

Seasonal Variation in Prices of Indian Frozen Shrimp in Japanese Market

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The movement of prices of any commodity is controlled by a number of market forces. The supply and demand of marine products in the international markets are also influenced by fish landings in the supplying countries and level of inventory, changing consumer behaviour, etc., in the importing countries. They are, however, found to follow a regular seasonal pattern. The prices of these products reflect the seasonal behaviour. The present study based on price movements of different size grades of HL White, HL Flower and Black Tiger has been carried out to understand how the seasonal variation is reflected in the prices of Indian frozen shrimp in the Japanese market. Apart from understanding the pattern of seasonal variation, the study has revealed that a steady Japanese market for Indian frozen shrimp depended mainly on enhanced economic activity due to consistency of yen, declining inventory of fish products, poor fish landings in the supplying countries and conventional festival seasons.

Key words : Price analysis, seasonal variation, frozen shrimp

The word 'season' indicates 'abundance' or availability in plenty of a particular commodity in a period of time. Any agricultural commodity has high or low production levels depending upon many biological and environmental factors. Fish also are no exception and have their own heavy and poor landings. Price levels are observed to be low when the fish landings are high. Food habits and man made conventions like festivals are found to greatly influence the consumption rate of fish, meat, etc. The supply and consumption of fish thus follows a regular seasonal pattern.

Japan continues to be the major market for Indian marine products. In quantity and value terms, the exports from India to Japan stood at 71060 t and Rs. 2625 crores, respectively, accounting for 16.88 and 41.03% of the total marine exports. Frozen shrimp is the major item of export accounting for 50005 t (11.88%) in terms of quantity and Rs. 2351.80 crores (89.60%) in terms of value of the total seafood exports to Japan.

India regained the first position among other competing countries in the export of shrimp into Japan in 1997 after a gap of eleven years. India continues to be the topmost exporter of frozen shrimp to that country in terms of quantity (Anon, 1999). However, in terms of value we stand behind Indonesia. The unit value of shrimp from India is US\$ 10.89.kg⁻¹ and from Indonesia US\$ 12.79.kg⁻¹.

Materials and Methods

Three major varieties of frozen shrimp, HL White, HL Flower and Black Tiger exported from Visakhapatnam base, for which continuous data was available, were selected for the study. The seasonal variation was studied by calculating the monthly indices for selected grades – 11/15, 16/20, 21/25, 26/30 and 31/35 for HL White and HL Flower and the grades 11/15, 16/20, 21/25, 26/30 and 31/40 for Black Tiger. Weekly price data on the varieties and grades were collected for the period 1997 - 2001 from published data of MPEDA and pooled to get monthly data. Seasonal indices were calculated using standard procedure (Rao & Nair, 1972; Waugh & Norton, 1969).

Results and Discussion

Movement of average monthly prices

The average monthly prices for the selected varieties and grades are presented in Tables 1, 2 and 3.

Table 1. Average monthly prices of Indian frozen shrimp (HL White) in Japan (US\$. kg⁻¹)

Grade	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
11/15	18.55 (±1.60)	18.23 (±1.21)	18.79 (±1.12)	18.11 (±0.87)	17.83 (±1.13)	17.55 (±0.97)	17.68 (±1.43)	17.22 (±2.13)	18.01 (±1.58)	18.62 (±1.88)	17.82 (±1.82)	18.35 (±2.18)
16/20	15.48 (±1.28)	16.00 (±1.57)	16.30 (±1.26)	15.88 (±1.60)	15.85 (±1.09)	15.57 (±1.35)	15.54 (±1.81)	14.64 (±2.70)	15.84 (±2.01)	16.26 (±2.52)	15.57 (±2.56)	15.81 (±2.15)
21/25	13.20 (±0.92)	13.45 (±1.38)	13.79 (±1.21)	13.38 (±1.46)	13.38 (±1.28)	12.90 (±1.31)	12.89 (±2.00)	12.22 (±2.57)	13.21 (±2.11)	13.77 (±2.28)	12.84 (±2.52)	13.14 (±1.79)
26/30	11.65 (±1.02)	11.65 (±1.60)	11.65 (±1.18)	11.57 (±1.60)	11.40 (±1.08)	11.36 (±1.21)	11.33 (±1.91)	10.53 (±2.51)	11.54 (±1.94)	11.77 (±2.49)	10.84 (±2.25)	11.32 (±1.97)
31/35	9.66 (±1.13)	9.72 (±1.40)	9.87 (±1.26)	9.93 (±1.55)	9.63 (±1.07)	9.62 (±1.13)	9.67 (±1.67)	9.18 (±2.04)	9.77 (±1.69)	10.02 (±2.09)	9.41 (±2.17)	9.34 (±1.90)

