

Asset Management and Graph Theory

February, 3rd, 2022



UNIVERSITÉ PARIS 1
PANTHÉON SORBONNE

ÉCOLE D'ÉCONOMIE
DE LA SORBONNE

Master 1 Econométrie-Statistiques

Armand L'Huillier, Camil Zahi, Yanis Rehoune

Supervised by Philippe De Peretti

Contents

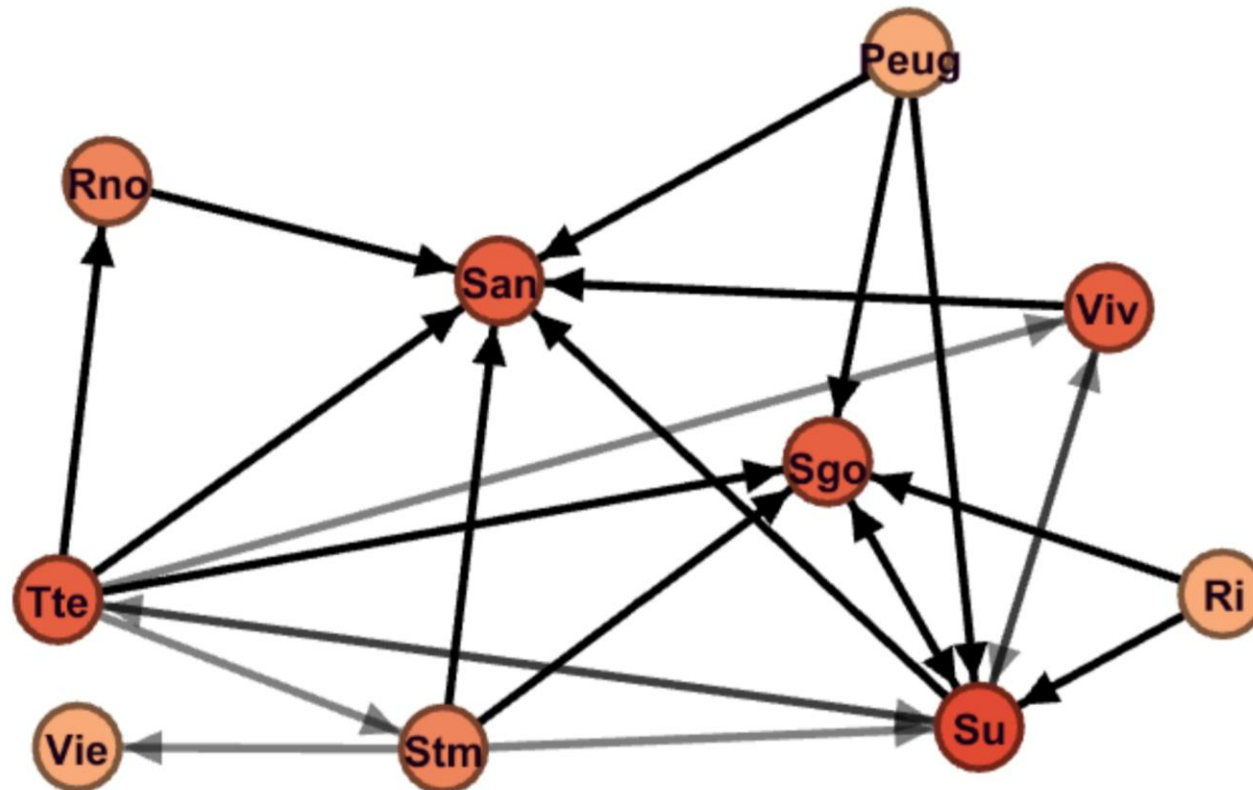
1. Theoretical approach

- *Performance attribution models*
 - The traditional measure
 - Multifactor models
 - The limits of modern financial theory
- *Graphs Theory*
 - General concept
 - The concept of centrality
 - The different types of clustering

2. Empirical approach

- *The Dataset*
- *Application: Outperform a stock index*
 - Data Structure
 - Correlations and clustering coefficients
 - Management of a simulated portfolio

