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Agricultural Policy Reform in the Pacific Rim: The Case of Japan

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Abstract: The world trade model used for this study suggests that Japanese agricultural policies have substantially depressed world rice prices. The study also indicates that such policies have imposed considerable distortions in Japan's domestic economy, costing consumers and taxpayers nearly \$1.73 to provide a dollar of support to agricultural producers. The study concludes that while elimination of agricultural support could considerably lower Japanese agricultural incomes, such losses may not affect the living standards of most farmers because agriculture contributes less than 8 percent of total household incomes for nearly 70 percent of farmers.

Introduction

The pressures on Japan to reform agricultural policies have been mounting over the last decade. With a current account surplus averaging over \$80,000 million during the late 1980s, Japan is facing growing criticism for continuing to exploit an increasingly open manufacturing market while restricting agricultural imports. These pressures on Japanese agriculture can be expected to increase even more as the end of the Uruguay Round approaches.

What happens to agriculture in Japan is of great interest to the world agricultural community. Japan is one of the world's richest countries, with a per capita GNP 8–10 percent higher than that of the USA. With a population base about half that of the USA, Japan is also one of the largest consumers of agricultural products among the industrial countries. And, despite attempts to maintain self-sufficiency in basic foodstuffs, Japan is the largest national importer of agricultural products and accounts for nearly a tenth of world agricultural imports. Any change in Japanese policies can be expected substantially to affect world agricultural markets.

This paper addresses two issues that relate to Japan in an open economy: the extent of government intervention in Japanese agriculture and how it has distorted world agricultural prices and trade and the domestic and international costs of Japanese agricultural policies.

Quantifying Agricultural Support in Japan

The policies and programmes used to support agriculture in Japan are complex and diverse across commodities (ABARE, 1988). A major practical step in understanding these measures has been the development and acceptance of a measurement methodology in the form of producer subsidy equivalents (PSEs) and consumer subsidy equivalents (CSEs).

A PSE is the level of subsidy that would be necessary to compensate producers for the removal of government programmes affecting a particular commodity (Ballenger, 1987). Similarly, a CSE is the level of subsidy that would be necessary to compensate consumers for the removal of government programmes. Figure 1 shows the extent of government protection to the Japanese agricultural sector in 1989/90 as

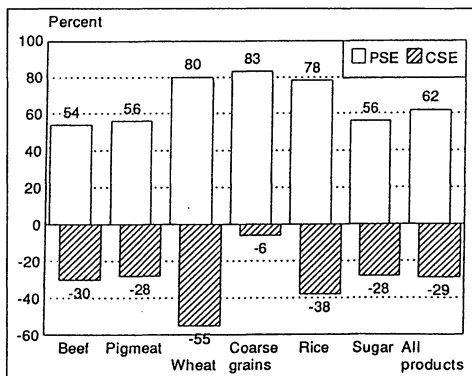


Figure 1—Rates of Support to Agriculture in Japan, 1989/90

represented by the producer subsidy equivalents (Webb *et al.*, 1990). The weighted average PSE for all commodities (62 percent) indicates that nearly two-thirds of total producer income is generated by transfers from government policies. The PSEs are highest for wheat, coarse grains (barley), and rice, followed by sugar and livestock products. Because imports of maize and soybeans are relatively free, government support for these two commodities are virtually non-existent.

The costs of agricultural support have to be borne either directly by domestic consumers through higher food prices or by taxpayers through increased government expenditures. Policies that artificially raise (tax) prices to consumers account for about 90 percent of the support to the agricultural commodities. Consequently, the CSEs are relatively high (29 percent), indicating the costs of policies to Japanese consumers represented nearly a third of consumer expenditure on the commodities considered.

How do Japan's PSEs and CSEs compare with those of other countries? Figure 2 indicates that the extent of government intervention in Japan is the highest among the industrial market economies. It is more than twice that of the EC and Canada and at least five times that of the USA and Australia. Also, the source of support in Japan varies considerably from that in the USA and Australia. While policies that transfer incomes from consumers to producers form the primary basis of Japanese agricultural support, countries like the USA and Australia rely more on direct government budget support.

