

Bounded Rationality and Fairness Ideals in Distribution Channels

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Abstract

It has been suggested that concerns for fairness may significantly affect the interactions between firms in a distribution channel. We analytically and experimentally analyze firms' decision makings in a two-stage dyadic channel, in which firms decide on investments in the first stage and then on prices in the second stage. We find that firms' behaviors are significantly different from the predictions of the standard economic model.

We explain the results by allowing the retailer to be concerned about fairness between the manufacturer and itself. Using a quantal response equilibrium model, in which both the manufacturer and retailer make noisy best responses, we show that there exist significant concerns for fairness between channel members. In addition, we propose a new principle of distributive fairness—sequence-aligned ideal that is studied first time in literature, and compare the new fairness ideal with several existing fairness ideals that are commonly adopted in literature. Surprisingly, the new fairness ideal, according to which the sequence of moving by channel members determines the formation of equitable payoff for players, significantly outperforms other fairness ideals, including strict egalitarianism, liberal egalitarianism, and libertarianism. We also show that both the manufacturer and the retailer are boundedly rational when making pricing decisions, and that the manufacturer is more irrational than the retailer when the manufacturer acts as a Stackelberg leader in the dyadic channel.

Keyword: quantal response equilibrium; fairness ideals; equity; distribution channels; behavioral economics; experimental economics

1. Introduction

Research in behavioral and experimental economics has shown that concerns for fairness impact a wide range of agents' behaviors.¹ Subjects in various versions of the ultimatum and dictator games routinely offer higher than optimal shares of the initial endowment and responders virtually always turn down low offers that are significantly higher than predicted by standard economic models (Camerer 2003).

Researchers have also surveyed consumers and companies to investigate what is considered fair in contexts ranging from price increases to renting contracts, and have found that people largely agree on what is fair and what is not fair, suggesting that fairness is a widely understood concept (Güth et al. 1982; Kahneman et al. 1986a, 1986b; Olmstead and Rhode 1985). In addition, there is empirical evidence suggesting that fairness/equity plays an important role in certain business contexts (Kumar et al. 1995; Olmsted and Rhode 1985; Scheer et al. 2003, etc.). For instance, in a study that surveyed 417 auto dealers from the USA and 289 auto dealers from the Netherlands, Scheer et al. (2003) find that auto dealers have concerns for distributive fairness with their business partners. Furthermore, they also find that inequity plays a very different role for dealers across cultures, with American dealers reacting only to disadvantageous inequity and Dutch dealers reacting to both disadvantageous and advantageous inequity.

There is also strong experimental support for fairness concerns from contracting agents (Fehr et al. 2007; Hackett 1994; Loch and Wu 2008). For example, Fehr et al. (2007) show that bonus contracts that offer a voluntary and unenforceable bonus for satisfactory performance provide

¹ A short list of research on this topic includes: Anderson and Simester 2004, 2008, 2010; Camerer 2003; Charness and Rabin 2002; Fehr, Klein and Schmidt 2007; Fehr and Schmidt 1999; Goldfard et al. 2010; Güth, Schmittberger and Schwarze 1982; Hackett 1994; Ho and Su 2009; Kahneman, Knetsch and Thaler 1986a, 1986b; Macneil 1980; Olmstead and Rhode 1985, and Rabin 1993, etc.

powerful incentives and are superior to explicit incentive contracts when there are some fair-minded players.

Given the widely documented importance of fairness in various business contexts, theorist and practitioners have called attention to the issue of understanding fairness as one of the priorities to develop and maintain healthy relations with business partners in distribution channels. Cui, Raju and Zhang (2007) model the effect of fairness concerns on the interactions between the manufacturers and the retailer in a dyadic channel with linear demand. They find that the manufacturer can use a single wholesale price to coordinate the channel so long as the retailer has strong concerns for fairness. That is, the double marginalization problem can be avoided in such a fair channel. Demirag, Chen and Li (2009) extend Cui et al. (2007) to consider non-linear demand functions and find that a linear wholesale price can coordinate the channel at a wider range when the retailer is fair-minded. Katok and Pavlov (2010) find that linear pricing contracts can still maximize the channel profit when there is information asymmetry between channel members. The importance of fairness for healthy relationship between channel members is also documented and analyzed in many other research studies.²

Although previous research has generated extensive useful insights on how fairness affects channel interactions, several important questions remain unanswered. How strong are the concerns of fairness in a channel? What principle is guiding the determination of the equitable payoff (*i.e.*, what is considered as a fair deal by a player)? If a firm's decision is deviating from the prediction of standard economic model, is it because the decision maker cares about fairness

² The research includes: Anderson and Weitz 1992; Corsten and Kumar 2003, 2005; Demirag, Chen and Li 2009; Frazier 1983; Geyskens, Steenkamp and Kumar 1998; Hackett 1994; Heide and John 1988, 1992; Katok and Wu 2009; Kaufmann and Stern 1988; Kumar 1996; Kumar et al. 1995; Loch and Wu 2008; Macneil 1980; McCharty 1985; Meyer 2010; Olmstead and Rhode 1985; Scheer, Kumar and Steenkamp 2003, etc.

or is it because the decision maker cannot always make optimal decisions due to bounded rationality?

