Effects of Foreign Import Tariffs and TRQs on U.S. Food and Agricultural Exports

by

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Abstract

This paper simulates economic effects of foreign tariffs and TRQs applied on U.S. exports of food and agricultural products. We find that foreign tariffs and TRQs depress the dollar value of U.S. exports by $15.8 billion. Exports which are affected the most are pork, rice, chicken, wheat, and corn. The economy-wide cost of foreign tariffs and TRQs for the United States is $5.4 billion. The simulation framework consists of a partial equilibrium (PE) model and a general equilibrium (GE) model. The PE model focuses on bilateral trade in 699 food and agricultural products between the United States and all other economies. The GE component models the whole economy and trade between the United States and all other economies.

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Introduction

In 2007 the United States exported $95.4 billion of food and agricultural products. The trade-weighted average ad valorem tariff equivalent imposed on these exports is estimated at 13.7 percent. There is wide variation in applied ad valorem tariff equivalents by product. Five percent of U.S. exports faced an average tariff of more than 37.1 percent while 25 percent of U.S. exports faced an average tariff of more than 21.9 percent.

This paper estimates economic impacts of foreign tariffs and TRQs on U.S. exports of food and agricultural products. We find that foreign tariffs and TRQs depress the dollar value of U.S. food and agricultural exports by $15.8 billion. The U.S. economy as a whole loses $5.4 in economic welfare (or real income) because of foreign tariffs and TRQs. Economic impacts are obtained with a model simulation of the absence of foreign tariffs and TRQs that are imposed on U.S. food and agricultural exports.

The simulation is performed with a partial equilibrium-general equilibrium framework. The partial equilibrium (PE) component models food and agricultural trade between the United States and the rest of the world (RoW) for products specified at the Harmonized System 6-digit (HS6) level. The general equilibrium (GE) component models the whole economy and trade between the United States and the RoW.

The advantage of linking a PE model to a GE model is that the PE model accounts for differences in bilateral trade policies at the HS6 level, while the GE model provides for intersectoral linkages within the United States and all other economies. Linking a PE model to a GE model not only provides a detailed analysis of import tariffs within a GE framework, but also provides an improved method of aggregating trade policies. Applied GE models are aggregate in their product specification. At a minimum, their product specification converts individual tariff

lines into aggregates that conform to the higher-level statistics available for production and consumption.

The most common method of aggregating trade policies is based on import value weights which are accessible at the HS6 level. A shortcoming of this method is that if a tariff rate increases, import demand would decrease, and the weight of that tariff would decline thereby reducing the importance of that tariff in the aggregate tariff.

Several authors have studied the implications of aggregating trade policies in GE models. Bach, Martin, and Stevens (1996) found that their estimate of economic welfare from China's trade reforms in the context of WTO accession was doubled if appropriate tariff aggregators were used to account for tariff dispersion. Bach and Martin (2001) subsequently defined ways in which a detailed set of tariffs may be aggregated consistently to measure tariffs at the sectoral level.

The Bach-Martin aggregation procedure was used by Martin, van der Mensbrugghe, and Manole (2003) to analyze European Union (EU) tariff reform. Martin *et al*. estimated that global economic benefits from EU agricultural trade reform increased by over 150 percent under consistent tariff aggregation. They concluded that inappropriate tariff aggregation may cause substantial underestimation of global economic gains from trade reform. Subsequently, Manole and Martin (2005) refined the tariff aggregators proposed by Bach and Martin and found that economic welfare gains from trade liberalization are severely underestimated when using the traditional tariff aggregator.

Grant, Hertel, and Rutherford (2007) developed a solution to the problem of aggregating trade policies that is both tractable and can be readily implemented in applied analysis. Grant *et al.* developed a PE model of dairy products that tracks trade policies at the HS6 level. The PE model was embedded in a standard GE model of the global economy to provide a comprehensive

analysis of trade policy reform.[1] This paper extends the Grant *et al.* approach by expanding the scope of the PE model to all food and agricultural HS6 products.

PE-GE simulation framework

The PE model focuses on food and agricultural trade between the United States and RoW for 699 HS6 products.[2] The GE model we use is the Global Trade Analysis Project (GTAP) model, an economy-wide computable general equilibrium model of world trade (Hertel, 1997, and Narayanan and Walmsley, 2008). The GTAP data we use have 57 sectors.

The PE model is organized in 26 product groups of HS6 products. Each product group corresponds to a sector in the GE model. Table 1 lists the GE sectors and the number of food and agricultural HS6 products they contain. Grain sectors in the GE model do not contain many HS6 products but other GE sectors contain several HS6 products. For example, the product group *food products nec* contains 188 HS6 products while the group *fruits, vegetables, and nuts* contains 91 HS6 products.

In the PE model, markets are inter-related within a product group. For example, a tariff change for one of the 16 HS6 oil seeds products (group no. 5 in Table 1) would affect markets for all other oil seeds products. Economic linkages across product groups are provided by the GE model. The effect of an oil seeds tariff change on the 47 markets in the *vegetable oils and fats* group (sector no. 21 in Table 1) is introduced in the PE simulation from a GE simulation.

