

ESTIMATION OF RELATIVE BARGAINING POWER IN MARKETS FOR RAW MILK IN THE UNITED STATES

BYEONG-IL AHN*

Korea University

DANIEL A. SUMNER

University of California, Davis

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This study contributes to the empirical industrial organization literature by deriving and estimating the empirical equation containing the parameter for bargaining power and an indicator of competition between suppliers. We specify a reduced form of the price equation, which is composed of the minimum price specified in milk marketing orders and the reduced form of the upper bound for the price in regional raw milk markets in the United States. Estimation results indicate that the relative bargaining power of dairy cooperatives in setting regional raw milk prices is small compared to the power of milk bottlers. We find the price differential in milk marketing orders has contributed to raise the price bargained between dairy cooperatives and milk bottlers.

JEL classification codes: L11, L13, L66, D43, Q13

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I. Introduction

There are several types of bargaining and the applied bargaining theories differ by the bargaining situation. Regardless of the types of bargaining, however, a bargained (agreed) outcome is attained only when the payoff under agreement is greater than the payoff under disagreement, for all bargaining parties (Nash 1950; Sutton and John 1986; Thomson 1992).

* Byeong-Il Ahn(corresponding author): Department of Food and Resource Economics at Korea University, Anam-dong Seongbuk-gu, Seoul, 136-701, South Korea; e-mail: ahn08@korea.ac.kr. Daniel A. Sumner: Department of Agricultural and Resource Economics, University of California, Davis, Davis, CA 95616, USA; e-mail: dan@primal.ucdavis.edu.

The structure of payoff gains and the procedures that influence these gains are the main issues in bargaining theory and function as criteria in categorizing empirical as well as theoretical models. It is agreed upon that the two most important theoretical divisions of bargaining are non-cooperative bargaining initiated by Stahl (1972) and Rubinstein (1982) and axiomatic cooperative bargaining formulated by Nash (1950). While strategic actions of players over time, terms of agreement, and sequence of moves are the main drivers affecting equilibrium in non-cooperative bargaining, payoff gains in contrast to payoff under disagreement play key roles in cooperative bargaining.

Axiomatic bargaining theory has been applied in many empirical studies, such as wage bargaining (Svenjar 1986; Ashenfelter and Brown 1986; Abowed and Lemieux 1993; Coles and Hildreth 2000), bargaining between hospitals and insurers (Brooks et al. 1997), and bargaining between farmers' cooperatives and food processors (Prasertsri and Kilmer 2008). In theory, the bargaining power that determines relative payoff gains of each party is defined as the ratio of a party's capability to draw an agreement by influencing the other party to the cost of failing to reach an agreement. In bargaining between two parties, as in the aforementioned empirical studies, this theoretical definition is applied by being transformed as the ratio of the difference between the bargained outcome and a party's threat point (the point indicating failure of agreement) to the difference between two disagreement points of each party (Svejnjar 1986; Brooks et al. 1997; Coles and Hildreth 2000). Thus, the formulation of a disagreement point is a critical step in the empirical application of bargaining theory.

Generally, disagreement points are not observable, and therefore, most previous studies estimated them based on market level data. Unlike these studies, the present paper provides a practical definition of bargaining power and performs an empirical application without estimating the disagreement points. We show that the disagreement points are actually the same as the upper and lower bounds of bargaining. Based on this, we define the relative bargaining power of buyers as the ratio of the difference between the observed bargained and regulated minimum prices to the difference between the upper bound of bargaining and regulated minimum price, wherein the minimum price is the lower bound for the observed bargained price.

A unique feature of the proposed model in the present paper is that estimation of the upper bound of bargaining is not required. We simply used the minimum price set by policy as a disagreement point of the sellers to estimate the bargaining power. Similar to the work of Coles and Hildreth (2000), which used the change in a policy variable as a variation in the disagreement point, the correlation between bargained price and minimum price in the present paper identifies the relative

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