The Effectiveness of Antidumping Measures under the Byrd Amendment: Some Empirical Evidence for Catfish

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INTRODUCTION

• Globalization benefits all, all countries, all people and all trade partners (Thompson)

• Through various GATT/WTO rounds, tariff barriers have decreased worldwide, but anti-dumping measurement has surged to play a crucial role as the most important non-tariff barrier (Zanardi, 2004).

• Antidumping duty (AD) is recently used more frequently, by more countries, and against more products (Prusa, 2005)

• As processed and differentiated agricultural products are increasingly traded cross national borders (Reimer and Stiegert, 2006) more of them are facing antidumping measurements conducted by importing countries

• Recently, aquatic products trade has the same problem
THIS STUDY

- As US food processing and distribution is often marked by product differentiation and imperfect competition (Cornor et al., 1985 and Sexton 2000), the theoretical framework assumes Bertrand competition and differentiated goods.

- Under “labeling” law 2001 and biological differentiation of the catfish products, “catfish war” is useful for a study case on effect of the antidumping tariff for differentiated products.

- In the empirical regression, price-reaction functions are derived and estimated jointly with a demand equation using monthly data for the period January 1999-August 2006 to test whether US price and quantity increased during the tariff period, as predicted by theory.

CASE STUDY – CATFISH WAR

- Catfish production is one of the biggest aquaculture industries in the US and frozen catfish fillets is the most important product of the US catfish processing industry (Harvey, 2005).

- The anti-dumping duties are large (ranging from 44.66% to 63.88%) affected all of the fisheries processing companies in Vietnam that export to the US and were implemented in 2003, two years after the Byrd Amendment went into force.

- Disbursement paid to processors of $9.2 million in two fiscal years of 2005-2006, or 3% of their 2005 sales revenue of frozen catfish fillet.

- The case attracted substantial media attention with articles in the New York Times and Wall Street Journal focusing the ethical and policy dilemmas raised by the action.
### Table 3. Imports, Production and Prices of US Catfish Industry 1999-2005

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
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<th>2002</th>
<th>2003</th>
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<th>2005</th>
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<tbody>
<tr>
<td>Frozen fillets imports from VN (mil. lb.)</td>
<td>1.99</td>
<td>7.04</td>
<td>17.12</td>
<td>9.62</td>
<td>4.25</td>
<td>6.57</td>
<td>17.42</td>
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<tr>
<td>US frozen fillets production (mil. lb.)</td>
<td>119.92</td>
<td>119.65</td>
<td>115.16</td>
<td>131.27</td>
<td>124.70</td>
<td>121.80</td>
<td>123.68</td>
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<tr>
<td>US Farm Production (mil. lb.)</td>
<td>596.63</td>
<td>593.60</td>
<td>597.11</td>
<td>630.60</td>
<td>661.47</td>
<td>630.45</td>
<td>600.67</td>
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<tr>
<td>F.o.b Vietnam price ($/lb)</td>
<td>2.04</td>
<td>1.52</td>
<td>1.26</td>
<td>1.29</td>
<td>1.21</td>
<td>1.15</td>
<td>0.93</td>
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<tr>
<td>US frozen fillets price ($/lb)</td>
<td>2.76</td>
<td>2.83</td>
<td>2.61</td>
<td>2.39</td>
<td>2.41</td>
<td>2.62</td>
<td>2.67</td>
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<tr>
<td>Farm price (cent/lb.)</td>
<td>73.75</td>
<td>75.22</td>
<td>64.81</td>
<td>56.86</td>
<td>58.17</td>
<td>69.75</td>
<td>72.36</td>
</tr>
</tbody>
</table>

### HYPOTHESES

- Anti-dumping duties tend to be ineffective as most of the duty is borne by the foreign supplier rather than the importing-country consumer (*Kinnucan, 2003*).