Partial representation of an adjacency matrix



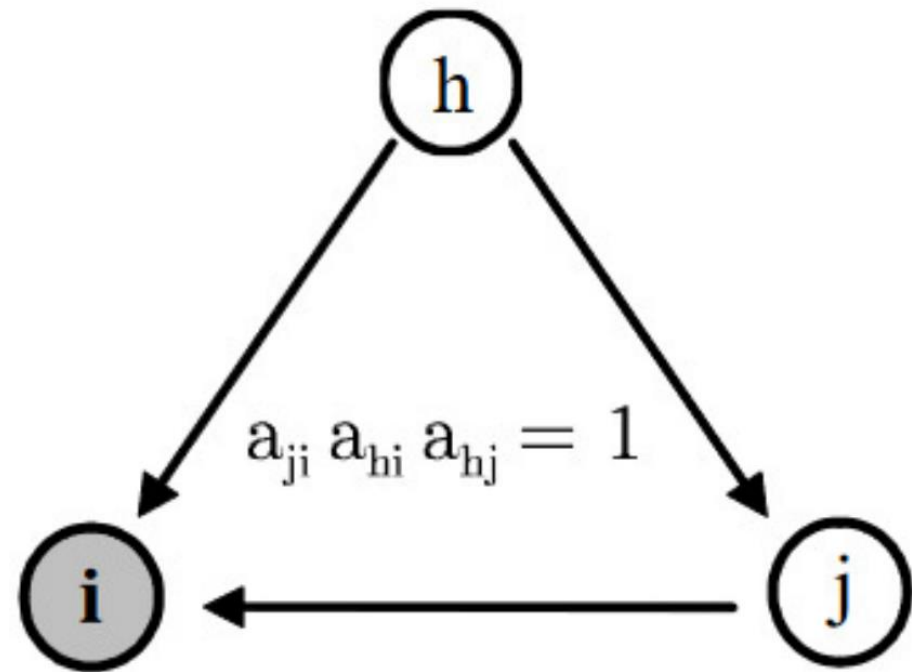
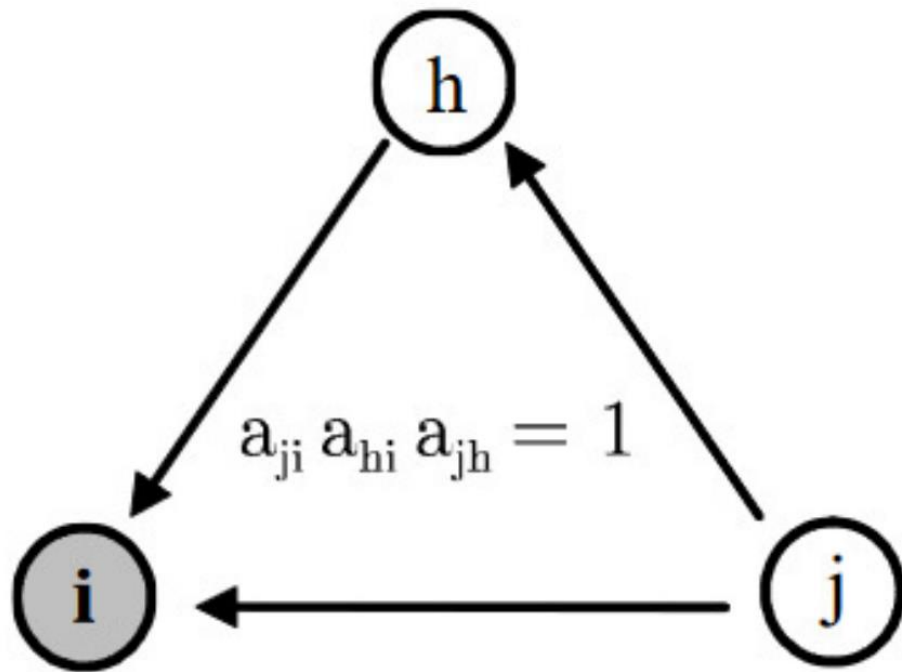


