

# BIG DATA & ALGORITHMIC FINANCE



## **Renzhi LIU**

Ph.D. candidate, Université Paris Dauphine-PSL

This work is coauthored by Renzhi LIU and Sylvain BENOIT. Renzhi LIU is a dedicated second-year Ph.D. candidate at Université Paris-Dauphine, specializing in systemic risk and climate change. Under the guidance of Mr. Sylvain BENOIT and Mr. René AID, he aims to bridge these two significant topics through his research. Sylvain Benoit is an Assistant Professor in Finance at Université Paris-Dauphine in the Department of Economics, his research mainly focuses on systemic risk, both from a theoretical and an empirical point of view, and has been presented to highly selective conferences such as the European Finance Association, the Northern Finance Association or the European Meeting of the Econometric Society. Two of his research papers have been published in the Review of Finance, and his latest published work is in the Journal of Financial Intermediation.

## **SAFE DISTANCE TO SYSTEMIC RISK**

Sylvain Benoit and Renzhi Liu.

In this study, we propose a new systemic risk indicator to measure the distance to the extreme losses of a financial system. Our indicator is based on cross-sectional concomitant VaR exceptions (Co-Exceptions) observed at a daily frequency, which are then converted into a weekly time series with only the maximum values to apply extreme value models. A set of 95 large U.S. financial institutions is used to run the empirical analysis over the last 20 years to check the real-time ability of our framework to predict significant financial crises, such as the great financial crisis of 2008, the sovereign-debt crisis of 2010 or the COVID lockdowns of 2020. Our systemic-risk indicator identifies accurately this surge in systemic risk and provides additional information compared to the VIX indicator or the Value-at-Risk of the market. Finally, we show that this new measure of financial instability is explained by macroeconomic variables, such as the industrial production and the unemployment which have a positive impact, whereas the Consumer Price Index, interest rate and federal funds rate have a negative impact.

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