Does excellence-based funding penalise peripheral innovation?

The impact of the FP7-to-Horizon 2020 transition on university–industry collaboration in less-developed EU regions

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1. Motivation and research question

The transition from the Seventh Framework Programme (FP7, 2007–2013) to Horizon 2020 (H2020, 2014–2020) intensified the excellence-based logic of competitive EU research funding. Less-developed NUTS-2 regions — those whose 2007–2009 mean GDP per capita fell below 75 percent of the EU-27 average — entered this transition with thinner research infrastructures and weaker absorptive capacity. The descriptive allocation paradox is well documented: such regions secure disproportionately less competitive funding relative to their research and innovation stock. What is not yet established is whether the FP7-to-H2020 transition produced a measurable causal worsening of this gap in the university–industry collaboration (UIC) channel specifically — the channel that EU policy designates as the primary mechanism through which regional research ecosystems translate framework-programme funding into innovation capacity.

This paper provides the first NUTS-2-level causal estimate of the dual-channel UIC funding gap induced by the FP7-to-H2020 transition. The dual channel is the central conceptual novelty: the paper separates the extensive margin (H1: the gap in the absolute count of UIC projects in which a region participates) from the intensive margin (H2: the gap in per-capita UIC funding received). The two margins jointly characterise whether the transition penalised less-developed regions through reduced participation, through reduced funding per project, or both. The dual decomposition provides finer-grained evidence than a single funding-gap coefficient and prepares the ground for a subsequent stage of the project (H3) that traces the channel through to patent and co-publication outcomes.

2. Identification strategy and data

The identification strategy is a two-way fixed-effects difference-in-differences (TWFE-DiD) design with region (α_r) and country-by-year (λ_{ct}) fixed effects, exploiting the FP7-to-H2020 transition as the treatment event. The treatment indicator D_r equals one for the 44 NUTS-2 regions whose 2007–2009 GDP per capita PPS fell below 75 percent of the EU-27 average, following the cohesion-policy operationalisation of Becker, Egger and von Ehrlich (2013, 2018). The post-treatment indicator $Post_t$ equals one from 2014 onwards (the first year of H2020 grant signing). The interaction $Z = D_r \times Post_t$ captures the differential effect of the transition on the 44 treated less-developed regions relative to the 191 more-developed control regions. Country-by-year fixed effects absorb national time-varying confounders (austerity packages, national R&D priority shifts, currency dynamics) that would otherwise be conflated with treatment status given that less-developed regions cluster geographically in Central and Eastern Europe (Figure 1).

The analytic panel covers 235 EU-27 NUTS-2 regions × 14 years (2007–2020) = 3,290 region-year observations. Romania is excluded from the main specification following the precedent of Becker, Egger and von Ehrlich (2018, Regional Science and Urban Economics), who exclude it on Eurostat NUTS-2 GDP data availability grounds for the 2007–2009 baseline window. UIC outcomes are constructed from the CORDIS database of FP7 and H2020 projects, identifying projects with at least one academic and one private-sector participant in the same NUTS-2 region. The intensive-margin outcome uses Eurostat regional population denominators. The principal confounding control is the ERDF+ESF cohesion-policy transfer per capita (Cohesion Open Data Portal), included to test the central exclusion restriction: that the identified effect operates through the framework-programme channel rather than through residual cohesion-policy transfers.

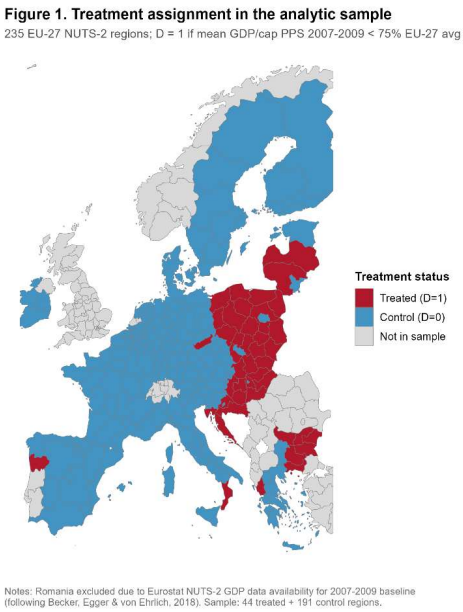

Figure 1. Treatment assignment across 235 EU-27 NUTS-2 regions. Treated regions (red, D=1, n=44) cluster in Central and Eastern Europe with peripheral additions in Southern Europe. Romania (grey) is excluded from the analytic sample.

3. Main results

Table 1 reports the main coefficients for both hypotheses across three nested specifications: (1) baseline TWFE-DiD with region and country-by-year fixed effects only; (2) adding a population scale control; (3) the MAIN specification adding the ERDF+ESF cohesion-transfer control. Standard errors are clustered at the NUTS-2 level.

Table 1. Main estimates — H1 extensive margin (log 1+UIC project count) and H2 intensive margin (log 1+UIC funding per capita).

