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FORECASTING CHANGES IN THE STRUCTURE OF JAPANESE MEAT INDUSTRY UNDER ALTERNATIVE BEEF IMPORT LIBERALIZATION SCENARIOS

Thomas I. Wahl, Gary W. Williams, and Dermot J. Hayes*

Since at least the mid-1970s, Japan and its beef import suppliers, the United States and Australia in particular, have engaged in heated negotiations on the level of the Japanese beef import quota. U.S. negotiators have demanded that Japan completely liberalize beef imports. The Japanese have responded in a piecemeal fashion, increasing the quota by comparatively small amounts in an apparent attempt both to appease U.S. interests and to minimize the opposition of the politically powerful domestic cattle producers. In the fall of 1984 the Japanese agreed to expand the total beef import quota by 9,000 metric tons (mt) per year for four years, which would have brought the total import quota to 177,000 mt by early 1988. Despite a quota increase of 46,000 mt (37,000 mt 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.

Discussions on the level of the quota beyond 1988 are continuing and are a part of more general, multilateral discussions on agricultural protectionism worldwide under the auspices of the General Agreement on Tariffs and Trade (GATT). A major objective of the GATT discussions is expected to be progressive reduction of agricultural support. A measure of relative levels of agricultural protection, known as Producer Subsidy Equivalents (PSEs), has been proposed by the United States as the main vehicle for GATT commitments in agriculture in the upcoming negotiations (OECD). If acceptable to participating countries, a gradual and balanced reduction of PSEs would become the focus of GATT negotiations.

The main interest of U.S. policymakers and beef producer groups in the Japanese beef market, of course, has been greater access of U.S. beef to a rapidly growing international market for meat. Consequently, U.S. analysts have focused on the impact of greater liberalization of Japanese beef imports on U.S beef exports and export market share. Little attention has been given to the likely effects of liberalization on the structure of the domestic Japanese meat industry. Liberalization could be expected to put pressure on not only the domestic Japanese cattle industry but also the domestic hog, poultry, and fish industries to some extent because of the consequent influx of cheap foreign beef. The extent of this impact, however, depends crucially on both the extent of the impact of liberalization on the domestic beef industry as well as the degree of substitutability of meats (including fish) in Japanese consumption.

The general dynamic effects of a reduction in the level of Japanese assistance to beef producers (i.e., a reduction in the Japanese beef PSE) between 1988 and 1996 on the structure of the Japanese meat industry 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 utilized are briefly characterized, followed by a simulation analysis of the effects of three Japanese beef import liberalization scenarios that involve alternative Japanese beef PSE reduction paths. Finally, some inferences for current discussions on a new import quota agreement are drawn.

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Japanese Beef Policy

A restrictive import quota is 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 price of beef within a politically and socially acceptable range (the upper and lower stabilization prices). As a consequence, Japanese domestic beef prices tend to be higher and more stable than otherwise might be the case. Not surprisingly, growth in the production and consumption of pork and chicken in Japan has completely outstripped that of beef over the last twenty years. In 1960, for example, Japanese people consumed beef, pork, and chicken in nearly equal amounts, about 1 kg/per person/year (retail cuts basis). By 1985, however, per capita pork and chicken meat consumption had jumped to 9.4 kg/year and 12 kg/year, respectively, compared to that of beef at only 3.6 kg/year (retail cuts basis). The implication is, of course, that the Japanese beef policy has created an environment conducive to strong growth in the markets for competing meats in Japan. Liberalization of Japanese beef imports, therefore, could be expected to reduce the size and restrict the growth rates of these competing markets to the extent that imported beef is considered to be a substitute for domestically produced meats in Japanese diets.

The extent of protection afforded beef producers in Japan can be measured using the PSE concept. In general, protection of the production of a given commodity in a given country implies a direct or indirect transfer of income from the government and/or consumers to producers of that commodity (Tangermann, Josling, and Pearson). The PSE for a given commodity and country is a measure of that transfer. In other words, the PSE is the cash payment (subsidy) to farmers that would substitute for all direct and indirect government support policies and would result in no change in farm income. The PSE is usually calculated as the difference between the domestic and world prices of the specific commodity, times domestic production (which accounts for trade-distorting policies), plus the value of all other government transfers that directly or indirectly support production of that commodity. The calculated PSE is usually expressed in relation to one of several bases, including domestic output, domestic output valued at domestic prices, or domestic output valued at world prices. In the latter case, if only trade-distorting policies are included, the PSE is comparable to an ad valorem tariff.

Some agreement on exactly what policies to include in the calculation of PSEs would have to be reached before they could actually be used as the basis for negotiations. Tangermann, Josling, and Pearson (p. 5) consider it likely that a definition of PSEs would be adopted "such that only trade-distorting policies would be included, since in international negotiations the principal interest is trade implications rather than income transfers." In this study, therefore, PSE includes only the trade-distorting policy transfers to producers expressed as a percent of domestic production valued at world prices.

The Japanese Livestock Industry Model

The dynamic effects of a progressive reduction in the Japanese beef PSE over 10 years (1988 through 1996) on the structure of the Japanese meat 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 hog and pork 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 behavioral equations were estimated using two-stage least squares and data for 1962 to 1985. The statistical structure of the full model, along with validation statistics, is discussed elsewhere in detail (Wahl and Williams 1987b). The model has been further enhanced for this study by incorporating a meat expenditure system on the demand side of the model.

The major economic and biological relationships in the cattle and beef sector block of the model are schematically diagrammed in Figure 1. The hog and chicken sector blocks are similar in structure to that of the cattle block. The three blocks are linked together on the demand side of the model through the meat expenditure system. The cattle block is somewhat more complicated than the hog or chicken blocks because it includes both the Wagyu and dairy cattle and beef subsectors, substantially increasing the number of equations in the block. Also a market share approach as outlined by Meilke and Griffith is followed to provide some detail on Japanese beef imports by source (right-hand side of Figure 1).

The meat expenditure system in the model follows the Almost Ideal Demand System specification of Deaton and Muellbauer. The price and expenditure elasticities of the demand system are presented in Table 1. For comparative purposes, Table 1 also gives Chalfont's estimates of similar elasticities for the United States. (Chalfant employed a nearly identical estimation procedure.) The estimated elasticities for the Japanese meat demand system are, in general, in accordance with a priori expectations. All own-price elasticities are negative, while most of the compensated cross-price elasticities are positive. For all meats, the Japanese own-price elasticity of demand is greater than that for the United States. 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[1] beef. The estimated expenditure elasticities indicate that both native and import-quality beef are luxury goods in Japan (Table 1). The expenditure elasticity of demand for import-quality beef is also greater than that for native beef. This result is somewhat surprising because native beef is much more expensive than import-quality beef. Japanese consumers consider native beef to be a much more desirable commodity than imported beef (Miyazaki). Nevertheless, the import-quality beef expenditure share more than doubled over the sample period, while the native beef expenditure share was virtually constant over the same period.

The Japanese expenditure elasticities for both poultry and fish are greater than the pork expenditure elasticity. Again, this is not the case for the United States where poultry has the lowest expenditure elasticity of all meats. The implication is that pork occupies the same position in Japanese spending priorities as poultry does in the United States. Increased pork consumption is not an automatic consequence of income growth as is the case for beef. Consequently, increased pork consumption in Japan will likely occur only if pork prices fall, regardless of changes in real income. In general, the estimated cross-price elasticities for fish are not significantly different from zero. Nevertheless, the authors provide statistical evidence elsewhere that fish cannot be treated as separable to other meats in Japan (Hayes, Wahl, and Williams).

