

Effect of Changes in Fresh Vegetables Prices Give Consumers

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Abstract. On October 6, 2015, TPP (Trans-Pacific Strategic Economic Partnership Agreement) has reached a basic agreement. TPP benefit in the industrial sector of Japan. However Japanese are wary about agriculture sector. As mountains account for 80 % of country, it cannot be efficient agriculture on a large scale in Japan. It is disadvantageous in the price side too. Furthermore, it becomes the problem that the area under tillage decreases by the aging of the scholar of agriculture. Among in this environment, the freshness vegetables are indispensable to a domestic dining table every day. Therefore, it is necessary that the freshness vegetables are supplied qualitative, price mark and quantitatively. It is the purpose that changes in the price of fresh vegetables is to analyze whether give how to affect the purchasing behavior of consumers.

As the analysis, changes in price and quantity were classified into three features.

Feature 1 is “two peaks of quantity”. Feature 2 is “The difference in the Hall vegetables and cut vegetables”. Feature 3 is “The difference in the way of price declines”.

From the analysis, the authors clarified what kind of influence the change of the price of freshness vegetables had on the purchasing action of consumers. In addition, it was found that there is a difference market transaction price and store price.

Keywords: Comparative analysis · TPP · Time-series data

1 Introduction

1.1 About TPP

On October 6, 2015, TPP (Trans-Pacific Strategic Economic Partnership Agreement) has reached a basic agreement. TPP is diversified economic partnership agreement with the aim of liberalization of the economy by the countries of the Trans-Pacific. TPP was started in among Singapore, Brunei, Chile, and New Zealand on June 3, 2005. After

that, due to an increase in participating countries, it has joined 12 countries. In addition to this, it is said that Korea and China and Thailand and Taiwan show interest (Fig. 1).

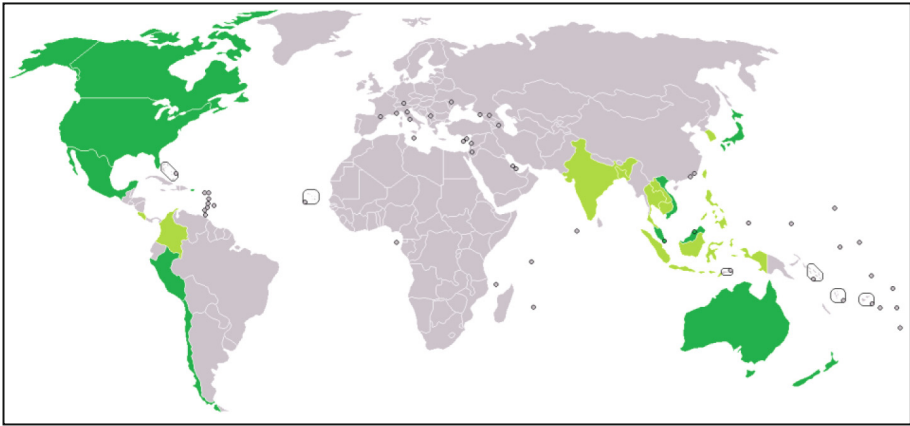


Fig. 1. Negotiations participating countries and Expressed an interest in the past the country (Color figure online)

1.2 Trends in Japan’s Agriculture

Approximately 80 % of Japan are mountainous districts. This is attributed that Japan belongs to the Ring of Fire. Therefore, it is difficult for farmer to secure large-scale farmland. Table 1 shows area per farmer review. Farmland area of Japan is about one two-thousandth as small as that of Australia which is a big exporter of farm produce. Being narrow farmland area per one farmhouse is reduced farm production efficiency. Therefore, farm production price of Japan is higher than Australia’s it.

Table 1. Area per famer review

	Farmland area per one farmhouse	Comparison with Japan
Japan (2006)	1.8ha	-
U.S. (2005)	180.2ha	99times
EU (2005)	16.9ha	9times
Australia (2004)	3,423.8ha	1,902times

In addition, it is for farmers of Japan to be aging and decrease. Figure 2 shows the configuration of the age agriculture employment population. Percentage in this figure shows composition ratio each year and Ave. in figure shows average of age of famers each year. It shows that agriculture employment population in 2015 is less than half compared to that in 1995 and Average age goes on increasing year after year. In particular, the proportion of the agriculture employment population of over 65 years old in 2015 is 63.5 %, and average age in 2015 is 66.3 years old; it is very high.

