COVID-19 IMPACT IN CUYAHOGA COUNTY, OH
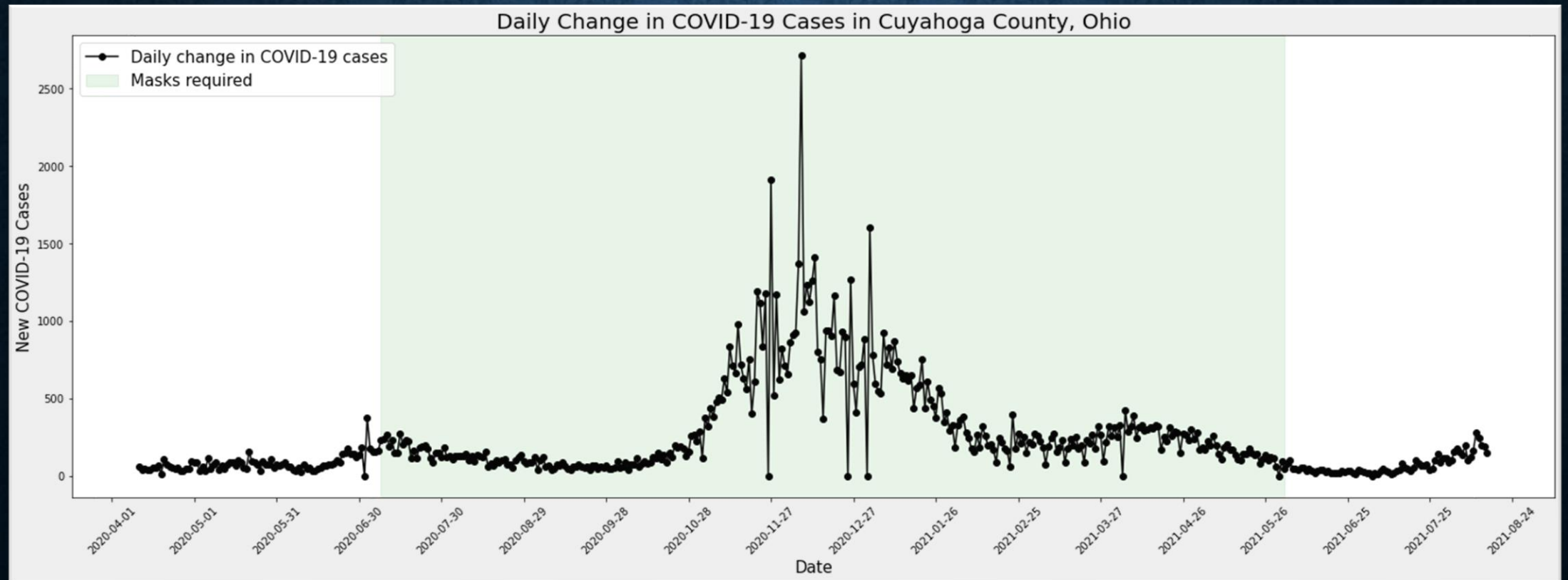
By Ryan Williams

RESEARCH QUESTIONS

1. Did masking policies change the progression of COVID-19 cases in Cuyahoga County, OH?

2. Is there a correlation between COVID-19 infections and unemployment in Cuyahoga?

3. Was employment in Cuyahoga impacted more by COVID-19 than the other counties in the Cleveland-Elyria metropolitan area?
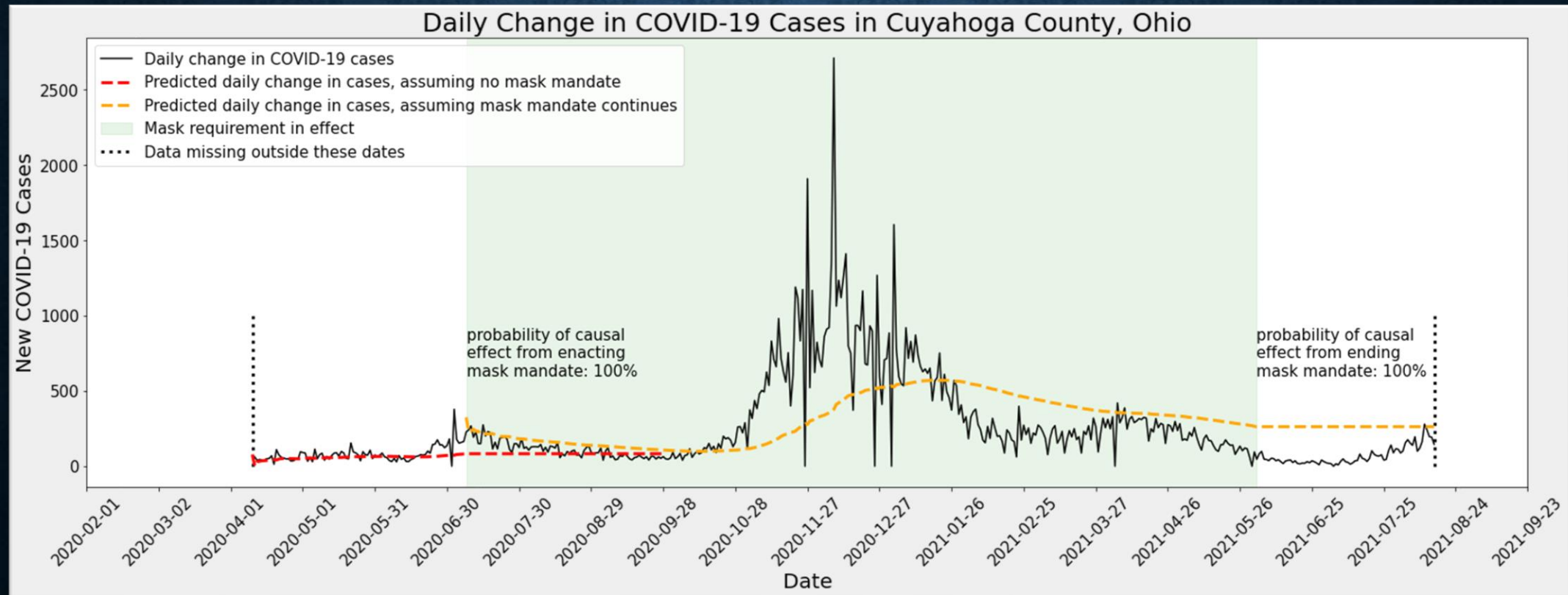
Q1: DID MASKING POLICIES CHANGE THE PROGRESSION OF COVID-19 CASES IN CUYAHOGA COUNTY, OH?

