novis-i-hwk5-1

April 15, 2025

0.1 ECON 470 Hwk4-1

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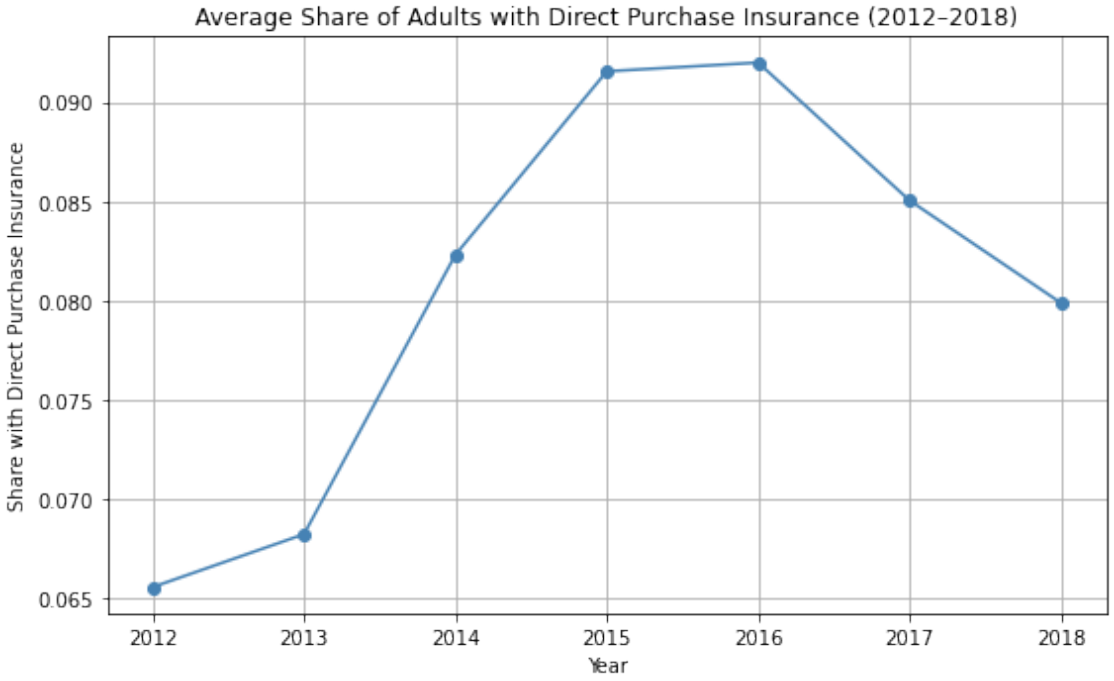
Due Date: 4/23/2025

GitHub Repository

1 Summarize the Data

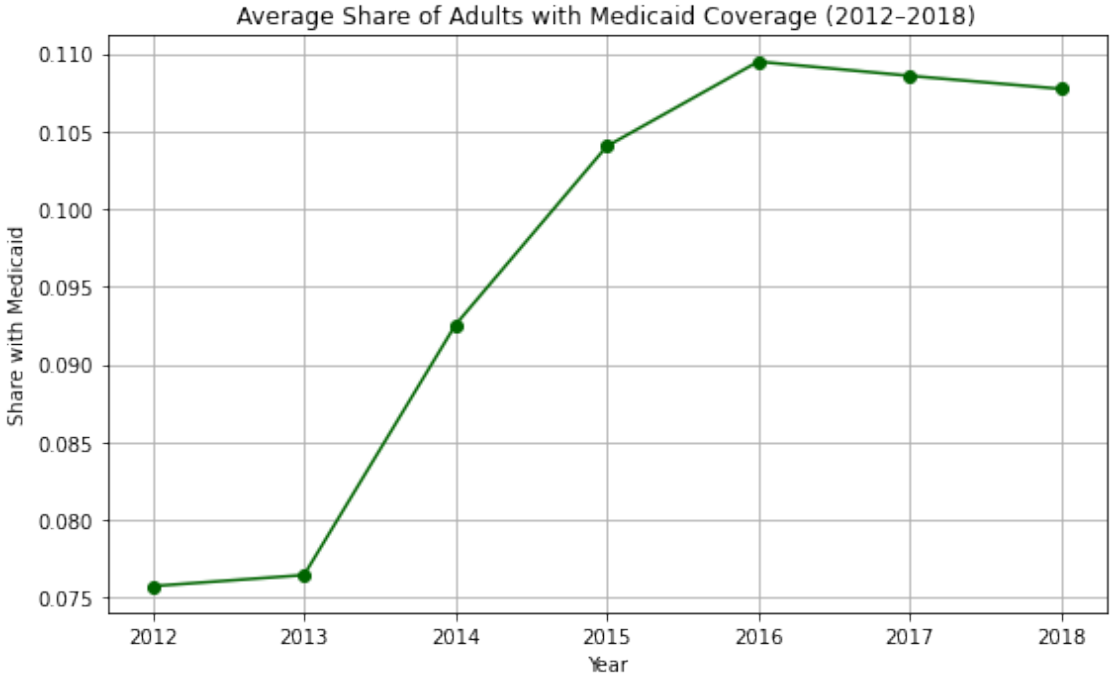
1.1 Question 1: Plot the share of the adult population with direct purchase health insurance over time.