As a background, there is two reasons that it is policy of the Japanese government and low wages of farmer. About first reason, it has been promoted the policy of reducing

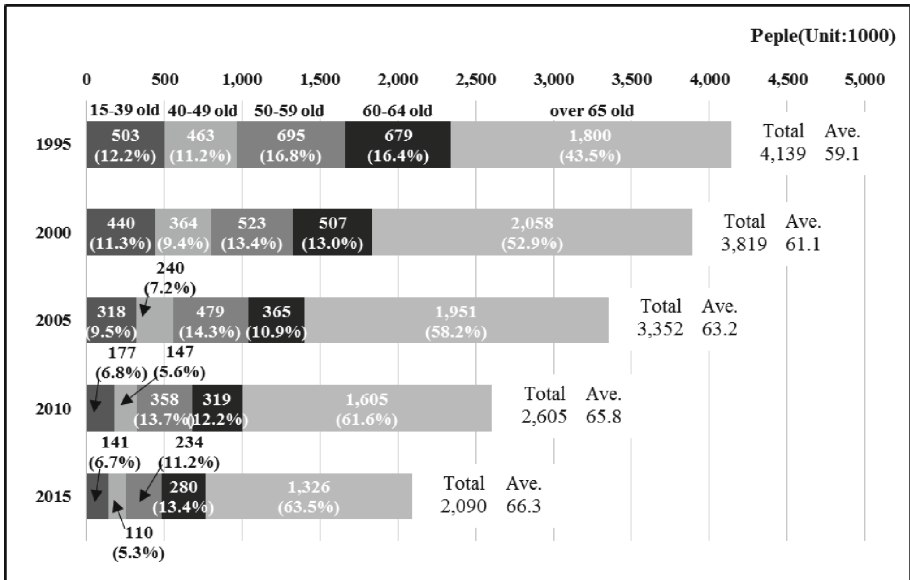


Fig. 2. The configuration of the age agriculture employment population

crop acreage by Japanese government. Japanese major production of agriculture is rice. However, Japanese no longer eats rice by westernizing of eating habits compared to before. For this reason, Japanese government has kept product prices by promoted the policy of reducing crop acreage. For this reason, Japanese government has kept product prices by promoted the policy of reducing crop acreage. At the same time, Japanese government has protected farmers by imposing duties from foreign countries. About second reason, as mentioned previously, there is inefficient farm production. Also, it is thought that the primary industries such as the agriculture and forestry marine products industry continue declining in the country which is high in wages like Japan widely. Furthermore, it is one of the reasons that there is a uniquely Japanese distribution system of production of agriculture. That system is commonly to be through JA (Japan Agricultural Cooperatives). At first, JA was made in order to protect farmers. Its purpose of JA was to stabilize shipping prices by shipping together the products. However, in the case of system of JA had to ship all products of making. Therefore, even if farmers thought to want to sell by myself a part of products of making, they weren't able to do it. This means that farmers can't decide product prices himself. Accordingly, in recent years, it has become the problem regarding system of JA.

1.3 Trends of Vegetable's Price in Japan

Vegetable's price in Japan is varies greatly. As a background, there is for seasons in Japan. There are the four seasons, and the severe change of the climate is not stable in its production of vegetables. Therefore, vegetable's price is not stable too. Figure 3 shows market transaction price of vegetables in Tokyo. The vertical line in Fig. 3

