



The impact of Cohesion Policy (2014–2020) on economic growth in Portugal

A DID Approach

A research paper by NOVA Economics Club in collaboration with GPEAR

Agenda:

- ① Why do Cohesion Funds matter for Portugal?
- ② What does the literature tell us about Cohesion Policy effectiveness?
- ③ How did we evaluate the 2014–2020 funds?
- ④ What did we find?
- ⑤ What do the results mean for policy?
- ⑥ Where do we go from here?

1

WHY DO COHESION FUNDS MATTER FOR PORTUGAL?

What is Cohesion Policy?

The EU Cohesion Policy is a key strategy aimed at **reducing regional disparities** and fostering **economic, social, and territorial** cohesion. It supports job creation, economic growth, and sustainable development across member states.

Total budget: €371 billion (~34 % of the total EU budget).

NUTS (Nomenclature of Territorial Units for Statistics) Structure

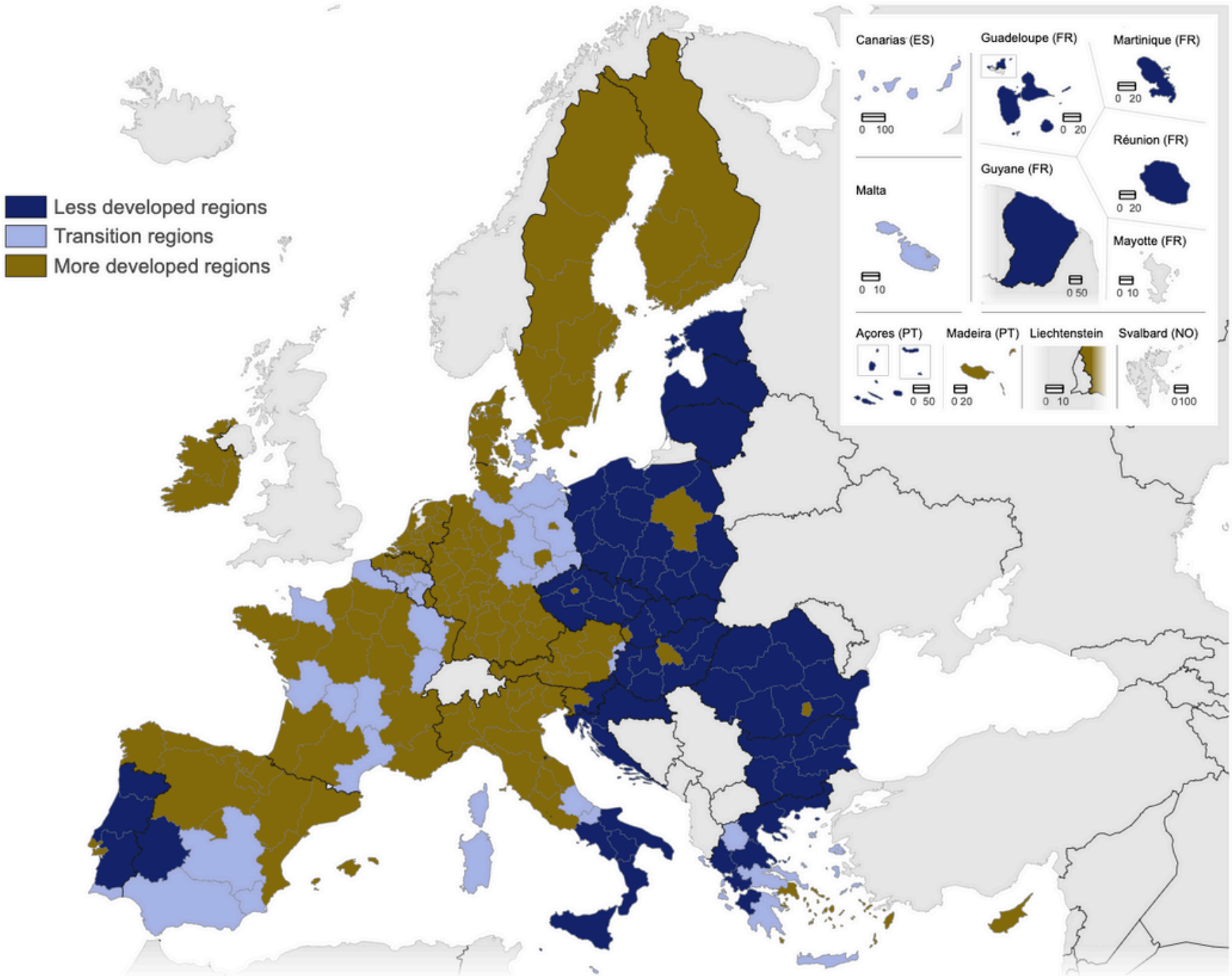
Three hierarchical levels:

- **NUTS 1:** Major socio-economic regions
- **NUTS 2:** Basic regions for the application of EU Cohesion Policy
- **NUTS 3:** Small regions for specific analyses

Why is NUTS Important?

Allocation of EU Cohesion Funds ➔ Eligibility for funding (**Objective 1 regions**) is determined based on NUTS 2 GDP per capita compared to the EU average.