Figures in parenthesis represent standard deviation

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Table 2. Average monthly prices of Indian frozen shrimp (HL Flower) in Japan (US\$. kg⁻¹)

Grade	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
11/15	15.94 (±1.47)	15.33 (±1.47)	16.12 (±1.47)	15.89 (±1.23)	16.82 (±2.13)	15.25 (±1.12)	14.80 (±1.60)	15.10 (±1.09)	15.77 (±1.72)	14.93 (±1.66)	15.80 (±1.95)	15.81 (±2.68)
16/20	13.80 (±1.17)	14.12 (±1.53)	14.42 (±1.24)	13.37 (±0.56)	13.88 (±1.61)	13.07 (±1.74)	12.87 (±1.66)	13.15 (±1.29)	14.20 (±2.15)	13.02 (±2.24)	13.36 (±2.61)	13.46 (±2.70)
21/25	11.36 (±1.18)	12.14 (±2.02)	11.68 (±1.19)	11.25 (±1.01)	11.59 (±1.96)	11.11 (±1.64)	10.84 (±1.79)	11.03 (±1.38)	11.78 (±2.60)	10.66 (±2.14)	11.00 (±2.98)	11.01 (±2.62)
26/30	9.75 (±1.44)	10.23 (±1.75)	9.89 (±1.13)	9.81 (±0.82)	9.74 (±2.09)	9.76 (±1.58)	9.22 (±1.50)	9.63 (±1.47)	10.08 (±1.96)	9.36 (±1.81)	9.65 (±2.18)	9.40 (±2.60)
31/35	7.45 (±1.61)	7.90 (±1.29)	7.85 (±1.43)	7.74 (±0.82)	8.46 (±1.81)	8.21 (±1.33)	7.80 (±1.27)	8.20 (±1.27)	8.18 (±1.54)	7.85 (±1.83)	7.67 (±2.16)	7.53 (±2.13)

Figures in parenthesis represent standard deviation

The mean prices for the variety HL White ranged from 17.22 US\$.kg⁻¹ to 18.79 US\$.kg⁻¹ for 11/15 grade (Table 1). The range for 16/20 was 14.64 to 16.30, for grade 21/25 12.22 to 13.79, 10.53 to 11.77 for grade 26/30 and 9.18 to 10.02 for the grade 31/35.

The average prices for the variety HL Flower for the grade 11/15 ranged between 14.80 to 16.82 US\$.kg⁻¹ (Table 2). The range in average prices was 12.87 to 14.42 for the grade 16/20, 10.66 to 12.14 for the grade 21/25, 9.22 to 10.23 for the grade 26/30 and 7.45 to 8.46 for the grade 31/35.

The range in average prices for Black Tiger was 17.33 to 19.38 US\$.kg⁻¹ for the grade 11/15 (Table 3), 14.66 to 16.60 for the grade 16/20, 12.37 to 14.16 for the grade 21/25, 10.53 to 12.57 for the grade 26/30 and 8.79 to 10.08 for the grade 31/40.