A PE-GE simulation of the effects of import tariffs consists of three steps. First, a PE simulation of the effects of import tariffs at the HS6 level provides estimates of import tariffs at the GE sector level (i.e., for the 26 GTAP sectors identified in Table 1). Second, the effects of the aggregate tariffs are simulated with the GE model to obtain GE effects. Third, a PE simulation of

[1] Other works applying a PE-GE approach are Narayanan *et al.* (2008), Jansson *et al.* (2008), and Tsigas *et al.* (2008).
[2] The 699 HS6 products identified in this work are the products covered by the WTO Agreement on Agriculture.

import tariffs at the HS6 level which incorporates estimates of selected GE effects provides revised estimates of PE effects.

Figure 1 sketches supply, demand, and trade linkages for a product group which contains two HS6 products. In Figure 1 the world consists of three economies: region R, the United States, and ROW. The quantities of total demand for the i^{th} product group in region r, $QD_{i,R}$, and domestic supply, $QO_{i,R}$, are exogenous in the PE model. In a first-round PE simulation, the PE model computes changes in trade, supply, and demand patterns at the HS6 product level under the restriction that demand and supply for the GE product groups are not affected by the simulation. In the second-round PE simulation, demand and supply for GE product groups are changed to reflect GE effects.

Producers determine optimal supply for HS6 products ($QO_{i,1,R}$ and $QO_{i,2,R}$) by maximizing revenues subject to a constant elasticity of transformation (CET) function with an elasticity of transformation elasticity, ET_G.[3] Optimal demand for HS6 products ($QD_{i,1,R}$ and $QD_{i,2,R}$) is determined by minimizing expenditures subject to a constant elasticity of substitution (CES) function with an elasticity of substitution, ES_G.[4]

The decision as to how much of a product to import is a function of the import price relative to the price of the domestic variety. In particular, optimal demand for the domestic varieties of HS6 products ($QDS_{i,1,R}$) and total imports of HS6 products ($QIM_{i,1,R}$) is determined with a CES function with an elasticity of substitution, ES_D.

Finally, the quantities of HS6 products imported from the United States and RoW ($QXS_{i,1,USA,R}$ and $QXS_{i,1,RoW,R}$) are also determined with a CES function with an elasticity of substitution, ES_M. If the price of the U.S. product declines, region R would demand more of the U.S. product and less of the RoW product.

[3] A CET production possibilities frontier is characterized by a constant percentage change in a product-mix ratio to changes in the marginal rate of transformation (Powell and Gruen, 1968).

[4] A CES function is characterized by a constant percentage change in product proportions due to a percentage change in the marginal rate of technical substitution (Arrow *et al*., 1961).

The PE model specifies that the domestic product is differentiated from imports. It is also specified that consumers (whether final or intermediate) view imports of a particular product from a region as different from imports from all other regions. These two specifications constitute the Armington specification of product differentiation by country of origin (Armington, 1969).

The PE model requires certain statistics: the dollar value of bilateral trade and demand for domestic variety of a product. We obtained 2007 bilateral trade statistics from the UN's COMTRADE database. Data for demand for the domestic variety of a product are not readily available for HS6 products. We used two sources to construct domestic demand data. The FAO's FAOSTAT databases provide export/production and import/demand shares for specific products. The GTAP database also provides these statistics for the 26 GE product groups. We applied the FAO and GTAP trade shares to the HS6 trade statistics to obtain estimates of supply and demand.

Bilateral applied ad valorem tariff equivalents at the HS6 level were obtained from UNCTAD's TRAINS database and the MAcMapHS6 database (Boumellassa *et al.*, 2008).

The demand elasticities ES_G, ES_D, ES_M (Figure 1) are based on the GTAP database. In particular, the estimated values for elasticities ES_M and their standard deviation are from Hertel *et al.* (2007) and are shown in Table 2. A range of tariff effects can be obtained by employing low and high values for ES_M.[5]

Employing the "rule of two," values for ES_D, and ES_G, are computed from the ES_M values as follows: $ES_D = ES_M/2$ and $ES_G = ES_D/2$. [6]

Table 2 also shows the values of elasticities ET_G in the PE model. This parameter determines supply response at the HS6 product level. For most product groups, ET_G is assigned the value -1. For products groups which may require relatively more time to adjust to price changes, ET_G is assigned the value -0.8.

[5] Low and high values for ES_M are computed as: $ES_M \pm$ standard error.

[6] The "rule of two" links ES_M with ES_D as follows: $ES_M=2\ ES_D$. This rule was proposed by Jomini *et al.* (1994). Liu *et al.* failed to reject this rule.

Simulated effects of foreign tariffs and TRQs

To estimate the effects of foreign tariffs and TRQs that are imposed on U.S. exports of food and agricultural products we simulate the absence of these tariffs and TRQs with the PE-GE simulation framework.[7, 8] In particular, the simulation removes foreign tariffs on food and agricultural imports from all sources. We simulate the effects of tariffs and TRQs assuming that 2007 trade levels were not influenced by any other import measures.