Regions eligible for cohesion policy funding, 2014–20
Funding from the European Development Fund (ERDF) and European Social Fund (ESF)



Source: Eurostat

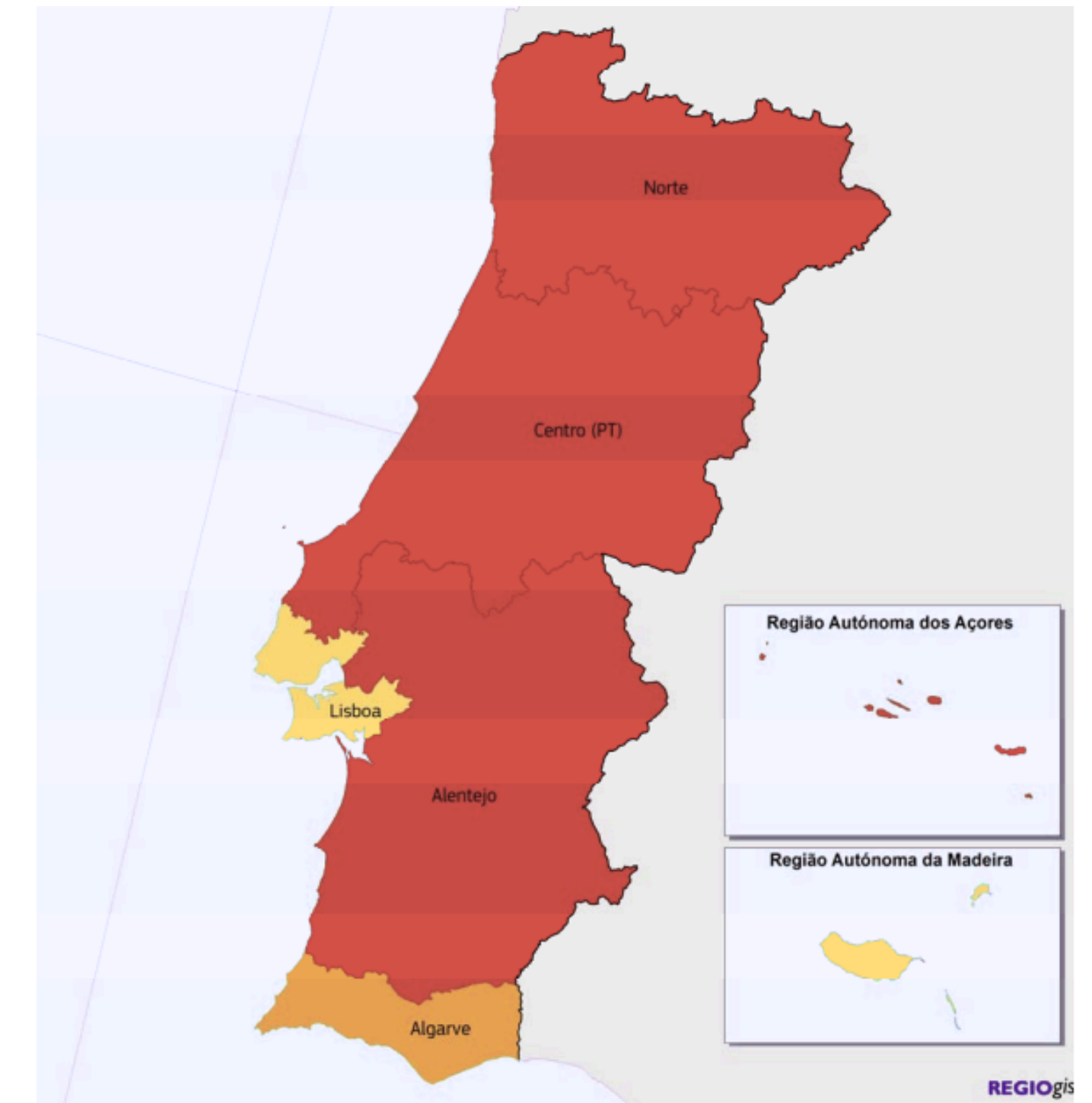
Portugal, a long-time recipient of EU funds, offers a critical lens for evaluating the policy's effectiveness. Many Portuguese regions have **GDP per capita** persistently **below the EU average**, making them eligible for substantial support.

2014–2020: **€ 21.46 billion** (current prices) in total Cohesion Policy funding

Four NUTS 2 regions qualified for "Objective 1" status (GDP per capita less than 75% of the EU average), entitling them to enhanced funding aimed at accelerating structural transformation:

- Norte
- Centro
- Alentejo
- Açores

⇒ EU investments focused on **transport networks, renewable energy, education, and innovation ecosystems**.



Structural Funds (ERDF and ESF) eligibility 2014-2020

- Less developed regions
(GDP/head < 75 % of EU-27 average)
- Transition regions
(GDP/head between >= 75 % and < 90 % of EU-27 average)
- More developed regions
(GDP/head >= 90 % of EU-27 average)

→ however, **regional disparities remain**, with persistent gaps in productivity, income, and infrastructure between coastal and inland areas.

TO WHAT EXTENT DID THE EU COHESION POLICY (2014–2020) CONTRIBUTE TO ECONOMIC GROWTH IN ELIGIBLE PORTUGUESE NUTS 2 REGIONS?

MAIN HYPHOTESIS:

Cohesion Policy funding had a **positive and significant impact on real GDP per capita growth** in Portuguese regions eligible for Objective 1 support during the 2014–2020 period.

2

WHAT DOES THE LITERATURE TELL US ABOUT COHESION POLICY EFFECTIVENESS?

2 Previous studies

Early work



Regression Discontinuity Design



DiD & Event Studies

- Relied on descriptive statistics and cross-sectional regressions.
- Found positive correlations between EU funds and regional growth.

Problems:

- **Endogeneity:** poorer regions targeted ➤ hard to separate cause and effect.
- **No counterfactuals:** couldn't answer "what would growth have been without funds?".
- **Over-aggregation:** many national-level studies hid regional disparities.

