The Two-Year Lag:
Mapping Causal Delays in the EU Economy
with Bayesian Networks*

Krzysztof BIEGUN

Wroclaw University of Economics and Business, Wroclaw, Poland

Correspondence should be addressed to: Krzysztof BIEGUN, krzysztof.biegun@ue.wroc.pl

Abstract

This paper introduces a novel Bayesian network framework for modeling temporal causality in complex macroeconomic systems. This data-driven, network-based methodology directly addresses the limitations of traditional econometric models, such as VAR, which often require restrictive structural assumptions and can struggle to effectively map non-linear policy and transmission lags. I apply this framework to the comprehensive Macroeconomic Imbalance Procedure (MIP) panel dataset for the European Union, covering 27 countries over the 23-year period from 1999 to 2021. The analysis models the dynamic interdependencies among eight key indicators, including GDP per capita, unit labour costs, unemployment, government debt, and private corporate debt, using a Hill Climbing learning algorithm. The results reveal a striking difference between static and dynamic perspectives. While a cross-sectional view shows a simple network, the temporal analysis uncovers a dense web of 242 causal connections dominated by two-year lag structure. Key findings demonstrate that building permits are a powerful leading indicator for forecasting GDP growth two years in advance. Furthermore, the model identifies private corporate debt as the central transmission hub for propagating economic shocks throughout the EU system, while also highlighting a delayed relationship between investment shifts and unemployment. The central implication for policymakers is that short-term, reactive interventions are fundamentally misaligned with the EU's economic structure. Effective macroeconomic policy requires proactive, sustained implementation over at least two years. This framework provides a robust tool for ex-ante policy simulation and the strategic design of more resilient, coordinated economic policies.

Keywords: Bayesian networks, macroeconomic policy, policy lags, European Union