- Methodology: Take a counterfactual approach using time series forecasts

Q1: DID MASKING POLICIES CHANGE THE PROGRESSION OF COVID-19 CASES IN CUYAHOGA COUNTY, OH?

- Result: Statistical significance in forecast vs. actuals, but forecasts are naive
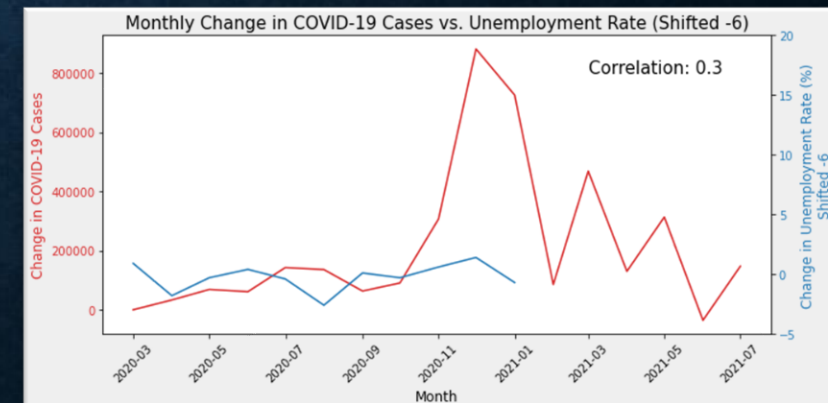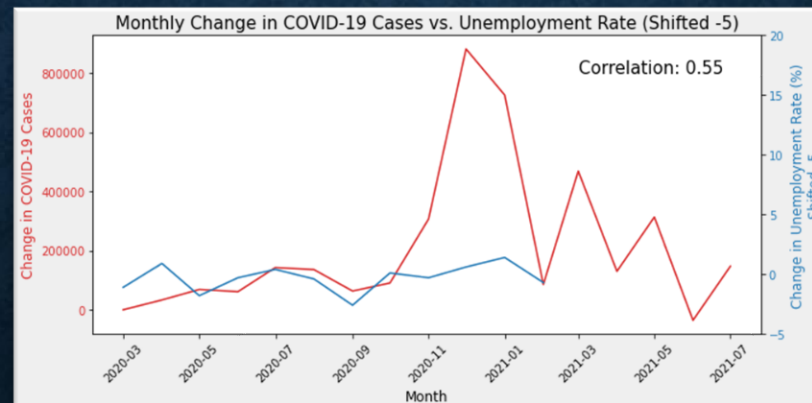

Daily Change in COVID-19 Cases in Cuyahoga County, Ohio

Q2: IS THERE A CORRELATION BETWEEN COVID-19 INFECTIONS AND UNEMPLOYMENT IN CUYAHOGA?

