US Seafood Exports and HACCP Regulatory System

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I. Introduction

As seafood safety guideline suggested by Food and Agriculture Organization (FAO), Hazard Analysis Critical Control Point (HACCP) is adopted by more and more countries as a foundation of food safety regulations to control microbial pathogens in food. However, the status of HACCP implementation is quite different among these countries. There are growing and strong evidences that HACCP played as a non-tariff barrier for many exporters of developing countries. As the World Trade Organization (WTO) contributes to free trade globally, the reduction of standards confliction depends on the harmony of standards, such as admitting equivalent standards with HACCP, and cooperation of trading countries or groups. This study contributes to investigate how the implementation of HACCP impact U.S. seafood export and whether the international standard harmonization benefits U.S. seafood export market.

II. Procedure

The model adopted in this study is Gravity model(GM), which uses GDP per capital of each importing country ($GDPC_i$), distance between U.S. and importing countries ($Dist_i$), total seafood export of each importing country($TExp_i$), as well as dummy variables for language of English, Free Trade Agreement (*FTA*) and HACCP implementation in U.S. to explain changes of trade flow. The GM is specified as:

$$\ln Export_i = \beta_1 \ln GDPC_i + \beta_2 \ln Dist_i + \beta_3 \ln TExp_i + \beta_4 lang + \beta_5 HACCP + \beta_6 FTA + \varepsilon_i$$

However, the residues of GM linear regression with panel data show correlation between countries. It implies the existence of spatial dependence of data. Considering our concern is only with correcting for the potentially biasing influence of the spatial autocorrelation, thus the spatial error model (SEM) was adopted for analysis, which is defined as following equation.

$$y = x\beta + \varepsilon$$

The errors are spatially correlated: $\varepsilon = \lambda W\varepsilon + \mu$

Then the reduced form is: $y = x\beta + (I - \lambda W)^{-1}\mu$

In this study, Variables are specified as:

$y = \ln Export$;

$X = [\ln GDPC, \ln Dist, \ln T\exp, Lang, HACCP, FTA]^T$;

W is the weighted matrix based on distance.

The panel data used includes the top 50 countries importing seafood from U.S. between 1980 and 2006. After dropping countries with incomplete data, 32 importing countries are used for analysis in this study

III. Results

Fig.1 clearly shows that the total value of seafood export suddenly decreased between 1998 and 1999, after the implementation of HACCP in 1997. The statistic results in Table1 imply that HACCP has significant positive impact on U.S. seafood exporting in the long time period, which is consistent with the figure. However, the estimate of SEM indicates a contradict conclusions of the effect of HACCP implementation in the short term. Both of the two models imply that HACCP does not have significant effect in the short run. Moreover, the trade flow is more sensitive to HACCP implementation in the long term.