- Exploits the 75% GDP per capita cutoff for Objective 1 eligibility.
- Findings: **+0.6–0.9 pp** faster annual growth in treated regions (Becker et al., Busillo et al.).
- Strengths: strong causal identification, intuitive method.

Limitations:

- Requires regions close to the **cutoff**.
- Not feasible in 2014–2020 for Portugal (no "near-threshold" regions, rules changed).

- Compares treated vs control regions over time. Can incorporate dynamic effects (event studies).

Findings:

- **Positive but modest growth** effects across Europe.
- **Infrastructure/productive investment** ➤ stronger impacts.
- **Human capital/R&D** ➤ slower, longer-term gains.
- **Context matters:** Italy (diminishing returns), UK (catch-up in Cornwall), CEE (large post-accession boosts).

2 Previous studies

- Research shows Cohesion Policy has a **positive impact** on growth, but the size is **modest**.

- Effects **vary strongly** across regions and countries.



Portugal is underrepresented in this literature.

2 Why results differ across regions



Institutions & governance

- Strong institutions amplify returns (Rodríguez-Pose & Garcilazo).
- Weak governance undermines absorption and effectiveness.
- “Funds without reforms don’t transform.”



Absorptive capacity

- Urban & innovative regions capture higher benefits.
- Complementarities with human capital, R&D, firm capacity are crucial.



Methodological rigor

- Modern studies stress validation:
- Parallel trends checks
- Placebo tests
- Event-study dynamics
- Aim: separate real effects from noise or anticipation.

Cohesion Policy works best in regions with the right institutional and economic conditions.

2 Methodological gaps & Portugal's case

Methodological Gaps

- **RDD:** strong identification but not feasible for Portugal 2014–2020 (no near-threshold regions, rules changed).
- **DiD studies:** available, but mostly EU-wide; few country-focused analyses.
- **Dynamic dimension:** still underexplored — we know if funds work, but not when.

Portugal's gap:

ONE OF THE LARGEST
RECIPIENTS OF EU
FUNDS.

EVIDENCE OF
MODERATE POSITIVE
EFFECTS, BUT
DISPARITIES PERSIST.

NO CAUSAL
EVALUATION YET FOR
THE 2014–2020 CYCLE.

Portugal is underrepresented in the literature: a major recipient, but with little rigorous evidence on recent policy impact.

2 Our Contribution

COUNTRY SPECIFIC FOCUS

First **causal analysis** of 2014–2020 Cohesion Policy at NUTS II level

Complements **EU-wide studies**

NOVEL EMPIRICAL DESIGN

Difference-in-Differences + Event Study

↓
not only if funds worked, but when.

CREDIBILITY AND ROBUSTNESS

Extensive validation:
• **Placebo tests**
• **Exclusion of Azores** (results unchanged)
• **Residualized outcomes** and different functional forms

POLICY RELEVANT OUTCOMES

Results consistent across specifications
↓
meaningful for evaluating Cohesion Policy effectiveness.

BRIDGING RESEARCH AND POLICY

Provides **evidence relevant** for Portuguese policymakers (not just EU-level).

3

HOW DID WE EVALUATE THE 2014–2020 FUNDS?

TREATMENT GROUP

Regions involved:

- Norte
- Centro
- Alentejo
- Açores

Allocation criteria:

Regions classified below 75% of the EU average GDP per capita and thus eligible for enhanced Cohesion Policy funding under the 2014–2020 cycle:

CONTROL GROUP

Regions involved:

- Spain: Andalucía, Castilla–La Mancha, Canarias, Murcia
- Italy: Abruzzo, Molise, Sardegna
- Greece: Dytiki Makedonia, Ionia Nisia, Kriti, Peloponnisos, Sterea Elláda, Voreio Aigaio
- France: Corse
- Malta
- Portugal: Algarve

Allocation criteria:

Regions above the 75% threshold, receiving significantly lower EU funding, used as a proxy for non-funded but comparable regions. Selected to maintain a high degree of socioeconomic and structural similarity with the treated group (similar size, economic and institutional context)

Table 1 – Description of Key Variables

Variable	Description	Unit
region_id	Region code (NUTS-2)	--
region	Name of the region	--
year	Calendar year of observation	Year
gdp per capita	Real GDP per capita	Euro
Treatment Dummy	Treatment indicator (1 = treated region post-2014)	Binary
unemployment	Unemployment rate	%
population_density	Population density	People per km ²
tertiary_education	Share of population with tertiary education	%

Sources: Eurostat, INE. 2009–2023

Table 2 – Summary Statistics of Main Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
year	300	2,016.00	4.33	2,009	2,023
gdp per capita (€)	300	18,763.67	4,421.63	9,900	37,100
Treatment Dummy	300	0.20	0.40	0	1
unemployment (%)	298	15.08	7.39	3.5	36.2
population density (people/km ²)	298	156.42	312.98	22.6	1,766
tertiary education (%)	300	22.20	6.02	8.3	39.3

Baseline Specification:

$$\log(\text{GDP}_{it}) = \alpha_i + \lambda_t + \beta \cdot \text{Treatment}_{it} + \varepsilon_{it}$$

- **Baseline model:** estimates the average treatment effect of Cohesion Funds post-2014. Without controls
- **Two-way fixed effects (region & year):** control for unobserved heterogeneity and common shocks.

$$\log(\text{GDP}_{it}) = \alpha_i + \lambda_t + \beta \cdot \text{Treatment}_{it} + \gamma X_{it} + \varepsilon_{it}$$

Final specification with controls

- **Final model with controls:** adds unemployment, education, population density to strengthen identification.
- **Clustering:** standard errors clustered at region level to account for serial correlation.
- **Outcome:** log GDP per capita $\Rightarrow$ effects interpreted in % terms.

$$\log(\text{GDP}_{it}) = \alpha_i + \lambda_t + \sum_{k \neq -1} \delta_k \cdot \mathbb{1}[\text{EventTime}_{it} = k] + \varepsilon_{it}$$

where k ranges from -5 to $+9$ and $k = -1$ is omitted as the reference year.