- Methodology: Calculate Pearson correlation between monthly change in COVID-19 cases and unemployment
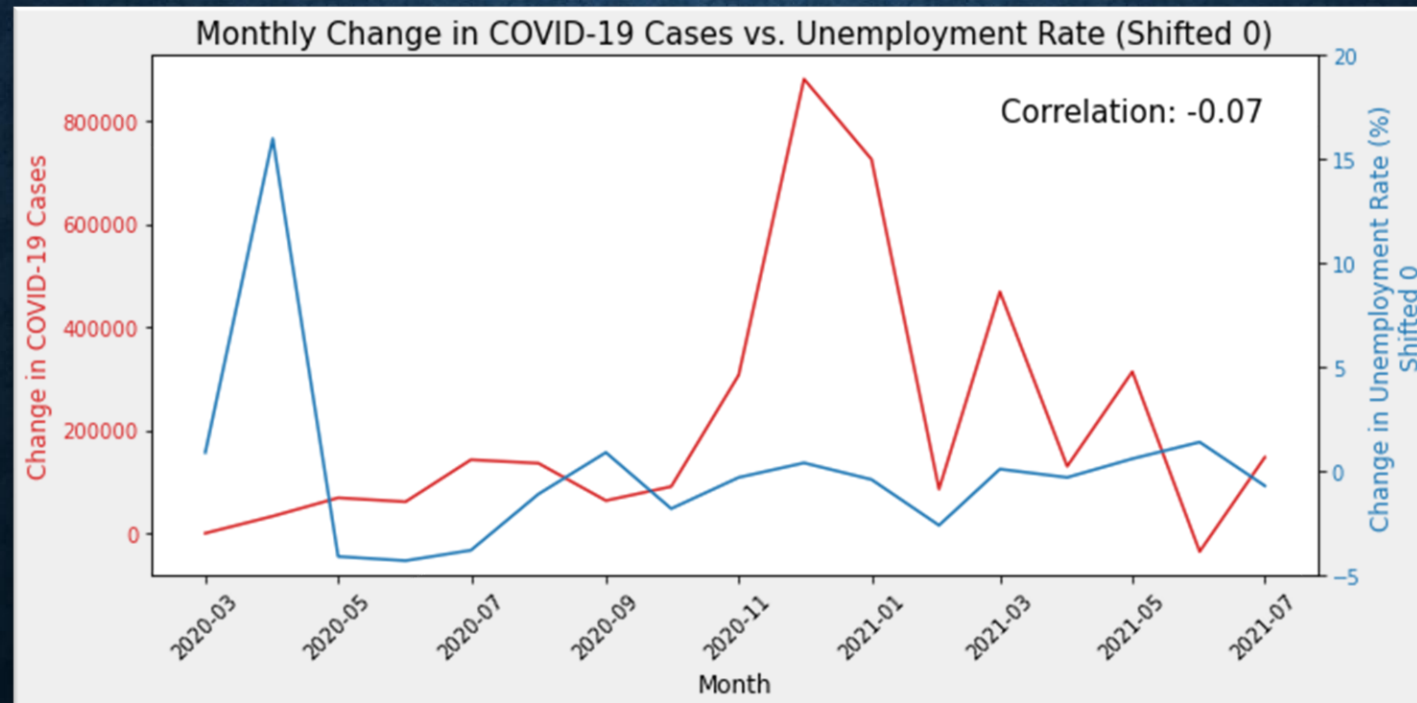
Q2: IS THERE A CORRELATION BETWEEN COVID-19 INFECTIONS AND UNEMPLOYMENT IN CUYAHOGA?

- Methodology: Introduce lags since infections may be a leading indicator
