

Flow-based Association Strength (FAS): A New Metric for Measuring Inter-Firm Connections and Its Application in Financial Risk Assessment

Abstract

In the rapidly evolving financial landscape, understanding the interdependencies among economic entities has become increasingly critical for risk assessment, investment strategies, and macroeconomic analysis. Traditional financial metrics often fail to capture the complex web of relationships between firms, particularly in terms of capital flow and mutual investments. This paper introduces a novel concept—Flow-based Association Strength (FAS), which quantifies the degree of connection between entities based on their investment and ownership ties. The idea originated from the observation that existing measures of firm relations do not adequately reflect the influence capital flows have on business stability and economic behavior. By employing a network-based approach and utilizing the Ford-Fulkerson algorithm for maximum flow calculation, we propose a method to measure the strength of these inter-entity connections in an objective and scalable manner.

Leveraging an extensive dataset that includes over 3000 listed companies in China, along with the investment data from nearly one million small and medium enterprises (SMEs), we compute the Flow-based Association Strength (FAS) between firms. Our dataset captures direct equity investments and shareholding relations, constructing a dynamic and comprehensive network of corporate interconnections. This paper presents a simple yet powerful statistical analysis of FAS across various industries and regions, providing insights into how these connections vary across sectors and geographical locations.

The findings of this study suggest that FAS can serve as a valuable indicator in several areas of finance, including risk assessment, market behavior analysis, and investment decision-making. We also explore its potential applications, such as ranking firms based on their FAS, and highlight the correlation between FAS and common economic indicators like market value and financial health. Our results offer preliminary evidence that FAS can enhance predictive models for financial stability and investment strategies.

This research contributes to both theoretical and practical applications by offering a novel metric for measuring inter-firm relationships and shedding light on how financial networks operate on a macro and micro level. As such, Flow-based Association Strength (FAS) has the potential to revolutionize how financial analysts and policymakers evaluate the interconnectedness of firms and the systemic risks inherent in complex financial networks.

Authors & Affiliations

Mr Wang Yang¹, Mr Sheng Peng¹, Dr Xinhai Liu^{2,3}, Dr Xiangfeng Meng¹

¹Coeus, Beijing, China. ²Beijing Credit Society, Beijing, China. ³Professional Committee of Credit Management, CMAA, Beijing, China