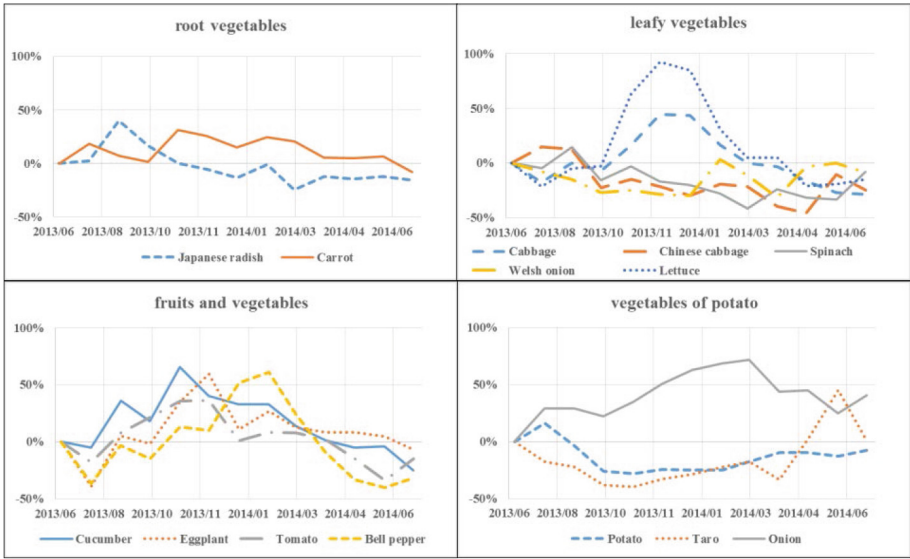


Fig. 3. Market transaction price of vegetables in Tokyo (Color figure online)

shows percentage of increase or decrease of the quantity standard of July 1, 2013. The price of vegetables, as can be seen from this figure change up to twice.

1.4 The Effect of TPP Gives to Japan

As mentioned previously, Japanese agriculture is having various problems. Therefore, it was divided Japan whether she will join or not to TPP. Especially, agricultural group including JA declared opposite opinion. On the other hand, TPP brings profit to manufacturing industry by being rescinded tariff of shipping country. Especially, it has brought about great effect for Japan which exports a lot of industrial products. Finally, Japanese government declared to join TPP on the condition that protect of rice, wheat, dairy products, beef, pork, sugar cane 5 items.

2 Data Used for the Analysis

The analysis was carried out using the purchasing data was offered from All Japan Foods Co., Ltd. which be supplied by Joint Association Study Group of Management Science of all customers who visited stores.

2.1 Store Data Used for the Analysis

It is used 5 stores in Hokkaido area and Tokyo area respectively to analysis. Data of store shows in Table 2.

Figure 4 shows position in Area of Hokkaido and Kanto. Area of Hokkaido is located in the north of Japan. Public transportation of Hokkaido is not much development. Therefore, motorized society is developing into Hokkaido in Japan relatively. On the contrary, public transportation of Tokyo is highly developed to be the center of Japan. Therefore, there are a lot of people who don't have a car.



Fig. 4. Position in area of Hokkaido and Kanto

Also, it is found that shop area is proportional to the daily turnover.

Table 2. Store data

		1\$=115yen(February,2016)	
Area	Adress	Shop area	Daily turnover
Hokkaido	Higasi-ku, Sapporo City, Hokkaido	879m ²	¥221,000
Н о к к а и д о	Н и г а с и - к у , С а п п о р о С и т я , Н о к к а и д о	1,285m ²	¥3,140,000
Н о к к а и д о	К и т а - к у , С а п п о р о С и т я , Н о к к а и д о	879m ²	¥1,740,000
Н о к к а и д о	В п у к л о о к с и , Е р е и з н С и т я , Н о к к а и д о	244m ²	¥280,000
Н о к к а и д о	А с а м и , Е р е и з н С и т я , Н о к к а и д о	482m ²	¥440,000
Т о к л о	Н и г а с и - к у , С а п п о р о С и т я , Н о к к а и д о	125m ²	¥390,000
Т о к л о	И т а м а - к у , С а п п о р о С и т я , Н о к к а и д о	330m ²	¥570,000
Т о к л о	Н и г а с и - к у , С а п п о р о С и т я , Н о к к а и д о	115m ²	¥290,000
Т о к л о	А с а м и , С а п п о р о С и т я , Н о к к а и д о	214m ²	¥490,000
Т о к л о	К и т а - к у , С а п п о р о С и т я , Н о к к а и д о	198m ²	¥400,000

2.2 Purchasing Data of All Customers

It is indicated below about the outline of data.

