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POSTHEARING SUBMISSION TO UNITED STATES

INTERNATIONAL TRADE COMMISSION

The Economic Effects of Significant U.S. Import Restraints	Investigation No. 332-262

EFFECTS OF U.S. IMPORT RESTRAINTS ON AGRICULTURAL AND OTHER PRODUCTS: GENERAL EQUILIBRIUM RESULTS

BY STAFF OF THE BUREAU OF ECONOMICS

FEDERAL TRADE COMMISSION

May 1990

Note: This submission is a replacement of an earlier Prehearing submission. The estimates contained in this Posthearing submission differ, and in some cases significantly, from those in the Prehearing submission.

EFFECTS OF U.S. IMPORT RESTRAINTS ON AGRICULTURAL AND OTHER PRODUCTS: GENERAL EQUILIBRIUM RESULTS[1] [2]

I. Introduction

The Senate Finance Committee has requested that the International Trade Commission ("ITC") conduct an investigation of the economic effects of existing significant U.S. import restraints.[3] The specific objectives of the investigation include assessing the effects of import restraints on U.S consumers, on the output and profits of U.S. firms, on the incomes and employment of U.S. workers, and on the net economic

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[1] These comments are the views of the staff of the Bureau of Economics of the Federal Trade Commission. They are not necessarily the views of the Federal Trade Commission or of any individual Commissioner. Please contact Morris Morkre at (202) 326-3365 if there are any questions regarding this submission.

[2] This paper revises and supersedes the Prehearing submission made to the ITC on February 21, 1990. The estimates contained in the Prehearing submission contained anomalies that were pointed out to us by ITC staff. In light of the concerns raised by ITC staff we have revised and reestimated our model. The estimates contained in this revised paper differ, often significantly, from those contained in the Prehearing submission. A discussion of the basis for these revisions is given in the Appendix to this Posthearing submission.

Acknowledgment is due to ITC staff for comments on the Prehearing submission, specifically to Commissioner David Rohr, Keith Anderson, Richard Boltuck, Seth Kaplan, and Steven Tokarick. Comments by David Tarr of the World Bank were also helpful.

[3] Federal Register, Vol. 53, No. 202, October 19, 1988.

welfare of the United States. The ITC investigation also is examining the direct effects of particular import restraints on the U.S. industry protected by the restraint and the indirect effects on industries that are customers of the protected industry ("downstream" effects). The investigation has been divided into three phases. Phase one, which was completed last September, focussed on import restraints on manufactured products. Phase two, the current phase, concerns restraints on agricultural products and natural resources. Phase three will examine restraints on services.

The Federal Trade Commission ("FTC") is concerned with actions and policies that affect the welfare of U.S. consumers, including U.S. government policies that affect imports. Over the past decade, the FTC's Bureau of Economics ("BE") has estimated the effects of various import restraints on U.S. consumers. The results of several of these efforts have been issued as staff reports.[4] Some of these reports may be useful to the ITC during the course of the present investigation.

More recently, the FTC's Bureau of Economics issued a report entitled A General Equilibrium Analysis of the Welfare and

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[4] For example, Morris E. Morkre and David G. Tarr (1980), Effects of Restrictions on United States Imports; David G. Tarr and Morris E. Morkre (1984), Aggregate Costs to the United States of Tariffs and Quotas on Imports; and Keith B. Anderson and Michael R. Metzger (1987), A Critical Evaluation of Petroleum Import Tariffs.

FTC staff has also made submissions to the ITC on other matters, including: Stainless Steel and Alloy Tool Steel, Inv. No. TA-203-16, March 27, 1987, and Certain Electrically Resistive Monocomponent Toner and "Black Powder" Preparations Thereof, Inv. No. 337-TA-253, August 20, 1987.

Employment Effects of US Quotas in Textiles, Autos and Steel by Dr. David G. Tarr, formerly with BE ("Tarr report"). In this report, Tarr presents a computable general equilibrium model ("CGE") of the U.S. economy and uses it to obtain estimates for the welfare effects of three major Quantitative Restraints that limited (or were about to limit) imports of automobiles, steel, and textiles and apparel in 1984. Copies of the Tarr report together with a paper by BE staff extending Tarr's results were submitted to the ITC last spring for Phase I of the current investigation. For this occasion, we are pleased to submit a second paper that provides estimates for the effects of import restraints on agricultural products. These results use a CGE model that builds on and extends Tarr's model.

II. Summary of Results

This paper presents estimates of the effects of Quantitative Restraints ("QRs") on imports of sugar and dairy products. To provide perspective for these results, we also furnish estimates for the effects of QRs on apparel and steel and for tariffs on all imports.[5] The results are based on conditions for the year

[5] The estimates provided in this paper for the effects of QRs on apparel and steel are different than the estimates we provided last year in our submission for phase I. The new estimates are based on conditions for the year 1987. The estimates in last year's submission were for the year 1984. Moreover, since market conditions and import policies may change over time, the welfare and employment effects of import restraints for more recent years may differ from our estimates for 1987. For example, we note that the quota for sugar imports was recently increased by 9.7 percent. New York Times, April 26, 1990, p. D25.

1987. Our estimates are summarized in Tables I and II, which are at the end of this paper.[6]

Removing the QR on sugar imports is estimated to provide gains to U.S. consumers in the amount of $462 million per year.[7] Nearly half of these gains, $211 million, represent excess payments by the United States to foreign countries or firms that export sugar to the United States, payments attributable solely to the higher price U.S. consumers are obliged to pay (because of the QR) for the sugar imports allowed under the QR. These excess payments, called "quota rents," could potentially be recaptured by the United States if, for example, the United States auctioned sugar quota rights.

Removing the QR on dairy imports (butter, cheese, and dry milk powders) would increase consumer welfare by $47 million per year. The gains from removing the dairy QR are smaller than the gains from removing the sugar QR, in part, because the quota rents created by the dairy QR are not lost to foreign suppliers. This is a consequence of the fact that the U.S. Department of

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[6] All of the tables containing estimates of the effects of import restraints are at the end of this paper.

[7] The framework we use to estimate gains to consumers is a general equilibrium model in which "consumers" are essentially viewed very broadly as individuals who both supply labor and/or capital resources and purchase goods with the incomes they earn. These individuals are both consumers and producers. In a sense, consumers and producers are "fully integrated." Thus, there is no distinction between "gains to consumers" and "gains to the U.S." They are one in the same. In the tables reporting welfare effects we use the expression "gains to the U.S." We could just as well have used the expression "gains to consumers." For an elaboration of this point, see the Tarr report, p. 9-5.

Agriculture administers dairy quotas and grants import quota rights to domestic importers. Moreover, the sugar QR restricts imports to a greater degree than does the dairy QR.

Removing the QR on apparel imports would provide annual gains to consumers of $9.7 billion. Quota rents accruing to foreign exporters are approximately 75 percent of this amount, $7.5 billion. If the steel QR were removed, consumer gains would be $498 million per year, with quota rents to exporters accounting for 98 percent, $489 million, of the total gains.

We also estimate the combined effect of simultaneously removing all import restraints. Removing all four QRs and all tariffs, we find that U.S. consumers would gain by $11.1 billion annually.

Removing import restraints will affect the pattern of employment in the economy. Our model divides the U.S. economy into 29 sectors and provides considerable detail on agriculture and food processing, which are represented by 18 of the 29 sectors in the model. A summary of the employment effects of import restraints is given in Table II.

Removing the sugar QR would shift employment out of agriculture and food processing and into manufacturing. In particular, the removal would likely result in a significant decline in the demand for corn syrups, a sugar substitute. This is reflected in large employment decline for corn manufacturing (-2,500 workers), which in turn reduces employment in feed crops (-2,500). Most of these workers shift to the large other

manufacturing sector (+4,800). Note that there is virtually no employment change in the sugar crop sector. This is due to the fact that sugar farmers are assumed to be supported by domestic agricultural policies. A discussion of this issue is provided in section V below.

Removing the dairy QR has considerably smaller employment effects. The sectors having the largest employment declines are dairy manufacturing (-600) and traded services (-600). The sector that is the major gainer is nontraded services (+400). There is almost no change in employment for dairy farms because domestic agricultural policies are assumed to support dairy farmers.

Employment shifts are much more pronounced when all import restraints are removed (simultaneously removing QRs on sugar, dairy, apparel, and steel, and also removing all tariffs). The magnitudes of the employment changes in the agricultural and food processing sectors are relatively small, primarily because in the overall economy these sectors are relatively small. The agricultural sectors with the largest employment changes are food grains (+6,200) and oil crops (+9,400). In manufacturing and services, the sectors with the largest employment declines are steel (-13,600), other consumer manufacturers (-14,000), textiles (-38,300), and apparel (-165,500), while the sectors with the largest increases are nontraded services (+26,400), traded services (+64,400), and other manufacturing (+113,200).

III. An Overview of The FTC CGE Model

The welfare and employment effects presented in this paper are obtained from a 29-sector Computable General Equilibrium Model based on data for the year 1987. The present version of the FTC CGE model is an extension of the 10-sector CGE model presented by Dr. David Tarr in his recent staff report to the FTC based on data for the year 1984. In addition to using more recent data and having more sectoral detail than the earlier model, the present version of the FTC CGE model has also been modified in other respects, the most important of which is the incorporation of certain U.S. agricultural programs. Since the focus of the current ITC investigation is on agricultural products, it is important to include these programs because they affect prices and influence production of several important agricultural crops, and are therefore needed to estimate accurately the effects of import restraints on agricultural products. As discussed in the next section, the way that agricultural programs are incorporated into our model follows their treatment in the CGE model constructed at the Economic Research Service ("ERS") of the U.S. Department of Agriculture ("USDA"). In the remainder of this section, an overview of the FTC CGE model is provided to set the stage for the analysis of the effects of import restraints on sugar and dairy, which follows in sections VI and VII. We also incorporate into the model the QRs on apparel and steel imports as well as tariffs on

all imports. The combined effect of all import restraints included in our model is taken up in section VIII.

The 29 sectors in the FTC CGE model are listed in Table A. There are nine agricultural sectors (1-9), nine food processing sectors (10-18) and eleven other sectors (19-29) covering natural resources, manufacturing, and services. Table A also gives employment, exports, and imports by sector.[8] The sectors are defined in terms of the nomenclature of the Bureau of Economic Analysis ("BEA"), U.S. Department of Commerce ("DOC").[9] BEA industries govern the structure and detail of the official U.S. input-output table issued by DOC. A major ingredient of our model is a 1987 29-sector input-output table for the U.S. economy based on a 1982 table from USDA, which in turn is derived from the official 1977 table.

The primary objective of the FTC CGE model is to estimate the full effect on consumers of U.S. import policy.[10] The

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[8] We are grateful to Valerie Personick and James Franklin, U.S. Department of Labor, Bureau of Labor Statistics, Office of Economic Growth and Employment Projections, for disaggregated data (by BLS industries) on employment, exports, imports, and calculated duties.

[9] The definition of BEA industries in terms of the Standard Industrial Classification (SIC) system is given in U.S. Department of Commerce, Survey of Current Business, May 1984.

[10] The effect on consumers of U.S. import restraints is indicated by the change in real consumer income, as measured by the Hicksian concept of equivalent variation. As explained in the Tarr report (chap. 3 section 5) this measure is applied to a linear expenditure system in final consumption of domestic and imported products. In the present version of the FTC CGE model, the linear expenditure system is expressed in terms of composite final goods, where composite final goods are constant elasticity

(continued...)

