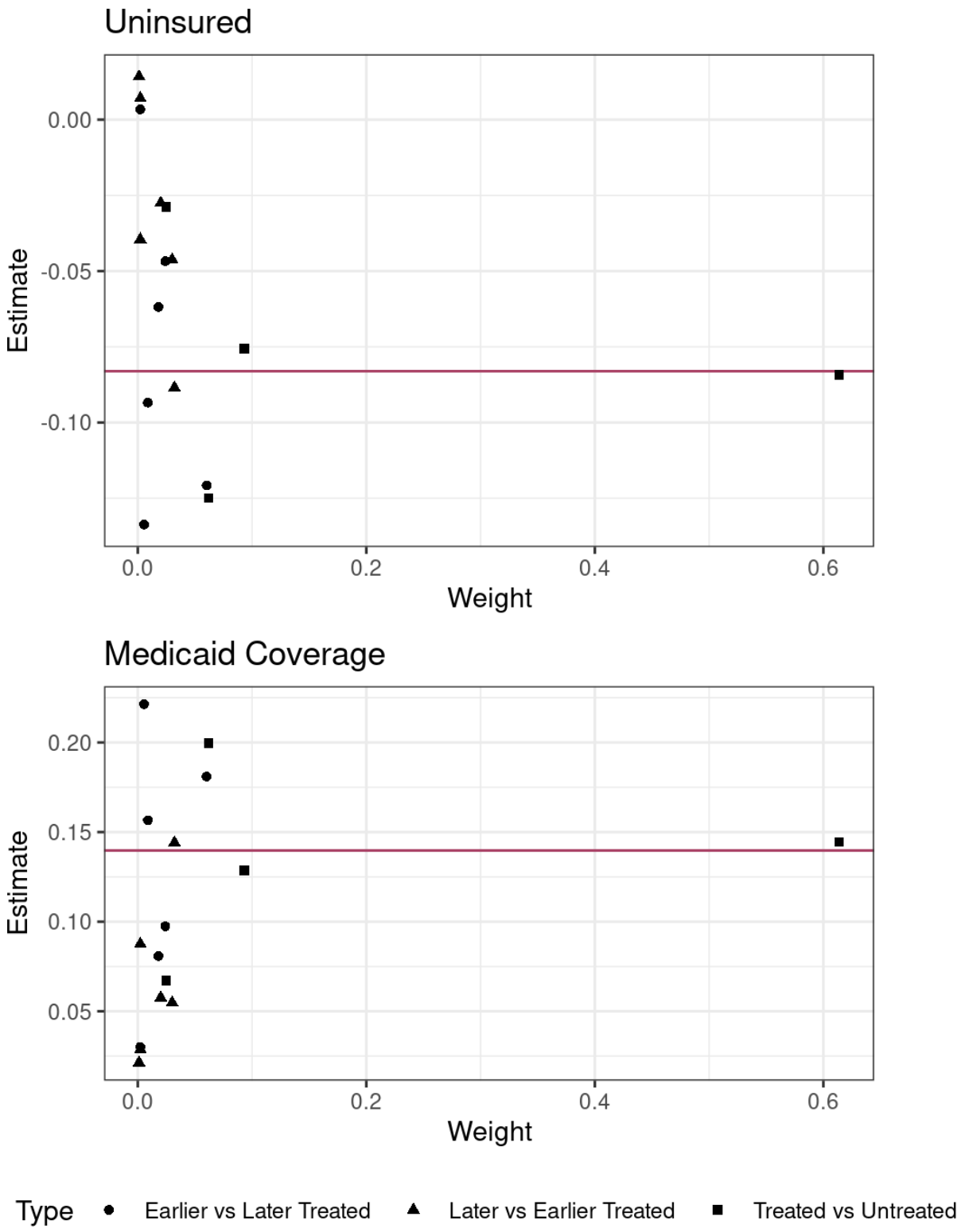


Figure 4 provides support for this finding by presenting the 2×2 DD estimates and associated weights derived from the conventional two-way fixed effect model. Panel (a) illustrates the estimates for the Uninsured group,

while panel (b) exhibits the estimates for Medicaid coverage.