

Essays on Pricing and Learning in Bertrand Markets

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THESIS

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Abstract

The thesis studies sellers' pricing and learning behaviour in Bertrand oligopoly markets using a bounded rational approach. It consists of four chapters.

Chapter 1 develops a quantal response adaptive learning model which combines sellers' bounded rationality with adaptive belief learning in order to explain price dispersion and dynamics in laboratory Bertrand markets with perfect information. In the model, sellers hold beliefs about their opponents' strategies and play quantal best responses to these beliefs. After each round, sellers update their beliefs based on the information learned from previous play. Maximum likelihood estimation suggests that when sellers have full past price information, the learning model explains price dispersion within periods and the dynamics across periods. The fit is particularly good if one allows for sellers being risk averse. In contrast, Quantal Response Equilibrium does not organize the data well.

Chapter 2 proposes a generalized payoff assessment learning model of Sarin & Vahid (1999) for the perfect information Bertrand experiments we studied in Chapter 1. The model contains the quantal-response adaptive learning model of Chapter 1 and the original payoff assessment learning model as special cases. A main feature of the model is that it stresses the importance of forgone payoffs for unselected prices in driving the price adjustments. Maximum likelihood estimation shows that the model substantially outperforms the quantal-response adaptive learning model with respect to fitting the data.

Chapter 3 studies the effects of increasing number of sellers on Quantal Response Equilibrium (QRE) prices in homogeneous product Bertrand oligopoly markets. We show that the comparative statics properties of QRE can be very sensitive to the specification of the quantal response function. With the power-function specification, an increase in the number of competing sellers leads to a decrease in the average QRE market price. In stark contrast, with logistic specification, having more sellers may

increase the equilibrium market price, which is at odds with the general intuition that competition should lead to lower prices.

Chapter 4 proposes an extended payoff-assessment learning model to explain the pricing and learning behaviour observed in a repeated Bertrand market experiment with limited feedback. In the experiments, sellers' only feedback after a period was their own payoff. Sellers were not able to observe the prices set by their competitors. The data show that pricing behaviour is strongly influenced by past sales. Sellers on average increase prices after being successful at selling, while they reduce prices after failing to sell. We show that by explicitly incorporating the sellers inferences from the sale history, our learning model manages to explain the data on both the aggregate and individual level.

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