TABLE A

SECTORS AND BASIC DATA FOR FTC CGE 29-SECTOR MODEL

Sector	BEA Industries	1987 Data		
		Employment (thousands of full-time equivalent workers)	Exports billions of dollars	Imports
1. Dairy Farms	1.01	207.02	0.060	
2. Meat Animals	1.0301	388.96	0.163	0.760
3. Other Livestock	1.02			
	1.0302	212.68	0.306	0.119
4. Cotton	2.01	107.68	1.458	0.002
5. Food Grains	2.0201	134.12	2.623	0.053
6. Feed Crops	2.02202	227.80	3.370	0.089
7. Oil Crops	2.006	154.52	4.006	0.017
8. Sugar Crop	2.0502	57.90	0.001	0.005
9. Other Crops	2.0203 2.03 2.04 2.0501 2.0503 2.07	1,046.35	2.859	3.019
10. Red Meat Mfg	14.0101 14.0102	220.26	3.552	3.635
11. Other Meat Mfg	14.0103 14.0104	168.68	0.507	0.036
12. Dairy Mfg	14.02-14.06	165.87	0.683	0.749

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TABLE A

SECTORS AND BASIC DATA FOR FTC CGE 29-SECTOR MODEL--Continued

Sector	BEA Industries	1987 Data		
		Employment (thousands of full-time equivalent workers)	Exports billions of dollars	Imports billions of dollars
13. Grain Mfg	14.14 14.1501 14.16 14.1802 14.31	75.35	1.244	0.256
14. Feed Mfg	14.1502	43.84	0.375	0.066
15. Corn Mfg	14.17	10.94	1.134	0.062
16. Sugar Mfg	14.19	21.05	0.272	0.572
17. Soya Mfg	14.24-14.27 14.29	38.63	2.748	0.657
18. Msc Food Mfg	14.07-14.13 14.28 14.30 14.32 14.1801 14.20-14.23	905.40	4.907	12.485
19. Textiles	16 17 19	746.15	3.289	7.559
20. Apparel	18	1,062.02	1.528	30.177
21. Mining	3 5 6 7 9 10	482.39	4.199	6.511

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TABLE A

SECTORS AND BASIC DATA FOR FTC CGE 29-SECTOR MODEL--Continued

Sector	BEA Industries	1987 Data		
		Employment (thousands of full-time equivalent workers)	Exports billions of dollars	Imports billions of dollars
22. Crude Oil/Nat Gas	8	217.31	0.139	34.029
23. Vehicles	59.0301	392.31	11.921	73.920
24. Petroleum Refining	31	173.56	8.372	21.277
25. Steel	37	451.55	1.391	11.793
26. Other Consumer Mfg	15 22 23 29 33 34 54 56.01-.04	1,924.04	17.943	51.932
27. Other Mfg	13 20 21 24-28 30 32 35 36 38-53 55 57.01-.03 58 59.01-.02 59.0302 60-64	20,171.04	168.325	215.887

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TABLE A

SECTORS AND BASIC DATA FOR FTC CGE 29-SECTOR MODEL--Continued

Sector	BEA Industries	1987 Data		
		Employment (thousands of full-time equivalent workers)	Exports billions of dollars	Imports billions of dollars
28. Traded Services	12 65 71.02, 72-79 83	46,301.97	201.224	85.532
29. Nontraded Services	4 11 71.01 82 84	28,196.41	———	———
Total		104,305.80	448.599	561.199

Note: For Bureau of Economic Analysis (BEA) industries see U.S. Department of Commerce, Survey of Current Business, September 1985. Data on employment, exports, and imports from U.S. Department of Labor, Bureau of Labor Statistics, Office of Economic Growth and Projections are arranged by sectors using information from the Bureau of the Census and U.S. Department of Agriculture.

Source: Bureau of Economics, Federal Trade Commission.

reference period is the year 1987. That is, the starting point is based on actual 1987 values for such variables as price, consumption, production, and employment for each of the 29 sectors of the economy. Also included in the basic data set are 1987 values for various import restraints, such as tariff rates. In the case of QRs on imports, the basic data set includes quota premia for the QRs. A quota premium is like an ad valorem tariff rate: it measures the percent difference between the price the U.S. actually paid foreigners for an imported product and the price that it would have paid absent the QR.

To determine the full effect on consumers of a particular import policy, e.g., the 56 percent quota premium for the QR on sugar in 1987 (discussed below in section V), we set the quota premium for sugar equal to zero and use the model to solve for the prices, quantities, and employments that are consistent with a zero quota premium. The new values for these variables represent the values that would have been observed but for the QR on sugar. By comparing actual 1987 data with the values that would have been observed but for the existence of the QR, it is possible to calculate the gains to U.S. consumers that would have been realized if, in fact, there had been no sugar QR in 1987.

One of the major features of the FTC CGE model is that it is, by design, able to detect and quantify the full impact of an

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[10](...continued)
of substitution functions of domestic and imported goods.
Other changes to the original Tarr model are discussed subsequently in the text or in footnotes. Indirect taxes have also been incorporated into the present version of the model.

import restraint. For example, in the case of sugar, eliminating the QR will lower the price of sugar in supermarkets. But there are other adjustments our model will also capture. A lower price of sugar will induce food processors, such as soft drink companies, to substitute sugar for other sweeteners (corn syrups).[11] This will lower the price of soft drinks and other prepared foods. The full impact on consumers encompasses both of these adjustments and is measured by our model.

The second objective of the FTC CGE model is to determine the full impact of U.S. import restraints on the distribution of employment across sectors.[12] For example, absent the sugar QR, employment in sugar manufacturing will be lower because firms in this sector make and use raw sugar -- which is subject to the QR. While sugar manufacturing is immediately influenced by the sugar QR, virtually all other sectors will also be affected in varying degrees. Using our 29 sector input-output table for the U.S. economy, we can trace the effect of the sugar QR on all sectors that use sugar as a raw material. In addition, there are further influences that are captured through the foreign exchange rate.

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[11] To analyze this we construct an aggregate good "sweet" that is a constant elasticity of substitution function of sugar and corn sweeteners. We follow Rendleman (as closely as possible) in distinguishing between the sectors that purchase corn sweeteners versus other products produced by the corn manufacturing sector. See Charles M. Rendleman, "The Economy-Wide Impact of the U.S. Sugar Program," Ph.D. Dissertation, Purdue University, Aug. 1989, p. 27.

[12] The present FTC CGE model is concerned with the sectoral distribution of the 1987 total employment for the economy as a whole. Issues relating to labor-leisure choice are not examined.

The FTC CGE model determines the effect of U.S. import policy on the foreign exchange rate.[13] Changes in the exchange rate influence all sectors and establish connections between sectors that otherwise would appear to be independent, e.g., sugar manufacturing and other consumer manufacturing (including shoes). For example, removing the sugar QR will cause the dollar to depreciate because sugar imports will be greater. The depreciation will make foreign-produced goods, such as shoes, less competitive in the domestic market and their imports will be smaller. Thus, the sugar QR, through the exchange rate, connects sugar and shoes.

The estimates of the welfare and employment effects in our model depend on the degree to which consumers and producers respond to changes in market conditions brought about by changes in prices of imported products. Generally, the greater the price sensitivities (or elasticities) the greater the change in consumption, production, and employment that result from an import restraint. There are four types of price elasticities in the model. They are: (1) the price sensitivity of consumers in purchasing final goods (demand elasticity), (2) the degree to which consumers or producers switch between domestic and import substitutes when their relative prices change (elasticity of substitution between domestic and imported products), (3) the

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[13] In our model the balance of trade (in world prices) is fixed to avoid exaggerating the gains from removing import restraints. The foreign exchange rate adjusts to ensure that the balance of trade does not change. For a discussion of this issue see the Tarr report, p. 2-6.

degree to which producers shift from labor to capital when the wage rate changes relative to the price of using capital goods (elasticity of substitution between labor and capital in production), and (4) the degree to which domestic producers shift sales between domestic and foreign markets when domestic prices change relative to foreign prices (elasticity of transformation between domestic and foreign sales). The FTC CGE model relies on previous work by other economists to obtain numerical values for price elasticities. Three different collections of values are used in the model. The central elasticity case is the collection that we believe is the most likely to exist in fact. The high and low elasticity cases contain values that are uniformly higher or lower than the central case.[14] The elasticity values used in our model are given in Table B.

Finally, although the FTC CGE model provides considerable detail about the structure and adaptability of the U.S. economy, it essentially regards the rest of the world as one large marketplace to which U.S. consumers and producers respond. However, for some products, U.S. exporters or importers may exert a significant and sustained influence on the prices they receive or pay in transactions with foreigners. In such instances, and treating the United States as a whole as one seller or buyer, there is an effect on the (price) terms when the United States deals with foreigners. This is referred to as a "terms-of-trade"

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[14] To the extent possible, we used the standard errors reported by previous researchers to obtain the high and low elasticity values.

TABLE B
ELASTICITIES USED IN 29-SECTOR FTC CGE MODEL

	Demand Elasticity			Elasticity of Substitution Between Domestic and Import Products		
	Low	Central	High	Low	Central	High
1. Dairy Farms	-0.139	-0.259	-0.379	1.1	2.0	4.0
2. Meat Animals	-0.569	-0.617	-0.665	1.1	2.0	4.0
3. Other Livestock	-0.470	-0.531	-0.592	1.1	2.0	4.0
4. Cotton	-0.169	-0.219	-0.269	2.0	4.0	8.0
5. Food Grains	-0.05	-0.109	-0.212	2.0	4.0	8.0
6. Feed Crops	-0.05	-0.109	-0.212	2.0	4.0	8.0
7. Oil Crops	-0.169	-0.219	-0.269	1.5	3.0	6.0
8. Sugar Crop	-0.035	-0.052	-0.069	3.0	5.0	7.5
9. Other Crops	-0.117	-0.209	-0.301	0.25	0.5	1.5
10. Red Meat Mfg	-0.569	-0.617	-0.665	0.865	1.73	3.46
11. Other Meat Mfg	-0.470	-0.531	-0.592	0.865	1.73	3.46
12. Dairy Mfg	-0.215	-0.332	-0.449	0.865	1.73	3.46
13. Grain Mfg	-0.05	-0.109	-0.212	0.865	1.73	3.46
14. Feed Mfg	-0.05	-0.109	-0.212	0.865	1.73	3.46
15. Corn Mfg	-0.035	-0.052	-0.069	0.865	1.73	3.46

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TABLE B

ELASTICITIES USED IN 29-SECTOR FTC CGE MODEL--Continued

	Demand Elasticity			Elasticity of Substitution Between Domestic and Import Products		
	Low	Central	High	Low	Central	High
16. Sugar Mfg	-0.035	-0.052	-0.069	3.65	5.0	7.5
17. Soya Mfg	-0.169	-0.219	-0.388	2.0	4.0	8.0
18. Msc Food Mfg	-0.117	-0.209	-0.301	0.865	1.73	3.46
19. Textiles	-0.17	-0.34	-0.51	0.6	2.58	4.56
20. Apparel	-0.25	-0.5	-0.75	0.81	1.62	3.24
21. Mining	-0.25	-0.5	-0.75	0.25	0.5	1.1
22. Crude Oil/Nat Gas	-0.25	-0.5	-0.75	1.18	2.36	4.72
23. Vehicles	-1.04	-1.2	-1.33	0.5	2.01	8.39
24. Petroleum Refining	-0.25	-0.5	-0.75	1.18	2.36	4.72
25. Steel	-0.75	-1.0	-1.5	1.1	3.05	5.0
26. Other Consumer Mfg	-1.3	-1.9	-2.85	1.58	3.15	6.3
27. Other Mfg	-1.15	-1.5	-1.75	0.13	3.55	6.97
28. Traded Services	-0.4	-0.5	-0.75	0.9	2.0	4.0
29. Nontraded Services	-0.4	-0.5	-0.75	0.8	0.8	0.8