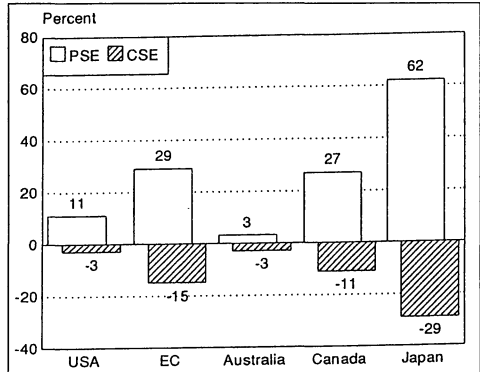


Figure 2—Rates of Support to Agriculture across Countries, 1989/90

The Modelling Framework

Summary measures of protection such as PSEs and CSEs are good indicators of the level of support to agriculture but do not incorporate the supply and demand responses to such policies. They therefore have little to say about the consequences of such protection on commonly used indicators of economic performance such as output and income of the sectors being supported or their effects on world agricultural markets. This requires a framework that would allow for economic responses.

The economic implications of agricultural policy reform in Japan are analysed using the static world policy simulation modelling (SWOPSIM) framework (Roningen, 1986). A SWOPSIM model is characterized by three basic features: it is a non-spatial price equilibrium model, it is an intermediate-run static model that represents world agriculture in a given year, and it is a multi-commodity, multi-region partial equilibrium model. In order to use this static, non-spatial partial equilibrium model to describe world agricultural trade, it is assumed that world markets are competitive, that domestic and traded goods are perfect substitutes in consumption, and that a geographical region, possibly containing many countries, is one market place.

The economic structure of SWOPSIM models includes constant domestic supply and demand equations. Trade is the difference between domestic supply and total demand (absorption). The policy structure is embedded in equations linking domestic and world prices. Policies (PSEs and CSEs) are inserted as subsidy equivalents at the producer, consumer, export, or import levels. (For details on the economic and policy structures and the use of summary support measures in the modelling framework, see Roningen and Dixit, 1989.)

The version of SWOPSIM used for this study (ST89) is based on 1989/90 marketing year data. The world is divided into 11 regions, 7 of which represent the industrial market economies, 3 developing countries, and 1 centrally planned economies. Included in the model are 22 agricultural commodities, representing mostly temperate-zone products. Tropical products, which account for a substantial proportion of agricultural trade of developing countries, are not included.

This paper presents the results of experiments using the ST89 model in which new equilibrium solutions were obtained by removing PSEs and CSEs. The new solutions represent an approximation of the resulting adjustments in production, consumption, trade, and prices of agricultural commodities expected after 5 years, with the important proviso that all other conditions remain the same as in the base year, 1989/90. This permits the analysis to isolate and identify the differences between the new solutions and the initial or reference solutions and to attribute them to the removal of distortionary agricultural policies.

Eliminating Agricultural Intervention in Japan

The model and the aggregate measures of government intervention were used to simulate conditions that would exist if Japan unilaterally eliminated all agricultural policies as they existed in 1989/90. From this, the distortions in world prices and trade and the annual economic welfare costs of such policies were deduced.

Effects on World Commodity Prices

Japanese agricultural policies have, on average, depressed world commodity prices by 2 percent by encouraging uneconomic production and inhibiting consumption (Figure 3). In other words, if Japan were to abandon its policy of supporting agricultural producers and taxing consumers, its production would contract and consumption would expand. As a result, world commodity prices would be higher. About 40 percent of this increase in world price would emanate from the liberalization of Japanese consumer demand.

