1988 Japanese Beef Market Access Agreement: Forecast Simulation Analysis

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Abstract: This paper uses dynamic simulation analysis to consider the likely consequences of the 1988 Japanese Beef Market Access Agreement (BMAA) on the Japanese livestock industry and beef imports. Using a simultaneous equations, econometric model of Japanese livestock markets, a forecast baseline up to 1997 was first established, assuming that the Japanese beef import quota continues to increase by 9,000 tons annually as under the 1984 agreement. The restrictions of the new agreement were then imposed on the model. The results lead to a number of conclusions. Beef imports will increase to the new quota level in the first three years and continue increasing at about the same rate thereafter. The shift from the import quota to the import tariff in 1991 will have little effect on imports or prices. The US share of increasing Japanese beef imports will increase at the expense of Australia and New Zealand. The effects of the BMAA on the Japanese beef industry will be significant but less than devastating. The pigmeat industry will also be affected. The chicken and fish industries will be little affected. Finally, the degree of responsiveness of Japanese cattle producers to the expected beef price decline will significantly affect the outcome.

Introduction

Following years of often heated negotiations with the USA and Australia, Japan recently agreed to a phased reduction of its longstanding restrictions on beef imports. The new agreement requires a substantial increase in the Japanese beef import quota for three years, followed by a switch to a declining import tariff over the subsequent three-year period. Japan has historically rejected calls for greater access to its beef market, allowing only relatively small increases in the import quota in an attempt both to appease US interests and to minimize the opposition of the politically powerful domestic cattle producers. This recent agreement, however, will significantly curtail Japanese intervention in its beef market over a number of years and force the Japanese cattle industry to adjust slowly to greater market determination of the supply of, demand for, and prices of beef.

The previous agreement, implemented in 1984, only required the Japanese to expand the import quota by 9,000 tons per year for four years, which would have brought the total import quota to 177,000 tons by early 1988. Despite a quota increase of 46,000 tons (37,000 tons above the negotiated level) in the last year of the agreement, the Japanese refused to consider additional increases when the agreement expired on March 31, 1988. Consequently, the USA, along with Australia and New Zealand, filed a complaint with the GATT on the Japanese beef import restrictions. Before GATT could take action, however, bilateral negotiations between the USA and Japan resulted in the signing of a new agreement in June 1988. Under the new agreement, the Japanese import quota will increase by 60,000 tons per year up to 1990 (the transition period), after which the quota system will be replaced with a temporary import tariff to be reduced from 70 percent in 1991 to 60 percent in 1992 and 50 percent in 1993 (the post-transition period). Additional safeguards for the Japanese allow for an additional 25-percent tariff in any year of the post-transition period in which beef imports increase by 20 percent over the previous year. Beginning in 1994, border measures on Japanese beef imports will be limited to those yet to be agreed upon in the ongoing Uruguay round of the multilateral trade negotiations.

Throughout the negotiations with Japan, US policy makers have implicitly assumed that an elimination of the quota will lead to increased imports of US beef. No guarantee exists, however, that imports will increase during the transition period or, at least, increase enough to reach the higher quota levels. During the post-transition period, the behaviour of imports will depend crucially on the price effects of the import tariff and the relative responsiveness of the domestic demand and supply of meat.

The Japanese, on the other hand, have assumed that beef import liberalization would devastate the domestic cattle industry. Although elimination of the restrictions on beef imports could be expected to put pressure on the domestic Japanese cattle industry as well as the domestic pig, poultry, and fish industries, the extent of the impact depends crucially on the degree to which imports increase, the response of cattle producers to the expected

price effects, and the degree of substitutability among meats (including fish) in Japanese consumption.

The likely dynamic effects of the 1988 Japanese Beef Market Access Agreement (BMAA) on the Japanese meat industry and imports of beef over the agreement period up to 1997 are measured in this study using an annual, simultaneous equations, econometric simulation model of the Japanese livestock industry. First, some discussion of Japanese beef policy is provided as background. Next, the econometric model and analytical techniques used are briefly described, followed by a forecast simulation analysis of the effects of the new agreement. Finally, the paper concludes with some policy implications.

