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Summary of the Dissertation

Title： Competition with Advertising and R&D Investment and Its Impact on Welfare

The Aim of The Dissertation

The relationships of competition with advertising and R&D are important topics in industrial organization. This dissertation aims to investigate how firms choose advertising strategies and how firms' innovation investment affects price-increasing competition.

For detail, the study of *Comparison and Self-Promotion in Advertising Competition* focuses on a persuasive aspect of comparison advertising and examines how firms choose between comparison and non-comparison advertising in the differentiated market. The background is that the use of comparison advertising has been evident in numerous industries. Interestingly, comparison advertising in highly concentrated markets is often unilateral, i.e., firms do not usually fight back at the firm that initiates comparison advertising against them, such as Pepsi and Coca-Cola wars. Thus, we wonder why the targeted firms attacked by comparison advertising are not following suit?　Do they have an incentive not to fight back, and further investigate under the conditions under which some firms adopt comparison advertising while others adopt non-comparison advertising. Moreover, the study considers whether and under what conditions comparison advertising contributes to social welfare.

Meanwhile, the research on *Price-Increasing Competition in R&D Investment in Oligopoly* investigates whether price-increasing competition will occur under R&D investment activity. The standard view shows that industry's total output grows with the increasing number of firms, and hence the market price decreases with the number of firms. However, some recent empirical studies provide evidence for price-increasing competition. Similarly, the interplay between market structure and innovation is another crucial issue in industrial organization. First, the market structure influences firms' incentives for R&D spending, then firms investing in R&D, in turn, may affect the market structure. This study aims to explore whether price-increasing competition will occur under the activity of R&D investment. If the answer is sure, we aim to clarify what the condition is. We introduce a more fundamental and straightforward question: does market price rise with the increasing number of R&D investing firms? Can the entry be beneficial for social welfare?

The Abstract of This Dissertation

In comparison advertising, we study the incentive for firms to choose either comparison advertising or self-promotion advertising in a duopolistic Hotelling model. Focusing on the

persuasive aspect of comparison advertising, we find a condition under which a subgame perfect Nash equilibrium exists in which one firm chooses comparison advertising while the other chooses self-promotion. Our main result shows that when the advertising cost difference is intermediate, one firm adopts comparison advertising while the other adopts non-comparison advertising in a subgame perfect Nash equilibrium. The equilibrium outcomes vary with the cost difference between comparison and self-promotion advertising. The result implies that the higher the product substitution, the more likely the asymmetric advertising choice will arise. The realistic examples, such as the Pepsi challenge, are explained since the products are highly substitutable. The welfare analysis indicates that the equilibrium choice of comparison advertising can be either optimal, insufficient, or excessive. It depends on the parametric conditions: the cost difference and the level of product differentiation.

Interestingly, unilateral comparison advertising is always socially optimal when the degree of product differentiation is low. Therefore, our study endorses policies for unilateral comparison advertising in markets where two firms dominate, and the product differentiation is low. For instance, the Pepsi challenge is arguably socially optimal. The welfare analysis suggests that regulatory authorities require careful assessments.

In the study of price-increasing competition, we investigate whether price-increasing competition will occur under the cost-reducing R&D investment. In an oligopoly market with restricted entry, first, we find that increasing the number of firms in the symmetric oligopolistic market may increase the market price and reduce the social surplus. Second, under an asymmetric oligopoly with efficient and inefficient firms, either efficient or inefficient entry can be welfare-reducing. Intuitively, when an additional firm invests in R&D, the direct effect is an increase in the total output. However, incumbent individual firms reduce R&D investment since the marginal cost reduction effect is weakened and thus leads to a lower price-cost margin. Therefore, incumbent firms have incentives to reduce their outputs to assure price-cost margins. The total output may decrease, and the market price increases when incumbent firms' production dominates the output increase.

Further, social welfare is affected by three effects. First the increasing marginal benefit that a new entrant brings to welfare. The second is the production cost-saving effect on social welfare. Due to lowering output, incumbents save the production cost. The third is that a new entrant joining R&D investment results in an unnecessary cost increase. When the loss caused by the entry dominates the marginal benefit and production cost-saving effect, social welfare decreases with the number of firms.

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The Future Work

The current study analyzes the comparison advertising in a duopoly market where two firms dominate. As a possible extension, we would like to disentangle intricate incentives of comparison advertising in a richer oligopolistic framework in future work. In addition to the framework expansion, we also strive to pursue the essential difference between comparison and non-comparative advertising. We find that one of the differences between comparative or non-comparative advertising depends on the experience of consumers. Comparison advertising is likely to be meaningless to experienced consumers. This is because professional consumers may know what the product is or how the function works. Thus, experienced consumers will not be affected by advertising that involves comparison attributes. However, any theoretical or empirical studies have not examined the relevance between comparison advertising and prior experience with the product. This is worth considering for future research.

Future research of R&D competition can consider a case in which firm investment works as a strategic commitment, and in which firms compete in price or in which firms compete in free entry market. These results could further clarify the relationship between market concentration and price and welfare.