

Chapter 18

On Reserve Money for a Fuzzy EOQ Model in an Inflationary Environment Under Supplier Credit: Reserve Money Policy for a Retailer

Nirmal Kumar Duari
Techno India University, India

Tripti Chakrabarti
University of Calcutta, India

ABSTRACT

We propose to derive a deterministic inventory model for a time varying deterioration rate with an exponential fuzzy demand over a finite planning horizon in this study. We assume that the supplier offers a credit limit to the retailer during which there is no interest charged. However, the retailer has the reserve capital with him to make the payments at the beginning of the transaction, but he decides to take the benefit of the credit limit. Each cycle has shortages, which have been partially backlogged to suit present day competition in the market. Also, the whole study has been done in an inflationary environment using the Discounted Cash Flow (DCF) approach to impart economic feasibility to the model. Numerical examples have been presented with the help of lingo software.

INTRODUCTION

The traditional inventory model considers in a static environment, where the demand for the item under consideration is assumed to be constant, for the sake of simplicity. However, it is observed that in practical situations, constant demand can be justified only for the maturity phase of the product. Many products, such as clothes, fashion accessories, mobile phones, need to prove their worth before they are generally

DOI: 10.4018/978-1-5225-3232-3.ch018

accepted. Hence, it is justifiable to approximate the demand for a product to be represented by a time dependent function during its growth stage. In real-life situations, the inventory lost by deterioration. Owing to this fact, how to control and maintain inventories of deteriorating items becomes an important problem for decision makers in modern organization. During the past few decades, many researchers have studied inventory models for deteriorating items such as volatile liquids, blood banks, medicines, electronic items and fashion goods. Ghare and Schrader (1963) were the first proponents to establish a model for an exponentially decaying inventory. Covert and Philip (1973) extended Ghare and Schrader's constant deterioration rate to a two-parameter Weibull distribution. Later, there are several interesting papers related to deterioration with and without shortage such as Shah and Jaiswal (1977), Aggarwal (1978), Dave and Patel (1981), Sachan (1984), Hariga (1996), and Goyal and Giri (2001), Bhunia and Maiti (1999), Chung and Tsai (2001), Sana et al. (2004), Ghosh and Chaudhuri (1996).

Inflation, very clearly, is a concept closely related to time. Inflation is generally associated with rapidly rising prices which cause or are caused by a decline in the purchasing power of money which varies or rather, depends upon time. However, from a financial point of view, an inventory represents a capital investment and must compete with other assets for a firm's limited capital funds. Perhaps, the reason that so many researchers still ignore the concept of inflation while framing their model of study is the difficulty in discounting the periodic cash flows that occur in the inventory system. For any system, inventory policy affects its profitability and a measure of profitability that disregards inflation and the time value of money has the advantage of simplicity, but definitely gives misleading and often devastating results. The returns of any enterprise depend very much on how and when it uses its resources. The investigation of inflation that took off with Buzacott (1975), saw of the likes of Misra (1979), Chandra and Bahner (1985), Dutta and Pal (1991) and Bose et al. (1995) further extends the concept of inflation. Wee and Law (1999) presented a production inventory problem with selling price dependent demand and completely backordered shortages when the environment is inflationary. Yang et al. (2001) generalized the inventory model under inflation for fluctuating demand and shortages. Huang et al. (2004) has put forward a production model for an inventory with defective items in an inflation induced environment. Jain et al. (2006) have put forward a study with time variable production, demand and deterioration rates in an inflationary environment. Jaggi et al. (2006) have gone one step further when they took inflation-induced demand for a deteriorating demand.

Time has also affected the business senses of organizations. Every businessman strives to increase his profits, his goodwill, and his customer base. To achieve this, he sometimes offers concessions or credit limits to his customers. Such a credit limit usually influences the customer into buying more, since it, in a way, reduces the purchasing cost for the customer. The traditional EOQ model assumes that a retailer accepts the offer of delay in payments since he does not have the capital with him. Even when he has to make the payments at the end of credit limit, he takes a loan to pay off the supplier. Goyal (1985) discussed such a situation in his paper. Mandal and Phaujdar (1989) extended on Goyal's work Goyal (1985) to incorporate shortages and considered the interest earned from sale revenues. Later, Aggarwal and Jaggi (1995), Jamal et al. (1997), Liao et al. (2000) studied supplier credit under inflation. Chung and Liao (2004), Chang (2004), Liao (2007), S. R. Singh and Richa Jain (2009) has put forward an EPQ model with a finite production and demand rate for a deteriorating inventory in an infinite planning horizon for supplier credits.

Also some of the practical situations with inflation have considered by Yang, H.L. et al. (2010) for deteriorating items and considered partial backlogging shortages; Yadav D et al. (2013) have considered retailer's policy with trade credit, Singh, S R et al. (2013) have considered an integrated model where as

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the product's webpage:
www.igi-global.com/chapter/on-reserve-money-for-a-fuzzy-eoq-model-in-an-inflationary-environment-under-supplier-credit/198698?camid=4v1

This title is available in Advances in Logistics, Operations, and Management Science, InfoSci-Books, InfoSci-Business and Management, Business, Administration, and Management, InfoSci-Computer Science and Information Technology, Science, Engineering, and Information Technology, InfoSci-Select, InfoSci-Select. Recommend this product to your librarian:
www.igi-global.com/e-resources/library-recommendation/?id=100

Related Content

Managing Chaos in Nonlinear Economic Systems: Globalization and Destination Tourism
Sam Cole (2013). *Chaos and Complexity Theory for Management: Nonlinear Dynamics* (pp. 297-314).
www.igi-global.com/chapter/managing-chaos-nonlinear-economic-systems/70895?camid=4v1a

Equal Pricing Strategies in a Dual Channel Supply Chain
Ue-Pyng Wen, Yun-Chu Chen and Kam-Hong Cheung (2011). *International Journal of Operations Research and Information Systems* (pp. 34-51).
www.igi-global.com/article/equal-pricing-strategies-dual-channel/58894?camid=4v1a

Knowledge Management: Analysis and Some Consequences
Petros A.M. Gelepithis and Nicole Parillon (2003). *Knowledge and Business Process Management* (pp. 68-81).
www.igi-global.com/chapter/knowledge-management-analysis-some-consequences/24837?camid=4v1a

Cloud-Based Manufacturing (CBM) Interoperability in Industry 4.0
István Mezgár and Gianfranco Pedone (2019). *Technological Developments in Industry 4.0 for Business Applications* (pp. 171-198).
www.igi-global.com/chapter/cloud-based-manufacturing-cbm-interoperability-in-industry-40/210484?camid=4v1a