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A Classroom Tariff Setting Game

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Abstract

The author outlines a classroom tariff setting game that allows students to explore the consequences of import tariffs imposed by large countries (countries able to influence world prices). Groups of students represent countries, which are organized into trading pairs. Each group's objective is to maximize welfare by choosing an appropriate *ad valorem* tariff that may be changed intermittently throughout the game. The game is built on a computable general equilibrium model, which allows each nation's utility and terms of trade under alternative tariff regimes to be expressed quantitatively. The exercise encourages students to consider terms of trade improvements and efficiency losses resulting from large-country tariffs, and provides a framework to discuss the Nash equilibrium of a tariff war. The game is a useful supplement to traditional teaching methods.

Key words: active learning, classroom experiment, international trade, tariff setting, tariffs

JEL codes: A22, F13

1. Introduction

When a large country (a country able to influence world prices) imposes a tariff it experiences a terms of trade improvement and an efficiency loss. As the tariff restricts domestic demand, terms of trade improvements are derived from a decrease in the world price of the imported good. Efficiency losses arise from distortions to producer and consumer prices. A partial equilibrium, supply and demand approach is a simple way of exposing students to these effects in introductory classes, but is of little use when two countries simultaneously impose tariffs; that is, when there is a tariff war. A rigorous treatment of a tariff war requires offer curve analysis, which can be used directly or, via the derivation of reaction functions in tariff space, indirectly to address the issue. Offer curve diagrams, however, are commonly omitted from introductory classes and/or not well understood by undergraduates.¹

A tariff setting game, built on a numerical representation of the standard two (countries) \times two (goods) \times two (factors) trade model is played over several rounds. Groups of students represent countries, which are organized into trading pairs and aim to maximize welfare by choosing an appropriate *ad valorem* tariff, which may be altered at certain intervals during the game. Solutions to the general equilibrium model under alternative tariff regimes are contained in the appendix and displayed to students after tariff choices are made. The game allows students to explore the effects of large-country tariffs on utility and the terms of trade in an interactive setting and exposes the Nash equilibrium of a tariff war. Although students may choose from a range of possible tariffs, they do not have enough information to determine precisely their country's utility under all possible

tariff combinations. Instead, students are encouraged to use economic intuition and learn from previous rounds to inform their decisions.

In addition to the absence of a suitable apparatus to demonstrate the consequences of a tariff war in introductory classes, the use of a classroom game, as opposed to a “talk and chalk” approach, can be justified on several grounds: (a) classroom experiments, because of their tangible nature, improve students’ understanding of abstract concepts (Oxoby 2001); (b) as students have different learning styles, using a range of teaching methods improves the accessibility of economics to more types of students (Becker and Watts 1995; 1996); and (c) going beyond the simple one-shot prisoners’ dilemma in games involving strategic choices facilitates a richer understanding of the concept under analysis (Ortmann 2003).

PARTICULARS

The game is suitable for introductory international trade courses and is best played after students have been exposed to the consequences of tariffs imposed by a large country in regular classes, but before retaliation and tariff wars are discussed (i.e., a lecture based on Chapter Eight of Krugman and Obstfeld (2003), or the equivalent section from another introductory international trade textbook, provides participants with suitable preparation). Approximately 45 minutes are required to introduce, play and discuss the game. The game is best suited to class sizes of fewer than 30 students. The game is built on the standard two (countries: the E.U. and the U.S.) \times two (goods: beer and pretzels) \times two (factors: capital and labor) trade model. Utility and production functions for each country and factor endowments are displayed in Table 1. Each country is endowed with the same number of capital and labor units and employs identical technologies. Dissimilar

preferences require the E.U. to have a comparative advantage in beer and the U.S. in pretzels. Taste differences are symmetric.