The Data set

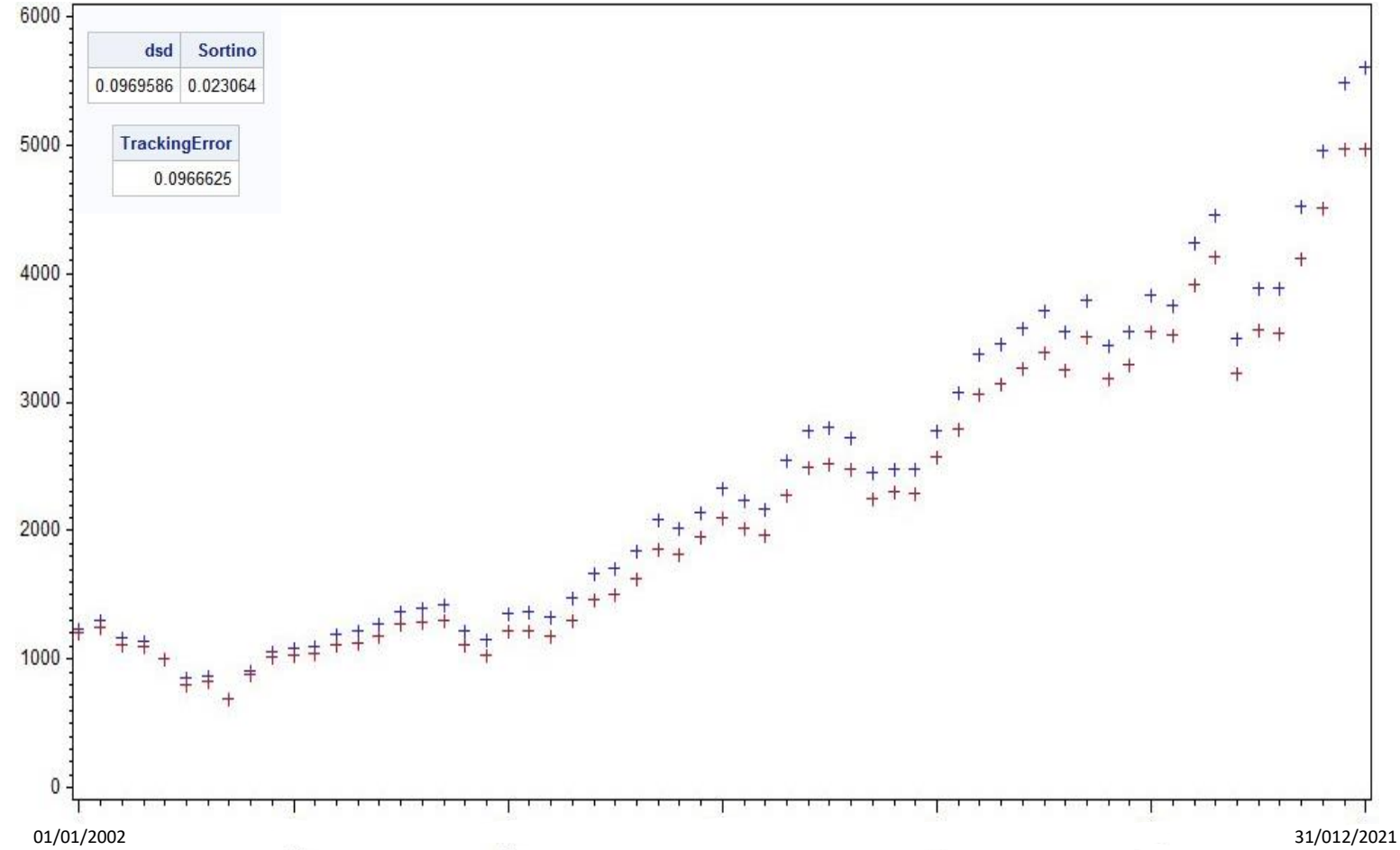
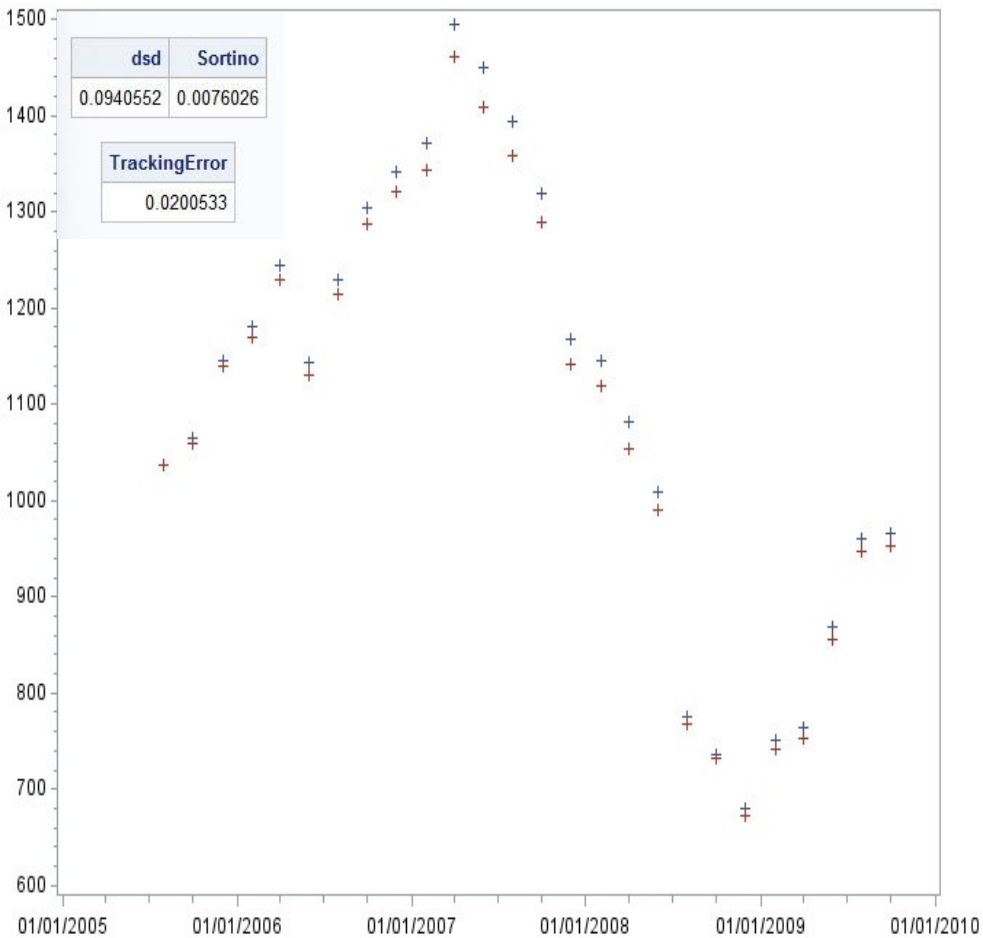
Limits

