On monopoly pricing : essays in microeconomics

Chapter 10

Summary and Conclusion

This thesis dealt with the theory of monopoly pricing. Chapter 2 surveyed the literature, focusing on theories in which a price is set below the standard monopoly price. Chapter 3 and 4 surveyed one strand within this literature, the theory of limit pricing. Chapter 5 through 9 gave extensions and applications of theories discussed in chapter 2 through 4. This final chapter summarizes and concludes the thesis. It gives the main results and indicates shortcomings.

In chapter 2 I study the theory of monopoly pricing. Textbook theory suggests that a monopolist will set marginal revenue equal to marginal cost, thus setting a price that exceeds marginal cost, causing a deadweight welfare loss. But under some circumstances, the monopolist's behavior will be different. When he produces complementary goods, for example, he may be inclined to lower price on one good in order to increase demand on another. Also, high monopoly prices may induce other firms to enter the industry. Therefore, by setting a limit price, a price below the standard monopoly price, the monopolist may be able to deter entry. If the monopolist produces a durable good, setting a high price may induce rational consumers to postpone their purchase, in anticipation of a future price decrease. Finally, consumers may simply boycott a firm which charges prices that are considered to be too high.

Although in all of these cases the price set by the monopolist is lower than when the standard monopoly price is used, this does not always imply that social welfare is higher as a result. When the monopolist produces a durable good, welfare is unambiguously higher than in the standard case. With a multiple good monopoly this is the case as well. If the monopolist is forced to set a lower price since consumers refuse to

buy at any higher price, feelings of being badly treated by the monopolist also have to be taken into account when assessing the total welfare effect. The net effect on welfare is ambiguous. Finally, in the case of limit pricing, the effect on welfare depends on the particular model that is used. This has been further studied in chapters 3 and 4.

Chapter 3 discusses the different strands of thought in limit pricing. The concept was introduced by Bain (1949), yet the first influential model was provided by Modigliani (1958). He considers a two stage model. In the first period, an incumbent monopolist sets a price and a quantity. Upon observing those, a potential entrant decides whether or not to enter in the second period. Obviously, the potential entrant's decision depends on the profits she expects to earn if she enters. Modigliani invokes the Sylos' postulate: the potential entrant expects that the incumbent will not change his output when entry occurs. Therefore, the incumbent can derive which quantity he has to set in the first period such that entry is just not profitable for the potential entrant. The corresponding price is the limit price. A second strand of thought is that of dynamic limit pricing. In these models, initiated by Gaskins (1971), the optimal pricing behavior of an incumbent firm through time is studied. Given some exogenous behavior of a potential entrant, or a competitive fringe, the optimal intertemporal pricing policy of the incumbent firm is derived. Friedman (1979) criticizes both types of models. His argument is the following. In a model that predicts that an incumbent firm will set a price such that a potential entrant will decide not to enter, both the incumbent and the potential entrant should be modelled as rational, maximizing agents. Nevertheless, static limit pricing models, like Modigliani, assume that the incumbent will not change his behavior upon entry, even if it is profit maximizing to do so. Similarly, dynamic limit pricing models assume that the behavior of the potential entrant is exogenously given, and is not the result of some rational optimization process. With perfect information, Friedman argues, a limit price will not be set. In that case, the pre-entry price does not influence post-entry competition whatsoever. Therefore, there is no need for the incumbent to set a limit price. If entry occurs, the incumbent firm can always lower his price. There is no need for him to do so beforehand.

Milgrom and Roberts (1982) show that limit pricing can occur in equilibrium if we assume asymmetric information. In their model, the incumbent can have low or high marginal costs, unknown to the potential entrant. Entry is profitable if his costs are high, it is not if his costs

are low. To deter entry, an incumbent with low marginal costs needs to convince the potential entrant that his costs really are low. Under certain circumstances, simply setting his monopoly quantity will not suffice. An incumbent with high marginal costs might do the same thing, if doing so deters entry. The low-cost incumbent thus has to set a limit price, a price lower than his monopoly price, which is so low that it is not profitable for a high-cost incumbent to set the same price, even if doing so deters entry. Only in that case does the potential entrant believe that she faces a low-cost incumbent, and refrain from entry.

Chapter 4 I develop a framework that can be used to study these equilibrium limit pricing models. I generalize Milgrom & Robert's model by assuming there is some state of the world that is unknown to the potential entrant, but known to the incumbent. Moreover, the incumbent can use some costly signal. Three types of models are used. In the first, there are two possible states of the world. In the second, there is a continuum of states. In the third model, we also have a continuum of possible states, but here the potential entrant has some private information as well. Most equilibrium limit pricing models in the literature easily fit in this framework. It is shown that, under some technical conditions, all three models yield qualitatively the same outcome. If the derivative of the incumbent's first period profits with respect to the signal used, is higher in cases where entry is profitable, rather than in cases where entry is not profitable, the equilibrium involves some downward distortion compared with the pure monopoly case. If, on the other hand, the opposite is true, then the equilibrium involves some upward distortion of the monopoly signal. For the theory of limit pricing, this implies that it is possible to build models in which, indeed, the incumbent monopolist sets a limit price, a price that is downward distorted compared with the pure monopoly case. However, it is just as easy to think of circumstances in which the monopolist will set a price higher than the monopoly price.