Table 3 reports simulated U.S. export effects at the HS chapter level and table 4 reports simulated U.S. export effects at the GTAP sector level. We find that in the absence of foreign tariffs and TRQs the dollar value of U.S. food and agricultural exports would increase by $15.8 billion which represents a 16.6 percent increase from 2007 U.S. exports.

Table 3 shows that the product group which gains the most in exports is meat and edible meat offal: exports expand by $7.2 billion which is an 86.7 percent increase over 2007 exports. Cereals expand by $3.8 billion, an increase of 17.9 percent. Exports of some U.S. product groups decline in value as foreign producers and consumers react to new relative product prices and they import less of those products.

Tables 5 reports U.S. export effects for the 200 HS6 products with the largest export effects. Export gains in pork, rice, chicken, wheat, and corn (i.e., the top six products in Table 5) account for more than 55 percent of the total gain in U.S. food and agricultural exports. The top fifty HS6 products in Table 5 account for 96 percent of total export gains. These fifty products are characterized by a combination of large ad valorem tariff equivalent, elastic foreign demand for imports, and a large level of U.S. exports in 2007.

The U.S. economy gains $5.4 billion in economic welfare or real income. The welfare effects for the U.S. economy are driven by increased export prices for food and agricultural

[7] In this simulation we employ central values for the demand elasticities ES_G, ES_D, ES_M (Figure 1).

[8] The GTAP framework was updated to 2007 trade and GDP levels with a preliminary simulation.

products and thus increased incomes in the United States ($5.6 billion). There are small efficiency losses stemming from increased production of some supported commodities.

Summary

We simulated the economic effects of foreign tariffs and TRQs on U.S. exports of food and agricultural products. The analysis is based on simulations with a partial equilibrium (PE) model and a general equilibrium (GE) model. The PE model focuses on bilateral trade in 699 products between the United States and all other economies. We found that foreign tariffs and TRQs depress the dollar value of U.S. exports by $15.8 billion. Exports which are affected the most in dollar value are pork, rice, chicken, wheat, and corn. The U.S. economy loses about $5.4 billion in economic welfare (or real income) because of foreign tariffs and TRQs.

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Table 1. GTAP model sectors and number of food and agriculture HS6 products contained in each sector

GTAP sector no.	GTAP sector description	Number of food and agriculture HS6 products
1	Paddy rice	2
2	Wheat	2
3	Cereal grains nec	10
4	Vegetables, fruit, and nuts	91
5	Oil seeds	16
6	Sugar cane, sugar beet	1
7	Plant-based fibers	3
8	Crops nec	62
9	Cattle, sheep, goats, horses	7
10	Animal products nec	47
12	Wool, silk-worm cocoons	7
13	Forestry	9
14	Fishing	3
19	Meat: cattle, sheep, goats, horses	29
20	Meat products nec	49
21	Vegetable oils and fats	47
22	Dairy products	24
23	Processed rice	2
24	Sugar	7
25	Food products nec	188
26	Beverages and tobacco products	31
27	Textiles	12
28	Wearing apparel	5
29	Leather products	28
33	Chemical, rubber, plastic products	16
42	Manufactures nec	1
	Total number of HS6 products	**699**

Source: Hertel (1997), and Narayanan and Walmsley (2008).

Table 2. Values of partial equilibrium model parameters ES_M and ET_G

Product group	ES_M		ET_G
	Estimated value	Standard deviation	
Paddy rice	10.1	4.0	-1.0
Wheat	8.9	4.2	-1.0
Cereal grains nec	2.6	1.1	-1.0
Vegetables, fruit, nuts	3.7	0.4	-0.8
Oil seeds	4.9	0.8	-1.0
Sugar cane, sugar beet	5.4	2.4	-1.0
Plant-based fibers	5.0	0.4	-1.0
Crops nec	6.5	0.7	-0.8
Cattle, sheep, goats, horses	4.0	0.7	-0.8
Animal products nec	2.6	0.3	-0.8
Wool, silk-worm cocoons	12.9	2.7	-1.0
Forestry	5.0	0.7	-1.0
Fishing	2.5	0.6	-1.0
Meat: cattle, sheep, goats, horses	7.7	1.9	-1.0
Meat products nec	8.8	0.9	-1.0
Vegetable oils and fats	6.6	0.7	-1.0
Dairy products	7.3	0.8	-1.0
Processed rice	5.2	2.6	-1.0
Sugar	5.4	2.0	-1.0
Food products nec	4.0	0.1	-1.0
Beverages and tobacco products	2.3	0.3	-1.0
Textiles	7.5	0.1	-1.0
Wearing apparel	7.4	0.2	-1.0
Leather products	8.1	0.3	-1.0
Chemical, rubber, plastic prods	6.6	0.1	-1.0
Manufactures nec	7.5	0.2	-1.0

Source: Estimated values for ES_M and their standard deviation are from Hertel *et al.* (2007).

