



Coordination of a socially responsible supply chain using revenue sharing contract



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ABSTRACT

This paper explores coordination of a corporate social responsible (CSR) manufacturer–retailer chain by considering two cases, CSR retailer and CSR manufacturer. In manufacturer–Stackelberg game setting revenue sharing (RS) contract is used to coordinate the channel. It is found that CSR retailer's perfect welfare maximizing motive resolves channel conflict, otherwise RS contract coordinates the channel. Wholesale price of RS contract is higher than marginal production cost above a threshold of CSR in one case and is negative above a threshold of CSR in the other. Also, CSR manufacturer's pure profit is negative above a threshold of CSR.

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1. Introduction

A supply chain consisting of an independent retailer and an independent manufacturer has conflicting self-interested objectives, which often lead to suboptimal decisions. It has been well established that the profit earned in a single central decision through cooperation is always higher than the profit under self-interested decentralized decision making. Thus, decentralized decisions are inefficient and coordination between channel members is pressing for improving channel wide performance. With supply chain coordination the manufacturer offers a side payment to the retailer that aligns both players profit maximizing objectives with the channel objective. Different classes of side payments as coordination contracts are used in supply chain literature aimed at impelling different entities to accept centralized decision. Interestingly, there is no universal contract that coordinates all supply chains because performance of a coordination contract depends on supply chain characteristic.

Corporate social responsibility (CSR) is roughly defined as a firms corporate behavior that displays social and ethical responsibility to its array of stakeholders (eg. customers, employees, communities, supply chain members, etc). With the continuing trend of globalization, CSR has been receiving notable attention from the academic and business communities and has become mainstream. [Murphy and Poist \(2002\)](#) have mentioned that though supply chain practitioners have been slow to adopt CSR considerations, social responsibility ideas in supply chains are increasing in importance. In a recent survey, 74% of the top 100 U.S. companies by revenue have published CSR reports in 2008, up from 37% in 2005. Globally, 80% of the world's 250 largest companies have issued CSR reports in 2008 ([KPMG, 2008](#)). Alongside business goals companies are pressurized by stakeholders and shareholders to look after social and environmental issues ([Fernandez Kranz and Santalo, 2010](#); [Kitzmueller and Shimshack, 2010](#); [Starks, 2009](#); [Mohr and Webb, 2001](#)). On social issue, largest apparel retailer GAP admits to charge of its substandard working conditions in as many as 3000 factories worldwide ([Merrick, 2004](#)). Nike is often

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accused for inhuman labor and business practices in Asian manufacturing factories (Amaeshi et al., 2008). For environmental issues, in 2009 a group of 186 institutional investors having assets of 13 trillion US dollars have signed a statement. It suggests directions to deal with global warming and greenhouse gases (Economist, 2009). Further, a 2004 Globescan CSR survey of more than 23,000 individuals in 21 countries have suggested the public expects more from the corporate. Recent empirical evidence shows that customers are willing to pay a higher price for products with CSR attributes (Trudel and Cotte, 2009; Ageron et al., 2011). As a result many leading international brands like WalMart, Nike, Adidas, GAP have been impelled to incorporate CSR in their complex supply chains by a code of conducts (Amaeshi et al., 2008). Although attention have been given discretely on channel coordination, CSR and effects of CSR in supply chain, coordination between socially concerned supply chain members is not explored yet. As a result, socially responsible supply chains often provide suboptimal decisions because of decentralized decision making.

The purpose of the paper is to merge two research areas, CSR and channel coordination, in a manufacturer–retailer supply chain, where besides pure profit one channel member has the intent to swell stakeholder's welfare by exhibiting CSR. To do so, in modelling and analysis we only consider effects of CSR in the form of consumer surplus rather than CSR activities that a socially concerned firm performed for stakeholder's welfare. So, a socially responsible supply chain member maximizes its traditional pure profit plus a share of consumer surplus that it accrues from its stakeholders (Lambertini and Tampieri, 2010; Lien, 2002; Goering, 2007, 2008; Kopel and Brand, 2012). Two cases, the retailer is socially concerned in one and the manufacturer is in the other, are discussed. In manufacturer–Stackelberg game setting considering RS as the coordination contract, we analyze reactions of the welfare concerned channel member and effects of CSR on the profits of the channel members. In particular we are interested in the following questions. First, for both the cases what impact may the exogenous CSR has on decentralized decisions? How does the socially responsible firm maximize its profit goal irrespective of other players decision? Second, does the RS contract resolve channel conflict? If it does then what is the form of wholesale price–RS fraction pair and how does it differ from that of traditional profit maximizing supply chain? That is, what impact does the CSR has on wholesale price–RS fraction pair? Third, under RS contract how do the firms apply their policies and counter policies to settle for a compromise solution? Fourth, under RS contract if a channel member is engaged in CSR then what impact does it has on other member's pure profit? Fifth, whoever, either the retailer or the manufacturer, be engaged in CSR, under what circumstances it's possible to gain entire channel profit and entire consumer surplus that accrues to socially concerned firm's stakeholders. In such case, apart from consumer surplus, in which part would the pure profit be divided between the channel members?

The rest of the paper is organized as follows. Section 2 summarizes the literature related to RS contract and CSR attribute in supply chain. In Section 3 the model is developed and several interesting results for socially concerned supply chain are derived. Finally, in Section 4 apart from managerial implications some concluding remarks and direction of future research are provided.

2. Literature review

With increasing emphasis on effective supply chain, significant research has been done on supply chain coordination. Commonly used coordination contracts are quantity discount, quantity flexibility, revenue sharing, buy back, sales rebate, etc. These contracts are related to quantity, quality, price and are different for contractual clauses among the channel members. Among these contracts, RS contract has been used extensively because of its simple design and administration. With revenue sharing contract, the retailer pays the manufacturer some of the revenue that it creates plus a wholesale price per unit product that it received. This contract has been widely used in videocassette industry. Cachon and Lariviere (2005) have examined the performance of RS contract on standard newsvendor problem. They have shown that it coordinates the channel and arbitrarily assigns profits for exogenous price, whereas, for the price-setting retailer it coordinates the channel for a particular profit split. Giannoccaro and Pontrandolfo (2004) have developed a revenue sharing model to coordinate a three-echelon supply chain. Van der Veen and Venugopal (2005) have used the RS contract as the coordination tool for videocassette industry, where demand varies with time. For a supplier–retailer chain, Hou et al. (2009) have used RS contract to improve performance of a supply chain under exact and tacit information about supplier's cost. Panda (2013a,b) has used RS contract to coordinate a two-echelon supply chain, where demand is sensitive to stock and endogenous price. He has determined best quantity–price pairs under explicit and implicit cost information. In this direction the works of Saha (2013), Saha et al. (in press) and Sana (2011) are worth mentioning. The outline of the application of RS contract on supply chain under newsvendor problem setting can be found in (Cachon and Lariviere, 2005). The authors have extensively discussed the strengths and limits of revenue sharing contract in comparison to other coordination contracts. The key problem of revenue sharing contract is in settling revenue sharing fraction for both players utmost benefit.

CSR is an evolving concept that currently does not has a universally accepted definition. "Social responsibility (is the) responsibility of an organization for the impacts of its decisions and activities on society and the environment through transparent and ethical behavior that is consistent with sustainable development and the welfare of society; takes into account the expectations of stakeholders; is in compliance with applicable law and consistent with international norms of behavior; and is integrated throughout the organization."¹ In recent years there is a significant rise in interest over CSR for stakeholder's

¹ Working definition, ISO 26000 Working Group on Social Responsibility, Sydney, February 2007.

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