Japanese Beef Policy

A restrictive import quota has been the main tool of the Japanese government to support the domestic cattle industry and encourage beef production. Through the complicated import quota structure, the government attempts to maintain the established domestic beef target prices. Then, through a fine-tuning mechanism of purchasing and storing or releasing beef from stocks (the beef price stabilization scheme), the government stabilizes the domestic prices of beef around the targets within a politically and socially acceptable range (the upper and lower stabilization prices). As a consequence, Japanese domestic beef prices have tended to be higher and more stable than otherwise might have been the case. The rapidly increasing demand for beef in Japan has required the government to allow imports to increase at least in line with demand increases over time in order to keep prices from increasing significantly above the established price stabilization range. Under the new agreement, if the annual increases in the quota during the transition period are large enough compared to the annual growth in beef demand in Japan over that period, imports might not increase to the higher quota levels, and prices in Japan would fall towards world levels. As illustrated in Figure 1, an increase in the quota from OQ_m^* to OQ_m^1 would lead to a decline in the internal price of beef to P^1 and an increase in imports to the new quota level. An increase in the quota to OQ_m^2, however, would allow an increase in imports to only OQ_m^w, which is below the established quota level. The interaction of Japanese excess demand (ED) and the world net excess supply facing Japanese consumers (ES) would then determine the internal beef price level (P^w).[2] When the quota is dismantled and the import tariff is implemented in the post-transition period of the BMAA, beef imports could decline from the level attained by the end of the previous three-year period. If the tariff to be
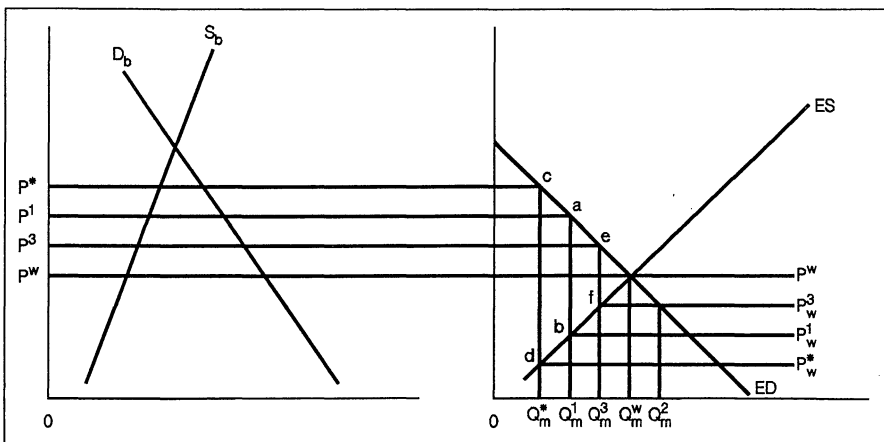

Figure 1—BMAA and Japanese Beef Imports

implemented is greater than the tariff equivalent of the quota (i.e., the percentage difference between the internal and world prices of beef), then imports will decline when the tariff is imposed. On the other hand, if the tariff is less than the tariff equivalent of the quota, imports will increase. Suppose, for example, that the quota has risen to OQ_m^l (Figure 1) just before it is replaced by an *ad valorem* tariff of cd/dQ_m^*, which is greater than the tariff equivalent of the quota (ab/bQ_m^l). Imports would then decline from the quota level (OQ_m^l) to OQ_m^*. But if the tariff were less than the tariff equivalent of the quota at ef/fQ_m^3, for example, imports would increase to OQ_m^3. Thus, whether Japanese beef imports will increase or decrease in 1991 from the level achieved in the first three years of the BMAA depends largely on the tariff equivalent of the quota in 1990; i.e., the divergence of the internal and world prices of beef in that year. If the internal price is more than 70 percent above the world price of beef in 1990, then Japanese beef imports will increase in 1991. Otherwise, the imposition of the 70-percent tariff in 1991 could actually lead to a decline in imports.

Because the Japanese government has consistently intervened in the past to stabilize prices, price changes within the established range have not been considered by cattle producers to be signals of future price movements. Consequently, Japanese cattle inventories historically have been relatively unresponsive to price changes. If the price of cattle were lower than expected in any given year and producers believed that this was the result of an announced change in policy to reduce support to beef producers, however, producers would likely become more price responsive than was the case historically. This suggests that, given a change in policy, producer price expectations would be more affected by current price movements than would normally be the case. At the same time, the responsiveness of producers to the change in expectations would increase. Consequently, a realistic measure of Japanese cattle producer and, therefore, domestic beef supply response to a reduction in government support of domestic beef production over the agreement period must account for the likelihood of increased producer responsiveness to price movements in a changed policy environment.

