AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Is the U.S. Losing its Competitiveness in the Global Chicken Markets: A Spatial Equilibrium Analysis

Harjanto Djunaidi
Assistant Professor of Agribusiness
School of Agribusiness and Agriscience
Middle Tennessee State University
Murfreesboro, Tennessee 37132
Contact: hdjunaidi@yahoo.com or at djunaidi@mtsu.edu

A Selected Paper Prepared for Presentation at the Western Agricultural Economic International Annual Meetings, San Francisco, California
July 4 – July 9, 2005

Is the U.S. Losing its Competitiveness in the Global Chicken Markets: A Spatial Equilibrium Analysis

Abstract

Though the last forty years of data showed that the U.S. chicken export growth was still positive, but it has slowed in more recent years. Other countries such as Brazil, the U.S. main competitor in the global chicken trade was able to expand its market shares in recent years. Simulation results showed that the United States will play important roles in future global chicken trade providing that the U.S. firms are willing to accommodate the non-tariff trade barriers imposed by major importing countries.

Introduction

The U.S. chicken market experienced a tremendous pressure in 2002 due to over supply of chicken meat in both domestic and world market. However, little attention has been given to study the causes of the situation by analyzing the international aspects and the linkages between domestic and world chicken market. The industry blamed two factors for the chicken over supply (1) due to Russia's imports embargo and (2) the avian influenza outbreaks (WATT PoultryUSA's Rankings). The above facts showed one that the industry has failed to recognize various relationships among different economic forces in both domestic and in international markets. A strong demand for chicken white meat in domestic market could play an important role on affecting the export markets.

Previous study showed that there is a strong negative relationship between U.S. chicken or broiler production and international chicken prices. It was found that most of the dark meat, mainly leg quarters and wings are shipped to the world market which caused price to decline due to over supply (Djunaidi, 2004; Goodwin, McKenzie and Djunaidi, 2003). This means that U.S. consumers who mainly consume white meat have subsidized consumers in the importing countries. Or it can also be seen that U.S. has applied an unfair export strategies, i.e. dumping to increase its export of the excess dark meat. As a result of applying aggressive marketing strategies, chicken meat export prices have declined in the rate of two percent annually. An easy and short term business and marketing strategies to "dump" the dark meat to the international market while fulfilling domestic consumption for white meat is not what the industry wants to pursue as a long run strategy.

Forty years of data have shown that on average the U.S. has experienced positive export growth. But the growth has slowed in recent years while other countries such as Brazil, Belgium, the Netherlands, China, Thailand and French have experienced an increase in their exports. For example, in 2004, Brazil's broiler export to the world market increased about 26 percent in volume

(2.4 million metric ton and the value of the export was US $2.6 billion which ranked Brazil as the largest broiler exporter to the world market. Figure 1 also shows that there was an indication that the U.S. broiler industry might have experienced a fierce competition from other countries that slowed its growth in the export market. Toward the end of 1990, the U.S. broiler market shares in the export market has persistently declined.

Objectives

The objective of this paper is to examine who gains and who loses in the global chicken trade. The second objective is to study whether the U.S. has lost its competitiveness in the world chicken market measured by the growth of market shares. A spatial equilibrium analysis is utilized to examine and to provide answers on the U.S. ability to compete in the international market due to its poor and ill and short run designed export strategies.

Data and Methods

The trade data used in this analysis is taken from the FAO, PS&D or from the FAS (Foreign Agricultural Trade). Figure 2 showed that there are three export price patterns and they are increasing, mixing and declining price trends. Therefore, there are three possible sets of data that can be utilized to generate the baseline analysis. Two baseline simulations were run in this study. The first baseline scenario was run using the export price average from the whole data set (1965 to 2003) while the second baseline estimation was done using 1990 to 2003 trade data. Choosing which patterns are applied to generate the baseline is important and will affect the simulation study. The first trend showed a situation where the export price experienced a positive growth, while the second trend showed a mixed combination of export price. The third situation showed a declining export price pattern. Statistical tests were conducted to check whether there is a significant different

in the mean of export prices during the period of more than forty years. The null hypothesis of no price difference in the mean (with unequal price variance) of the first (1961-1980) and the third period (1990-2003) is rejected at a one percent level. However, the statistical test results revealed that the null hypothesis of the second (1981-1989) and the third period is failed to be rejected.

