3. Cultured shrimp export comparative advantage: a global assessment

In this section we apply the assessment framework developed above to evaluate major shrimp farming countries' comparative advantage in exporting cultured shrimp to three major international markets (Japan, the United States of America, and the European Union). For readers' convenience, this section presents a self-contained report of the assessment exercise; its methodology is based on the framework developed above but modified to fit the issue at hand.

3.1 INTRODUCTION

Cultured shrimp production in the world has been growing dramatically over the last two decades, from 0.2 million metric tons (tonnes) in 1985 to 1.5 mmt in 2002; in terms of value it has grown from USD 1 billion to nearly USD 8 billion (Figure 1).

Shrimp farming has been export-oriented in most countries. The three major shrimp export markets are Japan, the United States of America and the European Union, which jointly consumed 90 percent of the world frozen cultured shrimp exports in the early 2000s (25, 48 and 17 percent for Japan, the United States of America and the European Union, respectively. See Figure 2).

In the following sections we attempt to conduct a global, comparative assessment of 28 major shrimp farming countries' frozen cultured shrimp export performance in these three major international markets. These 28 countries accounted for 98 percent of the world cultured shrimp production in the early 2000s (Table 3). We first discuss the assessment methodology and data in section 3.2, then present the empirical results in section 3.3, and finally summarize the study in section 3.4.

FIGURE 1
World cultured shrimp production

Source: FAO (2008)

FIGURE 2
Cultured shrimp exports to various markets
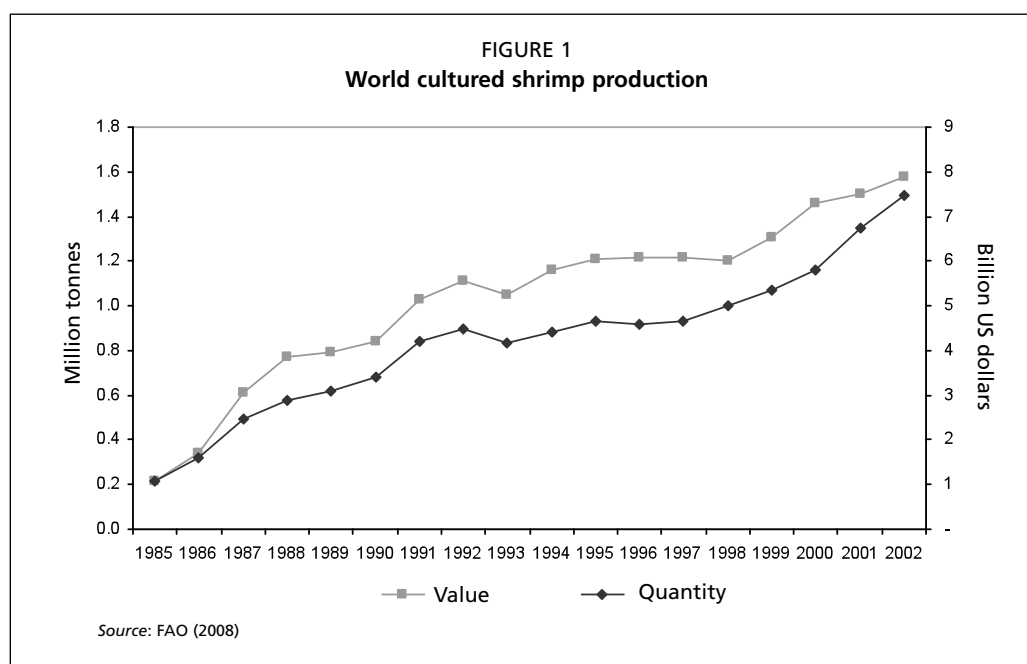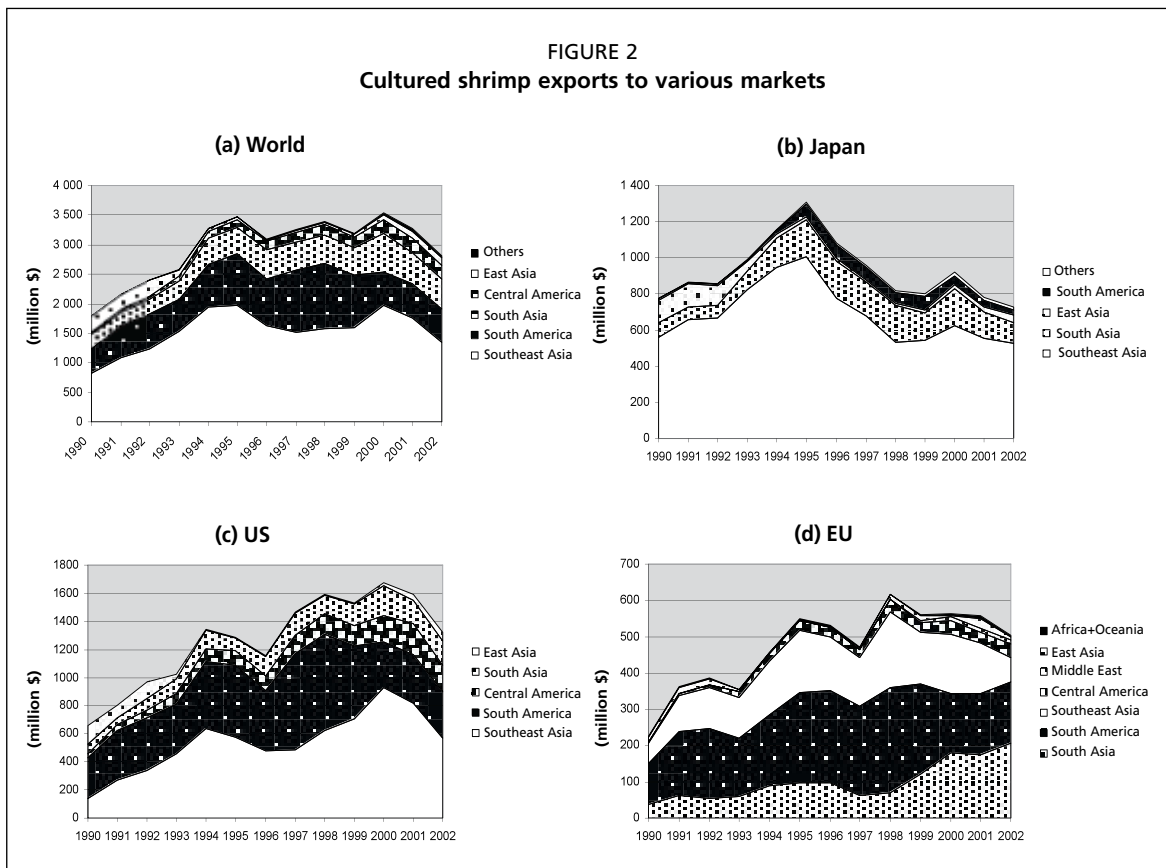
3.2 METHODOLOGY AND DATA

