Recent U.S. and China’s Trade Issues
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1. Introduction

From 2004 to 2008, China's share of the U.S. tire market surged from 4.7% to 16.7%. Furthermore, between January and July of 2009, U.S. imported $1.3 billion worth of tires from China. The U.S. tire producers claim that this unprecedented increase in imports of tires from China hurt their industry. Consequently, the United States imposed tariffs on Chinese tires for a three-year period (35% in the first year, 30% in the second year, and 25% in the third year), in addition to the existing 4% import duty. In 2010, China retaliated by imposing anti-dumping duties, ranging from 50.3% to 105.4%. These retaliatory tariffs adversely impacted the trade in tires and poultry between the two countries. U.S. imports of Chinese tires declined from $2851 million in 2008 to $2416 million in 2009, and Chinese imports of U.S. poultry also fell from $733.48 million in January 2010 to $210.27 million in November 2010.

2. Objectives

The objectives of this study are to

1. analyze retaliatory tariffs by the United States and China. The theoretical model consists of two countries (the United States and China) and two commodities (tire and poultry products).
2. determine the Nash equilibrium tariffs and compare them to the actual tariffs, and
3. estimate the impacts of tariffs on U.S. imports and Chinese imports of poultry products.

3. Methods

The theoretical model consists of two countries (the United States and China) and two commodities (tire and poultry products).

- The utility preference is given by Cobbdouglas function with each country having a different taste for both commodities.
- The production function of each good is quasiconcave, leading to the production possibility frontier which is concave to the origin. The technology, thus the shape of production possibility frontier, differs between the countries.
- Using the utility functions, production possibility frontiers, trade balances, tariff revenue, price linkages, and excess demand functions, the tariff reaction function is derived for each country. The reaction functions are solved simultaneously to determine the Nash Equilibrium tariffs.
- Comparative statics analysis show that home country tariff is monotonically decreasing in both foreign country tariff and foreign country GDP. We also provide sufficient conditions for the existence of Nash Equilibrium.

4. Theoretical Model and Results

Maximize utility subject to the constraints:

\[
\begin{align*}
\text{Utility Function} & : U(D^*, p^*) = (D^*)^{\alpha} \\
\text{Budget Constraint} & : S_T = D_T + p_T S_T + (1 - p_T) D^I \\
\text{Production Possibility Frontier} & : S_I = m_I (S_I)^{\alpha} \\
\text{Price Linkage} & : p_T = p^I \\
\text{Balance of Payments} & : S_T = m_T (S_T)^{\alpha}
\end{align*}
\]

where \( i = \text{U (United States), C (China)} \).

The reaction functions are:

\[
\begin{align*}
t_I &= (1 - a_I) \left( \frac{a_T m_I (1 + \alpha_I)}{m_T \left( \alpha_I + \alpha_T - 1 \right)} \right) \\
t_C &= (1 - a_C) \left( \frac{a_T m_C (1 + \alpha_C)}{m_T \left( \alpha_T + \alpha_C - 1 \right)} \right)
\end{align*}
\]

Comparative Statics Results:

1. U.S. tariff decreases monotonically with respect to Chinese tariff.
2. U.S. tariff decreases monotonically with respect to Chinese production capacity.

5. Empirical Analysis

To empirically implement the theoretical analysis:

- U.S. excess demand for Chinese tires and China's excess demand for U.S. poultry are estimated.
- Explanatory variables are in the excess demand functions are own prices, complementary and substitute prices, demand shifters (e.g., income), supply shifters (e.g., input prices), and tariffs.
- U.S. tire tariff and Chinese poultry tariff equations are estimated.
- Because of the simultaneity problem, three-stage least square method is used.

6. Data Source and Summary Statistics

The data for the empirical analysis comes from various sources:

- National Agricultural Statistics Service (NASS) for U.S. poultry domestic price
- Food and Agriculture Organization (FAO) for quantity and value of poultry trade data
- U.S. International Trade Commission (USITC) and World Bank data for U.S. tire import tariff and China poultry import tariff
- GDP data comes from International Financial Statistics.

7. Conclusion

This paper uses a game theoretical framework to analyze retaliatory tariffs by the United States and China. The theoretical analysis assesses the Nash equilibrium tariff levels. The empirical analysis quantifies Nash equilibrium tariffs and compares them to the actual tariffs imposed by these two countries. We also estimate the impacts of tariffs on U.S. tire imports and Chinese poultry imports.

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