- The Byrd Amendment has the paradoxical effect of increasing the value and total volume of imports (*Evenett, 2006*) and undermines the original intent of the duty because it gives an incentive for the domestic firm to increase its price for an increase in the sales of the foreign firm, which increases the domestic firm’s revenue from the tariff.
LITERATURE REVIEW
Imperfect Competition in Agricultural International Trade

• International markets of some other commodities:
  
  – *Buschena and Perloff* (1991): Philippines takes substantial market power in the coconut oil exports market
  
  
  – *Karp and Perloff* (1993): Brazil and Columbia are oligopolistics in coffee export market
  
  – *Deodhar and Sheldon* (1996): German banana import market follows Cournot-Nash equilibrium
  
  – *Dong, Marsh and Stiegert* (1996): the global malting barley market operates as a Cournot quantity setting oligopoly.
  
LITERATURE REVIEW
Imperfect Competition in Agricultural International Trade

- **Reimer and Stiegert, 2006**: a large number of the competitive behaviors in specific agricultural products have been documented.
- **Rice export markets**: 
  - **Karp and Perloff (1989)**: Thailand, Pakistan and China are oligopolists and all other countries as a competitive fringe 
  - **Yumkella, Unnevehr and Garcia, (1994)**: US and Thailand competitive behaviors are also imperfect.
- **Food and beverage export market** 
  - **Glauben and Loy (2003)**: there are exercises of market power by German export of beer to North America, in exports of sugar confectionery to the UK and in exports of cocoa powder to Italy. 
  - **Wilhelmsson (2006)**: Swedish food and beverage industry do enjoy some varied degrees of market power which is decreased with foreign competition

Vietnamese catfish industry globalizes…

- Vietnamese catfish industry has considerably developed since the country joined into globalization and adopted free trade principles (*Cohen and Hiebert, 2001*)
- employed almost a half of million Vietnamese people (*Narog, 2003*).
- Vietnamese producers successfully created low-cost breeding techniques of catfish in 1998 and developed a catfish breeding industry involving 15,000 families (*Kuntzman, 2003*)
- VN catfish farmers have opted to buy high protein pellet feed from an American company, Cargill (*Cohen and Hiebert, 2001; Sengupta, 2003*) and also adopted advanced feeding technologies to improve fish meat quality, meeting the quality and taste requirements of US consumers.
- VN catfish processors have learned catfish fillet techniques from an Australian importer and used processing equipments purchased from the US for their production (*Cohen and Hiebert, 2001*), following the quality control protocols of HACCP and Good Aquaculture Practice (GAP) recommended by US FDA.
...to export...

- Since 1998 with membership in APEC, Vietnamese fisheries export to US increased extremely, especially in catfish sales, from 0.6 million pound in 1998 to 17 million pound in 2001.
- Although exporting catfish even before 1995, when the official embargo on Vietnamese exports was lifted by the US, the tremendous spurt in exports to US came in 1999 when raw seafood tariffs dropped to zero and reached a volume of 18.3 million kilograms of catfish to the US, which is valued at $55.1 million in 2002 (Sengupta, 2003) after the bilateral trade agreement between US and Vietnam was signed in December 2001.

...and threaten the US catfish industry...

- With similarity of texture and taste but lower price, the “most similar product in characteristics and uses” (ITC, 2002), Vietnamese catfish was beginning to threaten the US catfish growers and wholesalers when 90% of the catfish imported by US in 2000 came from Vietnam (Cohen and Hiebert, 2001).
- Catfish production is the biggest aquaculture industry in the United State and frozen catfish fillet is the most important product of the US catfish processing industry (Harvey, 2005). In 2005, 124 million pounds of frozen catfish fillet was sold by domestic processors, increasing 1.5% relative to 2004 (Harvey, 2006).
leading to the catfish war

Catfish raised popularly in southern states of US are Ictaluridae family, mostly channel catfish (Ictalurus punctatus) and blue catfish (Ictalurus furcatus) farmed in closed ponds.

Vietnamese catfishes are basa (Pangasius bocourti) and tra (Pangasius pangasius) belong to Pangasius family and cultured popularly in cages and pens along the Mekong River.

