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Do Domestic Producers Benefit from Safeguards?

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Do Domestic Producers Benefit from Safeguards? The Case of a Japanese Safeguard on Chinese Vegetable Imports in 2001[1]

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Abstract

This study examines the effects of a safeguard policy imposed by Japan in 2001 using detailed product-level transaction data from domestic markets. The market prices of imported and domestic goods are almost always higher during the safeguard period compared with those in the previous year. However, the safeguard measure decreases the margins for imported goods, but does not affect the margins for domestic goods. As temporary import restrictions are expected to enable structural changes in the domestic industry, we also estimate the long-term effect on margins. We find that five years after the safeguard period, the margins remain similar for domestic goods and are smaller for imported goods. These results suggest that the temporary import restrictions were both harmful to imported goods producers and consumers and unbeneficial to domestic producers.

Keywords: safeguard, markups
JEL classification: F13, F14

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1. Introduction

The World Trade Organization acknowledges that transparent and temporary trade restriction measures can be required to facilitate free-trade negotiations by easing pressure from imports competing with domestic industries. A safeguard is one such import restriction measure. If there is a rapid increase in imports that damages the domestic industry, temporary restrictions can be imposed as a form of safeguard. Not only are such policies important from a political perspective, their economic consequences are also of strong interest. Hence, evaluating the impact of temporary import restrictions is a key task. We examine a case in which the Japanese government imposed a provisional safeguard measure on Chinese vegetable imports in 2001.

The temporary import quotas limit the foreign supply; therefore, market prices rise as a natural consequence. However, whether such changes affect imported goods or domestic goods, or both, is not obvious. Further, because of the increased trade costs, the benefits for producers of increased prices may not be substantial. If trade restrictions do not raise domestic goods prices substantially and, thus, if the level of profits remains at the pretrade policy level, the purpose for which the policy was implemented will not be achieved. Hence, this study examines the level of margins before, during, and after the safeguard policy period and address whether import restrictions are beneficial for domestic (and foreign) suppliers.

The effectiveness of temporary trade restrictions also hinges on whether the import-competing sector is able to conduct structural changes: e.g., if the sector can innovate to develop new products or to find a more efficient production process, a temporary safeguard measure may succeed in rescuing the domestic industry in a transparent way. One way of creating innovation is by building a brand. If the fact that goods are produced locally is attractive to consumers (e.g., as exemplified by a "local production for local consumption" slogan), then a temporary restriction can offer the industry a chance to build awareness of the benefits of the domestically produced goods. In the case of vegetable imports in Japan, there were concerns about the level of pesticides remaining in imported vegetables. These concerns offered domestic producers an effective way to boost the domestic industry by creating a reputation for domestic vegetables as being safer and fresher. To determine whether this occurred requires an empirical study of the safeguard. In this paper, using detailed domestic market data enables us to undertake a comprehensive evaluation of the impact of the trade policy on domestic suppliers. This study contributes to the literature by showing how domestic market transactions changed in response to the safeguard and, in particular, how the profits reacted to the imposition of the safeguard in the long run.

We use domestic vegetable market data based on 55 geographically separated wholesale markets across Japan. Imported vegetables are also traded in wholesale markets. We empirically investigate market outcomes by using a hedonic price approach and demand function estimations. By using hedonic approaches, we investigate the price effect of trade policy in a difference-in-difference framework. This enables us to isolate the effect of trade policy on imported goods exclusively. Because market supply is limited, there may be spillover effects on domestic goods, which may disguise the impact on imported goods. In addition, it is important to observe the direct effect of trade policy and the changes in price caused by the import quota. Furthermore, by estimating hedonic price equations, the coefficients of the product characteristics are the shadow prices of the product attributes. This enables us to evaluate the changes in demand-side perceptions associated with the safeguard measure.

Then, we estimate a structural model to detect the margins that producers enjoy. We employ a demand estimation for differential goods and assume that the supply side involves monopo-

listic competition. As discussed later, the market for vegetables that we investigate is a differential good market and the number of producers is large, yet limited; therefore, suppliers have market power to some extent. These characteristics fit the properties of monopolistic competition. By obtaining demand elasticity, we can compute margins for each product. We analyze whether the margins changes in association with the imposition of import quotas. We also estimate the same framework using data for the period five years after the end of the import restrictions. Whether the temporary restrictions successfully induced structural changes in the domestic industry can be determined by examining the margins: i.e., if these were higher five years later, it would indicative that the import restrictions had positive effects on the profits of domestic producers in the long run.

We consider the case of Welsh onions (*Allium fistulosum*), to which the provisional safeguard measure against China applied from April 23, 2001 to November 8, 2001. The data utilized are daily traded wholesale market data, which enables us to perform a detailed examination of the effect of the trade policy on domestic markets. The empirical results of the hedonic analysis show that the safeguard increased the market price for Welsh onions. Moreover, the price increases resulting from the safeguard influenced imported goods more than it influenced domestic goods. Hence, the higher prices were largely achieved for the imported goods. Then, our empirical analysis of the structural model demonstrates that the margins of imported goods are low during the safeguard periods compared with pre- or postsafeguard periods, whereas the domestic margins are virtually the same for all periods. Hence, although consumers suffer from higher prices and foreign producers lose their higher margins, the import restriction does not provide benefits for domestic producers.

Considering the long-run effect, temporary import restrictions are expected to lead to structural changes, such as attempts by the domestic industry to build brand images that highlight the superiority of the domestic product. However, we find that the demand parameters did not change drastically five years after the provision of the safeguard. This suggests that the temporary import restrictions did not result in domestic producers taking advantage of the opportunity to gain a competitive edge.