A spatial equilibrium model developed by Takayama and Judge (1971) is applied to address the research questions. The objective function in this model is the net quasi-welfare function which will be maximized subject to a set of linear constraints. In this study, broiler or chicken meat trade is assumed to be homogeneous which may not be realistic since broiler can be traded in many forms such as dark meat i.e. wings, leg quarters, legs, thighs, drumsticks or it also can be in white meat form such as BSB (boneless skinless breast) and its related derivative products. Most of U.S. broiler export to the world market is dark meat such as leg quarters and wings because the dark meat is available abundantly in the U.S. market (Djunaidi, 2004). The U.S. consumers prefer to consume the white meat instead of dark meat (Goodwin, McKenzie and Djunaidi). Therefore, U.S. exporters are more likely to export dark meat to the world markets instead of whole broiler or the BSB (Djunaidi, 2004). Brazilian is more likely to export either whole broiler or broiler parts depending on the export destination. For example, Brazil has exported more high value broiler part to the Japanese market and its part exports have increased by seventy five percent in volume in 2004.

Transportation cost is accommodated in the model. Both excess demand and excess supply will be generated from domestic demand and supply econometric and time series estimations. Once the excess supply and demand elasticities are generated, a spatial equilibrium mathematical model can be developed and solution can be found by applying GAMS software. The international chicken markets will be grouped into two separate regions, i.e. importing and exporting countries. Data

from more than 30 countries will be utilized in this analysis to find the trade flows, import and export prices such that the quasi welfare function will be maximized as discussed in Takayama and Judge. Interested readers are encouraged to consult the textbook to learn more about the model structure. In this analysis several assumptions are made. First, the quality of traded chicken meat in the world market is homogenous. Consequently, the cross-price elasticities are zero. Another important assumption that is used in this paper is that there are no trade barriers among the trading nations. These assumptions are a bit stronger, but are necessary to be made in the first attempt to study the global chicken trade and to generate the baseline.

Results

The results of the baselines based on two different assumptions and their respective scenarios are presented in Table 1 and in Table 2. Table 1 showed that when the study is based on the average of forty three years of data (1961-2003), the U.S. market share in the global chicken market was 48.43 percent of the total world trade. The average simulated export price during the same period of analysis was $ 1,003.11 per metric ton. Table 1 also presents the results of two other scenarios. The first scenario was run with the assumption that supply is constant while chicken meat world demand increases by five percent. The second scenario was run with the assumption that the world demand grows by 5 percent, while supply only increases by 3 percent. The U.S. share of global broiler meat trade under these two scenarios does not change significantly. This finding is consistent with the plot of U.S. market shares as shown in Figure 1. The spatial equilibrium showed the trade flows and most of the major importing countries such as Saudi Arabia, Russia, Japan, Canada, Mexico, United Arab Emirates will import from the United States. The simulated export price showed that the U.S. is able to export at the cheapest price followed by Brazil, the Netherlands,

China and Thailand.

Comparing the simulated export price as shown in Table 1 to that of in Table 2, one finds that there is about $200.00 price difference per metric ton. Under a declining world price trend simulation (1990-2003), the U.S. market share is higher as shown in Table 2. Evidence showed that when the simulation is based on a declining price trend, the U.S. was able to expand its export markets and capture about seventy five percent of the global chicken trade. This increase, among other things could have been caused by (1). Integrators in the U.S. are able to meet the importing countries broiler demand with a cheaper price and better quality than any other competitors. (2). Most of the exports from the U.S. to the world market is dark meat (leg quarters or wings) as argued by Djunaidi (2004). (3). Most of the production cost for the dark meat has been absorbed in the domestic market by selling the BSB. (4). Better technology and cheaper corn price brought a positive impact and have caused the U.S. integrators to have a comparative and competitive advantage compared to that of other countries. (5). The Export Credit Guarantee Program (GSM 102/103) scheme applied in most agricultural products has also helped the U.S. broiler integrators to compete in the world market.

