Eastern Economic Journal, Volume XIII, No. 4, December 1987

On Estimating the Static Effects of Preferential Tariffs*

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INTRODUCTION

Since Baldwin and Murray [2] published their article regarding the effects of MFN tariff cuts on beneficiaries of the Generalized System of Preferences (GSP), Ahmad [1] and Pomfret [8; 10] have claimed that trade diversion effects of the GSP are much larger than those estimated by Baldwin and Murray. In particular, the magnitude of trade diversion plays a crucial role in the Baldwin-Murray conclusion [2, 44] that "the developing countries stand more to gain from MFN tariff cuts than they will lose from the simultaneous erosion of their GSP preferential tariff margins . . . ", a conclusion that both Ahmad and Pomfret challenge.

In this paper I will show that the Baldwin-Murray methodology incorporates biases that have, in fact, over estimated trade diversion for two reasons not recognized by the aforementioned authors.

II. THE MODEL

Suppose that the donor country's economy is initially in equilibrium. In describing this equilibrium, allow Q to be the total quantity of a praticular product group consumed within the country. As such, Q equals the quantity imported by the donor plus its own domestic production, or

1.1 $$Q = Q_m + Q_d$$

1.2 $$Q_m = Q_b + Q_n$$

where

Q_m is the total quantity imported by the donor,
Q_b is the quantity imported from beneficiaries,
Q_n is the quantity imported from nonbeneficiaries, and
Q_d is the quantity produced in the donor country.

It is assumed that Q_b, Q_n and Q_d are differentiated products, and hence, their equilibirum prices (P_b, P_n and P_d, respectively) may differ. Thus, in determining the total expenditures by consumers in the donor country on the product group, it is inappropriate to multiply Q by P_b, P_n or P_d but instead one must multiply Q by an index, P, so that;

2.1 $$PQ = P_mQ_m + P_dQ_d$$

2.2 $$= P_bQ_b + P_nQ_n + P_dQ_d.$$

Accordingly, the demand for the product group can be written as a function of the product group's price index where

3.1 $$P = [Q_m/Q]P_m + [Q_d/Q]P_d.$$

so that

$$TD^A = [M_{ni}/V_i]dV^{BM} - [M_{ni}/V_i]dC$$
$$= TD^{BM} - [M_{ni}/V_i]dC$$

where TD^{BM} would be the estimate of trade diversion under the BM scenario.[10] Their failure to recognize $dC > 0$ thus implies that

7.3 $$TD^{BM} \geq TD^A.$$

However, BM also err in calculating the percent change in price and in their use of import data in calculating M_i and M_{ni}; they used the value as received by the exporting country (i.e., f.o.b.) rather than the actual value paid by consumers in the donor country. Hence, the BM calculation of M_i and M_{ni} understate, while dp_b, overstates, the required values by some fraction, say k_1 and k_2, respectively.[11] Upon multiplying the first occurrence of M_i in equation 6.2 by k_1/k_1 one has

8.1 $$dV^A = [1/k_1]dV^{BM} - dC$$

8.2 $$dV^A - dV^{BM} = [(1/k_1) - 1]dV^{BM} - dC,$$

where the right-hand side of 8.2 may be positive or negative.

In a similar fashion, 7.2 becomes

8.3 $$TD^A - TD^{BM} = [(1/k_1k_2) - 1]TD^{BM} - [M_{ni}/V_i]dC$$

which again implies that TD^{BM} may be biased in either direction.

V. IMPLICIT OWN- AND CROSS-PRICE ELASTICITIES

The above methodology can also be used to estimate the implicit values of E^b_{pb} and E^n_{pb}. To see this, multiply equations 5.1 and 5.3 by $-Ydp'_b$

9.1 $$dV^A = M_i[E_m - E^Q_p]dp'_b$$

9.2 $$TD^A = -M_{ni}E^n_{pb}dp'_b$$

and

9.3 $$TD^A = -M_i[E_m - E^b_{pb}]dp'_b.$$

Equation 7.1 implies that

9.4 $$TD^A = (M_{ni}/V)dV^A$$

which in conjunction with equations 9.1–9.3 leads to:

10.1 $$E^n_{pb} = E^d_{pb} = -B(M_i/V)E_m$$

10.2 $$E^b_{pb} = [B(M_{ni}/V_i) + 1]E_m$$

where

$$B = (1 - E^Q_p/E_m) \text{ and } 0 < B \leq 1.$$

Also, the traditional substitution elasticity between beneficiary and nonbeneficiary goods is

equation 10.1 minus equation 10.2 which leads to;

11.3 $$S_{n,b} = [1 + B(M_{Ti}/V_i)]E_m$$

where M_{Ti} is the total value of the donor country imports of the ith product group.

