COMMITTEE ON COMMODITY PROBLEMS

INTERGOVERNMENTAL GROUP ON CITRUS FRUIT

Thirteenth Session

Havana, Cuba, 20-23 May 2003

EFFECTS OF MULTILATERAL TRADE LIBERALIZATION ON FRESH AND PROCESSED CITRUS FRUIT TRADE

I.   INTRODUCTION

1.   This document presents a quantitative analysis of the probable effects of liberalizing citrus trade on the demand, supply and trade flows in and between major citrus producer and consumer countries and/or regions. Comparative static analyses are carried out with the aid of two partial equilibrium, single commodity, multi-country models. The models, one for fresh citrus and another one for citrus juices, simulate the effects of trade liberalization by comparing a baseline period with the long-term equilibrium under the assumption of a specific proposal of trade liberalization (Swiss 25, USDA News Release No. 01312.02). Delegates may wish to read this document in conjunction with CCP: CI 03/6.

II.   TRADE IN FRESH AND PROCESSED CITRUS FRUIT

2.   The world market for fresh and processed citrus products is complex, firstly because of the diversity of products traded and secondly because of the variety of import regimes that are in place. Notwithstanding the existence of trade in many different citrus products, this paper divides world citrus trade into two different systems: fresh (aggregated oranges, grapefruits, tangerines, lemons and limes) and processed citrus (orange, grapefruit, lemon and tangerine juices).

3.   There are important reasons why this analysis separates fresh from processed citrus. Substantial differences exist between them, both in terms of production and trade. On the one hand, fresh citrus are produced worldwide: Asia accounts for about 30 percent of world production, Latin America and the Caribbean 32, North America 15 and Africa and Europe 11 percent each. Large producing countries like China, Japan and India consume virtually all their production internally, while Morocco and Uruguay export almost half of their produce. On the other hand, citrus juice (orange and grapefruit) is consumed mainly in the United States, Canada,

Japan and the European Community. Citrus juice is produced largely in the United States and Brazil, although other countries also participate with smaller volumes in world trade (Cuba, Spain, Central America, Israel, South Africa and Argentina).

4.   Brazil and the United States produce about 85 percent of all citrus juices. While Brazil produces mostly frozen concentrated orange juice (FCOJ), US production is equally split between FCOJ and not-from-concentrate orange juice (NFC). Almost 90 percent of the FCOJ produced worldwide is consumed in North America and the European Community. Brazil contributes with 85 percent of the world supply of FCOJ, while the European Community captures about 70 percent of world imports. The United States is a large producer of FCOJ, most of which is consumed domestically. In addition, the United States imported in 2001 an equivalent 175 million dollars of orange juices from Brazil and Central America (Costa Rica, Belize, Mexico and Honduras).[1] US imports of frozen concentrate from Brazil are either mixed with local production (especially off season and in the years of low production of the production cycle), or re-exported under the drawback system.[2] Domestic sales and exports of NFC in the United States have also increased substantially in recent years. Brazilian industries have invested heavily in processing facilities in Florida, and occasionally import FCOJ to be mixed with local production in the low season to produce citrus juice for the US market.

5.   Import regimes for citrus vary considerably across countries. Some of the largest importers of fresh citrus such as Canada apply no tariffs. Seasonal tariffs are applied in Japan, with an *ad valorem* of 18 percent from 1 June to 30 November and 36 percent for the rest of the year. The European Community applies a complex system that includes as much as eight different seasonal duties and tariff quota rates. The weighted average of applied tariffs for fresh oranges in the most important importing countries is about 13 percent. Tariffs escalate significantly for processed citrus. For example China applies a flat rate of 22.6 percent for fresh oranges while the tariff increases to 70 percent for citrus juices[3]. The world weighted average for FCOJ is about 39 percent[4], while the maximum average *ad valorem* tax for citrus allowed under WTO (bound tariff) is 53 percent (USDA, 2002).

III.   ANALYSIS USING MODELS OF WORLD CITRUS TRADE

6.   In theory, a bilateral reduction of import tariffs causes a downward pressure on consumer prices in the importing country, and an upward pressure on producer prices overseas. However, a multilateral reduction of tariffs does not necessary mean a downward pressure of consumer prices in all importing countries. The magnitude and direction of price changes in a country depends on the magnitude of the tariff in a specific country, the magnitude of the tariff in other countries, the country's share of the world import market, the nature of the domestic demand, of world demand and of export supply. One way of exploring the possible effects of simultaneous multilateral trade liberalization on a particular country is through mathematical simulation models. Partial equilibrium models were chosen for this analysis.