The economic impacts of safeguards have been studied empirically in the literature. Several works confirm that safeguards have virtually no impact on domestic markets. For example, Kitano and Ohashi (2008) demonstrate that the US safeguard policy for motorcycles had little to do with the survival of Harley Davidson in the US in the face of competition from imported motorcycles. Instead, the key factor was that there was low substitutability between Harley Davidson and the imported motorcycles, such as Honda and Kawasaki. Hence, the safeguard policy itself had little impact on increasing Harley Davidson's profits. Similarly, Chung et al. (2016) examine the effect of the US's safeguard against Chinese tire imports and find no effect on the US labor market because, even though Chinese imports were restricted, there were increases in imports from other countries. While the presence of a third country may have important consequences for trade policy, this is not the case in relation to Japan's vegetable imports from China. Here, we can focus on the imports from China and still find no empirical evidence of successful temporary trade restrictions for domestic agricultural producers.

2. Data and Background

Due to a surge of vegetable imports from China, Japanese farmers sought to take action against imported vegetables. In 2000, the Japanese government initiated an investigation into a provisional safeguard measure. After a four-month investigation process, a provisional safeguard

measure was implemented on April 23, 2001 (for more details, see Kuno 2005 and Mulgan 2005). The vegetables included in the safeguard measure were raw shiitake mushrooms, Welsh onions, and igusa (rush grass). The actual import restriction regime imposed was a quota tariff scheme: up to certain volume of imports, the existing tariff was levied and beyond that import level, a higher import tariff rate was imposed. In this study, we focus on Welsh onions. The regular tariff rate for Welsh onions was three percent. However, between April 23 and November 8 (200 days), a 225-yen tariff rate per kg was levied, which corresponds to a 256 percent tariff rate, for imports beyond 5,383 tons. Based on the government investigation report, the average price of domestic Welsh onions was 337 yen per kg and that of imported Welsh onions was 112 yen. Thus, the new tariff rate was designed to approximately bridge the gap between the domestic and imported goods. As will be shown later, the volume of imports declined during the safeguard period.

After Japan imposed the provisional safeguard, China retaliated by increasing its import tariff on cell phones and automotive parts from Japan. Consequently, there was a series of negotiation meetings held between Japanese and Chinese government officials, which culminated in an agreement to form a "Japan–China Trade Council on Agricultural Products." This is a private forum intended to promote information exchange, which nonetheless may induce voluntary export restraints (Kagitani and Harimaya 2015). Under the agreement, Japan agreed not to implement its safeguard measure and China agreed to stop imposing a higher rate of tariffs on Japanese imports. Thus, the safeguard against Chinese vegetables in Japan did not last more than 200 days. This paper attempts to study how market outcomes changed before and after the safeguard and whether the temporary import restrictions affected economic outcomes; in particular, whether it influenced market prices and markups.

To conduct this investigation, we use detailed domestic market transaction data. The data set used in this study is the Daily Wholesale Market Information on Fresh Fruit and Vegetables ("*Seikabutsu Hinmokubetsu Shikyo Joho*" in Japanese). This data set covers daily transactions in Japanese agricultural wholesale markets, including those for Welsh onions. Imported vegetables are also traded in wholesale markets and, hence, the changes in market outcomes that resulted from the trade policy are reflected in this data. There are 47 prefectures in Japan and each prefecture has at least one wholesale market, ensuring that our data is spatially diversified. We use the data to examine the impact of the safeguard over four periods: 2000 (before the safeguard measure), 2001 (when the safeguard was imposed between April 23 and November 8), 2002 (after the safeguard measure was removed), and 2007 (five years after the safeguard was removed) to determine whether the policy had any long-run effects. Our data records daily transaction data. For example, there were 274 market open days in 2007.

This data set includes information on market price, quantity traded, grade and size of goods, and the production place (prefecture or imported country). Thus, we are able to control for product characteristics, which enables us to abstract from the influence of differences between the characteristics of the domestic and imported goods. We consider that a product's characteristics are a combination of brand (e.g., white Welsh onion or green Welsh onion), grade (e.g., "excellent" or "good"), size (e.g., "L" or "M" and producing place ("Tokyo" or "China." Because there is a great deal of variety in terms of grade and size categories in the data, there were 1,145, 1,124, 1,151, and 1,115 distinct Welsh onion products in 2000, 2001, 2002, and 2007, respectively. This high level of categorization allows us to obtain the price of individual goods and avoid aggregation biases when analyzing prices. In comparison, if we had used customs data instead, it would have been available only at the level of Welsh onions sold on a monthly basis; therefore, it would have lacked enough detail to examine daily market behavior.

Because we use data for the periods before and after the imposition of the safeguard measure, we can compare the overall data pattern for these years. Table 1 reports the descriptive statistics for each year. The average price per kg is around 300 to 350 yen (approximately 3.3 US dollars). During this period, there was no inflation in Japan; thus, we can compare the nominal prices. In the year when the safeguard measure was applied, the average price was relatively higher than in the previous and following years, probably because of natural environmental conditions; however, the 2007 price was almost the same as that in the safeguard year. The average delivery distance was approximately 250 km from 2000 to 2001, whereas the distance was much longer in 2007. If a certain producing prefecture suffers from a low level of production due to natural disaster, other prefectures may supply to markets that they have not reached before. This results in a higher price and longer delivery distance.

