

Chapter 9

Contracts Based on Inventory Cost Share for Supply Chain Coordination

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ABSTRACT

In this document it is analyzed the importance of contracts for coordination between two companies in a supply chain. In the studied situation, one company, or supplier, supplies one product to the other company, who is a retailer. The companies are going to coordinate by two types of decisions: economic (concerning prices fixed on a contract), and physical exchange (concerning the inventory to be held). Two types of contracts will be presented: one contract with a simple pricing scheme and two contracts with inventory holding cost shared among the companies of the supply chain. The objective is to show that contracts with inventory holding cost share allow the two companies to efficiently coordinate the chain they form.

INTRODUCTION

This work focus mainly on a specific question: for an adopted contract, what are the decisions to be taken for each company taking into account his own interests, knowing that these decisions influence the behavior of the other company and in consequence the coordination of the chain. This may be also explained using the terms of Cachon (2004) who clearly presents this situation: “Optimal supply chain performance requires the

execution of a precise set of actions. Unfortunately, those actions are not always in the best interest of the members in the supply chain, i.e., the supply chain members are primarily concerned with optimizing their own objectives, and that self-serving focus often results in poor performance. However, optimal performance can be achieved if the firms coordinate by contracting on a set of transfer payments such that each firm’s objective becomes aligned with the supply chain’s objective” (pp. 229).

On recent years there has been a growing interest on the study of dyadic supply chains. Liu and

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Wang (2007) revealed the importance of cooperation among members of a supply chain concluding that actual competition is between supply chains, not between companies, and Tyan and Wee (2003) identify four strategies of retailer-supplier partnership. Tyan and Wee (2003) consider that vendor managed inventory (VMI) is the highest level of partnership. In this document we are not centering our attention on partnership; we are centering attention on coordination. VMI should not be confused with a buy back contract, since as it will be explained in detail in the document, with a buy back contract the retailer continues to manage the inventory. VMI literature is very vast, going from the conditions for adoption (Dong et al., 2007) to operational decisions for cost reduction (Yao et al., 2007; Van der Vlist et al., 2007).

A contract is the assertion of the rights and obligations of each part for transactions (Penguin Dictionary of Economics, 2003) in which the affected parts agree to carry out or not specific actions. A contract may be oral or written. Attention is centered on contracts because of their relevance in explaining the financial flows and the physical flows that they generate among contracting companies.

In this work the interest on financial flows is particularly in terms of price and in terms of the reasons that activate a monetary transfer between the companies. The interest on physical flows is in terms of quantities of the exchanged product. There are several reasons that can activate a financial flow between the companies. One of the reasons is, of course, the fact that one of the companies buys a product, but other reasons may be, according to the contract, the fact of selling a quantity of products over the final market, or the fact of not selling all the products and hold them as inventory. Physical flows occur when one of the companies order a quantity of products. This quantity will be physically transferred, so that each unit may be sold, stored or put aside as unsold by the company receiving them.

A contract normally explicit the economic conditions regulating the monetary flows between companies. Contracts are documents specifying the engagements between the companies at the time of a commercial relation. These engagements represent the “rights and obligations” of each part. This rights and obligations have to be specified for the good operation of the commercial relation. In general, an obligation for one company represents a right for the other. The legal dimension of these contracts is important. This legal dimension will allow a third person to regulate the litigations, based on the commitments accepted by the companies at the time of the signature of the contract. This is the reason why many contracts also specify the penalties in the event of not accomplishing one or more engagements. It should be noted that this legal dimension makes it possible to have a “guarantee” for the commitments of the contracting parts: the contract considers the potential penalties that a company may expect if the engagements are not respected. In this way, a contract also represents an “inciting” device to avoid opportunist behaviors.

From a purely economic point of view, the contracts will determine the behavior of each company taking into account its objectives of profitability (profit maximization). The economic conditions of the exchanges, translated into contracts, determine the behavior of the companies and thus the effectiveness of coordination of the supply chain.

Indeed, the fact of supply and order quantities of a product, and to pay financial amounts implies decision-making, decisions that will be expressed and established in the contract. These decisions are made in order to achieve certain goals that each company has. The fact that the decisions established in a contract simultaneously satisfy the two companies corresponds to a situation known as “coordination” by certain authors (Anupindi and Bassok, 2002; Cachon, 2004; Larivière, 2002; Tsay, 1999; Weng, 1999). According to these authors, if the decisions taken

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