The cross-price elasticities (both Marshallian and compensated) of import-quality and native beef indicate that they are substitutes (Table 1). Hayes, Wahl, and Williams construct an asymptotic likelihood ratio test to determine whether native and import-quality beef are, in fact, perfect substitutes. They find that the null hypothesis of perfect substitutability of native and import-quality beef can be rejected at the 5 percent level of confidence. This result is of particular relevance for this analysis. The Japanese government restrictions on

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

Figure 1. Japanese Livestock Industry Model : Wagyu and Dairy Cattle and Beef Sectors

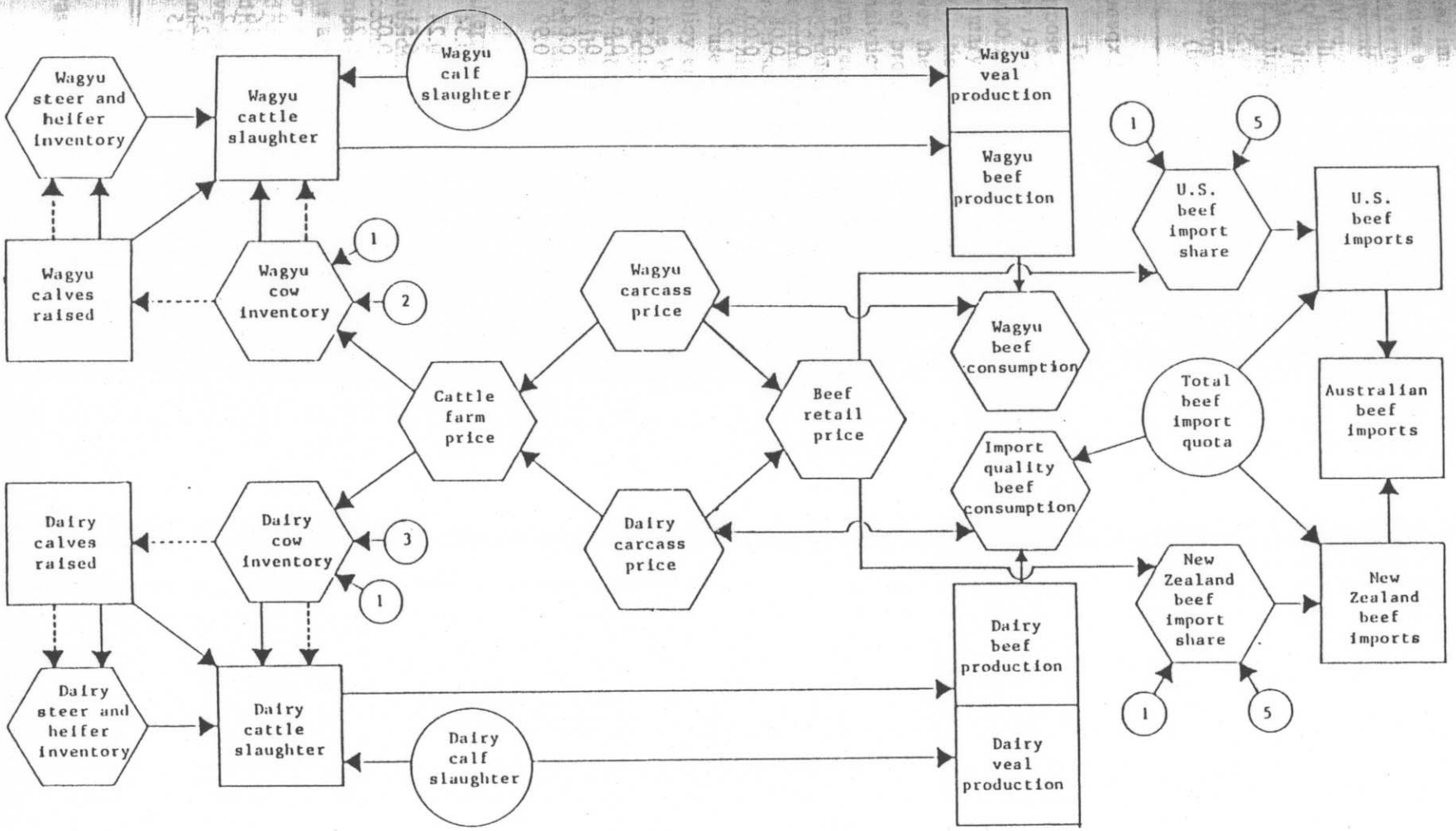


Table 1. Japanese and U.S. Meat Demand and Expenditure Elasticities[a]

Meat Type	Price or Expenditure	Compensated Elasticities for Japan (Slutsky Symmetry and Homogeneity Imposed)	Marshallian Elasticities for Japan (only Homogeneity Imposed)	Marshallian Elasticities for Japan (Slutsky Symmetry and Homogeneity (Imposed)	Marshallian Elasticities for the United States (Slutsky Symmetry and Homogeneity Imposed)
		% Change in Quantity Demanded From a 1% Change in Price or Expenditure			
NQ Beef					
	NQ Beef	-2.13	-2.38	-2.27	
	IQ Beef	0.71	0.54	0.57	
	Pork	1.21	0.65	0.96	
	Chicken	0.47	0.31	0.27	
	Fish	-0.23	-0.22	-0.71	
	Expenditure	2.33	1.74	2.33	
IQ Beef					
	NQ Beef	0.46	0.63	0.21	-0.37
	IQ Beef	-1.34	-1.76	-1.56	0.27
	Pork	0.42	-0.14	0.14	0.08
	Chicken	0.03	-0.41	-0.21	0.00
	Fish	0.42	0.56	-0.06	1.28
	Expenditure	2.59	1.39	2.59	
Pork					
	NQ Beef	0.29	0.79	0.90	0.52
	IQ Beef	0.16	0.40	0.51	-0.67
	Pork	-0.73	-0.74	-0.80	0.10
	Chicken	-0.23	-0.26	-0.19	0.04
	Fish	0.51	-0.05	0.14	0.99
	Expenditure	0.29	0.40	0.29	
Chicken					
	NQ Beef	0.15	-0.20	0.19	0.34
	IQ Beef	0.02	-0.14	-0.01	0.24
	Pork	-0.29	-0.29	-0.51	-0.51
	Chicken	-0.64	-0.85	-0.79	-0.07
	Fish	0.77	0.41	0.32	0.21
	Expenditure	0.83	1.52	0.83	
Fish					
	NQ Beef	-0.03	0.23	0.06	0.19
	IQ Beef	0.08	0.26	0.09	0.16
	Pork	0.25	0.06	0.06	-0.12
	Chicken	0.29	0.27	0.17	-0.23
	Fish	-0.60	-0.93	-1.03	0.15
	Expenditure	0.95	0.89	0.95	

[a]NQ Beef is native-quality beef and IQ Beef is import-quality beef.

Several alternative PSE adjustment formulas are available. Perhaps the most intuitive and reasonable from a modeling and forecasting viewpoint is to reduce the PSE by 1/X of the initial PSE level in each year, where X is the number of years over which the PSE is to fall to zero. This is shown as the diagonal line in Figure 2. Unfortunately, this concept may notappeal to trade negotiators because the measured level of PSEs in each year would depend on both domestic policies and world price levels. Countries are unlikely to agree to a PSE adjustment system that makes domestic agricultural policy a function of potentially volatile world prices. Indeed, the motivation for the protectionist policies of many countries is to protect domestic markets from the frequent wild swings in world prices. Hence, it seems unlikely that countries would accept a proposal that would immediately transfer this volatility to domestic prices and markets, at least until the impact of liberalization had stabilized world prices. The agreed-upon adjustment path, therefore, will likely have to allow for annual changes in the level of world prices.

A second alternative is the Swiss formula considered in the Tokyo Round of the GATT negotiations (Tangermann, Josling, and Pearson). This formula can be written as

$$PSE_t = aPSE_{t-1}/(a+PSE_{t-1}) \qquad (1)$$

where PSE_{t-1} is the PSE level in the year previous to the first year of the implementation of the reduction, PSE_t is the PSE level that must be achieved in a given year, and a is the negotiated coefficient of adjustment. The formula allows for annual changes in world price levels. For example, even though a sudden drop in world prices in a given year of the agreement would increase the measured PSE for that year, the formula automatically adjusts the target PSE upward for the following year. However, the nature of the formula guarantees that for all practical levels of the negotiated coefficient, the brunt of the adjustment will be borne in the early years of the agreement. This is demonstrated in Figure 3 in which the PSE adjustment paths for several values of the adjustment coefficient (a) are presented. The rapid adjustment of PSEs with this formula may be more suited to the industrial trade barriers considered in the Tokyo Round than to agriculture. Adjustment costs in agriculture would be relatively high. At the same time, the level of protectionism in agriculture is greater now than was the case during the Tokyo Round. Also, the Swiss formula does not allow for a reduction of a given PSE to zero over a given number of years. Unless the value of the adjustment coefficient is zero, the value of the PSE will never reach zero.