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TABLE B

ELASTICITIES USED IN 29-SECTOR FTC CGE MODEL--Continued

	Elasticity of Substitution Between Labor and Capital in Production			Elasticity of Transformation Between Domestic and Foreign Sales		
	Low	Central	High	Low	Central	High
1. Dairy Farms	0.25	0.5	1.0	1.0	2.0	4.0
2. Meat Animals	0.25	0.5	1.0	1.0	2.0	4.0
3. Other Livestock	0.25	0.5	1.0	1.0	2.0	4.0
4. Cotton	0.25	0.5	1.0	2.0	4.0	8.0
5. Food Grains	0.25	0.5	1.0	2.0	4.0	8.0
6. Feed Crops	0.25	0.5	1.0	2.0	4.0	8.0
7. Oil Crops	0.25	0.5	1.0	2.0	4.0	8.0
8. Sugar Crop	0.25	0.5	1.0	1.0	2.0	4.0
9. Other Crops	0.25	0.5	1.0	1.0	2.0	4.0
10. Red Meat Mfg	0.25	0.5	1.0	1.0	2.0	4.0
11. Other Meat Mfg	0.25	0.5	1.0	1.0	2.0	4.0
12. Dairy Mfg	0.25	0.5	1.0	1.0	2.0	4.0
13. Grain Mfg	0.25	0.5	1.0	1.5	3.0	6.0

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TABLE B

ELASTICITIES USED IN 29-SECTOR FTC CGE MODEL--Continued

	Elasticity of Substitution Between Labor and Capital in Production			Elasticity of Transformation Between Domestic and Foreign Sales		
	Low	Central	High	Low	Central	High
14. Feed Mfg	0.25	0.5	1.0	1.5	3.0	6.0
15. Corn Mfg	0.25	0.5	1.0	1.5	3.0	6.0
16. Sugar Mfg	0.25	0.5	1.0	1.0	2.0	4.0
17. Soya Mfg	0.25	0.5	1.0	1.5	3.0	6.0
18. Msc Food Mfg	0.333	0.667	1.334	1.0	2.0	4.0
19. Textiles	0.744	0.914	1.084	1.6	2.9	4.2
20. Apparel	0.936	1.106	1.276	1.6	2.9	4.2
21. Mining	0.6	0.8	1.0	1.6	2.9	4.2
22. Crude Oil/Nat Gas	0.4	0.8	1.6	1.6	2.9	4.2
23. Vehicles	0.5	0.81	1.12	1.6	2.9	4.2
24. Petroleum Refining	0.4	0.8	1.0	1.6	2.9	4.2
25. Steel	0.84	1.0	1.16	1.6	2.9	4.2

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TABLE B

ELASTICITIES USED IN 29-SECTOR FTC CGE MODEL--Continued

	Elasticity of Substitution Between Labor and Capital in Production			Elasticity of Transformation Between Domestic and Foreign Sales		
	Low	Central	High	Low	Central	High
26. Other Consumer Mfg	0.6	0.8	1.0	1.6	2.9	4.2
27. Other Mfg	0.6	0.8	1.0	1.6	2.9	4.2
28. Traded Services	0.6	0.8	1.0	0.3	0.7	1.1
29. Nontraded Services	0.6	0.8	1.0	0	0	0

Several sources were used for elasticity values. Demand Elasticities. For sectors 10-18, the source was Kuo S. Huang, U.S. Demand for Food: A Complete System of Price and Income Effects, U.S. Dept. of Agriculture, ERS, Technical Bulletin No. 1714, Dec. 1985. Since demand elasticities are for final goods, the values for sectors 1-9 were taken from Huang, matching categories as closely as possible. For sectors 21-29, we use the demand elasticities for domestic products in the Tarr report, p. 5-12. For sectors 19 and 20, the source was Gary C. Hufbauer, Diane T. Berliner, and Kimberly A. Elliott, Trade Protection in the United States: 31 Case Studies, Institute for International Economics, Washington, D.C., 1986, p. 135.

Elasticity of Substitution between Domestic and Imported Products. For sectors 1-18, we rely primarily on information from the U.S. Dept of Agriculture, ERS.

For sectors 19 and 21-29, we use the estimate in the Tarr report, p. 5-4. For sector 20, we use the estimate from Clinton R. Shiells, Robert M. Stern, and Alan V. Deardorff, "Estimates of the Elasticities of Substitution between Imports and Home Goods for the United States," Weltwirtschaftliches Archiv, Vol. 122, 1986, p. 515.

Elasticity of Substitution between Labor and Capital in Production. For sectors 1-18, we rely primarily on information from the U.S. Dept. of Agriculture, ERS. For sectors 19-29, we use the estimates in the Tarr report, p. 5-4.

Elasticity of Transformation between Domestic and Foreign Sales. For sectors 1-18 we rely on information from the U.S. Dept. of Agriculture, ERS. For sectors 19-29 we use the estimates in the Tarr report, p. 5-8.

Source: Bureau of Economics, Federal Trade Commission.

issue. To allow for this, the FTC CGE model has a terms-of-trade case which is reported in several of the tables in this paper.[15]

IV. Agricultural Programs

Under the Food Security Act of 1985 (the "Act"), the U.S. government provides support to domestic farmers, including intervention in markets for several agricultural and processed food products, to support income of farmers, stabilize prices of farm products, and increase agricultural exports. Intervention takes many forms, and may not always affect incentives of farmers regarding how much to produce. Our interest is with those agricultural policies that are expected to have an appreciable impact on production.

Significance of Intervention

When intervention affects output by means of policies that subsidize production, additional resources are drawn into the subsidized sectors. To estimate accurately the welfare effects of import restraints when there are subsidies, it is important to find out what happens to the subsidized sectors. For example, if initially a QR on one product coincides with low production of another product that is subsidized, then removing the import restraint on the first product but maintaining the intervention

[15] Specifically, the terms-of-trade case involves the following exports: cotton, feed crops, food grains, and oil crops. For these products, an export demand elasticity of 3 is used. For imports of vehicles, an import supply elasticity of 5 is used. The elasticity values for the agricultural sectors are based on information from ERS, USDA. The elasticity value for vehicles is from the Tarr report, p. 7-4.

on the second product involves a tradeoff in terms of welfare. On the one hand, there is a gain because the price of the formerly restrained import product is lower. On the other hand, more workers are employed in the subsidized sector. A priori the net effect on welfare is unknown. Of course, removing both import restraints and production subsidies will improve consumer welfare. But the focus here is on the effect of import restraints. Since our model incorporates the basic parameters for both agricultural policies and import restraints, we can estimate the overall net effect of removing import restraints.

The agricultural policies incorporated into the FTC CGE model provide direct or indirect subsidies to farmers. They are: deficiency programs, export enhancement programs, and nonrecourse loan programs.[16] The way we incorporate these programs into our model follows, as closely as possible, the specifications in the CGE model constructed at USDA.[17]

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[16] The principal source of information about the farm program variables discussed below is the 1989 Mid-Session Review of the Commodity Credit Corporation. In addition, unpublished data was obtained from various sources at USDA.

[17] Special acknowledgment to Dr. Kenneth Hanson (ERS) and Dr. Maureen Kilkenny (formerly of ERS now at Pennsylvania State University) for assistance in modelling the agricultural programs. For a discussion of these issues see Maureen Kilkenny, "CGE Analysis of Agricultural Liberalization: Factor Mobility and Macro Closure Implication," Working Paper No. 12-1-88, Department of Economics, Pennsylvania State University; Sherman Robinson, Irma Adelman, and Maureen Kilkenny, "The Effect of Liberalization in Agriculture on the US Economy: Projections to 1991," in Andrew B. Stoeckel, David Vincent, and Sandy Cuthbertson, eds. Macroeconomic Consequences of Farm Support Policies, Duke Univ. Press, 1989, pp. 222-259.

(continued...)

Deficiency Programs

Deficiency programs provide payments to certain farmers equal to the difference between a target price and market price or loan rate (whichever difference is less) multiplied by the quantity of eligible production.[18] The target price is mandated by the Food Security Act and the loan rate is a price determined by the Secretary of Agriculture, subject to provisions in the Act. Eligible production is based on a formula that involves approved acreage planted in the crop and program yield. To be eligible for deficiency payments a farmer is obliged to devote a certain percentage of his acreage to approved conservation uses (10 percent in the case of corn in 1987).

In 1987, deficiency programs were in effect for the following sectors in our model: cotton, feed crops (primarily corn), and food grains (primarily wheat). For these sectors the 1987 ratios of target price to market price (weighted averages) were: cotton 1.28, feed crops 1.36, and food grains 1.69. Nearly all farmers producing covered crops participate in the

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[17](...continued)
Because the structure and objective of the FTC and USDA models is somewhat different, it was not possible to follow precisely the way that agriculture programs are treated in the USDA CGE model. One major difference between the two models is that the USDA model incorporates major macroeconomic variables (such as aggregate investment, and total private and public saving). Additionally, as with most models (including ours), the USDA model is revised over time so that the precise manner in which agricultural programs are treated in the current USDA CGE model may have changed somewhat.

[18] See USDA, ERS, "The Basic Mechanisms of U.S. Farm Policy, Part one: Target, Loan, & Deficiency, How They Work," May 1989.

programs. However, some eligible farmers do not participate and there are also ceilings on the amount of payments. Dividing total deficiency payments by value of crop output gives the following subsidy rates by sector in 1987: cotton 21 percent, feed grains 33 percent, and food grains 60 percent. These percentages are entered into our program as production subsidy rates for the respective sectors.[19] Total deficiency payments for these crops were $13.24 billion in 1987.

Export Enhancement Programs

Export enhancement programs provide certificates to exporters of certain agricultural products that can be used to obtain commodities from the Commodity Credit Corporation (CCC). In 1987, export enhancement programs were in effect for food grains (rice and wheat), feed crops (barley and grain sorghum), grain manufacturing (flour), soya manufacturing (vegetable oils), and other livestock products (frozen poultry and table eggs). Dividing the value of certificates by the value of exports gives the following export subsidy rates by sector: food grains 26 percent, feed crops 4.4 percent, grain manufacturing 5.9 percent, soya manufacturing 0.036 percent, and other meat manufacturing 14.7 percent. These percentages were entered into our model as

[19] Specifically, the subsidy rate for a deficiency program is treated as a fixed percentage. This way of incorporating deficiency programs into our model differs from the way they were treated in the Prehearing submission. For a discussion of this issue see the Appendix.

fixed export subsidy rates. The total value of these export subsidies approached $1 billion in 1987.

Nonrecourse Loan Programs

Under nonrecourse loan programs participating farmers can pledge crops as collateral for loans from the CCC. The value of the loan equals the quantity pledged times the loan rate. The loan rate is the minimum price for a farmer. If market price is lower than the loan rate he can surrender title to his crop to CCC and retain the proceeds of the loan. Thus, the loan rate acts as a floor to market price, treating the CCC as a reservation "buyer" at the loan rate.

In 1987, there were nonrecourse loan programs for cotton, dairy manufacturing (manufacturing milk), feed crops (barley, corn, grain sorghum, and oats), food grains (rice, rye, and wheat), oil crops (soybeans), and sugar. The ratios of market price to loan rate (weighted averages) by sector in 1987 are: cotton 0.82, dairy manufacturing 0.96, feed crops 0.96, food grains 0.90, oil crops 0.81, and sugar crops 0.83. These ratios were entered into our program as lower bounds on the prices for the respective sectors.