• First step: the US Congress passed a law in 2002 restricting the use of the word “catfish” for labeling to only those Ictaluridae varieties farmed in US (Narog, 2003)

• The second step is lobbying for renegotiation of the 2001 bilateral trade agreement between US and Vietnam to set limits on catfish imports (Cooper, 2001)

• The third is antidumping suit filed by US producers in 2002 that led to tariffs ranging from 44.66% to 63.88% levied on frozen fillet catfish imported from Vietnam, starting from January 2003.

• The war is still continuing with non-tariff barriers as “Sales Ban” orders in 2005 in Alabama, Mississippi and Louisiana.

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LITERATURE REVIEW

Antidumping measurement – definition and investigation process

What does “dumping” mean?

| There are two criteria in WTO regulations (Knetter and Prusa, 2000): |
| First, there must be evidence that the domestic industry has materially injured (e.g., a loss or decline in profitability) by foreign imports |
| Second, the foreign suppliers must be found to be selling their products at dumping prices |

A dumping case occurs when subject products are sold at a price “less than fair value” (LTFV).

LTFV criterion can be determined in either of two ways:

1. by showing that the price charged in the domestic market by the foreign suppliers is below the price charged for the same product in other markets (i.e., the “price-based” method)
2. by showing that the price charged in the domestic market is below an estimate of cost plus a normal return (i.e., the “constructed-value” method).

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LITERATURE REVIEW
Antidumping measurement – definition and investigation process

In US, the Department of Commerce (DOC) and the International Trade Commission (ITC) administrate the antidumping laws. Each has distinct roles in the antidumping investigation process.

Blonigen and Haynes (2002): Exporters react to avoid or reduce the duty by raising their price prior to and during the long process of investigation.

Time line of standard US Antidumping Investigation (Source: Blonigen and Haynes, 2002)

Incidence of a tariff

Assume: US and VN catfish fillets are substitute goods in US market.
Incidence of a tariff

An antidumping tariff $T$ imposed on VN catfish fillets raises home price and output.

If import demand is perfect elastic, no effect on home product.
Incidence of an antidumping tariff with Byrd Amendment

Byrd effect can offset the tariff effect on home price in perfect competition

\[ P \quad S_u \quad S'_u \quad \text{Byrd effect} \]
\[ P' \quad S'_u \quad \text{Tariff effect} \]

\[ Q_u \quad Q'_u \quad Q''_u \]

US catfish

Negative effect of a tariff in a Bertrand competition

Best reaction functions of domestic and import catfish from Vietnam

\[ R_{vn} \colon P_{vn} = f(P_{us}) \]
\[ R'_{vn} \colon P'_{vn} = f(P_{us}) \]

\[ R_{us} \colon P_{us} = f(P_{vn}) \]
\[ R'_{us} \colon P'_{us} = f(P_{vn}) \]
THEORETICAL FRAMEWORK
Bertrand Competition

$Q_1$, be the quantity sold in the home market by the home firm at price $P_1$
$Q_2$, be the quantity sold in the home market by the foreign firm at price $P_2$

$$Q_1 = \alpha_1 - \beta_1 P_1 + \gamma_1 P_2$$
$$Q_2 = \alpha_2 - \beta_2 P_2 + \gamma_2 P_1$$

$\beta_i > 0$ \hspace{1cm} $\gamma_i \geq 0$

The degree of substitutability between $Q_1$ and $Q_2$ is given by $\frac{\beta_1 \beta_2}{\beta_1 \gamma_2} < 1$

To protect the home firm, a tariff equal to $t$ is imposed on each unit of sales by the foreign firm.

$$P_2^- = P_2^- + t$$
$P_2^-$ is the f.o.b price received by the foreign seller
$t$ is the per-unit dumping duty.