Term: Jul. 2013–Jun. 2014

Area: Hokkaido area and Tokyo area, 5 each

Number of data: about 18.6 million cases

Data is receipt data. Including information is sale date, sale time, membership number (members only), large classification code, middle classification code, jan-code, using coupon flag (members only), and coupon number (members only).

3 Procedure of Analysis

3.1 The Selection of Kind of Vegetables for Analysis

Firstly, the authors selected vegetables for analysis. As research object, it is targeted the 14 items listed in “About the growth situation and price outlook of vegetables” that are announced every month by Ministry of Agriculture, Forestry and Fisheries. These 14 items are popular items and are eaten in Japan.

Table 3. Selected vegetables for analysis

Genre	Item Name	Genre	Item Name
root vegetables	Japanese radish	fruits and vegetables	Cucumber
	Carrot		Eggplant
leafy vegetables	Cabbage		Tomato
	Chinese cabbage	Bell pepper	
	Spinach	vegetables of potato	Potato
	Welsh onion		Taro
	Lettuce		Onion

Table 3 shows vegetables which is selected for analysis.

3.2 The Selection of Kind of Items for Analysis

Secondly, the authors selected items for analysis. As a reference Jan-code, it targeted things that are sold more than 250 days corresponds to two-thirds of the year were included. Table 4 shows items that are selected for analysis. Looking at the figure, there is “1/2 off”, “1/4 off” or “1 pice” in item name. This shows purchasing style of Japanese. The Japanese tends to purchase it many times little by little. Therefore, supermarket in Japan sells the item which was subdivided. Additionally, about Taro, it was excluded from items for analysis because it didn’t exist items were sold more than 250 days.

3.3 Ranking for Items Price

Thirdly, the authors was the ranking of the items price. At first, we seek Dairy price each item. If same item sells at plurality of stores in same day, daily price was the average of the price of each store. Next, it was classified as a price per day the 22 stage from less than 100 yen to more than 300 yen as shown in Table 5. Finally, we aggregated number of sales each rank.

4 Result of Analysis

As the result of analysis, it was found three characteristics.

