This paper extends the theory of $N$ competitive newsvendors to the case where competition occurs simultaneously in both price and inventory. The basic research questions are whether the Nash equilibrium exists in this game, whether it is unique, and how the resulting inventories and prices are affected by competition. Using a novel method, we show the quasiconcavity of the competitive newsvendor’s problem and establish the existence of the pure-strategy Nash equilibrium. Through a contraction mapping approach, we develop sufficient conditions for the Nash equilibrium to be unique. We then analyze the properties of the equilibrium and compare it with the optimal solution for the (non-competing) price-sensitive newsvendor. We prove that at a symmetric equilibrium, retail prices and safety stocks strictly increase with the proportion of a newsvendor’s unsatisfied demand that switches to a competitor but strictly decrease with the intensity of price competition. Total inventories, on the other hand, increase with the intensity of price competition. Further, the competitive equilibrium never has lower safety stocks and higher retail prices (a situation that definitely hurts the customers) than the solution for non-competitive newsvendors.

1 Introduction

The newsvendor model, a basic building block of stochastic inventory theory, describes a single-period business setting in which a monopolist vendor must commit to inventory of a perishable product in advance of knowing demand. A simple fractile solution to this problem appears repeatedly as a component of more complex models and extensions. Two major extensions closely related to our paper are concerned with the need to better integrate supply chains with the markets they serve. The first extension, often called the “price-sensitive newsvendor model,” includes the selling price of the product as a decision variable, making demand a function of price (see Petruzzi and Dada 1999). The key question in this case is to understand the interaction between optimal inventory order size and the