The Impact of Microeconomic Structure Adjustment and Macroeconomic Variables under NAFTA on U.S. Agriculture

Youngjae Lee
Assistant Professor/Research
Department of Agricultural Economics and Agribusiness
117 Martin D. Wooding Hall, Louisiana State University, Baton Rouge, LA 70803
Ylee@agcenter.lsu.edu

P. Lynn Kennedy
Crescent City Tigers Alumni Professor
Department of Agricultural Economics and Agribusiness
181 Martin D. Wooding Hall, Louisiana State University, Baton Rouge, LA 70803
LKennedy@agcenter.lsu.edu

Brian M. Hilbun
Research Associate
Department of Agricultural Economics and Agribusiness
181 Martin D. Wooding Hall, Louisiana State University, Baton Rouge, LA 70803
BHilbun@agcenter.lsu.edu

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Youngjae Lee, P. Lynn Kennedy, & Brian Hilbun
Department of Agricultural Economics and Agribusiness, Louisiana State University

BACKGROUND

On January 1, 2000, the last transitional agricultural trade restrictions established by North American Free Trade Agreement (NAFTA) were removed, marking an end to a 14-year process in which Canada, Mexico, and the United States—the three members of NAFTA—gradually removed thousands of tariff and non tariff barriers to regional agricultural trade. As a result, the NAFTA countries’ agricultural economies are increasingly behaving as one market (Zahniser and Cigan, 2000).

Therefore, this market integration of agricultural economies might have enforces structure adjustment in member countries. According to recent research of the USDA, changes in agricultural commodity prices are felt across international borders as market integration opens new sales territories for producers, sometimes enabling further exploitation of economies of scale. It gives producers access to potentially cheaper inputs and creates new opportunities for Foreign Direct Investment (FDI). However, market integration also exposes producers to new competition from other producers in formerly isolated locations. For consumers, market integration provides access to new varieties of food products and lowers the cost of food and vegetables and may lead to lower income growth. Greater competition is also likely to make food more affordable, thereby expanding consumer purchasing power (Zahniser and Cigan, 2000).

OBJECTIVES

Many studies have analyzed the effect of NAFTA on U.S. agriculture before and during the implementation period of NAFTA. These studies have provided a valuable guide for policy makers to drive U.S. agriculture in the right direction given the open economic circumstances.

In addition to those studies, this study tried to identify structure adjustment under NAFTA. This effort is not limited to member countries but also includes the third trading partners to distinguish trade creation and diversion being generated by NAFTA. We adopt partial equilibrium theory to link the price of U.S. agricultural products to 1) tariff; 2) the trade bartering trade; 3) policy variables, and 4) structural adjustment in microeconomic level. This linkage is because NAFTA is the biggest regional market in the world.

ANALYTICAL FRAMEWORK

Price at World Market Equilibrium

The interaction of supply / for agricultural product j can be simply expressed as:

\[ P = \alpha_j Q_j + \beta_j + \gamma_j + \epsilon_j \]

\[ E_j = \alpha_j Q_j + \beta_j + \gamma_j + \epsilon_j \]

\[ \text{where } P \text{ is market price, } Q_j \text{ is quantity demanded (or supplied), } \]
\[ \gamma_j \text{ is income, } a, b, c, \text{ and } d \text{ represent passive parameters.} \]

By using these passive parameters, quantities demanded and supplied are expressed as:

\[ Q_j = \frac{\alpha_j}{1+\alpha_j} \left( P - \beta_j \right) \]

\[ Q_j = \frac{\alpha_j}{1+\alpha_j} \left( P - \beta_j - \gamma_j \right) \]

The effect on agricultural product j of NAFTA can be expressed as:

\[ \alpha_j = \frac{\alpha_j}{1+\alpha_j} \left( P - \beta_j - \gamma_j \right) \]

\[ \alpha_j = \frac{\alpha_j}{1+\alpha_j} \left( P - \beta_j - \gamma_j \right) \]

Therefore, it is reasonable to think about a possibility of structural change of economies during the implementation of NAFTA in involved trading countries. For example, if price responsiveness of agricultural product k decreased more in the country k, because the price of agricultural product in the country k is greater than before market integration. Therefore, the effect of NAFTA on U.S. price will be affected by structural adjustment in member countries. In addition, if there are other exporters to Canada and Mexico and importers from the U.S., those countries might also affect U.S. price.

MONTE CARLO SIMULATION

Using U.S. corn industry, this study conducts Monte Carlo simulations covering the range of variation of parameter values at 95% confident intervals. For example, the study estimates passive parameters by using restricted SUR regression based on equations (9). And then we determine benchmark values of these parameters and calculate 95% confident intervals of the benchmark values by using simulation. The prices obtained by Monte Carlo simulations are a little higher than those obtained at benchmark values.

EMPIRICAL EXAMPLE

Figure 1 shows U.S. annual corn price movements before and after NAFTA. As shown, average U.S. corn price increased after NAFTA. However, variance of price also increased after NAFTA, indicating that corn prices after NAFTA are lower than the average price of before NAFTA. In actuality, U.S. corn prices are lower than those before NAFTA except for two exceptional periods including the beginning year of NAFTA and bio-ethanol booming years of the late 2000s.

IMPLICATION

NAFTA has eliminated enormous barriers to regional agricultural trade. During the implementation period, the agricultural sectors of North American countries have become much more integrated, which might have influenced market structure. Using partial equilibrium trade theory, we can obtain the equilibrium price of U.S. agricultural products in an open economic condition. The equilibrium price is a function of the impact factors, which will represent the new market circumstance created by NAFTA. This study shows that if agricultural product j is a normal good in country i (while the inferior good in country k), market integration leads country i to produce agricultural product j more because the price of agricultural product j increases more in the country k than before market integration. Therefore, market integration might accelerate specialization in the agricultural sector of each country through consumer preference.