Table 1 also shows the ratio of the particular product characteristics of high quality and large size. While there are many unidentified category names for quality and size, we take a conservative approach, such that we use the identified names of category. We can assume that a grade name including "*syu*" (excellent) means the product is high quality and that a size category including the letter "L" implies a large size. High-quality products account for approximately 30 percent of the total and large-sized products account for 60 percent. The share of imported goods is also reported in Table 1. It was lower in 2001 compared with 2000 and 2002, which is likely to be the effect of the safeguard imposed during 2001. By 2007, the share of imported Welsh onions had risen to 9 percent.

Although the share of imported goods in the total is relatively small, the presence of individual imported goods in each wholesale market is sometimes significant. Because there are fragmented delivery patterns in daily trade, we consider a time window of a month for each market, which ensures stable delivery and market share patterns. We assume that a market in a prefecture is defined on a monthly basis because, if markets are defined on a daily basis, often only one product is supplied in a market. Furthermore, the pattern of demand and supply changes because of seasonality and such a variation does not drastically occur daily or weekly. This allows us to conduct a stable empirical analysis using a monthly basis unit. Hence, the total market size is defined by the aggregate total volume in market n in month t, X_{nt}. The total market size corresponds to the total consumption volume in each prefecture. This is calculated using two data series: i.e., the Food Balance Sheet issued by the Ministry of Agriculture, Forestry and Fisheries, which reports average consumption amounts of stem vegetables (including cabbage, spinach, and Welsh onions) in each prefecture; and the population numbers in each prefecture, reported by the Census. The share of each product is shown by $s_{nj} = q_{nj}/X_{nt}$, where q_{nj} is the quantity of each goods.

Figure 1 shows an individual good share in each market. We take the average of the market share, which is defined as the quantity supplied divided by the market size in each month in each market. The share of imported goods seems large based on the volume of imports. The reason for this is as follows: consider a market in which there are two domestic goods, with market shares of 0.1 and 0.2, and one imported good, with a market share of 0.1, then the average domestic goods share is 0.15 and the share of imports is 0.1. Although domestic goods account for 30 percent of the total market share, at the individual goods level, the shares are more comparable.

By focusing on 2001, we can calculate how the average prices vary between the periods with and without the safeguard in place. The safeguard measure was in place, roughly, from May to October of 2001. The average price per kg of domestic goods without the safeguard was 305.553, whereas it was 388.996 under the safeguard. Hence, the import restrictions imposed under the

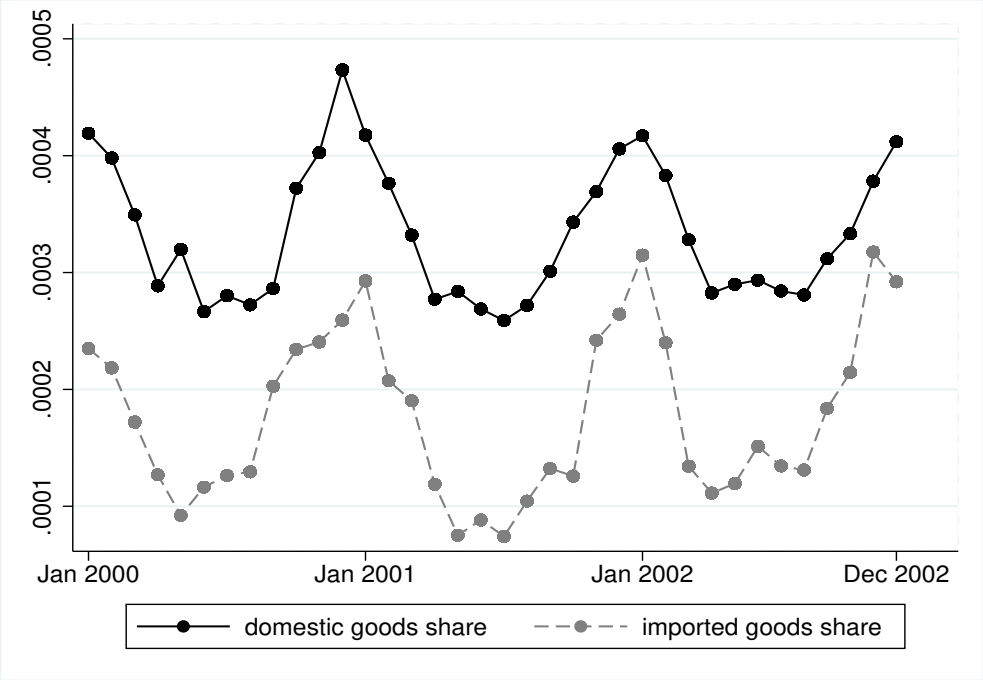

Figure 1: Share (individual goods)

safeguard policy raised the domestic goods price. However, the imported goods price was 157.031 without the safeguard and 257.343 under the safeguard. The quota level was set to 5,383 tons and the actual imported volume was 6,251.884 tons, indicating that, although the quota was binding, the volume of imports exceeding the quota limit was not large. Hence, the increase in the imported goods price was not merely caused by the tariff (of 225 yen per kg), but by other factors, such as changes in demand-side behavior.

	Year 2000	Year 2001	Year 2002	Year 2007
Average price	302.234	347.812	328.497	349.756
S.D. of price	228.348	243.494	212.088	245.486
Average delivery distance	266.755	255.177	266.271	334.154
Percentage of high quality	30.043	29.628	29.213	25.539
Percentage of large size	55.673	56.639	58.968	60.036
Percentage of imported goods	5.704	5.241	6.317	9.056
Num. of obs.	36465	36270	35792	37609

Table 1: Summary statistics 1

Although our focus is on using domestic transaction data, it is informative to observe the trade patterns for Welsh onions from China by examining the trade customs data in Table 2. This data is only provided on a monthly basis, but it indicates import patterns and, in particular, shows that a decrease of imports occurred during the provisional safeguard period. Often, when quotas are imposed, they do not end up being binding. However, in the case of Welsh onion imports from China, it appears that the quota was binding. Our primary interest is in investigating how this restricted supply affected domestic market outcomes.

