

Essays on Empirical Models of Strategic Interactions in Industrial Organization

By

Masato Nishiwaki*

March 2 2010

Abstract

Analyzing market structure and market outcomes is the main objective in Industrial Organization (IO). A distinctive feature of IO as a research field in economics is its explicit treatment of strategic interactions between market participants. IO economists have been devoting much effort to explain various phenomena arising in oligopolistic market and their accomplishments have been contributing to developments in antitrust, industrial, trade and other public policies as well as advances in economics.

Structural empirical IO that takes accounts of oligopolistic interactions is a relatively new research field that started in the late of 1980s. A rigorous handling of endogenous equilibrium outcomes in imperfectly competitive markets based on theoretical models characterizes structural empirical IO. A typical empirical model in this field dialogues with a game theoretic model to treat equilibrium interactions without leaving them exogenous or predetermined. This nature distinguishes the empirical IO from other empirical research fields where interdependence between agents are not so essential. In analyzing strategic interactions empirically standard estimation technique can not be applied straightforwardly.

*mstnishi@gmail.com

The thesis intensively uses structural econometrics of games to study and evaluate market outcomes. Structural econometrics provides powerful tools for identifying primitives of underlying theoretical models describing interactions between firms. Each research in the thesis modifies and extends existing empirical frameworks for the specific problems as well as utilizing leading developments in the fast-growing area. Chapter 2 of this thesis conducts a dynamic equilibrium analysis of discrete divestment game with its relation to horizontal merger in a sunset industry. By developing a fully structural model incorporating divestment and quantity setting game simultaneously, mergers can be evaluated based on the total welfare criterion. Chapter 3 is a descriptive and old-fashioned analysis since the underlying economic model is unspecified. To complement the descriptive analysis, an experimental exercise is conducted to quantify inefficiency of divestment behaviors in the cement producing plants. In Chapter 4 an empirical framework of an entry game is developed and it is applied to the entry decisions in the airline industry in Japan. This chapter uncovers driving forces behind firms entering the market although it leaves competition between entrants unspecified. This semi-structural analysis identifies changes in the mode of competition in the airline industry.

The common theme in all three chapters is mergers in oligopolistic markets. Merger (and acquisition) activities are now prevailing all over the world. This is also the case in Japan. From the turn of the millennium Japan has been experiencing the rapid rise of mergers and acquisitions cases. A total of 2775 mergers and acquisitions took place in 2006, while there were only 638 transactions in 1991. The number of M&As more than tripled in the past 15 years and its increasing trend seems to last at least in the early stage of this century. It is said that there has been a call for structural reforms in Japan and the upsurge in the number of M&As is not a temporary phenomenon. With this dramatic surge, a simple but quite pertinent question can arise. Are mergers beneficial for the society? The thesis tries to answer the question by examining mergers

from various view points and with advanced methodologies.

In Chapter 2, the relationship between mergers and socially excessive capacities is discussed. It is well-known that in an oligopolistic market the socially excessive capacity can arise due to the presence of a business stealing effect and fixed cost (Mankiw and Whinston (1986) and Suzumura and Kiyono (1987)). This is because business-stealing effect which is a gain to the entrant but not to the industry as a whole. Similarly, in a sunset industry with declining demand, now socially excessive capacity cannot be dissolved because everyone intends to free ride on the reduction of industry supply expected from someone else's divestment. As a result, no firm will divest, even though divestment contributes to the saving on fixed costs. This chapter highlights the role of mergers as a device for internalizing the business-stealing effect and thereby promoting divestment, and examines if the merger-induced divestment could improve the total welfare using the case of cement mergers in Japan. A model of divestment based on the Markov perfect equilibrium framework of Ericson and Pakes (1995) is estimated by an asymptotic least squares. Then a counterfactual experiment is conducted to quantify the welfare impact of mergers, and shows that merged firms in fact divested their facilities more and contributed to the improvement of the total welfare despite the reduced consumers surplus.

Chapter 3 studies another source of inefficiency of divestitures in oligopolistic market. As demand shrinks, pressure for capacity reduction is gradually created. The main concern in declining industries is who should reduce the capacity. In an oligopolistic market, undesirable outcome in the sense that efficient plants divest capacity may arise since the plant size can be the key determinant of capacity reduction (Ghemawat and Nalebuff (1985)). That is, larger plants shrink regardless of their efficiency. What really happened in divestment behaviors is empirically tested by studying the Japanese cement industry. In addition, how efficient production reallocation was achieved as a result of divestitures relative to an optimal allocation is also investigated. The result shows that the extent

of the allocation inefficiency is surprisingly small because efficient intra-firm capacity reductions contributed to capacity reductions of less efficient plants in the industry as a whole and led to efficient production reallocation. This means implicitly that the presence of large firms with many plants contributed to avoiding inefficiency of divestments and eventually to the improvement of production allocation across plants.

The recent controversial event, JAL and JAS merger, is studied with particular emphasis on the effect of the merger on competitiveness in domestic airline markets in Chapter 4. The competitive effect of a carrier on rivals' profit is treated in a very general form. This introduction of flexible competition pattern between carriers allows us to compare the effects between two different time points of before and after the merger, and reveals that the competition was greatly lessened. This chapter not only offers an empirical study of a very interesting merger case of Japan in recent years, also proposes an alternative empirical framework for an entry game with multiple equilibria. The framework takes two steps: in the first step underlying parameters of payoff functions are estimated and with the estimates equilibrium selection mechanisms are identified. An advantage of the framework over other alternatives is that the parameter estimates of payoffs are free from assumptions on the equilibrium selections. A counterfactual experiment is also conducted by exploiting estimated equilibrium selection mechanisms.