Table 4. Selected items for analysis

Vegetables	Area	Jan-Code	ItemName	Vegetables	Area	Jan-Code	ItemName
Japanese radish	Hokkaido	210010000000	Japanese radish	Tomato	Hokkaido	210410000000	Tomato(Pack)
		210020000000	Japanese radish 1/2Off			210411000000	Tomato(1Pice)
		250010000000	Japanese radish			210420000000	Tomato(Pack)
		2000020318138	Japanese radish(1Pice)			210426000000	Mini Tomato
		4963717129401	Japanese radish(Top)			251200000000	Tomato
		210010000000	Japanese radish			251203000000	Fruit Tomato
Japanese radish 1/2Off	Tokyo	210020000000	Japanese radish 1/2Off			251240000000	Cherry Tomato
		210050000000	Carrot(1Pice)			251241000000	Mini Tomato
		250150000000	Carrot			2000020221353	Mini Tomato
		2000020413178	Carrot(1Pice)			2000020302038	Tomato(in Box)
		2000020413253	Carrot(in Bags)			2000020302113	Tomato(1Pice)
		2000020413338	Carrot(in Bigbags)			2000020302458	Tomato(4Pices)
Carrot	Hokkaido	210050000000	Carrot			2000020304193	Midi Tomato
		210051000000	Carrot			2000020304278	Tomato(in Box)
		210322000000	Cabbage(1Pice)			4993839072262	Fruit Tomato
		210325000000	Cabbage 1/2Off			4993839072521	Tomato
		251000000000	Cabbage			210411000000	Tomato
		2000020305183	Cabbage(1Pice)			210420000000	Tomato
Cabbage 1/2Off	Tokyo	2000020305268	Cabbage 1/2Off			210420000000	Midi Tomato
		210322000000	Cabbage			210426000000	Mini Tomato
		210325000000	Cabbage 1/2Off			210460000000	Bell pepper(small bags)
		210192000000	Chinese cabbage 1/4Off			251400000000	Bell pepper(small bags)
		2000020324313	Chinese cabbage 1/4Off			2000020315168	Bell pepper(Pack)
		210192000000	Chinese cabbage 1/4Off			210460000000	Bell pepper
Spinach	Hokkaido	210100000000	Spinach	210461000000	Bell pepper		
		216018000000	Spinach(bundle)	210636000000	Potato		
		250400000000	Spinach	210641000000	<i>Mekuin(in bags)</i>		
		2000020101143	Spinach(bundle)	251900000000	Potato		
		210100000000	Spinach	251910000000	Potato		
		210100000000	Spinach	251930000000	<i>Mekuin</i>		
Welsh onion	Hokkaido	210240000000	Welsh onion(1Pice)	2000020405333	Potato(big bags)		
		250700000000	Welsh onion	2000020410108	<i>Mekuin(big bags)</i>		
		250710000000	Welsh onion	2000020454904	<i>Kitaakari(big bags)</i>		
		2000020112033	Welsh onion	4946666904015	<i>Mekuin</i>		
		2000020321008	Welsh onion(1Pice)	4946666904022	<i>Bareisyo</i>		
		2000020321183	Welsh onion(1Pice)	4988559800080	<i>Kitaakari</i>		
		210241000000	Welsh onion	210631000000	Potato		
		210251000000	Welsh onion	210636000000	Potato		
		210330000000	Lettuce	210700000000	Onion		
		251110000000	Lettuce	210710000000	Onion		
Sunny Lettuce	Hokkaido	251120000000	Sunny Lettuce	210710000000	Onion		
		251180000000	Other Lettuce	210711000000	Onion(in bags)		
		2000020326133	Lettuce(1Pice)	252200000000	Onion		
		4571129876105	Lettuce	2000020203038	Onion(Big bags)		
		210330000000	Lettuce	2000020401113	Onion(Midi bags)		
		210490000000	Cucumber(1Pice)	2000020401298	Onion(3Pices)		
Cucumber	Hokkaido	210491000000	Cucumber(5Pices)	2000020401373	Onion(Big bags)		
		251500000000	Cucumber	2000020401601	Onion(1Pices)		
		2000020312198	Cucumber(1Pice)	4946666904039	Onion		
		2000020312358	Cucumber(3Pices)	210710000000	Onion		
		210490000000	Cucumber	210711000000	Onion(in bags)		
		210432000000	Eggplant(1Pice)				
Eggplant	Hokkaido	2000020310118	Eggplant(3Pices)				
		2000020310293	Eggplant(5Pices)				
		2000020311023	Eggplant(1Pice)				
		210430000000	Eggplant				

Note: Italic type of Item Name in Table.5 shows

4.1 Characteristic 1: There Was Two Peaks

The first characteristic, it was found two peaks in low-price rank. As the background, there is sale of supermarket. It is commonly that the supermarket in Japan performs a sale in once a week. Thereby, vegetables also are often on sales items. Therefore, these two peaks is conceivable that one is normal selling price and the other is sale selling price. Figure 5 shows Specific examples that belong to characteristic 1.

Table 5. Ranking for item price

Rank	Daily price	
1	0 yen or more	less than 100yen
2	100 yen or more	less than 110yen
3	110 yen or more	less than 120yen
4	120 yen or more	less than 130yen
5	130 yen or more	less than 140yen
.		.
.		.
.		.
18	260 yen or more	less than 270yen
19	270 yen or more	less than 280yen
20	280 yen or more	less than 290yen
21	290 yen or more	less than 300yen
22	300 yen or more	

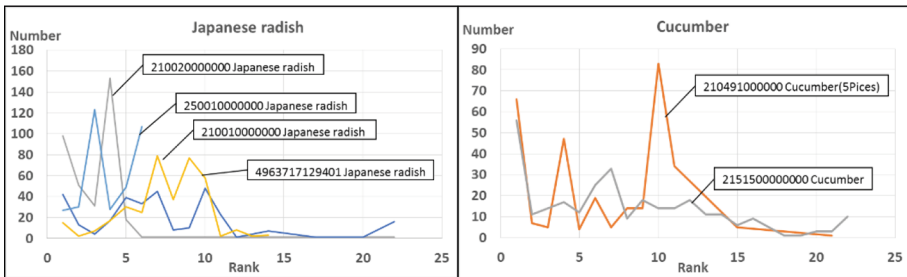


Fig. 5. Specific examples that belong to characteristic 1 (Color figure online)

