

Governing the Twin Transition: Institutional Quality and Regional Divergence in Europe

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Extended abstract

Europe's green and digital transitions are unfolding unevenly across regions, reflecting differences not only in technological capacities, infrastructure, and sectoral composition, but also in the broader institutional environments within which transformation takes place. While much of the policy debate focuses on investment gaps, innovation systems, or carbon intensity, less attention has been given to how regional governance contexts shape the direction, pace, and consistency of transition processes. This paper examines how institutional settings relate to twin transition pathways across European NUTS2 regions, exploring the relationship between governance conditions, transition profiles, and socio-economic structures.

The twin transition is frequently framed as a structural and technological transformation: decarbonising energy systems, modernising industrial production, expanding digital infrastructure, and upgrading skills (European Commission, 2020). However, these processes are embedded in regional political economies characterised by different administrative traditions, policy coordination capacities, degrees of institutional stability, and public trust environments. Such contextual conditions may influence how effectively transition policies are implemented, how consistently investment strategies are pursued, and how social and economic actors respond to change (Rodríguez-Pose, 2013). As such, rather than treating institutions as a fixed background variable, this paper considers them as part of the regional environment within which green and digital transformations unfold, in line with evolutionary perspectives on regional adjustment and path dependence (Boschma, 2015; Simmie & Martin, 2010).

The analysis adopts a multi-dimensional framework combining measures of green transition capacity (e.g. emissions intensity and decarbonisation dynamics), digital capacity (e.g. broadband access and knowledge-intensive sectors employment), and structural economic change (e.g. diversification and investment patterns). These are examined alongside indicators capturing the quality of regional governance environments, interpreted broadly as reflecting the effectiveness, coherence, and credibility of public institutions. For each domain, we consider both current levels and dynamic measures of change in order to distinguish static outcomes from sustained transformation trajectories.

Three questions guide the analysis. First, to what extent are regions characterised by more effective governance structures associated with stronger green and digital transition outcomes? Second, do institutional contexts relate more strongly to the momentum of change rather than to levels alone? Third, do these relationships vary

between the green and digital dimensions once socio-economic conditions are taken into account?

Regions are classified according to their relative position in green and digital performance, allowing identification of clusters such as digitally advanced but carbon-intensive regions, environmentally improving but digitally lagging regions, or regions facing constraints in both domains. Governance indicators are then examined in relation to these transition profiles, as well as to observed changes over the period of analysis. This allows evaluation of whether institutional environments are associated not only with where regions stand, but with how their trajectories evolve.

The findings suggest that governance conditions are relevant, but in different ways across the two transition domains. The digital dimension shows a clearer association with institutional environments: regions characterised by more stable and effective governance contexts tend to display higher levels of digital development and more consistent progress over time. This pattern is consistent with the coordination-intensive nature of digital transformation, which depends on regulatory clarity, innovation support mechanisms, and trust-based interactions among public and private actors.

In contrast, the green transition exhibits more heterogeneous patterns. Although governance conditions are positively related to certain environmental indicators, decarbonisation trajectories appear mediated by inherited production structures, energy systems, and industrial legacies. This suggests that the relationship between governance and green transition outcomes is less linear and more contingent on regional starting points. Institutional environments may facilitate the implementation of climate policies, but their effects are filtered through sectoral composition, energy infrastructure, and historical development pathways. The green transition therefore appears to be shaped by a more complex interaction between institutional context and structural legacy than the digital transition.

When socio-economic conditions are included into the analysis, additional nuances emerge. Nevertheless, institutional context retains explanatory relevance even when controlling for these factors, particularly in the digital domain. This suggests that governance conditions are not proxies for development levels but may exert an independent association with certain aspects of transition dynamics.

Overall, the results underline that the twin transition is not just a technological or infrastructural process, but one embedded in broader socio-institutional contexts. Transition pathways reflect the interplay between structural conditions, economic specialisation, and governance environments. While infrastructure and investment are necessary components of transformation, their effectiveness appears shaped by the broader context in which they are set in. At the same time, structural constraints,

especially in carbon-intensive regions, may limit the extent to which institutional quality alone can accelerate environmental transformation.

These findings have implications for European transition policy. First, they caution against uniform policy templates that assume similar institutional conditions across regions. Second, they suggest that strengthening governance environments may be particularly important in supporting digital advancement. Third, green transition strategies may require greater sensitivity to structural starting points and legacy industrial configurations, recognising that institutional improvement alone may not offset deeply embedded production patterns.

Therefore, by situating green and digital transformation within their wider regional contexts, this paper contributes to a more differentiated understanding of transition pathways across Europe. It shows that institutional environments operate in interaction with socio-economic structure and historical development trajectories and recognising these contextual variations is key for designing transition strategies that are both effective and territorially sensitive.

References

Boschma, R. (2015). Towards an Evolutionary Perspective on Regional Resilience. *Regional Studies*, 49(5), 733–751.

European Commission. (2020). *The European Green Deal Investment Plan and Just Transition Mechanism Explained*. Brussels.

Rodríguez-Pose, A. (2013). Do Institutions Matter for Regional Development? *Regional Studies*, 47(7), 1034–1047.

Simmie, J., & Martin, R. (2010). The economic resilience of regions: towards an evolutionary approach. *Cambridge Journal of Regions, Economy and Society*, 3(1), 27–43.