V. Quantitative Restraints and Quota Premia

Measuring the effects of restraints on imports of agricultural/food products is complicated by the fact that these restraints are only one component, although an important component, of a general policy to support domestic farmers. In

the case of dairy, the objective is to assist dairy farmers by supporting the price of manufacturing grade milk. One component of this policy is the imposition of quotas on imports of products made from milk. Thus, USDA administers a quota system to limit imports of foreign-produced butter, cheese, and non-fat dry milk. Similarly, in the case of sugar, the objective is to assist sugarbeet and sugarcane farmers by supporting the price of raw sugar. Once again, one component of the overall policy is the quota on sugar, which is a processed product of sugarbeets and sugarcane.

Baseline Model for Analyzing QRs on Sugar and Dairy

Removing quotas on dairy and sugar imports, but leaving the other components of support policy in place, would likely cause enormous effects on dairy and sugar farmers and on consumers/taxpayers. The domestic market prices of dairy products and sugar could fall appreciably and force the CCC to purchase and stockpile massive amounts of these products to support prices received by dairy and sugar farmers. Alternatively, removing the quotas could conceivably be part of a major overhaul of policy that eliminates all support programs for dairy and sugar farmers.

The point is that it is unlikely that dairy or sugar quotas would be removed without changing simultaneously other dimensions of the support policy. Accordingly, assessing the welfare and employment effects of these quotas really involves more than just examining the effects of the quotas because other programs will

change as well. However, the request by the Senate Finance Committee for this investigation is to assess only the effect of significant import restraints. No mention is made of assessing the effect of agricultural programs.

The approach adopted in this paper is to posit that the U.S. farm program, in broad terms, continues and maintains the income of farmers when import quotas are removed. This has the advantage of allowing us to examine the effects of lower-priced imports on consumers without disturbing the objective of farm policy to preserve incomes of dairy and sugar farmers. The specific way this is accomplished is simultaneously to eliminate the quotas, hold production of dairy and/or sugar farmers at actual 1987 levels, and provide a transfer payment to farmers to compensate them for the income declines that would otherwise accompany lower prices. Another advantage of this approach is that we can make explicit the amount of the implicit transfers that accrue to dairy and sugar farmers because of import quotas. This approach underlies our baseline model. However, for comparison we also determine the effect of jointly removing quotas and eliminating the farm program support (for dairy and/or sugar) completely.

Quota Premium for Sugar

The current import quota on sugar dates from 1982.[20] The global quota is allocated to sugar exporting countries primarily

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[20] Presidential Proclamation 4941, Federal Register, 47(89), May 7, 1982, pp. 19661-19664.

on the basis on historical performance.[21] Individual countries are responsible for administering their exports and ensuring that their quota limits are not exceeded. USDA monitors imports to ensure they comply with the limits.

As a result of the sugar QR, the domestic price of raw sugar[22] is higher than the world price. In 1987, the average domestic price for raw sugar (duty paid and delivered to New York) was 21.82 cents per pound; the average world price was 6.71 cents (f.o.b. Caribbean ports).[23]

We calculate two estimates of the sugar quota premium. The first is based on the difference between the domestic and world prices of raw sugar, after adjusting the latter (increasing it) by 1.5 cents per pound for handling costs to deliver foreign-produced raw sugar to the United States.[24] This gives an

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[21] The quota for certain countries has been modified since 1982, e.g., an embargo was placed on imports from Panama. USDA, ERS, Sugar and Sweetener, Situation and Outlook Report, September 1989, p. 12.

[22] Raw sugar (from sugarcane) as opposed to refined sugar dominates international trade in sugar owing to the relatively higher cost of handling refined sugar. However, a small quantity of refined sugar (from sugarbeets) is imported into the United States from Canada.

[23] USDA, ERS, Sugar and Sweetener, Situation and Outlook Report, Yearbook, July 1989, pp. 50, 68.

[24] According to Robert Barry (ERS, USDA), the cost of shipping raw sugar from Caribbean ports to New York is 1.5 cents per pound. Sugar duties are one-half cent per pound. They were not considered because most countries are exempt under preferential trading arrangements (Generalized System of Preferences (GSP) and the Caribbean Basin Initiative (CBI)).

absolute quota premium of 13.61 cents per pound, which is 165.77 percent of the adjusted world price.

The second estimate is based on the difference between the domestic price and the cost of producing raw sugar in major exporting countries. In 1987, the cost to produce raw sugar in major exporting countries was 12.50 cents per pound.[25] Adjusting the latter for handling costs gives an absolute quota premium of 7.82 cents per pound, which is 55.86 percent of the adjusted cost.

For our baseline model we estimate the effect of the U.S sugar quota using the second (lower) estimate for the quota premium. The appropriate value for the quota premium is based on the world price that will prevail absent the quota. Removing the quota could, particularly in the short run, cause the world price to rise as U.S. sugar imports increase.[26] However, the cost of major exporters is taken to measure the long-run supply price for sugar in the world market, which is not affected by U.S. sugar

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[25] USDA, ERS, Sugar and Sweetener, Situation and Outlook Report, June 1989, p. 32. The figure of 12.5 cents was the midpoint of the range reported by USDA (10.30 to 14.70 cents per pound). The seven major sugar exporters were Australia, Brazil, Cuba, Dominican Republic, Mauritius, South Africa, and Thailand.

[26] U.S. sugar imports as a share of total world imports was 6.1 percent in crop year 1986/87. This share would increase considerably if the quota were removed. Between 1975 and 1981, when the United States did not have a sugar quota, the percent share of U.S. imports of total world imports ranged between 14 and 20 percent. USDA, ERS, Sugar and Sweetener, Situation and Outlook Report, pp. 42 and 49; U.S. International Trade Commission, Sugar, Report to the President on Investigation No. 22-45 Under Section 22 of the Agricultural Adjustment Act, USITC Pub. 1253, June 1982, p. A-20.

import policy. Accordingly, our baseline model adopts a quota premium for sugar of 55.86 percent. However, for comparison, we also estimate the effect of the sugar quota using a quota premium of 165.77 percent.[27]

Quota Premium for Processed Dairy Products

Quotas on dairy products were imposed in 1951 and restrict imports of several types of cheeses (including Cheddar, Edam and Gouda, Italian, and Swiss) as well as butter and dry milk products.[28] Dairy quotas are administered by USDA. Licenses are issued to U.S. importers, primarily on the basis of past performance, and specify both product and country of origin. They are not transferable.

Little information is available about the current magnitude of the quota premium for dairy imports. In his study of five cheese imports, Anderson found that the average quota premium over the period 1964 to 1979 ranged between 2.5 percent for Blue cheese and 33 percent for Cheddar, Edam-Gouda and Gruyere

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[27] When the higher (165.77 percent) quota premium is used, we also incorporate a terms-of-trade effect for sugar imports to allow for the fact that the price the U.S. pays for imported sugar can increase when the quota is removed. An import supply elasticity of 3 is used for sugar. This specification is a supplement to our terms-of-trade case, which has terms-of-trade effects for exports of cotton, feed crops, food grains, oil crops, and for imports of vehicles.

[28] USDA, ERS, Dairy, Situation and Outlook Report, April 1989, p. 18; USDA, Foreign Agricultural Service, Meat and Dairy Monthly Imports, Handbook on Section 22 Dairy Quotas and Import Licensing System, April 1988, p. 2.

cheeses.[29] A second study, by Hornig, Boisvert, and Blandford, examined seven cheese products and estimated that the quota premium for 1980 ranged between 11.2 percent for Swiss type cheese from Norway and 41.4 percent for Cheddar cheese from New Zealand.[30] We have not found any estimates of quota premia for dairy products for 1987.

For a more recent quota premium we rely on a study by Roningen and Dixit.[31] They calculate adjusted consumer subsidy equivalents ("CSEs") for three broad dairy products for 1986. CSE is defined as the implicit tax on consumption resulting from a government policy, such as a quota.[32] USDA publishes estimates of CSEs for a variety of agricultural products and their

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[29] James E. Anderson, "The Relative Inefficiency of Quotas: The Cheese Case," American Economic Review, March 1985, p. 188.

[30] Ellen Hornig, Richard N. Boisvert, and David Blandford, "Quota Rents and Subsidies: The Case of U.S. Cheese Import Quotas," Cornell Agricultural Economics Staff Paper No. 88-14, Cornell University, July 1988. Hornig, Boisvert and Blandford also estimate quota premia for earlier years for six cheese products. The premia rates do not vary substantially from year to year and are generally higher in earlier years. However, they calculate quota premia by dividing quota rents by domestic wholesale price as opposed to foreign supply price. Therefore, their estimates understate the true quota premia (by not dividing quota rents by foreign supply price).

[31] Vernon O. Roningen and Praveen M. Dixit, Economic Implications of Agricultural Policy Reforms in Industrial Market Economies, USDA, ERS, 1989.

[32] For a discussion of CSEs, see Organization of Economic Cooperation and Development (OECD), National Policies and Agricultural Trade, 1967, pp. 99-124.

estimates are the starting point for Roningen and Dixit.[33] USDA calculates CSEs by comparing domestic retail price with world price, which is measured by the price in a major low-cost exporting country (plus estimated transport cost to the U.S.). In the case of dairy products, USDA uses the New Zealand price for the world price. New Zealand is a major exporter and low-cost producer of dairy products.[34] However, for our purpose the appropriate domestic price is the producer price. The value of wholesaling and retailing activities are not part of the quota premium. Roningen and Dixit adjust USDA CSEs for the margin between producer and retailer values and find that the adjusted CSE for cheese in 1986 was 30 percent. The corresponding values for butter and milk powder are 48 percent and 33 percent respectively. The weighted average of the adjusted CSEs is 31 percent.[35] We adopt 31 percent as the quota premium for imported dairy products.

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[33] USDA, ERS, Estimates of Producer and Consumer Subsidy Equivalents, Government Intervention in Agriculture, 1982-86, 1988.

[34] M.C. Hallberg and Woong-Je Cho, "The World Dairy Market, Policies, Trade Patterns, and Prospects," Department of Agricultural Economics and Rural Sociology, Pennsylvania State Univ., Aug. 1987, p. 16.

[35] The weight for each of the three product groups is the product's value of imports divided by total value of imports of the three product groups. Values are based on world prices (assumed to be exclusive of quota premia). The weights are: 0.625 for cheese, 0.007 for butter, and 0.368 for milk powder. The import price and quantity data are from Roningen and Dixit, p. 58.

Quota Premia for Apparel and Steel

Since the Senate Finance Committee has expressed interest in the effects of all major import restraints, we also include in our model the quota premia for two major manufacturing sectors, apparel and steel. Moreover, although import restraints on manufacturing products were covered in Phase I of the ITC's investigation last year, there can be interactions between the restraints in agriculture and in manufacturing. By including the apparel and steel QRs in our model we will be able to cumulatively assess the combined effects of restraints on agricultural and manufacturing products and capture possible interaction effects.

Quantitative restraints of textile imports are part of the Multifiber Arrangement. In the recent FTC report by David Tarr, which examined the effects of QRs in 1984, the quota premium for the broad category textiles (which combined apparel together with textile mill products) relied on market prices in Hong Kong for the sale of export quota rights to the United States. In 1984, the average quota premium for apparel was 47 percent.[36] Similar data for 1987 gives a quota premium for apparel of 31.6 percent.[37]

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[36] Tarr report, p. 6-7.

[37] Data on 1987 Hong Kong quota prices was provided by the Trade Industry and Customs Department of the Hong Kong Government. No quota prices were reported for textile mill products. Therefore, the quota premium for the textiles sector is set equal to zero in our model.

