

Title: Change in hierarchy of the financial networks: A study on firms of an emerging market in Bangladesh

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Abstract: We investigate the hierarchical structure of Dhaka stocks' financial networks, known as an emerging market, from 2008 to 2020. To do so, we determine correlations from the returns of the firms over a one-year time window. Then, we construct a minimum spanning tree (MST) from correlations and calculate the hierarchy of the tree using the hierarchical path. We find that during the unprecedented crisis in 2010–11, the hierarchy of this emerging market did not sharply increase like in developed markets, implying the absence of a compact cluster in the center of the tree. Noticeably, the hierarchy fell before the big crashes in the Bangladeshi local market, and the lowest value was found in 2010, just before the 2011 Bangladesh market scam. We also observe a lower hierarchical MST during COVID-19, which implies that the network is fragile and vulnerable to financial crises not seen in developed markets. Moreover, the volatility in the topological indicators of the MST indicates that the network is adequately responding to crises and that the firms that play an important role in the market during our analysis periods are financial, particularly the insurance companies. We notice that the largest degrees are minimal compared to the total number of nodes in the tree, implying that the network nodes are somewhat locally compact rather than globally centrally coupled. For this random structure of the emerging market, the network properties do not properly reflect the hierarchy, especially during crises. Identifying hierarchies, topological indicators, and significant firms will be useful for understanding the movement of an emerging market like Dhaka Stock exchange (DSE), which will be useful for policymakers to develop the market.

Key words: Dhaka Stock Exchange (DSE) Emerging markets Financial networks Minimum spanning tree (MST)

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