A third alternative is a modification of the Swiss formula that combines the features of the first two alternatives

$$PSE_t = \frac{R}{X} a\ PSE_{t-1}/(\frac{R}{X} a + PSE_{t-1}) \qquad (2)$$

where X is the negotiated length of the adjustment period and R is the number of years remaining in the agreement. This formula allows for a wide range of adjustment paths as demonstrated in Figure 4. The advantage of the modified formula is that a target date by which zero producer protection must be achieved can be stipulated.

Three PSE adjustment paths are assumed in this paper and correspond to those shown in Figure 2. A 10-year forecast horizon was chosen for this study because that is the adjustment period proposed by the United States in the GATT negotiations. The diagonal line in Figure 2 represents a reduction in the initial PSE level of one-tenth annually. The concave line is the adjustment which would occur with an adjustment coefficient value (a) of 0.5 in the Swiss formula as suggested by Tangermann, Josling, and Pearson. The S-shaped line represents the modified Swiss formula adjustment path with an adjustment coefficient value (a) of 5.

Figure 2. Alternative PSE Adjustment Paths

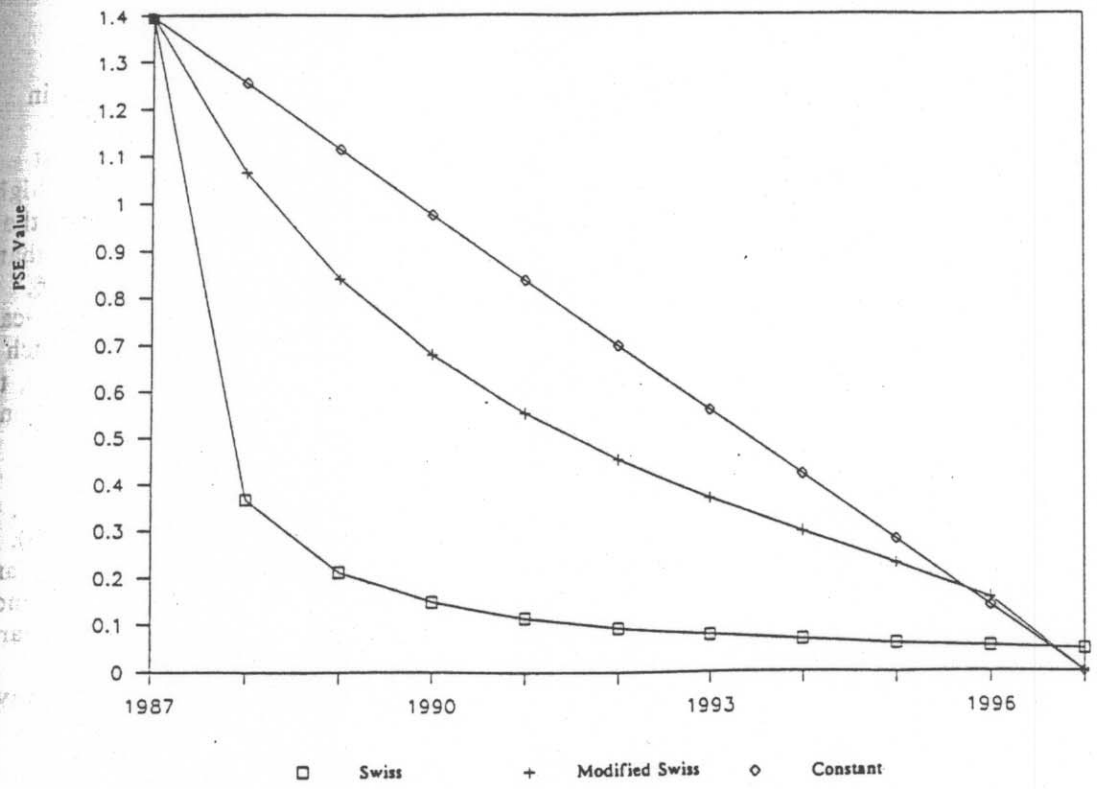
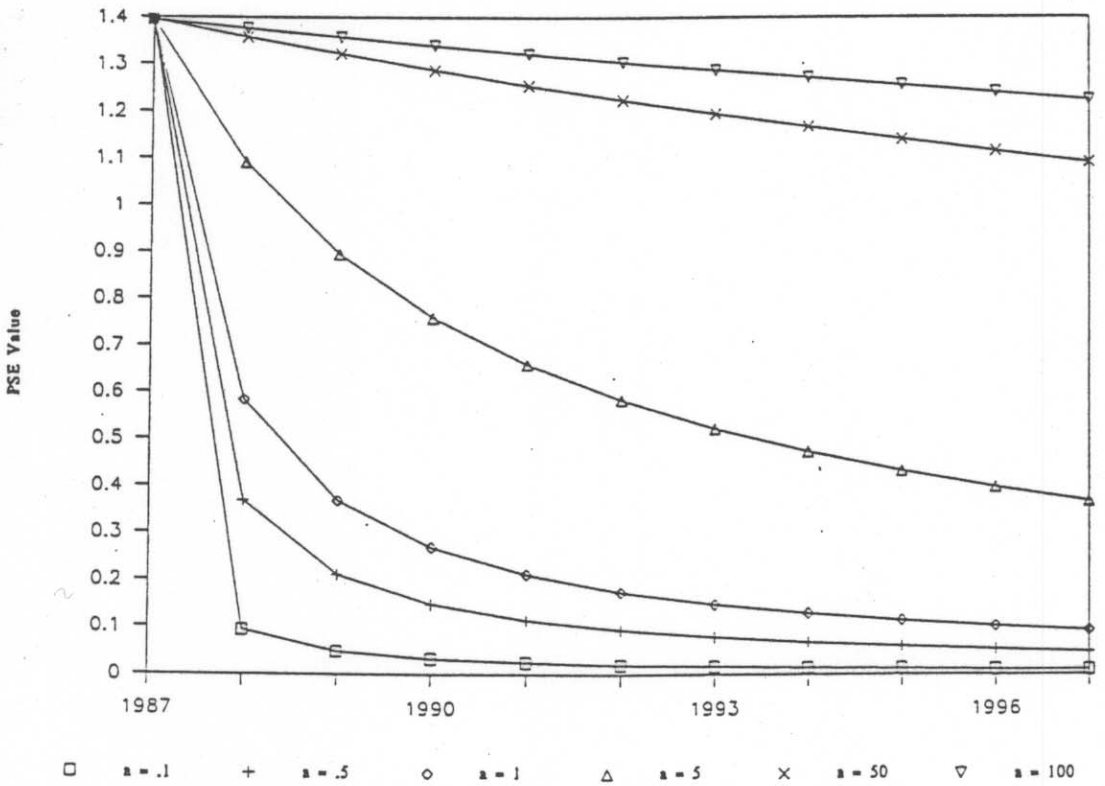


Figure 3. Alternative Swiss Formula PSE Adjustment Paths



beef imports to protect the native beef industry imply that Japanese policymakers consider native and imported beef to be close substitutes. Such does not appear to be the case. Nevertheless, the estimated cross-price elasticity between native and import-quality beef implies a significant degree of substitutability. Accordingly, the appropriate procedure is to treat native and import-quality beef as separate but related goods in the Japanese livestock industry model. Assuming that changes in the price of imported beef cause an equivalent corresponding change in native beef prices would greatly overestimate the impact of beef import liberalization on the native beef industry in Japan. Such an analysis would implicitly use a cross-price elasticity of demand of infinity, while the results of this study indicate that the elasticity is less than one.