Market share (MS) is a basic export performance indicator that reflects a country's "degree of dominance" in a market. Such dominance depends on two factors. One is the country's "size advantage" that reflects its total export capacity as compared to that of other countries. The other factor is its "comparative advantage" that reflects its export structure as compared to those of other countries. Dynamically, the change of degree of dominance can be directly measured by market share variation. We will develop an approach to decompose a country's total market share variation into "size" and "structural" variations that are driven by changes in size and comparative advantage respectively. We will also construct a "revealed comparative advantage variation" (*RCAV*) index to facilitate cross-country comparisons of comparative advantage variation.

3.2.1 Degree of dominance (market power)

When a country competes with other countries in an international market, the degree of its dominance in the market (i.e. market power) can be measured by its market share:

$$s_{ij,t} = E_{ij,t} / E_{j,t},\qquad(6)$$

where $E_{ij,t}$ denotes country i's export to market j;

$E_{j,t} = \sum_{i} E_{ij,t}$ denotes the total export to market j by all countries (i.e. the size of market j);

t is the time subscript.

The larger the share a country controls, the more dominant this country is in the market. The degree of dominance depends on its "size advantage" and "comparative advantage".

TABLE 3
A profile of major shrimp farming countries

Country	Cultured shrimp production quantity (tonnes)			Share of world cultured shrimp production
	Early 1990s (1990–92 average)	Mid 1990s (1995–97 average)	Early 2000s (2000–02 average)	Early 2000s (2000–02 average)
Asia:				
China	203 751	90 063	302 106	24.4%
Thailand	155 482	242 871	250 754	20.2%
Indonesia	129 705	155 271	148 929	12.0%
India	40 600	69 089	104 872	8.5%
Viet Nam	35 327	51 454	68 144	5.5%
Bangladesh	19 726	40 737	57 408	4.6%
Philippines	61 273	69 997	40 560	3.3%
Malaysia	2 787	8 014	22 830	1.8%
Iran (Islamic Republic of)	31	274	5 872	0.5%
Myanmar	1	1 687	5 662	0.5%
Sri Lanka	1 500	3 508	5 573	0.4%
Saudi Arabia	122	411	3 587	0.3%
Republic of Korea	467	784	1 547	0.1%
Subtotal	**650 772**	**734 160**	**1 017 845**	**82.2%**
Latin America:				
Ecuador	98 265	115 409	56 703	4.6%
Mexico	5 936	15 535	42 449	3.4%
Brazil	1 933	2 995	41 796	3.4%
Colombia	7 383	6 740	11 797	1.0%
Honduras	4 267	8 621	10 532	0.9%
Venezuela (Bolivarian Republic of)	683	4 023	10 337	0.8%
Nicaragua	65	2 737	5 750	0.5%
Belize	185	961	4 163	0.3%
Guatemala	646	2 065	3 131	0.3%
Costa Rica	492	2 450	2 416	0.2%
Panama	3 457	5 711	1 986	0.2%
Peru	3 924	5 330	991	0.1%
Subtotal	**127 236**	**172 577**	**192 052**	**15.5%**
Others:				
Madagascar (Africa)	26	2 146	5 255	0.4%
Australia (Oceania)	769	1 556	3 142	0.3%
New Caledonia (Oceania)	622	974	1 783	0.1%
World	**805 066**	**928 700**	**1 238 902**	**100%**