In comparing the effects of Japan's policies on world agricultural markets with those of other countries, the results show that policies of industrial market economies, taken together, have, on average, depressed world commodity prices by 12 percent (Figure 4). This suggests that Japanese policies account for nearly a sixth of the depression in world prices. Only EC policies (8 percent) contribute more to aggregate world price changes than do those of Japan.

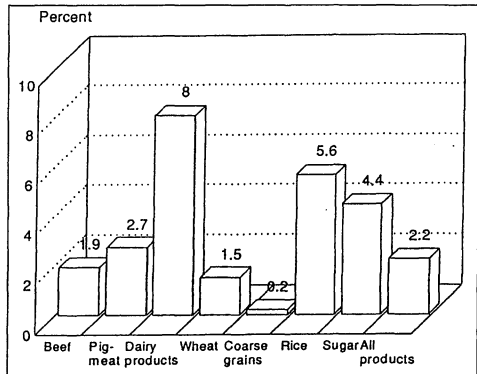


Figure 3—World Price Effects of Unilateral Japanese Liberalization

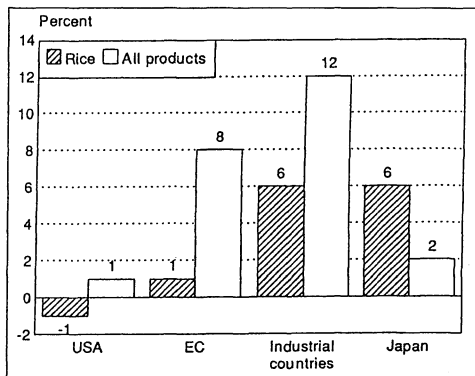


Figure 4—Comparing World Price Effects of Unilateral Policy Reform

The world price implications of Japan's policies are especially dramatic for rice. Japan's policies have depressed world rice prices (6 percent) more than the combined effects of all other industrial market economies' policies (1 percent). This reflects both the high levels of assistance to Japanese rice producers and the relatively small proportion (4 percent) of global rice production that is traded in the world market.

Despite high levels of protection, the price distortionary implications of Japanese policies do not have the same consequences for most other commodities. Japanese policies depress the world sugar price by 4 percent and livestock product prices by only 2–3 percent. The country's role in global production and trade, rather than the levels of support, appears to be the dominating factor in determining the extent of trade distortion.

Implications for Japanese Imports

Perhaps the most contentious issue concerning Japanese agricultural policy is the import restriction on rice (Figure 5). The model results indicate that that policy has prevented nearly 4.7 Mt of rice from entering Japan annually. Hence, whereas there are virtually no imports of rice into Japan at present, imports would be nearly half (46 percent) of total consumption in a liberalized environment. Imports of other products, especially wheat and sugar, have also been affected by import restrictions, but their magnitudes are not very large. By contrast, imports of maize would actually decline by 4 Mt if Japan unilaterally liberalized its agricultural policies because of the contraction in the livestock sector.

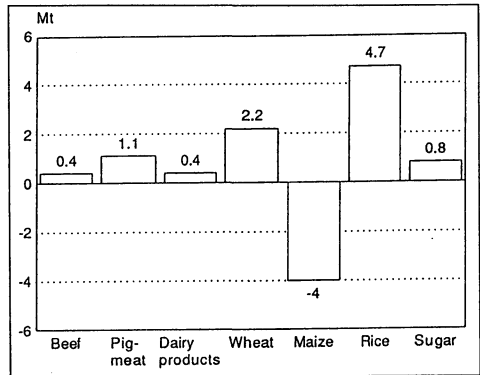


Figure 5—Changes in Japanese Imports from Unilateral Agricultural Reform

The USA and Australia have been in the forefront of international efforts to pressure Japan into liberalizing its beef import policies. In response, Japan recently agreed to eliminate all import quotas on beef by 1991 and replace them with higher *ad valorem* tariffs. The question is, How great an increase in imports can be expected from a liberalization of the Japanese beef market? Estimates from the model indicate that Japanese imports of beef would nearly double from base levels, an increase of 417,000 t annually, if all border restrictions were eliminated. Nearly half of the additional imports would originate from the USA, with the rest coming from Australia, the EC, and South America. Alston, Carter, and Jarvis (1989) contest this view and argue that countries such as Australia would gain greater market shares because of the elimination of “discriminatory import quotas” that have favoured US beef.

