Cournot and Bertrand Oligopoly Competitions in Payment Card Industry

Siyu Ma
Stony Brook University

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Abstract

With the assumption of 'no surcharge rule' in credit card industry, we construct a platform economy without price discrimination, meaning no matter what payment method consumers choose, they pay the same price for the goods.

To start with, we consider an economy where cash is the only payment method as a benchmark. Then here comes a monopoly credit card company functioning as a platform to enable firms and consumers to make transactions on it. The credit card platform (CC platform for short in the following literature) charges the firms merchant fees as a percentage of product prices, denoted by $f$. It gives a cash-back bonus to consumers who use credit cards, denoted by $b$, as a percentage of the product price. The difference in $f$ and $b$ times the product price consists CC platform’s profit margin.

Consider a market segmentation on consumers’ side. There is a fixed proportion, $\alpha$, of cash-only consumers who are not qualified to use a credit card. The rest of them are potential card holders able to use either card or cash when making purchase.

In this model, we consider two types of competition on firms’ side: $n$ firms competing in price (Bertrand) or quantity (Cournot).

We derive the optimal merchant fee, product price, firm’s profit, cc platform’s profit and consumer surplus in each case and make comparisons between: (1) the two competition types, and (2) before and after the implementation of the CC platform.

After calculating the respective terms in different scenarios, our analysis sheds light on the following research questions: (1) How does a monopoly credit card platform decide the optimal merchant fee? What is the impact of a credit card platform on consumer surplus, product price, firms’ profit and the market structure? (2) Is it beneficial for consumers to join the CC platform? (3) What about merchants? Are they making higher profits when accepting cards or doing worse? (4) Does any of the above conclusions differ when firms compete in price and quantity?

Some non-trivial findings can be summarized as follows:
0.1 Impact on Consumers and Firms after the Implementation of CC Platform

(A comparison of the economy with and without a CC platform)

After introducing the CC platform to the market,

**Consumers:** Cash users are worse off and card holders are better off. Aggregate consumer surplus increases implying that the total gain of card holders exceeds the total loss of cash users. After the implementation of the CC platform, both cash and card users pay a higher product price. Even with a bonus given to the card holders, the actual unit cost of the product is still higher.

**Firms:** Cournot firms make higher profits after joining the CC platform while Bertrand firms are indifferent.

0.2 A Comparison between Cournot and Bertrand Competition

**CC Platform** The platform charge the same merchant fee in both cases, and it makes a higher profit when firms compete in Bertrand. But when the number of firms goes to infinity, Bertrand and Cournot will generate the same profit for the CC Platform.

**Firms** Cournot firms make positive profits while Bertrand make 0 profit in the market. Taking a closer look at each section of the market, we find that both competition type generate a positive profit in cash-only market sector, while Bertrand firms make negative profits in solely CC market; however Cournot profit is positive in CC market. The reason that merchants would like to accept cards rather than reject to join the platform is that they are able to charge a higher product price than before and compensate cc market loss from cash market. We also claim that to accept cards is the only Nash equilibrium in Bertrand, even though Bertrand firms make 0 profit no matter whether they accept cards or not. Because the CC platform can always reduce the merchant fee, \( f \), by a negligible small amount to induce the firms to accept the card, firms will always have the incentive to join. Staying out of the platform is not stable. In terms of product price: Cournot firms set a higher price. When \( n \) goes to infinity, Bertrand price and Cournot price are the same.

**Consumers** Aggregate Consumer surplus, CC holders' consumer surplus and cash users' consumer surplus are all higher when firms compete in Bertrand. When \( n \) infinity, all three terms in Cournot converge to Bertrand results.