3.2.2 Size advantage

Given other things, a country (e.g. Thailand) that has a large amount of cultured shrimp products for export tends to have a strong "size" advantage that gives it relatively high degree of dominance in every market.

A country's size advantage can be measured by its share in the world market:

$$s_{i,t} = E_{i,t} / E_t, \tag{7}$$

where $E_{i,t} = \sum_j E_{ij,t}$ denotes country i's total cultured shrimp exports and

$E_t = \sum_{i,j} E_{ij,t}$ denotes total world cultured shrimp exports (i.e. the size of the world market).

Obviously, the larger a country's world market share is, the stronger its size advantage is.

3.2.3 Comparative advantage

Besides its size advantage, a country's market power in a specific market also depends on its "comparative advantage" which can be measured by its "revealed comparative advantage" (RCA) index:

$$RCA_{ij,t} = \frac{s_{ij,t}}{s_{i,t}}. \tag{8}$$

Dividing country i's share in market j by its share in the world market, the $RCA_{ij,t}$ index defined in equation (8) essentially filters the impact of country i's size advantage (measured by $s_{i,t}$) from its degree of dominance in market j (measured by $s_{ij,t}$). The residual can then be taken as a measure of its "structural" advantage in the market, which is commonly called "comparative advantage".[5,6]

According to equation (8), $RCA_{ij,t} > 1$ implies that $s_{ij,t} > s_{i,t}$, which indicates that country i's degree of dominance in market j is greater than its dominance in the world market; namely, country i has a strong comparative advantage in market j. The greater the $RCA_{ij,t}$ index is, the stronger the advantage would be. Conversely, $RCA_{ij,t} < 1$ would indicate that country i's degree of dominance in market j falls short of its dominance in the world market, which implies that it has a weak comparative advantage in market j. The smaller the $RCA_{ij,t}$ index is, the weaker the advantage would be.[7]

Note that the exact magnitude of the $RCA_{ij,t}$ index measures country i's degree of dominance in market j relative to its dominance in the world market. For example, an $RCA_{ij,t}$ index of 1.5 implies that country i's share in market j is 1.5 times larger than its share in the world market; conversely, an $RCA_{ij,t}$ index of 0.5 implies that country i's share in market j is only half of its share in the world market.

3.2.4 Market share variation

While market share provides a static measure of market power at a certain point in time, market share variation defined as

$$\Delta s_{ij} = s_{ij,t+1} - s_{ij,t}, \tag{9}$$

can be used to measure the gain or loss of market power between time t and $t+1$.

A positive Δs_{ij} indicates that country i has increased its degree of dominance in market j between time t and $t+1$; the larger the Δs_{ij} is, the greater the market power gain would be. The interpretation of a negative Δs_{ij} would be the opposite.

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[5] Comparative advantage is a concept commonly used to explain specialization patterns: a country (or other entities) tends to have relatively high specialization in activities where it has strong comparative advantage. The idea of "revealed" comparative advantage is to use *ex post* specialization patterns to infer comparative advantage patterns: a country's actual high specialization in an activity can be viewed as an evidential indication that it has strong comparative advantage in that activity (Balassa, 1965). It is "revealed" (rather than actual) comparative advantage in that rather than reflecting true comparative advantage, high specialization could be a result of policy interventions.

[6] The way to reveal comparative advantage is a highly controversial issue. Many different RCA indices have been suggested and disputed (Bowen, 1983; Vollrath, 1991; Yeats, 1985). While a consensus is yet to be reached, the original Balassa's RCA indices (Balassa, 1965) are the most widely used by applied economists and will be adopted here.

[7] In the revealed comparative advantage literature, an RCA index greater than unity is often treated as an indication of the existence of comparative "advantage", while an RCA index less than unity indicates the existence of comparative "disadvantage". We do not follow this arbitrary categorization, which would be especially inconvenient when discussing comparative advantage variation. Instead, we treat RCA index greater (or less) than unity as an indication of "strong" (or "weak") comparative advantage.