Forecast Simulation Analysis of Alternative Beef Import Liberalization Scenarios

To forecast the dynamic effects that liberalization of Japanese beef imports would likely impose on the structure of the Japanese meat industry, a forecast baseline was first established for 1987 through 1996. The Japanese beef import quota was assumed to continue increasing by 9,000 mt/year as under the 1984-1988 agreement through the end of the forecast period.[2] The primary objective was to determine the likely effects of various methods of calculating a reduction in the Japanese beef PSE on 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 would respond to a reduction in government price support. The typical analytical procedure would be simply to simulate the model over the forecast period assuming some reduction in the level of the PSE. Lucas, among others, however, has questioned this procedure because a policy change alters the underlying structure of a market. Thus, a permanent shift in beef import policy would result in permanent changes in Japanese beef prices so that the responsiveness of beef producers to expected price changes as estimated from historical data would be inappropriate to use for the forecast simulation analysis. This is because beef producers would likely be more responsive to price changes given the changed policy environment than otherwise would be the case. Consequently, the estimated coefficients in the Wagyu and dairy breeding inventory equations were altered to reflect an increase in the respective coefficients of price expectations before simulating the various PSE reduction scenarios. Because of the extreme nature of the assumed policy shift, the maximum increase possible in the coefficient of price expectation, within biological constraints, was assumed. See Wahl and Williams (1987a) for details on the empirical procedures.

Alternative Japanese Beef PSE Reduction Schemes

Although the objective of agricultural trade liberalization talks is to reduce government subsidization of producers over some specified number of years, how that would actually be accomplished is not clear. The adjustment path chosen is crucial both for forecasting the impacts of import liberalization as well as for political reasons. Proposals that require most of the adjustment to occur in the years immediately following the agreement, as has been the case for industrial goods in previous GATT negotiations, may well imply politically unacceptable adjustment costs in agriculture. At the same time, agreements that delay the brunt of the adjustment until the latter years of the agreement would be wasteful to the extent that overproduction would continue. In addition, these latter agreements may break down when the time to make the adjustments finally arrives.

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[2]This assumes that the 37,000 mt increase in the quota in 1987 above the negotiated level was a one-time occurrence.

Figure 4. Alternative Modified Swiss Formula PSE Adjustment Paths

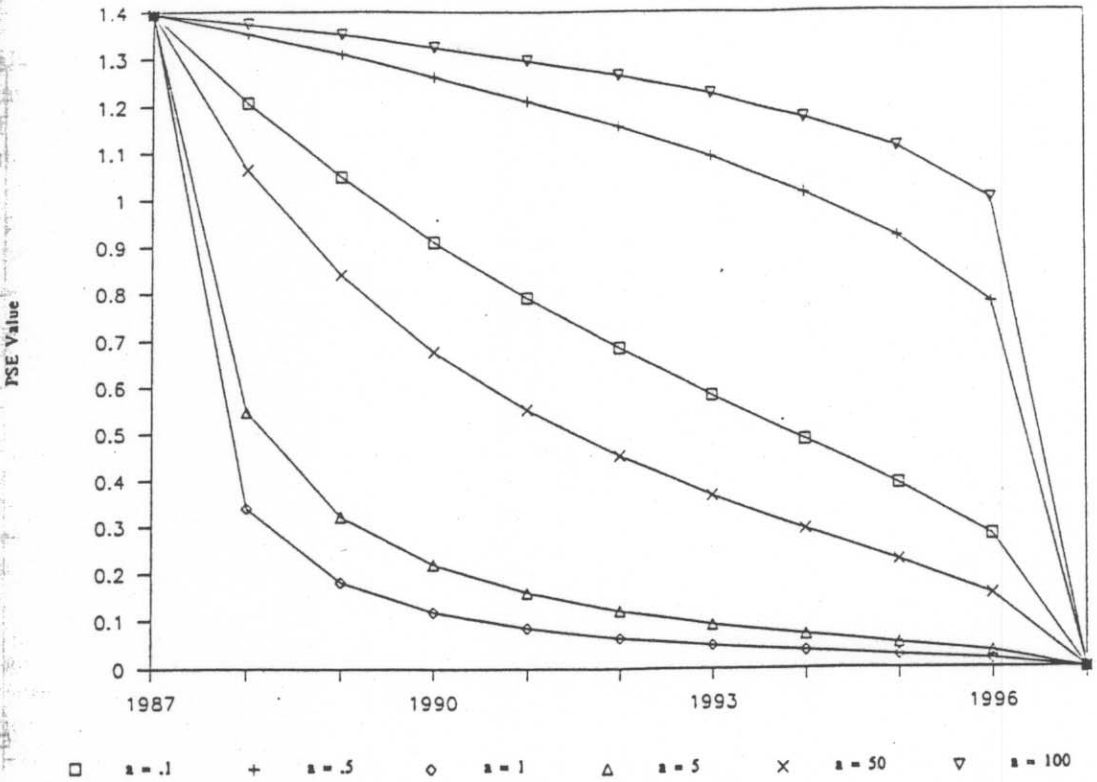
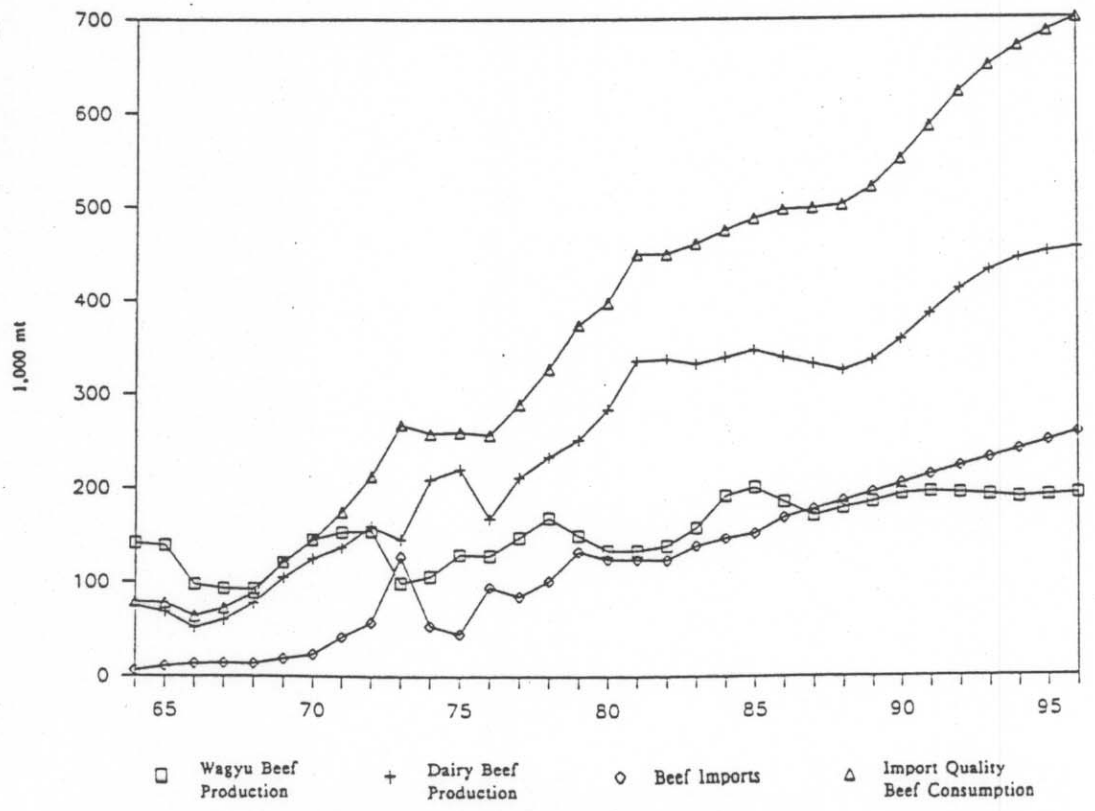


Figure 5. Japanese Beef Consumption, Production, and Imports : Actual and Baseline Forecast



The Baseline Forecast (1987 to 1996)

The baseline forecasts of Japanese beef consumption and production are presented in Figure 5. Given the assumed annual increase in the import quota, the rate of growth of domestic dairy beef production in Japan is forecast to decline somewhat over the forecast period from nearly 5% to 3% between 1976 and 1986. This rate of growth, however, is higher than the nearly zero growth rate experienced between 1981 and 1986. At the same time, the average annual growth rate of Wagyu beef production is also expected to decline to less than 1% over the forecast period compared to a nearly 4% growth rate between 1976 and 1986. Consumption of import-quality beef (domestic dairy and imported beef), however, is forecast to grow at about the 3% to 4% average annual rate experienced during 1981 to 1986 but much below the nearly 10% annual growth rate achieved between 1976 and 1980. Consequently, the gap between domestic production and consumption of import-quality beef is forecast to continue growing.

