

ANALYZING THE IMPACT OF COVID-19 LOCKDOWN POLICIES ON UNEMPLOYMENT USING STATA: A DIFFERENCE-IN-DIFFERENCES ECONOMETRIC APPROACH

1. Background and Problem Statement

The COVID-19 pandemic caused severe disruptions in labor markets worldwide. Countries implemented varying lockdown intensities, which may have influenced unemployment trends differently. To assess the causal effect of strict lockdowns on unemployment, the client requested a Difference-in-Differences (DiD) analysis using Stata. The study compares countries with high-stringency lockdown policies (treatment group) against countries with moderate measures (control group), before and after the pandemic onset.

2. Objectives

- To estimate the causal impact of COVID-19 lockdowns on national unemployment rates
- To apply a Difference-in-Differences estimator using Stata across panel data
- To test the validity of the parallel trends assumption and provide robust diagnostics
- To create a publication-ready APA-style econometric report including visuals and annotated code

3. Methodology

3.1 Data Source and Scope

- **Time Period:** 2018–2021 (quarterly data)
- **Countries:** 20 OECD countries (10 in treatment, 10 in control)
- **Variables:**
 - *Dependent Variable:* Unemployment Rate (%)
 - *Treatment Variable:* Lockdown Policy Stringency (binary: 1 = strict, 0 = moderate)
 - *Time Variable:* Post-lockdown dummy (1 = Q1 2020 onwards)
 - *Interaction Term:* Treatment $\times$ Post

3.2 Software and Commands

- Stata 17
- xtset, reg, reghdfe, twoway, didregress, test, coefplot, esttab

3.3 Estimation Strategy

- Two-way fixed effects model
- DiD specification:

$$\text{Unemployment}_{it} = \alpha + \beta_1 \text{Treatment}_i + \beta_2 \text{Post}_t + \beta_3 (\text{Treatment}_i \times \text{Post}_t) + \mu_i + \lambda_t + \epsilon_{it}$$

- Clustered robust standard errors by country
- Parallel trends visually tested using pre-trend comparison graphs

4. Key Results

Main DiD Estimation:

- Treatment effect (Interaction Term): $\beta = 1.92$, $p = 0.004$
- Pre-trend coefficients not statistically significant $\rightarrow$ supports parallel trends
- Country and quarter fixed effects statistically significant
- $R^2 = 0.81$

Interpretation of β : Countries with stricter lockdowns experienced, on average, a 1.92 percentage point higher increase in unemployment compared to control countries after lockdown enforcement.

Placebo Test: Using a fake treatment date (2019), the interaction effect was not significant, reinforcing the robustness of the true model.

5. Interpretation and Insights

- Lockdown stringency had a measurable and significant effect on short-term labor market outcomes
- The increase in unemployment in treated countries highlights the economic cost of stringent mobility restrictions
- The DiD model controlled for unobserved country heterogeneity and time effects, validating causal inference

- Pre-trend graphs confirmed that the treatment and control groups followed similar unemployment paths prior to the pandemic

6. Recommendations

- Future public health crises should consider staggered or sector-specific lockdowns to mitigate unemployment shocks
- Support mechanisms like wage subsidies or remote work programs could buffer employment losses in high-stringency contexts
- Ongoing monitoring of labor markets is essential post-lockdown to identify long-term structural effects

7. Deliverables

- .do file with full commented code including DiD estimation, tests, and graphs
- Final APA-formatted report (DOC and PDF)
- DiD coefficient plots and pre-trend graphs using coefplot and twoway
- Summary Excel sheet with regression tables, descriptive statistics, and variable dictionary

8. Stakeholder Relevance

Academic:

- Teaches DiD implementation in Stata with real-world policy relevance
- Suitable for coursework in Labor Economics, Applied Econometrics, and Public Policy Evaluation

Corporate:

- Valuable to consulting firms, economists, and government policy units evaluating the labor impact of crisis policies
- Can inform future emergency response strategies balancing health and economic outcomes