According to equations (6)-(8), market share ($s_{ij,t}$) is the product of size advantage ($s_{i,t}$) and comparative advantage ($RCA_{ij,t}$). Similarly, market share variation defined in equation (9) can also be decomposed into "size variation" and "structural variation" to identify market share variation driven by changes in "size advantage" and "comparative advantage".

Size (market share) variation

To identify country i's size variation in market j, we first derive what the country's share in market j would have been at time $t+1$ (denoted as $\tilde{s}_{ij,t+1}$) had there been no changes in its comparative advantage between time t and $t+1$. Then the difference between this hypothetical $\tilde{s}_{ij,t+1}$ and country i's share in market j at the initial time t (*i.e.* $s_{ij,t}$) would provide a measure of the country's size variation in market j.

According to equation (8), a country's revealed comparative advantage in a market is measured by its share in the market divided by its share in the world market. More specifically, country i's comparative advantage in market j relative to market k can be measured by the ratio between its shares in the two markets, i.e. $s_{ij,t}/s_{ik,t}$. Thus, a country would experience no comparative advantage variation between time t and $t+1$ only if its market share ratios for any two markets remain constant during the period, i.e.

$$\frac{\tilde{s}_{ij,t+1}}{\tilde{s}_{ik,t+1}} = \frac{s_{ij,t}}{s_{ik,t}}, \forall j,k,$$

or equivalently,

$$\frac{\tilde{s}_{ij,t+1}}{s_{ij,t}} = \frac{\tilde{s}_{ik,t+1}}{s_{ik,t}} \equiv g, \forall j,k, \tag{10}$$

Equation (10) indicates that only when a country's share in every market grows at the same rate would it experience no comparative advantage variation.[8]

According to equation (10), had country i maintained its export comparative advantage pattern between time t and $t+1$, its share in market j at time $t+1$ would be

$$\tilde{s}_{ij,t+1} = g s_{ij,t},$$

which, given the actual size of market j ($E_{j,t+1}$), allows the corresponding country i's comparative-advantage-variation-free benchmark exports in market j to be calculated as

$$\tilde{E}_{ij,t+1} = \tilde{s}_{ij,t+1} E_{j,t+1} = g s_{ij,t} E_{j,t+1}. \tag{11}$$

The sum of country i's benchmark exports ($\tilde{E}_{ij,t+1}$) in each market needs to be consistent with its actual total exports, i.e.

$$\sum_j \tilde{E}_{ij,t+1} = E_{i,t+1}. \tag{12}$$

Substituting equation (11) into (12) gives

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[8] A similar "constant export market share" (CMS) condition has often been used to evaluate countries' export competitiveness (e.g. Richardson, 1971a, 1971b; Bowen and Pelzman, 1984; Chen *et al.*, 2000). A country that can keep its market share constant is deemed as being able to maintain its "competitiveness" in the market. Therefore, what we call "degree of dominance" or "market power" here can also be called "competitiveness".

$$g = \frac{E_{i,t+1}}{\sum\limits_{j} s_{ij,t} E_{j,t+1}}$$

which, substituted back to equation (10), gives

$$\tilde{s}_{ij,t+1} = \frac{s_{ij,t} E_{i,t+1}}{\sum\limits_{j} s_{ij,t} E_{j,t+1}} = \alpha s_{ij,t}, \tag{13}$$

where $\alpha = \dfrac{1 + g_i}{\sum\limits_{j} c_{ij,t}(1 + g_j)}$,

in which $g_i = (E_{i,t+1} - E_{i,t})/E_{i,t}$ represents the growth rate of country *i*'s total cultured shrimp exports between time *t* and *t*+1; $g_j = (E_{j,t+1} - E_{j,t})/E_{j,t}$ represents the growth rate of market *j*; and $c_{ij,t} = E_{ij,t}/E_{i,t}$ measures country's export specialization in market *j*.

Since $\tilde{s}_{ij,t+1}$ represents what country *i*'s share in market *j* would have been at time *t*+1 had its comparative advantage not changed between time *t* and *t*+1, the difference between this hypothetical $\tilde{s}_{ij,t+1}$ and country *i*'s actual market share at time *t* would provide a measure of its "size" market share variation (denoted as Δs_{ij}^{sc}), i.e.

$$\Delta s_{ij}^{sc} = \tilde{s}_{ij,t+1} - s_{ij,t} = (\alpha - 1)s_{ij,t}. \tag{14}$$

Structural (market share) variation
With size variation identified, structural variation (the other component of total market share variation) can be computed by subtracting size variation from total variation, i.e.

$$\Delta s_{ij}^{st} = \Delta s_{ij} - \Delta s_{ij}^{sc},$$

which, after substituted in equations (9) and (14), becomes

$$\Delta s_{ij}^{st} = s_{ij,t+1} - \tilde{s}_{ij,t+1} = s_{ij,t+1} - \alpha s_{ij,t}. \tag{15}$$

According to equation (15), structural variation is measured by the deviation of country *i*'s actual share in market *j* at time *t*+1 (i.e. $s_{ij,t+1}$) from what it would have been had country *i*'s comparative advantage not changed between time *t* and *t*+1 (i.e. $\tilde{s}_{ij,t+1}$).

