Inventory and Credit Decisions Under Inflationary Conditions With Inflation Induced Bad-Debts

K.K. Aggarwal, Department of Operational Research, Faculty of Mathematical Sciences, University of Delhi, Delhi, India
Arun Kumar Tyagi, Department of Operational Research, Faculty of Mathematical Sciences, University of Delhi, Delhi, India

ABSTRACT

This article describes how a credit period, through its influence on demand, becomes a determinant of inventory decisions; therefore, inventory decisions should be determined jointly with credit decisions. Inflation and time value of money affects valuation of investments; hence their effect should not be disregarded in decision-making. Selling on credit exposes a firm to an additional dimension of default risk from customers as a result of inflation. Consequently, this article presents a mathematical model for the joint determination of optimal inventory and credit decisions for a day-terms credit-linked demand by incorporating the effects of inflation and the time value of money. It is assumed that an increase in the rate of inflation leads to an increase in bad-debts. The objective of the model is to maximize the present value of a firm’s net profit per unit of time by jointly optimizing the day-terms credit period and order interval. A numerical example, sensitivity analysis, and observations are presented to illustrate the effectiveness of the proposed model.

KEYWORDS

Accounts Receivable, Accounts Receivable Carrying Cost, Bad-Debts, Credit Linked Demand, Credit Period, DCF, Discounted Cash Flow, Inventory

1. INTRODUCTION

The classical economic ordering (EOQ) model is based on the assumption that demand is an exogenous variable i.e. it cannot be influenced by the decision maker. However, it has been observed that the demand can be influenced by offering credit period to the customers. Teng (2002) also illustrated two benefits of trade credit policy to the supplier: (1) it should attract new customers who consider it to be a type of price reduction; (2) it should cause a reduction in the sales outstanding, since some established customers will pay more promptly in order to take advantage of permissible delay more frequently. Trade credit reduces the customers’ cost of holding stock and thus motivates them to purchase in large quantities. Credit is used by the firm as a marketing strategy when a new product is launched. It is used as an effective means of price discrimination, product differentiation and product quality guarantee. In fact, many theories (Bougeas, Mateut & Mizen, 2009; Brennan, Maksimovic & Zechner, 1988; Daripa & Nilsen, 2010; Emery, 1984; Lee & Stowe, 1993; Lehar, Song & Yuan, 2012; Metzler, 1960; Schwartz, 1974; Smith, 1987; Vaidya, 2011) have been given for explaining why firms grant credit to their customers; but the one common theme among various theories of trade credit is that it is used to stimulate demand of the product. Peterson & Rajan (1997), Atanasova
& Wilson (2003) showed respectively that 70 percent of small U.S firms and 80 percent of firms in U.K provide credit to their customers. Ge & Qiu (2007) found that, on average, 27 percent of total sales in China are based on trade credit. In India, strong evidence exists in support of an inventory management motive for offering trade credit where firms attempt to increase sales and lower finished goods inventory by offering trade credit to their customers (Vaidya, 2011). The two common forms of trade credit are day-terms and date-terms. In day-terms payment has to be done within a fixed time period after the purchase and in date-terms the firm specifies a due date on which payment has to be done (Kingsman, 1983; Carlson & Rousseau, 1989; Robb & Silver, 2006). Thus, in day-terms credit each customer gets same amount of credit period irrespective of its purchase date, while in date-terms credit policy the credit period availed by the customers is the difference between due date (i.e. maximum credit period) and the time at which customer has purchased the goods.

Credit period through its influence on demand becomes a determinant of inventory decisions which are intended towards meeting that demand. Moreover, inventories sold on credit get converted into accounts receivable. Thus, inventories have to be built ahead of sales and accounts receivables are built after the sales. The close interaction among these components implies that efficient management of one component cannot be undertaken without the simultaneous consideration of other components. The inventory decisions of the firm affect the timing and quantity of cash outflows, while credit policy affects the timing and quantity of cash inflows. Because of the link among their associated cash flows, the inventory and credit decisions will be influenced by each other. As a result of this interrelationship between inventory and credit decisions, the inventory decisions should be determined simultaneously with the credit decisions. Thus, in the presence of credit-linked demand the optimal solution of the economic replenishment problem can only be obtained by solving it in combination with problem of setting credit policy. That is, the problem of when to order for replenishment, how much to order for replenishment and how much credit period should be given have to be determined jointly.

Granting credit stimulates sales which results in increased revenue but at the same time brings certain costs to the firm. The interactive nature of inventory and accounts receivable implies that all the costs and benefits associated with the inventory-credit system must also be integrated in the model. Selling on credit will be economical for the firm if the revenue generated due to credit sales is sufficient to compensate the cost of giving trade credit. If this is not the case, the firm would like to have cash sales program. Goods sold on credit get converted to accounts receivable causing accounts receivable carrying cost to the firm. The costs associated with carrying accounts receivable are the cost of financing accounts receivable, administrative costs in running a credit department, delinquency or collection costs and cost of default by the customers i.e. bad-debt losses. Out of the total cost in granting credit period the most significant cost is uncollectible accounts or bad-debts. This is due to the fact that selling on credit exposes the firm to the additional dimension of default risk (i.e. nonpayment) from the customers as some customers are either unable or unwilling to pay. Most firms expect to incur bad-debt losses in the normal course of business. These losses are properly viewed as a cost of administrating a credit policy. If the firm can identify such nonpaying customers in advance then it would refuse to trade with them except on a cash basis. Since the firm cannot identify such customers beforehand so this loss may be a necessary loss of business. It is the cost which must be sustained in order to obtain the profit from the paying customers. Since the timing and volume of cash flows resulting from accounts receivable is affected by the uncertainties of late collection and default. Hence, the bad-debt expenses need to be given an explicit consideration in decision making.

Moreover, a firm must take into account the effects of the general economic environment over its decisions. Inflation is a pervasive facet of our economic environment and has become a permanent feature of the economies throughout the world. In addition, money has a time value and under inflationary condition the time value of money will have an even more prominent role in the evaluation of monetary values. Inventory and accounts receivable are tied up assets of a firm which forms a significant portion of total investments. From a financial standpoint inventory and accounts receivable represents a capital investment and must compete with other assets for a firm’s limited
Opportunities for Data Mining and Customer Knowledge Management for Shopping Centres

Charles Dennis, David Marsland and Tony Cockett (2003). Knowledge and Business Process Management (pp. 154-172).

www.igi-global.com/chapter/opportunities-data-mining-customer-knowledge/24842?camid=4v1a