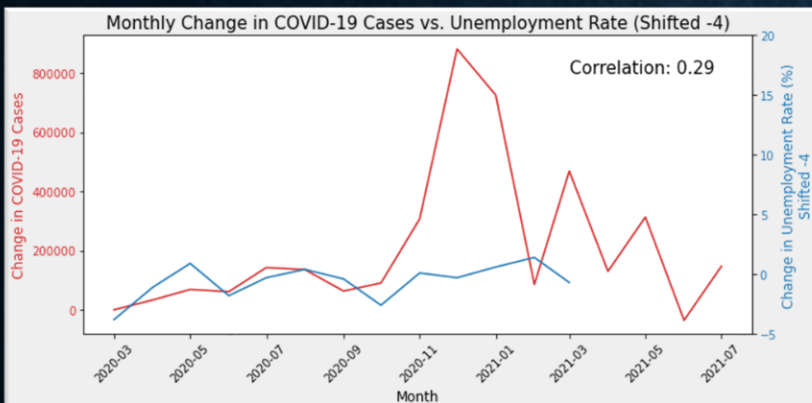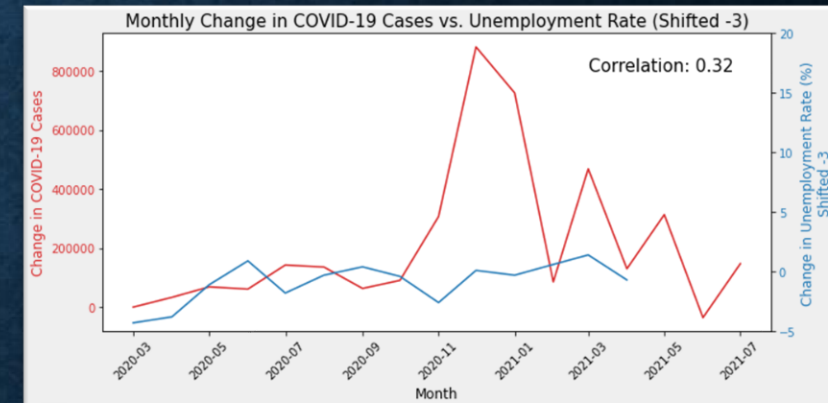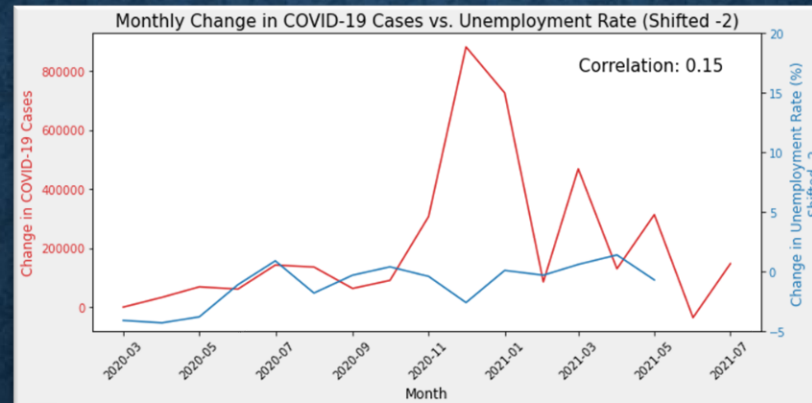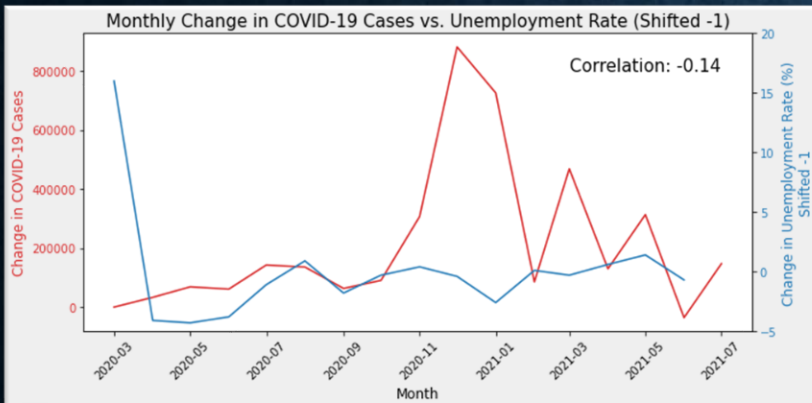
Q2: IS THERE A CORRELATION BETWEEN COVID-19 INFECTIONS AND UNEMPLOYMENT IN CUYAHOGA?

