



Sequential negotiations with loss-averse buyers[☆]



Antonio Rosato

University of Technology Sydney, Australia

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ABSTRACT

This paper analyzes sequential negotiations with exogenous breakdown risk between a risk-neutral seller and a loss-averse buyer who is privately informed about his valuation. I show that, compared to the risk-neutral benchmark, loss aversion on the buyer's side softens the rent-efficiency trade-off for the seller. The reason is that the higher the buyer's valuation is, the more he has to lose by rejecting the seller's offer. Thus, in equilibrium the seller's profits and overall efficiency are both higher than in the risk-neutral case. Moreover, I also show that loss aversion has a redistributive effect by increasing the equilibrium payoff of some low-valuation buyers and decreasing that of high-valuation ones.

“When you ain't got nothing, you got nothing to lose”

Bob Dylan, *Like a Rolling Stone* (1965)

1. Introduction

Many bargaining situations involve negotiations that take place over a period of time between parties that are differentially informed. Consider, for instance, a seller making a series of price offers to a buyer who is privately informed about his valuation. Three types of economic forces contribute to shape outcomes in such an environment. First, a buyer who has the option of deferring a purchase until later may have an incentive to wait for a better price offer even if his current payoff from making a purchase is positive. Second, a seller should anticipate strategic behavior by buyers when choosing prices. If a buyer is waiting for a better offer then the seller may have to set a price below the price she would set in a static setting, in order to induce the buyer to purchase earlier. Third, the possibility of making multiple price offers may allow the seller to engage in inter-temporal price discrimination and extract more surplus from buyers than what would be possible in a static setting. Hence, when the parties are differentially informed, delay serves as a signalling device for the informed party to communicate his private information, as well as a screening device for the uninformed party to gauge whether the other party is in a weak or strong bargaining position.

Moreover, many negotiations are inherently subject to various forms of breakdown risk. Maybe another buyer will arrive and offer the seller better terms of trade, or maybe the original buyer might discover another product that better suits his needs. For

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E-mail address: Antonio.Rosato@uts.edu.au.

example, suppose you are planning to buy a house and have started negotiating with one particular seller. Out of many factors that you may take into account during the negotiation, two important ones are: (1) How likely it is that if you wait for the seller to reduce the price, she will find another interested buyer and “disappear”? (2) How likely it is that if negotiations do breakdown you will find another house that matches your tastes? In fact, these risks in many situations are likely to be more important in evaluating the relative costs and benefits of delay than the standard discounting costs that play a crucial role in many bargaining models.

Sequential negotiations with asymmetric information have also been the focus of several laboratory experiments.¹ By and large, however, equilibrium predictions from game theoretic models of sequential bargaining have fared poorly in these experiments. In particular, prices are often far higher than the levels predicted in models with risk-neutral buyers, and the buyers appear to be eager to make a purchase in earlier periods. Moreover, several comparative statics predictions about the effects of changes in information, changes in the discount factor, or changes in the time horizon are also rejected by the data. As some have argued, relaxing the assumption of risk-neutral preferences could potentially rationalize these experimental findings. Yet, while several studies have explored the role of risk preferences in static bargaining problems or in models of sequential bargaining with complete information, the role of risk preferences in models of sequential bargaining with asymmetric information has remained largely unexplored.²

In this paper I introduce buyer loss aversion into a model of sequential negotiations with one-sided incomplete information and breakdown risk. I focus on loss aversion rather than classical risk aversion for several reasons. First, there is ample experimental and field evidence that people evaluate outcomes not (only) in absolute terms but (also) relative to a reference point, and that losses (relative to this reference point) loom larger than equal-size gains. Moreover, the recent literature in Behavioral Industrial Organization shows that in many buyer-seller interactions loss aversion seems to be empirically more relevant than risk aversion. For example, [Heidhues and Köszegi \(2014\)](#) show that buyer loss aversion is consistent with the puzzling combination of flexibility and stickiness observed in consumer prices; such a combination could not be rationalized by classical risk aversion alone. Similarly, most advertising and marketing techniques commonly employed by firms seems to be directly targeted at creating an “attachment effect” ([Köszegi and Rabin, 2006](#)) and exploiting consumers' feeling of loss from failing to buy a product they were expecting to obtain.³ Most of the papers in this literature, however, impose (some or all of) the following assumptions: (i) the seller can commit in advance to a specific pricing strategy; (ii) consumers have homogenous preferences and no private information, and (iii) the interaction between the seller and the consumers lasts only one period. Yet, many buyer-seller interactions take place in a dynamic environment where the seller is unable to commit in advance to a given price. Moreover, consumer loss aversion is likely to play a relevant role in dynamic negotiations as consumers do not know what the future terms of trade will be if they refuse to buy at the current price.⁴