Quantitative restraints of steel imports are the result of Voluntary Restraint Agreements ("VRAs") negotiated by the United States with leading steel exporters.[38] To measure the quota premium for the steel VRAs we rely on data reported by the ITC.[39] For 1987, the ITC estimates that the VRAs increased prices of imported steel products in the United States by an average of 4.2 percent. Accordingly, we use 4.2 percent as the quota premium for steel.

VI. Sugar

Supporting Sugar Farmers

We estimate that the gains to U.S. consumers of removing the import quotas on sugar would have been $462 million in 1987. (Table III) Of this amount, $211 million represents quota rents transferred to countries and/or firms that export to the U.S. market, rents that could have been recaptured if the United States administered the quota or if quota rights were auctioned by the government.

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[38] Tarr report, p. 6-4; U.S. International Trade Commission, The Economic Effects of Significant U.S. Import Restraints, Phase I: Manufacturing, Report to the Committee on Finance of the United States Senate on Investigation No. 332-262 Under Section 332 of the Tariff Act of 1930, USITC Pub. 2222, October 1989, p. 3-4.

[39] U.S. International Trade Commission, The Effects of the Steel Voluntary Restraint Agreements on U.S. Steel-Consuming Industries, Report to the Subcommittee on Trade of the House Committee on Ways and Means on Investigation No. 332-270 Under Section 332 of the Tariff Act of 1930, USITC Pub. 2182, May 1989, p. 2-2.

These gains are for the baseline model where the sugar quota premium is 55.86 percent, which uses the central case elasticities, and has no terms-of-trade effects. For the high elasticity case, the annual gains are $584 million, for the low elasticity case they are $362 million. In this instance, allowing for terms-of-trade effects (and using the central elasticity case) has virtually no effect on welfare gains: the annual gains remain at $462 million.

These results were obtained even though sugar farmers receive full support from agricultural policy to maintain sugar crop output. Notice that there is virtually no change in employment in sugar farming. (Table IV) Moreover, a transfer payment compensates sugar farmers for the fall in the market price of sugar crops. In the baseline model, the amount of the annual transfer payment is $1.098 billion. Note that this transfer payment is taken into account in our calculation of gains to consumers from removing the sugar QR. That is, our estimated gains to consumers, $462 million, are net of the $1.098 billion transfer payment to sugar farmers.

Although agricultural policy leaves sugar farmers unaffected when the sugar quota is removed, the lower price of sugar does have an impact on other sectors. The sharpest impact is borne by corn manufacturing, the sector that produces high fructose corn syrup and other sugar substitutes. The lower price of sugar induces industrial users of sweeteners to substitute sugar for corn sweeteners. The dollar value of sugar purchased by food

processors (in terms of initial prices) increases by $605 million; corn manufacturers lose $536 million in sales. As a consequence, full-time equivalent employment in corn manufacturing is lower by 2,500 workers. (Table IV, central elasticity case) This is a relatively large effect: 1987 employment in corn manufacturing was 10,900 so the sector contracts by 22 percent. (Table A)

The effects on other sectors reflect the interplay of several factors, including the links among sectors through the input-output table as well as broader influences, such as the depreciation of the foreign exchange rate and the increase in real income. A depreciation of the exchange rate indicates that the average price of foreign goods increases relative to the average price of domestic goods, which operates to expand employment in sectors that are heavily involved in international trade (whether exporting or importing).[40] Thus, employment increases in cotton, food grains, and oil crops. These three agricultural sectors have a strong export orientation, with exports taking one-third (or more) of total output. The increase in real income has a relatively strong positive effect on

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[40] Formally, the real exchange rate is the average price of imported and exported goods (tradeables) relative to the average price of domestic goods (nontradeables). A depreciation (appreciation) of the real exchange rate is defined as the increase (decrease) in the average price of tradeable goods relative to the average price of nontradeable goods. See Tarr report, appendix 3A for a more detailed discussion of the real exchange rate.

products for which consumer demand is highly responsive to income (e.g., other consumer goods and other manufacturing sectors).[41]

Effects of Agricultural Programs

The contraction of corn manufacturing reduces employment in feed crops (where corn is the major crop) by 2,500 workers.[42] Since feed crops are subsidized, this reduction in employment, brought about by removing the sugar QR, is a further source of gains to consumers in addition to the gains resulting from the fact that consumers can take advantage of a lower price of sugar. Thus, the presence of agricultural subsidies has an influence on our estimates the welfare effects of the sugar QR. This can be demonstrated another way. We can use our model to evaluate the effects of the removing the sugar QR after first having removed all agricultural programs. The result is that the gains to

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[41] In our model the income elasticity of consumption demand is positively related to the (absolute value of) the price elasticity of demand. In the central elasticities case, the income elasticity of demand for other consumer manufactures is 2.41, while for other manufactured products it is 2.51.

[42] Feed crop exports also decline slightly, by $31 million, even though the depreciation of the real exchange rate (-0.06 percent) exceeds the increase in the average cost of producing feed crops (+0.04 percent), because production of these crops declines. (Table III) Changes in average costs of domestic products are explained primarily by changes in input prices because production functions are assumed to be constant returns to scale so that supply curves are highly elastic. In addition to labor and capital, the most important inputs for feed crops are intermediate products from the following sectors: other manufacturing, nontraded services, and traded services. The prices for these intermediate inputs increase slightly, by about +0.05 percent. The increase in the average cost of producing feed crops is somewhat less than this, by +0.04 percent, due to the decline in demand for corn caused by the contraction in corn manufacturing.

consumers from removing the sugar QR -- after having removed the agricultural programs -- is $362 million. This indicates that the $462 million gain we report in Table III can be divided into two parts: (1) $100 million in efficiency gains from shifting resources out of subsidized feed crops into more productive employment and (2) $362 million in gains from the lower price of sugar.[43]

Not Supporting Sugar Farmers

If the sugar QRs were removed and sugar farmers were not supported (but other agriculture programs remain in effect), we estimate that the annual gains to consumers would have been $617 million in 1987. (Table VI) For the high elasticity case the annual gains are $929 million; for the low elasticity case they are $463 million. With terms-of-trade effects the annual gains are $631 million.

The annual gains from removing the sugar QR are $155 million larger when sugar farmers are not supported compared to when they are supported by a deficiency payment-type policy ($617 versus $462 million). (Tables III and VI, central elasticity case). When sugar farmers are not supported, labor and capital shift from sugar to other sectors. With support, labor and capital have no incentive to leave sugar. In effect, the policy of supporting sugar farmers limits the ability of the economy to respond to and take advantage of the removal of the sugar QR by

[43] Note that there are employment changes for cotton and food grains, sectors that are also subsidized, but these changes are dominated by the employment change for feed crops.

keeping too many workers in domestic sugar operations. When this support is removed, some sugar workers move to more productive uses in other sectors and provide additional efficiency gains to the economy. If sugar farmers were not supported, 16,600 workers would leave sugar farming and another 7,000 would leave sugar manufacturing. (Table VII, central elasticity case) Most of these workers shift to the large other manufacturing sector, which gains 16,800 workers. The only other sectors that would gain more than one thousand workers are other consumer manufacturers (+1,600) and traded services (+2,800).

Results when sugar quota premium is 166 percent

For comparison, we have also calculated the welfare and employment effects using a sugar quota premium of 166 percent versus the premium of 56 percent used above. Using the higher premium, the gains to U.S. consumers of removing the sugar QR and supporting sugar farmers are $1.15 billion per year. Quota rents alone are $362 million. These welfare gains are considerably higher, nearly two and one-half times higher, than the gains obtained using the baseline model. Not surprisingly, the size of the quota premium makes a considerable difference.[44]

[44] With a higher sugar quota premium, the decline in the average price of sugar farm output is greater when the sugar QR is removed. Therefore, the transfer payment to sugar farmers to compensate them for the decline in sugar price is also higher, $1.6 versus $1.1 billion.

VII. Dairy

Supporting Dairy Farmers

U.S. consumers would have been better off by $47 million if the quotas on processed dairy products had not been in effect in 1987. (Table VIII) Since the dairy quotas are administered by USDA, we do not consider quota rents lost to foreigners. We assume they are captured by domestic interests, such as the importers who are granted import licenses.[45]

For dairy (in contrast to sugar) our welfare estimates are more sensitive to elasticities and terms of trade. For the high elasticity case, the gains to consumers are $99 million; for the low elasticity case, the gains are $23 million. Allowing for the terms-of-trade effects, removing the dairy QR provides consumers with gains of $52 million.

In our baseline model, dairy farmers are insulated from the adverse effects they would otherwise incur by a deficiency-type program. Their output is maintained so that employment in the sector is virtually unchanged. (Table IX) The amount of the annual transfer payment to dairy farmers to preserve their incomes is $802 million. As in the case of sugar, discussed above, the transfer payment to dairy farmers is allowed for in

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[45] We do not consider the efficiency of the quota system administered by USDA, which grants import licenses specifying type of dairy product as well as country of origin and bars transfer of licenses. Using a partial equilibrium model to study the effects of the USDA quota system for six cheese products, Anderson (1985) estimates that removing the rigidities of this system (i.e., replacing the existing quota system by an efficient tax) would reduce the costs of the quotas by about one third.

our calculation of gains to consumers so that it is not appropriate to deduct the transfer from consumer gains to obtain the net gain for the economy.

Effects of Agricultural Programs

In contrast to the case of sugar, discussed earlier, domestic agricultural programs have little effect on our estimates for the welfare effects of removing the dairy QR because they have little effect on the three subsidized agricultural sectors: cotton, food grains, and feed crops. If the dairy QR were removed, employment would increase only marginally in these three sectors (+300). (Table IX, central elasticity case) These small employment increases are due primarily to the depreciation of the real exchange rate (by -0.034 percent), which gives a slight boost to exports for these sectors. (Tables VIII and X)

Not Supporting Dairy Farmers

If the dairy QR were removed but dairy farmers were not supported (but other agricultural programs remained in effect) the welfare and employment effects are considerably larger. In this case, we estimate that consumers would gain $80 million per year. (Table XI) The annual gains are $196 million in the high elasticity case and $37 million in the low elasticity case. With terms-of-trade effects, the annual gains are $83 million.

The gains from removing the dairy QR are greater, by $33 million, if dairy farmers are not supported compared to when they are supported ($80 versus $47 million). (Tables VIII and XI)

As in the case of sugar, the reason for this difference is that the economy is more flexible when support is removed. With support, virtually no workers leave dairy farming and only 600 leave dairy manufacturing. (Table IX, central elasticity case) When there is no support, more than 1,600 workers leave dairy farming and a further 1,700 leave dairy processing. (Table XII, central elasticity case) The other manufacturing sector absorbs most of these workers (+2,600).

VIII. All Import Restraints

In the previous two sections we examined the effects of the QRs on sugar and dairy separately. In this section, we examine the cumulative effect of all import restraints for which we have information. In addition to the QRs on dairy and sugar, this includes the QRs on apparel and steel, and tariffs on all imports. Throughout, we assume that domestic agricultural policy fully supports dairy and sugar farmers.

Simultaneously removing all these import restraints we estimate that U.S. consumers would gain by $11.1 billion dollars per year.[46] Absent the import restraints, workers would also have been better off as the real wage rate is 0.3 percent higher. To accommodate the increased inflow of less expensive imports

[46] The calculation of this gain allows for and incorporates the provision of transfer payments to dairy and sugar farmers. Annual transfer payments are $777 million to dairy farmers and $1.098 billion to sugar farmers to compensate them for the lower market prices of their products when the dairy and sugar QRs are removed. Thus, the estimated gains to consumers of $11.1 billion also represents the net gains to the economy.

