

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

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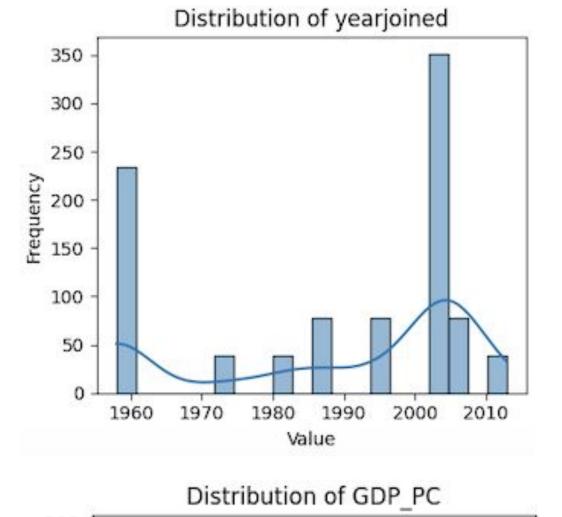


Introduction

- 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



Frequency of EU Membership by Year of Joining

FIGURE 1:

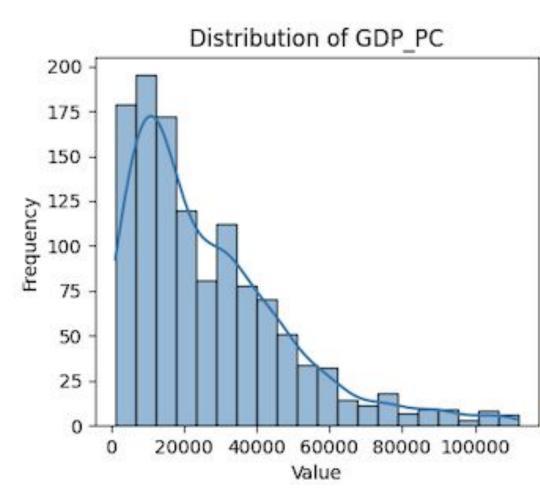


FIGURE 2: GDP Per Capita Distribution

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 and Weights other WDI before treatment.

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

4. Synthetic Control Evaluation **Tune Predictors** show similar trend before treatment. treatment effect synthetic - treatment

period. Potential Outcomes (Y₁T and

Y₀T): Outcomes with treatment and without treatment if the unit is treated at time t

5. Performance

 $au_T = Y_{1T} - Y_{0T}$

joining EU on GDP Per Capita for

treated units in post-intervention

Treatment Effects: Effect of



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.

2. Control and Treatment

 $\min_W \sum (X_i - X_D W)^2$ Weights (W): sum to one and are non-negative.

Xi: pre-treatment characteristics of the treated unit.

3. Weights

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

Results

Country	Year Joined	Treatment Effect	• Positive Impact on GDP per Capita: The majority of the countries exhibited positive
Bulgaria	2007	1478.0343	treatment effects after joining EU, indicating an overall beneficial impact on their economies.
Czech Republic	2004	532.292	Notably, Spain and Portugal, which joined in 1986, show significant increases in GDP per capita.
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	1980 1985 1990 1995 2000 2005 2010 2015 1980 1985 1990 1995 2000 2005 2010 2015 year
Romania	2007	944.3368	FIGURE 4: GDP Per Capita Trajectory for Portugal and Spain with Synthetic Control (joined EU in 1986)

FIGURE 3: Treatment Effect Results Table

2004

1995

Slovenia

Sweden

1600.0604

3822.2126

• 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.

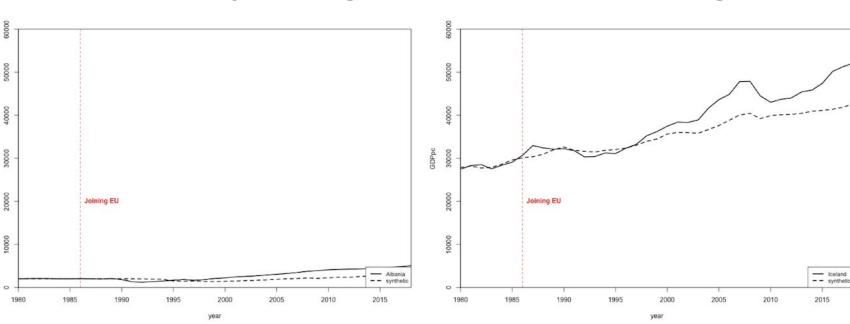


FIGURE 5: Placebo Tests - Albania and Iceland (if they joined EU in 1986)

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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