Table 3. U.S. food and agricultural exports and simulated effects of the absence of foreign food and agriculture tariffs and TRQs, by HS chapter

HS chapter no.	HS chapter description	Number of food and agriculture HS6 products	2007 U.S. food and agricultural exports	Simulated change in U.S. exports in the absence of foreign tariffs	
			million $	*million $*	*percent*
01	Live animals	23	749.2	-24.2	-3.2
02	Meat and edible meat offal	59	8,343.7	7,233.7	86.7
04	Dairy, eggs, honey, and edible products	27	2,509.8	1,128.7	45.0
05	Products of animal origin	17	868.1	10.0	1.2
06	Live trees and other plants	12	419.6	-3.8	-0.9
07	Edible vegetables	61	3,010.0	-69.4	-2.3
08	Edible fruits and nuts, peel of citrus/melons	55	7,419.7	-100.7	-1.4
09	Coffee, tea, mate and spices	32	666.4	19.6	2.9
10	Cereals	16	21,119.6	3,779.3	17.9
11	Milling industry products	29	1,272.1	72.0	5.7
12	Oils seeds/misc. grains/med. plants/straw	44	12,672.9	-205.7	-1.6
13	Lac, gums, resins, etc.	11	398.2	46.2	11.6
14	Vegetable plaiting materials	3	9.5	-0.4	-3.8
15	Animal or vegetable fats, oils, and waxes	43	3,002.1	201.8	6.7
16	Edible preparations of meat, fish, crustaceans, etc.	12	872.1	871.8	100.0
17	Sugars and sugar confectionary	16	1,386.8	115.6	8.3
18	Cocoa and cocoa preparations	11	1,013.4	298.4	29.4
19	Preparations of cereals, flour, starch or milk	19	2,329.1	339.2	14.6
20	Preparations of vegetables, fruits, nuts, etc.	50	3,020.8	350.5	11.6
21	Misc. edible preparations	16	4,394.0	989.3	22.5
22	Beverages, spirits, and vinegar	22	3,411.9	158.7	4.7
23	Residues from food industries, animal feed	25	5,073.7	392.2	7.7
24	Tobacco and manufactured tobaco substitutes	9	2,369.6	416.7	17.6
29	Organic chemicals	2	33.2	1.4	4.1
33	Oils and resinoids, prefumery, cosmetic or toilet preparations	8	403.0	13.8	3.4
35	Albuminoidal sub, starches, glues, enzymes	7	502.9	30.2	6.0
38	Miscellaneous chemical products	1	15.9	0.6	3.6
41	Raw hides and skins and leather	38	3,064.8	-142.4	-4.6
43	Furskins and artificial fur, manufactures	10	286.2	-2.2	-0.8
50	Silk, including yarns and woven fabrics thereof	2	0.9	0.0	-2.2
51	Wool and fine or coarse animal hair, inc. yarns and woven fabrics thereof	8	35.5	-2.3	-6.5
52	Cotton, inc. yarns and woven fabrics thereof	5	4,722.9	-107.7	-2.3
53	Vegetable textile fibers nesoi, yarns and woven etc.	6	1.8	0.0	-1.0
Total		699	95,399.2	15,810.9	16.6

Table 4. U.S. food and agricultural exports and simulated effects of the absence of foreign food and agriculture tariffs and TRQs, by GTAP sector

GTAP sector no.	GTAP sector description	2007 U.S. food and agricultural exports	Simulated change in U.S. exports in the absence of foreign tariffs	
		million $	*million $*	*percent*
1	Paddy rice	546.0	220.4	40.4
2	Wheat	8,344.7	1,157.7	13.9
3	Cereal grains nec	11,378.8	990.7	8.7
4	Vegetables, fruit, nuts	9,943.9	-205.0	-2.1
5	Oil seeds	10,655.5	-307.2	-2.9
6	Sugar cane, sugar beet	0.1	0.1	71.3
7	Plant-based fibers	4,581.6	-105.1	-2.3
8	Crops nec	3,377.1	354.7	10.5
9	Cattle, sheep, goats, horses	589.1	-39.4	-6.7
10	Animal products nec	3,398.8	17.2	0.5
12	Wool, silk-worm cocoons	33.5	-2.6	-7.7
13	Forestry	180.0	5.1	2.8
14	Fishing	25.7	0.3	1.1
19	Meat: cattle, sheep, goats, horses	3,178.1	408.5	12.9
20	Meat products nec	6,946.2	7,737.5	111.4
21	Vegetable oils and fats	4,304.3	130.6	3.0
22	Dairy products	2,599.2	1,139.6	43.8
23	Processed rice	850.1	1,410.6	165.9
24	Sugar	238.8	-19.1	-8.0
25	Food products nec	16,780.6	2,613.2	15.6
26	Beverages and tobacco products	5,104.5	324.4	6.4
27	Textiles	146.3	-2.4	-1.6
28	Wearing apparel	25.1	4.9	19.7
29	Leather products	1,144.1	-79.6	-7.0
33	Chemical, rubber, plastic prods	1,025.6	55.8	5.4
42	Manufactures nec	1.5	0.1	7.0
	Total	95,399.2	15,810.9	16.6

