Proposal V2 — Econometric Design (Final Draft, Simplified)

The econometric are designed to estimate how Israel's two port reforms --competition entry of private deep-water terminals ,and the subsequent privatization of legacy operators -- impacted labor productivity in the Haifa port and the Ashdod port. The design has two parts: First, a staggered event-study quantifies the dynamic impact of each reform on labor productivity. Second, a 2SLS mediation design estimates the effect of capital deepening on productivity and decomposes the total reform effect into indirect (through K/L) and direct components.

Part 1: regress ln(LP) on reforms

Equation.

$$ Y_{p,t} = \alpha_p + \delta_t \; + \; \beta_0\,\mathbf{1}{\tau^{(r)}*{p,t}=0} \; + \; *beta_1*\,*mathbf{1}{1*le *tau^{(r)}*\le 6} \; + \; \beta_2\,\mathbf{1}{7\le \tau^{(r)}*{p,t}*\le 24} \; + \; *psi*\,*S*, $$} + \varepsilon_{p,t

with all pre-reform months ($\tau_{p,t}^{(r)} < 0$) omitted as the reference category. Bins are: **Event month** (β_0), **Early** (months 1–6; β_1), and **Sustained** (months 7–24; β_2).

TERMS.

- **Outcome** $Y_{p,t}$: log labor productivity at port p in month t .
- **Fixed effects** α_p, δ_t : port FE (time-invariant differences); month FE (nationwide shocks/seasonality).
- **Event time** $\tau_{p,t}^{(r)}$: months since reform r (competition or privatization) at port p .
- **Spillover flag** $S_{p,t}$: the other port is already post-reform.
- **Error** $\varepsilon_{p,t}$: SEs clustered by port; wild bootstrap for small G .

IDENTIFICATION.

- **Treatment (for reform **********r **********)**: months with $\tau_{p,t}^{(r)} \geq 0$ at port p .
- **Controls (not-yet-treated only)**: (i) the same port's **pre** months ($\tau < 0$); (ii) the other port's months **before** it experiences the same reform. Months when **both** ports are already treated for r drop out (differenced by δ_t).
- **Estimator**: Sun–Abraham / Callaway–Sant'Anna to get average treatment effects using only not-yet-treated comparisons.

INTERPRETATION.

- β_0 : immediate change at the reform month.
- β_1 : average change in the first six months after reform.

- β_2 : average change in months 7–24 after reform. Interpret each as a percent change relative to pre-reform using only valid not-yet-treated comparisons. Together these coefficients communicate whether each reform raised productivity, how quickly effects appear, and whether they persist.

Part 2: 2SLS to get impact of reform on ln(LP) mediated by ln(K/L)

Equations.

$$\text{First stage:}\quad M_{p,t} = \alpha_p + \delta_t + \lambda_1 T^{\text{comp}}_{p,t} + \lambda_2 T^{\text{priv}}_{p,t} + \omega Z_{p,t} + u_{p,t}.\ \text{Second stage:}\quad Y_{p,t} = \alpha_p + \delta_t + \beta_M \widehat{M}_{p,t} + \theta_1 T^{\text{comp}}_{p,t} + \theta_2 T^{\text{priv}}_{p,t} + \varepsilon_{p,t}.$$

TERMS.

- **Mediator** $M_{p,t}$: log capital deepening $\ln(K/L)$.
- **Reform timing** $T^{\text{comp}}_{p,t}, T^{\text{priv}}_{p,t}$: calendar-time dummies (post-competition; post-privatization).
- **Instruments** $Z_{p,t}$: concrete engineering milestones that shift K/L , e.g., **STS crane commissioning by class** (Panamax/Post-Panamax/Super-Post-Panamax), **berth deepening and channel dredging completion** (meters × depth), **yard crane deliveries** (RTG/RMG), **terminal/yard automation go-live** (TOS, gate OCR), and **new berth segments entering service**.
- **Fitted mediator** $\widehat{M}_{p,t}$ and **elasticity** β_M .
- **Fixed effects** α_p, δ_t : as in Model 1.

INTERPRETATION.

- From **Part 1**, take the total reform effects for the three windows (event month; months 1–6; months 7–24).
- From the **first stage**, compute the average change in predicted M over the same windows (ΔM).
- **Indirect effect via capital deepening:** $\text{IE} = (\Delta M) \times \beta_M$.
- **Direct effect:** $\text{DE} = \text{TE} - \text{IE}$.
- **Mediated share:** IE/TE (when TE > 0). These outputs jointly quantify the reform's impact (magnitude and timing) and the mechanism share attributable to capital deepening, stated in a way that is easy to read on two proposal pages.