3.2.5   Revealed comparative advantage variation
Although direct use of the variation of an *RCA* index to measure comparative advantage variation is often taken for granted in the *RCA* literature,[9] it is actually a questionable practice. In other words, it is usually not appropriate to directly use the variation of the $RCA_{ij,t}$ index to measure comparative advantage variation.

The reader is reminded that according to equation (8), country *i*'s revealed comparative advantage index for market *j* ($RCA_{ij,t}$) is the ratio between its share in market *j* and its world market share. When the size of each market is changed disproportionately between time *t* and *t*+1, it is generally not possible for a country to keep its $RCA_{ij,t}$ index constant in all the markets. In other words, the variation of a country's *RCA* indices may not necessarily reflect changes in its comparative advantage, but could also be caused by disproportionate changes in the sizes of markets. Therefore, we first need to derive what country *i*'s *RCA* index for market *j*

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[9]   For example Yeats (1992); Hiley (1999); Bojnec (2001); and Havrila and Gunawardana (2003).

would have been at time $t+1$ if it maintains its comparative advantage in the market at time t. Then we can use the deviation of its actual $RCA_{ij,t+1}$ from this benchmark RCA index to measure its comparative advantage variation between time t and $t+1$.

In the above discussion we have derived that country i's share in market j at time $t+1$ would have been $\tilde{s}_{ij,t+1}$ without comparative advantage variation between time t and $t+1$ – see equation (10). Therefore, without comparative advantage variation between time t and $t+1$, country i's RCA index for market j at time $t+1$ would be

$$R\tilde{C}A_{ij,t+1} = \frac{\tilde{s}_{ij,t+1}}{s_{i,t+1}},$$

which, according to equation (10), can be transformed into

$$R\tilde{C}A_{ij,t+1} = \beta RCA_{ij,t} \tag{16}$$

where $\beta = \dfrac{1+g}{1+\sum\limits_{j} c_{ij,t} g_j}$,

in which $g = (E_{t+1} - E_t)/E_t$ represents the growth rate of the world market between time t and $t+1$; and g_j as well as $c_{ij,t}$ have been defined in equation (13).[10]

Since country i's RCA index for market j at time $t+1$ would be $R\tilde{C}A_{ij,t+1}$ when there is no comparative advantage variation between time t and $t+1$, the deviation of its actual RCA index at time $t+1$ from this $R\tilde{C}A_{ij,t+1}$ would provide a measure of its revealed comparative advantage variation ($RCAV$) in market j between time t and $t+1$, i.e.

$$RCAV_{ij} = RCA_{ij,t+1} - R\tilde{C}A_{ij,t+1} = RCA_{ij,t+1} - \beta RCA_{ij,t}. \tag{17}$$

A positive $RCAV_{ij}$ index implies that country i has increased its comparative advantage in market j; the higher the index is, the greater the advantage gain would be. A negative $RCAV_{ij}$ index would have the exact opposite implication.

According to equations (16) and (17),

$$RCAV_{ij} = \frac{s_{ij,t+1} - \tilde{s}_{ij,t+1}}{s_{i,t+1}}. \tag{17'}$$

Therefore, the $RCAV_{ij}$ index actually reflects country i's structure market share variation in market j (measured by $s_{ij,t+1} - \tilde{s}_{ij,t+1}$) normalized by its world market share $s_{j,t+1}$. The normalization is to facilitate cross-country comparison of export structural changes. That a country has a higher $RCAV$ index in a market than another country implies that the former has had an export structure change more biased to the market than the latter.

3.2.6 Data
Twenty-eight shrimp farming countries in eight regions are included in the global comparative assessment of frozen cultured shrimp export performance (Tables 3

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[10] It is not difficult to verify that $\sum\limits_{j} c_{j,t} g_j = g$,

where $c_{j,t} = E_{j,t}/E_t$ represents the proportion of world cultured shrimp exports sold to market j. Thus, β would be unity when $c_{ij,t}$ is identical to $c_{j,t}$ for every market j, i.e. when country i's RCA index for every market j is equal to unity. According to equation (8), it is not difficult to see that $RCA_{ij,t} = c_{ij,t}/c_{j,t}$. Otherwise, β would generally be different from unity unless every market grows at the same rate (i.e. $g_j = g, \forall j$). Therefore, when the sizes of markets are changed disproportionately, direct use of the variation of RCA indices to measure comparative advantage variation would not be appropriate in general.

and 4).[11] The assessment is focused on Japan, the United States of America and the European Union as the three major international frozen shrimp export markets; other (regional) export markets are aggregated into "other markets".