Table 3. Average monthly prices of Indian frozen shrimp (Black Tiger) in Japan (US\$. kg⁻¹)

Grade	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
11/15	19.38 (±2.17)	19.25 (±2.20)	19.33 (±1.86)	18.93 (±1.76)	19.14 (±2.16)	17.77 (±2.01)	17.68 (±1.98)	17.33 (±2.27)	19.11 (±2.36)	18.51 (±2.92)	18.21 (±3.30)	18.57 (±2.52)
16/20	16.60 (±1.19)	16.60 (±1.75)	16.45 (±1.66)	15.86 (±2.52)	16.24 (±2.03)	14.98 (±1.58)	14.66 (±2.33)	14.63 (±2.50)	16.24 (±2.29)	14.81 (±3.38)	14.91 (±3.30)	15.29 (±2.15)
21/25	14.16 (±1.64)	14.09 (±2.42)	13.94 (±2.29)	13.49 (±2.59)	13.87 (±2.44)	12.73 (±2.11)	12.63 (±2.55)	12.37 (±2.20)	13.75 (±2.49)	12.63 (±3.37)	12.58 (±3.24)	13.13 (±2.07)
26/30	12.57 (±1.76)	12.60 (±2.50)	12.36 (±2.14)	12.07 (±2.52)	12.15 (±2.16)	11.09 (±2.11)	11.01 (±2.32)	10.53 (±1.94)	11.98 (±2.42)	11.15 (±3.37)	10.95 (±3.12)	11.56 (±1.94)
31/40	9.98 (±1.25)	9.88 (±1.35)	9.64 (±1.29)	9.84 (±1.60)	9.94 (±1.71)	8.94 (±1.28)	9.16 (±1.50)	9.01 (±1.54)	10.08 (±1.76)	9.13 (±2.77)	8.79 (±2.47)	9.05 (±1.28)

Figures in parenthesis represent standard deviation

Seasonal variation in monthly prices

The seasonal indices for the variety HL White is presented in Table 4. It can be observed that the indices are high during the first part of the year and falls towards the later part for most grades. The seasonal index was maximum for most grades during the period January - March and minimum for all grades in August.

Table 4. Seasonal variation in prices of Indian frozen shrimp (HL White) in Japan

Grade	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
11/15	1.03	1.01	1.04	1.00	0.99	0.97	0.98	0.95	1.00	1.03	0.99	1.02
16/20	0.98	1.02	1.04	1.01	1.01	0.99	0.99	0.93	1.01	1.03	0.99	1.01
21/25	1.00	1.02	1.05	1.02	1.02	0.98	0.98	0.93	1.00	1.04	0.97	1.00
26/30	1.02	1.02	1.02	1.02	1.00	1.00	1.00	0.92	1.01	1.03	0.95	0.99
31/35	1.00	1.01	1.02	1.03	0.99	0.99	1.00	0.95	1.01	1.04	0.98	0.97

The percentage variation between the maximum and minimum indices varied between 9 to 13 %, for different grades.

The seasonal indices for the variety HL Flower is presented in Table 5. The seasonal indices for HL Flower were maximum during January-March for the grades 16/20, 21/25 and 26/30 and in May for the grades 11/15 and 31/35. The minimum indices were observed during the latter part of the year, July for the grades 11/15, 16/20 and 26/30 and October for 21/25. Only for the grade 31/35 was the index minimum in January.