- Result: Correlation is highest with a 5-month lag, but never very high
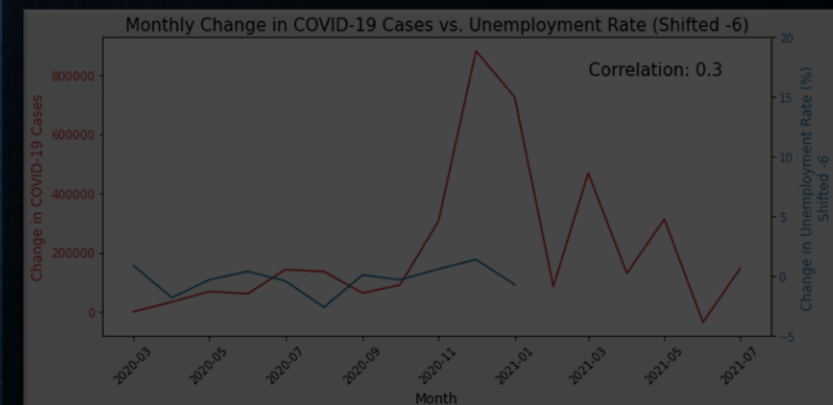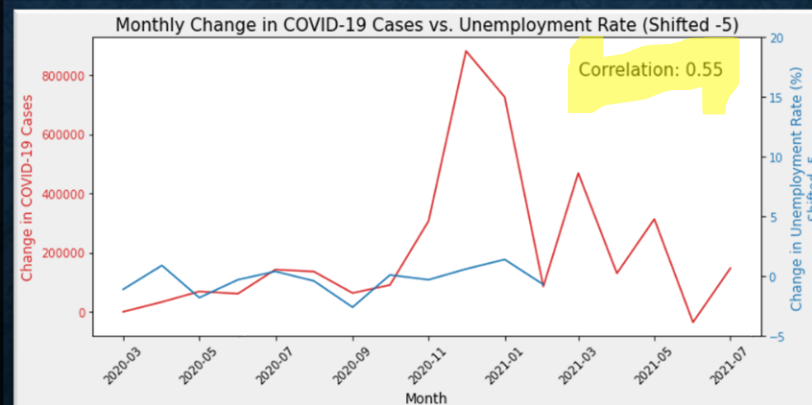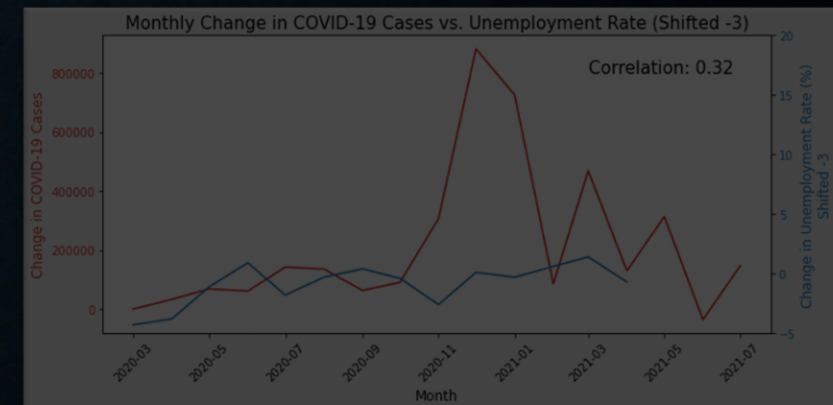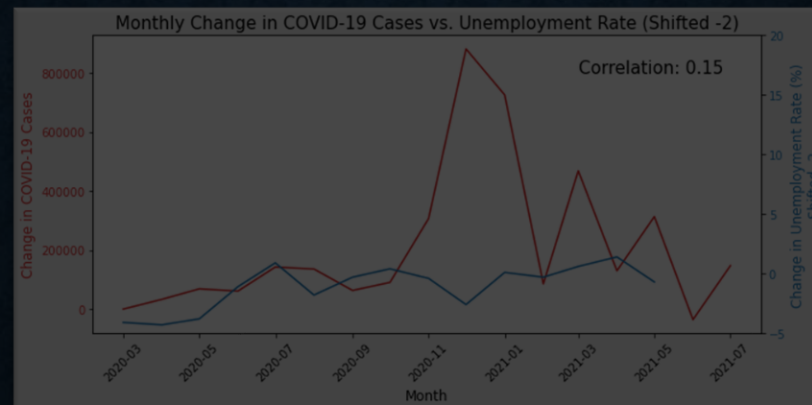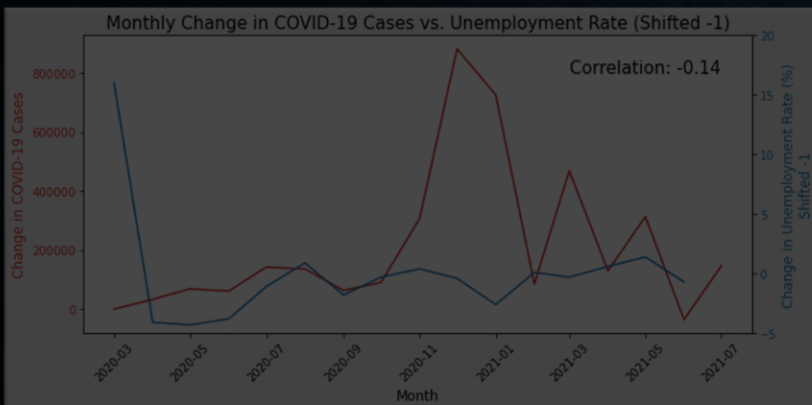
Q3: WAS EMPLOYMENT IN CUYAHOGA IMPACTED MORE BY COVID-19 THAN THE OTHER COUNTIES IN THE METRO AREA?