The baseline forecasts of per capita consumption of Wagyu beef, import-quality beef, chicken, pork, and fish indicate a continuation of the growth trends of the past (Figure 6). Per capita consumption of chicken and pork continues to grow rapidly from 12.1 kg/year and 9.4 kg/year, respectively, in 1986 to 22.5 kg/year and 16.0 kg/year, respectively, by the end of the forecast period. Per capita beef consumption increases more modestly from 3.6 kg/year in 1986 to 4.9 kg/year in 1996, mostly on the strength of the growth in the consumption of import-quality beef (dairy beef and imported beef). Per capita consumption of fish, however, remains relatively constant at about 20 kg/year.

Forecast Simulation of PSE Reduction Scenarios

Recalling that the PSE as defined here is comparable to an ad valorem tariff, the import quota in the model was first replaced by its tariff equivalent, i.e., the properly defined PSE. Progressive reduction of the PSE, therefore, implied a gradual narrowing of the percentage difference between the predicted world price of beef (the weighted average cost, insurance, and freight (CIF) price of imported beef) and the predicted internal Japanese price of dairy beef (i.e., the dairy steer carcass price) over a 10-year period. Imports are endogenously determined in this case as the difference between the domestic demand and supply of import-quality beef.

The forecasts of many of the exogenous variables in the model were based on the 10-year forecast of the Food and Agricultural Policy Research Institute (FAPRI). The simulated values of selected variables for the three alternative PSE reduction paths are presented in Figures 7 through 14. In general, the Swiss formula (with the adjustment coefficient term set at 0.5) resulted in the most dramatic changes in the model variables because of the large decline in the PSE required by that formula in the first years of the assumed agreement period (1988 through 1996).

In the baseline, the dairy breeding herd continues the growth pattern of the late 1970s, growing by 2% to 3% annually until the early 1990s and then leveling off somewhat in the final years of the forecast (Figure 7). This is due largely to two factors. First, the baseline projection suggests that the profitability of milk production will continue to rise as the highly protective Japanese milk producer support policy maintains milk prices at a relatively high and increasing level. Second, current and projected declines in world feedgrain prices are expected to give a further boost to the real profitability of milk production in Japan. The reduction in the dairy beef price over the forecast period is dramatic, reflecting a relatively high level of protection to beef producers before the implementation of the PSE reduction (Figure 8). Nevertheless, the dairy breeding herd and dairy beef output continue to increase, although at a 2% to 3% lower rate than in the baseline. This occurs despite the assumption of maximum

responsiveness of dairy beef producers to beef price changes in the price expectations formulation. In essence, the model assumes that Japanese dairy beef producers know at the time of the PSE reduction agreement that beef prices will decline in the future. Consequently, dairy steer fatteners would bear the burden of the reduction in the price of beef. Because 90% of the revenues of dairy farmers comes from milk production, however, the predicted increase in the profitability of milk production dominates the reduction in profitability of dairy steer fattening.

The simulated increase in the consumption of import-quality beef is large under all PSE reduction schemes as expected given the large estimated own-price elasticity of demand for beef as discussed earlier (Figure 9). By the end of the PSE reduction period, the consumption of import-quality beef is more than twice the level of the baseline projection. Although imports tend to replace domestic production of import-quality beef to some extent, the trade-off is much smaller than might be expected. Consequently, the additional consumption of import-quality beef above the baseline is about equal to the simulated increase in imports (Figure 10). Beef imports grow rapidly with the Swiss formula, and more slowly with the other two formulas, to about 1.1 million tons by 1996, more than 400% above the baseline and more than 600% above the 1986 level. Imports from the United States grow over the forecast period about in line with imports from Australia as a result of the PSE reductions, with the United States gaining slightly in import share. The simulated increase in beef imports could be viewed as the increase in the beef import quota that would be necessary in order to meet PSE reduction targets as specified in the three formulas used. That is, a beef import quota of about 1.1 million tons would reduce domestic dairy beef prices to the beef import price level. The additional imports would not likely displace feedgrain imports to a large extent inasmuch as the domestic beef industry would be relatively unaffected by the PSE reduction. This would be the case as long as the Japanese milk PSE remains unaffected. As a corollary, a reduction in the very high Japanese milk PSE would likely do more to reduce domestic production of beef than a reduction of the beef PSE.

The beef PSE reduction affects the Wagyu industry in the model only through the estimated cross-price elasticity of demand between import-quality and Wagyu beef. Because this elasticity is relatively large (0.57), the simulated decline in the dairy steer carcass price as a result of the PSE reductions has an impact on the Wagyu industry (Figure 11) . With the Swiss PSE reduction formula, the Wagyu steer carcass price is over 40% lower in 1989 than otherwise would have been the case, inducing a decline in the Wagyu breeding herd to about 13% below the baseline forecast by 1990 (Figure 12). The reductions in the Wagyu carcass price and, hence, in the Wagyu breeding herd are more modest using the Constant Absolute or the Modified Swiss formulas. 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 regardless of the formula used. A continuing consumer preference for native-quality 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 formulas tend to converge so that the final effect is to reduce the Wagyu breeding herd by about 9% and Wagyu prices by about 15% to 20% below what otherwise would have been the case, restricting the availability of native Wagyu beef for consumption (Figure 13).

The effects of the alternative PSE reduction scenarios on the hog and chicken sectors is significant. Sow inventories drop to 38% below the baseline by the end of the forecast period (Figure 14). This occurs because pork prices are 25% below the baseline at the end of the period. The simulated drop in the pork price is large enough to reduce the profitability of pork production despite the sharp expected decline in world feedgrain prices. As a consequence, per capita pork consumption declines as well.

Figure 8. Dairy Steer Carcass Price

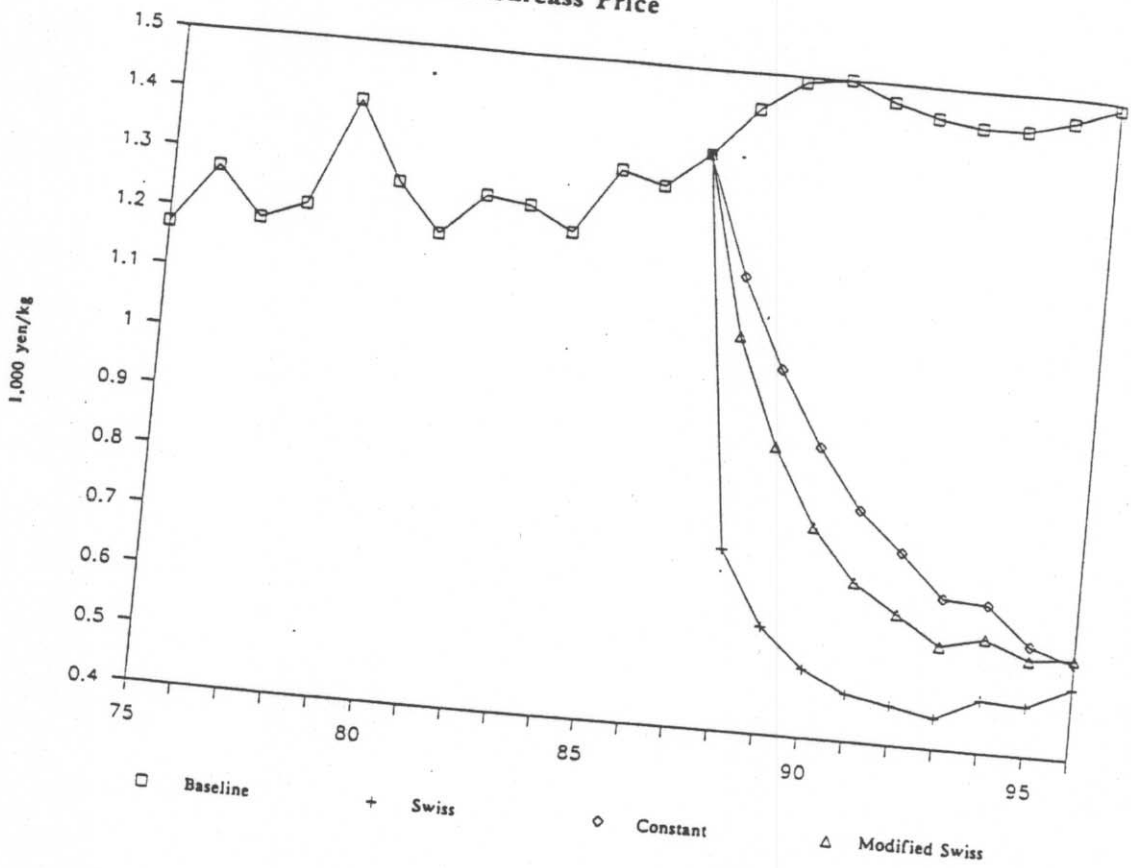


Figure 9. Import-Quality Beef Consumption.