- **Purpose:** captures how the effect evolves over time, not just on average.
- **Implementation:** replace single treatment dummy with event-time dummies around policy start (2014).
- **Interpretation:** pre-treatment $\delta_k \approx 0 \Rightarrow$ supports parallel trends; post-treatment $\delta_k > 0 \Rightarrow$ policy impact emerges.
- **Benefit:** identifies timing and persistence of Cohesion Fund effects.

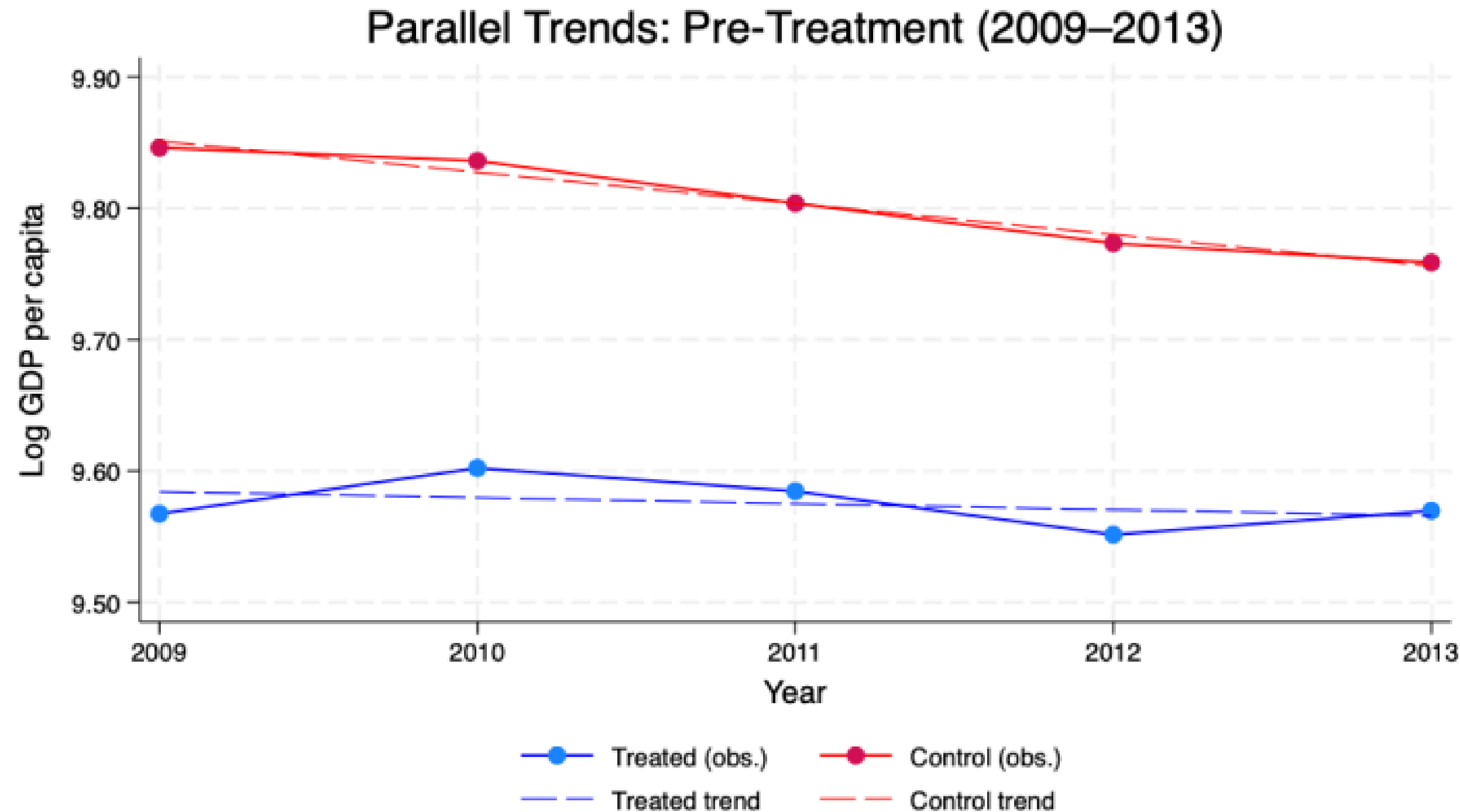
Parallel trends assumption and placebo tests

**Table 3 – Placebo Regression Results
(Pre-Treatment Period Only)**

Placebo Year	Coefficient	p-value
2011	-0.0034	0.3877
2012	-0.0041	0.4246

Ensuring Robustness and Credibility:

- **Parallel trends check:** Pre-2014 GDP per capita evolved similarly for treated and control regions: assumption holds.
- **Placebo tests:** Fake treatments in 2011–2012 show no significant effects
- **Result:** Confirms that post-2014 divergence reflects the true effect of Cohesion Funds.
- **Takeaway:** Identification strategy is credible