Japanese Livestock Industry Model

The dynamic effects of the BMAA (1988-97) on the Japanese livestock industry are measured in this study using an annual, simultaneous equations, econometric model of the Japanese livestock industry. The 70-equation model contains three simultaneous blocks: the Wagyu (native breed) and dairy cattle and beef sector, the pig and pigmeat sector, and the chicken and chicken meat sector. Each block contains two main components: (1) live animal supply (breeding herd, slaughter livestock inventories, animals raised, and imports) and slaughter demand and (2) meat supply (production and imports) and consumption.

The parameters of the behavioural equations were estimated using two-stage least squares and data for 1962-85. The statistical structure of the full model, along with validation statistics, is detailed in Wahl and Williams (1987b). The model has been enhanced by incorporating a meat expenditure system on the demand side of the model. World meat prices are also now endogenous with the inclusion of net excess world meat supply relations in the model. Unfortunately, space limitations preclude more than a general description of the full model.

The meat expenditure system in the model follows the "almost ideal demand system" specification of Deaton and Muellbauer (1980) and is discussed at length in Hayes, Wahl, and Williams (1988). The price and expenditure elasticities of the Japanese demand system used in the model and presented in Table 1 are Hicksian measures with Slutsky symmetry, homogeneity, and net substitutability among meats imposed. All own-price elasticities are negative, and all compensated cross-price elasticities are positive. Note that for all meats except chicken, the Japanese own-price elasticity of demand is greater than that for the USA. This is particularly the case for beef and implies, *ceteris paribus*, that any reduction in the Japanese beef import barrier would lead to a large increase in the quantity demanded

of import-quality beef.[3] The estimated expenditure elasticities indicate that both Wagyu and import-quality beef are luxury goods in Japan (Table 1). The expenditure elasticity of demand for import-quality beef is also slightly greater than that for Wagyu beef. This result is somewhat surprising because Wagyu beef is much more expensive than import-quality beef. Japanese consumers reportedly consider Wagyu beef to be a higher quality and more desirable commodity than imported beef (Miyazaki, 1986). Nevertheless, the share of consumer meat expenditures accounted for by import-quality beef more than doubled between the early 1960s and the mid-1980s while that of Wagyu beef was virtually constant over the same period (Wahl, Hayes, and Williams, 1987).

Table 1—Japanese and US Meat Demand and Expenditure Elasticities*

Price or Expenditure	Wagyu Japan	Beef† Japan	Beef† USA	Pigmeat Japan	Pigmeat USA	Chicken Japan	Chicken USA	Fish Japan	Fish USA
Wagyu	-2.06	0.32	---	0.23	---	0.05	---	0.06	---
Beef†	0.49	-1.00	-0.37	0.13	0.52	0.06	0.34	0.04	0.19
Pigmeat	0.95	0.36	0.27	-0.81	-0.67	0.06	0.24	0.20	0.16
Chicken	0.16	0.11	0.08	0.05	0.10	-0.21	-0.51	0.17	-0.12
Fish	0.47	0.20	0.02	0.39	0.04	0.04	-0.07	-0.31	-0.23
Expenditure	1.42	1.47	1.28	0.34	0.99	1.07	0.21	1.16	0.15

*US elasticities are from Chalfant (1987); all elasticities are Hicksian measures with Slutsky symmetry and homogeneity imposed; and net substitutability is also imposed for Japan.
†Import quality.

The estimated compensated cross-price elasticities suggest that Wagyu and import-quality beef are not highly substitutable. Hayes, Wahl, and Williams (1988) test and reject the hypothesis that Wagyu and import-quality beef are perfect substitutes. This result is of particular relevance for this analysis. The Japanese government has restricted beef imports in the past in order to protect the Wagyu beef industry. The implicit assumption underlying that policy has been that Wagyu and imported beef are near-perfect substitutes. This does not appear to be the case, however, so that any change in the level of beef imports will influence Wagyu beef demand only through the import-quality beef cross-price elasticity.

The expenditure elasticities for both poultry and fish are greater than the pigmeat expenditure elasticity for Japan, whereas the opposite is the case for the USA. The implication is that pigmeat occupies the same position in Japanese spending priorities as does poultry in the USA. Increased pigmeat consumption is not an automatic consequence of income growth, as is the case for beef. Increased pigmeat consumption in Japan is thus only likely to occur if pigmeat prices fall, regardless of changes in real income. The estimated elasticities of the fish expenditure share with respect to the prices of other meats are not significantly different from zero, suggesting little substitutability between fish and other meats in consumption.