• Methodology: Compare OLS regressions for each county (values & slope)

Q3: WAS EMPLOYMENT IN CUYAHOGA IMPACTED MORE BY COVID-19 THAN THE OTHER COUNTIES IN THE METRO AREA?

- Methodology (cont.): Calculate significance of difference in actuals & slope using two separate regressions

Unemployment ~ 1 + Time + County

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==============================================================================
Dep. Variable:            Unemployment   R-squared:                       0.672
Model:                             OLS   Adj. R-squared:                  0.649
Method:                  Least Squares   F-statistic:                     29.68
Date:                 Sun, 05 Dec 2021   Prob (F-statistic):           9.64e-08
Time:                         01:21:09   Log-Likelihood:                -75.375
No. Observations:                   32   AIC:                             156.8
Df Residuals:                       29   BIC:                             161.1
Df Model:                            2
Covariance Type:             nonrobust
==============================================================================
                    coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept        14.6252      1.021     14.321      0.000      12.537      16.714
County[T.Geauga] -3.5937      0.947     -3.793      0.001      -5.532      -1.656
Time             -0.6892      0.103     -6.706      0.000      -0.899      -0.479
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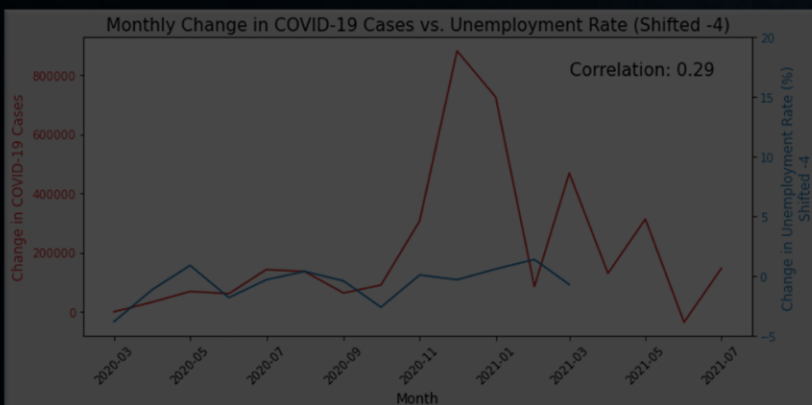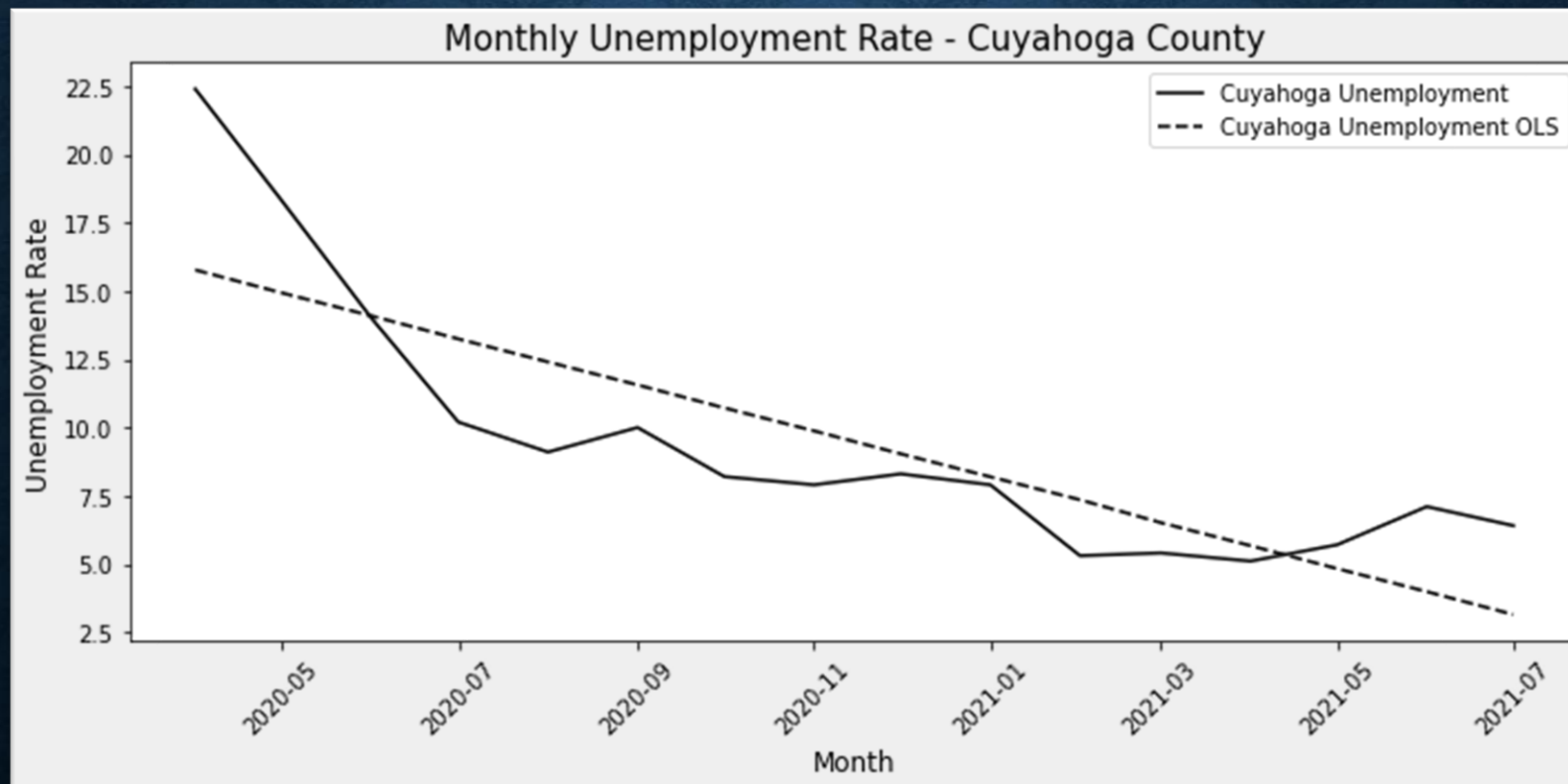
Unemployment ~ 1 + Time + County + (Time * County)

```
==============================================================================
Dep. Variable:            Unemployment   R-squared:                       0.697
Model:                             OLS   Adj. R-squared:                  0.664
Method:                  Least Squares   F-statistic:                     21.46
Date:                 Sun, 05 Dec 2021   Prob (F-statistic):           2.03e-07
Time:                         00:04:51   Log-Likelihood:                -74.103
No. Observations:                   32   AIC:                             156.2
Df Residuals:                       28   BIC:                             162.1
Df Model:                            3
Covariance Type:             nonrobust
==============================================================================
                          coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept              15.7728      1.251     12.605      0.000      13.210      18.336
County[T.Geauga]       -5.8890      1.770     -3.328      0.002      -9.514      -2.264
Time                   -0.8422      0.142     -5.925      0.000      -1.133      -0.551
Time:County[T.Geauga]   0.3060      0.201      1.522      0.139      -0.106       0.718
```

Q3: WAS EMPLOYMENT IN CUYAHOGA IMPACTED MORE BY COVID-19 THAN THE OTHER COUNTIES IN THE METRO AREA?