The UN Comtrade database is our main data source (United Nations, 2008). We used the data on commodity "shrimps and prawns, frozen", code S3-03611 under the Standard International Trade Classification, Revision 3 (SITC, Rev. 3).[12] We used the frozen shrimp imports of Japan, the United States of America and European Union from the 28 shrimp farming countries to represent the latter's exports to the respective markets.[13] The import value includes transportation and insurance costs (i.e. CIF).[14]

The data are aggregated, including both cultured and captured shrimp exports; thus we had to estimate frozen cultured shrimp exports from the aggregated data. We first calculated a country's cultured/total shrimp *production* ratio,[15] and then applied it as a proxy of the country's cultured/total shrimp *export* ratio to estimate the country's cultured shrimp exports. For example, 75 percent of Thailand's total shrimp production in 2001 came from aquaculture while its total frozen shrimp export to the EU in that year was USD70 million. Thus, the country's estimated cultured shrimp exports to the EU in 2001 would be equal to USD52.5 million (i.e. USD70 million multiplied by 75 percent).[16]

The time period under assessment is from the early 1990s (represented by the 1990–92 average) to the early 2000s (represented by the 2000–02 average), which includes two sub-periods from the early 1990s to the mid-1990s (represented by the 1995–97 average) and from the mid-1990s to the early 2000s.[17]

3.3   RESULTS
The size of the world frozen cultured shrimp export market (in terms of value) almost doubled during the first half of the 1990s, remained stable in the second half, and declined in the early 2000s (Figure 2a). Southeast Asia has always been the number one exporter in the market, responsible for most of its ups and downs. South America was in the second place in the 1990s, yet it tended to yield the place to South Asia in the

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[11] Japan and the United States of America (with shares in world cultured shrimp production of 0.2 and 0.3 percent respectively in the early 2000s) are not considered since they are two of the three markets examined here. Taiwan, Province of China (with a 0.9 percent share of world cultured shrimp production in the early 2000s) is also excluded because data on its shrimp exports are not included in the United Nations Comtrade database.

[12] Here we only examine countries' performance in exporting "frozen" shrimp products, while some countries (e.g. Thailand, China and India) also have substantial exports of other types of shrimp products such as "prepared or preserved" or "fresh or chilled".

[13] The data for the EU are computed by summing the cultured shrimp imports of 15 EU countries including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom.

[14] We use export value instead of quantity because different shrimp products are more comparable in terms of value than in terms of quantity. The choice between value and quantity can affect assessment results when the prices of shrimp products from different countries are significantly different. For example, in terms of quantity China was the second largest cultured shrimp exporter to the United States market in the early 2000s, while in terms of value China's United States market share during that period was smaller than that of Ecuador, Viet Nam and some other countries.

[15] Shrimp production data were obtained from FAO's FishStat database (FAO, 2008). Cultured shrimp production includes all species in the group of "shrimps and prawns" (code 45) under the FAO's International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP).

[16] Since cultured shrimp is in general more likely to be exported than captured shrimp, using the cultured/captured shrimp production ratio as a proxy of their export ratio tends to underestimate the amount of cultured shrimp exports. Since the degree of such underestimation tends to be more severe for countries with relatively large captured shrimp production (e.g. China), these countries' comparative *static* performance tends to be underrated. However, the assessment results for their comparative *dynamic* performance would not be affected.

[17] We use average time periods to smooth the impacts of transitory shocks on countries' frozen shrimp exports.

early 2000s. In addition to South Asia, Central America is another region with steady growth in frozen cultured shrimp exports. East Asia (primarily China) was the third largest exporter in the early 1990s yet reduced its market share to nearly zero since 1993 until the recent recovery in the early 2000s.

3.3.1 The Japanese market

Japan was the largest frozen cultured shrimp export market in the early 1990s, accounting for 39 percent of world exports by quantity. However, the ratio declined to 34 percent by the mid-1990s and to 25 percent by the early 2000s primarily because of shrinking demand for shrimp by Japanese consumers in the context of a stagnated domestic economy. In terms of value, frozen cultured shrimp exports also experienced significant growth in the first half of the 1990s and an equally significant decline in the second half (Figure 2b).

Southeast Asia has always been the dominant exporter to the market, followed by South Asia. South America increased its presence in the market during the second half of the 1990s, but the market was already entering its declining phase. Despite the shrinking size of the market, East Asia (especially China) increased its exports in the early 2000s.

