Accounting for the health benefits of air pollution regulations in China, 2013-2019

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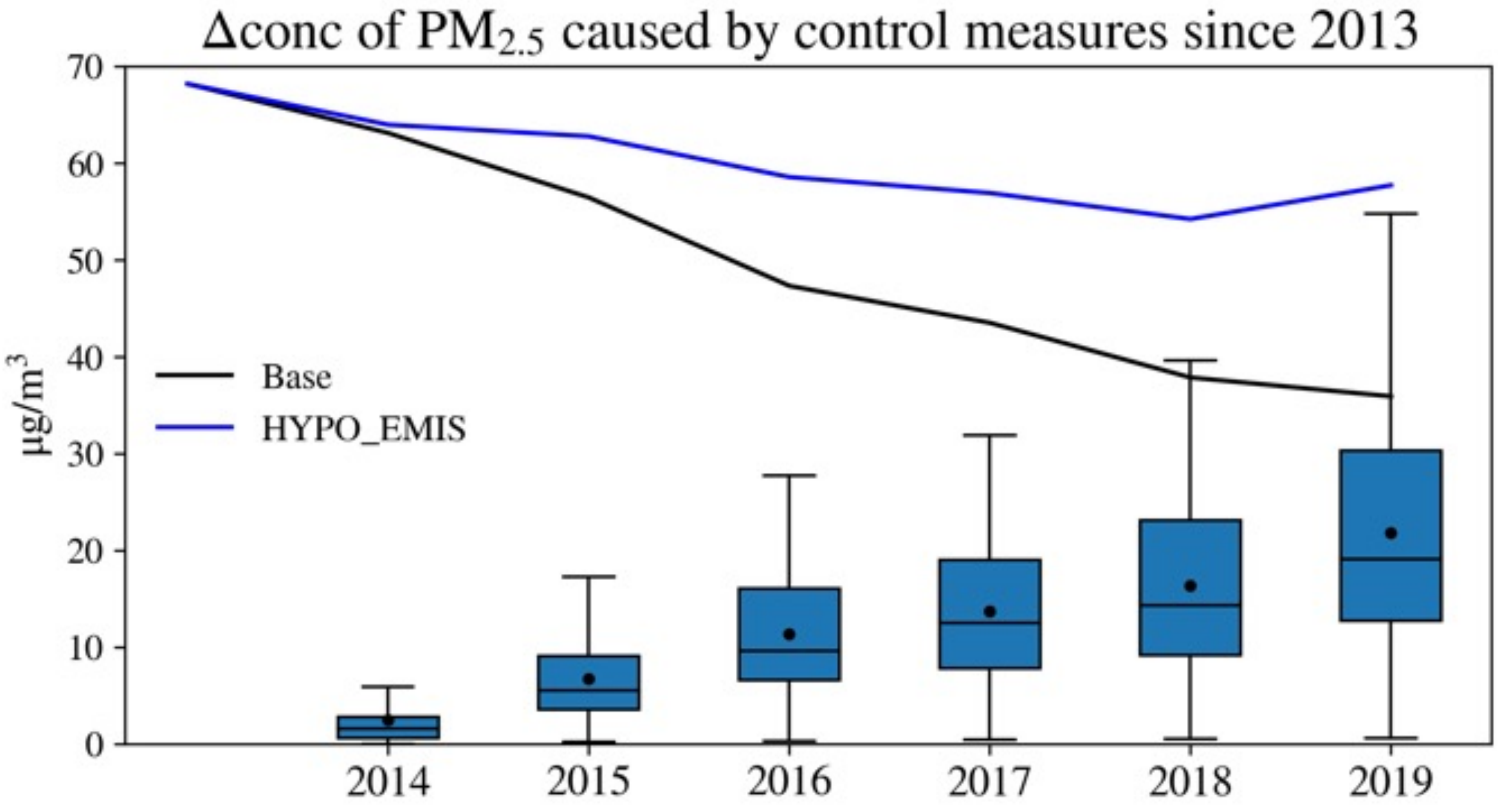
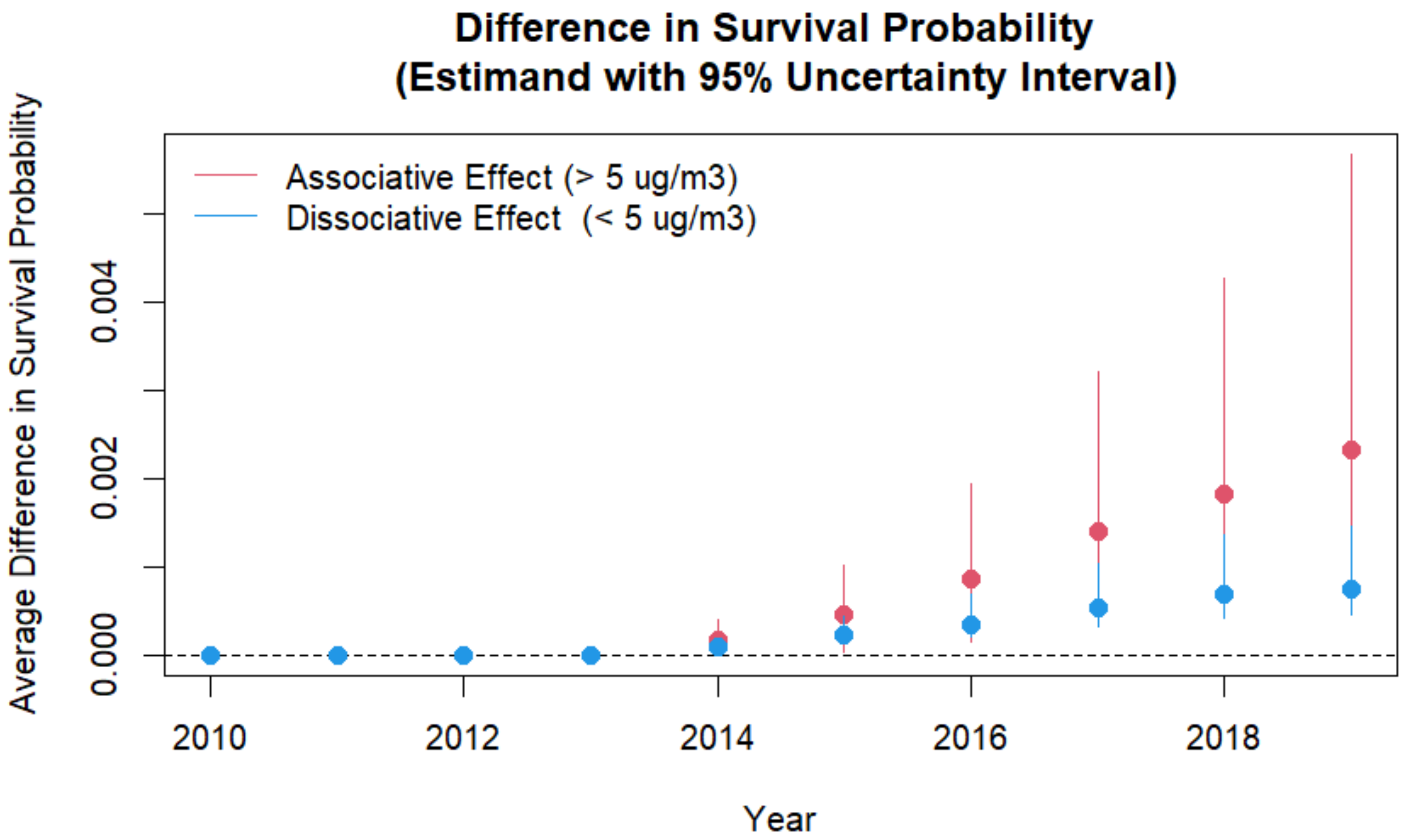
Strategy

1. Define observed surface concentrations of $PM_{2.5}$ and ozone from 2008-2019 using available gridded hybrid model estimates
2. Use CMAQ to model ambient $PM_{2.5}$ and ozone changes from 2008-19 across China with:
   a. Observed emissions and meteorology **–> representing observed concentrations**
   b. Constant 2013 emissions but observed meteorology **-> what would concentrations have been without the 2013+ regulations?**
   c. Use the location-specific differences in these two scenarios, applied to observed concentrations, to define places where regulations had greater or lesser air quality benefits (e.g., more than 5 $\mu g/m^3$ reduction in $PM_{2.5}$)
3. Analyze changes in mortality rates over space and time from two large, nationally representative Chinese cohorts, amounting to over 200,000 individuals
   - Ask: how did survival probabilities change in places that were more impacted by regulations?

Effects of 2013 regulations on $PM_{2.5}$ in China based on CMAQ modeling





Increase in survival probability for locations in China where regulations led to more than or less than 5 $\mu g/m^3$ reduction in $PM_{2.5}$ concentrations from 2013-2019. Based on the Chinese Chronic Diseases Risk Factor Surveillance cohort (N=229,629)