(apparel, dairy products, steel, and sugar), while at the same time keeping the balance of trade unchanged, the exchange rate depreciates by 1.6 percent. (Table XIII)

We estimate that the range for gains to consumers extends from $9.5 billion (low elasticity case) to $13.8 billion (high elasticity case). When there are terms-of-trade effects the gains are $11.3 billion.

Although the employment changes brought about by removing all import restraints are strongest for the nonagricultural sectors, there are two agricultural sectors that have relatively large increases in employment -- food grains (+6,200) and oil crops (+9,400). (Table XIV, central elasticity case) They have relatively large exports and are strongly influenced by the depreciation in the exchange rate. In contrast, cotton (-300) and feed crops (+200) are also heavily involved in exporting but have modest employment changes. In this case the stimulus from exports is blunted by declines in the output of major downstream customers that are adversely affected by import liberalization. The decline in corn manufacturing limits feed crops; the decline in textiles limits cotton.

Taken together, the nine agricultural sectors have larger employment (+17,200). This result is linked to the fact that import liberalization will induce many workers to leave manufacturing.

The manufacturing sectors with the largest employment declines are: steel (-13,600), other consumer manufacturers

(-14,000), textiles (-38,300), and apparel (-165,500). However, the large other manufacturing sector gains employment (+113,200). And large employment gains are also made by nontraded services (+26,400) and traded services (+64,400). These shifts are the net result of a combination of influences, including the direct and indirect impact of increased import competition (apparel, steel, and textiles) and the differing income elasticities of demand across sectors, which boosts other manufacturing (high income elasticity).

Changes in exports and imports (valued in domestic prices) help explain the employment expansion in the other manufacturing and traded services sectors. Both sectors have large increases in net exports. Exports increase in other manufacturing (+$11.6 billion) and in traded services (+$5.4 billion). (Table XV, central elasticity case) Imports increase in other manufacturing (+$4.2 billion) but fall in traded services (-$1.0 billion). The large increase in imports of other consumer goods (+$2.8 billion) compared to the expansion in the sector's exports (+$0.9 billion) also explains the decline in the size of this sector. Other major trade changes include the increase of exports in food grains (+$0.3 billion) and in oil crops (+$0.6 billion), and the increase in imports of sugar manufacturers (+$0.4 billion).

IX. Conclusion

This paper provides estimates of the welfare and employment effects for Quantitative Restraints on imports of dairy, sugar,

apparel, steel, and for tariffs on all imports. Estimating the effects of QRs on agricultural imports is complicated by the fact that many farmers are involved in one or more domestic agricultural programs that subsidize their production. This raises two issues: (1) how to proceed to estimate the effect of QRs when QRs are only one component of domestic agricultural policy and (2) how to interpret the results.

The estimation approach we have chosen emphasizes the effects that lower-priced imports have on consumers and on producers in other sectors. We assume that dairy and sugar farmers are fully insulated from adverse effects of removing the QRs: domestic agricultural programs fully compensate dairy and sugar farmers if the QRs are removed. In this way we extract the QRs from agricultural policy.

We estimate that removing the sugar QR would improve the welfare of U.S. consumers by $462 million per year, $211 million of which is recaptured quota rents. We also estimate that removing the dairy QR would improve consumer welfare by $47 million per year. Finally, we estimate that U.S. consumers would gain $11.1 billion per year if all four QRs were removed and if all tariffs were also removed.

APPENDIX ON MODEL CHANGES SINCE THE PREHEARING SUBMISSION

In this submission, deficiency programs are assumed to provide farmers of cotton, feed crops, and food grains with subsidy payments equal to a fixed percentage (a subsidy rate) of the market value of output. This specification differs from the way these programs were treated in the Prehearing submission.

In the Prehearing submission, the subsidy rate was an endogenous variable. Farmers made production decisions based on an effective target price for their crop. The effective target price was defined as a weighted average of the announced target price (specified by law) and the market price. The weight for the each price was a fraction reflecting the relative importance of the two prices for farmers based on 1987 deficiency payments.

The treatment of deficiency programs in the Prehearing submission resulted in anomalous changes in price and employment for subsidized crops (particularly feed crops) when the dairy or sugar QRs were removed. Not only were these changes relatively large, some were also in the opposite direction to what was expected. For example, when the sugar QR was removed, we estimated that there would be a relatively large (2.4 percent) increase in the price of feed crops.

In our investigation of these results, prompted by helpful comments from ITC Commissioners and staff, we examined the structure and specifications of the model by including more detail for products and inputs and by modifying the way

deficiency programs are specified.[47] As a result of this investigation, we found that the algorithm used to solve our model was not suited to solve for the effects of the dairy and sugar QRs when deficiency programs were specified as they were in the Prehearing submission.[48]

Fortunately, the algorithm can solve for these effects when deficiency programs are modelled as fixed percent subsidy rates. Moreover, for purposes of estimating the effects of dairy and sugar QRs on consumers, the spillover effects on cotton, feed crops, and food grains are not expected to have an appreciable impact on subsidy rates so it is reasonable to treat these rates as constants. Accordingly, in this submission, we specify deficiency payments by constant percent subsidy rates.

With this specification, when the dairy or sugar QRs are removed, the resulting price changes for the three subsidized agricultural sectors are very small (at most 0.05 percent) and the anomalies contained in the Prehearing submission do not appear.

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[47] Commissioner Rohr of the ITC prepared questions based on our Prehearing submission. In a letter to the ITC dated May 22, 1990, we discuss the issues raised by these questions, elaborate on how we investigated the structure and specifications of our model, and explain how the Posthearing submission compares with the Prehearing submission. Copies of Commissioner Rohr's questions and our letter to the ITC can be obtained from the Bureau of Economics.

[48] The computer language used to write the FTC CGE model is the General Algebraic Modeling System (GAMS), developed by A. Brooke and A. Meeraus. The algorithm used to solve the model was MINOS, developed by P. Gill, W. Murray, B. Murtagh, M. Saunders, and M. Wright.

LIST OF TABLES

TABLE I
SUMMARY OF WELFARE EFFECTS OF REMOVING QUANTITATIVE RESTRICTIONS AND TARIFFS ON IMPORTS BASED ON 1987 DATA
(central elasticity case)

Sector and Policy	Gains to U.S.*	Percent Change in Real Wage	Percent Change in Real Exchange Rate**
Agriculture (Sugar and Dairy)			
Sugar			
Remove QRs	0.462	+0.061	-0.063
Maintain QRs but capture rents	0.211	-0.000	+0.009
Dairy			
Remove QRs	0.047	+0.029	-0.034
Manufacturing (Apparel and Steel)			
Remove Apparel QRs	9.731	-0.001	-0.037
Maintain Apparel QRs but capture rents	7.465	-0.010	+0.302
Remove Steel QRs	0.498	+0.012	-0.020
Maintain Steel QRs but capture rents	0.489	-0.001	+0.020
All Sectors			
Simultaneously Remove QRs on Sugar, Dairy, Apparel and Steel, and Remove Tariffs on all Sectors	11.117	+0.317	-1.598

* Gains are in billions of 1987 dollars and measured by the Hicksian Equivalent Variation.

** Plus indicates appreciation, negative depreciation.

Note: Dairy and/or Sugar farmers are fully supported by domestic income maintenance programs.

Source: Bureau of Economics, Federal Trade Commission.

TABLE II

SUMMARY OF EMPLOYMENT EFFECTS OF REMOVING QUANTITATIVE RESTRICTIONS AND TARIFFS ON IMPORTS BASED ON 1987 DATA
(central elasticity case, thousands of full-time equivalent workers)

Sector	Remove Quantitative Restrictions on: Sugar	Dairy	Apparel	Steel	All Four Sectors Simultaneously Plus Removing all Tariffs
Dairy Farms	0.041	-0.001	0.137	-0.003	0.039
Meat Animals	0.217	0.122	0.322	-0.005	0.993
Other Livestock	-0.013	0.034	0.130	0.002	0.669
Cotton	0.090	0.046	-1.539	0.040	-0.285
Food Grains	0.163	0.070	0.061	0.036	6.204
Feed Crops	-2.481	0.180	0.180	0.021	0.202
Oil Crops	0.229	0.161	0.139	0.062	9.392
Sugar Crop	-0.003	-0.013	0.024	0.002	0.007
Other Crops	0.137	0.033	0.794	0.105	0.924
Red Meat Mfg	0.119	0.051	0.228	-0.003	0.593
Other Meat Mfg	0.067	0.012	0.144	-0.005	0.289
Dairy Mfg	0.100	-0.631	0.121	-0.002	-0.659
Grain Mfg	0.130	0.017	0.044	0.003	0.489
Feed Mfg	0.033	0.012	0.031	-0.000	0.200
Corn Mfg	-2.461	0.013	0.015	0.005	-2.180

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TABLE II
SUMMARY OF EMPLOYMENT EFFECTS OF REMOVING QUANTITATIVE
RESTRICTIONS AND TARIFFS ON IMPORTS BASED ON 1987 DATA--Continued
(central elasticity case, thousands of full-time equivalent workers)

		Remove Quantitative Restrictions on:			
Sector	Sugar	Dairy	Apparel	Steel	All Four Sectors Simultaneously Plus Removing all Tariffs
Sugar Mfg	-0.452	-0.005	0.012	0.001	-0.446
Soya Mfg	0.040	0.020	0.038	0.009	0.972
Msc Food Mfg	1.724	0.058	0.656	0.007	-0.355
Textiles	0.105	0.028	-16.956	0.237	-38.337
Apparel	0.024	-0.006	-119.584	0.038	-165.500
Mining	0.022	0.047	0.932	-1.576	3.110
Crude Oil/Nat Gas	0.015	0.033	0.340	0.019	2.450
Vehicles	0.043	-0.012	0.917	0.159	3.728
Petroleum Refining	-0.009	0.011	0.228	-0.003	1.132
Steel	0.141	0.032	1.285	-10.313	-13.558
Other Consumer Mfg	0.478	-0.081	4.648	0.358	-14.035
Other Mfg	4.848	-0.110	55.537	15.266	113.189
Traded Services	-1.383	-0.552	41.616	-0.818	64.416
Nontraded Services	-1.967	0.432	29.499	-3.641	26.360

Source: Bureau of Economics, Federal Trade Commission.

Note: Dairy and/or sugar farmers are fully supported by domestic income maintenance programs.

TABLE III

REMOVING IMPORT QUOTAS ON SUGAR AND SUPPORTING DOMESTIC SUGAR FARMERS: WELFARE EFFECTS BASED ON 1987 DATA

	Gains to U.S.*	Percent Change in Real Wage	Percent Change in Real Exchange Rate
Low Elasticity Case	0.362	+0.062	-0.073
Central Elasticity Case	0.462	+0.061	-0.063
High Elasticity Case	0.584	+0.063	-0.059
Central Elasticity Case with Terms of Trade Effects	0.462	+0.061	-0.063

* Gains are in billions of 1987 dollars and measured by the Hicksian Equivalent Variation.

Source: Bureau of Economics, Federal Trade Commission.