THEORETICAL FRAMEWORK
Bertrand Competition

$Q_{21} = \alpha_2 - \beta_2 P_2 + \gamma_2 P_1$, quantity sold by the foreign firm in the home market
$Q_{22} = \alpha_3 - \beta_3 P_3$, quantity sold in alternative export markets

$Q_2 = Q_{21} + Q_{22}$ is the foreign firm’s total exports

With the Byrd subsidy for the US firm, profit functions for the home and foreign firms

$$\pi_1 = (P_1 - C_1)Q_1 + \phi t Q_{21}$$
$$\pi_2 = (P_2 - C_2 - t)Q_{21} + (P_3 - C_3)Q_{22}$$

$C_1$ is the home firm’s constant marginal cost
$\phi < 1$ is a parameter indicating the firm’s share of the total duties collected
$C_2$ and $C_3$ are the foreign firm’s per-unit marginal cost of supplying the two markets
THEORETICAL FRAMEWORK

Bertrand Competition

Profit maximization for both firms give price reaction functions

\[ P_1 = \frac{\alpha_1}{2\beta_1} + \frac{\gamma_1}{2\beta_1}P_2 + \frac{1}{2}C_1 + \frac{\varphi\gamma_1}{2\beta_1}t \]

\[ P_2 = \frac{\alpha_2 - \alpha_1}{2\beta_2} + \frac{\gamma_2}{2\beta_2}P_1 + \frac{\beta_2}{\beta_1}P_3 + \frac{1}{2}C_2 - \frac{\beta_2}{2\beta_2}C_3 + \frac{1}{2}t \]

And the price reaction function of exporters is

\[ P_2^* = \frac{\alpha_2 - \alpha_3}{2\beta_2} + \frac{\gamma_2}{2\beta_2}P_1 + \frac{\beta_3}{\beta_2}P_3 + \frac{1}{2}C_2 - \frac{\beta_3}{2\beta_2}C_3 - \frac{1}{2}t \]

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THEORETICAL FRAMEWORK

Perfect competition

Assume for simplicity that the home market has just two sources of supply: home production and imports from the foreign country in which the duty is imposed. The supply equations for the home and imported goods are

\[ Q_1 = \varphi_1 + \epsilon_1 (P_1 + \psi t) - \theta_1C_1 \]

\[ Q_{21} = \varphi_2 + \epsilon_2 (P_2 - t) - \theta_2C_2 \]

\[ \psi = \frac{Q_{21}}{Q_1} \geq 0 \quad \text{where} \quad \tilde{Q}_{21} \leq Q_{21} \]

\[ \tilde{Q}_1 \leq Q_1 \]

is the quantity of imports subject to the duty

\[ \tilde{Q}_1 \leq Q_1 \]

is the quantity of domestic production certified to receive duty revenue

\[ \psi \ t \] is the per-unit subsidy for domestic firms as a result of the Byrd Amendment.

Recall the demand equations

\[ Q_1 = \alpha_1 - \beta_1P_1 + \gamma_1P_2 \]

\[ Q_2 = \alpha_2 - \beta_2P_2 + \gamma_2P_1 \]

And tariff wedge

\[ P_2 = P_2^* + t \]

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THEORETICAL FRAMEWORK

Perfect competition

\[ P_1 = \frac{\alpha_1 + \phi_1}{\epsilon_1 + \beta_1} + \frac{\gamma_1}{\epsilon_1 + \beta_1} P_2^- + \frac{\theta_1}{\epsilon_1 + \beta_1} C_1 + \frac{\gamma_1 - \psi E_1}{\epsilon_1 + \beta_1} t \]

\[ P_2^- = \frac{\alpha_2 + \phi_2}{\epsilon_2 + \beta_2} + \frac{\gamma_2}{\epsilon_2 + \beta_2} P_1 + \frac{\theta_2}{\epsilon_2 + \beta_2} C_2 - \frac{\beta_2}{\epsilon_2 + \beta_2} t \]

Comparison to the Bertrand competition

\[ P_1 = \frac{\alpha_1}{2\beta_1} + \frac{\gamma_1}{2\beta_1} P_2^- + \frac{1}{2} C_1 + \frac{\gamma_1 + \phi E_2}{2\beta_1} t \]

\[ P_2^- = \frac{\alpha_2 - \alpha_1}{2\beta_1} + \frac{\gamma_2}{2\beta_1} P_1 + \frac{\beta_2}{\beta_1} P_3 + \frac{1}{2} C_2 - \frac{\beta_2}{2\beta_1} C_3 - \frac{1}{2} t \]