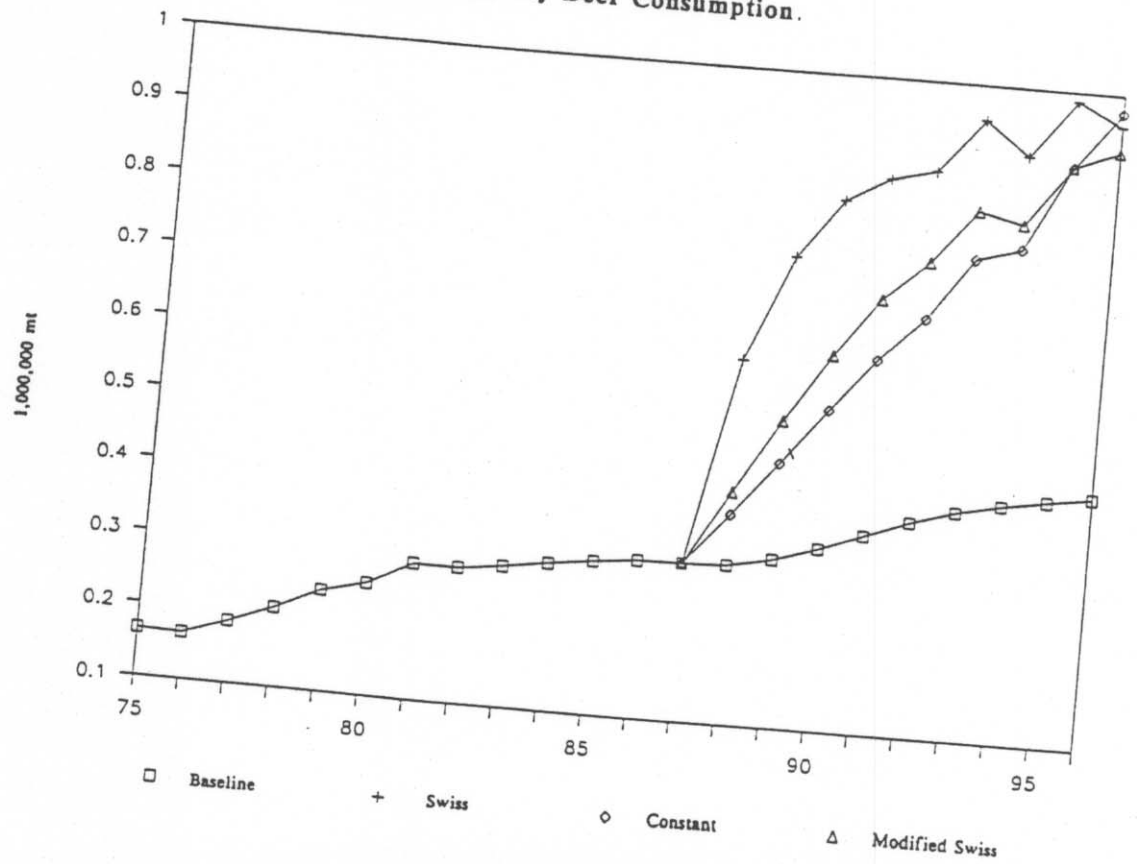


Figure 10. Japanese Beef Imports

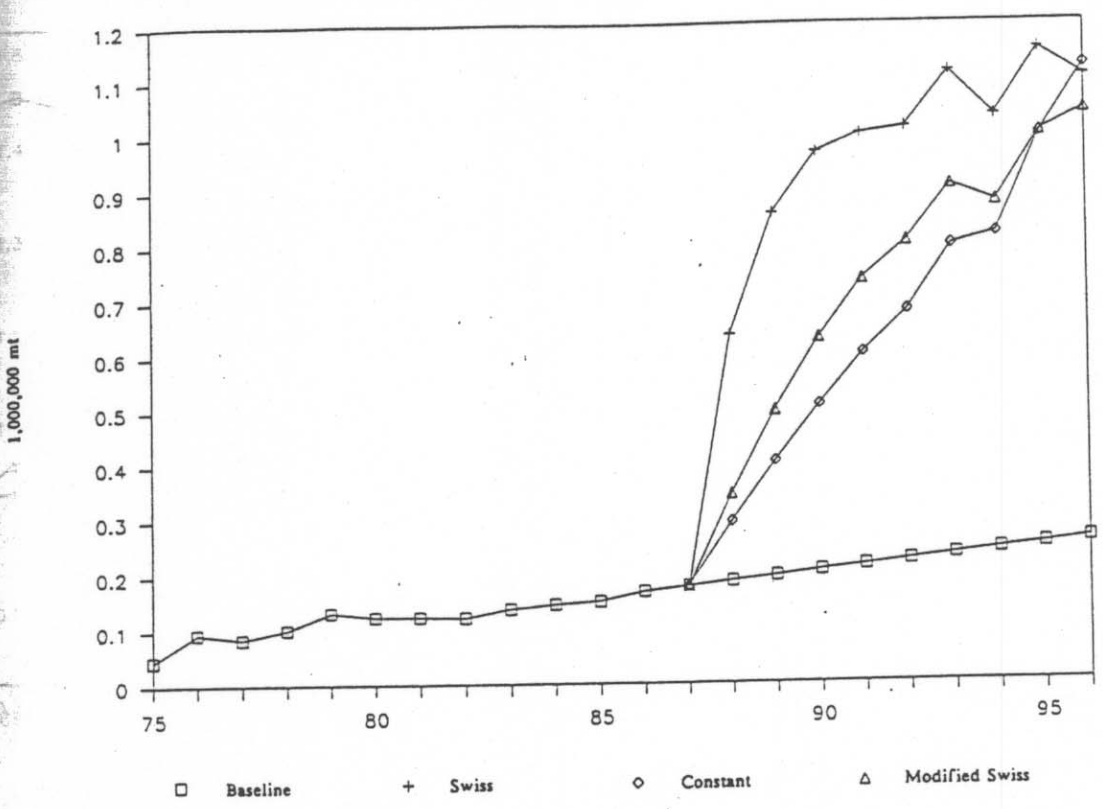


Figure 11. Wagyu Steer Carcass Price

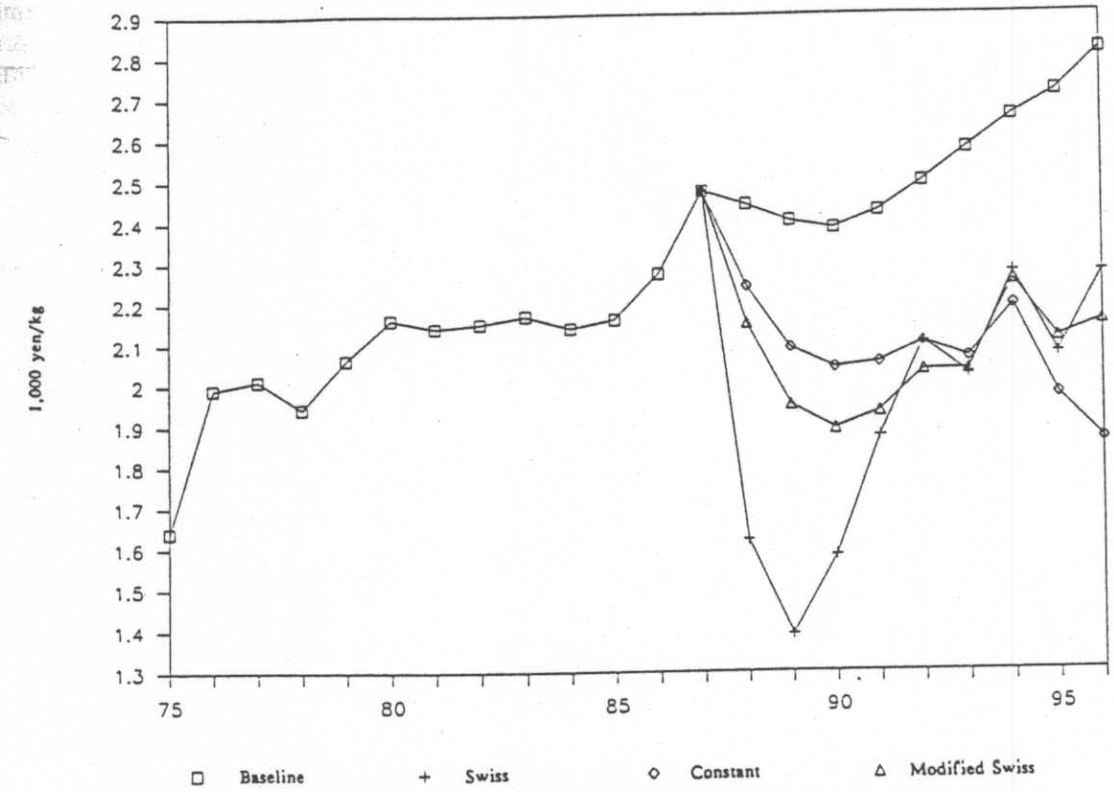