Dynamic Forecast Simulation Analysis of the BMAA

To forecast the likely dynamic effects of the BMAA on Japanese beef imports and the Japanese livestock and meat industry, a forecast baseline was first established for 1988-97. The baseline assumes no change in Japanese beef policy over the forecast period; i.e., a continuing annual increase in the Japanese beef import quota of 9,000 tons as under the 1984-88 agreement up to the end of the forecast period.[4] Forecasts of the exogenous agricultural and macroeconomic variables in the model were based on the long-term international projections of the Food and Agricultural Policy Research Institute (1988) and the WEFA Group (1988).[5]

Producer Behaviour under the New Policy

The primary objective of the simulation analysis is to determine the likely effects of the new agreement on Japanese beef imports, the import shares of the USA and competing exporters, and domestic meat supplies, consumption, and prices in Japan over the next decade. What is likely to happen, however, depends crucially on how domestic beef producers will respond to the reduction in government price support. The typical analytical procedure would be simply to simulate the model over the forecast period, given the restrictions of the new agreement. The changes in the model variables from their baseline forecast values in the simultaneous system would be taken as a measure of the impact of the new agreement on the Japanese livestock industry. Lucas (1981), among others, however, has questioned this procedure because a policy change alters the underlying structure of a market. Thus, such a permanent shift in beef import policy would result in permanent changes in Japanese beef prices so that the price responsiveness of Japanese breeding herds, as estimated from historical data, would be inappropriate to use for the forecast simulation analysis. This is because producers would probably be more responsive to price changes under the changed policy environment than would otherwise be the case. As a consequence, the typical simulation analysis would tend to underestimate the effects of the new policy.

Based on a procedure suggested by Wahl and Williams (1987a), the estimated coefficients in the Wagyu and dairy cattle breeding inventory equations were altered to reflect an increase in both the coefficient of price expectations (θ) and the parameter for breeding herd size responsiveness to changes in price expectations (b), before simulating the implementation of the new policy.[6] The result is a more representative measure of cattle producers and, therefore, of domestic beef supply response to reduced support from the government. Unfortunately, the extent to which θ and b should be increased is unknown, so that any particular choice is arbitrary. The historically estimated values of θ and b represent the minimum likely responsiveness. The maximum feasible values of each are those that are consistent with the biological restrictions on the year-to-year growth in the Wagyu and dairy breeding herd sizes, given the price changes under the new policy. Given the extreme nature of the shift in policy in Japan from a slowly increasing import quota to a substantially liberalized beef market, the maximum levels of both θ and b would probably most nearly approximate the price responsiveness of domestic beef producers under the new policy. For purposes of comparison, two sets of simulations representing the historical producer price responsiveness (HIST) and the maximum feasible producer price responsiveness (MAX) are compared to the baseline forecast. The simulated changes in the values of the model variables in each scenario from their baseline values approximate the range of likely effects of the new agreement.

Simulation Results

The beef import quota was increased by 60,000 tons in each year of the transition period (1988-90), becoming the upper limit on beef imports in each year. If imports are below the quota level in any year of the transition period, the interaction of the domestic and world beef markets in the model determines the simulated internal price of beef as the world price plus a 25-percent tariff. Otherwise, the quota is binding, cutting the link between internal and world beef prices. In accordance with the agreement, the quota was replaced in 1991 by a 70-percent import tariff that declined to 60 percent in 1992 and 50 percent in 1993. If necessary, an additional 25-percent tariff is imposed in any year of the post-transition period in which imports increase by more than 20 percent, as stipulated in the agreement. The 50-percent tariff was assumed to hold for the 1994-97 period. Beef in government inventories at the end of 1987 as part of the price stabilization programme was assumed to be sold in 1988. Other Japanese farm programmes, such as milk price supports, were assumed to remain in effect over the simulation period.