Table 5. U.S. food and agricultural exports and simulated effects of the absence of foreign food and agriculture tariffs and TRQs, top 200 HS6 products

Rank no.	HS6 no.	Product description	2007 U.S. exports	Average ad valorem tariff equivalent applied on U.S. exports	Simulated change in U.S. exports in the absence of foreign tariffs	
			million $	*percentage rate*	*million $*	*percent*
1	020319	Meat of swine, nesoi, fresh or chilled	936	74	2,550	272
2	020329	Meat of swine, nesoi, frozen	1,069	49	1,512	141
3	100630	Rice, semi-milled or wholly milled, whether or not polished or gl...	825	100	1,370	166
4	020714	Chicken cuts and edible offal (including livers) frozen	2,493	23	1,304	52
5	100190	Wheat (other than durum wheat), and meslin	7,743	20	1,153	15
6	100590	Corn (maize), other than seed corn	9,899	22	955	10
7	210690	Food preparations nesoi	2,696	22	831	31
8	020713	Chicken cuts and edible offal (including livers) fresh or chilled...	271	80	566	209
9	160232	Prepared or preserved chicken meat, meat offal or blood, n.e.s.o....	185	79	434	235
10	020311	Carcasses and half-carcasses of swine, fresh or chilled	121	57	342	283
11	040510	Butter	98	68	312	318
12	240120	Tobacco, partly or wholly stemmed/stripped	1,063	19	222	21
13	100620	Rice, husked (brown)	136	142	221	162
14	160100	Sausages and similar products, of meat, meat offal or blood; food...	325	17	215	66
15	180690	Cocoa preparations, not in bulk form, nesoi	381	50	190	50
16	230310	Residues of starch manufacture and similar residues, whether or n...	596	33	178	30
17	040690	Cheese, nesoi, including cheddar and colby	186	27	177	95
18	230910	Dog and cat food, put up for retail sale	1,045	10	148	14
19	020230	Meat of bovine animals, boneless, frozen	386	37	143	37
20	160249	Meat, meat offal or mixtures of swine, prepared or preserved, nes...	128	31	135	105
21	240220	Cigarettes containing tobacco	1,036	24	135	13
22	190190	Malt extract; food products of flour, meal, etc. with cocoa (if a...	292	30	129	44
23	020312	Meat of swine, hams, shoulders and cuts thereof, with bone in, fr...	244	8	126	52
24	040410	Whey and modified whey, whether or not concentrated or containing...	580	15	121	21
25	020130	Meat of bovine animals, boneless, fresh or chilled	1,341	19	121	9
26	020711	Meat and edible offal of chickens, not cut in pieces, fresh o...	86	48	117	136
27	190120	Mixes and doughs for the preparation of bread, pastry, cakes, bis...	305	33	115	38
28	040210	Milk and cream, concentrated, whether or not sweetened, in powder...	838	10	112	13
29	040490	Products consisting of natural milk constituents, whether or not ...	108	50	111	103
30	121490	Forage products, nesoi, including rutabagas (swedes), mangolds, f...	592	12	97	16
31	200410	Potatoes, including french fries, prepared or preserved otherwise...	592	9	89	15
32	020727	Turkey cuts and edible offal (including liver) frozen	152	21	85	56
33	180620	Chocolate and other food preparations containing cocoa nesoi, in ...	141	50	81	57
34	151790	Edible mixtures or preparations of animal or vegetable fats or oi...	213	23	71	33
35	100300	Barley	161	61	68	42
36	230990	Animal feed preparations (mixed feeds, etc.), other than dog or c...	861	5	66	8
37	040700	Birds' eggs, in the shell, fresh, preserved or cooked	219	36	62	28
38	040630	Cheese, processed, not grated or powdered	45	54	57	128
39	020322	Meat of swine, hams, shoulders and cuts thereof with bone in, fro...	111	15	56	50
40	190590	Bread, pastry, cakes, biscuits and similar baked products, nesoi,...	798	5	53	7
41	080510	Oranges, fresh	271	20	48	18
42	020726	Turkey cuts and edible offal (including livers), fresh or chilled...	162	6	45	28
43	160231	Meat or meat offal of turkeys, prepared or preserved, nesoi	36	37	44	124
44	200990	Mixtures of juices, fruit and/or vegetable, unfermented and not c...	175	19	42	24
45	220290	Nonalcoholic beverages, nesoi (including milk-based drinks and no...	291	20	42	14
46	220421	Wine of fresh grapes (other than sparkling wine) and grape must w...	721	10	41	6
47	200911	Orange juice, frozen, whether or not sweetened	226	16	41	18
48	100640	Rice, broken	25	93	40	159
49	170211	Lactose and lactose syrup containing by weight 99% or more lactos...	157	9	39	25
50	240110	Tobacco, not stemmed/stripped	139	20	36	26