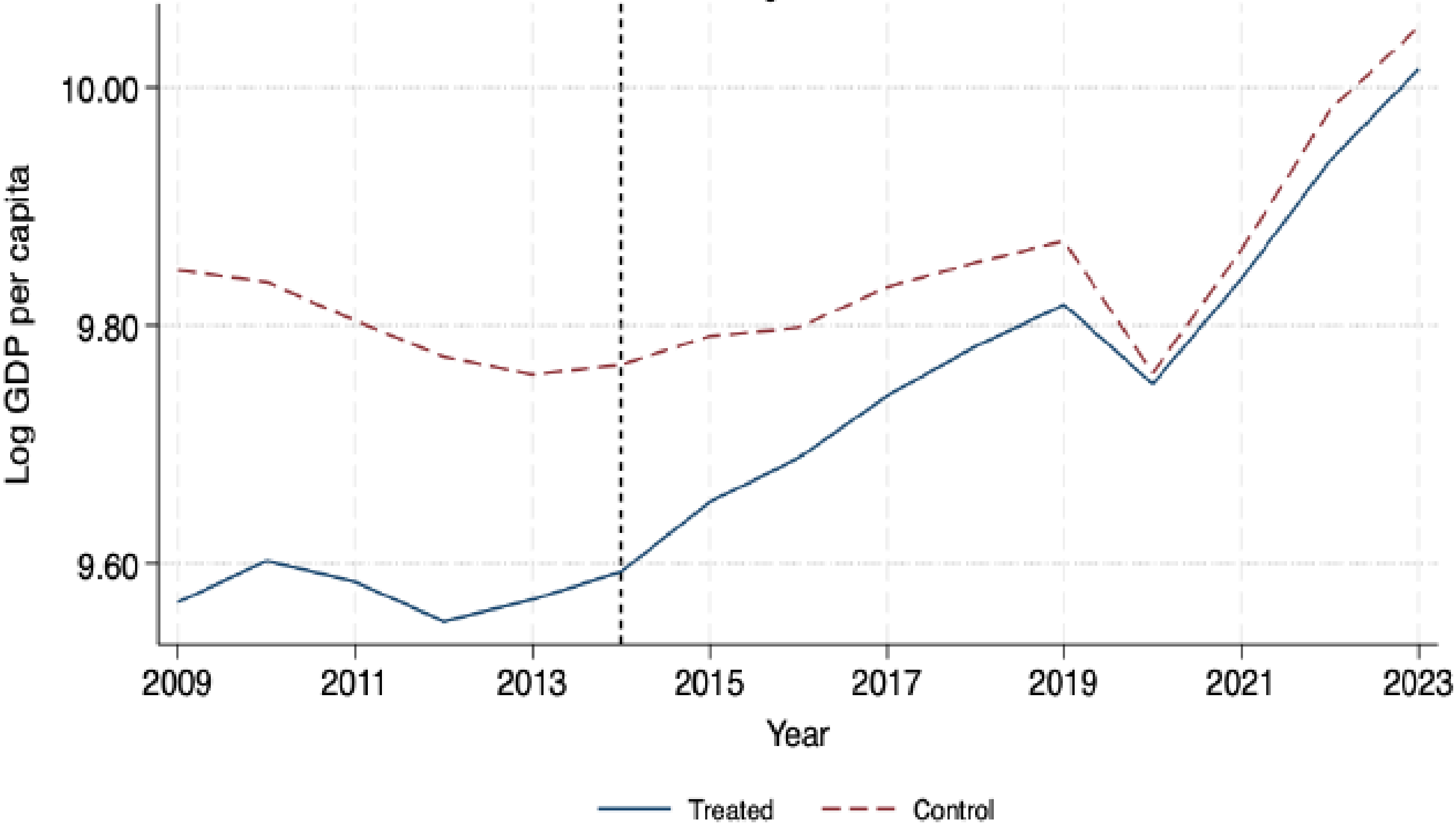


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WHAT DID WE FIND?

4 Results: baseline specification

Classic Difference-in-Differences Plot
Treated vs Control Regions – EU Cohesion Funds