Table 5. Seasonal variation in prices of Indian frozen shrimp (HL Flower) in Japan

Grade	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
11/15	1.02	0.98	1.03	1.02	1.08	0.98	0.95	0.97	1.01	0.96	1.01	1.01
16/20	1.02	1.04	1.06	0.99	1.02	0.96	0.95	0.97	1.05	0.96	0.99	0.99
21/25	1.01	1.08	1.04	1.00	1.03	0.98	0.96	0.98	1.04	0.94	0.97	0.98
26/30	1.00	1.05	1.02	1.01	1.00	1.01	0.95	0.99	1.04	0.96	0.99	0.97
31/35	0.94	1.00	0.99	0.98	1.07	1.04	0.99	1.04	1.03	0.99	0.97	0.95

The variation in indices ranged from 11 to 15% for various grades. The seasonal indices for the variety Black Tiger is presented in Table 6. The seasonal indices were high for the first five months of the year and then tended to fall for most grades. The maximum seasonal index was observed in January. The percentage variation between the maximum and minimum

indices ranged from 12 to 20%. The indices in general tended to rise in September for all varieties and grades, which again declined thereafter. The standard deviations for most grades tended to increase towards the later part of the year. The reason behind this feature is fluctuations in prices during the latter part of the year.

Table 6. Seasonal variation in prices of Indian frozen shrimp (Black Tiger) in Japan

Grade	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
11/15	1.04	1.03	1.04	1.02	1.03	0.96	0.95	0.93	1.03	1.00	0.98	1.00
16/20	1.06	1.06	1.05	1.02	1.04	0.96	0.94	0.94	1.04	0.95	0.96	0.98
21/25	1.07	1.06	1.05	1.02	1.04	0.96	0.95	0.93	1.04	0.95	0.95	0.99
26/30	1.08	1.08	1.06	1.03	1.04	0.95	0.94	0.90	1.03	0.96	0.94	0.99
31/40	1.06	1.04	1.02	1.04	1.05	0.95	0.97	0.95	1.07	0.97	0.93	0.96

The higher indices reported during the first part of the year is the result of good demand due to the new year, spring and school vacation seasons. The rain during June records a shift in the consumption pattern with dull demand for this product. Low seasonal indices were observed during this period. The demand once again picks up during late August and September.

The price levels also depended upon the landings in supplying countries. Inventory levels in five major cities in Japan, Tokyo, Osaka, Yokohama, Kobe and Nagoya also affected the prices of the product. The fluctuations of the yen also had an impact on the price of imports.

Monthly price variation in the year 2001

In the trade circles there was an apprehension that the September 11 tragedy in the US and the consequent repercussions had adverse effect on the Japanese market as well. A comparison of the seasonal trend and the average monthly price levels during the year 2001 shows that there was a marked decline in the price level from September onwards, but the trend had already started from the beginning of the year itself and decelerated post September.

The monthly prices for the year 2001 for HL White are presented in Table 7. It can be observed that average prices for most grades were maximum in January and subsequently declined. The percentage fall from the previous years ranged from 6.1% in February to 10.05% in September

Table 7. Monthly prices of Indian frozen shrimp (HL White) in Japan for the year 2001 (US\$. kg⁻¹)

Grade		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
11/15	Mean	21.18	17.15	19.71	18.60	16.75	17.50	16.88	16.40	16.20	16.30	16.10	16.17
	SD	0.65	4.74	0.55	0.42	2.52	0.00	1.03	0.65	0.92	0.53	0.86	0.42
	CV	3.07	27.62	2.78	2.27	15.05	0.00	6.11	3.95	5.66	3.25	5.36	2.58
16/20	Mean	17.20	14.20	16.07	14.60	14.77	13.70	13.15	12.66	12.63	12.20	11.84	13.05
	SD	0.00	3.39	0.69	0.35	0.26	0.00	0.30	0.14	0.38	1.73	2.22	1.98
	CV	0.00	23.90	4.32	2.42	1.78	0.00	2.28	1.09	3.00	14.22	18.73	15.19
21/25	Mean	14.06	11.95	12.64	11.18	11.39	10.75	10.15	9.85	9.70	10.00	8.72	10.63
	SD	0.18	2.19	0.73	0.22	0.34	0.06	0.30	0.26	0.30	1.73	1.45	3.04
	CV	1.24	18.34	5.77	1.95	2.98	0.54	2.96	2.69	3.09	17.32	16.61	28.62
26/30	Mean	12.15	10.50	10.99	10.00	10.39	9.75	9.15	8.45	8.53	7.77	7.38	8.88
	SD	0.10	1.41	0.37	0.47	0.41	0.06	0.30	0.33	0.33	0.59	0.52	1.60
	CV	0.82	13.47	3.38	4.71	3.94	0.59	3.28	3.92	3.90	7.54	7.07	17.99
31/35	Mean	10.30	9.15	9.79	9.10	8.92	8.35	7.63	7.23	7.03	6.80	6.38	7.30
	SD	0.00	1.20	0.47	0.92	0.30	0.40	0.25	0.55	0.80	0.62	0.52	0.85
	CV	0.00	13.14	4.80	10.16	3.38	4.84	3.28	7.59	11.34	9.18	8.17	11.68

