

# US and European stock markets in response to exogenous shocks: cross-regional analysis of dynamic networks during the COVID-19 pandemic

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## Abstract

This study aims to analyze the impact of exogenous shocks on the US and European stock market behavior based on the sample of the largest stock-listed companies in the region to discern whether specific regional differences in stock market reaction—exemplified by the ongoing COVID-19 pandemic – and their recovery paths are visible.

The COVID-19 pandemic, which took hold over Europe and the United States around March 2020, can be classified as a force majeure event. Although regional epidemics are relatively common, a global spread like it has been seen with COVID-19 is extraordinary. Unlike other events with a much shorter time of impact, the COVID-19 pandemic is an ongoing circumstance to which the stock markets need to adjust continuously.

The United States and Europe are home to large and highly developed stock markets. Both regions were severely hit by the pandemic, with over 19 million cases in both regions as of the end of December 2020 (CDC, 2020; ECDC, 2020). The current pandemic in its scale and severity can only be compared to the 1918 Spanish Flu. While stock markets certainly existed back then, they were far from the developed markets that we see today and much less interconnected.

Thus, the phenomena to analyze stock market behavior under unprecedented pandemic conditions in cross-regional and inter-industrial comparison is under investigated in academic literature. The research conducted by the authors of this paper is therefore current, novel in its nature and contributes to:

a) a deeper understanding of stock market reaction on exogenous shocks exemplified by mean of association network analysis and Gaussian Graphical Models.

b) investigation of inner- and inter-industrial connections of stock market participants in two regions selected for the study.

The methodology applied in this paper compiles dependency connections based on financial market data of listed companies in two advanced economic regions, while taking into consideration the respective dynamics of the COVID-19 pandemic measured by number of cases. The study conducted by the authors enhances the international connectivity research with this novel dimension and generates unique results contributing to a deeper understanding of stock market re-configuration pattern in an event of exogenous shock.

The results reveal that in an event of exogenous shock US industry sectors are more likely to be closely connected to their industry peers. The Exponential Random Graph Model analysis further confirms this phenomenon. Compared to the configuration of the European stock market network, the US network reveals higher probabilities of intra-industrial connections of the US market participants. In contrast, the European stock market exhibits fewer connections and a less dense network of market participants in cross-regional comparison. Except for the European financial industry, which behaves similarly to its US counterpart in the event of exogeneous shock represented by the ongoing pandemic, the overall interconnectedness of European companies is weaker. This could be partially due to diverse national regulations implemented at a country-level in European countries and deviating from the EU single market policies, as well as non-harmonized industrial policies, with latest being further expanded during the ongoing crisis in various European locations.

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