By denying access to their markets, Japan's agricultural policies cost other countries \$6,800 million in export earnings. Nearly 25 percent of the loss in earnings occurs because of support to rice producers. Import restrictions on pigmeat and beef account for most of the rest.

Economic Welfare Implications of Policy Reform

Agricultural support policies in Japan have reduced national income by encouraging inefficient use of resources. They have also transferred resources from consumers and taxpayers to agricultural producers.

The study shows that less than 60 percent of the costs to consumers and taxpayers in Japan are transferred to producers (Figure 6). The rest (\$5,700 million) represents dead-weight (income) losses to society arising out of misallocated resources.

In other words, Japan's policy of providing support to agricultural producers is inefficient because the costs to consumers and taxpayers of distortionary policies (\$38,000 million) are considerably more than the benefits to producers (\$22,000 million). For every \$1.00 that producers in Japan gain because of protectionist agricultural policies, consumers and taxpayers lose \$1.73. Consumers and taxpayers in the USA, on the other hand, forfeit only \$1.05 in transfers for every dollar gained by producers.

Japanese consumers have had to shoulder much of the burden of domestic agricultural support policies. Model results indicate that each consumer spends an additional \$290 annually on food to maintain agricultural support. This is nearly twice the per capita costs that consumers in the EC have had to bear to support their agricultural sector.

Opponents of trade reform often point to the losses in producer incomes as an argument against liberalization. Indeed, these results indicate that producer surplus losses from unilateral policy reform would be about \$22,000 million, or about 45 percent of the value of agricultural production in 1989/90. Rice producers would shoulder about two-thirds of this loss, while most of the other remaining losses would accrue to beef and pigmeat producers.

While these losses may appear large, consider the following. In 1986, agricultural income provided only about 2 percent of household income for the 40 percent of farm households with 0.5 hectare or less of cultivated land, and less than 8 percent of household income for the 28 percent of farm households with 0.5–1.0 hectare of cultivated land (ABARE, 1988). Therefore, for nearly 70 percent of farm households, even a considerable drop in farm income as implied by the present results would have little effect on their living standards. This is especially true given that average income of farm households in 1986 was nearly 30 percent higher than average income of other households. It should, however, be noted that because the size of an average farm household (4.53 persons) is much larger than that of urban households (3.00), the difference in income, when expressed on a per capita basis, is less than 15 percent.

The domestic costs of distortionary policies represent only a part of the welfare costs of such policies. Japan's policies not only affect producers, consumers, and taxpayers within the country but also those in other countries (Figure 7). While Japanese policies raise producer incomes by \$22,000 million, they cost producers in other countries \$10,000 million because of their price-depressing effects. Conversely, such policies save consumers in food-deficit countries nearly \$6,000 million. The global real income gain from unilateral Japanese agricultural liberalization is \$5,000 million.