…..continued

Table 5. U.S. food and agricultural exports and simulated effects of the absence of foreign food and agriculture tariffs and TRQs, top 200 HS6 products (continued)

Rank no.	HS6 no.	Product description	2007 U.S. exports	Average ad valorem tariff equivalent applied on U.S. exports	Simulated change in U.S. exports in the absence of foreign tariffs	
			million $	*percentage rate*	*million $*	*percent*
51	020649	Offal of swine except livers, edible, frozen	186	19	35	19
52	020120	Meat of bovine animals, cuts with bone in (other than half or who...	124	14	35	28
53	210610	Protein concentrates and textured protein substances	278	10	33	12
54	020712	Meat and edible offal of chickens, not cut in pieces, frozen	41	25	33	81
55	200980	Juice of any other single fruit or vegetable, unfermented and not...	156	15	32	20
56	210500	Ice cream and other edible ice, whether or not containing cocoa	60	21	31	52
57	040620	Cheese of all kinds, grated or powdered	94	23	31	33
58	021019	Meat of swine, nesoi, salted, in brine, dried or smoked	51	14	31	61
59	040610	Cheese, (unripened or uncured) fresh (including whey cheese), and...	70	20	29	42
60	151590	Fixed vegetable fats and oils and their fractions, whether or not...	186	17	27	15
61	020500	Meat of horses, asses, mules or hinnies, fresh, chilled or frozen...	17	54	26	154
62	130219	Vegetable saps and extracts, nesoi	79	26	26	33
63	210390	Sauces and preparations therefor, nesoi; mixed condiments and mix...	494	5	25	5
64	220429	Wine of fresh grapes (other than sparkling wine) and grape must w...	161	25	24	15
65	020220	Meat of bovine animals, cuts with bone in (other than half or who...	37	37	23	61
66	200819	Nuts (other than peanuts (ground-nuts)), and other seeds, includi...	288	7	23	8
67	170260	Fructose, nesoi (other than chemically pure), and fructose syrup ...	199	13	22	11
68	170219	Lactose in solid form and lactose syrup, nesoi	147	7	22	15
69	210111	Coffee extracts, essences and concentrates, and preparations with...	78	18	22	28
70	200899	Fruit and other edible parts of plants, nesoi, prepared or preser...	145	12	21	15
71	040221	Milk and cream, concentrated, not sweetened, in powder, granules ...	42	22	20	49
72	021012	Meat of swine, bellies (bacon etc.) and cuts thereof, salted, in ...	59	11	20	35
73	350400	Peptones and derivatives; other proteins and derivatives, nesoi; ...	320	4	19	6
74	170250	Chemically pure fructose in solid form	87	15	18	21
75	230110	Flours, meals and pellets, of meat or meat offal, unfit for human...	121	3	18	15
76	160239	Meat or meat offal of chickens, ducks, geese and guineas, prepare...	28	19	18	65
77	150420	Fish fats and oils and their fractions (other than liver oils), w...	58	6	17	30
78	210120	Tea or mate extracts, essences and concentrates, and preparations...	109	19	16	15
79	151529	Corn (maize) oil and its fractions, refined but not chemically mo...	136	17	15	11
80	050400	Animal guts, bladders and stomachs (other than fish), whole and p...	591	8	15	3
81	151800	Animal or vegetable fats, oils and their fractions, boiled, oxidi...	102	8	15	15
82	150710	Soybean oil and its fractions, crude, whether or not degummed	574	7	15	3
83	020622	Livers of bovine animals, edible, frozen	88	13	15	17
84	200580	Sweet corn (zea mays var. saccharta) prepared or preserved otherw...	117	12	14	12
85	071310	Peas (pisum sativum), dried shelled, including seed	156	25	14	9
86	040299	Milk and cream, sweetened, whether or not concentrated, nesoi	29	17	14	48
87	090121	Coffee, roasted, not decaffeinated	375	2	14	4
88	080211	Almonds, fresh or dried, in shell	291	13	14	5
89	040390	Buttermilk, and curdled, fermented or acidified milk or cream, ne...	34	25	13	40
90	150790	Soybean oil, and its fractions, refined but not chemically modifi...	152	11	13	9
91	040310	Yogurt, whether or not sweetened, flavored or containing added fr...	13	26	13	104
92	200520	Potatoes, nesoi, prepared or preserved otherwise than by vinegar ...	224	6	13	6
93	170230	Glucose (dextrose) and glucose syrup, not containing fructose or ...	179	5	12	7
94	110811	Starch, wheat	21	68	12	58
95	110100	Wheat or meslin flour	126	10	12	9
96	010511	Chickens, live, weighing more than 185 g (6.53 oz.) each	135	17	12	9
97	110520	Flakes, granules and pellets of potatoes	71	11	12	17
98	180631	Chocolate and other cocoa preparations in blocks, slabs or bars, ...	143	7	12	8
99	190410	Prepared foods obtained by the swelling or roasting of cereals or...	254	3	11	4
100	040120	Milk and cream, not concentrated nor sweetened, of a fat content,...	26	9	11	42