In addition to the spatial equilibrium analysis which showed the trade flow, a regression analysis was also estimated to study the market share trend. The ordinary least square (OLS) analysis showed that the growth of the U.S. market share during the period of declining price trend in the last fourteen years (1990-2003) has declined with a significant rate. However, the estimate is not statistically significant, but the sign of the estimated coefficient is negative which could indicate market share shrinkage. One can compare the development of market shares between the U.S. and Brazil as shown in Figure 3 and 4, respectively. The size of the bubble or the circle represents the

size of market share. One might notice that Brazil gained more control in the market in recent years, while the United States' market share was very much constant or it was even shrinkage. This example might show that other countries are trying hard to increase their share in the markets. If the U.S. wants to keep it position as a market leader certainly it needs to take appropriate actions. The U.S. chicken exporters are expected to be more willing to satisfy the new trade regulations which mostly non-tariff trade barriers such as sanitary issues imposed by importing countries. By following sanitary regulation request from the importing countries, integrators in the U.S. may lower their short run profit, but it gives a greater market access to the market. Therefore, in the long run, it may be better marketing strategies for the U.S. exporters to do so. The simulation results as presented in Table 1 and 2 showed that in the long run, the U.S. will keep its position as a market leader, providing that the U.S. firms are willing to accommodate import policy from the importing countries.

Conclusions

The United States will be an important player in the global chicken trade. However, other countries are willing to meet non-tariff trade barriers from the importing countries which gave them a greater access to the export market. In the last fifteen years, the U.S. export growth has slowed while Brazil, the U.S. main competitor in the global chicken trade is able to expand its market shares. In the future, U.S. chicken exporters are expected to be more accommodating with the non-tariff trade regulations if they want to keep the position as a market leader. Short run profit may be jeopardized as more and more importing nations impose a non-tariff barrier of trade. But it will be the interest of the U.S. companies to make every effort to satisfy the request as long run marketing strategies.

References

Djunaidi, Harjanto., "Econometrics and Time Series Model Selections: A Choice between Two Possible Approach to Access Linkages between the U.S. and Export Chicken Markets. A Selected Paper Presentation at the Southern Agricultural Economics Associations Annual Meetings in Little Rock, Arkansas, 2004.

Djunaidi, Harjanto., "Assessing the Linkages between the U.S. and Export Chicken Markets. A Selected Poster Presentation at Southern Agricultural Economics Associations Annual Meetings in Little Rock, Arkansas, 2004.

Djunaidi, Harjanto., "Econometrics and Time Series Model Selections: A Choice between Two Possible Approach to Access Linkages between the U.S. and Export Chicken Markets. A Monthly Research Seminar at College of Basic and Applied Sciences, Middle Tennessee State University, Murfreesboro, Tennessee, March 2004.

Eric J. Wailes, Frank Fuller, Harjanto Djunaidi and Alvaro Durand', "Regional Trade Agreements in the Americas: Impacts on Rice Trade., Free Trade of the Americas, the WTO, and New Farm Legislation Conference. San Antonio, Texas. May 23-24, 2002.

Goodwin, H.L, Andrew McKenzie and Harjanto Djunaidi., "Which Broiler Part is the Best Part?. Journal of Agricultural & Aplied Economic" 35(2003): 483-495.

Greene H. William., Econometric Analysis. Fourth Edition., Prentice Hall, 1999.

Http://agecon.lib.umn.edu/cgi-bin/view.pl

Silberberg Eugene and Wing Suen., The Structure of Economics: A Mathematical Analysis. Third Edition. McGraw-Hill. 2000.