While the Byrd Amendment enhances duty efficacy under Bertrand competition, it undermines efficacy under perfect competition

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EMPIRICAL FRAMEWORK

Assumption

There are two firms, domestic catfish process industry and Vietnamese catfish exporters competing to supply frozen catfish fillets to US market

US catfish fillets does not compete with the Vietnamese catfish in other market because US catfish fillets exports is so tiny

Catfish fillets produced by US and Vietnamese processors are differentiated (under “labeling” law and biological species differences)

Both firms use price-setting duopoly in US market

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EMPIRICAL FRAMEWORK

\[
P_1 = \delta_0 + \delta_1 P_{\text{sal}} + \delta_2 P_{\text{p}} + \delta_3 I + b_1 P_2^- + d_1 f + w_1 W + w_2 G + \varepsilon_1
\]

\[
P_2 = \delta_0 + \delta_1 P_{\text{sal}} + \delta_2 P_{\text{p}} + \delta_3 I + b_2 P_1 + d_2 f + eX + \varepsilon_2
\]

\[
Q_1 = \xi_0 - \xi_1 P_1 + \xi_2 P_2^- + \xi_3 P_{\text{sal}} + \xi_4 P_{\text{p}} + \xi_5 I + \varepsilon_D
\]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Unit</th>
<th>Source of data</th>
</tr>
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<tbody>
<tr>
<td>Q_1</td>
<td>Production of US frozen catfish fillets</td>
<td>$/lb</td>
<td>USDA</td>
</tr>
<tr>
<td>P_1</td>
<td>Price of US frozen catfish fillets</td>
<td>$/lb</td>
<td>USA</td>
</tr>
<tr>
<td>P_2</td>
<td>F.o.b price of Vietnamese frozen catfish fillets</td>
<td>$/lb</td>
<td>NMFS</td>
</tr>
<tr>
<td>P_{\text{sal}}</td>
<td>Price of salmon import</td>
<td>$/lb</td>
<td>NMFS</td>
</tr>
<tr>
<td>P_{\text{p}}</td>
<td>US poultry price</td>
<td>$/lb</td>
<td>IMF</td>
</tr>
<tr>
<td>I</td>
<td>US personal income per capita</td>
<td>$/year</td>
<td>US BEA</td>
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<td>f</td>
<td>Freight index from Pacific</td>
<td>US BLS</td>
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<td>W</td>
<td>US wage of manufacture sector</td>
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<td>US BLS</td>
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<td>G</td>
<td>Energy index in US market</td>
<td>US BLS</td>
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<td>X</td>
<td>Real exchange rate of VND against US$</td>
<td>VDN/$</td>
<td>oanda.com</td>
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SUR regression for US price