Figure 12. Wagyu Cattle Breeding Herd Ending Inventory

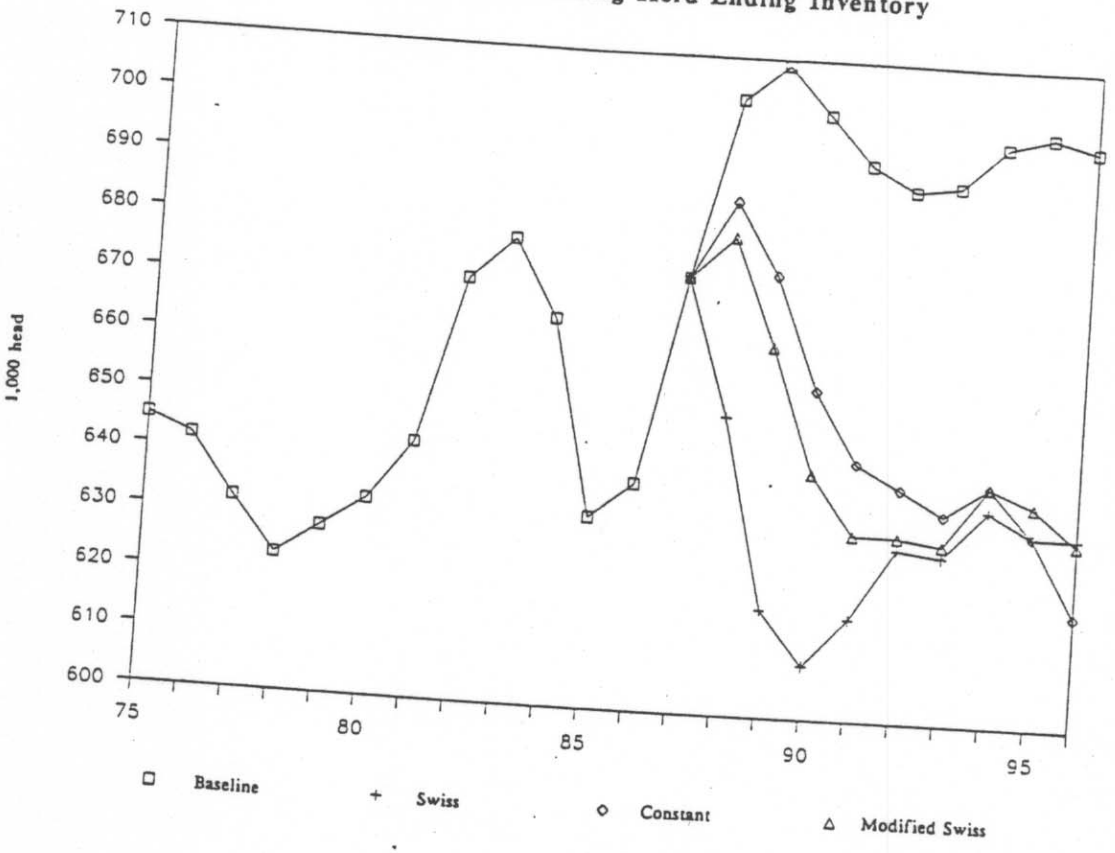


Figure 13. Native Quality Beef Consumption

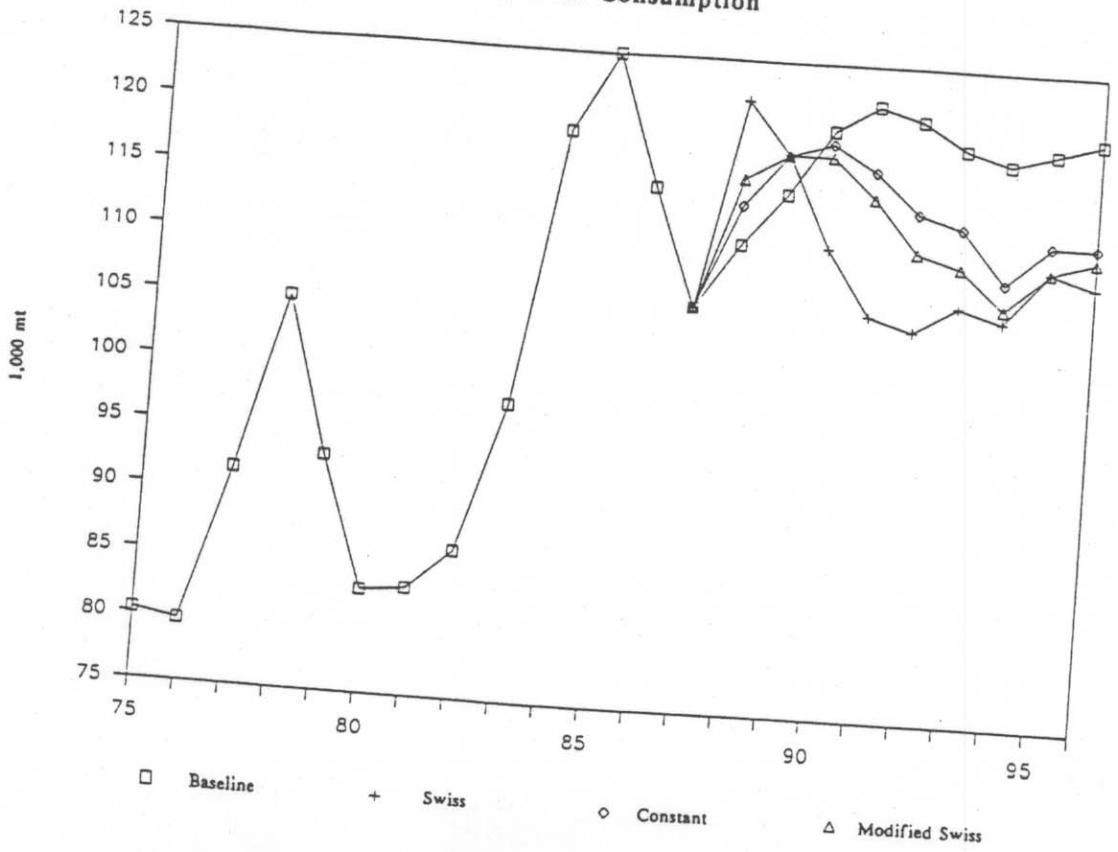
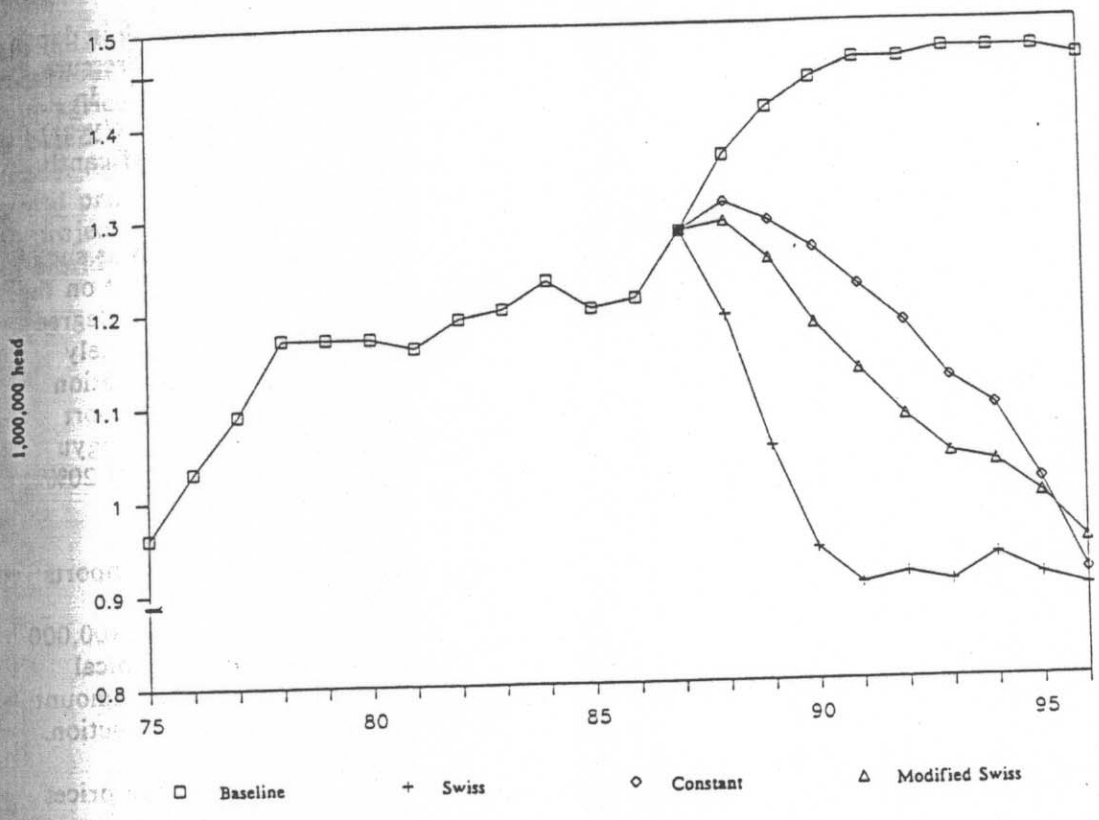