Takayama, Akira., Analytical Methods in Economics., The University of Michigan Press, 1993.

Takayama, T. and G.G. Judge, Spatial and Temporal Price and Allocation Models. North Holland Publishing Company. Amsterdam. 1971.

WATT PoultryUSA's Rankings, Various Issues.

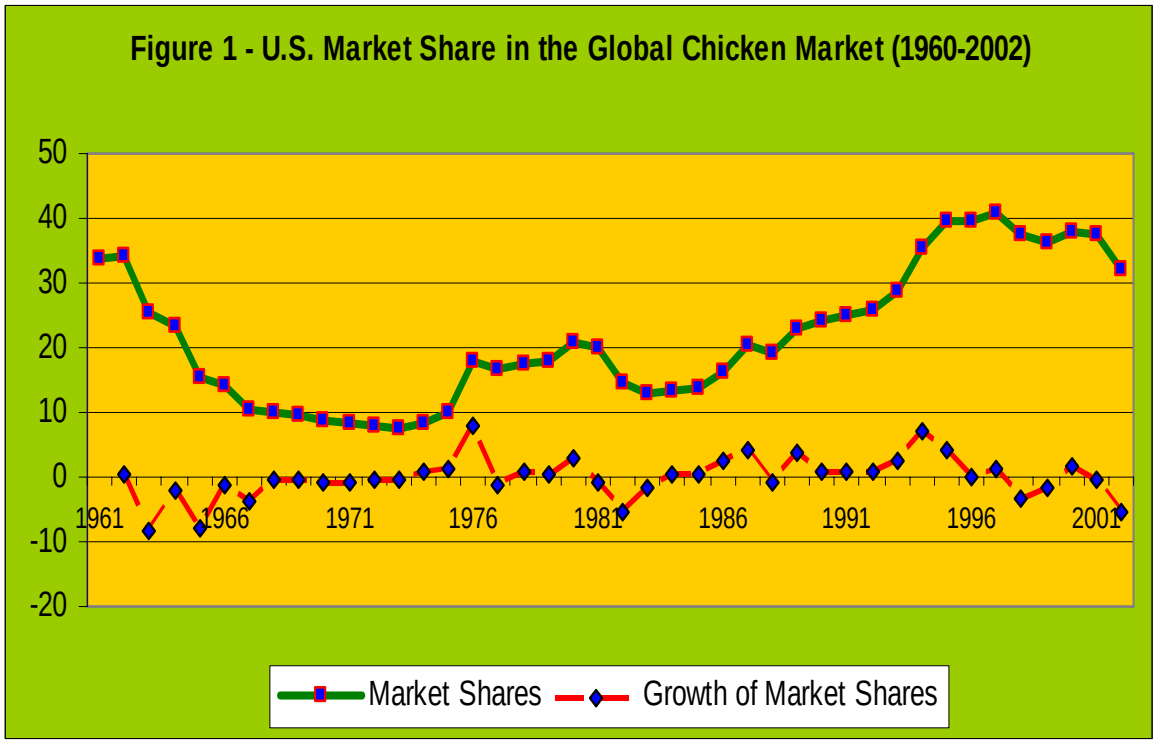
Figure 1 - U.S. Market Share in the Global Chicken Market (1960-2002)
50
40
30
20
10
0
-10
-20
1961
1966
1971
1976
1981
1986
1991
1996
2001
Market Shares
Growth of Market Shares