[Insert Table 1 here]

PLAYING THE GAME

Begin by distributing instruction sheets to students that describe the trade model pertaining to Table 1 (see the appendix).² Next, display Figure 1, which illustrates the E.U.'s utility, and terms of trade (utility and terms of trade are based so that they equal 1000 and 1, respectively, when there is free trade) for different *ad valorem* import tariffs levied by the E.U. (τ^{EU}) when the U.S. commits to free trade. It is also a good idea to reiterate that the model is symmetric and ask students to consider the following questions: (a) What are the sources of changes in E.U. utility?³ (b) Why is welfare unchanged for increases in τ^{EU} above 70 percent?⁴ (c) What happens to U.S. utility and terms of trade as τ^{EU} increases? Why?⁵

[Insert Figure 1 here]

Although, the game can be played with any even number of groups chosen by the instructor, having six groups permits all students to have an input into tariff choices and also ensures that the game is completed within a reasonable time period when class size is between 20 and 30. When there are six groups, three simulations of the game are played simultaneously by three trading pairs (E.U.¹ and U.S.¹, E.U.² and U.S.², and E.U.³ and U.S.³). Once groups have been established, the instructor distributes signs displaying each group's country type and number. To avoid collusion among country pairs, do not allow students to disclose their country details to other groups.

The objective of each group is to maximize their nation's utility by choosing an appropriate nonnegative, *ad valorem* tariff, which, for reporting convenience, must be a multiple of 5 percent. Free trade is the starting point for the game. The sequence of tariff choices is as follows: E.U. country groups select tariffs in odd-numbered rounds and U.S. country groups choose tariffs in even-numbered rounds. Tariff choices are maintained for two rounds (i.e., Round 1: the E.U. chooses a tariff while the U.S. commits to free trade; Round 2: U.S. country groups select a tariff while E.U. country groups maintain tariffs chosen in Round 1; Round 3: E.U. country groups select a tariff while U.S. country groups maintain tariffs chosen in Round 2; and so on). When introducing the game, make it clear to students that they are not expected to solve for the optimal tariff level explicitly, although they should be able to derive some qualitative conclusions using Figure 1 and (where applicable) results from previous rounds (across all trading pairs). Students have two minutes to select a tariff in each round. Playing six rounds is usually sufficient to tease out the important aspects of a tariff war. As country pairs choose tariffs consecutively, I do not tell students how many rounds the game will have to prevent country groups acting as Stackelberg leaders when selecting tariffs in the penultimate round.

To entice groups to maximize utility, a prize is offered to each member of the best E.U. country group and the best U.S. country group, where best is defined as highest average utility and ties are broken by flipping a coin. Although it is common to offer monetary prizes, distributing cash amongst group members can be time consuming and impractical if the instructor has several consecutive classes. I have found chocolate bars act as a good incentive.⁶

Utility and terms of trade for the E.U. under alternative tariffs regimes are derived via computer simulation and displayed in Appendix Tables A.1 and A.2, respectively. U.S. utility and terms of trade are derived symmetrically.⁷ For example, if $\tau^{EU} = 15$ percent and $\tau^{US} = 5$ percent, E.U. and U.S. utility are 1002.68 and 988.95, respectively, and the two countries' terms of trade are 1.045 and 0.957, respectively. After tariff choices are made, approach each group eligible to choose a different tariff and record their selections. Once each group's utility and terms of trade have been determined, display these figures along with tariff choices to the class. Do not display the complete contents of Tables A.1 and A.2. If a tariff structure chosen by a trading pair results in zero trade, make this explicit to the class. Students record the results from each round in a results sheet (see the appendix). The end of each round provides an opportunity to discuss the results in terms of increases/decreases in each nation's terms of trade and efficiency losses. For example, the instructor may ask, why is utility in the E.U. higher in round 2 than round 3 when the E.U.'s terms of trade is higher in the latter?⁸ Questions can also be asked as tariffs are entered but before the results are displayed. For example, after revealing tariff choices by a trading pair the instructor may ask: (a) Which nation will experience an improvement in its terms of trade? (b) Which nation will have higher utility?⁹

As demonstrated in the following section, six rounds are normally sufficient to portray the key elements of a tariff war and the results provide enough information to tease out the Nash equilibrium, which occurs when each country levies a tariff of 15 percent. Conclude by summarizing the game using the payoff matrix displayed in Figure 2. For ease of illustration, each player can only choose between two alternatives in this payoff

matrix – to commit to free trade or to impose a tariff of 15 percent. (Summarizing the actual game would require a payoff matrix with 15 rows and 15 columns.)