Figure 14. Hog Breeding Herd Ending Inventory



In contrast, the per capita consumption of both chicken and fish increases under all PSE reduction scenarios. The underlying reason is that both import-quality beef and pork are complementary to chicken and both import-quality and native beef are complementary to fish (see Table 1). Hayes, Wahl, and Williams test for and reject the hypothesis of net substitutability among meats in Japan. The results indicate that chicken is complementary to at least one of the other meats.

Summary and Implications for Current Negotiations

This paper considers the likely consequences of a reduction in the level of government assistance to Japanese beef producers through a negotiated, progressive reduction in the beef Producer Subsidy Equivalent (PSE) on the Japanese meat industry. Using a simultaneous equations model of Japanese livestock markets, a forecast baseline through 1996 was first established assuming that the import quota continues to increase by 9,000 mt/year as in the 1984 agreement. Three formulas for reduction of the beef PSE over ten years were selected from among the many available (the Swiss formula, a constant absolute reduction of one-tenth per year, and a modified Swiss formula) and alternatively imposed on the model over the forecast period. The simulated changes in the values of the model variables from their baseline values in each case are the measured effects of the alternative PSE reduction schemes. The empirical results lead to a number of conclusions and implications for current negotiations.

First, larger own-price elasticities for all meats in Japan than in the United States imply that a reduction of protection to beef producers in Japan would result in a significant increase in per capita meat consumption in Japan.

Second, because the income elasticities of demand for both dairy and Wagyu beef in Japan are also relatively high, expected increases in Japanese real incomes will put upward pressure on beef prices unless the present rate of increase in the beef import quota is increased. In other words, the rate of increase in the beef quota under the 1984 agreement (9,000 mt/year) is not likely to be sufficient in coming years to keep beef prices from increasing significantly in Japan.

Third, Wagyu and dairy beef are not perfect substitutes in Japan. Treating them as such will lead to overestimates of the impact of any reduction of beef producer price support on the Japanese beef industry. At the same time, however, there is a significant and growing degree of substitutability between the two types of beef in Japan. Considering them as completely unrelated commodities would lead to the erroneous conclusion that beef import liberalization would have no impact on the Wagyu industry. In fact, because of the high level of support provided to milk producers in Japan, beef import liberalization would tend to reduce Wagyu beef output more than dairy beef output. Wagyu beef production would likely be about 20% lower at the end of the PSE reduction period than would otherwise be the case.

Fourth, a reduction of assistance to Japanese beef producers could increase beef imports into Japan by more than 600% over the 1986 level by the end of a 10-year period of adjustment. This would require an annual increase in the beef import quota of almost 100,000 mt/year, over 10 times the annual rate of increase in the 1984 agreement, to meet a typical progressive PSE reduction target. Beef consumption would increase by almost the full amount of the increase in imports because of the relatively small decline in domestic beef production.

Fifth, Japanese dairy cattle producers are much more responsive to changes in the prices of milk and feedgrains than they are to changes in the prices of dairy beef. The projections of low world feedgrain prices and an increasing level of milk support in Japan would likely lead to an increase in dairy beef production even under a PSE reduction scheme that reduces dairy beef prices significantly. An agreement to liberalize the Japanese milk market through a reduction in the extremely high milk PSE in Japan would likely have a greater impact on Japanese beef production than would an agreement to simply reduce support for beef producers. As a corollary, a trade liberalization agreement that allows the Japanese to retain their dairy support programs would lead to a more immediate and even perhaps a greater increase in beef imports besides being more politically acceptable in Japan. This is because a reduction in the milk PSE would force significant amounts of import-quality beef onto the market, reducing the need for imports to meet consumer beef demand.

Sixth, the increase in milk cow numbers in the baseline forecast may result in a worsening milk oversupply problem in Japan by the early 1990s. Surprisingly, a negotiated reduction in support to beef producers in Japan would not help reduce the oversupply by much.

Seventh, one major result of a reduction in the Japanese beef PSE could likely be the impact on the hog, chicken, and fish industries. In the case of pork, production is 40% lower than the baseline forecast by 1996 as a result of the simulated beef PSE reductions. In the chicken industry, if chicken is truly complementary in consumption to beef in Japan as this and other research indicates, the consequence of beef import liberalization could be a further impetus to growth in the Japanese poultry industry. The substitutability of beef and chicken in Japanese diets thus merits further investigation. In any case, negotiators deliberating a reduction in the Japanese beef PSE would need to consider the entire livestock industry as an interrelated system in order to correctly project the outcomes of alternative beef import liberalization schemes.

Finally, the specification of the adjustment path deserves serious consideration in trade negotiations. The rapid reductions in tariffs agreed to during previous multilateral trade talks

are unlikely to be politically acceptable in agriculture. This is because the adjustment costs that would likely occur as a result of trade liberalization are greater in agriculture than in the non-agricultural markets liberalized in previous agreements. Any measure of protectionism that is based on the difference between world and domestic prices will increase if world prices fall, rendering the agreed-upon adjustment path more difficult to achieve as a result of volatile world prices, despite the best efforts of the country. To avoid this problem, the formula used to project a PSE adjustment path should automatically adjust the target to changes in the level of world prices.

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