Figure 2 plots the monthly value of imports from 2000 to 2001. Because the safeguard

Month	Year 2000	Year 2001	Year 2002
Jan	290.6	288.4	367.1
Feb	208.3	427.3	235.2
Mar	254.5	240.2	138.9
Apr	178.8	165.2	130.8
May	184.7	68.9*	236.8
Jun	306.7	78.4*	210.2
Jul	320.4	89.2*	189.2
Aug	293.32	97.6*	157.7
Sep	379.9	119*	193.6
Oct	517.9	135.8*	347.6
Nov	331	432.6	440.9
Dec	406.2	554.6	525.9

Table 2: Import volume (million yen) of Welsh onions: ∗=safeguard periods

measure was imposed from April 23, 2001 to November 11, 2001, it was mainly effective from May to October 2001. As the figure shows, the value of imports was lower in these months than in other years, which means that the safeguard measure was effective.

To understand the effects of the safeguard on market outcome in more detail, we calculate monthly average prices of imported and domestic goods (Table 3). As a reference, the 2002 prices are also reported. During the safeguard period, the imported goods prices were higher than they were during the other months of 2001 or during other years. Hence, by limiting the supply of imported goods, the safeguard resulted in increased imported goods prices. Similarly, domestic goods prices were higher under the safeguard than during the other months of 2001. Compared with the 2002 prices, the prices under the safeguard are higher in almost all months. Thus, the safeguard policy appears to have successfully increased prices so that domestic producers were able to increase their profits compared with the case without safeguards. However, comparing the prices in the reference year indicates that although the prices of imported goods almost doubled, those of domestic goods increased only by up to 20 percent.

	2001		2002		Ratio	(2001/2002 percentage)
	Import	Domestic	Import	Domestic	Import	Domestic
Jan	180.439	352.705	147.602	294.605	122.25%	119.72%
Feb	162.548	321.438	127.2	263.823	127.79%	121.84%
Mar	97.29	253.77	112.969	229.742	86.12%	110.46%
Apr	142.727	259.285	161.114	279.428	88.59%	92.79%
May	230.595	391.844	214.518	401.731	107.49%	97.54%
Jun	301.821	391.285	115.063	334.367	262.31%	117.02%
Jul	261.69	365.65	128.314	316.205	203.95%	115.64%
Aug	310.597	495.05	135.825	411.525	228.67%	120.30%
Sep	354.648	465.88	157.942	429.033	224.54%	108.59%
Oct	279.271	346.62	158.083	379.074	176.66%	91.44%
Nov	233.86	319.997	157.161	384.822	148.80%	83.15%
Dec	137.456	288.339	130.554	343.376	105.29%	83.97%

Table 3: Average monthly price: imported and domestic goods

Considering other variables that influence price, the distance between market and source is an important factor. We define the interprefectural distance as the direct distance between the prefectural head offices in the prefectural capital cities.[1] We set the internal distance to 10

[1]This information is available from the Geospatial Information Authority of Japan, see http://www.gsi.go.jp/KOKUJYOHO/kenchokan.html

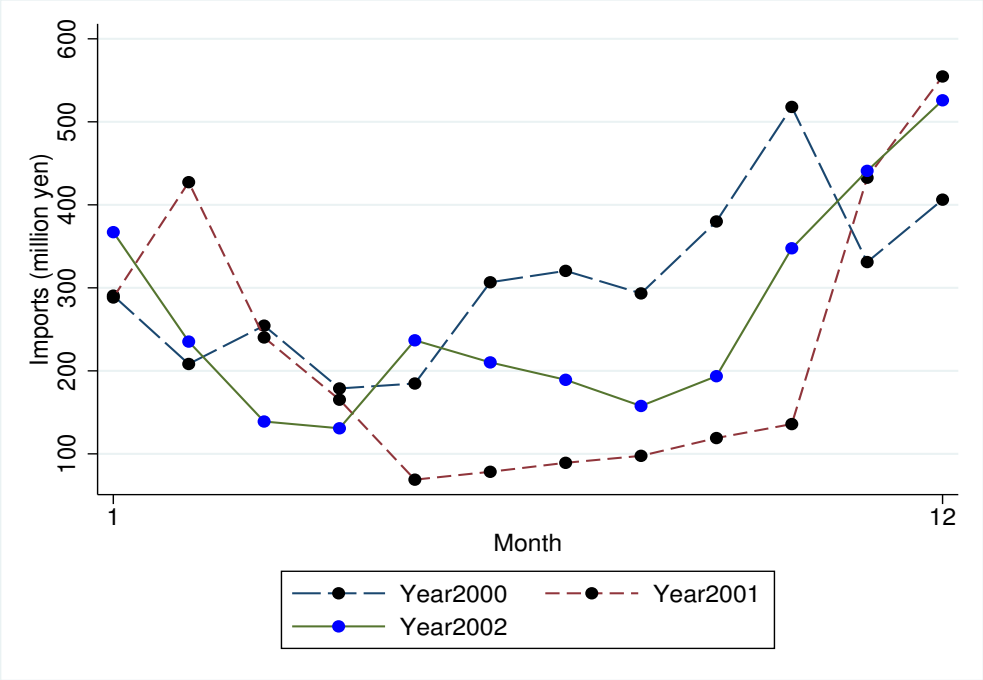

Figure 2: Imports of Welsh onions

km, which is slightly less than the minimum interprefectural distance of 10.4 km (Kyoto–Shiga). Considering the imports from China, we do not directly observe the distance between production places in China and markets in Japan. Because the vegetables are shipped by ocean and the three major ports in Japan are Tokyo and Osaka in the east and west, respectively, and Fukuoka in the Kyusyu area, we assume that the distance between markets and the source in China is the distance between Beijing and each prefecture where the port is located. Although this is a simplified assumption, it approximates actual shipment patterns.