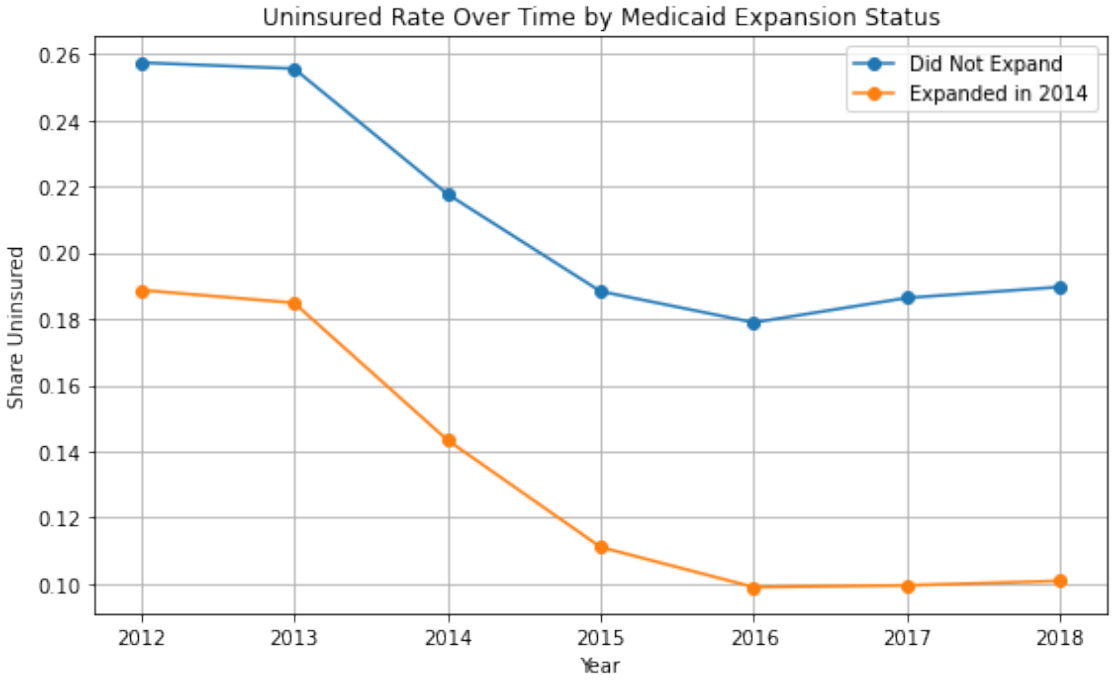
1.2 Question 2: Discuss the reduction in direct purchase health insurance in later years. Can you list a couple of policies that might have affected the success of the direct purchase insurance market?

1. Repeal of the Individual Mandate Penalty (Effective 2019)
    - Though passed in late 2017 (Tax Cuts and Jobs Act), anticipation of the penalty's removal may have influenced enrollment decisions in 2018.
    - Without a tax penalty, some healthy individuals likely opted out of buying coverage, causing a decline in enrollment and rising premiums for those who remained.
2. Cutbacks in ACA Outreach and Enrollment Support
    - The federal government significantly reduced funding for advertising and navigator programs during Open Enrollment periods (starting in 2017).
    - This made it harder for new enrollees to access information or get assistance, particularly impacting low-income or tech-averse individuals.
3. Expansion of Non-ACA-Compliant Plans
    - In 2018, the Trump administration expanded the availability of short-term, limited-duration insurance plans.
    - These plans are often cheaper but lack essential health benefits and consumer protections, drawing healthier individuals away from ACA-compliant markets and increasing risk-pooling issues.

1.3 Question 3: Plot the share of the adult population with Medicaid over time.



1.4 Question 4: Plot the share of uninsured over time, separately by states that expanded Medicaid in 2014 versus those that did not. Drop all states that expanded after 2014.



