**Technical Appendix: Formal Models**

Notation: i subscript for county, t subscript for day

Model: Difference-in-Difference

1. $Y\_{it}=α\_{1}M\_{it}+ ΔX\_{it}+ ϕ\_{i}+ϕ\_{t}+ϵ\_{it} $
2. $Z\_{it}=β\_{1}M\_{it}+ ΔX\_{it}+ ϕ\_{i}+ϕ\_{t}+ϵ\_{it} $

Model: Event Study

1. $Y\_{it}=γ\_{1}T\_{it}^{-3} +γ\_{2}T\_{it}^{-2}+γ\_{3}T\_{it}^{1} +γ\_{4}T\_{it}^{2} +γ\_{5}T\_{it}^{3} +γ\_{6}T\_{it}^{4} +γ\_{7}T\_{it}^{5}+ΔX\_{it}+ ϕ\_{i}+ϕ\_{t}+ϵ\_{it} $
2. $Z\_{it}=δ\_{1}T\_{it}^{-3} +δ\_{2}T\_{it}^{-2}+δ\_{3}T\_{it}^{1} +δ\_{4}T\_{it}^{2} +δ\_{5}T\_{it}^{3} +δ\_{6}T\_{it}^{4} +δ\_{7}T\_{it}^{5}+ΔX\_{it}+ ϕ\_{i}+ϕ\_{t}+ϵ\_{it} $

Where,

$Y\_{it}$ is the number of inpatient beds occupied by a patient with COVID-19 per 100,000 individuals on day t, in county i

$Z\_{it}$ is the % of inpatient beds in county i occupied with COVID-19 patients on day t

$M\_{it}$ is equal to 1 if county i was subject to a mask mandate on day t, 0 otherwise

$T\_{it}^{-3}$ is equal to 1 if day t is 29-42 days before county i was subject to a mask mandate, 0 otherwise

$T\_{it}^{-2}$ is equal to 1 if day t is 15-28 days before county i was subject to a mask mandate, 0 otherwise

$T\_{it}^{1}$ is equal to 1 if day t is 0-14 days after county i was subject to a mask mandate, 0 otherwise

$T\_{it}^{2}$ is equal to 1 if day t is 15-28 days after county i was subject to a mask mandate, 0 otherwise

$T\_{it}^{3}$ is equal to 1 if day t is 29-42 days after county i was subject to a mask mandate, 0 otherwise

$T\_{it}^{4}$ is equal to 1 if day t is 43-56 days after county i was subject to a mask mandate, 0 otherwise

$T\_{it}^{5}$ is equal to 1 if day t is 57-70 days after county i was subject to a mask mandate, 0 otherwise

$X\_{it}$ includes additional policy covariates for county i at time t (includes gathering bans, stay-at-home orders, restaurant closures, bar closures (note these are individual dummy variables for each policy).

$ϕ\_{i}$ are county fixed effects

$ϕ\_{t}$ are day fixed effects

$ϵ\_{it}$ is the error term

Note: $T\_{it}^{-1}$ left out as reference period in event study models (1-14 days before mask implementation). Analyses were also conducted at the Hospital Referral Region level in addition to county-level.