

Supply Contracts with Asymmetric Demand Information

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Abstract

Long lead times and short product life cycles in many sectors of the retail industry (e.g., fashion apparel) induce retailers to place orders very early in the season, while there is still considerable uncertainty regarding customer demand. In such situations the product manufacturers and/or suppliers may make their pricing decisions taking into account the retailers' risk assessment regarding the demand. However there is often asymmetry of information on anticipated demand between retailers and suppliers. This is for example the case when the retailer, being closer to the end-customer, has developed a more accurate estimate of the demand distribution, which he does not share with the supplier. The supplier is then compelled to design pricing policies under partial information on the demand distribution.

The supplier has a similar problem when she sells the product to many different retailers, each of who is faced with a different demand distribution, but because of legal or other reasons, she cannot differentiate among the retailers with respect to the wholesale price.

In this paper we analyze how a non-linear price schedule can be used to influence stocking decisions and supply chain performance in single period interactions between a supplier and buyer(s). We assume that there is asymmetric information between the supplier and the buyer with respect to demand. In contrast to much of the work that has been done on single period supply contracts, we assume that there is no opportunity for ongoing interactions between the supplier and the buyers after demand information is revealed. We also investigate channel coordination issues in this framework.

There is a growing literature that is devoted to analyzing mechanisms for achieving channel coordination in *newsvendor* environments. However, most of it has focused on various forms of returns policies and back-up agreements, both of which are widely used in practice. Non-linear pricing is another type of coordination mechanism that is widely used in practice, and there is a wide literature on its role in EOQ (long product life cycle) environments. However, surprisingly little attention has been paid to understanding how non-linear pricing can be used to achieve coordination in newsvendor environments. Moreover, non-linear pricing has some implementation advantages over returns policies and back-up arrangements because they do not require on-going interactions between the supplier and its buyer(s) and they do not require the supplier to deal with confirming, collecting, or disposing of excess stock at the end of the selling season.

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