to 12.00% in December for 11/15. The percentage reduction in the case of the grade 16/20 was 11.2% in February, 14.52% in August, 20.07% in September and 17.5% in December. The percentage reduction in 21/25 was 11.2% in February, 19.4% in August, 26.6% in September and 19.1% in

Table 8. Monthly prices of Indian frozen shrimp (HL Flower) in Japan for the year 2001 (US\$. kg⁻¹)

Grade		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
11/15	Mean	16.63	14.50	16.09	15.90	16.52	14.00	13.88	13.65	13.60	12.23	13.20	13.25
	SD	0.25	-	0.56	0.48	1.41	0.00	0.25	0.21	0.17	1.94	0.00	0.21
	CV	1.50	-	3.49	2.99	8.54	0.00	1.80	1.55	1.27	15.86	0.00	1.57
16/20	Mean	15.13	16.50	14.29	13.35	12.58	10.28	11.25	11.05	10.78	9.50	9.50	9.53
	SD	0.25	-	1.32	0.17	0.99	0.32	0.29	0.07	0.52	1.50	0.00	0.25
	CV	1.65	-	9.21	1.30	7.90	3.15	2.57	0.64	4.81	15.79	0.00	2.62
21/25	Mean	11.63	15.00	11.69	10.13	9.54	8.25	8.40	8.65	8.20	7.50	7.00	7.18
	SD	0.25	-	1.87	0.29	0.55	0.29	0.12	0.21	0.81	0.87	0.00	0.28
	CV	2.15	-	15.96	2.84	5.77	3.50	1.37	2.45	9.91	11.55	0.00	3.84
26/30	Mean	9.00	11.50	9.91	9.15	8.34	7.03	7.23	7.40	7.20	6.67	6.50	6.30
	SD	0.00	-	0.95	0.80	0.76	0.54	0.21	0.57	0.81	0.76	0.00	0.28
	CV	0.00	-	9.55	8.77	9.12	7.72	2.85	7.64	11.28	11.46	0.00	4.49
31/35	Mean	6.50	9.00	8.17	7.05	6.94	5.92	6.13	6.00	5.88	5.50	5.00	5.13
	SD	0.00	-	0.75	0.17	0.13	0.09	0.48	0.71	0.63	0.50	0.00	0.32
	CV	0.00	-	9.13	2.46	1.93	1.56	7.82	11.79	10.71	9.09	0.00	6.26

December. For the grade 26/30 the percentage reduction was 9.9% in February, 19.75% in August, 24.1% in September and 21.6% in December. In the case of 31/35, 5.9% reduction in average monthly prices was observed in February, 21.3% in August, 28.1% in September and 21.9% in December.

In the case of HL Flower, it was observed that the average prices were maximum during January- February and minimum during October-December (Table 8). The decrease ranged from 2% in April to 10% in August, 14% in September and 17% in December for the grade 11/15. For the grade 16/20 the decrease was 1% in April, 16% in August, 25% in September and 30% in December. The decrease was 10% in April, 22% in August, 30% in September and 35% in December for grade 21/25, 7% in April, 24% in August, 29% in September and 33% in December for grade 26/30 and 9% in April, 27% in August, 29% in September and 32% in December.