7.   The use of partial equilibrium models has some limitations. Firstly the models assume that SPS related disputes will not play a major part in shaping the future of citrus trade, an

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[1] In 2000 the United States imported concentrated orange juice from Brazil for an estimated value of US$158 million, of which US$55 million were re-exported under the drawback system (Brazilian Embassy; US Barriers to Brazilian Goods and Services; Washington D.C.; October 2001).

[2] The drawback system covers goods in free circulation, with a reimbursement of, or rebate on, import duties payable on the goods if they are exported outside the country's customs territory as compensating products.

[3] China may lower its import duties on citrus juices to 7.5 percent in 2003 (Fruit Juices Report Issue No. 4/2002; Market News Service; International Trade Centre UNCTAD/WTO, Geneva)

[4] Average world tariffs are weighted averages. Weights are a country's share of the world market, and tariff escalation is not equal across the border. A country's share of world fresh citrus may be different from the same country's share of processed citrus, and so its different contribution to the weighted averages of fresh and processed citrus.

assumption that may not withstand close scrutiny (see CCP: CI 03/6). Secondly, trade liberalization in agriculture is expected to affect the general equilibrium of an economy, causing interactions between different sectors in each economy and between economies. Trade liberalization is expected to affect GDP growth and relative factor and product prices. As a result, contradictory results may be obtained with the same data if partial or general equilibrium models are applied. Hence, failure to endogenize GDP growth in the simulation may underestimate the effect of trade liberalization on citrus demand in consuming countries[5]. Also, if changes in allocation of resources to different production activities following changes in relative factor and product prices are not taken into account, the effects of a possible relocation of productive resources for different activities is not analysed. Finally, the model does not include inventories (see Table 1). It was estimated that in the baseline years 1998-2000 inventories represented 17 percent of the volume of citrus juice traded worldwide[6]. Stock equations could not be approximated because the series were too short for computing statistically significant parameters.

Table 1 - Exports, consumption and stocks of orange juice in the United States and Brazil

	Year	Exports	Consumption	Ending Stocks
USA	2000	100 134	1 150 363	428 913
	2001	95 000	1 147 818	369 088
Brazil	2000	1 240 000	16 000	236 000
	2001	1 185 000	16 000	120 000

Source: USDA, August 2001

8.   The analysis consists of comparing the situation in a baseline period (average of years 1998-2000) with the long-term adjusted equilibrium after applying the US proposal at the WTO to harmonize tariffs (see USDA News Release No. 0312.02). The US proposal (July 2002) consists of applying a mathematical formula to tariffs known as Swiss 25[7]. This formula has the effect of levelling up dissimilar tariff values by reducing faster the higher rates, and to set them all below the value of 25. Table 2 shows the actual tariffs in the baseline period (average 1998-2000) and the computed values after applying Swiss 25. Note that tariffs are not high for fresh fruits, but tariff escalation is significant for processed citrus.

Table 2 - Fresh citrus and FCOJ tariffs: Baseline and Swiss 25 for selected countries

	Fresh citrus		FCOJ	
	Baseline	Swiss Formula	Baseline	Swiss Formula
USA [ψ]	11.1	7.7	42.9	13.6
Canada	0	0	0	0
EC (15) [ψψ]	16	9.8	48	16.4
Japan [ψψψ]	27	13	35	14.6

Source: [ψ]http://dataweb.usitc.gov/, [ψψ] http://www.trade.gov, [ψψψ] http://www.apectariff.org.

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[5] However, Freeman et al. (2000) have suggested that the effect of trade liberalization in agriculture may have a limited impact on GDP (0.2 percent of total GDP).

[6] In the partial equilibrium model of world citrus juice trade, world imports were increased by 17 percent to calibrate demand and supply in the baseline.

[7] Swiss Formula: $T1 = (To * a) / (To + a)$, where $a = 25$

9.   The US proposal also includes a reduction of trade-distorting support to domestic producers, which would be capped at five percent of the value of agricultural production. However, it was estimated that the current support is below this value both in the European Community and the United States, major producers and consumers of citrus products. The EC fruits and vegetables regime (which includes citrus) includes a provision of intervention arrangements and export refunds. The intervention agreement is a short-term instrument to stabilize supply of fresh produce, and consists of a compensation fund for the withdrawal of produce from the domestic market, and to be disposed of by donation, no-food purposes or destroyed. As from 2002, this facility has been capped to a ceiling of ten percent of total production, and reduced to five percent in subsequent years. The compensation is equivalent to some US$150 per tonne for oranges and US$140 for mandarins, clementines, satsumas and lemons. Export refunds (subsidies based on the difference between the European Community and world prices) of processed fruits and vegetables were estimated at some US$3.6 million in 2001, but no information was found on how much was allocated to citrus fruits. A compensation scheme also exists to encourage the processing of fruits and vegetables, including oranges, lemons and easy peelers rather than their withdrawal. This aid, which is paid directly to producers and not to processors, is equivalent to some US$100 per tonne of fresh citrus.