[Insert Figure 2 here]

A quick guide to the game is presented below:

1. Distribute instruction and record sheets to students.
2. Divide the class into six groups and create three trading pairs.
3. Display Figure 1.
4. Ask EU country groups to choose an *ad valorem* tariff.
5. Ask US country groups to choose an *ad valorem* tariff (if round number less than six, repeat step (4), otherwise go to step (6)).
6. Summarize and discuss game; display Figure 2.

SIMULATION RESULTS

Data from a typical class simulation for a single trading pair are presented in Table 2. In this exercise, the E.U. selected the optimal tariff indicated in Figure 1 in the first round. Although this may seem obvious, a 20 percent tariff is not always selected in this round. Sometimes students who are aware of the prisoners' dilemma nature of the game select a lower tariff in the hope that the U.S. will be kind to them in subsequent rounds.¹⁰ Both countries focused on terms of trade gains in rounds 2 and 3, which resulted in utility in these nations deteriorating relative to free trade. The U.S. traded a terms of trade loss for an efficiency improvement in the fourth round by lowering its tariff from 25 percent to 20

percent, which increased U.S. utility from 971.71 to 975.24. The E.U. adopted a similar strategy in round 5. Although the Nash equilibrium is not replicated in round 6, the key elements of the equilibrium are: both countries derive lower utility than in free trade and levy lower tariffs than that which is optimal when their trading partner commits to free trade. Additionally, when asked about their strategies, both groups were aware of the prisoners' dilemma nature of the game. In general, tariff choices in other in-class simulations follow a similar pattern (i.e., tariff choices are higher in rounds 2 and 3 than in rounds 4 and 5). Groups who choose relatively low tariffs are hardly ever rewarded, and impose positive tariffs as soon as it obvious that their partner is not willing to cooperate. Tariff combinations that prohibit trade are seldom in place for more than one round in any set of simulations.

EXTENSIONS

The game can also be used to demonstrate one benefit from setting the rules for world trade via a governing body such as the World Trade Organization, as emphasized by, amongst others, Bagwell and Staiger (1999), McMillan (1989) and Mayer (1981). Playing another round in which inter-group discussions are allowed prior to tariff selection accomplishes this. Ask groups who chose a zero tariff why they did so without a binding contract. Ask students who chose a positive tariff what would be required for them to commit to free trade.

Many real-life examples can be included to animate the game, such as referring to the Smoot-Hawley tariff Act, which enticed a large proportion of foreign nations to impose retaliatory tariffs. The recognition by many Western nations that these actions hindered global economic development and that trade policies should be determined cooperatively

shortly after the Second World War, also fits nicely with the demonstration mentioned above. Substituting steel for beer and agriculture for pretzels presents a more recent illustration (i.e., the narrowly averted tariff war between the U.S. and the E.U. in 2003).

SUMMARY

A tariff setting game requires students, who represent countries, to consider terms of trade movements and efficiency losses associated with large country-import tariffs. At the beginning of the game, students only know the optimal strategy when one country levies a nonnegative tariff and the other commits to free trade. The structure of the game forces students to think carefully about the effects of retaliation by evaluating the channels through which tariffs operate, which can be discussed at the end of each round. A simple form of the tariff setting game involves students choosing a zero or a positive tariff. Holt and Capra (2000) outline how such a game can be played using playing cards.¹¹ The binary variant of the game, however, is much less thought provoking than when tariffs are a multiple choice. Comments from students who have played the game indicate that the numerical nature of the game greatly assists understanding of the channels through which large-country tariffs affect welfare.

NOTES

¹ Two prominent undergraduate international trade texts, Krugman and Obstfeld (2003, 212-3) and Yarbrough and Yarbrough (2003, 159-62), confine offer curve analyses to appendices.

² The instruction sheet simply states each nation's exports and imports. An alternative approach is to ask students to determine the natural pattern of trade before attending the class in which the game is played, which can be reviewed at the start of the session. If this is the case, some leading questions may be useful: (a) Are the production possibilities frontiers the same across countries? How do you know this? (b) Which

country has the steeper indifference curve? (c) Which country has the higher autarky relative price of beer?
(d) Which nation will export beer? Which nation will export pretzels?

³ As a result of the tariff, the E.U. experiences a terms of trade improvement, which increases welfare, and an efficiency loss, which decreases welfare. Additionally, the magnitude of the latter effect rises relative to that of the former as the tariff increases (for all $\tau^{E.U.} < 70$ percent).