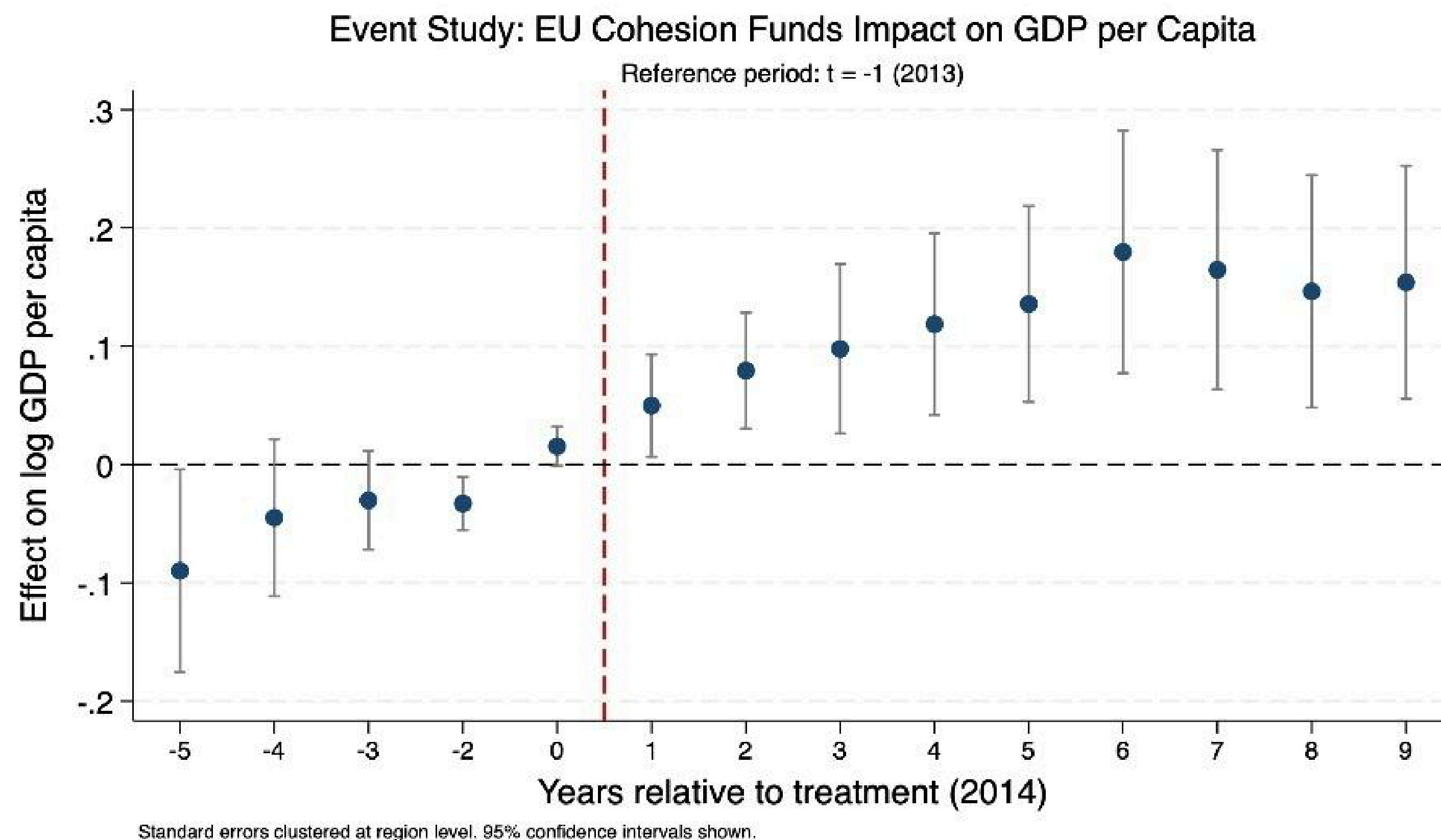
Dashed line at 2014 indicates treatment start

Dependent variable: Log GDP per capita	
(1)	
Treated X Post	0.154*** (0.0450)

Standard errors clustered at region level. *** p<0.01.

- **Positive and significant impact:** Treated regions' GDP per capita rose $\approx 15\%$ more than control regions after 2014
- **Parallel pre-trends and Post-2014 divergence:** Growth gap shrinks progressively, indicating a catch-up effect from Cohesion Funds.
- **Interpretation:** Evidence that the 2014–2020 Cohesion Policy fostered regional convergence in Portugal.

Results: Dynamic effects– Event Study (baseline)