Finally, we plot the delivery pattern of Welsh onions in Figure 3. The horizontal axis shows an index of origin and the vertical axis is an index of markets. Each point represents the frequency of delivery from source prefectures to consuming markets. As shown, the diagonal lines reflect local delivery: i.e., Welsh onions produced in a prefecture are supplied to that prefecture's market. The right-hand side of the origin axis shows China. Welsh onions produced in China are shipped across Japan on a nationwide basis. Thus, restricting Chinese imports affects every market in Japan.

3. Model

To investigate the impact of the safeguard measure, we employ two types of models: 1) a hedonic price model with a difference-in-difference framework; and 2) a discrete-choice model to estimate demand for differentiated goods by Berry (1994). The first approach is used to show the direct consequences of trade restrictions. The second framework is used to derive producers' margins and to analyze the impact of trade policy.

A hedonic price model is based on a consumer's utility-maximizing behavior. Assume that

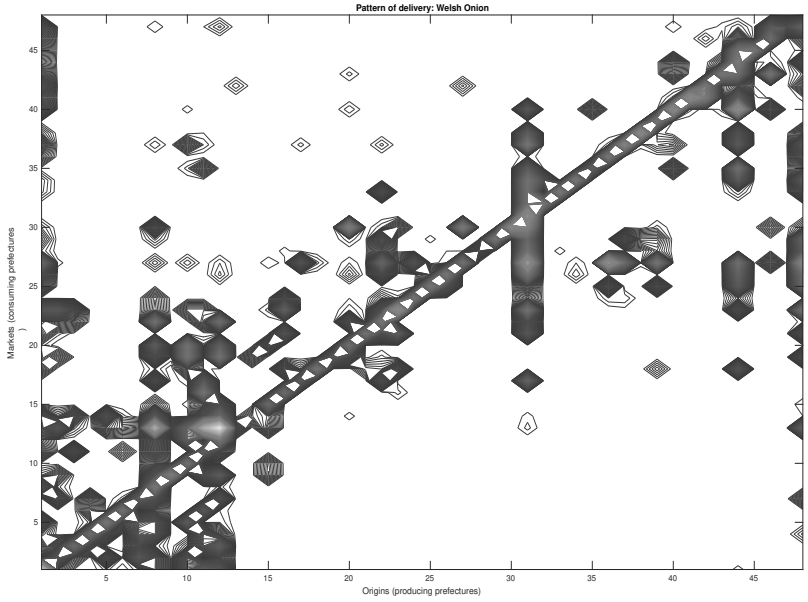

Figure 3: Delivery pattern in 2001

a consumer in region n has the following utility when consuming good i with characteristic k:

$$u_n = \sum \alpha_k \ln x_{i,k} + y - c,$$

where α_k is a taste parameter, $x_{i,k}$ is good i's characteristic k, y is income, and c is the consumption of outside goods. The budget constraint is $y = c + \beta_0 + x'\beta$. Then, from the utility-maximization problem, we have the following relationship:

$$\alpha_k / s_{i,k} = \beta_k.$$

Thus, the shadow price is the marginal utility of characteristic k. This fundamental parameter can be obtained using a hedonic price equation.

The hedonic price equation is expressed by a function of product characteristics:

$$p_{njt} = f(\text{grade}, \text{size}, \text{origin}), \tag{1}$$

where n is the market, j is the place of origin, and t is the month. Then, we assume linearity in this price function and introduce product type dummies, time dummies, and the dummy for policy timing:

$$p_{njt} = a + b\ \text{safeguard}_{jt} + c\ \text{month}_t + d\ \text{import}_j + e\ \text{grade}_{njt} + f\ \text{size}_{njt}, \tag{2}$$

where safeguard_i takes a value of one for the imported goods when the safeguard measure was in place. The indicator of imported goods from China reveals how consumers evaluate imported goods. This perception could be changed by the domestic producers if they used the safeguard period to build a domestic brand based on local products being superior. Thus, for the period when the

safeguard measure was imposed, we add a safeguard dummy to the import index. If the magnitude of this import index is different before, during, and after the safeguard period, it indicates that the domestic industry successfully changed consumers' perceptions of products produced domestically. Thus, the coefficient for the safeguard dummy reveals the true impact of the trade policy on market prices. We also investigate the effects of the safeguard measure by estimating a demand equation. We adopt a simple demand estimation procedure for differentiated goods by Berry (1994). Consider utility in a discrete-choice model, in which a consumer in region n chooses product j:

$$u_{nj} = q_j\gamma - ap_j + \xi_j + \nu_{nj},$$

where $q_j\gamma - ap_j + \xi_j$ shows the mean utility level, δ_j. By making a logit assumption on the error term, the share of each good is simply expressed by:

$$s_j = \exp(\delta_j) / \sum_{j'=1}^{J} \exp(\delta_{j'}),$$

where the share of the outside good, s_0, is $s_0 = 1 - \sum_j s_j$. From the data, the actual share, $\hat{s}_j$, can be calculated. Hence, the estimated mean utility level, $\hat{\delta}_j$, is obtained by solving the following system of equations:

$$\hat{s}_j = \exp(\delta_j) / \sum_{j'} \exp(\delta_{j'}), j = 1, ...J,$$

Using the definition of the mean utility yields:

$$\hat{\delta}_j = q_j\gamma - ap_j + \xi_j, j = 1, ...J.$$

Because we can express the mean utility level by the shares ($\delta_j = \ln s_j - \ln s_0$) and normalize the utility from outside goods to zero ($\delta_0 = 0$), the above equation is converted to the demand function: $\ln s_j - \ln s_0 = q_j\gamma - ap_j + \xi_j$. As ξ_j is an unobserved product characteristic, it is likely to be correlated with price p_j. Thus, an endogeneity problem should be addressed. Applying an instrumental variable (IV) approach can provide us with a consistent estimator.

