

# Designing mechanisms to control the over-ordering problem associated with trade credit

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## Abstract

We develop a trade credit model that captures the practices followed by suppliers issuing credit to retailers. We model the problem as a Stackelberg game where the supplier announces the trade credit contract terms, and the retailer responds by choosing the optimal order quantity. We show analytically and numerically how the traditional trade credit contract gives rise to the supplier's problem of over-ordering by retailers. This over-ordering leads to certain benefits, like boosting expected product sales and increasing supply chain efficiency. The associated downside is that retailers tend to place unreasonably large orders. As per the trade credit contract, the supplier is liable to take back the unsold inventory bought on credit. This exposes the supplier to the risk of excessive buyback or returns and causes a high inventory build-up at his end. The ongoing COVID19 has added to the woe of suppliers as the pandemic has severely plummeted customers' purchase causing returns from retailers to suppliers to increase further. In this work, we incorporate return policy in the trade credit model to control the problem of over-ordering by retailers. Managers can leverage our model to understand the impact of restricting the return percentage. Accordingly, they can design a suitable trade credit contract. Given the supplier's return policy, financially constrained retailers can use our model to obtain optimal inventory levels. We present numerical examples to illustrate evidence of derived conclusions.

Keywords: Trade credit; Over-ordering; Financially constrained; Return policy; Newsvendor