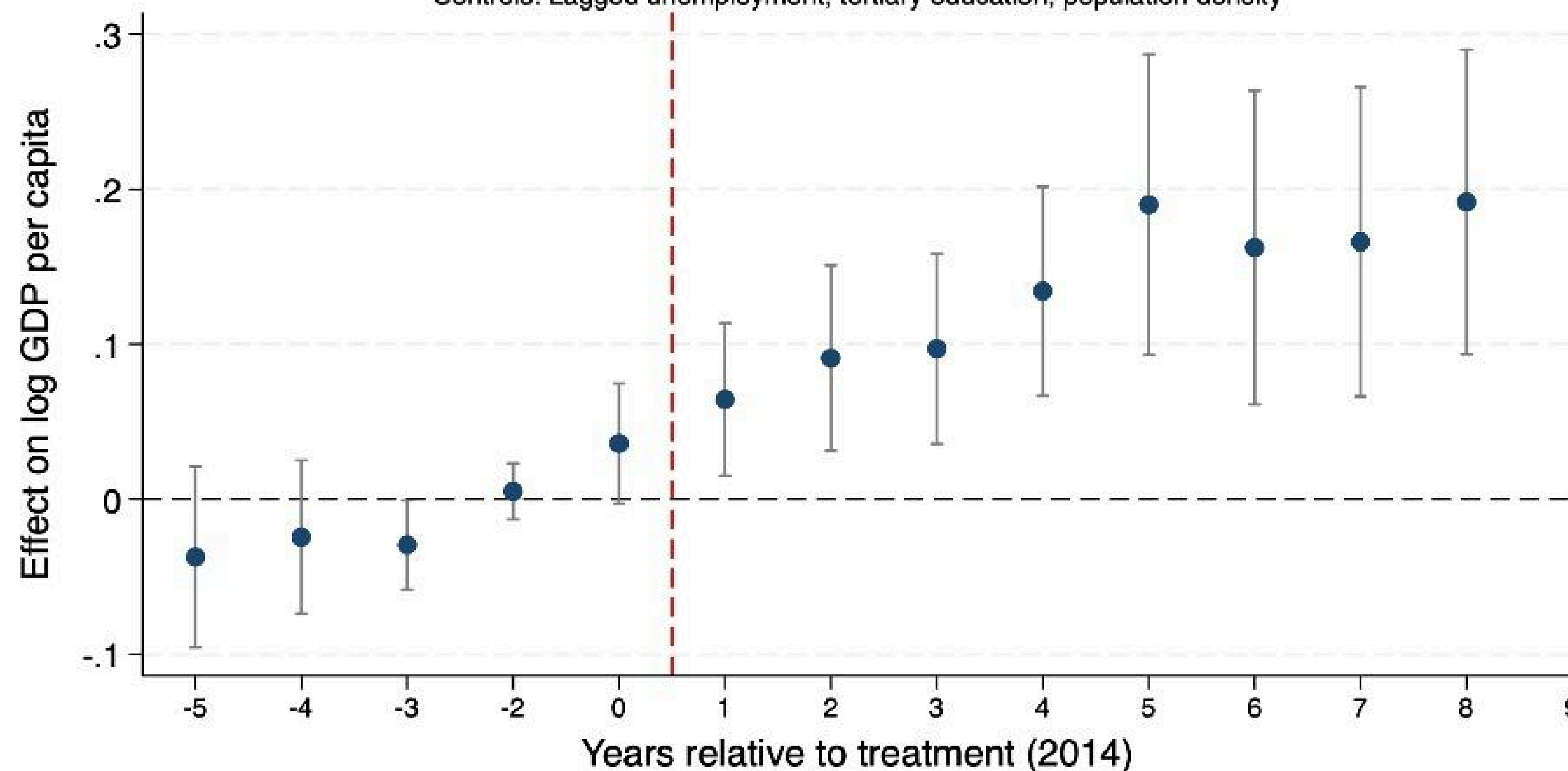


- **No pre-treatment effects:** Coefficients before 2014 are ≈ 0 : confirms parallel trends.
- **Lagged impact:** Positive and significant effects start around +2 years, consistent with implementation delays.
- **Cumulative growth:** Impact strengthens over time: by +5 years, treated regions' GDP per capita is about 10% higher.
- **Interpretation:** Cohesion Funds drive gradual and sustained convergence, not an immediate shock.

Results: Dynamic effects- Event Study (final specification)

Event Study: EU Cohesion Funds Impact (With Control Variables)

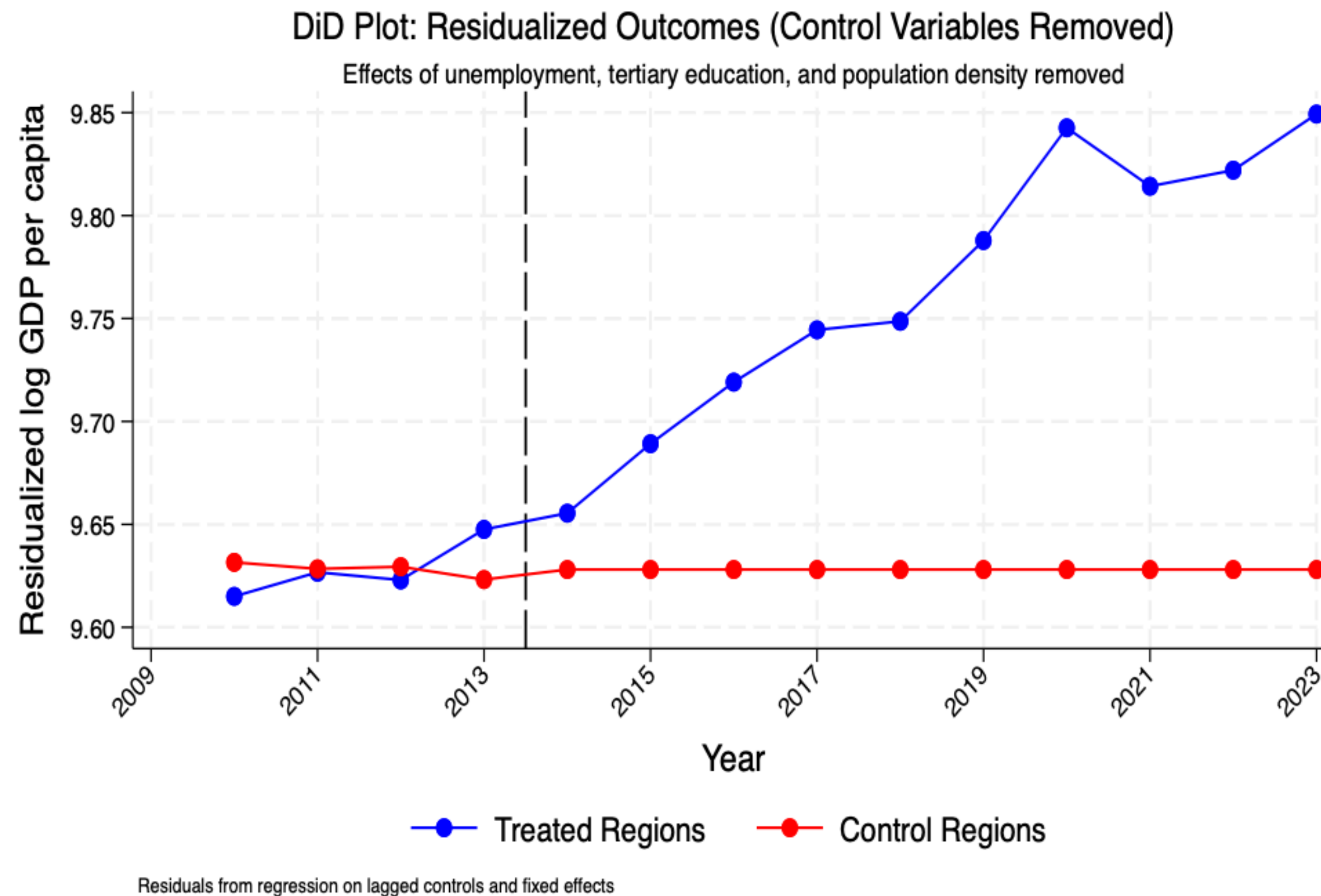
Controls: Lagged unemployment, tertiary education, population density



Standard errors clustered at region level. 95% confidence intervals shown.
Reference period: t=-1 (2013). Controls are lagged one year.

