

Title:

Sub-Tier Supply Network Structure, Risk, and Business Performance

Abstract:

Although past research on Supply Chain Risk Management has focused on immediate supply chain connections, propagation of risks can extend beyond a firm's direct linkages. The structure of sub-tier supply network may also impact such risk propagation. In this paper, we focus on a specific aspect of sub-tier network structure, the sharing of tier-2 suppliers, and empirically study its prevalence and quantify its impact. Using firm-level supplier-customer relationship data in the high-tech industry, we find on average 20 percent of tier-2 suppliers are shared by tier-1 suppliers. We also find tier-0 firm risk is positively associated with common tier-2 supplier risk. The association is stronger with a higher degree of commonality. To disentangle the effect of risky supply network structure from risky tier-2 suppliers, we define two network metrics, viz., diamond ratio and cosine commonality score. A 10 percent increase in either metric is associated with around 5 percent increase in tier-0 firm risk. Lastly, using a new source of risk event data, we find that firms experience significant negative abnormal returns when their tier-2 suppliers are located in the event impact area, even though they themselves are not. The magnitude of this impact is much larger when the impacted tier-2 suppliers are heavily shared, similar to the scale of directly impacted firms, though taking longer to materialize. Overall, our results reveal existence of substantial supply chain risks due to sub-tier supplier overlapping and highlight the need for firms to increase visibility into their extended supply network. (Joint work with Iris Wang & Jun Li)

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