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## **Mutual Information-Based Hierarchies on Warsaw's Stock Exchange**

Econophysicists often use network theory to understand financial markets as complex systems. Nonetheless the networks created in such efforts are focused exclusively on correlations between stocks. We find this insufficient for two reasons. First, scientists in other fields have used hierarchical clustering and hierarchical networks based on other measures, hence this limit does not seem natural or necessary. Second, there exists a large body of literature confirming that the behaviour of financial markets is largely non-linear while Pearson's correlation coefficient only quantifies linear interdependencies. We are thus left with a body of research in econophysics which deliberately ignores the non-linearity of market behaviour when creating hierarchical networks yet assumes chaotic behaviour of financial markets, which can only be present if they behave non-linearly. We propose to remedy this situation using mutual information-based hierarchical networks. We estimate mutual information using naive plug-in estimator since consistent bias is not harmful to this application, however other methods may also be used. We then transform the mutual information into an Euclidean metric and build networks, namely minimal spanning trees and maximally filtered graphs, on this basis. We apply this methodology to Warsaw's Stock Exchange for years between 2000 and 2013, and comment on the difference between the results using this methodology and methodology based on correlation. We also comment on the structural changes on Warsaw's Stock Exchange which the study reveals.