

Accounting and Finance PhD Research Project

Forecasting multilayer interconnectedness with uncertainty

Supervisor: Dr Thach Pham

Abstract:

This project investigates the forecasting ability of economic and policy changes on financial market interconnectedness through a multilayer network perspective. Given that a single-layer networks to analyse connectedness fails to capture the complexity of multiple information spillover effects, this proposed project advances the understanding by implementing a multilayer network framework that accounts for various interconnection types simultaneously. By doing so, this project aims to explain how economic and policy changes influence network dynamics across different market layers, offering novel insights into risk transmission patterns and market stability in an increasingly interconnected global financial system.

Project:

In recent years, global supply and demand have become seriously imbalanced, and financial markets have experienced sharp volatility, uncertainty, and risk spillovers due to an increasingly interconnected world and major events such as financial crises, extreme weather, geographic wars, and public health emergencies. While tight interconnectedness in the financial system facilitates rapid economic growth and risk dispersion, the advancement of financial technology and unrestricted capital flows also enable the swift transmission of negative shocks throughout the financial network, posing significant threats to global stability and economic development by creating favourable conditions for risk and information transfer among financial institutions and countries. Consequently, information spillover networks have emerged as an important research direction and tool to measure the connectedness and systemic risk contribution of financial firms in the financial network literature. Indeed, a large number of existing studies only uses a single-layer network to quantify the connectedness among different financial institutions, neglecting the complexity and multiplicity of the interconnectedness, and thus cannot capture multiple types of possible information spillover effects. As a result, the study of multilayer networks serves as effective tools for studying

complex systems with several different relationships simultaneously and has become crucial for understanding the complex dynamics underlying.

On the other hand, since the 2008 financial crisis, governments have increased their intervention in economic markets to maintain global economic stability. Global economic integration and the frequency of major events make the uncertainty related to economic policies more important than ever before. There is a growing body of uncertainty-generating policies that impact economic policy and financial decisions, spanning a vast range of issues including oil price fluctuations, regulatory conflicts, conflicts over income distribution inequality. Given this topic is of great importance to investors and researchers, the literature has confirmed the impact of economic uncertainty and policy adjustments on the volatility of the financial market via various aspects, including macro and micro indicators, stock market returns, corporate capital investment and spending, corporate finance, risk management process, and commodities markets. Differing from previous studies, this project aims to look at the forecasting ability of changes in the economy and policies on the interconnectedness from multilayer network perspective.

From the above outline of the project, specific research questions include, but are not limited to the following:

- Can changes in the economy and policies significantly forecast the multilayer interconnectedness?
- Can investors and market participants obtain economic gains from asset allocation using forecasting ability of changes in the economy and policies?
- How does the forecasting vary across different market conditions?

The following research papers build an understanding of the field. A number of the papers are by the lead supervisor to allow candidates to understand his background work in this field.

References

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- Pham, T. N., Powell, R., & Bannigidadmath, D. (2021). Systemically important banks in Asian emerging markets: Evidence from four systemic risk measures. *Pacific-Basin Finance Journal*, 70, 101670. <https://doi.org/10.1016/j.pacfin.2021.101670>
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- Wang, G. J., Xiong, L., Zhu, Y., Xie, C., & Foglia, M. (2022). Multilayer network analysis of investor sentiment and stock returns. *Research in International Business and Finance*, 62, 101707. <https://doi.org/10.1016/j.ribaf.2022.101707>
- Xiang, Y., & Borjigin, S. (2024). Multilayer networks for measuring interconnectedness among global stock markets through the lens of trading volume-price relationship. *Global Finance Journal*, 62, 101006. <https://doi.org/10.1016/j.gfj.2024.101006>

Desired skills: Quantitative research methodology, Financial modelling, R, Stata.

Project area: Accounting and Finance.

Project level: PhD, MBR.