TABLE IV

REMOVING IMPORT QUOTAS ON SUGAR AND SUPPORTING DOMESTIC SUGAR FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Dairy Farms	0.026	0.041	0.091	0.048
Meat Animals	0.188	0.217	0.319	0.228
Other Livestock	0.002	-0.013	0.028	-0.005
Cotton	0.057	0.090	0.142	0.037
Food Grains	0.100	0.163	0.282	0.080
Feed Crops	-1.508	-2.481	-3.038	-2.288
Oil Crops	0.146	0.229	0.382	0.116
Sugar Crop	-0.005	-0.003	-0.004	-0.003
Other Crops	0.065	0.137	0.383	0.140
Red Meat Mfg	0.098	0.119	0.167	0.123
Other Meat Mfg	0.052	0.067	0.099	0.068
Dairy Mfg	0.062	0.100	0.160	0.101
Grain Mfg	0.067	0.130	0.265	0.130
Feed Mfg	0.022	0.033	0.065	0.035
Corn Mfg	-1.511	-2.461	-3.061	-2.459

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TABLE IV

REMOVING IMPORT QUOTAS ON SUGAR AND SUPPORTING DOMESTIC SUGAR FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA--Continued
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Sugar Mfg	-0.301	-0.452	-1.529	-0.452
Soya Mfg	0.025	0.040	0.071	0.037
Msc Food Mfg	0.881	1.724	3.349	1.725
Textiles	0.058	0.105	0.108	0.101
Apparel	0.026	0.024	0.005	0.021
Mining	0.012	0.022	0.010	0.021
Crude Oil/Nat Gas	0.016	0.015	0.014	0.015
Vehicles	0.022	0.043	0.096	0.039
Petroleum Refining	-0.002	-0.009	-0.013	-0.008
Steel	0.074	0.141	0.156	0.139
Other Consumer Mfg	0.366	0.478	0.620	0.471
Other Mfg	2.579	4.848	5.290	4.791
Traded Services	-0.587	-1.383	-2.045	-1.349
Nontraded Services	-1.030	-1.967	-2.412	-1.903

Source: Bureau of Economics, Federal Trade Commission.

TABLE V

REMOVING IMPORT QUOTAS ON SUGAR AND SUPPORTING DOMESTIC SUGAR FARMERS: EFFECTS ON EXPORTS AND IMPORTS BASED ON 1987 DATA
(billions of 1987 dollars)

	Low Elasticity		Central Elasticity		High Elasticity	
	Exports	Imports	Exports	Imports	Exports	Imports
Dairy Farms	0.000	---	0.000	---	0.000	---
Meat Animals	0.000	-0.001	0.001	-0.002	0.001	-0.004
Other Livestock	0.001	-0.000	0.001	-0.000	0.002	-0.000
Cotton	0.003	-0.000	0.004	-0.000	0.006	-0.000
Food Grains	0.005	0.000	0.007	0.000	0.010	0.000
Feed Crops	-0.018	-0.001	-0.031	-0.001	-0.038	-0.001
Oil Crops	0.009	0.000	0.012	0.000	0.017	0.000
Sugar Crop	0.002	-0.005	0.007	-0.005	0.045	-0.006
Other Crops	0.003	0.002	0.003	0.002	0.004	0.002
Red Meat Mfg	0.007	0.001	0.010	-0.001	0.016	-0.006
Other Meat Mfg	0.001	0.000	0.001	-0.000	0.002	-0.000
Dairy Mfg	0.002	-0.000	0.003	-0.001	0.006	-0.004
Grain Mfg	0.009	-0.001	0.016	-0.001	0.031	-0.003
Feed Mfg	0.003	-0.000	0.005	-0.000	0.009	-0.001
Corn Mfg	-0.155	-0.009	-0.254	-0.014	-0.316	-0.018

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TABLE V

REMOVING IMPORT QUOTAS ON SUGAR AND SUPPORTING DOMESTIC SUGAR FARMERS: EFFECTS ON EXPORTS AND IMPORTS BASED ON 1987 DATA--Continued
(billions of 1987 dollars)

	Low Elasticity		Central Elasticity		High Elasticity	
	Exports	Imports	Exports	Imports	Exports	Imports
Sugar Mfg	0.065	0.183	0.141	0.447	0.340	0.925
Soya Mfg	0.005	0.000	0.007	-0.000	0.011	-0.000
Msc Food Mfg	0.033	-0.039	0.064	-0.091	0.131	-0.208
Textiles	0.004	0.006	0.004	0.004	0.004	0.004
Apparel	0.002	0.022	0.002	0.019	0.001	0.018
Mining	0.005	0.004	0.006	0.003	0.006	0.002
Crude Oil/Nat Gas	0.000	0.018	0.000	0.011	0.000	0.004
Vehicles	0.013	0.050	0.014	0.037	0.014	0.019
Petroleum Refining	0.009	0.010	0.009	0.005	0.009	-0.000
Steel	0.002	0.008	0.002	0.006	0.002	0.005
Other Consumer Mfg	0.024	0.027	0.026	0.017	0.026	0.009
Other Mfg	0.213	0.180	0.234	0.054	0.228	0.012
Traded Services	0.162	0.047	0.150	0.032	0.138	0.026
Nontraded Services	---	---	---	---	---	---

Source: Bureau of Economics, Federal Trade Commission.

TABLE VI

REMOVING IMPORT QUOTAS ON SUGAR AND NOT SUPPORTING DOMESTIC SUGAR FARMERS: WELFARE EFFECTS BASED ON 1987 DATA

	Gains to U.S.*	Percent Change in Real Wage	Percent Change in Real Exchange Rate
Low Elasticity Case	0.463	+0.020	-0.118
Central Elasticity Case	0.617	+0.023	-0.076
High Elasticity Case	0.929	+0.030	-0.077
Central Elasticity Case with Terms of Trade Effects	0.631	+0.023	-0.078

* Gains are in billions of 1987 dollars and measured by the Hicksian Equivalent Variation.

Source: Bureau of Economics, Federal Trade Commission.

TABLE VII

REMOVING IMPORT QUOTAS ON SUGAR AND NOT SUPPORTING DOMESTIC SUGAR FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Dairy Farms	0.026	0.027	0.060	0.028
Meat Animals	0.157	0.177	0.314	0.176
Other Livestock	-0.029	-0.089	-0.143	-0.095
Cotton	0.156	0.205	0.380	0.098
Food Grains	0.247	0.314	0.631	0.106
Feed Crops	-0.406	-1.121	-2.007	-1.079
Oil Crops	0.383	0.482	0.946	0.195
Sugar Crop	-10.749	-16.598	-29.012	-16.597
Other Crops	0.292	0.374	0.780	0.382
Red Meat Mfg	0.085	0.099	0.170	0.100
Other Meat Mfg	0.043	0.047	0.081	0.047
Dairy Mfg	0.034	0.052	0.105	0.053
Grain Mfg	0.034	0.064	0.170	0.063
Feed Mfg	0.015	0.020	0.046	0.019
Corn Mfg	-0.504	-1.202	-2.172	-1.201

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TABLE VII
REMOVING IMPORT QUOTAS ON SUGAR AND NOT SUPPORTING DOMESTIC SUGAR FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA--Continued
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Sugar Mfg	-4.563	-7.046	-12.315	-7.046
Soya Mfg	0.051	0.066	0.132	0.059
Msc Food Mfg	0.390	0.782	2.002	0.784
Textiles	0.336	0.605	1.096	0.612
Apparel	0.305	0.359	0.710	0.367
Mining	0.215	0.305	0.451	0.316
Crude Oil/Nat Gas	0.115	0.129	0.224	0.132
Vehicles	0.087	0.253	0.960	0.242
Petroleum Refining	0.040	0.037	0.065	0.038
Steel	0.280	0.526	0.848	0.538
Other Consumer Mfg	1.261	1.648	2.942	1.680
Other Mfg	8.154	16.825	27.034	17.167
Traded Services	2.984	2.776	5.639	2.930
Nontraded Services	0.564	-0.118	-0.136	-0.115

Source: Bureau of Economics, Federal Trade Commission.

TABLE VIII

REMOVING IMPORT QUOTAS ON DAIRY AND SUPPORTING DOMESTIC DAIRY FARMERS: WELFARE EFFECTS BASED ON 1987 DATA

	Gains to U.S.*	Percent Change in Real Wage	Percent Change in Real Exchange Rate
Low Elasticity Case	0.023	+0.022	-0.032
Central Elasticity Case	0.047	+0.029	-0.034
High Elasticity Case	0.099	+0.046	-0.049
Central Elasticity Case with Terms of Trade Effects	0.052	+0.029	-0.035

* Gains are in billions of 1987 dollars and measured by the Hicksian Equivalent Variation.

Source: Bureau of Economics, Federal Trade Commission.

TABLE IX

REMOVING IMPORT QUOTAS ON DAIRY AND SUPPORTING DOMESTIC DAIRY FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Dairy Farms	-0.000	-0.001	-0.003	-0.001
Meat Animals	0.072	0.122	0.280	0.116
Other Livestock	0.018	0.034	0.085	0.026
Cotton	0.025	0.046	0.122	0.019
Food Grains	0.040	0.070	0.179	0.027
Feed Crops	0.080	0.180	0.531	0.097
Oil Crops	0.082	0.161	0.447	0.063
Sugar Crop	-0.003	-0.013	-0.031	-0.011
Other Crops	0.023	0.033	0.087	0.035
Red Meat Mfg	0.030	0.051	0.116	0.049
Other Meat Mfg	0.008	0.012	0.025	0.011
Dairy Mfg	-0.247	-0.631	-1.636	-0.629
Grain Mfg	0.008	0.017	0.046	0.017
Feed Mfg	0.006	0.012	0.030	0.011
Corn Mfg	0.006	0.013	0.035	0.012

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TABLE IX

REMOVING IMPORT QUOTAS ON DAIRY AND SUPPORTING DOMESTIC DAIRY FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA--Continued
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Sugar Mfg	-0.001	-0.005	-0.013	-0.005
Soya Mfg	0.010	0.020	0.053	0.018
Msc Food Mfg	0.031	0.058	0.143	0.058
Textiles	0.011	0.028	0.064	0.034
Apparel	0.015	-0.006	-0.025	-0.001
Mining	0.025	0.047	0.103	0.053
Crude Oil/Nat Gas	0.019	0.033	0.078	0.034
Vehicles	-0.021	-0.012	0.057	-0.013
Petroleum Refining	0.007	0.011	0.027	0.012
Steel	0.009	0.032	0.071	0.038
Other Consumer Mfg	-0.016	-0.081	-0.235	-0.062
Other Mfg	-0.342	-0.110	0.226	0.085
Traded Services	-0.153	-0.552	-1.887	-0.493
Nontraded Services	0.258	0.432	1.025	0.399

Source: Bureau of Economics, Federal Trade Commission.