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Table 5. U.S. food and agricultural exports and simulated effects of the absence of foreign food and agriculture tariffs and TRQs, top 200 HS6 products (continued)

Rank no.	HS6 no.	Product description	2007 U.S. exports	Average ad valorem tariff equivalent applied on U.S. exports	Simulated change in U.S. exports in the absence of foreign tariffs	
			million $	*percentage rate*	*million $*	*percent*
101	210320	Tomato ketchup and other tomato sauces	182	3	11	6
102	220210	Waters, including mineral waters and aerated waters, sweetened or...	221	7	11	5
103	020725	Turkeys, not cut in pieces, frozen	28	11	11	37
104	200830	Citrus fruit (including mixtures and chilled segments), prepared ...	46	19	10	23
105	151521	Corn (maize) oil and its fractions, crude, not chemically modifie...	182	12	10	5
106	220300	Beer made from malt	251	8	9	4
107	160241	Hams and cuts thereof of swine, prepared or preserved, nesoi	23	13	9	40
108	040590	Fats and oils derived from milk, n.e.s.o.i.	18	19	9	50
109	121299	Vegetable products (including unroasted chicory roots of the vari...	5	139	9	173
110	190219	Pasta (spaghetti, macaroni, etc.), uncooked, not stuffed or other...	74	13	9	11
111	200811	Peanuts (ground-nuts), prepared or preserved, nesoi, including pe...	79	12	8	11
112	210410	Soups and broths and preparations therefor	313	2	8	3
113	110313	Groats and meal of corn (maize)	127	8	8	7
114	021011	Hams, shoulders and cuts thereof, of swine, bone in, salted, in b...	17	13	8	50
115	240210	Cigars, cheroots and cigarillos, containing tobacco	43	26	8	19
116	190490	Cereals, other than corn (maize), in grain form, pre-cooked or ot...	69	10	8	12
117	020321	Carcasses and half-carcasses of swine, frozen	6	37	8	140
118	180632	Chocolate and other cocoa preparations in blocks, slabs or bars, ...	84	7	8	9
119	200490	Vegetables, nesoi, prepared or preserved otherwise than by vinega...	84	8	7	9
120	151190	Palm oil and its fractions, refined but not chemically modified	43	12	7	17
121	150100	Lard; other pig fat and poultry fat, rendered, whether or not pre...	130	8	7	5
122	170490	Sugar confectionary (including white chocolate), not containing c...	266	3	7	3
123	160300	Extracts and juices of meat, fish or crustaceans, molluscs or oth...	14	10	7	46
124	230330	Brewing or distilling dregs and waste, whether or not in the form...	392	1	7	2
125	240391	Homogenized or reconstituted tobacco	30	46	6	21
126	040891	Birds' eggs, not in shell, dried, whether or not sweetened	18	24	6	37
127	220720	Ethyl alcohol and other spirits, denatured, of any strength	345	8	6	2
128	130239	Mucilages and thickeners, whether or not modified, derived from v...	60	8	6	10
129	130213	Vegetable saps and extracts of hops	103	5	6	6
130	110812	Starch, corn (maize)	72	10	6	9
131	170290	Sugar, nesoi, including invert sugar and invert syrup	42	14	6	15
132	170112	Beet sugar, raw, in solid form, not containing added flavoring or...	32	25	6	19
133	020621	Tongues of bovine animals, edible, frozen	44	12	6	13
134	040819	Egg yolks, fresh, cooked by steaming or by boiling in water, mold...	18	19	6	31
135	071040	Sweet corn, uncooked or cooked by steaming or boiling in water, f...	49	9	6	11
136	071220	Onions, dried (powder, etc.), but not further prepared	79	7	5	7
137	200860	Cherries, prepared or preserved, whether or not containing added ...	26	13	5	21
138	081190	Fruit, nesoi, and nuts, uncooked or cooked by steaming or boiling...	97	5	5	6
139	100890	Cereals nesoi, including wild rice	38	25	5	14
140	071290	Vegetables, nesoi, dried and vegetable mixtures, dried (whole, cu...	95	6	5	6
141	110220	Corn (maize) flour	37	13	5	14
142	020736	Duck, geese or guinea cuts and edible offals (including livers), ...	7	17	5	70
143	040811	Egg yolks, dried, whether or not sweetened	17	20	5	29
144	220710	Ethyl alcohol, undenatured, of an alcoholic strength by volume of...	51	27	5	10
145	200799	Jams, fruit jellies, marmalades and cooked purees or pastes, othe...	44	9	5	11
146	200870	Peaches, including nectarines, otherwise prepared or preserved, w...	29	12	5	16
147	020610	Offal of bovine animals, edible, fresh or chilled	14	17	4	32
148	200912	Orange juice, not frozen, of a brix value not exceeding 20, not f...	242	0	4	2
149	121020	Hop cones, ground, powdered or in the form of pellets; lupulin	54	8	4	8
150	350220	Milk albumin, including concentrates of two or more whey proteins...	84	4	4	5