Despite the significant increase in the level of the import quota under the BMAA during the transition period, the demand for beef is strong enough to push imports to the quota in each year during that period. When the tariff is implemented in 1991 and the quota eliminated, imports continue to increase to a peak of nearly 590,000 tons in 1993, about 50 percent above the last quota level in 1990 and over 100 percent above the baseline level under the MAX assumption. Even under the assumption of minimum producer price response (HIST), however, imports increase significantly as a result of the new policy. Imports from the USA and Australia both increase from 85,000 tons and 121,000 tons (carcass weight basis), respectively, to 264,000 tons and 324,000 tons. The USA gains slightly in import share from 39 percent in 1987 to 43 percent in 1997, while the Australian and New Zealand shares drop from 55 percent and 3 percent, respectively, to 53 percent and 1 percent.

The BMAA leads to a sharp reduction in beef prices in Japan. At the retail level, the price of beef drops by nearly 20 percent in the first year of the new policy. This occurs because not only do imports increase but also domestic beef supply increases to some extent as producers send Wagyu and dairy breeding stock to slaughter. Internal beef prices subsequently rebound to some extent, because the liquidation of breeding herds leads to a tighter supply situation in later years. The shift in 1991 to the 70-percent tariff has little effect on internal beef prices and, therefore, on the domestic supply and demand for beef. The tariff equivalent of the quota drops gradually from about 240 percent in 1987 to 137 percent in 1988, 97 percent in 1989, and 63 percent in 1990, under the MAX assumption. Consequently, the switch to a 70-percent import tariff in 1991 from the quota forces only a relatively mild increase in domestic prices.

In the baseline, the dairy industry continues in the liquidation phase of the dairy cattle cycle up to 1988. The dairy breeding herd begins to build again in 1989 and hits a peak in 1992, about 12 percent above the previous peak in 1985. The profitability of milk production continues to rise as the highly protective Japanese milk producer support policy maintains milk prices at a relatively high and increasing level. With the implementation of the BMAA, however, the drop in the domestic price of beef forces an immediate reduction of the dairy breeding herd, which has long-run implications. In essence, Japanese dairy beef producers recognize that beef prices will decline significantly in the future when the new policy is implemented and react accordingly. Consequently, dairy steer fatteners bear the burden of the reduction in the price of beef. Nevertheless, even under the assumption of maximum dairy producer responsiveness to the price drop, the dairy breeding herd declines by only about 22 percent between 1987 and 1990 before rebounding to some extent. Because 90 percent of the revenues of dairy calf producers come from milk production, the predicted increase in the profitability of milk production forestalls any larger impact from the reduction in the profitability of dairy steer fattening. By the end of the forecast period, the dairy herd is about 27 percent below the baseline as a result of the new policy. The effects of the new policy on the dairy industry are greatly underestimated if the change in the behaviour of dairy cattle producers to the changed policy environment is ignored. For example, the simulation of the policy effects using the historically estimated producer responsiveness to changes in expected prices (HIST) differs little from the baseline, underestimating the effects of the new policy on the Japanese dairy breeding herd by nearly 80 percent by the end of the agreement. The additional beef imports under the new policy would be unlikely to displace feed grain imports to any great extent, as the Japanese milk price support remains unaffected. As a corollary, a reduction in the very high protection afforded Japanese milk producers would probably do more to reduce domestic production of beef than is estimated to occur under the BMAA.

The BMAA affects the Wagyu industry in the model only through the estimated cross-price elasticity between import-quality and Wagyu beef. Because this elasticity is significantly larger than zero (Table 1), the simulated decline in the import-quality beef price as a result of the new policy has a significant impact on the Wagyu industry. Under the MAX assumption, the Wagyu steer carcass price drops by 15 percent in 1988 and is over 16 percent lower than the baseline, inducing a decline in the Wagyu breeding herd of about 23 percent in 1988. Consequently, Wagyu beef output initially increases as farmers

reduce the size of their breeding herds, placing further downward pressure on Wagyu prices. After the initial declines, both the Wagyu breeding herd and the carcass price tend to rebound to some extent. A continuing consumer preference for Wagyu beef combined with declining supplies puts some upward pressure on prices and arrests the decline in Wagyu inventories and beef output. By the end of the forecast period, the Wagyu breeding herd is about 16 percent lower and Wagyu prices only 2 percent below what would otherwise have been the case. Again, the reductions in the Wagyu carcass price and, hence, in the Wagyu breeding herd are quite small if producers are assumed to be fairly unresponsive to price changes (i.e., the HIST assumption).