TABLE X

REMOVING IMPORT QUOTAS ON DAIRY AND SUPPORTING DOMESTIC
DAIRY FARMERS: EFFECTS ON EXPORTS AND IMPORTS BASED ON 1987 DATA
(billions of 1987 dollars)

	Low Elasticity		Central Elasticity		High Elasticity	
	Exports	Imports	Exports	Imports	Exports	Imports
Dairy Farms	0.002	---	0.006	---	0.022	---
Meat Animals	0.000	-0.000	0.000	-0.001	0.001	-0.003
Other Livestock	0.000	-0.000	0.000	-0.000	0.001	-0.000
Cotton	0.001	-0.000	0.002	-0.000	0.005	-0.000
Food Grains	0.002	-0.000	0.004	-0.000	0.008	-0.000
Feed Crops	0.007	-0.000	0.015	-0.000	0.046	-0.001
Oil Crops	0.005	-0.000	0.010	-0.000	0.025	-0.000
Sugar Crop	0.000	-0.000	0.000	-0.000	0.000	-0.000
Other Crops	0.001	0.001	0.002	0.001	0.003	0.001
Red Meat Mfg	0.003	0.000	0.005	-0.001	0.013	-0.005
Other Meat Mfg	0.000	0.000	0.000	-0.000	0.001	-0.000
Dairy Mfg	0.010	-0.039	0.026	0.133	0.088	0.559
Grain Mfg	0.001	-0.000	0.003	-0.000	0.007	-0.001
Feed Mfg	0.001	-0.000	0.001	-0.000	0.003	-0.000
Corn Mfg	0.002	0.000	0.003	0.000	0.008	-0.000

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TABLE X

REMOVING IMPORT QUOTAS ON DAIRY AND SUPPORTING DOMESTIC DAIRY FARMERS: EFFECTS ON EXPORTS AND IMPORTS BASED ON 1987 DATA--Continued
(billions of 1987 dollars)

	Low Elasticity		Central Elasticity		High Elasticity	
	Exports	Imports	Exports	Imports	Exports	Imports
Sugar Mfg	0.000	-0.000	0.000	-0.000	0.000	-0.001
Soya Mfg	0.003	-0.000	0.005	-0.000	0.011	-0.002
Msc Food Mfg	0.003	0.002	0.004	-0.001	0.010	-0.007
Textiles	0.002	0.002	0.002	0.001	0.003	0.001
Apparel	0.001	0.008	0.001	0.008	0.001	0.009
Mining	0.003	0.002	0.003	0.002	0.006	0.003
Crude Oil/Nat Gas	0.000	0.007	0.000	0.006	0.000	0.001
Vehicles	0.005	0.014	0.006	0.009	0.012	-0.008
Petroleum Refining	0.005	0.004	0.006	0.002	0.010	-0.001
Steel	0.001	0.002	0.001	0.001	0.002	-0.000
Other Consumer Mfg	0.009	0.005	0.009	0.001	0.013	-0.011
Other Mfg	0.085	0.058	0.101	-0.010	0.158	-0.067
Traded Services	0.071	0.016	0.080	0.012	0.115	0.004
Nontraded Services	---	---	---	---	---	---

Source: Bureau of Economics, Federal Trade Commission.

TABLE XI

REMOVING IMPORT QUOTAS ON DAIRY AND NOT SUPPORTING DOMESTIC DAIRY FARMERS: WELFARE EFFECTS BASED ON 1987 DATA

	Gains to U.S.*	Percent Change in Real Wage	Percent Change in Real Exchange Rate
Low Elasticity Case	0.037	+0.004	-0.021
Central Elasticity Case	0.080	+0.006	-0.016
High Elasticity Case	0.196	+0.009	-0.022
Central Elasticity Case with Terms of Trade Effects	0.083	+0.006	-0.017

* Gains are in billions of 1987 dollars and measured by the Hicksian Equivalent Variation.

Source: Bureau of Economics, Federal Trade Commission.

TABLE XII

REMOVING IMPORT QUOTAS ON DAIRY AND NOT SUPPORTING DOMESTIC DAIRY FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Dairy Farms	-0.683	-1.613	-4.292	-1.612
Meat Animals	0.011	0.008	0.011	0.009
Other Livestock	-0.001	-0.011	-0.035	-0.012
Cotton	0.023	0.036	0.094	0.014
Food Grains	0.034	0.046	0.123	0.007
Feed Crops	-0.133	-0.334	-0.893	-0.317
Oil Crops	0.039	0.040	0.107	-0.003
Sugar Crop	-0.005	-0.016	-0.045	-0.016
Other Crops	0.032	0.046	0.119	0.047
Red Meat Mfg	0.007	0.007	0.011	0.007
Other Meat Mfg	0.004	0.004	0.005	0.004
Dairy Mfg	-0.742	-1.750	-4.656	-1.750
Grain Mfg	-0.002	-0.008	-0.022	-0.008
Feed Mfg	-0.033	-0.080	-0.213	-0.080
Corn Mfg	0.001	0.001	0.001	0.001

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TABLE XII

REMOVING IMPORT QUOTAS ON DAIRY AND NOT SUPPORTING DOMESTIC DAIRY FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA--Continued
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Sugar Mfg	-0.002	-0.007	-0.020	-0.007
Soya Mfg	-0.003	-0.013	-0.035	-0.014
Msc Food Mfg	0.016	0.011	-0.001	0.011
Textiles	0.041	0.104	0.290	0.104
Apparel	0.041	0.057	0.178	0.058
Mining	0.044	0.090	0.208	0.091
Crude Oil/Nat Gas	0.023	0.035	0.082	0.035
Vehicles	0.002	0.040	0.279	0.036
Petroleum Refining	0.009	0.012	0.031	0.013
Steel	0.035	0.096	0.233	0.097
Other Consumer Mfg	0.131	0.221	0.630	0.226
Other Mfg	0.741	2.641	6.710	2.689
Traded Services	0.232	0.166	0.674	0.191
Nontraded Services	0.138	0.173	0.427	0.178

Source: Bureau of Economics, Federal Trade Commission.

TABLE XIII

SIMULTANEOUSLY REMOVING QUANTITATIVE RESTRICTIONS ON SUGAR, DAIRY, APPAREL, AND STEEL AND REMOVING ALL TARIFFS WHILE SUPPORTING DOMESTIC SUGAR AND DAIRY FARMERS: WELFARE EFFECTS BASED ON 1987 DATA

	Gains to U.S.*	Percent Change in Real Wage	Percent Change in Real Exchange Rate
Low Elasticity	9.531	+0.296	-0.690
Central Elasticity	11.117	+0.317	-1.598
High Elasticity	13.795	+0.315	-1.889
Central Elasticity Case with Terms of Trade	11.276	+0.316	-1.632

* Gains are in billions of 1987 dollars and measured by the Hicksian Equivalent Variation.

Source: Bureau of Economics, Federal Trade Commission.

TABLE XIV

SIMULTANEOUSLY REMOVING QUANTITATIVE RESTRICTIONS ON SUGAR, DAIRY, APPAREL, AND STEEL AND REMOVING ALL TARIFFS WHILE SUPPORTING DOMESTIC SUGAR AND DAIRY FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Dairy Farms	0.005	0.039	0.170	0.037
Meat Animals	0.061	0.993	2.923	0.844
Other Livestock	0.017	0.669	2.023	0.415
Cotton	-0.823	-0.285	1.013	-1.572
Food Grains	0.900	6.204	16.821	1.773
Feed Crops	-1.161	0.202	4.097	-1.040
Oil Crops	1.413	9.392	25.965	3.191
Sugar Crop	0.001	0.007	0.030	0.007
Other Crops	-0.883	0.924	2.011	1.072
Red Meat Mfg	0.069	0.593	1.694	0.574
Other Meat Mfg	0.036	0.289	0.808	0.276
Dairy Mfg	-0.247	-0.659	-1.739	-0.623
Grain Mfg	0.088	0.489	1.275	0.472
Feed Mfg	0.033	0.200	0.538	0.177
Corn Mfg	-1.474	-2.180	-2.438	-2.181

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TABLE XIV

SIMULTANEOUSLY REMOVING QUANTITATIVE RESTRICTIONS ON SUGAR, DAIRY, APPAREL, AND STEEL AND REMOVING ALL TARIFFS WHILE SUPPORTING DOMESTIC SUGAR AND DAIRY FARMERS: EMPLOYMENT EFFECTS BASED ON 1987 DATA
(thousands of full-time equivalent workers)

Sector	Low Elasticity	Central Elasticity	High Elasticity	Central Elasticity with Terms of Trade
Sugar Mfg	-0.314	-0.446	-1.416	-0.444
Soya Mfg	0.112	0.972	2.633	0.819
Msc Food Mfg	-1.168	-0.355	1.017	-0.324
Textiles	-14.982	-38.337	-78.023	-38.059
Apparel	-82.487	-165.500	-371.430	-165.306
Mining	1.052	3.110	6.663	3.357
Crude Oil/Nat Gas	0.298	2.450	6.083	2.520
Vehicles	2.255	3.728	11.161	3.855
Petroleum Refining	0.220	1.132	2.533	1.149
Steel	-4.531	-13.558	-21.507	-13.269
Other Consumer Mfg	-8.473	-14.035	-33.665	-13.208
Other Mfg	92.008	113.189	202.274	122.135
Traded Services	8.554	64.416	148.315	67.675
Nontraded Services	9.420	26.360	70.168	25.681

Source: Bureau of Economics, Federal Trade Commission.

TABLE XV

SIMULTANEOUSLY REMOVING QUANTITATIVE RESTRICTIONS ON SUGAR, DAIRY, APPAREL, AND STEEL AND REMOVING ALL TARIFFS WHILE SUPPORTING DOMESTIC SUGAR AND DAIRY FARMERS: EFFECTS ON EXPORTS AND IMPORTS BASED ON 1987 DATA
(billions of 1987 dollars)

	Low Elasticity		Central Elasticity		High Elasticity	
	Exports	Imports	Exports	Imports	Exports	Imports
Dairy Farms	0.003	---	0.009	---	0.029	---
Meat Animals	0.002	-0.000	0.009	-0.001	0.019	-0.008
Other Livestock	0.004	0.000	0.016	-0.000	0.034	-0.001
Cotton	0.014	0.000	0.103	0.000	0.253	0.000
Food Grains	0.062	0.002	0.322	0.004	0.801	0.007
Feed Crops	0.047	0.003	0.266	0.008	0.657	0.017
Oil Crops	0.110	0.000	0.580	0.001	1.505	0.003
Sugar Crop	0.002	-0.005	0.007	-0.005	0.043	-0.006
Other Crops	0.031	-0.095	0.129	-0.052	0.255	0.031
Red Meat Mfg	0.048	-0.002	0.177	-0.003	0.364	-0.038
Other Meat Mfg	0.007	-0.000	0.025	-0.000	0.051	-0.000
Dairy Mfg	0.020	-0.045	0.060	0.154	0.160	0.653
Grain Mfg	0.027	-0.001	0.100	-0.002	0.221	-0.006
Feed Mfg	0.010	-0.000	0.034	-0.001	0.076	-0.002
Corn Mfg	-0.137	-0.009	-0.169	-0.014	-0.133	-0.018

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TABLE XV

SIMULTANEOUSLY REMOVING QUANTITATIVE RESTRICTIONS ON SUGAR, DAIRY, APPAREL, AND STEEL AND REMOVING ALL TARIFFS WHILE SUPPORTING DOMESTIC SUGAR AND DAIRY FARMERS: EFFECTS ON EXPORTS AND IMPORTS BASED ON 1987 DATA
(billions of 1987 dollars)

	Low Elasticity		Central Elasticity		High Elasticity	
	Exports	Imports	Exports	Imports	Exports	Imports
Sugar Mfg	0.070	0.182	0.157	0.444	0.383	0.925
Soya Mfg	0.055	0.003	0.272	-0.015	0.656	-0.051
Msc Food Mfg	0.079	-0.124	0.272	0.113	0.558	0.451
Textiles	0.008	-0.420	0.058	0.304	-0.005	0.731
Apparel	-0.010	-5.888	-0.001	0.180	-0.226	11.410
Mining	0.082	0.028	0.285	0.039	0.471	-0.012
Crude Oil/Nat Gas	0.002	0.084	0.010	0.051	0.017	-0.421
Vehicles	0.307	-0.105	0.892	-0.009	1.577	-1.350
Petroleum Refining	0.146	0.030	0.507	-0.081	0.829	-0.494
Steel	0.014	-0.062	0.048	1.165	0.072	2.391
Other Consumer Mfg	0.216	0.939	0.927	2.812	1.333	6.464
Other Mfg	3.851	-2.708	11.559	4.200	18.516	6.245
Traded Services	1.711	0.210	5.414	-1.008	7.997	-3.973
Nontraded Services	---	---	---	---	---	---

Source: Bureau of Economics, Federal Trade Commission.