Abstract

Manufacturers often procure raw materials from overseas sources and, therefore, are subjected to risks of price uncertainty due to exchange rate volatility. In this thesis a multi-period, two-stage supply chain has been considered that consisting of a manufacturer procuring an input raw material from two suppliers located in two different countries other than the home country. Although the offered price during the planning horizon remains same, due to fluctuations in the exchange rate, the manufacturer faces the problem of deciding the source, timing and the quantity of procurement. To mitigate the risks of such fluctuations in price, the manufacturer, at the beginning of the planning horizon, decides whether to purchase now or postpone the decision to a later period. A subsequent decision that the manufacturer has to make is to decide the purchase quantity from each source whenever it decides to purchase. For this base situation, this thesis analyses an optimal order-up to-level procurement policy considering a multi-period inventory model. The model evaluates various operational hedging strategies such as postponement with switching, pure postponement, pure switching for single sourcing and dual sourcing cases. To identify a suitable exchange rate forecasting model, real time exchange rate data has been collected and tested through statistical comparison of various time series models. It was observed that the postponement with switching strategy is advantageous compared to sole sourcing. Further, operational hedging strategies when integrated with GARCH model gives better results compared to other time series models. Additionally, it has also been observed through experimentation that operational hedging strategies when combined with financial options gives lower procurement costs under risks of price uncertainty.

Key Words: Operational Hedging, Exchange rate volatility modelling, multi-period inventory models, (s_t, S_t) policy.