The welfare effects are ambiguous. First, they depend on whether the price a monopolist sets is higher or lower than the monopoly price. If they are higher, welfare is obviously lower than the case in which a monopoly price is set. If they are lower, there is a trade-off between a lower price in the first period, and a higher price in the second, if more entry is deterred. The most interesting case occurs if we are in the third model: a continuum of possible states of the world, and the potential entrant has some private information as well. In that case,

there is a one-to-one relation between the state of the world, and the signal the incumbent uses. In other words, upon observing the signal, the potential entrant can exactly infer which state of the world prevails. Therefore, the entry decision will not be influenced compared to the case of perfect information. Nevertheless, the monopolist does have to incur some costs in order to convince the potential entrant of his type. Therefore, if a limit price is used in this set-up, welfare is always higher. If the price the monopolist sets is higher than the monopoly price, welfare is lower. Therefore, the main conclusion of these models is not that the monopolist will always set a price lower than the monopoly price. Rather, when a monopolist has some private information, he has to incur costs in order to convince a potential entrant. Under some circumstances these costs imply that the price the consumer has to pay, is lower.

Chapter 5 is the first application of the theory discussed in the first part of this thesis. In this chapter, an equilibrium limit pricing model is studied, in which second-period competition is Stackelberg rather than Cournot, as is the usual assumption. In a Stackelberg model, prices are always lower than in a Cournot model. In chapter 5, however, I show that this result does not necessarily hold in an entry deterrence framework. This is due to two effects. First, if the potential entrant will be the Stackelberg follower upon entry, her profits will be lower compared to the case of Cournot competition. Therefore, she will have less of an incentive to enter. Second, the incumbent's profits are higher under Stackelberg competition than they are under Cournot competition. Therefore, a high-cost incumbent has less of an incentive to mimic the behavior of a low-cost incumbent. Therefore, the latter can set a higher limit price than would be the case under Cournot competition.

Chapter 6 also uses equilibrium limit pricing as a basis. Firms in the computer industry are often accused of vaporware, the untruthful pre-announcement of a new version of their product. By claiming they have a new product, critics argue, these firms try to deter potential entrants. Vaporware has also been a concern for the US anti-trust authorities. Nevertheless, there is no satisfactory economic model that analyzes vaporware. Chapter 6 fills that gap. To do so, it combines the theories of equilibrium limit pricing with that of durable goods, which was also discussed in chapter 2. In the model, the incumbent monopolist has one of two possible types: either he has an innovation that can be marketed

in the second period, or he does not have such an innovation. His first period quantity serves as a signal. One complicating factor, however, is that consumers also play a role in this set-up. If they believe there is an innovation in the next period, they price they are willing to pay for the current good is lower than when they believe this is not the case. This is the durable goods effect. I show that vaporware is an equilibrium strategy in a signaling game in which the possibility to market a new good is private information. Moreover, vaporware is an anti-competitive strategy. The possibility of vaporware has adverse effects on welfare, also in the case the incumbent does have a new version of his product.

In chapter 2 theories were discussed that predicted that monopolies may set a price lower than the standard monopoly price. Chapter 7, however, shows that there can also be circumstances in which perfect competition, in the sense of free entry and zero profits, does not yield the socially optimal price textbook theory predicts. The chapter considers the cruising taxi market. Recently, there has been a tendency to deregulate the market for taxi services. Countries that have deregulated their taxi market, or that are considering doing so, include the US, Sweden, the Netherlands, and Japan. The issue has drawn attention from theoretical economists as well. Their models, however, do have some shortcomings. They either take fares as given, or they fail to study individual behavior of taxi drivers and customers. Chapter 7 therefore provides a model which does not suffer from these shortcomings. In the model, individual behavior is studied, and fares are set by taxi drivers. A circular street is used on which taxis are searching for consumers, and consumers are waiting for a taxi. Demand depends on both price and expected waiting time. I solve for the deregulation equilibrium, in which taxi drivers can choose their own price, but profits are driven to zero, because of free entry. I show that a regulator can improve upon this outcome, by setting a fare. Of course, it is difficult for such a regulator to obtain all necessary information and determine the optimal fare. It is easy to see, however, that an easy way to improve upon the market outcome is for the regulator to imposes a maximum price.

