TOC:

Model 1

$$Delay_{it} = \beta_0 + \beta_1 Treat_i + \beta_2(Treat_i \times Post_t) + \beta_3 \rho_{ft} + \beta_4(\rho_{ft} \times Post_t) + \beta_5(\rho_{ft} \times Post_t \times Treat_i) + \eta_t + \gamma_f + \epsilon_{it}$$

where

γ_f = Firm fixed effects, and

$\rho_{ft} = 4\sum_t FAO/Sales$ of firm f in quarter t.

Essentially, ρ_{ft} should be defined for all projects of a firm in a given quarter and not just "small" ones.

To illustrate this with an example, suppose we have just one firm with:

- two projects, one small and one large
- two quarters, Quarter 1 (before QP) and Quarter 2 (after QP)
- Say the firm's "business reliance" in the two quarters is $\rho_{f,Q1}$ = 0.25 and $\rho_{f,Q2} = 0.5$

Small Project

Quarter 1 delay = $\beta_0 + \beta_1 + 0.25\beta_3$

Quarter 2 delay = $\beta_0 + \beta_1 + \beta_2 + 0.5\beta_3 + 0.5\beta_4 + 0.5\beta_5$

Difference = $\beta_2 + 0.25\beta_3 + 0.5\beta_4 + 0.5\beta_5$

Large Project

Quarter 1 delay = $\beta_0 + 0.25\beta_3$

Quarter 2 delay = $\beta_0 + 0.5\beta_3 + 0.5\beta_4$

Difference = $0.25\beta_3 + 0.5\beta_4$

Difference between Small and Large

$$\underbrace{\beta_2}_{\text{baseline treatment effect}} + \underbrace{0.5\beta_5}_{\text{intensity effect for treated units after QP}}$$

Takeaways

- I think this is the complete model that we should consider

Model 2

$$Delay_{it} = \beta_0 + \beta_1 Treat_i + \beta_2(Treat_i \times Post_t) + \beta_3(\rho_{ft} \times Post_t) + \eta_t + \gamma_f + \epsilon_{it}$$

where γ_f = Firm fixed effects, and $\rho_{ft} = 4\sum_t FAO/Sales$ of firm f in quarter t for *small projects only*

To illustrate this with an example, suppose we have just one firm with:

- two projects, one small and one large
- two quarters, Quarter 1 (before QP) and Quarter 2 (after QP)
- Say the firm's "business reliance" in the two quarters is $\rho_{f,Q1}$ = 0.25 and $\rho_{f,Q2} = 0.5$

Small Project

Quarter 1 delay = $\beta_0 + \beta_1 + 0.25\beta_3$

Quarter 2 delay = $\beta_0 + \beta_1 + \beta_2 + 0.5\beta_3$

Difference = $\beta_2 + 0.25\beta_3$

Large Project

Quarter 1 delay = β_0

Quarter 2 delay = β_0

Difference = 0

Difference between Large and Small

$$\underbrace{\beta_2}_{\text{baseline treatment effect}} + \underbrace{0.25\beta_3}_{\text{intensity effect after QP}}$$

Takeaways

- This model omits a baseline change in "business reliance" that would have occured even if quickpay was not implemented

Model 3

$Delay_{it} = \beta_0 + \beta_1 Treat_i + \beta_2(Treat_i \times Post_t) + \beta_3 \rho_{ft} + \beta_4(\rho_{ft} \times Post_t) + \eta_t + \gamma_f + \epsilon_{it}$

where γ_f = Firm fixed effects, and $\rho_{ft} = 4\sum_t FAO/Sales$ of firm f in quarter t for *small projects only*

To illustrate this with an example, suppose we have just one firm with:

- two projects, one small and one large
- two quarters, Quarter 1 (before QP) and Quarter 2 (after QP)
- Say the firm's "business reliance" in the two quarters is $\rho_{f,Q1}$ = 0.25 and $\rho_{f,Q2} = 0.5$

Small Project

Quarter 1 delay = $\beta_0 + \beta_1 + 0.25\beta_3$

Quarter 2 delay = $\beta_0 + \beta_1 + \beta_2 + 0.5\beta_3 + 0.5\beta_4$

Difference = $\beta_2 + 0.25\beta_3 + 0.5\beta_4$

Large Project

Quarter 1 delay = β_0

Quarter 2 delay = β_0

Difference = 0

Difference between Large and Small

$$\underbrace{\beta_2}_{\text{baseline treatment effect}} + \underbrace{0.25\beta_3}_{\text{baseline intensity effect}} + \underbrace{0.5\beta_4}_{\text{intensity effect after QP}}$$

Takeaways

- This model considers a baseline change in “business reliance” that would have occured even if quickpay was not implemented
- But it does so only for “small” projects, when in reality, this effect would be true for both small and large projects of a given firm