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Table 5. U.S. food and agricultural exports and simulated effects of the absence of foreign food and agriculture tariffs and TRQs, top 200 HS6 products (continued)

Rank no.	HS6 no.	Product description	2007 U.S. exports	Average ad valorem tariff equivalent applied on U.S. exports	Simulated change in U.S. exports in the absence of foreign tariffs	
			million $	*percentage rate*	*million $*	*percent*
151	170410	Chewing gum, whether or not sugar coated	47	9	4	9
152	100110	Durum wheat	602	5	4	1
153	170240	Glucose (dextrose) and glucose syrup, containing in the dry state...	24	11	4	17
154	040229	Milk and cream, concentrated, sweetened, in powder, granules or o...	8	17	4	50
155	040130	Milk and cream, not concentrated nor sweetened, of a fat content,...	8	12	4	49
156	130232	Mucilages and thickeners, whether or not modified, derived from l...	73	4	4	5
157	081110	Strawberries, uncooked or cooked by steaming or boiling in water,...	32	9	4	11
158	071090	Mixtures of vegetables, uncooked or cooked by steaming or boiling...	30	9	4	12
159	090220	Green tea (not fermented) nesoi	5	34	4	79
160	200892	Fruit mixtures, prepared or preserved, whether or not containing ...	33	9	4	11
161	040291	Milk and cream, concentrated, not sweetened, nesoi	16	12	3	20
162	151329	Palm kernel or babassu oil and their fractions, refined but not c...	11	17	3	29
163	020724	Turkeys, not cut in pieces, fresh or chilled	13	6	3	25
164	120810	Flours and meals of soybeans	449	6	3	1
165	240310	Smoking tobacco, whether or not containing tobacco substitutes in...	14	38	3	22
166	200590	Vegetables and mixtures of vegetables, nesoi, prepared or preserv...	45	7	3	7
167	230120	Flours, meals and pellets, of fish or of crustaceans, molluscs or...	72	2	3	4
168	200210	Tomatoes, whole or in pieces, prepared or preserved otherwise tha...	38	5	3	8
169	040899	Birds' eggs, not in shell, fresh, cooked by boiling or steaming i...	8	25	3	37
170	020210	Carcasses and half-carcasses of bovine animals, frozen	4	28	3	84
171	330129	Essential oils, nesoi	57	3	3	5
172	071339	Beans nesoi (black, lima, pinto, cowpeas, etc.), dried shelled, i...	141	8	3	2
173	110510	Flour and meal of potatoes	7	24	3	39
174	240399	Manufactured tobacco and its substitutes, nesoi; tobacco extracts...	25	27	3	12
175	190110	Food preparations for infant use, put up for retail sale, nesoi	87	3	3	3
176	220600	Fermented beverages, nesoi (incl cider, perry & mead); mixtures o...	38	14	3	8
177	220870	Liqueurs and cordials	68	8	3	4
178	210210	Yeasts, active	21	10	3	14
179	330124	Essential oils of peppermint (mentha piperita)	114	3	3	2
180	190531	Sweet biscuits	122	0	3	2
181	230700	Wine lees; argol	10	79	3	29
182	200190	Vegetables, fruit, nuts and other edible parts of plants, nesoi, ...	19	10	3	14
183	220890	Spirituous beverages, nesoi, including cordials, liqueurs, kirshw...	96	10	3	3
184	430219	Furskins nesoi, whole, with or without head, tail or paws, tanned...	9	6	3	28
185	350110	Casein	18	5	3	14
186	020890	Meat and edible meat offal, nesoi, fresh, chilled or frozen	4	13	3	61
187	190430	Bulgur wheat, in grain form or in form of flakes or other worked ...	58	3	3	4
188	160250	Meat or meat offal of bovine animals, prepared or preserved, neso...	123	7	3	2
189	080540	Grapefruit, fresh or dried	268	7	2	1
190	240130	Tobacco refuse (waste)	11	18	2	21
191	220110	Mineral waters and aerated waters, natural or artificial, not swe...	115	4	2	2
192	180610	Cocoa powder, containing added sugar or other sweetening matter	26	10	2	9
193	200110	Cucumbers including gherkins, prepared or preserved by vinegar or...	17	12	2	15
194	150600	Animal fats and oils and their fractions, nesoi, whether or not r...	7	7	2	34
195	160210	Homogenized preparations of meat, meat offal or blood	6	23	2	39
196	200880	Strawberries, prepared or preserved, whether or not containing ad...	13	11	2	17
197	060491	Foliage, branches and other parts of plants, without flowers or b...	107	3	2	2
198	091099	Spices, nesoi	24	7	2	10
199	110290	Cereal flours other, nesoi	13	12	2	17
200	220410	Sparkling wine of fresh grapes	20	14	2	11

Figure 1. Partial equilibrium model: supply and demand linkages for a product group with two HS6 products in economy R