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Chapter 6

Summary

In this thesis we have investigated the consequences of incorporating bounded rationality and learning in different models of market competition. The relevance of the analysis is that empirical evidence shows that observed behavior is not always in line with the assumption of perfect rationality and that models of bounded rationality may describe behavior better in some situations. In the thesis we have focused on bounded rationality on the supply side of the market in order to complement the recent literature on behavioral industrial organization, which mainly focuses on deviations from standard rational models on the demand side.

There are many different ways to incorporate bounded rationality in market competition. We have focused on two aspects of rationality throughout the chapters of this thesis. Under perfect rationality, firms know the market environment (or they have correct beliefs about it) and their beliefs about the action of their competitors are consistent with the competitors' actual choice. First we have relaxed the assumption that firms perfectly know the demand condition in the market and we have considered different learning methods that firms may apply. Second, we have weakened the consistency requirement on beliefs about the action of other firms, under a known demand structure. We have combined analytical investigation with numerical analysis to explore how the market outcome changes compared to the standard equilibrium prediction and what the possible welfare effects are. Moreover, we have investigated behavior by means of a laboratory experiment as well.

In Chapter 2 we have focused on the interaction between different learning methods. We have considered a situation where firms do not know the demand conditions in the market and they can use two different methods for finding the optimal action. We have shown that different methods can lead to different market outcomes, different methods can coexist in the market at the same time and the coexistence of different methods may affect the convergence properties of the methods. Thus, this chapter has stressed that it is important to take into account learning and heterogeneity in economic models.

In Chapter 3 we have further investigated the properties of least squares learning. We have considered a model where firms can observe all the relevant variables that affect the demand for their good and the functional form they use in the estimation is locally correct. We have analytically shown that some firms may end up in a suboptimal situation as firms do not learn the whole demand function correctly, only one part of it. These firms could increase their profit by charging a different price. Thus, this chapter has demonstrated that least squares learning can lead to a suboptimal outcome even when the estimation seems correct in the sense that the estimated function perfectly matches the observations.

In Chapter 4 we have analyzed the effects of weakening the consistency requirement on beliefs about the competitors' actions. We have shown that this may induce existence of a pure-strategy equilibrium in a situation where such an equilibrium does not exist otherwise. We have modified the standard version of simultaneous price and quantity setting by introducing risk aversion and uncertainty in the beliefs of firms about the price and quantity choice of their competitor. We have numerically shown that the modified model may have an equilibrium in pure strategies. This chapter has illustrated that incorporating bounded rationality in a model can substantially change the equilibrium prediction compared to the corresponding rational model and that a small amount of bounded rationality may be welfare enhancing.

In Chapter 5 we have investigated by means of a laboratory experiment how information about the competitors' production choices affects the corresponding market outcome. Subjects play the role of firms in the experiment and they receive information either about the total

production in the market or about firm-specific production levels. We have found that total output is typically lower when subjects receive firm-specific information. This supports the view of competition authorities that reporting detailed firm-specific information has anti-competitive effects. We have also found that voluntary information sharing serves as a signaling device: subjects show their willingness to collude by sharing information with each other. This chapter has shown that both the voluntary nature of information sharing and the level of data aggregation can have important consequences for the market outcome.

To summarize, this thesis has stressed that bounded rationality and learning should be taken into account in economic models. Models with bounded rationality and learning can lead to substantially different market outcomes than standard rational models and these outcomes may be closer to observed behavior.