2 Estimate ATEs

2.1 Question 5: Calculate the average percent of uninsured individuals in 2012 and 2015, separately for expansion and non-expansion states. Present your results in a basic 2x2 DD table.

```
Q5: Difference-in-Differences Table (Uninsurance Rates)
year              2012      2015    Change
group
Expanded      0.188707  0.111088 -0.077619
Not Expanded  0.257413  0.188323 -0.069090

Estimated ATE (Difference-in-Differences): -0.0085
```

2.2 Question 6: Estimate the effect of Medicaid expansion on the uninsurance rate using a standard DD regression estimator, again focusing only on states that expanded in 2014 versus those that never expanded.

OLS Regression Results

Dep. Variable:	uninsured_rate	R-squared:	0.394
Model:	OLS	Adj. R-squared:	0.389
Method:	Least Squares	F-statistic:	75.03
Date:	Tue, 15 Apr 2025	Prob (F-statistic):	2.10e-37
Time:	11:26:55	Log-Likelihood:	593.48
No. Observations:	350	AIC:	-1179.
Df Residuals:	346	BIC:	-1164.
Df Model:	3		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.2229	0.010	22.329	0.000	0.203	0.243
treatment	-0.0420	0.011	-3.759	0.000	-0.064	-0.020
post	-0.0569	0.012	-4.818	0.000	-0.080	-0.034
interaction	-0.0110	0.013	-0.832	0.406	-0.037	0.015

Omnibus:	1.713	Durbin-Watson:	1.837
Prob(Omnibus):	0.425	Jarque-Bera (JB):	1.744
Skew:	0.121	Prob(JB):	0.418
Kurtosis:	2.754	Cond. No.	15.0

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Estimated ATE (DiD Regression across all years): -0.0110

2.3 Question 7: Include state and year fixed effects in your estimates.

```
Q7: DiD Regression with State and Year Fixed Effects
                          PanelOLS Estimation Summary
================================================================================
Dep. Variable:         uninsured_rate   R-squared:                        0.0206
Estimator:                   PanelOLS   R-squared (Between):             -0.0767
No. Observations:                 350   R-squared (Within):               0.1843
Date:                Tue, Apr 15 2025   R-squared (Overall):             -0.0633
Time:                        11:34:37   Log-likelihood                    1005.3
Cov. Estimator:            Unadjusted
                                        F-statistic:                      6.1670
Entities:                          50   P-value                           0.0136
Avg Obs:                       7.0000   Distribution:                   F(1,293)
Min Obs:                       7.0000
Max Obs:                       7.0000   F-statistic (robust):             6.1670
                                        P-value                           0.0136
Time periods:                       7   Distribution:                   F(1,293)
Avg Obs:                       50.000
Min Obs:                       50.000
Max Obs:                       50.000

                             Parameter Estimates
================================================================================
             Parameter  Std. Err.     T-stat    P-value    Lower CI    Upper CI
--------------------------------------------------------------------------------
interaction    -0.0110     0.0044    -2.4833     0.0136     -0.0197     -0.0023
================================================================================

F-test for Poolability: 54.468
P-value: 0.0000
Distribution: F(55,293)

Included effects: Entity, Time

Estimated ATE (w/ FE, all years): -0.0110
```

2.4 Question 8: Repeat the analysis in question 7 but include all states (even those that expanded after 2014). Are your results different? If so, why?

```
Q8: DiD Regression with All States and Years Included (w/ FE)
                          PanelOLS Estimation Summary
================================================================================
Dep. Variable:         uninsured_rate   R-squared:                        0.0206
Estimator:                   PanelOLS   R-squared (Between):             -0.0767
No. Observations:                 350   R-squared (Within):               0.1843
Date:                Tue, Apr 15 2025   R-squared (Overall):             -0.0633
Time:                        11:32:12   Log-likelihood                    1005.3
Cov. Estimator:            Unadjusted
                                        F-statistic:                      6.1670
Entities:                          50   P-value                           0.0136
Avg Obs:                       7.0000   Distribution:                   F(1,293)
Min Obs:                       7.0000
Max Obs:                       7.0000   F-statistic (robust):             6.1670
                                        P-value                           0.0136
Time periods:                       7   Distribution:                   F(1,293)
Avg Obs:                       50.000
Min Obs:                       50.000
Max Obs:                       50.000

                             Parameter Estimates
================================================================================
             Parameter  Std. Err.     T-stat    P-value    Lower CI    Upper CI
--------------------------------------------------------------------------------
interaction    -0.0110     0.0044    -2.4833     0.0136     -0.0197     -0.0023
================================================================================

F-test for Poolability: 54.468
P-value: 0.0000
Distribution: F(55,293)

Included effects: Entity, Time

Estimated ATE (All States, w/ FE): -0.0110
```

2.4.1 Are the results different from Question 7? If so, why?

The estimated average treatment effect (ATE) using a difference-in-differences (DiD) model with state and year fixed effects remained the same at **−0.0110**, even after including all states (including those that expanded Medicaid after 2014).