	(1) Baseline	(2) +Population	(3) +ERDF (MAIN)
H1 — Extensive margin			
D × Post (β_1)	−0.323***	−0.312**	**−0.347****
(SE)	*(0.124)*	*(0.135)*	*(0.176)*
H2 — Intensive margin			
D × Post (β_1)	−0.396***	−0.390***	**−0.363*****
(SE)	*(0.106)*	*(0.107)*	*(0.125)*
Observations	3,220 / 3,018	3,018 / 3,018	2,437 / 2,437
Region FE / Country×Year FE	Yes / Yes	Yes / Yes	Yes / Yes

*Notes: SEs clustered at NUTS-2 level. *** p<0.01, ** p<0.05. Sample: 235 EU-27 NUTS-2 regions, 2007–2020 (Romania excluded). H2 column 1 omits population (no scale control). ERDF coefficient in column 3: +0.054** (H1) and +0.043* (H2), confirming that ERDF/ESF transfers correlate positively with UIC outcomes but do not absorb the treatment effect.*

The MAIN specification yields **β_1(H1) = −0.347 (SE 0.176, p < 0.05)** for the extensive margin and **β_1(H2) = −0.363 (SE 0.125, p < 0.01)** for the intensive margin. The H2 estimate is the central headline: less-developed regions experienced an approximately 30 percent relative decline in per-capita UIC funding across the FP7-to-H2020 transition. The H1 estimate translates to a counterfactual loss of approximately one UIC project per region per year, sustained across the seven-year H2020 cycle. The exclusion restriction holds: the ERDF/ESF control variable is itself positively associated with UIC outcomes (β = +0.054, p < 0.05 for H1; β = +0.043, p < 0.10 for H2), but its inclusion slightly strengthens rather than attenuates the treatment coefficients, confirming that the identified effect operates through the framework-programme channel rather than through residual cohesion-policy transfers.

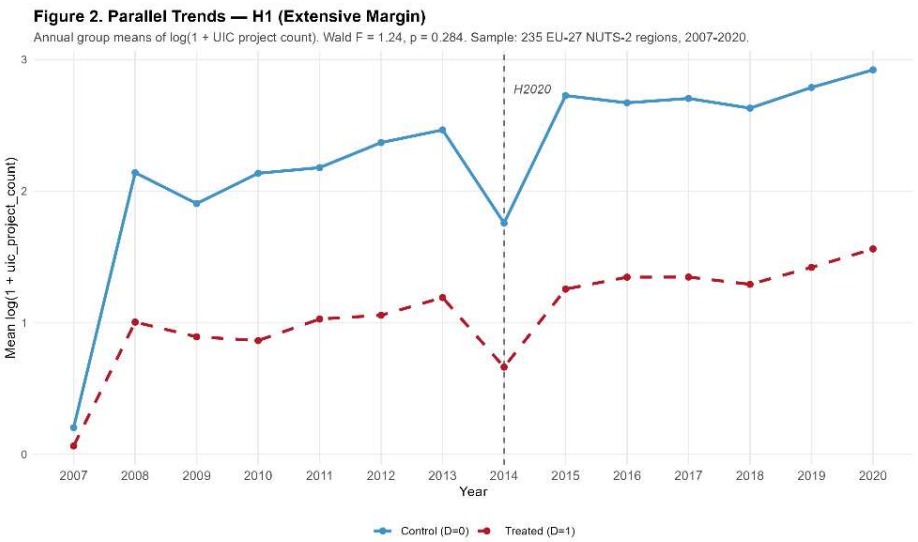

Figure 2. Parallel-trends diagnostic for H1. Control and treated regions move broadly in parallel through 2013. Both groups exhibit a common V-shape transition pattern in 2014 (absorbed by country×year fixed effects), reflecting the administrative FP7-to-H2020 transition rather than a treatment effect. The post-2015 divergence identifies the treatment effect.

4. Identification credibility and robustness

Three diagnostics support the parallel-trends assumption. First, the joint Wald F-test of the pre-treatment coefficients (relative-year window k = −7 to k = −2, with k = −1 = 2013 as the omitted reference) fails to reject parallel trends for both outcomes: F(H1) = 1.24, p = 0.284; F(H2) = 1.40, p = 0.211. Second, the event-study coefficients evolve from approximately zero at k = 0 (the 2014 administrative transition year) to between −0.4 and −0.8 over k = +1 to +6, with a clear visual break at the treatment date in both panels. Third, a steady-state robustness specification that excludes both transition years (2007 FP7 onset and 2014 H2020 onset) yields slightly larger effects in both margins — H1: $\beta_1 = -0.351$ ($p < 0.05$); H2: $\beta_1 = -0.410$ ($p < 0.01$) — confirming that the main specification is conservative and that the 2014 dip absorbed by the country-by-year fixed effects does not mask a stronger underlying effect.

5. Contribution and forward agenda

The empirical contribution of the present paper is the first NUTS-2-level dual-channel causal estimate of the UIC funding gap induced by the FP7-to-H2020 transition, with explicit decomposition of the gap into extensive (participation) and intensive (per-project funding) margins. The paper also operationalises a research-data infrastructure (CORDIS × Eurostat × Cohesion Open Data) at the regional × framework-programme level that has not previously been assembled for causal estimation at this granularity.

Two extensions are in progress. H3 traces the identified UIC funding gap through to regional innovation outcomes (patents from OECD REGPAT and university–industry co-publications from Web of Science), using the reduced-form event-study form for the patent outcome and an IV/2SLS specification with Z = D_r × Post_t as the excluded instrument for endogenous UIC funding on innovation outputs. H4 decomposes the H3 reduced-form effect into the participation channel (the H1 effect) and the funding-per-project channel (the H2 effect conditional on participation), reporting both the channel-attribution test and the channel-complementarity test. Heterogeneity by baseline R&D intensity is reserved for a final extension, testing whether the dual-channel gap moderates with absorptive capacity in the manner predicted by the regional reformulation of Cohen and Levinthal (1990) and Zahra and George (2002).

JEL codes: O38, R58, H54, O33. *Keywords:* Horizon 2020, cohesion policy, regional innovation, university–industry collaboration, difference-in-differences, less-developed regions, EU framework programmes.