Because logit models are subject to restricted substitution patterns of goods demanded, we consider a more unrestricted framework, the nested logit framework. Assume that there are two categories of goods: i.e., domestic and imported goods. The utility from product j is expressed by:

$$u_j = q_j\gamma - ap_j + \xi_j + \zeta_g + (1-\sigma)\nu_j, j = 1, ...J,$$

where g is an index of the group of goods. The random component, ν_j, has an extreme value distribution. The parameter, σ, captures the correlation within a group of goods. Then, the mean utility level is expressed by the shares, as in the logit model:

$$\hat{\delta}_j (= q_j\gamma - ap_j + \xi_j) = \ln s_j - \sigma \ln s_{j/g} - \ln s_0, j = 1, ...J.$$

This provides us with a demand function formula that we estimate as follows:

$$\ln s_j - \ln s_0 = q_j\gamma - ap_j + \xi_j + \sigma \ln s_{j/g}$$

Because prices and within-group shares are endogenous variables, we need to employ an IV approach. The candidates are exogenous shocks and variables of geographical distance, in the sense

that these are correlated with market prices through competition and cost, but are not correlated with product characteristics.

The demand elasticity is obtained by the following:

$$\epsilon_j = -\frac{\partial s_j}{\partial p_j}\frac{p_j}{s_j} = -a(-1/(1-\sigma) + \sigma s_{j/g}/(1-\sigma) + s_j)p_j.$$

This is used to derive producers' margins of each product, j.

Considering the supply side, we assume that producers compete in a monopolistically competitive fashion. In general, the main suppliers are not farmers but agricultural cooperatives, who engage in marketing activities with wholesale markets and have shipping facilities, where they collect vegetables from farmers. The number of agricultural cooperatives is large (there are approximately 900), but because of the local nature of competition, it is not perceived as infinite[2]. Furthermore, because wholesale prices are different depending on the source prefecture, goods are considered to be differentiated based on the place of origin. Thus, these features fit with the properties of monopolistic competition. Because their goods are differentiated, the cooperatives have some market power and set a markup price. The profit for product j from market i is:

$$\pi_{ij} = p_j M s_j - \tau_{ij} c_j M s_j,$$

where M is the total market size and s_j is the product share, as before. From the profit-maximizing behavior, the optimal price will be:

$$p_{ij} = \tau_{ij} c_j - \frac{s_j}{\frac{\partial s_j}{\partial p_j}}.$$

Then, the margins are:

$$\frac{p_j - \tau_{ij} c_j}{p_j} = -1/\epsilon_j.$$

Combined with the demand elasticity estimates, we can derive the margins over time. Hence, we can demonstrate how these margins change in association with the changes in trade policy. Note that because we use the data in Japanese wholesale markets, the margin for imported goods may not be the margin of Chinese producers, but that of importers (or intermediaries).

4. Results

The result of a hedonic price regression is reported in Table 4. The impact of the imported goods characteristic becomes smaller in the year that the safeguard measure was in place. That is, although the imported goods are perceived negatively from the demand side, the restriction of imports makes the imported goods relatively more valuable than they would be otherwise. Other characteristics, such as high quality and large size, are positively evaluated by consumers in most cases. The inclusion of the safeguard dummy controls for the direct effect on prices and, as we expected, it has a positive impact on price. The safeguard dummy is the interaction term of the time dummy during the safeguard and imported goods dummy. This interaction term captures the treatment effect on the demand for imports as in the difference-in-difference estimation. The

Safeguard	0.468	0.464
	(0.027)	(0.027)
Import	-0.758	-0.702
	(0.009)	(0.009)
High Quality		0.269
		(0.004)
Large Size		0.056
		(0.004)
Constant	5.482	5.359
	(0.008)	(0.008)
Month/Year dm	Yes	Yes
R square	0.148	0.185
Num of Obs	108527	108527

Table 4: Hedonic regressions (difference-in-difference)

safeguard and import interaction term is positively significant (0.464), which implies that those on the demand side valued imported goods highly during the safeguard period.

Table 5 reports the results of the demand estimations.[3] We employ a logit demand and a nested logit model estimation by Berry (1994). We use the market dummies, the price and volume of goods from other sources, and the log of geographical distance to market from other sources as an instrument. Although geographical distance does not correlate with the product characteristics of the good itself, it does affect the product price through competition and cost spillover effects. Thus, the geographical distance attribute facilitates identification.

In addition to the nested logit result, we report the simple regression and logit demand results. The coefficient of price is significantly negative in all estimations. However, because of endogeneity, the price coefficient is the lowest. There is also a lower demand for high-quality goods, which is probably due to the high price. The demanded quantity is lower because the safeguard measure limits the supply of imports.