⁴ An *ad valorem* tariff greater than or equal to 70 percent prohibits trade.

⁵ The U.S. experiences greater efficiency losses and a worsening of its terms of trade as $\tau^{E.U.}$ increases (for all $\tau^{E.U.} < 70$ percent). U.S. utility is, therefore, a decreasing function of $\tau^{E.U.}$ (for all $\tau^{E.U.} < 70$ percent).

⁶ As minimizing the utility of a trading partner (i.e., choosing a different objective to that stipulated) provides an illustration of the “cutting off your nose to spite your face” nature of tariff wars, one referee questioned whether an incentive is needed. My experience, however, suggests that students are more enthusiastic about the game, and therefore learn more, when a prize is offered.

⁷ Simulation results are also available in Excel format. The spreadsheet calculates utilities and terms of trades once tariff choices are entered and can be downloaded from:

http://www.business.otago.ac.nz/econ/Personal/NW/tariff_results.xls.

⁸ Efficiency losses outweigh terms of trade improvements as $\tau^{E.U.}$ increase. Hence, a higher terms of trade is not necessarily associated with higher utility.

⁹ Providing trade is not prohibited, as the underlying model is symmetric, both nations will experience similar efficiency losses but the country that chooses the higher tariff will experience a terms of trade improvement. Hence, the country that sets the higher tariff will also have higher utility. However, this is not to say that choosing a higher tariff than ones trading partner is a dominant strategy.

¹⁰ This is not uncommon in finite period, prisoners’ dilemma type economic experiments – see for example Holt and Capra (2000).

¹¹ As Cournot reaction functions resemble reaction functions in tariff space, the tariff setting game is also related to oligopoly in-class games outlined by Meister (1999) and Beckman (2003).

REFERENCES

- Bagwell, K., and R. W. Staiger. 1999. An economic theory of GATT. *American Economic Review* 89 (March): 215-48.
- Becker, W. E., and M. Watts. 1995. Teaching tools: Teaching methods in undergraduate economics. *Economic Inquiry* 33 (October): 692-700.
- _____. 1996. Chalk and talk: A national survey on teaching undergraduate economics. *American Economic Review* 86 (May): 448-53.
- Beckman, S. R. 2003. Cournot and Bertrand games. *Journal of Economic Education* 34 (Winter): 27-35.
- Holt, C. A., and M. Capra. 2000. Classroom games: a prisoner's dilemma. *Journal of Economic Education* 31 (Summer): 229-36.
- Krugman, P. R., and M. Obstfeld. 2003. *International economics: Theory and policy*. 6th ed. Boston: Addison Wesley.
- McMillan, J. 1986. A game-theoretic view of international trade negotiations: Implications for developing countries. In J. Whalley, ed., *Developing countries and the global trading system: Volume I*. 26-44. Ann Arbor: University of Michigan Press.
- Mayer, W. 1981. Theoretical considerations on negotiated tariff adjustments. *Oxford Economic Papers* 33(March): 135-53.
- Meister, J. P. 1999. Oligopoly-An in-class economic game. *Journal of Economic Education* 30 (Fall): 383-91.
- Ortmann, A. 2003. Bertrand price undercutting: A brief classroom demonstration. *Journal of Economic Education* 34 (Winter): 21-6.

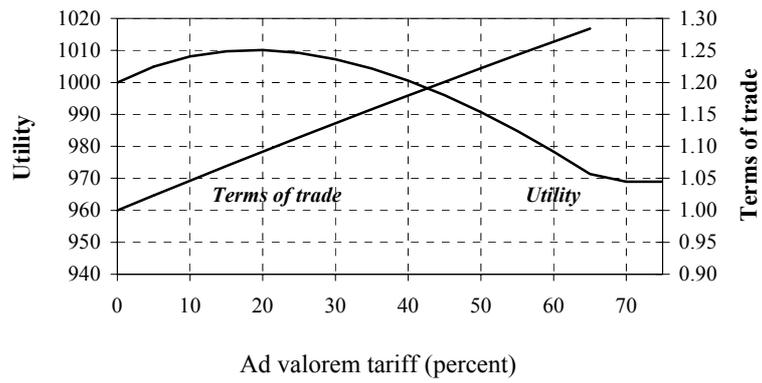
Oxoby, R. J. 2001. A monopoly classroom experiment. *Journal of Economic Education* 32 (Spring): 160-8.