- Result 1 (Values): Geauga, Medina significantly different at alpha = 0.0125* level
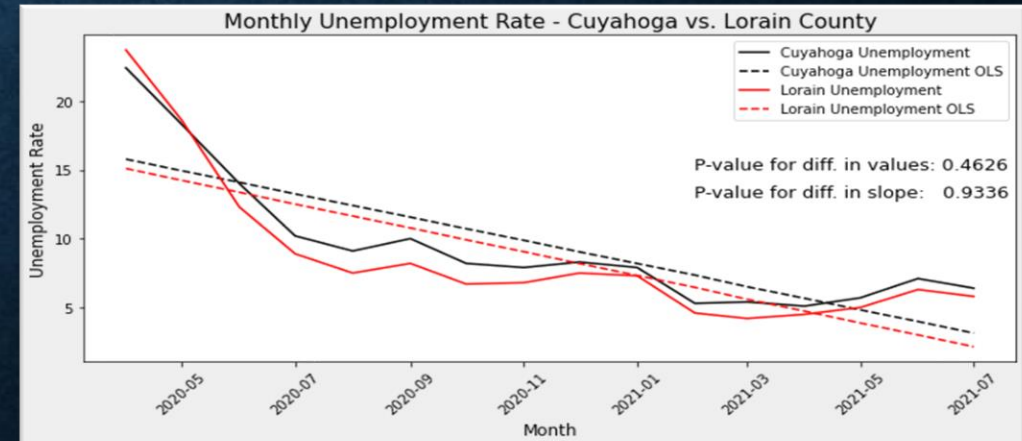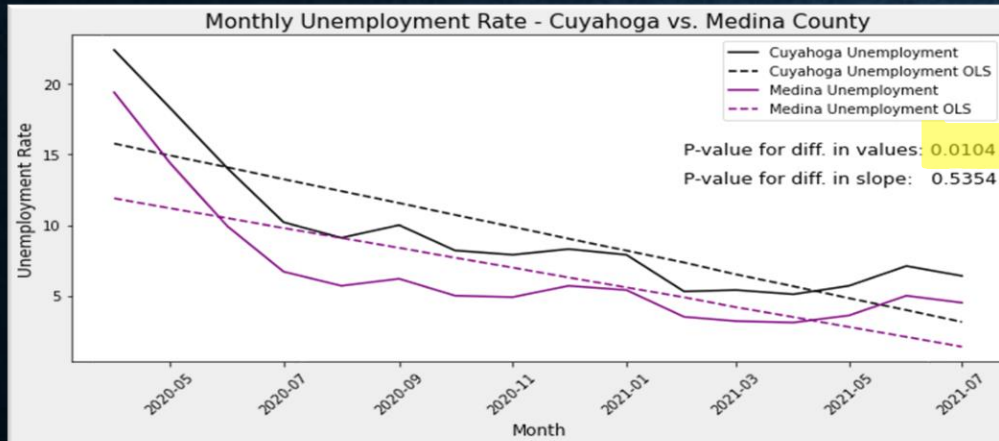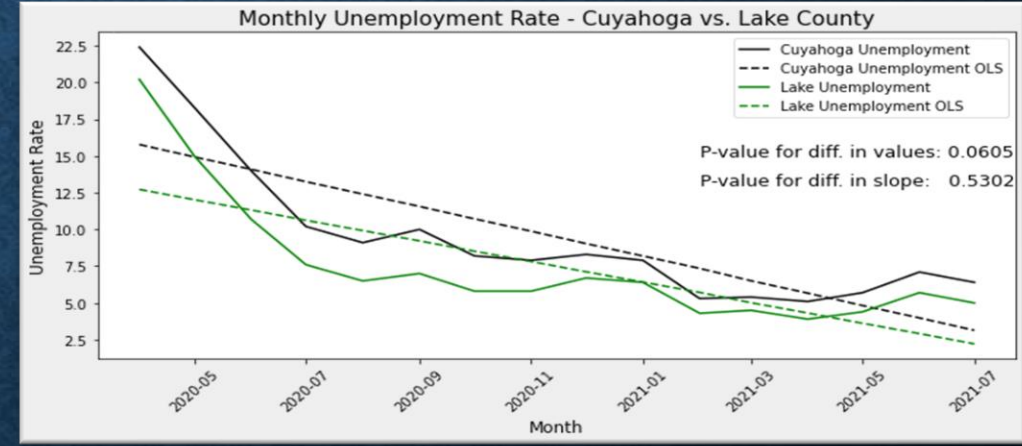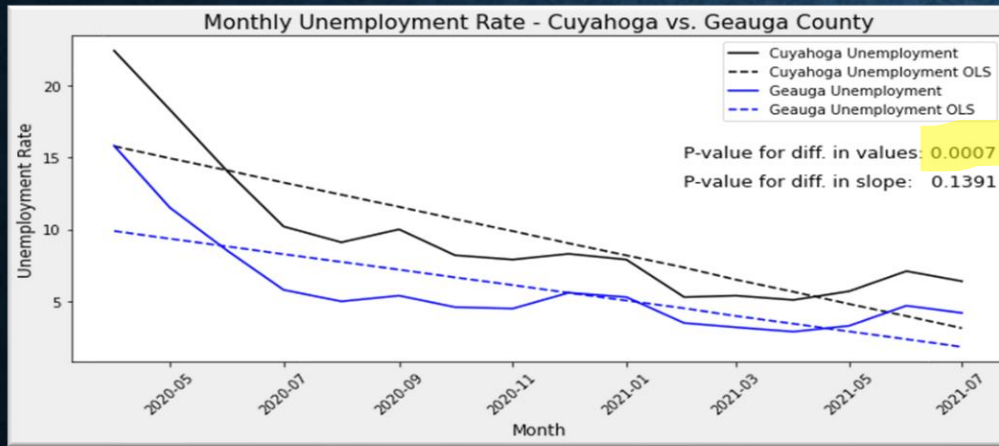
*Alpha = 0.05 w/ Bonferroni correction

Q3: WAS EMPLOYMENT IN CUYAHOGA IMPACTED MORE BY COVID-19 THAN THE OTHER COUNTIES IN THE METRO AREA?

- Result 2 (Slopes): No differences statistically significant at alpha = 0.0125* level