The effects of the change in Japanese beef import policy on the pig and chicken sectors are significant. Sow inventories under the MAX assumption, for example, drop to nearly 8 percent below the baseline by the end of the forecast period. Pigmeat prices drop by 14 percent in 1988 and are 5 percent below the baseline at the end of the period. Pigmeat consumption also drops over the period to about 8 percent below the baseline despite the drop in price because of the reduction in the production of pigmeat from the lower prices. Chicken and fish consumption are little affected by the new policy. Consequently, their shares of total meat expenditures increase along with that of import-quality beef, as the shares of both Wagyu beef and pigmeat decline.

Implications for Policy

Beef imports under the new agreement will increase to the quota level in each year of the transition period and continue increasing at about the same rate in the post-transition period. The internal demand for beef at the reduced price implied by the increasing quota is thus strong enough to absorb the additional beef output from a reduction in Japanese breeding herds and still push imports to the levels allowed by the quota.

The shift from the import quota to the tariff in 1991 will have little impact on imports, prices, or the domestic Japanese livestock industry. The tariff equivalent of the quota (i.e., the percentage difference between the internal and world prices of beef) drops gradually from about 240 percent in 1987 to 137 percent in 1988, 97 percent in 1989, and 63 percent in 1990. Consequently, the switch to a 70-percent import tariff in 1991 results in only a relatively mild increase in the domestic price of beef. This conclusion could be affected by any number of unanticipated exogenous events, including, for example, changes in US or Japanese macroeconomic policies affecting exchange rates, income growth rates, or the rate of inflation.

Exports of beef to Japan by both the USA and Australia will increase, with the USA gaining slightly in market share as a result of the BMAA. US exports are estimated to increase on average by about 26,000 tons or $132 million a year over the six years of the agreement. Gross revenues of the US beef industry are estimated to increase by about $795 million over the life of the agreement.

The effects of the new agreement on the domestic Japanese livestock industry will be significant but less than devastating. The dairy breeding herd could decline by as much as 22 percent as a result of the decline in profitability of dairy steer fattening. Any larger effect is unlikely because of the high level of price support provided to milk producers and the relatively small proportion of average dairy producer income that depends on dairy steer fattening. An agreement to reduce the milk price supports in Japan would probably have a greater impact on Japanese beef production than would any agreement simply to reduce support for beef producers. Wagyu beef is not highly substitutable for import-quality beef in Japan. Consequently, increased imports of beef under the new agreement will have a more limited impact on the Wagyu industry than on the dairy industry. By the end of the forecast period, for example, Wagyu beef output is only about 18 percent below the baseline, whereas that of dairy beef is nearly 30 percent below. Note that treating Wagyu and dairy beef as close substitutes would lead to an overestimation of the impact of the new agreement. Considering them as completely unrelated commodities, however, would

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lead to the equally erroneous conclusion that the new beef import agreement would have no impact on the Wagyu industry.

The degree of responsiveness of Japanese cattle producers to the expected beef price decline in the changed policy environment will significantly affect the outcome of the new agreement for the Japanese livestock industry. If Wagyu and dairy cattle producers are assumed to be no more responsive to expected price changes under the new agreement than they have been historically under a stable price environment, the BMAA would be expected to have little effect on the domestic cattle industry. Given the extreme nature of the shift in policy from a slowly increasing import quota to a substantially liberalized beef market in Japan, however, producers are likely to be quite responsive to the shift in policy. If producers are assumed to respond to price changes according to historical standards, the effects of the new policy on the dairy breeding herd, for example, could be underestimated by as much as 80 percent.

The new agreement will have a significant effect not only on the beef but also on the pigmeat industry in Japan. Pigmeat production, for example, could be as much as 8 percent lower than the baseline by 1993 as a result of the agreement. The chicken and fish industries will be little affected.

Finally, what happens after the agreement expires in 1993 will depend on the outcome of the current GATT negotiations. If negotiators agree to a further reduction in the Japanese import tariff, Japanese beef demand should be strong enough to cause further increases in Japanese beef imports.

Notes

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[2]The BMAA allows for the continuation of the 25-percent import tariff in this case. Note that the upward sloping excess supply curve in Figure 1 implies the usual "large country" assumption in which the behaviour of Japanese beef producers and consumers affects world beef prices and markets.

[3]The term "import-quality beef" is used to refer to the aggregate of imported and domestic beef.

[4]This assumes that the 37,000-ton increase in the quota above the negotiated level in 1987 was a one-off occurrence.

[5]The average annual growth rate of Japanese household income, a particularly important exogenous variable for this analysis, is about 3 percent above the forecast period.