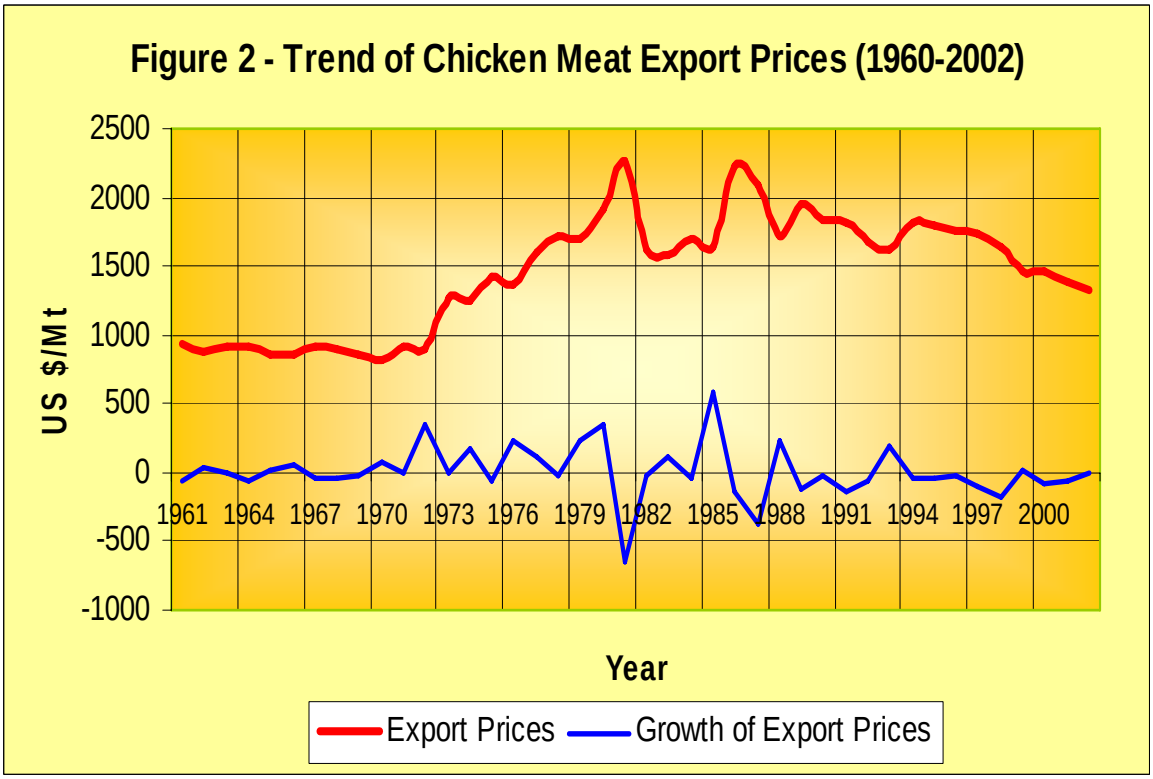
Figure 2 - Trend of Chicken Meat Export Prices (1960-2002)
2500
2000
1500
1000
500
0
-500
-1000
US $/M t
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
Year
Export Prices
Growth of Export Prices

