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Portfolio Signed Graphs

A signed graph is formed by assigning a $+$ or $-$ to each edge of a graph. A signed graph is said to be clusterable if its nodes can be partitioned into sets such that all positive edges join nodes in the same cluster, while all negative edges join nodes in different clusters. Signed graphs provide an ideal framework to model positive and negative relations between entities and, as a result, have been extensively used in areas like social network analysis. Here, we investigate a more recent application to investment portfolio management. The first author and Pirzada [Clusterability of portfolio signed graphs, in *Proceedings of the Second Symposium on Games and Decisions in Reliability and Risk (GDRR)*, Belgirate, Italy, May 19-21, 2011] introduced the term *portfolio signed graph* (PSG) for a signed graph whose nodes represent assets in an investment portfolio and whose edges represent positive or negative correlations between assets. They showed that a portfolio that gives rise to a clusterable PSG is more predictable and hence, more risk-averse than a non-clusterable portfolio. In this talk, we study PSGs in detail and establish a relationship between the variance of a portfolio and the clustering properties of the corresponding PSG. This is joint work with Muhammad Ali Khan (University of Calgary).