<table>
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<tr>
<th>Variable</th>
<th>Coef.</th>
<th>t-value</th>
<th>Demand for the US fillets</th>
<th>Coef.</th>
<th>t-value</th>
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<td>Prelim</td>
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<td>0.068</td>
<td>0.001</td>
<td>0.054</td>
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<tr>
<td>Final</td>
<td>0.005**</td>
<td>2.126</td>
<td>0.019</td>
<td>1.207</td>
<td></td>
</tr>
<tr>
<td>US domestic price</td>
<td>-2.359***</td>
<td>-3.268</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnamese f.o.b price</td>
<td>0.019***</td>
<td>2.613</td>
<td>0.131***</td>
<td>2.407</td>
<td></td>
</tr>
<tr>
<td>Poultry price</td>
<td>0.019</td>
<td>0.253</td>
<td>-0.593</td>
<td>-1.068</td>
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<tr>
<td>Salmon price</td>
<td>0.016</td>
<td>1.208</td>
<td>-0.122</td>
<td>-1.211</td>
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<tr>
<td>US per capita income</td>
<td>0.128</td>
<td>1.228</td>
<td>1.421*</td>
<td>1.821</td>
<td></td>
</tr>
<tr>
<td>Manufacture wage</td>
<td>0.207</td>
<td>1.329</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy index</td>
<td>0.004</td>
<td>0.151</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight index from Pacific</td>
<td>0.114**</td>
<td>2.106</td>
<td></td>
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<td></td>
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<tr>
<td>Lag of dependent variable</td>
<td>0.345***</td>
<td>3.879</td>
<td>-0.533***</td>
<td>-6.246</td>
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<tr>
<td>Constant</td>
<td>-0.003</td>
<td>-1.213</td>
<td>-0.095***</td>
<td>-4.980</td>
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<td>Q1</td>
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<td>0.202***</td>
<td>8.392</td>
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<td>Q2</td>
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<td>-0.914</td>
<td>0.039*</td>
<td>1.694</td>
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<td>Q3</td>
<td>-0.005*</td>
<td>-1.748</td>
<td>0.090***</td>
<td>4.034</td>
<td></td>
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</tbody>
</table>

R^2 = 0.54

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level
Table 4. SUR regression for reaction price equations and demand of US catfish fillets

<table>
<thead>
<tr>
<th>Variable</th>
<th>US home price</th>
<th>VN price</th>
<th>Demand for US products</th>
<th>US farm price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef. t-value</td>
<td>Coef. t-value</td>
<td>Coef. t-value</td>
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<tr>
<td>PRELIM</td>
<td>0.000 0.068</td>
<td>0.015 0.426</td>
<td>0.001 0.054</td>
<td></td>
</tr>
<tr>
<td>FINAL</td>
<td>0.005*** 2.126</td>
<td>-0.022 -0.783</td>
<td>0.019 1.207</td>
<td></td>
</tr>
</tbody>
</table>

| US domestic price                       | 1.005 2.613 4.972*** 3.801 -2.359*** -3.268 |
| Vietnamese f.o.b price to US            | 0.019*** 2.613 0.131** 2.407 |
| Non-US market price                     | 0.022 0.395 |
| Salmon price                            | 0.016 1.208 -0.026 -0.146 -0.122 -1.211 |
| Poultry price                           | 0.019 0.253 -0.289 -0.293 -0.593 -1.068 |
| US per capita income                    | 0.128 1.228 -0.215 -0.149 1.421* 1.821 |
| Manufacture wage                        | 0.207 1.329 |
| Energy index                            | 0.004 0.151 |
| Freight index from Pacific              | 0.114** 2.106 -1.233* -1.658 |
| Real exchange rate VND-USD              | 0.192 0.705 |
| Lag of dependent variable               | 0.345*** 3.879 -0.464*** -4.657 -0.533*** -6.246 |
| First quarter                           | 0.008** 2.374 0.014 0.341 0.202*** 8.392 |
| Second quarter                          | -0.003 -0.914 0.049 1.085 0.039* 1.694 |
| Third quarter                           | -0.005* -1.748 0.050 1.242 0.090*** 4.034 |
| Constant                                | -0.003 -1.213 -0.025 -0.741 -0.095*** -4.980 |
| R2                                      | 0.48 0.009 0.26 0.54 |
| DW-h                                    | 1.31 0.00 0.00 1.10 |
CONCLUSION

• The domestic price of frozen catfish fillet increased after the ITC imposed an antidumping tariff on Vietnamese frozen catfish fillets import.

• The tariff incidence on home price is very small (0.5%)

• Antidumping duty is a weak tool to protect domestic catfish industry.

• Other measurements rather than tariff should be implemented to support domestic catfish industry to raise its competition capacity to import catfish.

• With the Byrd Amendment and Bertrand imperfect competition, the domestic firms have ability to raise their price for a respective rise in import price and get more disbursement from larger tariff revenues.

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The Mekong Delta is home of Vietnamese catfish farming

Cage culture of tra, basa catfish