Following [Köszegi and Rabin \(2006\)](#), I assume that the buyer's reference point is given by his rational expectations, which are determined endogenously in the model by requiring that they must be consistent with optimal behavior given expectations. Since in bargaining negotiations parties cannot credibly commit in advance to a given strategy, the expectations about the possible outcomes of the bargaining process with which a party enters the negotiation may play an important role in assessing the outcome of the negotiation itself. To what extent then do the expectations with which parties enter a negotiation matter? I show that, compared to the risk-neutral case, loss aversion with expectations as the reference point actually makes delay and disagreement *less* likely, thus increasing overall efficiency. The intuition behind this result — which may appear counterintuitive at first — is as follows. In equilibrium, a buyer with a high valuation expects to achieve a large surplus and since expectations are the reference point, he suffers a large loss when delaying (or failing to reach) agreement. In other words, a high-valuation loss-averse buyer has a lot to lose and so he is more willing to make concessions and to accept a high price. Hence, loss aversion with expectations as the reference point softens the rent-efficiency trade-off for the seller.

[Section 2](#) introduces the model and the buyer's preferences, and describes the solution concept. I focus on two-period sequential negotiations between a risk-neutral seller and a loss-averse buyer who is privately informed about his valuation (i.e., one-sided private information). In each period the seller makes a take-it-or-leave-it (TIOLI) offer to the buyer who can either accept or refuse and at the end of the first period there is an exogenous probability of breakdown.⁵ The assumption about the seller being risk neutral and having all the bargaining power is appropriate if we think of the seller as a large, profit-maximizing firm with (some) market power. Furthermore, this assumption is rather common in the current literature in Behavioral IO with loss-averse consumers.

[Section 3](#) analyzes the case where the buyer's valuation can take one of two values (high or low) and characterizes the unique equilibrium of the model. Moreover, I show that for some values of the seller's prior beliefs about the buyer's valuation, in equilibrium the buyer must play a mixed strategy.⁶ Delay still happens with positive probability, but it is less likely to arise when the

¹ See, for instance, [Güth et al. \(1995\)](#), [Rapoport et al. \(1995\)](#), [Reynolds \(2000\)](#), [Cason and Sharma \(2004\)](#) and [Cason and Reynolds \(2005\)](#).

² On the role of risk aversion in models of bargaining with complete information see, for instance, [Chae and Heidhues \(2004\)](#), [Roth \(1985\)](#) and [Volij and Winter \(2002\)](#).

³ See also [Heidhues and Köszegi \(2008\)](#), [Herweg and Mierendorff \(2013\)](#), [Karle and Peitz \(2014, 2016\)](#) [Karle and Schumacher \(2016\)](#) and [Rosato \(2016\)](#).

⁴ For example, in his account of sales practices, [Cialdini \(2001, page 208\)](#) reports: << Customers are often told that unless they make an immediate decision to buy, they will have to purchase the item at a higher price later or they will be unable to purchase it at all. [...] A home vacuum cleaner operation I infiltrated instructed its sales trainees to claim that, “I have so many other people to see that I have the time to visit a family only once. It's company policy that even if you decide later that you want this machine, I can't come back and sell it to you.”>>.

⁵ In the classical analysis of sequential bargaining, the incentive to reach an agreement can arise either from the parties' (intrinsic) impatience or from an exogenous risk of negotiations breaking down. As shown by [Binmore et al. \(1986\)](#) and [Sutton \(1986\)](#), with classical preferences these two alternative interpretations are equivalent. Since reference-dependent preferences are a model of choice under risk — and not of intertemporal choice — in this paper I focus on a model with exogenous breakdown risk without intertemporal discounting.

⁶ See [Dato et al. \(2015\)](#) for a comprehensive analysis regarding strategic interaction under expectation-based loss-aversion. To the best of my knowledge, my paper and theirs are the only ones to explicitly characterize a mixed-strategy equilibrium when players are expectations-based loss-averse.

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