	OLS	Logit	Nested Logit
Price	-0.12	-0.508	-0.227
	(0.031)	(0.012)	(0.01)
sigma			0.238
			(0.00)
High Quality	-0.398	-0.299	-0.371
	(0.007)	(0.008)	(0.008)
Large Size	-0.018	-0.007	0.005
	(0.007)	(0.007)	(0.007)
Import	-0.57	-0.854	-0.693
	(0.015)	(0.017)	(0.016)
Safeguard	-0.385	-0.203	-0.439
	(0.044)	(0.046)	(0.044)
Constant	-7.35	-5.26	-6.058
	(0.031)	(0.067)	(0.059)
Month/Year dm	Yes	Yes	Yes
R square	0.085	0.035	0.081
Num of Obs	97935	97935	97935

Table 5: Demand estimation

Using the estimated results enables us to compute the margins. Figure 4 plots the average

[2]http://www.maff.go.jp/j/tokei/kouhyou/noukyo (in Japanese).

[3]The number of observations is different from the hedonic analysis because of data availability. Although quantity information is sometimes lacking from our daily transaction data, price and product characteristics data are consistently available.

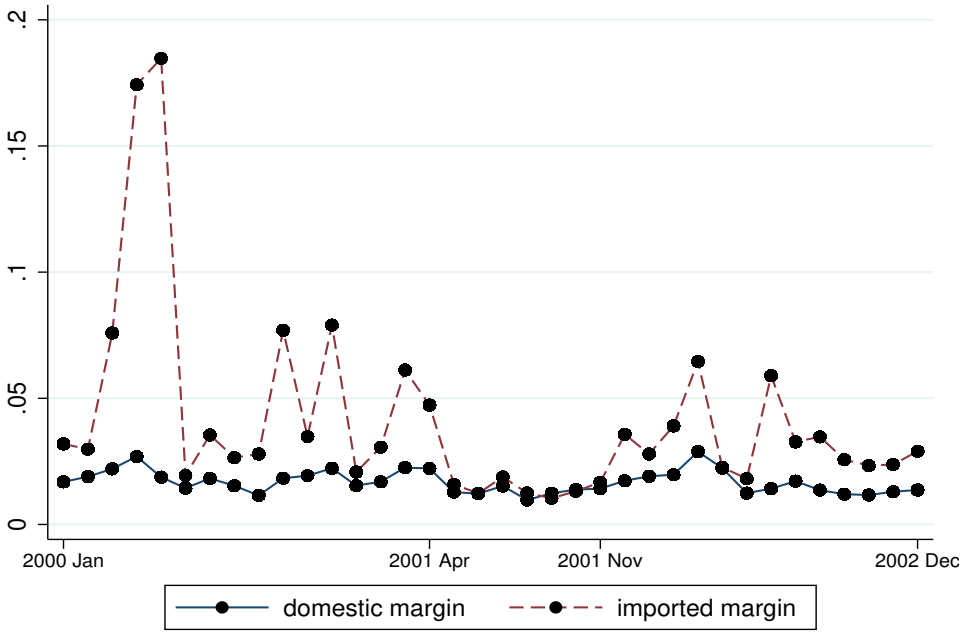

Figure 4: Margin (individual goods)

margins of imported and domestic goods in each month. It appears that during the safeguard period, the margins of imported goods dropped, whereas those of domestic goods remained the same. This is because the share of imported goods decreased and thus the demand became more elastic. In such a case, the optimal margin is also lower for imported products.

To understand whether the safeguard measure influenced the margins significantly, we regress the margins of domestic and imported goods on the safeguard dummy and product characteristics. The empirical results in Table 6 show that there is a negative effect on imported goods margins (at the 10 percent significance level), whereas it has no impact on domestic margins. Thus, although the safeguard was successful in terms of restricting imports, the domestic industry fails to exploit this opportunity to earn larger profits.

	Domestic	Import
Safeguard	-0.0002	-0.016
	(0.001)	(0.009)
High Quality	-0.007	-0.001
	(0.0004)	(0.005)
Large Size	-0.005	-0.006
	(0.0004)	(0.005)
Constant	0.024	0.044
	(0.001)	(0.008)
Month/Year dm	Yes	Yes
R square	0.014	0.01
Num of Obs	91921	6014

Table 6: Margin regressions

To examine the long-run effect of safeguards, we calculate the margins five years after the safeguard periods. If the domestic industry had successfully introduced structural changes,

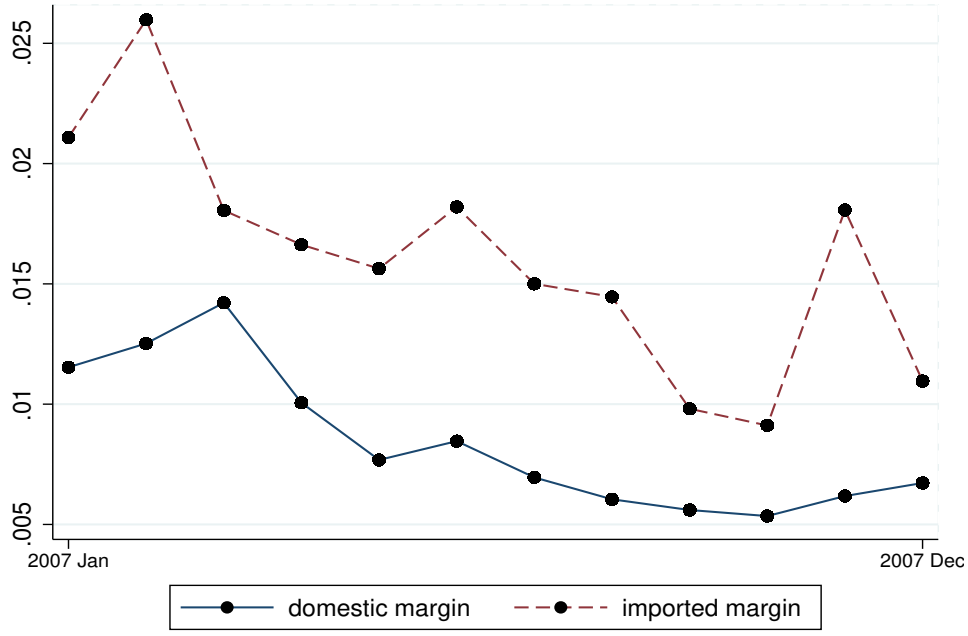

Figure 5: Margins (individual goods)