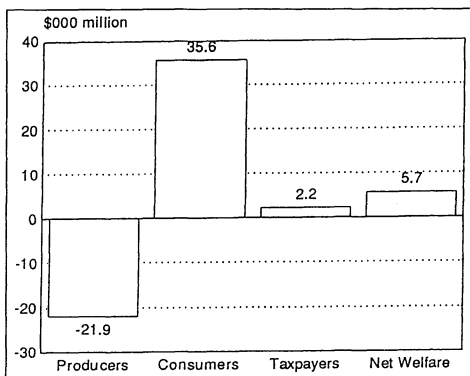


Figure 6—Domestic Welfare Effects of Unilateral Japanese Liberalization

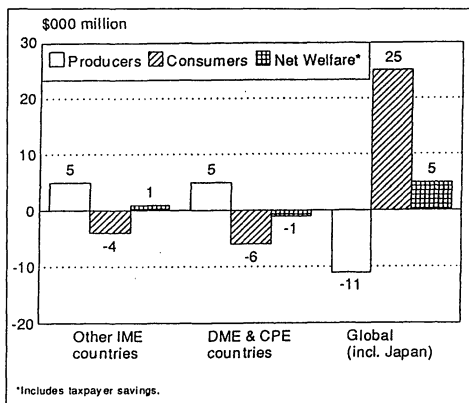


Figure 7—Global Welfare Effects of Unilateral Japanese Liberalization

Limitations of the Analysis

The predicted economic implications of trade liberalization are likely to differ depending upon the period under analysis. Comparing the results of this study with those of another study (Roningen and Dixit, 1989) that used the 1986/87 marketing year as its base, it was found that liberalization of policies by Japan would have increased world agricultural prices much less under 1989/90 market conditions than under 1986/87 conditions. The Japanese and world economies have been undergoing a number of changes in the recent past, the most significant of which is the pursuit of a more liberal agricultural trading environment for beef. If these changes are taken into account, the implications of agricultural policy reform may be somewhat different.

The model does not take into account the substantial product differentiation among agricultural commodities. *Japonica* rice produced and consumed in Japan is, for instance, far different in quality to Thai rice traded in the world market. Recognition of product differentiation in the rice market could alter the economic implications of Japanese policy reform. Dixit and Roningen (1991) show that a proper representation of rice imports into Japan following unilateral liberalization may be somewhere between 3.6 Mt and 5.1 Mt, depending upon the degree of substitution assumed in Japanese consumption and foreign production of *Japonica* and *Indica* rice.

Finally, there is also the Lucas critique. Lucas (1976) argued that models estimated using data collected under a past policy régime may not be relevant to current or future conditions. This issue is of special concern when large shocks like trade liberalization occur. Should policy régimes change drastically, as would be the case with trade liberalization, a model based on historical parameters might not give the correct story.

Conclusions

The objective of this study was to examine the distortionary costs of Japanese agricultural policies. It can be inferred from the analysis that Japanese policies have considerably distorted world rice prices but that the distortionary implications for other commodities are not as significant. The analysis also indicates that distortions introduced by agricultural policies have substantially benefited Japanese producers but hurt consumers and taxpayers. Consumers and taxpayers pay \$1.73 to provide a dollar of support to agricultural producers.

Support to agricultural producers in Japan has often been justified as a means of maintaining parity between farm and non-farm incomes and of providing an assured quantity of food. However, because incomes of those in agriculture are nearly 30 percent higher than those of urban dwellers, the commitment to continue support to agriculture at past levels can be questioned. Moreover, given that agriculture contributes less than 8 percent of total household incomes for nearly 70 percent of farmers, even a substantial drop in agricultural incomes would not greatly affect living standards of most farm families.

Major unilateral policy reform in agriculture is one option that Japan could pursue in the future. Indeed, the analysis shows that there would be some real income gains from such an undertaking. Opening up the agricultural market, however, is not without risks. Problems of price stability, food security, and foreign exchange variability could abound. The challenge for Japan and its trading partners is to recognize the benefits of freer agricultural trade while meeting legitimate concerns about food security and rural prosperity without distorting world agricultural trade.

Note

¹Economic Research Service, US Department of Agriculture. Views expressed in this paper are those of the authors and not necessarily those of the US Department of Agriculture.

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Discussion Opening—Nobuhiro Suzuki (National Research Institute of Agricultural Economics, Japan)

The significance of support should be measured not only in terms of rates of PSEs but also in terms of total amount. The per-unit PSEs for wheat and barley were 80 and 83 percent respectively in 1989 (Figure 1). However, we cannot say that the subsidies to wheat and barley were the highest because only 16 percent of wheat and 17 percent of barley consumption were met by domestic supply in the same year. Japan's small effect on world price distortion, despite high per-unit PSEs, should be explained not only by the fact that Japan's share in global production and trade is small, but also by the fact that Japan's import share in total demand is already very large and the total amount of PSEs fairly small. This implies that per-unit PSEs are not good indicators of protection.