Thailand and Indonesia

In the early 1990s, Thailand and Indonesia were the two largest exporters to the Japan market, meaning that they had a strong revealed comparative advantage (Figure 3a). Their Japan RCA indices were 1.3 and 1.9 respectively (Table 5), which implies that their Japan market shares were respectively 1.3 and 1.9 times greater than their world market shares.
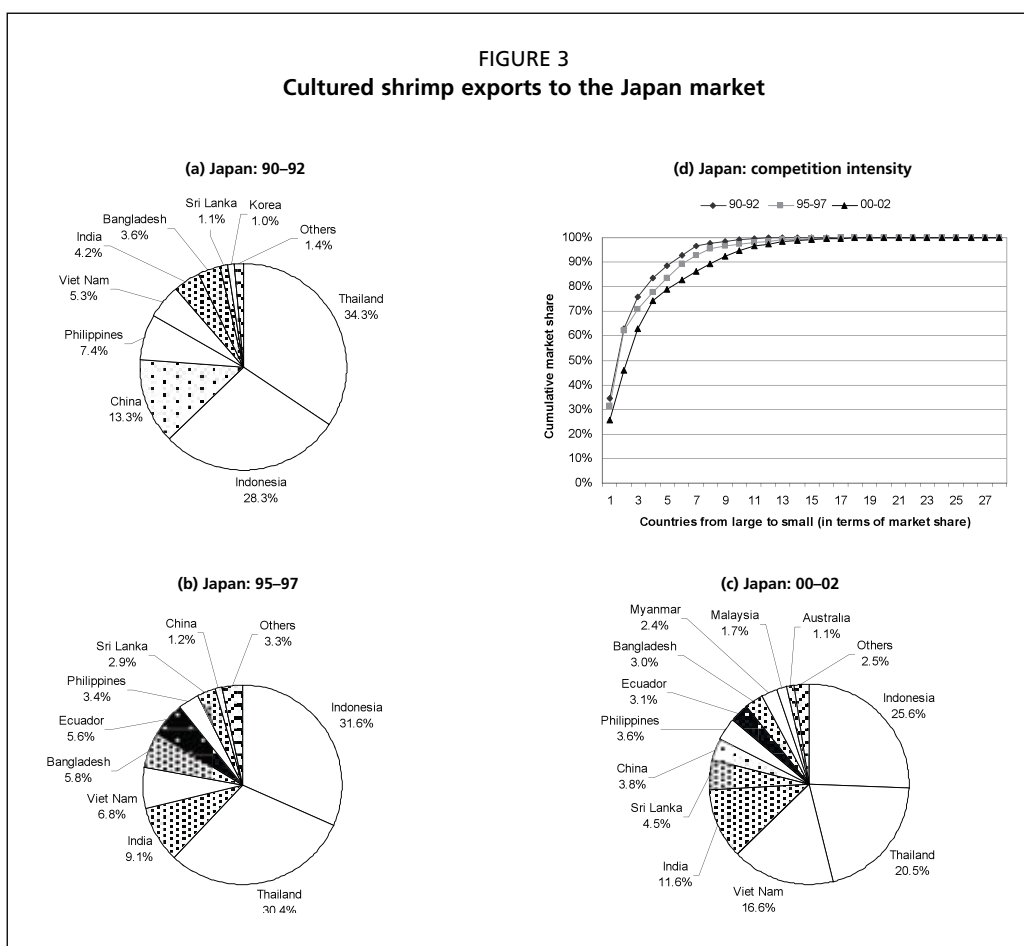

FIGURE 3
Cultured shrimp exports to the Japan market

TABLE 4
Cultured shrimp exports to the world market (million USD)