[6]Space limitations preclude a detailed discussion of the procedure. See Wahl and Williams (1987a) for details.

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DISCUSSION OPENING—*Toshio Kuroyanagi* (Hokkaido University)

In June 1988, the negotiations over Japan's programme for beef import liberalization were concluded between the USA and Japan. The agreement on the programme is as follows: (1) Japan shall increase beef imports by 85,714 t of dressed carcass every year from 1988 to 1990; (2) after 1991, Japan will liberalize beef imports; and (3) the rate of duties on imported beef prices will be gradually decreased; i.e., 70 percent in 1991, 60 percent in 1992, and 50 percent in 1993.

In Japan, results of simulation analyses on import beef liberalization were made by Keiji Ohga and Shigemasa Matsubara of the Ministry of Agriculture, Forestry and Fishery. The simulation analysis by Ohga is based on the Japan-USA agreement on beef import liberalization mentioned above. Other assumptions are as follows: case 1 is without deficiency payments for calves; in case 2, the deficiency payment is the difference between ¥300,000 and the average market price per Wagyu calf, and the difference between ¥160,000 and the average market price per dairy calf. The exchange rate is ¥125/$1. The rate of increase in population is 0.7 percent and that in annual expenditure on personal consumption is 2.7 percent. The beef import price is $3.20/kg of dressed carcass f.o.b., and the freight is $0.40/kg. The study by Wahl *et al.* differs from that by Ohga in terms of assumptions for simulation methods. However, the two studies agree roughly concerning the assumption that the PSE will be reduced to zero by 1997.

Japan's situation on consumption of beef is as follows: (1) consumption of beef per capita in 1985 was 4.4 kg, about one-sixth of the level in Europe and America; (2) in 1985, the ratio of demand for beef to total meat was 18 percent, being expected to increase, while that for pigmeat was 42 percent and for chicken 34 percent; (3) beef production costs for Wagyu steers in 1983 were about three times those for US steers, and those for dairy steers were about double.

A point of the simulation analysis on import beef liberalization common to Wahl and Ohga is that their assumptions for simulation agree roughly. Namely, reduction of producer price support results in an increase in beef imports, substitution of dairy beef for Wagyu beef, and lower prices of both types of beef. The Ohga model shows that the deficiency payment for beef increases the production of both Wagyu and dairy beef, and this fact further increases the deficiency payment. On the other hand, Wahl's paper shows that dairy beef production increases due to the government support to dairy farming, while Wagyu beef decreases. Accordingly, abolition of this support leads to a great decrease in total beef production compared with reduction of support for beef production, except dairy farming, because dairy beef is mainly produced in Japan.

In this way, the reduction of support to beef cattle producers has a great influence on dairy farming, because dairy beef forms 70 percent of Japan's beef production. Even

among dairy farmers, the decrease in newborn calf prices results in an economic loss to stock feeders and a gain to growing and finishing farmers.

Following the beef import liberalization, bipolarization on Japan's market occurs between the increase in calf prices of high-quality Wagyu steers and the decrease in calf prices of middle-class Wagyu steers and dairy steers. Moreover, consumers will react to the standard to prevent agricultural chemical pollution of import beef in the future.

I have some specific questions about Wahl's paper: (1) exogenous variables do not include input prices (i.e., why were wages and feed prices not used?); (2) is the level of statistical significance of the cross-elasticity of meat satisfactory?; and (3) PSE is effective in terms of CSE or free trade, but is PSE, regardless of input prices, a reasonable index to show degree of government support for agriculture.

GENERAL DISCUSSION—*Mathew Shane* (Economic Research Service, US Department of Agriculture)

A participant asked which elements of the Japanese livestock model were based on trend extrapolations and which were based on income and price effects. The author replied that income and population growth rates were taken from WEFA. Wholesale prices were also assumed exogenously. Quantities were then assumed to respond through income and price effects.

Another participant asked what retail prices were used in the calculations and if the retail margin was allowed to vary. The author replied that dairy and Wagyu beef were assumed to have separate prices, while the retail margin was assumed to be constant throughout the projection period.

A question was raised about whether the variables chosen biased the outcome towards increasing US market share over Australia. The author replied that the USA gained market share because of the assumptions about relative demands for high quality versus lower quality beef and the relative initial positions of the two suppliers.

Participants in the discussion included I. Jarratt, G.T. Jones, and K. Terfertiller.