Yarbrough, B. V., and R. M. Yarbrough. 2003. *The world economy: Trade and finance*. 6th ed. Mason, Ohio: South-Western/Thomson Learning.

TABLE 1: Utility, Production and Factor Endowments

Utility	Production
$U_{EU} = B_{EU}^{1/4} P_{EU}^{3/4}$ $U_{US} = B_{US}^{3/4} P_{US}^{1/4}$	$B_j = 1.75 K_{bj}^{1/4} L_{bj}^{3/4}$ $P_j = 1.75 K_{pj}^{3/4} L_{pj}^{1/4}$
$K_{bj} + K_{pj} = 4000 \quad L_{bj} + L_{pj} = 4000 \quad j = E.U., U.S.$	

Note: B_j and P_j denote the quantity of beer and pretzels in country j respectively; and K_{ij} and L_{ij} denote the quantity of capital and labor employed by industry i in country j respectively ($i = \text{beer, pretzels}$).



Note: An ad valorem tariff greater than or equal to 70 percent prohibits trade.

Figure 1: E.U. Utility and terms of trade when the E.U. imposes a tariff and the U.S. commits to free trade.

		U.S.			
		$\tau^{US} = 0$		$\tau^{US} = 15\%$	
E.U.	$\tau^{EU} = 0$	1000.00	<i>1000.00</i>	985.62	<i>1009.77</i>
	$\tau^{EU} = 15\%$	1009.77	<i>985.62</i>	990.78	<i>990.78</i>

FIGURE 2: Payoff matrix for tariff setting game.

TABLE 2: Results from a Class Simulation.

Round	E.U. tariff	U.S. tariff	E.U. utility	U.S. utility	E.U. ToT	U.S. ToT
Free Trade	0	0	1000.00	1000.00	1.000	1.000
1	20	0	1010.09	982.08	1.092	0.916
2	20	25	979.47	981.53	0.980	1.020
3	30	25	972.19	971.71	1.020	0.981
4	30	20	977.78	975.24	1.041	0.961
5	15	20	985.83	989.65	0.979	1.021
6	15	10	996.37	990.60	1.022	0.979

Note: ToT denotes “terms of trade”.

APPENDIX: Student Instruction and Result Sheet and Solutions to the General Equilibrium Model

Student Instruction and Results Sheet

Consider two countries, the E.U. and the U.S., which produce two goods, beer and pretzels, under conditions of increasing opportunity costs. The two countries are identical in every aspect except for tastes. Residents of the E.U. prefer to consume large amounts of pretzels whereas residents of the U.S. prefer to consume large amounts of beer. Preferences are symmetric (i.e., the E.U.'s liking for pretzels matches the U.S.'s liking for beer and *vice versa*). As a result, the E.U. will export beer and import pretzels, and the U.S. will export pretzels and import beer when the two countries trade.

Figure 1, displayed at the front of the class, illustrates the E.U.'s utility and terms of trade for various *ad valorem* import tariffs levied by the E.U. when the U.S. commits to free trade. (Note: the game is symmetric, so the diagram can also be interpreted to display U.S. utility and terms of trade when the U.S. chooses a positive tariff and the E.U. commits to free trade).

The diagram illustrates that, when the U.S. commits to free trade, the welfare-maximising tariff for the E.U. is 20 percent. Your objective is to maximise your country's utility by choosing a non-negative, *ad valorem* import tariff in each round. Your chosen tariff must be a multiple of 5 percent (e.g., 0, 5, 10, 15, etc). The starting point for the game is free trade. E.U. country groups can only choose a different tariff in odd-numbered rounds and U.S. country groups may only levy a different tariff in even-numbered rounds. Tariff choices remain in place for two rounds. That is, the sequence of the game is as follows: Round 1 – E.U. country groups choose tariffs

while U.S. country groups impose zero tariffs; Round 2 – U.S. country groups select a tariff while E.U. country groups maintain tariffs chosen in Round 1; Round 3 – E.U. country groups select a tariff while U.S. country groups maintain tariffs chosen in Round 2; and so on. The game will last for an unspecified number of rounds.