these producers would have reaped higher profits, as indicated by higher margins. Table 7 reports the estimation results five years after the provisional safeguard measure was terminated. The coefficients of the parameters do not differ drastically from those before or during the safeguard.

	OLS	Logit	Nested Logit
Price	-0.151	-0.449	-0.392
	(0.01)	(0.022)	(0.02)
sigma			0.249
			(0.011)
High Quality	-0.477	-0.387	-0.4
	(0.014)	(0.015)	(0.015)
Large Size	0.214	0.178	0.183
	(0.013)	(0.013)	(0.013)
Import	-0.585	-0.807	-0.783
	(0.023)	(0.027)	(0.026)
Constant	-7.467	-5.838	-5.38
	(0.061)	(0.124)	(0119)
Month/Year dm	Yes	Yes	Yes
R square	0.085	0.062	0.082
Num of Obs	33301	33301	33301

Table 7: Demand estimation (long-run effect)

Based on the demand estimation, we derive the average margins of domestic and imported goods in 2007. Figure 5 plots the average margins of domestic and imported goods in 2007. These margins are similar for domestic and imported goods, whereas foreign products have slightly higher margins.

One of the purposes of a temporary import restriction is to give domestic import-competing industries a chance to generate structural changes, such as efficiency improvements or quality

upgrades. If domestic producers were able to use the safeguard period to create a brand image conveying the high quality of domestic goods, then the characteristic of imported goods would have a large negative effect on demand. However, our empirical results do not support such an idea. The estimation results using data for 2007, when the safeguard measure had been terminated for five years, are similar to those during the safeguard years. In 2001, when the Ministry of Agriculture, Forestry and Fisheries initiated a policy to structurally reform the vegetable sector to make vegetable production and distribution more efficient (see, e.g., Mulgan 2005), it also adopted a "positive list" policy because of safety concerns regarding imported vegetables. This basically involved a tightening of environmental standards.[4] Hence, our empirical results imply that the demand side of the market may have appreciated these strong safety restrictions, while there may not occur structural changes in the domestic industry.

One remark should be made regarding the demand-side behavior. In our setting, the demand side is modeled as a static framework; therefore, it is not possible to examine dynamic behavior. In our case, the demand side consisted of wholesalers who repeatedly purchased vegetables and possessed strong knowledge of how to trade vegetables; it is possible that they may have acted in response to foreseeing the consequences of the imported goods restriction. At the same time, because of the perishable nature of agricultural products, it is not clear how such behavior would have affected the market outcomes; thus, the static framework may replicate actual demand-side behavior well.

5. Conclusions

How temporary trade restrictions change market outcomes is a primary concern for policy-makers. We empirically analyze daily traded markets for vegetables to investigate the effects of a safeguard measure. The safeguard increased the price for imported goods. However, it decreased the margins of imported goods and furthermore it did not affect domestic goods margins. Although temporary import restrictions are expected to lead to structural changes in the domestic market, the demand parameters did not change drastically, which suggests that structural changes did not occur. Thus, the restrictions were harmful for foreign producers.

It is often argued that vegetable import increases are caused by "develop-and-import schemes" (Kuno 2005, Mulgan 2005). Under such schemes, intermediaries develop a link with foreign farmers to produce, say, Welsh onions, to supply Japanese markets. Hence, restricting imports causes a conflict between domestic producers and intermediaries. In addition, it should be noted that there may be winners who are able to export and losers who cannot export under the low tariff quota. Based on our data, we cannot distinguish between imports incurring a low tariff and those with a high tariff. That is, although some foreign producers can export without incurring high tariffs, yet benefit from the resulting higher prices, others, who are not assigned a quota, must pay high tariffs. As outsourcing is currently spreading in the international economy, the same scenario may occur in other industries. Hence, safeguards cause tension between producers who continue to produce domestically and those who shift abroad, and tension between producers who can export without incurring high tariffs and those who cannot.

[4] www.mhlw.go.jp/english/topics/foodsafety/residue.

References

[1] Berry, S. T., 1994. Estimating discrete-choice models of product differentiation, Rand Journal of Economics 25, 242–262.

[2] Chung, S., Lee, J., Osang, T., 2016. Did China tire safeguard save U.S. workers? European Economic Review 85, 22–38.

[3] Kagitani, K., Hariyama, K. 2015 Safeguards and voluntary export restraints under the World Trade Organization: The case of Japan's vegetable trade, Japan and the World Economy 36, 29–41.

[4] Kitano, T., Ohashi, H. 2009. Did U.S. safeguard resuscitate Harley Davidson in the 1980s? Journal of International Economics 79, 186–197.

[5] Kuno, A., 2006. An evaluation of Japan's first safeguards actions, World Economy 29, 763–782.

[6] Mulgan, A. G., 2005. Japan's Agricultural Policy Regime, Routledge.