In Black Tiger the average prices were high in January and low in October-November (Table 9). The percentage decrease for the grade 11/15 was 4.7% in May, 6.7% in August, 10.88% in September and 15.08% in December. For grade 16/20 the percentage decrease was 11.6% in February, 26.06% in August, 22.03% In September, 23.09% in December. For the grade 21/25 the percentage decrease was 14.5% in February, 26.2% in August, 30.0% in September and 25.5% in December. The decrease was 14.5% in

Table 9. Monthly prices of Indian frozen shrimp (Black Tiger) in Japan for the year 2001 (US\$. kg⁻¹)

Grade		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
11/15	Mean	21.90	18.73	20.04	18.75	18.24	17.70	16.40	16.17	17.03	15.55	14.28	15.77
	SD	0.46	4.19	0.78	0.35	0.62	0.28	0.14	0.32	0.84	0.35	0.45	0.08
	CV	2.09	22.36	3.89	1.89	3.42	1.60	0.86	1.99	4.92	2.27	3.14	0.48
16/20	Mean	16.80	14.68	14.77	12.80	13.19	13.60	11.14	11.11	12.63	9.40	9.80	11.76
	SD	0.00	1.96	0.69	0.93	0.32	2.40	0.35	0.33	2.49	0.10	0.56	0.41
	CV	0.00	13.33	4.68	7.28	2.46	17.65	3.14	2.99	19.71	1.06	5.73	3.48
21/25	Mean	13.91	12.05	11.77	10.81	10.30	10.74	9.15	9.13	9.63	7.47	7.65	9.79
	SD	0.06	1.33	0.68	0.26	0.30	0.96	0.37	0.32	0.78	0.06	0.20	0.38
	CV	0.45	11.06	5.76	2.40	2.91	8.94	4.04	3.51	8.06	0.77	2.61	3.92
26/30	Mean	12.44	10.78	10.57	10.21	9.52	9.49	8.15	8.15	8.23	6.43	6.75	8.94
	SD	0.13	1.23	0.65	0.69	0.52	0.48	0.37	0.30	0.21	0.06	0.22	0.21
	CV	1.01	11.40	6.13	6.79	5.43	5.06	4.54	3.68	2.53	0.90	3.23	2.30
31/40	Mean	10.51	9.30	8.82	8.84	8.34	8.08	7.13	7.28	7.27	5.40	5.75	7.28
	SD	0.03	0.82	0.52	0.88	0.50	0.11	0.33	0.49	0.23	0.10	0.22	1.22
	CV	0.24	8.80	5.91	9.99	5.97	1.31	4.64	6.68	3.18	1.85	3.79	16.74

February, 22.6% in August, 31.3% in September and 22.7% in December for the grade 26/30 and 5.9% in February, 21.2% in August, 27.8% in September and 19.6% in December for the grade 31/40.

The trend in decline in average prices had begun from the beginning of the year itself in all the varieties and grades studied. The reason was the general recession in Japan that has affected the consumer behaviour. The Japanese people are shifting to meat products due to decline in their purchasing power. There was also oversupply from countries like Indonesia during the first part of the year that led to a fall in prices. The strong yen post-September also resulted in increased supply of the products to Japan causing fall in prices. Lower prices were also offered by supplying countries like Indonesia, Vietnam and Bangladesh.

The prices of Indian frozen shrimp in Japan did follow a seasonal pattern. The domestic demand, fluctuations in yen, inventory levels of major cities in Japan, festive seasons, landings and supply from other supplying countries, etc., affected the price levels. The seasonal demand for the product must be taken into account while developing marketing strategies so as to realize better prices. There is also a need to maintain stringent quality standards to compete with other supplying countries and for being able to sell our product at a premium.

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