

DISSERTATION DEFENSE

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Essays on Operations Management with Strategic Consumer Behavior, Real Earnings Management, and Capital Financing

This dissertation consists of three self-contained chapters that address the management problems of firm operation in the scenarios with strategic consumer behavior, real earnings management and capital constraint. The goal of this dissertation is to provide frameworks for modeling those aspects, and understanding their impacts on operations.

The first chapter is motivated by the widely observed waiting behavior of consumers when they are considering to make a purchase. Consumers can be substantially influenced by firms' operational decisions. They may time their purchases for when prices are marked down. This can be so extreme as to severely impact firms' profits. Firms in practice may apply different strategies to deal with this consumer waiting behavior. In this chapter, we focus on a marketing instrument—posterior price matching policy, which guarantees a refund to consumers if the seller marks down the price within a specified time. Based on a classical inventory model but with forward-looking consumers, we study a Rational Expectations Equilibrium on stocking, pricing and purchasing. We compare the consumers' purchasing decisions and the seller's pricing and inventory decisions as well as their payoffs in the scenarios with and without such a price matching policy. We reveal when and how much a price matching policy can benefit the seller, alleviating the negative impact from consumer waiting. These results can provide guidance for retailers as well as dealers and wholesalers when they are considering such a policy. Interestingly, we find that in some environments, a posterior price matching policy can also benefit consumers, which leads to a “win-win” outcome.

In the second chapter, we address a typical real earnings management problem related to operations—channel stuffing. In practice, managers' compensation is often linked to the reported performance of the firm, for instance, they may be compensated by stock awards and stock options whose value is determined by the stock market based on the firm's financial reports. In presence of information asymmetry, managers may be tempted to manipulate the operations considering the short-term return. Channel stuffing is one of such phenomena, in which managers induce the downstream parties to order more than the real demand. In this chapter, we aim to understand the determinants of managers' behavior on channel stuffing by a classical inventory management framework. In our model, a self-interested manager who controls the inventory and sales decisions has both short-term interest from stock-based returns and long-term interest in the firm's

value. The manager first invests inventory. After privately observing the real demand, the manager has a choice to pad, at some cost, the sales by stuffing the sales channel, which can inflate the financial report. We analyze a Perfect Bayesian Equilibrium in which the rational but imperfectly-informed investors infer the firm's real performance from the reported sales. We reveal when and how much the manager may choose to stuff the sales channel. Furthermore, we show that in equilibrium, the manager may over- or under-invest in inventory compared to the level determined by the traditional inventory theory. Our results provide meaningful intuitions for the impact of the managers' short-term interest on a firm's operational decisions.

The last chapter studies a firm's inventory and contracting strategies under capital constraint. In practice, firms usually operate with leverage, borrowing from capital markets to finance their operations. This motivates us to understand how firms in different scenarios make their financing, production/inventory and contracting decisions. In this chapter, we apply the classical two-stage supply chain framework, but with capital constrained participants who need to finance their inventory investment under the risk of costly bankruptcy. We study two supply chain modes: preorder and consignment. In the former, the supplier transfers the inventory risk to the buyer; in the latter, the supplier can capture more margin, but he bears the risk. Based on a Stackelberg game, we investigate the costs of both financing and preorder for the supplier. This study reveals the impact of capital constraint on the optimal allocation of contracts as well as the inventory decisions and the corresponding performance of the participants.