Chapter 8 is not concerned with the theory of monopoly pricing per se, but rather uses insights obtained from that theory to a different field in economics. Anecdotal evidence suggests that politicians often promise more during an election campaign than they are willing or able to deliver once elected. This phenomenon poses problems for the model of rational, utility-maximizing, economic agents. It is hard to imagine that rational

voters are systemically fooled by untruthful promises of politicians. But if voters are rational and do not believe these promises, we face a different problem. Why do politicians make promises which voters do not believe? Chapter 8 proposes a way to solve this paradox. In the models presented in that chapter, the promise a politician makes in an election campaign serves as a signal for her true preference, just as in limit pricing models the price a monopolist sets serves as a signal for his true marginal cost. In equilibrium, any left-wing candidate makes a promise that is to the right of her real position, while every right-wing candidate will make a promise that is to the left of her real position. Voters, however, are not fooled by these promises, since, upon observing election promises, they can rationally infer the true position of each candidate. This is equivalent to the third model discussed in chapter 4, in which a potential entrant could always infer the true type of incumbent she faces.

Finally, chapter 9 applies the fairness model, which was also discussed in chapter 2. This model assumes that people are willing to sacrifice some of their material payoffs, in order to either punish someone who is nasty to them, or reward someone who is nice to them. If people behave this way, I argued in chapter 2, monopolists will not set prices as high as standard theory suggests. Chapter 9 applies the same model, but to a different field: that of intertemporal choice. The standard life cycle model predicts that agents use a constant discount rate. But experimental evidence shows this is typically not the case. Implicit discount rates are higher than interest rates. They decline with time to be waited, and size of the sum at stake. For speeding up a reward they are lower than for delaying. Several explanations have been put forward to solve for these intertemporal choice anomalies. None of the explanations, however, are fully satisfactory. Most of them can only account for one of the anomalies stated, and they often do not provide an analytical framework. Others do account for all anomalies, but fail to give an intuitive interpretation of the utility function individuals are using. In chapter 9 I show that it is possible to explain all anomalies in an intuitive framework. To do so, I use the fairness model, and assume that when deciding on the intertemporal allocation of a windfall gain, an agent acts as if a "Future Self" were to divide the money, taking considerations of fairness into account.

In this thesis, a wide range of topics is covered. Therefore, general con-

clusions are hard to draw. Nevertheless, some points do figure prominently. First, in competition policy, it is important to make a full analysis of the industry that is considered. Just looking at the number of firms is not enough to assess welfare effects. Obviously, this insight is hardly new. Especially the literature on entry barriers argued that public policy does not have to be to concerned with monopolized industries in which entry barriers are low. But the examples given in this thesis move beyond that. In fact, in chapter 7 we have a market in which, even if entry barriers are absent, a price above the social optimum is set. Also, the models in chapter 2 show that there are more circumstances in which the adverse effects of monopolies are much lower than the standard monopoly model suggests. Moreover, in chapter 4 we saw that, even if monopolists are prone to set a limit price, which is welfare-enhancing, they may also be inclined to set a price even higher than the standard monopoly price which, obviously, adversely affects welfare.

Second, there are circumstances in which having private information can actually hurt economic agents, rather than being to their advantage, as intuition suggests. Both in limit pricing models and in the voting model described in chapter 8, agents have to incur costs to convince others of the information they have. In both cases, they would be better off if their private information were common knowledge. But the welfare effects of this phenomenon are ambiguous. Limit pricing is desirable from a welfare point of view, compared with a case where the incumbent does not have any private information. The discussion in chapter 4 shows that the incumbent's desire to convince the potential entrant of his private information, might just as well lead to prices that are higher than the monopoly price. In chapter 8, a situation without private information is desirable from a welfare point of view. When politicians could commit themselves not to lie in election campaigns, their utility would increase, without affectng the election result.

Third, this thesis shows how methods and insights from industrial organization theory can also be fruitfully applied to other, non-related fields. The same mechanism that causes incumbents to set a limit price in chapter 4, also causes politicians to lie in chapter 8. The same mechanism that causes monopolists to set a price lower than the standard monopoly price in chapter 2, also causes individual agents to act in a way inconsistent with the standard lifecycle model in chapter 9. Hence, industrial organization theory is not only relevant to industrial economists. Insights gained here can also be applied to other fields.

The analyses in these thesis are only of a theoretical nature. This does not imply, however, that they are void of any empirical observation. On the contrary. Chapter 6 gives an explanation of the observation that software producers often fail to meet the deadline they set themselves. Chapter 7 explains why the results of taxicab deregulation are often disappointing. Chapter 8 explains why politicians always lie in election campaigns. Chapter 9 provides a model in which some regularities that are often found in both empirical and experimental research, can be explained. Nevertheless, before any policy implications of these models are to be implemented, more empirical and experimental research of the assumptions made and their implications, is obviously necessary. Especially in the taxi model in chapter 7 there are possibilities for empirical research. In the other models, however, this is more difficult. In models of asymmetric information, by construction, agents have some private information, which is also unknown for someone doing empirical research. Therefore, to assess the relevance of these models, experiments in which the information available to each agent can be controlled directly, seem a more promising avenue of research.