

Suppose that we observe two states, $s = \{0, 1\}$, where one was affected by a policy change and the other was not. The policy change was time dependent, such that neither state was affected in $t = 0$ but one was affected when $t = 1$.

$$Y_{ist} = \bar{Y} + \tau D_{st} + \gamma_s + \delta_t + \epsilon_{st} + u_{ist}$$

The treatment is only indexed by s and t , since the treatment does not vary at the individual level, but only the state level. The component δ_t captures any time trend that changes for both states, over time. The error term ϵ_{st} is the aggregate randomness, whereas u_{ist} is the individual, idiosyncratic error term. Even in the treated state, D_{st} is set to 0 when $t = 0$ — before the treatment is enacted.

This specification ensures that $\bar{u}_{st} = 0$, since any mean effect will be folded into the ϵ_{st} term.

We need to be worried about factors that vary at the level of the treatment. Absent the treatment, the two states *would have* followed similar trajectories. Is this true for IDN and MYS? Are there differential impacts to changes in oil palm price? Force identification to nearby the policy shock, and soak up longer term trend variation. Policy endogeneity may be an issue. Higher rates of deforestation may have focused conservation attention on Indonesia. Why should this be a problem?

The regression form is:

$$\begin{aligned} Y_{ist} &= \alpha + \tau D_{st} + \gamma \mathbf{1}(s = 1) + \delta \mathbf{1}(t = 1) + \epsilon_{st} + u_{ist} \\ &\Leftrightarrow \\ Y_{ist} &= \alpha + \tau \mathbf{1}(s = 1) \mathbf{1}(t = 1) + \gamma \mathbf{1}(s = 1) + \delta \mathbf{1}(t = 1) + \epsilon_{st} + u_{ist} \end{aligned}$$