It is misleading to evaluate the effects of unilateral liberalization on world prices by only one time-period analysis because the results are too sensitive to the period under analysis. The same authors' previous study, based on 1986/87 data, indicated that the effect of US policy on the world rice price is an increase of 2.9 percent, whereas the present study, based on 1988/89 data, indicates a decrease of 1 percent. Similar differences can be noted for the cases of Japan's rice (from 19.6 down to 5.5 percent), Japan's dairy products (from 4.5 up to 8 percent), Japan's average (3.6 down to 2 percent) and the US average (5.9 down to 1 percent). The US effect is on average larger than that of Japan in the previous study, but smaller here. Moreover, it is doubtful that the US unilateral liberalization will have a negative effect on world rice prices (–1 percent) considering that the USA has already established the marketing loan system for its rice export expansion.

Trade liberalization may not be a very severe problem for farm households that earn a large proportion of their income from other sources. The concern is not about these farmers

but about those who earn the majority of their income from farming and play a significant role in supplying food to consumers. We are also concerned that much of the demand for rice in Japan may be satisfied with imports. Rice is a staple food in Japan as are dairy products in the USA and EC. US imports of dairy products are kept at about 1 percent of total demand.

The simulation for unilateral liberalization is not effective in separating the country's effects on global economic welfare from those of other countries. For example, if Japan were to liberalize unilaterally under the situation where world dairy prices were distorted by US and EC policies, Japan's dairy imports might increase substantially. Japanese consumers' gains are generated not only as a result of Japan's policy changes but also as a consequence of the policies of some exporting countries that depress world prices. The magnitude of an increase in economic welfare by unilateral liberalization is not an appropriate indicator of how policies of the country concerned distort world markets.

Product differentiation is important, especially for beef and rice. The rice (beef) market should be divided into segments based on quality. It should then be examined carefully as to which segment of the domestic rice (beef) market can be substituted for the appropriate type of imported rice (beef).

Japanese consumers may prefer the present situation, considering the extra-market values of domestic farming and rural communities, even if food prices are rather high. It may be difficult to quantify such values and incorporate them into this kind of study. However, it would be better to consider external effects of agriculture in some way.

A reduction in PSEs as an aggregate indicator does not discern the various effects of different policy measures. For that purpose, a policy-specific version of the SWOPSIM model is required.

Japan will not import beef from South America because the beef is contaminated by foot and mouth disease. This study suggests that import restrictions on pigmeat are fairly effective in limiting the amount imported. This cannot be the case because Japan's only protection in this area is tariffs.

[Other discussion of this paper and the authors' reply appear on the following page.]

General Discussion—*R.D. Ghodake, Rapporteur* (Dept. of Agriculture and Livestock, Papua New Guinea)

In the general discussion, Ohno and Gallagher's use of data for 1971–88 but with conclusions on imperfect competition for 1973–78 was questioned, particularly whether this was a problem of degrees of freedom. Ohno replied that when the equations were estimated simultaneously, the hypothesis $H_1 = H_2 = 0$ was not rejected. However, D_1 was found to be statistically significant for the period 1973–78, and hence the episode was tested for that specific period.

In answer to a question about why US export prices are higher than import prices at some periods and lower at others, Gallagher replied that, as processing mills are generally located at points of import, import unit values (which are calculated on a c.i.f. basis) are a reasonable proxy for processors' transaction prices. Wholesale prices are reported for Tokyo locations, since this is regarded as a suitable price for evaluating users for human consumption like *tofu* shops. The higher import prices in Tokyo thus reflect local distribution costs and profits associated with wholesale distribution of imports.