10.   In the United States, the Florida citrus industry has a long history of export-promotion programmes, but their cost has been small relative to the total value of production. USDA's Market Access Program (MAP), as well as its predecessors, the Targeted Export Assistance (TEA) and Market Promotion Program (MPP), were designed (according to USDA) to offset the adverse effects of subsidies, import quotas or other support practices by foreign countries. They co-funded overseas marketing and promotional activities of the Florida Department of Citrus (FDOC) for some US$10 million in 1989. More recently citrus export development and maintenance programmes have concentrated mainly on product differentiation, where a total of US$3.8 million were allocated to FDOC in 2001, representing approximately 0.4 percent of the total export value of citrus products.

IV.   LIBERALIZATION ON FRESH CITRUS

11.   The results of the simulation presented in Table 4 suggest that Swiss 25 may be of limited impact on aggregate fresh citrus trade. The model indicates that only slightly higher prices would have existed under a more open world citrus trade (two percent), and that trade would barely be above one percent higher than the baseline.

12.   Having said this, the effects are felt unevenly for individual countries depending on the combined effects of tariff protection and price elasticities. The effect of slightly higher world prices in countries that apply no import tariffs and have low price elasticities, such as Canada, would be a small fall of imports compared to the baseline. Conversely, countries which currently enjoy a high level of protection and high price elasticity of demand, such as WTO newcomer China, could be importing seven percent more than the baseline. Note that while Japan has the highest initial tariff (27 percent) the effects of liberalization are small because of its small import demand elasticity (-0.08). The impact of Swiss 25 on EC imports (mainly grapefruit and oranges) is small due to its average elasticity and moderate import tariff compared to other economies.

Table 3 - Effects on fresh citrus demand and supply after applying US Swiss 25 tariff reform of major importing countries and regions (tonnes per annum)

Fresh Citrus	Baseline	Swiss 25	Difference (%)	Tariffs	
World Price (US$/t)	503	513	1.9		
Imports	5 663 274	5 736 779	1.3	Baseline	Swiss 25
USA	342 448	342 985	0.2	11.1	7.7
Canada	389 803	385 425	-1.1	0.0	0.0
EC 15, excl. intra-trade	1 677 390	1 698 317	1.2	16.0	9.8
Europe, non-EC	1 819 146	1 820 873	0.1	9.0	6.6
Japan	479 479	483 246	0.8	27.0	13.0
China, Hong Kong SAR	283 456	280 563	-1.0	0.0	0.0
China	32 497	34 938	7.0	22.6	11.9
Other Asia	624 190	675 565	7.6	21.9	11.7
Rest of the World	14 866	14 866	0.0		

Exports $^{\Psi}$	Baseline	Swiss 25	Difference (%)
USA	1 041 516	1 048 506	0.7
Mexico	265 845	270 572	1.7
Argentina	310 695	316 220	1.7
Chile, Brazil, Uruguay	238 535	240 420	0.8
Australia	153 844	157 193	2.1
Israel	262 201	262 693	0.2
EC 15, excl.intra-trade	1 135 775	1 151 454	1.4
Europe, non-EC	298 756	302 173	1.1
China	184 007	189 147	2.7
Morocco	569 420	564 624	-0.8
South Africa	750 458	759 904	1.2
Turkey	437 354	444 139	1.5

Notes: Exports have been decreased by 5 percent to account for shrinkage

13. Trade liberalization would imply higher exports in all fresh citrus exporting countries with the exception of Morocco. To Moroccan producers, lower import tariffs in the European Community mean an erosion of its current trade preference of duty-free entry to the European Community, and therefore lower export prices. In Israel, ageing of orchards, water shortages and lack of manpower are constraining production and therefore only a small impact is expected from liberalization. Measured in volume, most of the increase in exports would be secured by Northern Hemisphere countries, which would capture about two-thirds of the export differential (United States, Mexico, Europe, China and Turkey). This is due to the fact that these countries concentrate a large share of world fresh citrus trade. However, in terms of proportional impact, the effect would be slightly higher in Southern Hemisphere countries due to their marginally higher export supply elasticities (0.78 vs. 0.70 in Northern Hemisphere countries).