- **Stable results:** with controls, treatment effect remains positive and significant.
- **Magnitude:** by year +5, $\approx +20\%$ GDP per capita relative to pre-treatment.
- **Takeaway:** confirms that policy impact is not driven by pre-existing regional differences, Including controls slightly attenuates coefficients but preserves timing and significance of effects.

	(1)	(2)	(3)	(4)
	DiD Baseline	Event Study Baseline	DiD w/ Controls	Event Study w/ Controls
treated_post	0.154*** (0.0450)		0.133*** (0.0268)	
treat_year0		0.0153* (0.00790)		0.005 (0.00864)
treat_year1		0.0498** (0.0207)		0.0359* (0.0185)
treat_year2		0.0794*** (0.0235)		0.0643** (0.0235)
treat_year3		0.00979** (0.0343)		0.0911*** (0.0286)
Standard errors in parentheses				
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$				



- **Residualized outcomes:** removing effects of unemployment, education, and density » same post-2014 divergence » treatment effect not driven by observables.

Robustness Checks (2): alternative specifications

	(1)	(2)	(3)	(4)
	Baseline	With Controls	Baseline (no Azores)	With Controls (no Azores)
Treated X Post	0.154*** (0.0450)	0.133*** (0.0268)	0.167*** (0.0436)	0.138*** (0.0304)

- Model excluding Azores: results remain highly consistent, proving effect not driven by one outlier region.

	(1)	(2)
	Log GDP pc	GDP pc (levels)
treat_year0	0.0153* (0.00790)	281 (132.6)
treat_year1	0.0498** (0.0207)	595 (382.2)
treat_year2	0.0794*** (0.0235)	990.7** (441.0)
treat_year3	0.0979** (0.0343)	1,168 (679.9)

- Model with GDP in levels: re-estimating with GDP levels instead of logs yields similar results: specification robust.

Takeaway:

results are stable, significant, and resilient across alternative samples and model forms.

Prior evidence

- Becker et al. (2010); Busillo et al. (2010): well-targeted Cohesion Policy with reforms boosts regional growth.
- Rodríguez-Pose & Fratesi (2004); Crescenzi & Giua (2020): strongest effects in Southern and Eastern Europe.
- Bussoletti (2008); Crescenzi & Giua (2020): impact is gradual, emerging about two years after implementation.
- Bachtler & Mendez (2016): institutional capacity and complementary investment shape policy returns.

Our contribution

- Granular evidence for Portugal: causal DiD + event-study using NUTS-2 regional variation.
- Captures heterogeneity beyond EU-wide averages.
- Shows when and how Cohesion Policy drives growth: effects emerge gradually and strengthen over time (consistent with Bussoletti, 2008; Crescenzi & Giua, 2020).

- **Outcome scope:** focus on GDP per capita only, ignores social, environmental, and distributional dimensions of Cohesion Policy impact.
- **Cross-country controls:** model includes region & year FE, but no country×year effects: possible bias from country-specific shocks (e.g., fiscal, recovery post sovereign debt crises).
- **Few treated regions:** may lead to underestimated standard errors, inference could be optimistic.
- **Eligibility for funds based on low GDP per capita:** mechanical catch-up could inflate estimated effects, even after controls.
- **Limited control set:** only unemployment, education, and density; could not capture other confounders (sectoral structure, private investment, governance quality).
- **Lack of data for periods before 2009:** this would have permitted us to better assess the parallel trends assumption and examine the broader impact of the whole of cohesion policy on portuguese regions (even before 2006)

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WHAT DO THE RESULTS MEAN FOR POLICY?

Cohesion Policy contributed **positively** to Portuguese regional growth during 2014–2020.

Effects are **modest but significant**: funds matter, but they are not transformative on their own.

Timing matters: results suggest that impacts emerge with a lag ➞ policy needs patience.

Regional disparities persist: not all regions benefitted equally (interior vs coast, Norte/Centro vs others).

5 Implications for Portuguese policymakers

Absorptive capacity is critical: regions with better governance, skills, and innovation ecosystems captured more benefits.

Targeting matters: infrastructure investment paid off; human capital and R&D need longer horizons

Need for **complementary reforms:** EU funds deliver more when combined with national reforms in education, innovation, and business environment.

Strategic focus: not just absorption rates, but quality of projects and governance structures.



6

**WHERE DO WE GO
FROM HERE?**

BROADER OUTCOMES:

Extend beyond GDP per capita to include social, environmental, and distributional effects.

STRONGER CONTROLS:

Add governance quality, sectoral structure, and private investment.

ADDRESS SAMPLE SIZE:

Enlarge treated/control groups or use different regional breakdowns (NUTS III).

DATA EXTENSIONS:

Incorporate earlier periods (pre-2009) for longer-term dynamics.

- **Methods:** combine DiD with synthetic control to handle small treated samples.
- **Spillovers:** account for interactions across neighboring regions.
- **Comparative angle:** benchmark Portugal against other high-recipient countries (Spain, Greece, CEE).
- **Policy timing:** refine event study analysis to better capture when effects appear.

Our results show Cohesion Policy has helped Portugal's regions,
but the bigger challenge is to understand how to make these
funds more effective, more targeted, and more transformative
in the future.

Thank you for the attention!

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