- Some missing values and unexplained 0
- CAC40 entry-exit: partial representation of the index (27 assets)
- Short period (2005-2009)

Topology of triangles



Outperform a stock index



Bibliography

- Cohen L., Frazzini A., (2008), Economic links and predictable returns, In Journal of Finance, volume 63(4), pages 1977–2011.
- El Himdi K., Roy R., (1997), Tests for Noncorrelation of Two Multivariate ARMA Time Series, The Canadian Journal of Statistics / La Revue Canadienne de Statistique, Jun.,1997, Vol. 25, No. 2, pp. 233-256.
- Fagiolo G., (2006), Clustering in Complex Directed Networks, Sant'Anna School of Advanced Studies, Laboratory of Economics and Management, Piazza Martiri della Libertà 33, I-56127 Pisa, Italy.
- Kharoubi C., (2016), Hedge Funds, une analyse critique, RB edition.
- Pacreau G., Lezmi E., Xu J., (2021), Graph Neural Networks for Asset Management, 119-2021, Amundi Asset Management, Working Paper.
- Wu J., Birge J.R., (2014), Supply chain network structure and firm returns. SSRN, 238547.
- Wu L., (2015), Centrality of the supply chain network. SSRN, 2651786.
- Zhu Z., Peng Q., Guan X. (2016), A time series clustering method based on hypergraph partitioning. In 2016 International Conference on Progress in Informatics and Computing (PIC 2016), pages 27–31.



*Thanks for
your attention !*

Armand L'Huillier, Camil Zahi, Yanis Rehoune