Evaluating the Economic Impact of EU Membership: A Synthetic Control Analysis

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Introduction

- **EU** governs 27 European nations under social, economic, and security policies, aiming for political and economic unity since the Maastricht Treaty in 1993 (Gabel, 2021).
- **Membership Benefits:** Promotes peace, freedom of movement, single market access, and global developmental aid.
- **Economic Growth:** The EU's single market contributes to an average increase in GDP per capita by 12% upon joining the EU, according to Campos et al. (2014).
- **Research Objective:** Investigate EU membership's impact on **GDP Per Capita.**

Data

- **Source:** World Development Indicators (WDI) 1980-2018 for all countries from the World Bank.
- **Size:** rows = 1209, columns = 24
- **Missing Data:** Dropped columns with over 50% missing values. Handled the rest by Histogram-based Gradient Boosting.
- **Important Variables:**
  'yearjoined' - the year countries joined the EU
  'GDP_PC' - GDP Per Capita

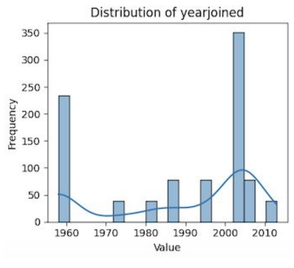


FIGURE 1: Frequency of EU Membership by Year of Joining

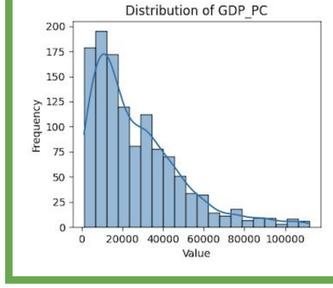


FIGURE 2: GDP Per Capita Distribution

Methods

Synthetic Control Method (SCM)

1. Estimators

$$Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \epsilon_t$$

Outcome (Yt): GDP per capita of the country at year t.

Predictors (X): Covariates believed to influence the outcome, such as FDI inflow, population density, and other WDI before treatment.

Weights (β): coefficients that are optimized to construct the synthetic control unit

2. Control Countries

3. Weights

$$\min_W \sum (X_i - X_D W)^2$$

Weights (W): sum to one and are non-negative.

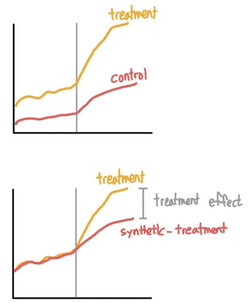
Xi: pre-treatment characteristics of the treated unit.

XD: pre-treatment characteristics of the treated unit of the control countries.

Evaluation

Tune Predictors and Weights

4. Synthetic Control



5. Performance

$$\tau_T = Y_{1T} - Y_{0T}$$

Treatment Effects: Effect of joining EU on GDP Per Capita for treated units in post-intervention period.

Potential Outcomes (Y_1T and Y_0T): Outcomes with treatment and without treatment if the unit is treated at time t

6. Validation

Placebo Tests: Re-assign treatment to units from the donor pool (control units) and re-estimate the model to generate a distribution of placebo effects.

Results

Country	Year Joined	Treatment Effect
Bulgaria	2007	1478.0343
Czech Republic	2004	532.292
Spain	1986	5063.9478
Estonia	2004	2178.9206
Finland	1995	3651.6778
Greece	1981	-457.8119
Hungary	2004	51.9585
Lithuania	2004	1772.611
Latvia	2004	2064.797
Poland	2004	-196.0478
Portugal	1986	5639.7199
Romania	2007	944.3368
Slovenia	2004	1600.0604
Sweden	1995	3822.2126

FIGURE 3: Treatment Effect Results Table

- **Positive Impact on GDP per Capita:** The majority of the countries exhibited positive treatment effects after joining EU, indicating an overall beneficial impact on their economies. Notably, Spain and Portugal, which joined in 1986, show significant increases in GDP per capita.

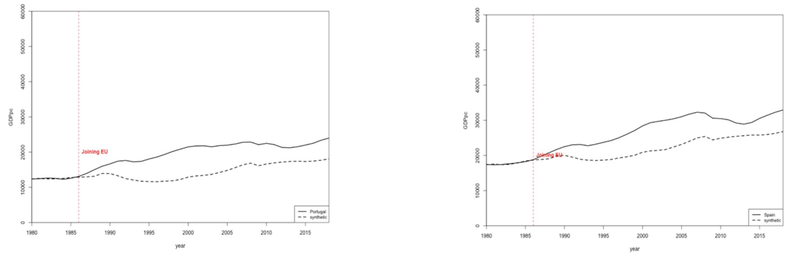


FIGURE 4: GDP Per Capita Trajectory for Portugal and Spain with Synthetic Control (joined EU in 1986)

- **Varied Effects Across Countries:** While most countries benefitted from EU membership, Greece, which joined in 1981, had a negative treatment effect, primarily due to its national credit crisis. This suggests that the impact is contingent upon a country's specific context.

Conclusions

Results:

- EU membership generally boosts GDP per capita.
- Effects vary by country.
- Placebo tests confirm the causal link between joining EU and economic growth.

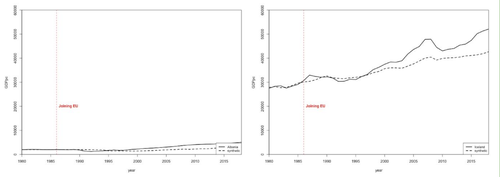


FIGURE 5: Placebo Tests - Albania and Iceland (if they joined EU in 1986)

Limitations:

- SCM's precision depends on chosen predictors.
- Potential unobserved factors may affect synthetic controls' accuracy.
- Assumes no spillover between member states, though policy or economic shifts could influence results.

References

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