In order to better understand these issues, we experimentally investigate the theoretical predictions on prices in a dyadic channel where the manufacturer acts as a Stackelberg leader in choosing prices and the retailer acts as a follower, and build a quantal response equilibrium (QRE) model (McKelvey and Palfrey 1995) that incorporates both retailer's concerns for fairness and the bounded rationality by both firms to explain the discrepancy between the theoretical predictions and empirical regularities. The behavioral model nests the standard economic model as a special case. Through such an enriched model, we are able to investigate how equitable payoffs are determined in a fair channel. We estimate the behavioral model from experimental data using maximum likelihood models.

Our research makes the following contributions to the literature. First, we provide an estimation of fairness parameters in a channel context. The estimation results suggest that there are significant fairness concerns in distribution channels. Second, we propose a new principle of fairness that is studied for the first time in literature, *i.e.*, sequence-aligned ideal, and compare the new fairness ideal with the fairness ideals that are commonly adopted in the literature, *i.e.*, strict egalitarianism, liberal egalitarianism, and libertarianism (Cappelen et al. 2007). . The new fairness ideal reflects the power structure in the dyadic channel and proposes that the equitable payoff should be consonant with the ratio of players' profits in the standard Stackelberg game. Hence, our research contributes to the understanding of the determinants of equitable payoffs between fair-minded agents. The research is also the first study in the literature to empirically study fairness ideals in the pricing game of a distribution channel.

Next, we use a two sided QRE specification to study the bounded rationality of both the manufacturer and retailer. To our best knowledge, this is the first research that analyzes the bounded rationality of both players in a dyadic channel. With both bounded rationality of players and the fairness concerns by the retailer incorporated in the behavioral model, the results of the estimated behavioral model quantify both effects using experimental data from incentive aligned experimental studies. We show that fairness concerns capture well entrenched preferences, instead of simply an artifact of bounded rationality. Finally, we provide managers with indications of how the power structure affects the interactions between channel members who may care about fairness in the channel. Based on our results, the power structure does affect the effect of fairness concerns on the dynamics between firms in a channel. It is perceived as “fair” for the more powerful firm, *i.e.*, the manufacturer as a Stackelberg leader in our model, to obtain a higher payoff than the less powerful firm, *i.e.*, the retailer as a follower in the model.

Our paper is closely related to Cappelen et al. (2007), who study three fairness ideals, strict egalitarianism, liberal egalitarianism, and libertarianism, in a dictator game where the outputs of a production stage may determine the equitable payoff in the following dictator distribution game. Our paper is different from Cappelen et al. (2007) in three ways. First, players in a dyadic channel make pricing decisions in the second stage of the game in our paper, while the dictator is deciding the amount of currency to give to the passive receiver in the second stage in Cappelen et al. (2007). The setting in our paper is closely related to the dyadic channel structure that is widely studied in marketing. Second, we propose a new fairness ideal, sequence-aligned ideal, that is studied for the first time in the literature. We show that the newly proposed fairness ideal outperforms other fairness ideals in our experimental studies. Third, our paper presents a

behavioral model that incorporates both bounded rationality and fairness concerns, while Cappelen et al. (2007) only consider fairness concerns.

Our research also contributes to the literature on incorporating behavioral theories into quantitative marketing models to better understand how firms' decisions may be affected by certain behavioral factors, such as cognitive hierarchy (Camerer, Ho and Chong 2004; Goldfarb and Xiao 2010; Goldfarb and Yang 2009), fairness concerns (Chen and Cui 2010; Cui, Raju and Shi 2011; Cui et al. 2007; Feinberg, Krishna and Zhang 2002), bounded rationality (Che, Sudhir and Seetharaman 2007; Chen, Iyer and Pazgal 2010), loss and/or risk aversion (Hardie, Johnson and Fader 1993; Kalra and Shi 2010), regret or counterfactual consideration (Lim and Ho 2007; Syam, Krishnamurthy and Hess 2008), reference dependency (Amaldoss and Jain 2010; Ho and Zhang 2008; Orhun 2009), and learning (Amaldoss and Jain 2005; Amaldoss, Bettman and Payne 2008; Bradlow, Hu and Ho 2004).