Region	Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	World market share (1990)	World market share (2002)
Africa	Madagascar	0.2	0.5	0.5	0.2	0.7	0.8	0.8	3.3	1.8	2.4	3.8	7.8	6.1	0.0%	0.2%
	Belize	0.3	1.1	3.9	4.5	4.6	6.1	4.8	7.9	10.4	22.3	25.3	20.9	17.4	0.0%	0.6%
	Costa Rica	0.3	1.7	1.7	1.7	3.2	10.0	9.6	9.4	8.1	10.1	7.3	8.8	11.6	0.0%	0.4%
Central America	Guatemala	4.3	4.6	6.2	18.6	25.1	15.0	16.5	17.9	8.8	10.1	13.6	22.4	28.4	0.2%	1.0%
	Honduras	20.9	30.0	40.4	54.3	46.4	39.6	46.1	46.3	41.8	40.1	64.5	61.2	58.6	1.2%	2.1%
	Mexico	4.3	5.7	3.6	8.5	15.0	25.4	26.2	37.1	70.1	48.9	61.9	102.1	69.4	0.2%	2.5%
	Nicaragua	5.1	5.3	3.5	8.9	21.9	40.4	37.7	41.6	54.6	49.1	57.7	46.3	38.8	0.3%	1.4%
	Central America	**35**	**49**	**59**	**96**	**116**	**136**	**141**	**160**	**194**	**181**	**230**	**262**	**224**	**2.0%**	**8.0%**
	Brazil	2.1	3.1	3.7	4.0	4.2	2.3	3.5	2.3	4.9	14.7	45.6	90.7	136.1	0.1%	4.8%
	Colombia	33.7	29.7	39.0	37.9	52.6	55.9	38.5	41.8	47.6	50.5	59.0	55.7	47.3	1.9%	1.7%
	Ecuador	376.2	511.8	540.8	480.6	628.4	739.9	693.5	911.2	923.0	714.8	338.8	333.7	288.3	21.0%	10.2%
South America	Panama	3.0	1.9	2.0	7.6	17.9	38.8	30.2	48.1	59.4	33.2	33.1	34.5	30.4	0.2%	1.1%
	Peru	7.8	7.0	10.5	9.4	11.1	13.2	11.1	22.4	27.8	4.4	0.6	1.6	5.7	0.4%	0.2%
	Venezuela (Bolivarian Republic of)	1.2	2.6	5.1	3.7	7.4	11.6	19.9	31.3	29.7	68.6	82.0	51.1	49.5	0.1%	1.8%
	South America	**424**	**556**	**601**	**543**	**722**	**862**	**797**	**1 057**	**1 092**	**886**	**559**	**567**	**557**	**23.6%**	**19.8%**
East Asia	China	269.4	236.3	267.0	91.7	39.2	32.3	22.1	28.8	31.4	33.4	80.5	109.9	130.0	15.0%	4.6%
	Republic of Korea	10.7	8.2	8.1	6.5	3.8	5.7	3.0	1.3	1.2	1.3	0.7	3.9	2.5	0.6%	0.1%
	East Asia	**280**	**245**	**275**	**98**	**43**	**38**	**25**	**30**	**33**	**35**	**81**	**114**	**132**	**15.6%**	**4.7%**
Middle East	Iran (Islamic Republic of)	0.0	0.0	0.0	0.0	0.1	0.2	0.3	1.0	2.2	6.2	12.6	14.2	16.3	0.0%	0.6%
	Saudi Arabia	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.7	2.3	1.4	3.6	3.4	0.0%	0.1%
	Middle East	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**3**	**8**	**14**	**18**	**20**	**0.0%**	**0.7%**

TABLE 4 (Continued)
Cultured shrimp exports to the world market (million USD)

Region	Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	World market share (1990)	World market share (2002)
South Asia	Bangladesh	170.1	145.9	164.8	205.7	266.0	269.4	307.9	284.6	241.8	293.8	363.5	272.8	279.0	9.5%	9.9%
	India	54.6	59.6	64.5	88.2	145.3	144.1	144.4	156.3	158.3	145.0	217.7	202.8	206.1	3.0%	7.3%
	Sri Lanka	12.3	10.1	11.7	15.2	30.3	38.0	41.1	33.7	74.0	33.1	73.8	49.5	30.2	0.7%	1.1%
	South Asia	**237**	**216**	**241**	**309**	**442**	**452**	**493**	**475**	**474**	**472**	**655**	**525**	**515**	**13.2%**	**18.3%**
Southeast Asia	Indonesia	269.7	344.1	333.3	383.8	414.7	444.5	426.9	436.7	339.3	321.6	355.9	327.5	281.9	15.0%	10.0%
	Malaysia	0.1	0.4	0.3	8.5	3.7	17.0	20.9	22.3	21.4	29.1	45.5	49.2	38.2	0.0%	1.4%
	Myanmar	2.2	2.5	6.3	10.8	17.6	22.3	25.5	29.1	33.5	30.5	50.8	55.4	55.7	0.1%	2.0%
	Philippines	72.5	98.9	67.5	55.6	71.8	60.4	51.8	33.0	24.3	40.3	28.9	29.4	56.0	4.0%	2.0%
	Thailand	403.1	586.5	736.7	972.5	1 322.7	1 321.9	997.8	871.0	1 012.9	1 008.7	1 217.2	994.6	579.1	22.5%	20.6%
	Viet Nam	67.4	55.8	85.5	96.0	117.4	114.8	106.9	124.9	154.6	165.9	283.4	308.4	336.1	3.8%	11.9%
	Southeast Asia	**815**	**1 088**	**1 230**	**1 527**	**1 948**	**1 981**	**1 630**	**1 517**	**1 586**	**1 596**	**1 982**	**1 765**	**1 347**	**45.4%**	**47.8%**
Oceania	Australia	3.5	4.3	4.1	5.8	8.9	9.4	8.0	7.2	5.8	11.1	15.2	14.2	12.5	0.2%	0.4%
	New Caledonia	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.9	2.4	2.0	2.3	2.8	0.0%	0.1%
	Oceania	**3**	**4**	**4**	**6**	**9**	**10**	**8**	**8**	**7**	**14**	**17**	**17**	**15**	**0.2%**	**0.5%**
World		1 795	2 158	2 411	2 580	3 280	3 480	3 096	3 251	3 390	3 194	3 543	3 275	2 817	100%	100%

Source: United Nations (2008)