14. Further research may be required to better understand what the impact of trade liberalization would be on China. China currently exports mandarins and grapefruit, and imports sweet oranges and lemons. Previous studies have concluded that China may be a net importer of

citrus by 2005. The area planted to citrus and citrus production increased 20 times in the past 50 years, with the fastest growth rates following the market reforms of the mid-1980s. Consumption has kept pace with production, mainly due to the high income growth and high demand elasticity that is thought to range between 1.2 and 1.5. Thus, population and income growth, combined with constraints in arable land, are expected in a few years to result in demand outstripping supply, with China becoming a net importer of citrus by 2005. The model used for this research, however, includes long run demand and supply equations that do not capture the dynamics of area planted and the subsequent longer term dynamics on production and productivity mentioned by these authors[8], and does not differentiate between different citrus fruits. The export supply elasticity obtained from FAOSTAT is high (1.44) and has a trend component that suggests an annual rate of growth of two percent. With these parameters the model indicates that, assuming trade liberalization of the form Swiss 25, China would export 2.7 percent more (mandarins and grapefruits) than the baseline.

15.   Trade liberalization may have a significant impact in the seasonal influx of world off-season imports[9], although considering the low tariffs currently applied on fresh citrus the impact is not expected to be large. Table 4 presents the 2001 and 2002 average seasonal market share of imports in the European Community of easy peelers assuming that domestic production plus imports is a proxy for domestic availability.

Table 4 - Easy peelers: seasonal production, imports and market share of imports in the European Community (tonnes, average 2001-2002)

Month	Tariff	Production	Imports	Market Share of Imports (%)
Nov.	16	455 000	31 693	7
Dec.	16	477 000	53 447	10
Jan.	16	313 000	50 298	14
Feb.	16	217 000	26 714	11
Mar.	16	120 000	20 265	14
Apr.	12	36 000	18 302	34
May	12	8 000	22 200	74
Jun.	12	0	25 713	100
Jul.	12	0	22 985	100
Aug.	12	0	17 050	100
Sep.	12	72 000	9 846	12
Oct.	12	200 000	8 650	4

Source: Compiled from Clam and Eurostat

[8] The model used in this research assumes a long-term equilibrium, i.e. it assumes that in the long run a perennial crop behaves as if it were an annual crop. In reality citrus crops go through period of gestation (gap between the initial investment and the first output), plant productivity increases over the years until it peaks, after which its productive capacity deteriorates.

[9] Kawaguchi and Arahata (2000) found that demand for mandarin oranges in Japan was elastic in the second quarter (off-season) but inelastic in other seasons.

V. CITRUS JUICE

16.   Due to tariff escalation, the impact of trade liberalization on citrus juices is expected to be larger than that for fresh fruits. Table 5 shows the simulation results, where world prices would be some 11 percent higher than the baseline period, while the volume traded worldwide would be about three percent higher. Although the difference in volume appears to be small, it nevertheless entails changes in the flow of international citrus juice trade.

Table 5 - Effects of applying US Swiss 25 tariff reform on citrus juice (tonnes per annum, fresh fruit equivalent)

Citrus juice	Baseline	Swiss 25	Difference (%)	Tariffs	
World Price (US$/t)	**1 316**	**1 465**	11.3		
Imports	14 381 676	14 854 318	3.3	Baseline	Swiss 25
USA	*1 008 132*	*1 031 203*	2.3	42.9	15.8
Canada	*1 430 969*	*1 343 048*	-6.1	0.0	0.0
EC (15)	*10 712 007*	*11 303 079*	5.5	48.0	16.4
Europe, non-EC	*401 150*	*390 710*	-2.6	15.0	9.4
Japan	*331 731*	*340 680*	2.7	35.0	14.6
Oceania Dvpd	*193 600*	*173 810*	-10.2	5.5	4.5
Saudi Arabia	*205 699*	*184 372*	-10.4	5.0	4.2
Singapore	*98 388*	*87 418*	-11.2	0.0	0.0

Exports (tonnes)	Baseline	Swiss 25	Difference
South Africa	*137 819*	*142 335*	*4 516*
Mexico	*642 264*	*663 310*	*21 046*
Israel	*264 037*	*272 689*	*8 652*
Argentina	*320 165*	*332 042*	*11 877*
Brazil	*13 017 391*	*13 443 943*	*426 552*

17.   Under the simulated scenario, imports to the European Community would be some six per cent higher (600 000 tonnes fresh equivalent) than the baseline. Much of this increase in demand would be satisfied by higher exports from Brazil, its major citrus juice trading partner. However, a considerable volume of imports (150 000 tonnes fresh equivalent) that are currently being captured by other importing countries would be diverted to the European Community. In Saudi Arabia, other non-EC European countries and Australia, consumers would face higher domestic prices despite lower import tariffs, and some of their current imports would otherwise be captured by the EC market. The re-direction of trade is due to the high market concentration of world citrus juice imports in the European Community, combined with its high initial tariff. Swiss 25 would imply that the European Community would increase its share of the world citrus juice market from 72 to 76 percent, at the expense of all other importing countries. The impact of Swiss 25 on US net trade would be small, with imports increasing by only 2.3 percent, the lowest impact of all importing countries.