IV. ESTIMATION

Equations 9 and 10 require estimates of E_m, which are generally available, and the product group's own-price elasticity of demand, E^Q_p, which are generally not known. Baldwin-Murray and Rousslang-Parker [10] overcome this latter difficulty by implicitly assuming that E^Q_p is zero.[12] In this instance B equals one and the ratio of 11.1 to 11.2 becomes

$$E^n_{pb}/E^b_{pb} = -M_i/(M_{ni} + V_i)$$

which is the Rousslang-Parker outcome. Further, the simple substitution elasticity becomes;

$$S_{n,b} = [1 + M_{Ti}/V_i]E_m$$

which has been criticized by Pomfret [8] and defended by Baldwin-Murray [3]

However, the assumption that the product group own-price elasticity is zero is extremely restrictive. In particular, it is often assumed that utility is separable with independence across product groups. This implies that expenditures are constant, i.e. that E^Q_p is unit elastic. However, when E_m is inelastic, an adjustment to the value of E^Q_p is necessitated by the constraint $|E_m| > |E^Q_p|$. Rather than address this problem, 31 observations, for which $|E_m| \leq 1$, were deleted from the data set.

The components of trade expansion were estimated on an annual 1976 trade flow basis using data on 5-digit product categories as defined in the Tariff Schedules of the United States (TSUS). The sample of products cover 90 percent of U.S. imports of GSP-eligible products from all beneficiary countries combined. Estimates are provided for those goods which qualify for GSP tariff treatment; the value of beneficiary imports used in this study is reduced by the amount of trade deprived GSP duty-free treatment under the "competitive need" limits.[13] The import demand elasticities are the same as those used by Baldwin-Murray. Also, I have estimated the erosion of GSP benefits by using the actual tariff reductions resulting from the Tokyo Round. Observe Tables I and II.

Table I reports the results of the Baldwin-Murray methodology whereas Table II reports the results when both of the previously discussed biases are acknowledged. Comparison of total TC under the two methodologies shows that the incorrect use of import data by BM has led them to overestimate total TC by 9%. And, the overestimation of dV by BM has led to an overestimation of total TD by some 57%.[14] When both biases are combined, TE is overestimated by 15%. These results are especially noteworthy when the total erosion calculated from the BM methodology is 54% higher than that calculated from the corrected methodology.

I initially estimated the elasticities for 185 5-digit TSUS product categories, whereupon the TSUS outcomes were grouped into 2-digit categories. The value of beneficiary trade for a particular 5-digit TSUS product within a 2-digit TSUS was divided by the total value of beneficiary trade for all 5-digit TSUS comprising the 2-digit TSUS. The resulting ratios were used as weights in the aggregation of the 5-digit TSUS results to the 2-digit outcomes presented in Table III. Table III also provides the number of 5-digit TSUS within a 2-digit product category.

TABLE 3

Elasticities for Two Digit TSUS . . . Corrected Methodology (absolute values)

TSUS	E_m	E^n_{pb}	E^b_{pb}	$S_{n,b}$	Count
10	1.14	0.01	1.14	1.15	1
11	1.14	0.04	1.18	1.22	1
14	1.14	0.00	1.15	1.15	2
15	1.14	0.02	1.17	1.19	6
16	1.14	0.00	1.14	1.14	2
17	1.14	0.00	1.18	1.18	2
18	1.14	0.00	1.14	1.14	4
20	1.46	0.04	1.46	1.50	6
22	1.40	0.03	1.41	1.44	6
24	1.67	0.04	1.65	1.68	3
25	1.40	0.00	1.45	1.46	4
30	1.30	0.04	1.35	1.39	1
40	1.65	0.00	1.71	1.71	1
42	1.52	0.02	1.44	1.46	3
43	1.65	0.02	1.68	1.70	5
44	1.65	0.07	1.87	1.94	1
45	1.65	0.01	1.68	1.69	1
47	1.39	0.02	1.33	1.35	3
51	1.60	0.01	1.61	1.62	1
52	3.77	0.99	4.36	5.35	2
53	4.60	0.86	7.49	8.36	3
54	1.60	0.01	1.64	1.65	2
60	1.67	0.08	1.61	1.69	6
61	1.10	0.00	1.10	1.10	5
64	2.98	0.06	3.18	3.24	4
65	4.69	0.11	4.94	5.05	2
66	1.14	0.00	1.22	1.23	8
67	3.15	0.20	4.09	4.29	5
68	2.97	0.11	3.17	3.28	25
69	2.87	0.04	3.55	3.59	5
70	2.14	0.54	2.33	2.87	5
71	1.31	0.07	1.80	1.87	3
72	3.96	0.17	4.99	5.16	10
73	3.77	0.25	4.02	4.27	20
74	3.77	0.33	4.04	4.37	5
75	3.77	0.17	3.99	4.17	2
77	5.70	0.11	5.78	5.89	10
79	3.70	1.57	5.28	6.85	10
					185

rather than fob values. To ascertain the effect on the export countries, one need only deflate the estimated components of TE by the appropriate ad valorem equivalent insurance and freight costs.