*Alpha = 0.05 w/ Bonferroni correction
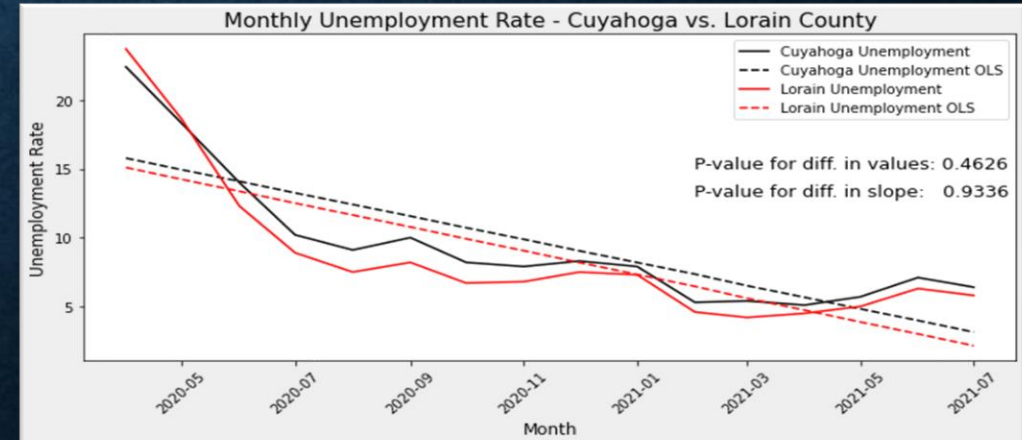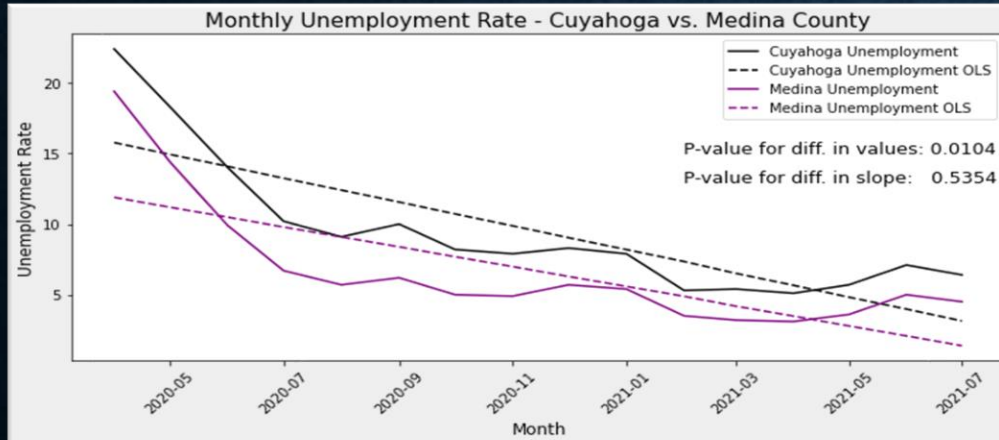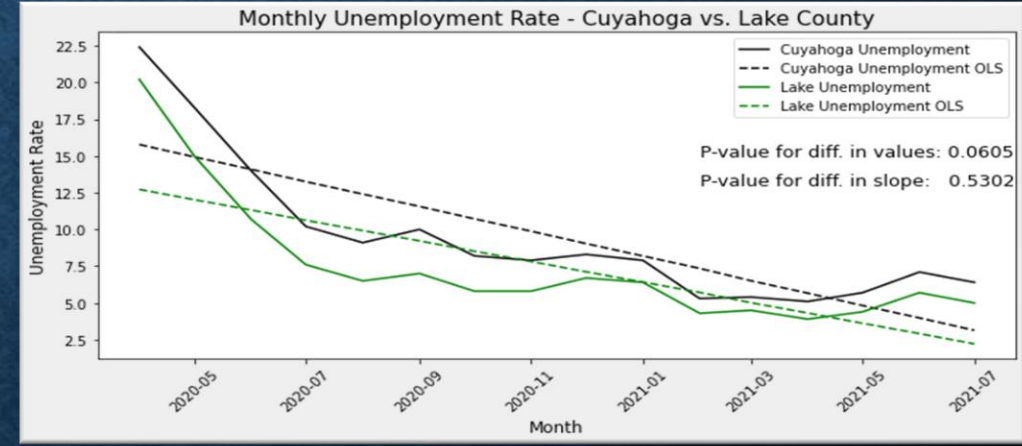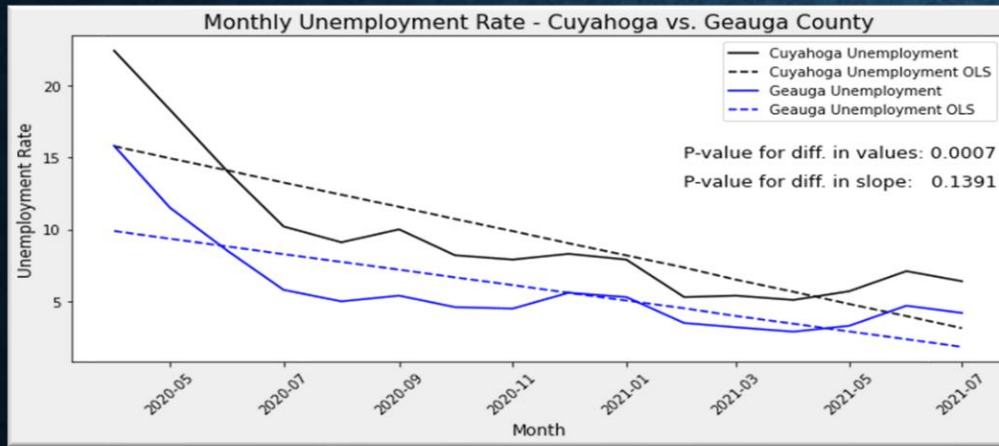
SUMMARY OF CONCLUSIONS

1. Masking policy did have a significant impact on the spread of COVID-19 in Cuyahoga (but need a less naïve infection model to validate)

2. Weak correlation between changes in infection rate and unemployment – likely policy driven rather than infection driven

3. Unemployment rate in Cuyahoga was significantly higher than Geauga and Medina throughout the pandemic, but rate of change not significantly different than any other county in metro area