In reply to the discussion opener, Woo explained that because of space limitation not much background information was provided, although such information is essential for developing economic models. The rice diversification payment was included in the model but was found to be statistically insignificant. From Theil's statistics, there is no serious problem about model misspecification. A misspecified model is not judged simply by income elasticities that are not consistent across individual soyabean products. However, there are no perfect models, and further modifications in the model according to the research objectives are really needed.

To comments that simultaneous equation bias should be checked, Nerlovian models bias supply elasticity downwards, and yields should be endogenous, Woo replied that, since the model specified is a recursive equation system, SUR is acceptable/valid for the estimation of such a simultaneous equation system. In addition, SUR estimates are quite close to 3SLS estimates in the primary study.

Asked how he dealt with the combined products soyaoil and soyameal, the author replied that soyabean meal and oil were treated as joint products. The model, as specified, integrated the market clearance identities of soyameal, soyabeans, soyaoil, soyabean crushing demand, and soyabean crushing ratio. The soyabeans, soyaoil, and soyameal markets are linked.

The inclusion of lagged dependent variables in the supply models, acreage equations in particular, was questioned, as it often causes a model to miss the turning point. Woo was asked whether this had been checked and the results with and without lagged dependent variables compared. Woo replied that, for the questions containing lagged dependent variables, Durban-Watson and t statistics show no evidence of first-order serial correlations. For the behavioural equations that showed a problem of serial correlation, the Cochrane-Orcutt procedure was adopted to correct the first-order serial correlation and increase the efficiency of estimation. The conclusions might seem like common sense, but the model did exert evidence of common sense.

Woo was also asked why he chose to simulate the effects of devaluation, since the term "devaluation" is only used in cases where a managed currency is overvalued. Since the Japanese yen is freely tradeable and convertible and is not overvalued, it is inappropriate to consider a devaluation; it is simply a question of a price increase.

Roningen and Dixit were asked why, if Japanese rice imports under liberalization are 30 percent of world trade, world rice prices rise only by 6 percent? They replied that rice trade is small relative to the size of production and consumption. A small price change clears the world market, while creating a large trade change.

Asked to account for rice diversion policies in the PSE in their model, the authors replied that they did not do this in the PSE. They account for these policies for soyabeans and wheat on rice land by simultaneous shifts of the supply schedules for rice, wheat, and soyabeans as rice support is lowered.

Asked about comparative static analysis in relation to a dynamic real world, the authors acknowledged that it would be instructive and useful to carry out trade liberalization in a dynamic model, but the mechanics of such a model are much more complicated, and they made the decision to use as simple a model as possible. This is an area that should be developed in the future.

Asked to give further consideration to product differentiation, for example with different types of rice, such as *Japonica* and *Indica*, the authors indicated that they have considered differentiation for rice in another paper. Depending upon the assumptions about further substitution in production and consumption, the answers can be larger or smaller than theirs for Japanese rice imports, for example. They agree that differentiation is important for greater accuracy in some trade modelling situations for Japan, including rice and beef.

The model was considered very dangerous by one participant, based as it is on several assumptions for which there is very little knowledge and evidence, which could be misused by politicians and negotiators.

While this could happen, the authors believe that numbers openly calculated, checked, and debated help to formulate more rational policies that will ultimately foster rather than distort world trade. Economists should provide the best analysis and numbers possible; this makes progress possible but not inevitable.

Asked what exactly they meant by liberalization and its timing, the authors responded that they simply eliminated Japanese supply and calculated the new equilibrium. The elasticities in the model are medium term; i.e., 3–5 years, so it is assumed that the figures calculated will be fully realized on an annual basis after 3–5 years.

Participants in the discussion included J. Beghin (North Carolina State University), D. Colman (University of Manchester), S. Ito (Tokyo University), G.T. Jones (University of Oxford), J.B. Morison (University of New England), K. Oga (IFPRI), D. Pick (US Department of Agriculture), and H. Popp (Ministry of Agriculture, Switzerland).