Finally, if one is concerned about the validity of the BM conclusion and their estimates of TC and TD, my findings concur with BM in that TC continues to exceed TD by a multiple in excess of one. The contentions of Ahmad and Pomfret that TD should be much larger relative to TC is not supported by this examination of the BM methodology.

REFERENCES

1. Ahmad, Jaleel, "Tokyo Rounds of Trade Negotiations and the Generalized System of Preferences." *Economic Journal,* vol. 88, 1978, 285–295.
2. Baldwin, Robert and Tracy Murray, "MFN Tariff Reductions and Developing Country Trade Benefits Under the GSP." *Economic Journal,* vol. 87, 1977, 30–46.
3. _____, "MFN Tariff Reductions and Developing Country Trade Benefits Under the GSP: A Reply." *Economic Journal,* vol. 96, 1986, 537–539.
4. Clague, Christopher, "Tariff Preferences and Separable Utility." *American Economic Review Papers and Proceedings,* May 1971, 188–194.
5. _____, "The Trade Effects of Tariff Preferences," *Southern Economic Journal,* Vol. 38, 1972, 379–398.
6. MacPhee, Craig R., "The Consistency of Partial Equilibrium Estimates of Trade Creation and Diversion." *Weltwirtschaftliches Archiv,* Vol. 123, 1987, 81–91.
7. Murray, Tracy. *Trade Preferences for Developing Countries.* London: Macmillan Press, 1977.
8. Pomfret, Richard, "A Note on MFN Tariff Reductions and Developing Country Trade Benefits Under the GSP." *Economic Journal,* Vol. 96, 1986a, 534–536.
9. _____, "The Effects of Trade Preferences for Developing Countries." *Southern Economic Journal,* Vol. 53, 1986b, 18–26.
10. Rousslang, Donald and Stephen Parker, "Cross-Price Elasticities of U.S. Import Demand," *Review of Economics and Statistics,* June 1984, 518–523.

FOOTNOTES

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1. A utility function expressing a consumer's preferences over Q and Q_a, i.e. $U(Q, Q_a)$, is weakly separable. See Clague [4; 5].
2. A detailed mathematical derivation of these equations is available from the author.
3. "If we assume that donor consumers simply substitute one for the other and do not change their spending on other goods or saving," p. 33.
4. BM state that their empirical results estimated the benefits received by the beneficiary countries. Thus, their data refer to fob values and, therefore, do not reflect prices actually paid by consumers in the donor country.
5. Since tariffs are assessed on the fob value of a product the percentage change in price to consumers in the donor country must incorporate transportation costs in the base value from which the percentage change is calculated. This is in contrast to the BM methodology where $dp'_b = dt/(1 + t)$
6. Since goods are valued at prices observed by consumers in the donor country, TE^A includes insurance and frieght. If one is interested in the increase in export earnings actually received by the beneficiary exporting countries, TE^A must be adjusted downward to equivalent fob values.
7. In assessing the welfare effects, the traditional concept of trade creation is the value of domestic displacement plus the change in consumption, i.e. $TC = dV^A + dC$.
8. In effect, BM set domestic displacement equal to trade creation, i.e. $dV^{BM} = TC = dV^A + dC$. However, the value of TC reported by BM is biased due to their incorrect use of fob values for M_i as well as the incorrect perccent change in price.
9. Using the model developed by Clague, MacPhee [6] reaches a similar conclusion.
10. Again, this bias ignores both the incorrect percent change in price and fob values versus consumer value data problems of the BM methodology.
11. When taking into account both problems, these fractions equal $1/(1 + t)$.
12. Within the context of my model, the Rousslang-Parker assumption that the income shares spent on the components of the product group are small leads to the Baldwin-Murray assumption, equation 8.1.
13. See Murray [7] for a description of the rules and regulation governing trade under the GSP system.
14. The extent of this overestimation is in agreement with MacPhee's [6] generalization.