You are not required to calculate your chosen tariffs explicitly, but you should use the information displayed in Figure 1 and, where applicable, results from previous rounds, to assist your decisions. You will have two minutes to select a tariff in each round, which must be chosen without communicating with your trading partner. At the end of the game, prizes will be awarded to members of the best performing E.U. country group and best performing U.S. country group (where “best” is assessed by average utility achieved). Record your outcomes in the table below.

Results from the tariff setting game

Round	E.U. tariff (%)	U.S. tariff (%)	E.U. utility	U.S. utility	E.U. terms of trade	U.S. terms of trade
Free Trade	0	0	1000.00	1000.00	1.000	1.000
1		0				
2						
3						
4						
5						
6						
.						
.						
.						

TABLE A.1: E.U. Utility Under Alternative Tariff Regimes

τ^{US}	τ^{EU}														
	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70
0.00	1000.00	1004.92	1008.11	1009.77	1010.09	1009.20	1007.24	1004.32	1000.53	995.97	990.71	984.81	978.34	971.35	968.91
0.05	994.52	998.88	1001.53	1002.68	1002.49	1001.11	998.67	995.28	991.04	986.03	980.33	974.00	968.91	968.91	968.91
0.10	989.75	993.58	995.72	996.37	995.70	993.85	990.96	987.12	982.44	977.01	970.89	968.91	968.91	968.91	968.91
0.15	985.62	988.95	990.60	990.78	989.65	987.35	984.02	979.76	974.66	968.91	968.91	968.91	968.91	968.91	968.91
0.20	982.08	984.92	986.11	985.83	984.26	981.53	977.78	973.12	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.25	979.05	981.43	982.17	981.46	979.47	976.34	972.19	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.30	976.51	978.45	978.76	977.63	975.24	971.71	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.35	974.39	975.91	975.81	974.28	971.50	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.40	972.68	973.78	973.29	971.38	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.45	971.32	972.03	971.16	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.50	970.29	970.63	969.38	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.55	969.57	969.54	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.60	969.12	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.65	968.92	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91
0.70	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91	968.91

Note: τ^{EU} and τ^{US} denote *ad valorem* tariffs levied by the E.U. and the U.S., respectively; U.S. utility is derived symmetrically; and utility is 968.91 in each nation in autarky.

TABLE A.2: E.U. Terms of Trade Under Alternative Tariff Regimes

τ^{US}	τ^{EU}														
	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70
0.00	1.000	1.023	1.046	1.069	1.092	1.114	1.136	1.158	1.179	1.201	1.222	1.243	1.264	1.284	-
0.05	0.977	1.000	1.023	1.045	1.067	1.089	1.110	1.131	1.152	1.173	1.194	1.214	-	-	-
0.10	0.956	0.978	1.000	1.022	1.043	1.065	1.086	1.106	1.127	1.147	1.168	-	-	-	-
0.15	0.935	0.957	0.979	1.000	1.021	1.042	1.062	1.083	1.103	-	-	-	-	-	-
0.20	0.916	0.937	0.959	0.979	1.000	1.020	1.041	1.060	-	-	-	-	-	-	-
0.25	0.898	0.919	0.939	0.960	0.980	1.000	1.020	-	-	-	-	-	-	-	-
0.30	0.880	0.901	0.921	0.941	0.961	0.981	-	-	-	-	-	-	-	-	-
0.35	0.864	0.884	0.904	0.924	0.943	-	-	-	-	-	-	-	-	-	-
0.40	0.848	0.868	0.887	0.907	-	-	-	-	-	-	-	-	-	-	-
0.45	0.833	0.852	0.872	-	-	-	-	-	-	-	-	-	-	-	-
0.50	0.818	0.838	0.856	-	-	-	-	-	-	-	-	-	-	-	-
0.55	0.805	0.823	-	-	-	-	-	-	-	-	-	-	-	-	-
0.60	0.791	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.65	0.779	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: τ^{EU} and τ^{US} denote *ad valorem* tariffs levied by the E.U. and the U.S., respectively; the terms of trade for the U.S. is derived symmetrically; and “-” indicates that no trade will take place.