Figure 3 – The Growth of U.S. Market Shares over Time

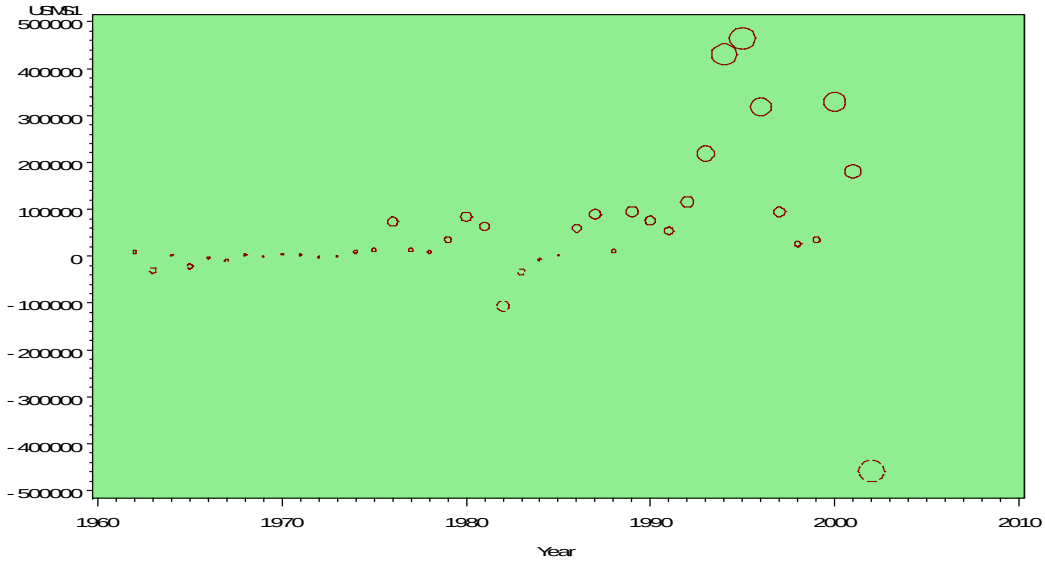

Figure 4 – The Growth of Brazilian Market Shares over Time

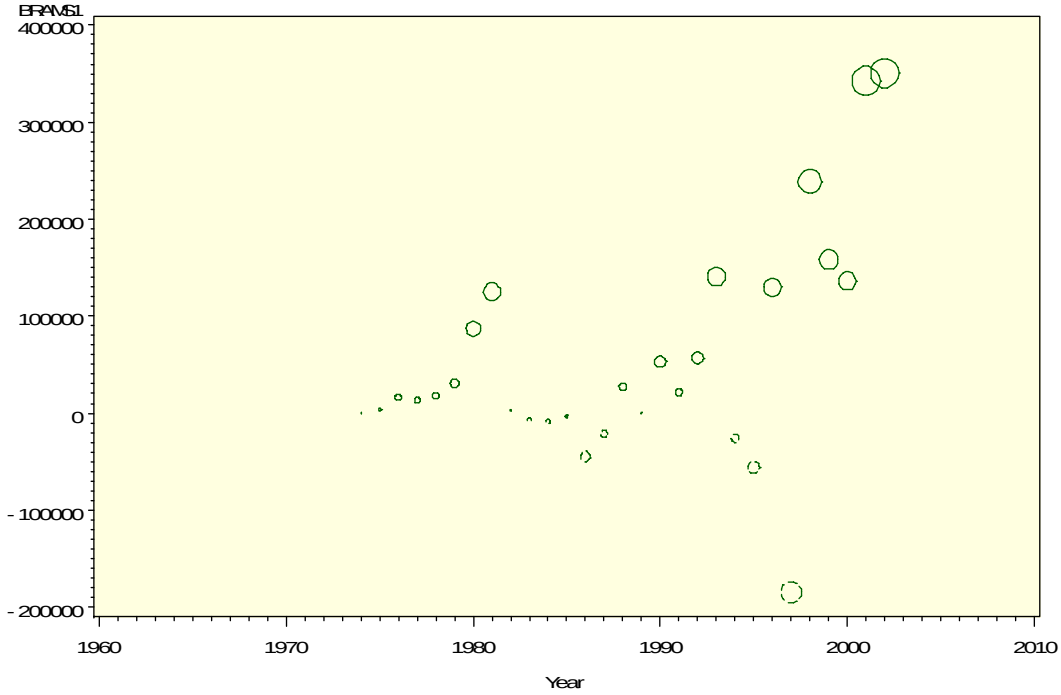

Table 1 - U.S. Market Share in the Global Chicken Markets (1961-2003)			
	Baseline	**Simulation I**	**Simulation II**
Total U.S. Exports	991720.117	1028021.64	1035820.421
Total World	2047463.11	2158085.585	2170046.321
U.S. Market Share	48.43	47.64	47.73
Export Price	**1003.11**	**1020.77**	**1009.89**

Table 2 - U.S. Market Share in the Global Chicken Markets (1999-2003)			
	Baseline	**Simulation I**	**Simulation II**
Total U.S. Exports	4434608.3	5562671.7	5416842.3
Total World	6267333.9	7045117.3	6847498.4
U.S. Market Share	70.75	78.96	79.11
Export Price	**791.77**	**828.72**	**817.221**