4.2 Characteristic 2: Difference of Hole Vegetables and Cut Vegetables

The second characteristic, it was found difference of hole vegetables and cut vegetables. Hole vegetables sales volume is greatly changed with the rise of the price. Reduces the quantity and price of the hole vegetables increases. The quantity of cut vegetables rises. This tings is conceivable that there have been switching to cut vegetables from the Hall vegetables with an increase in price. Figure 6 shows Specific examples that belong to characteristic 2. Market price shows market transaction price in Tokyo, and its unit is “Yen”. Otherwise shows percentage of increase or decrease of the quantity standard of July 1, 2013.

4.3 Characteristic 3: Difference of Way of Decline in the Items Price

The third characteristic, it was found difference of way of decline in the items price. Even if these products are the same products, the change of the price is not similar. For the reason, it is conceivable difference of sales specifications. Figure 7 shows Specific examples that belong to characteristic 3.

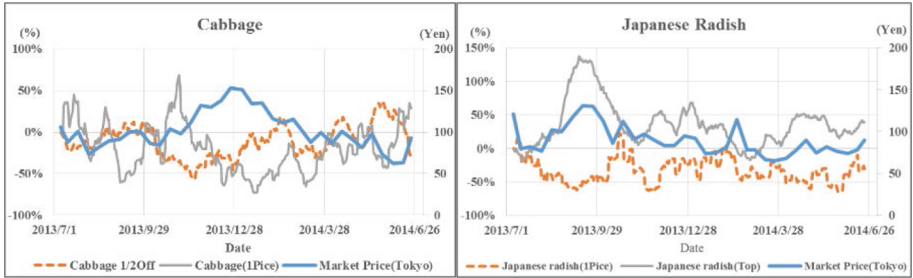


Fig. 6. Specific examples that belong to characteristic 2 (Color figure online)

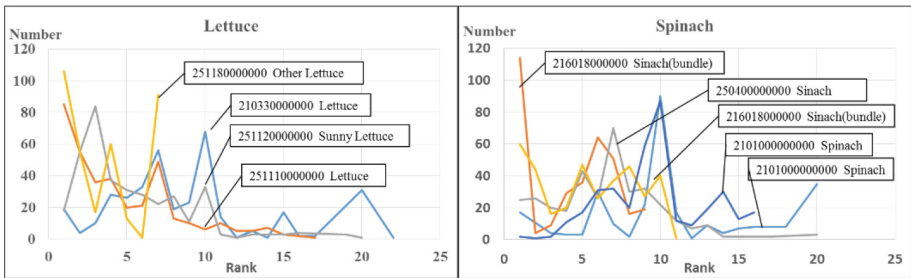


Fig. 7. Specific examples that belong to characteristic 3 (Color figure online)

5 Conclusion

5.1 Conclusion

The authors analyzed changes in sales volume with respect to a change in price using purchasing data of all customers. The purpose of the analysis was to clarify effect of changes in fresh vegetables prices give consumers.

As a result of the analysis, it was clarified that the change in the price of fresh vegetables had three features.

The result of the study is able to predict the influence that the change of the price of vegetables gives demand. By using this prediction, the farmers can be maintained prices by exported overseas, when the supply is too large relative to demand. As mentioned previously, farmers of Japan has disagreed to TPP. However, the farmers can utilize TPP in what they export abroad positively in this way effectively.

5.2 Further Task

As a result of the analysis, it was clarified that the change in the price of fresh vegetables had three features. However, using the analysis as for the data which I used for analysis this time, standard information suffered a loss. Therefore, it is necessary to analyze considering standard information. Also, because there is season in vegetables, a price fluctuates by a season. It is necessary to analyze considering seasons too.

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