On the Shape of the Trade Indifference Curve: Rejoinder to Batra

By Murray C. Kemp and Edward Tower*

Raveendra Batra argues in his reply that our comment on his article is substantially incorrect because "the curvature of the trade indifference curve in the presence of the non-traded good is indeterminate" (p. 252). In this note we demonstrate the correctness of our earlier assertion that, even when there are nontraded goods, the trade indifference curve has the usual curvature.

Let $C=\{c=(c_1, c_2, \dots, c_n)\in R^n_+ \mid U(c)\geq U_0\}$ be the production possibility set, where T denotes the set of input-output combinations let $Y=\{y=(y_1, y_2, \dots, y_n)\in R^n_+ \mid (y, \bar{x})\in T\}$ be the production possibility set, where T denotes the set of input-output combinations that are feasible and $\bar{x}$ denotes the given factor endowments. Both Y and C are assumed to be convex. The set of trades which generate levels of utility not less than U_0 is simply $E=Y-C$, where $E=\{e=(e_1, e_2, \dots, e_n)\in R^n\}$ and the ith good is exported or imported according as e_i is greater than or less than zero. It is well known that any linear combination of two convex sets must also be convex.[1] Thus E also is convex, and the surface which bounds it, a trade indifference surface when all goods are traded, must have the normal curvature.

Now in restricting our attention to the case in which m goods are not traded, so that $c_i=y_i$, $i=n-m+1, \dots, n$, we are considering that linear cross section of E determined by $E\cap\Gamma$, where $\Gamma=\{e=(e_1, e_2, \dots, e_n)\in R^n \mid e_i=0, i=n-m+1, \dots, n\}$. Since Γ is convex (Γ is a linear subspace), $E\cap\Gamma$ must also be convex. Since this is simply the set circumscribed by the trade indifference surface when the last m goods are nontradeables, we have proved that the trade indifference surface for an economy which consumes n goods, m of which are nontradeables ($m<n$), has the normal curvature.

* Research professor of economics, University of New South Wales, and associate professor of economics, Duke University, respectively. We are grateful to Daniel Graham for helpful suggestions.

[1] See, for example, theorem 2.10 of H. Nikaido.

REFERENCES

R. N. Batra, "Nontraded Goods, Factor Market Distortions, and the Gains from Trade: Reply," *Amer. Econ. Rev.*, Mar. 1975, *65*, 251–52.

M. C. Kemp and E. Tower, "Nontraded Goods, Factor Market Distortions, and the Gains from Trade: Comment," *Amer. Econ. Rev.*, Mar. 1975, *65*, 249–50.

H. Nikaido, *Convex Structures and Economic Theory*, New York and London 1968.