The Quarterly Review of Economics and Finance
45 (2005) 144–160

Dynamic cash discounts when sales volume is stochastic

Jeffrey R. Stokes*

The Pennsylvania State University, University Park, PA 16802, USA

Received 8 May 2003; received in revised form 15 December 2003; accepted 10 August 2004
Available online 21 November 2004

Abstract

In this paper, a dynamic terms of sale model is developed which suggests deep cash discounts can be partially explained by the positive relationship between the shadow value of sales and the optimal cash discount. The effect of sales volume uncertainty on the magnitude of cash discounts is also explored. Numerical results suggest the relationship between uncertainty and cash discounts is nonlinear. The model is then re-cast as a dynamic, differential game between two competing suppliers who use cash discounts to entice buyers. The results suggest that when firms are allowed to behave strategically, cash discounts are always larger as a result.
© 2004 Board of Trustees of the University of Illinois. All rights reserved.

JEL classification: G32; Q13; Q14

Keywords: Cash discount; Differential game; Terms of sale; Working capital management

1. Introduction

Trade credit represents one of the most flexible sources of short-term financing available to firms principally because it arises spontaneously with the firm's purchases (Scott, Martin, Petty, & Keown, 1999).[1] Estimates from Dunn and Bradstreet and Robert Morris Associates

---

* Tel.: +1 814 863 2984; fax: +1 814 865 3746.
E-mail address: jstokes@psu.edu.

[1] Trade credit is distinguished from consumer credit in this paper through the extension of credit terms between two firms rather than between a firm and a consumer.

1062-9769/$ – see front matter © 2004 Board of Trustees of the University of Illinois. All rights reserved.
doi:10.1016/j.qref.2004.08.001

suggest that the typical firm offering trade credit has an investment in accounts receivable that represents about 25% of all assets. Naturally, the management of accounts receivable becomes increasingly important the more the firm relies on credit sales.

The decision to offer trade credit and the determination of the firm's terms of sale are important managerial considerations. In addition, the purchasing firm's decision to take advantage of a cash discount or not and the motivations behind such a decision are also important. Retail firms such as Wal-Mart and Kroger have become particularly adept at exploiting the advantages of trade credit by moving product inventory well before the last day that a discount can be taken and thereby earning considerable return on the float.

Survey research conducted by the Credit Research Foundation found that nearly 60% of respondents offered cash discounts to their customers. Of the customers offered cash discounts, about 43% responded that over 75% of their customers took them. In addition, respondents reported that they felt the level of their cash discount accelerated DSO by as much as 20 days.[2] Survey evidence presented in *Progressive Grocer* suggests that in 2000, demanding better cash discount terms was ranked the 10th most likely action to be taken by grocers in 2001 while supplier cash discounts were ranked 22nd in terms of problem severity.

While results such as these indicate the importance of trade credit and cash discounts, there are other reasons cash discounts are important such as the Robinson–Patman Act (RPA). The RPA precludes firms from price discrimination including price discrimination that can arise through differential credit terms. However, there is evidence that suggests firms may at times violate the RPA without being caught. Two separate surveys reported in *Supermarket Business* suggest that as high as 76% of manufacturers thought a stronger enforcement of the RPA would be beneficial (see Partch, 1990 and Partch, 1992). The Federal Trade Commission's investigation into flavorings and spice marketer McCormick and Co. is a recent example where potential violations of the RPA occurred through preferential cash discounts.[3]

Numerous factors likely influence the determination of the firm's terms of sale; especially the level of the firm's cash discount. Building on work by Nadiri, Wrightsman, and Schwartz, Hill and Riener (H&R) model the firm's optimal cash discount in a static and deterministic setting by assuming that a greater proportion of the firm's customers will pay early (and hence take a cash discount) the higher the cash discount offered by the firm.[4] The H&R model, while intuitive and probably the most cited work in the cash discount area, typically predicts cash discounts that are lower than those observed in practice.

---

[2] Interestingly, about two-thirds of the respondents indicated that they do not re-evaluate their cash discount policy as market conditions change.

[3] McCormick signed a settlement agreement in 2000 with the FTC following a four-year investigation.

[4] Hill and Riener's static cash discount model suggests optimal cash discounts according to the equation: $\delta^* = 1/2[1 - (1 + r/365)^{m-n}]$ when the cash discount does not affect sales volume. In the equation, δ^* represents the optimal cash discount percentage, m is the last day the discount can be taken, n is the last day payment in full can be made ($m < n$), and r represents the firm's annual cost of capital. Hill and Riener also present a model to determine the *maximum* cash discount a firm should offer when current sales volume is positively impacted by the cash discount offered by the firm. This is the model used by Borde and McCarty. However, the *maximum* cash discount is likely a much less useful number than the *optimal* cash discount and the impact a cash discount has on future sales volume is explicitly ignored by H&R due to their static framework.

Download English Version:

https://daneshyari.com/en/article/9731506

Download Persian Version:

https://daneshyari.com/article/9731506

Daneshyari.com