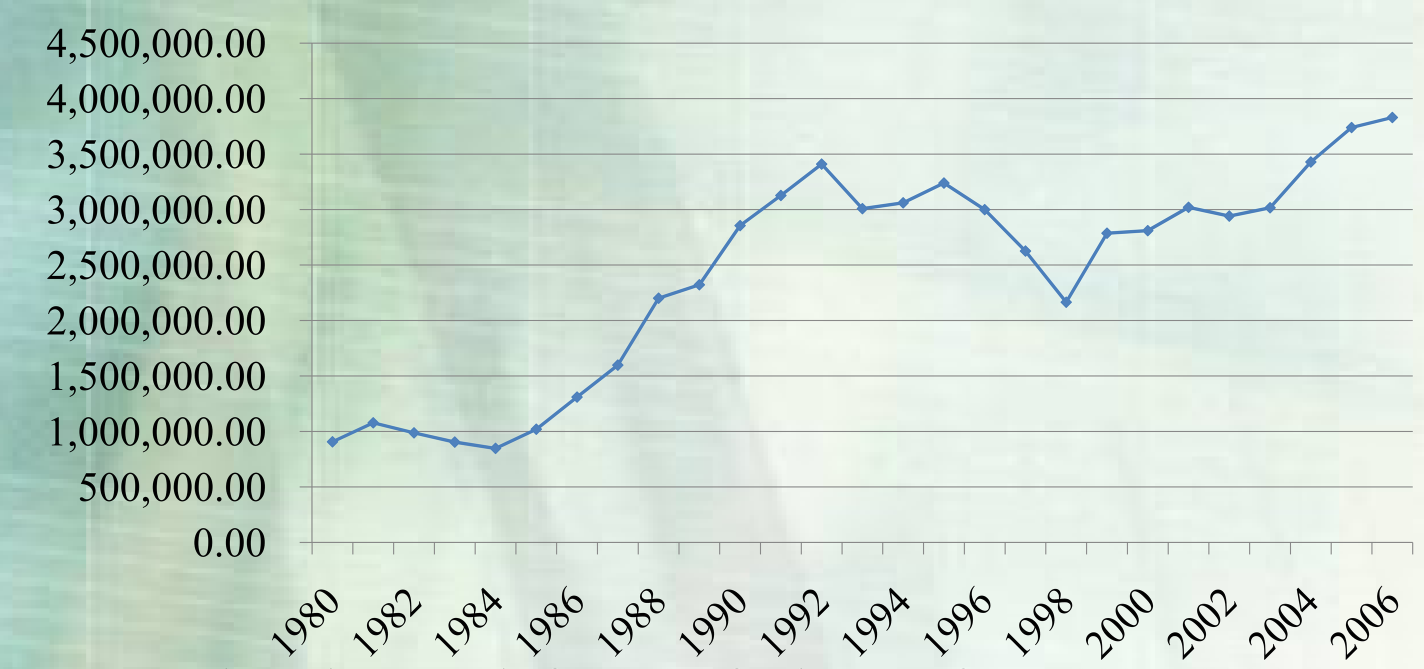

Fig.1 Time Trend of U.S. Seafood Export from 1980 to 2006

Based on the implementation status and standards harmonization of HACCP, the importing countries are categorized into three groups.

The first group: countries implementing broaden defined performance standards. This group mainly includes countries that not only implement HACCP but also adopts the Codex hygiene code as its source of prerequisite requirements (such as Canada) and countries that harmonize HACCP with existing food safety standards but still accept HACCP license of exporters (such as Malaysia).

The second group: countries implementing process standards. Countries in the second group either directly adopt HACCP or incorporate with existing regulation and only approve equivalence by specific decisions of individual country, such as European Union and Japan.

Third group: countries not implement HACCP.

Table 2 presents statistical estimates based on above three groups of countries. The results present consistent indication with table one on that HACCP implementation benefits U.S. seafood export to all three groups of country given the positive sign of HACCP estimators of all three groups. In addition, the sensitivity of trade flows between U.S. and importing countries is increased with the standards harmonization of HACCP. Since the regulation requirements of countries in group one are easiest to meet, the trade flow is most sensitive to HACCP implementation. Once U.S. adopted HACCP, the value of seafood exporting would dramatically increase. These results support that the way of performance standards benefits international trade more in globally implementing HACCP standards.

IV. Conclusions

This study investigates how the implementation and standards harmonization of HACCP regulation affects U.S. seafood exporting. Our results indicate that HACCP standards benefit U.S. seafood exporting in the long time period and are believed to benefit more in the future. However, the impact is not significant in the short term period. At the individual country level, the way of performance standards is better for HACCP implementation and standards harmony. The less standard conflicts exist, the more enhancing effects on international trade flows seafood safety regulation provides.

Table 1 Gravity Model and Spatial Error Model Estimates of HACCP Impact on overall U.S. Seafood Exports

	Short Run 1990-1999		Long Run 1980-2006	
ln Export	GM	SEM	GM	SEM
ln Distance	-0.33 (0.54)	0.92* (0.066)	-0.0094 (0.46)	0.83* (0.050)
ln GDP per Capital	0.89* (0.19)	-0.78* (0.17)	1.46* (0.12)	-0.90* (0.12)
ln Total export	0.39* (0.10)	0.42 (0.048)	0.50* (0.05)	0.40* (0.031)
Language	0.26 (0.64)	-0.24* (0.18)	0.20 (0.54)	-0.13* (0.12)
HACCP	0.016 (0.073)	-0.027 (0.16)	0.23* (0.075)	0.39* (0.11)
FTA	0.074 (0.11)	0.27* (0.16)	0.028 (0.057)	0.11* (0.080)
Constant	-0.89 (5.71)	7.84* (6.44)	-10.69* (4.45)	11.05* (7.57)
Moran's I		0.037* (0.005)		0.037* (0.002)

Table 2 Gravity Model and Spatial Error Model Estimates of HACCP Impact on U.S. Seafood Export to Different Groups of Countries

	Group1		Group2		Group3	
ln Export	GM	SEM	GM	SEM	GM	SEM
ln Distance	-1.51* (0.61)	-1.41* (0.072)	1.32* (1.12)	-0.97* (0.18)	-7.75* (0.95)	-9.92* (0.68)
ln GDP per Capital	-0.27* (0.25)	0.065* (0.054)	2.54* (0.24)	1.12* (0.048)	1.73* (0.10)	1.90* (0.072)
ln Total export	1.50* (0.12)	1.27* (0.10)	0.28* (0.084)	0.41* (0.035)	0.17* (0.040)	0.24* (0.029)
Language	2.30* (0.97)	2.65* (0.98)	0.57 (1.50)	0.99* (0.22)	-0.38* (0.22)	-0.077 (0.12)
HACCP	0.40* (0.13)	0.55* (0.13)	0.050 (0.11)	0.18* (0.12)	0.13* (0.12)	0.10* (0.12)
FTA	0.029 (0.079)	-0.070* (0.083)	-0.11 (0.14)	0.59* (0.14)	-0.063* (0.073)	-0.17* (0.066)
Constant	3.27 (5.98)	2.47* (1.24)	-30.66* (10.59)	1.44* (2.01)	64.81* (8.58)	82.88* (5.75)
Moran's I		-0.05* (0.006)		-0.022* (0.003)		0.12* (0.007)

*: statistically significant at 95% level