Possible Explanations:

- **Most Medicaid expansions occurred in 2014**, so the majority of treatment variation is already captured by those states.

- **States that expanded after 2014** (e.g., Missouri in 2021, North Carolina in 2023) are not considered treated in the 2012–2018 analysis window. Thus, they behave like non-expanding states during this period.
- Because these later expanders do not contribute new treatment variation within the sample window, **their inclusion has no meaningful effect on the estimated ATE**.

2.4.2 Summary:

The inclusion of all states did **not materially alter the DiD results**, because the key expansion variation still occurred in 2014—already accounted for in the base model.

2.5 Question 9: Provide an "event study" graph showing the effects of Medicaid expansion in each year. Use the specification that includes state and year fixed effects, limited to states that expanded in 2014 or never expanded.

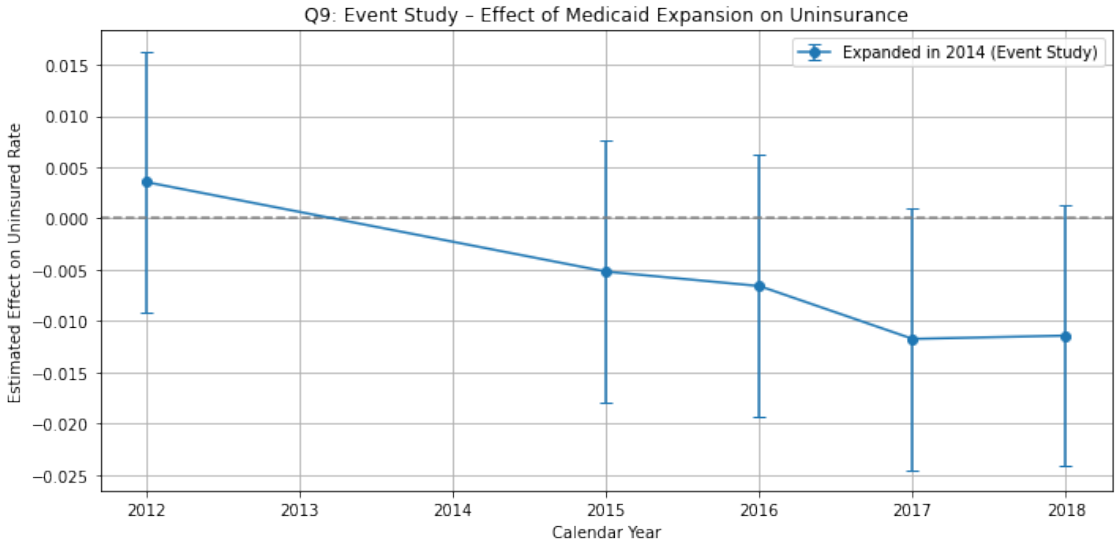
```
/var/folders/6z/mn9hb6p56ms_p7_tp4k05vl40000gn/T/ipykernel_87479/2058081198.py:5
3: AbsorbingEffectWarning:
Variables have been fully absorbed and have removed from the regression:

event_m3

  expand_model = PanelOLS.from_formula(expand_formula, data=expanders,
check_rank=False, drop_absorbed=True).fit()
/var/folders/6z/mn9hb6p56ms_p7_tp4k05vl40000gn/T/ipykernel_87479/2058081198.py:8
7: AbsorbingEffectWarning:
Variables have been fully absorbed and have removed from the regression:

event_m3

  event_model = PanelOLS.from_formula(formula, data=event_df, check_rank=False,
drop_absorbed=True).fit()
```



2.6 Question 10: Repeat part 9 but again include states that expanded after 2014. Note: this is tricky...you need to put all states onto "event time" to create this graph.

```
/var/folders/6z/mn9hb6p56ms_p7_tp4k05vl40000gn/T/ipykernel_87479/2630385980.py:3
0: AbsorbingEffectWarning:
Variables have been fully absorbed and have removed from the regression:

event_m3
```

```
  event_model_q10 = PanelOLS.from_formula(formula_q10, data=event_df_q10,
check_rank=False, drop_absorbed=True).fit()
```