Smart and Green.

The spatial effects of the Twin Transition in EU regions

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Abstract
The European Union (EU) faces the dual challenges of achieving climate neutrality and digital transformation, embodied in the European Green Deal and the Twin Transition (TT) strategy. These initiatives aim to foster sustainability and global competitiveness while advancing economic and technological innovation. The Smart Specialisation Strategy (S3), the EU's regional innovation framework, has evolved to reflect TT priorities, integrating environmental sustainability and digital advancement. This evolution, termed "S4," emphaxizes the role of tailored regional strategies in aligning with broader EU goals.
This paper examines how European regions incorporated TT priorities into their S3 strategies during the 2014–2020 programming period, offering a twofold contribution. First, it documents significant regional heterogeneity in the integration of green and digital policies, highlighting the influence of local institutional capacities and economic conditions on the priority selection process. Second, it evaluates the relationship between these priorities and regional labor productivity growth.
The main findings indicate that digital, green, and twin projects are positively and significantly associated with productivity growth in low-productivity regions, highlighting their potential to address structural disadvantages. Moreover, we find evidence of U-shaped effects: middle-income regions experience weaker productivity impacts due to structural barriers and implementation inefficiencies, while high-productivity regions derive limited benefits, potentially due to diminishing returns. These results highlight the middle-income development trap and the complexity of TT implementation, where synergies and trade-offs vary across contexts.
This study enriches the literature on regional innovation and sustainability, emphasizing the need for place-sensitive regional policies to promote sustainable and inclusive economic growth. By examining the differential impacts of digital and green strategies, it contributes to discussions on how the twin transition can reduce disparities and enhance resilience in Europe.

Keywords
Green policies, Digital policies, Twin Transition, Smart Specialisation Strategy, Regional economic growth

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