Brexit, COVID-19, and Regional Disparities in the UK: Evidence from Multi-Regional Input-Output Analysis

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Author: Qianhong Ouyang
Co-Authors: Heran Zheng, Yafei WANG

The United Kingdom's decision to leave the European Union, confirmed by the 2016 referendum, represents one of the most consequential structural shocks to the British economy and its trade patterns. The fact that Brexit's transition period (February to December 2020) almost entirely overlapped with the most severe phase of the COVID-19 pandemic has further reshaped the UK's economic geography in ways that remain poorly understood. Existing research shows that Brexit widened regional disparities, exposed industrial weaknesses, and caused competitive losses. The pandemic worsened the situation but constituted a mostly short-term shock compared to Brexit's long-lasting structural effects. Some studies also find that more pro-Brexit regions tend to have suffered more, indicating a gap between policy expectations and outcomes. Due to the limited availability of economic data with sufficient timeliness, temporal coverage, regional granularity, and sectoral specificity, most quantitative studies rely on aggregated macroeconomic indicators or data before Brexit, which cannot fully capture the complex effects of these dual shocks.

The multi-regional input-output (MRIO) model is widely recognized as an effective tool for tracing regional heterogeneity and the structure of supply chains. However, available MRIO tables at the UK sub-national level remain scarce. Among the early contributions, the EUREGIO database team developed a NUTS 2-level MRIO dataset for the entire EU covering 2000 to 2010. This was later extended to 2018 using trade data from 2013, though it covers only 10 industry categories. To address this gap, in a previous study we compiled a UK MRIO database from 2017 to 2022 with 105 sectors but only covers 12 regions.

In this paper, we substantially extend our previous UK MRIO database using a hybrid entropy-based framework. The updated database contains annual MRIO tables from 2017 to 2023, covering 41 International Territorial Level 2 (ITL-2) regions in the UK, 105 industries, and 6 final demand categories, distinguishing imports and exports of goods to the EU and the rest of the world. The tables are constructed using macroeconomic data as posterior constraints and by maximizing information entropy to enhance their regional specificity. The regional gross output data are estimated using enterprise turnover data from the Annual Business Survey as proxies. This is by far the most comprehensive dataset focused on the UK's sub-national economic structure. The tables are consistent with publicly available data from the UK Office for National Statistics (ONS), including national input-output tables, regional value added, regional import-export statistics, interregional trade flows. This dataset enables a clearer distinction between urban and rural areas across the UK and facilitates linkage with local Brexit support rates, thereby helping to examine whether regions with higher levels of Brexit support have experienced more severe economic impacts.

To better disentangle the effects of Brexit and the pandemic, we propose a three-phase temporal structure for the analysis. The period from 2017 to 2019 serves as the baseline, capturing the economic structure and growth trends of each ITL-2 region after the referendum but before either shock. The period from 2020 to 2021 represents the joint shock phase, in which the formal completion of Brexit in January 2020 and the onset of the pandemic produced overlapping and interacting disruptions. The period from 2022 to 2023 constitutes the post-shock divergence phase, during which the pandemic no longer directly influenced the economy, but more persistent consequences emerge. Within this framework, we first calculate descriptive indicators including output volume, industry share and trade openness to assess their spatial and temporal evolution.

We then apply Structural Decomposition Analysis (SDA) to decompose annual variation in value added into a technology effect, a value-added coefficient effect, a domestic final demand effect, and an export effect. Finally, we construct ITL-2 level leave vote shares by aggregating Electoral Commission local authority results and compare these with the patterns of structural change identified in the preceding analysis.

This paper makes three main contributions. First, we introduce a comprehensive MRIO dataset that enables detailed regional and sectoral analysis of the UK economy in recent years. Second, we jointly examine the impacts of Brexit and the COVID-19 pandemic and compare their quantitative dynamics across three periods, providing a more detailed assessment than existing literature offers. Third, we present new evidence on the divergence between Brexit support rates and regional economic performance. The dataset and analytical framework developed in this paper provide a foundation for further value chain analysis, counterfactual simulations, and investigations into the mechanisms behind the results.