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CUSTOMS UNIONS WITH NONTRADED GOODS IN INTERCONNECTED MARKETS: A GEOMETRICAL ANALYSIS

Thomas W. GILLIGAN and Eden S. H. YU

I. INTRODUCTION

Since the publication of the pioneering work on the customs union issues by Viner (1950), numerous articles have appeared to extend and to refine Viner's contributions [Batra, 1973; Gehrels, 1956; Kemp, 1969; Lipsey, 1957; Melvin, 1969; Michaely, 1965; Vanek, 1965 and Yu, 1979]. It is notable that every country produces a large percentage of goods which cannot be traded at all. The existence of these nontraded goods may be attributable to the nature of the goods, like building structures, or to political barriers preventing, for example, the export of certain military equipment, or to artificial trade barriers, e.g. prohibitive tariffs. With a few exceptions, e.g. Yu (1979), the implications of the existence of such nontraded goods for economic integration have been, by and large, untackled.

The purpose of this note is to utilize a simple geometrical framework of international trade to examine the welfare effects of customs unions. The four-quadrant diagrammatic framework was recently developed by Hazari et al. (1980) on the basis of twin assumptions that no consumption of exportables or production of importables takes place in the home country. Such assumptions may have relevance to those underdeveloped countries which are characterized by such a pattern of specialization in consumption and production.

In section II of this paper, the simple model of international trade with nontraded goods will be described graphically. Utilizing such graphical technique, the welfare implications of the conventional trade creation and trade diversion will be examined. Section III offers concluding remarks.

II. ASSUMPTIONS AND THE ANALYSIS

It is assumed, throughout the analysis, that the world, although composed of a finite number of countries, is sufficiently large so that the price of the home country's exported good is exogenously given. Our analysis will focus on a subset of three nations: the home country, the low-cost producer of the importable good, and the high-cost producer of the same importable good. It is assumed that two goods are produced by the home country, one non-traded and the other totally exported. There are two primary factors of production capital and labor. In the home country two goods are consumed, one non-traded and the other totally

imported. Thus, the exported good is not consumed domestically while the imported good is not produced locally.

The social welfare of the home country is represented by a strictly quasi-concave social utility function which depends on the consumptions of the non-traded good and the imported good only. The home country produces its non-traded good and exportable good with the help of two primary inputs. The production functions are subject to constant returns to scale and diminishing returns to factor proportions. Assuming flexible factor prices, both inputs, capital and labor are fully employed. Balance of payments equilibrium requires that the value of exports must equal the value of imports. It is noteworthy that in the present framework, the production possibility set is separable from the consumption possibility set, due to the fact that the commodities that are produced are not the same as the commodities which are consumed.¹

Trade creation is identified with the home country's shift from autarky to trade with the low-cost producer by lowering its tariff against the importable good from a prohibitive level to tolerable level. The welfare effect of trade creation can be depicted in Fig. 1. In quadrant I of Fig. 1, the curve TT' , drawn concave to the origin, is the home country's production possibility curve depicting the maximum possible output mix of the nontraded good, X_1 and the exported good X_2 . In quadrant II, exports are indicated by the horizontal axis X_2 and imports by the vertical axis X_3 . Hence, the terms of trade i.e. the price of the exported good relative to the price of the imported good, P_2/P_3 , are given by the slopes of the lines DD' or EE' . The 45° degree line dissecting quadrant III is used to transfer the amount of imports measured along the vertical axis of quadrant III to the horizontal axis of quadrant III. Thus OE' equals OK and OD' equals OJ . In quadrant IV, the social indifference curves reflecting the aggregate social utility levels are depicted. They are convex to the origin and non-intersecting. Based on the relations in the first three quadrants, it is possible to derive the consumption possibility frontier for the home country in quadrant IV. Although the procedure of derivation is available from Hazari et al. (1980), for ease of illustrating the customs union effects, the procedure of deriving the consumption possibility curve is briefly outlined as follows: If production occurs at point P , which yields OB of X_1 and OD of X_2 . The value of exports OD is equivalent to $OJ (=OD')$ value of imports. The amount OJ of commodity X_3 and DP of commodity X_1 , the two commodities consumed by the home country, determine a point on the consumption possibility curve at C . Applying this technique to all possible production points along the production possibility curve TT' yields the concave-to-the origin consumption possibility frontier, TM . Since the national income from the production side must equal that from the consumption side, the straight lines QP and QC whose slopes represent the price ratios for producers and consumers commence from the same point Q on the X_1 axis.

¹ For detailed discussions and a demonstration of the separation between the consumption possibility set and the production possibility set, see Hazari et al. (1980, Ch. 1).

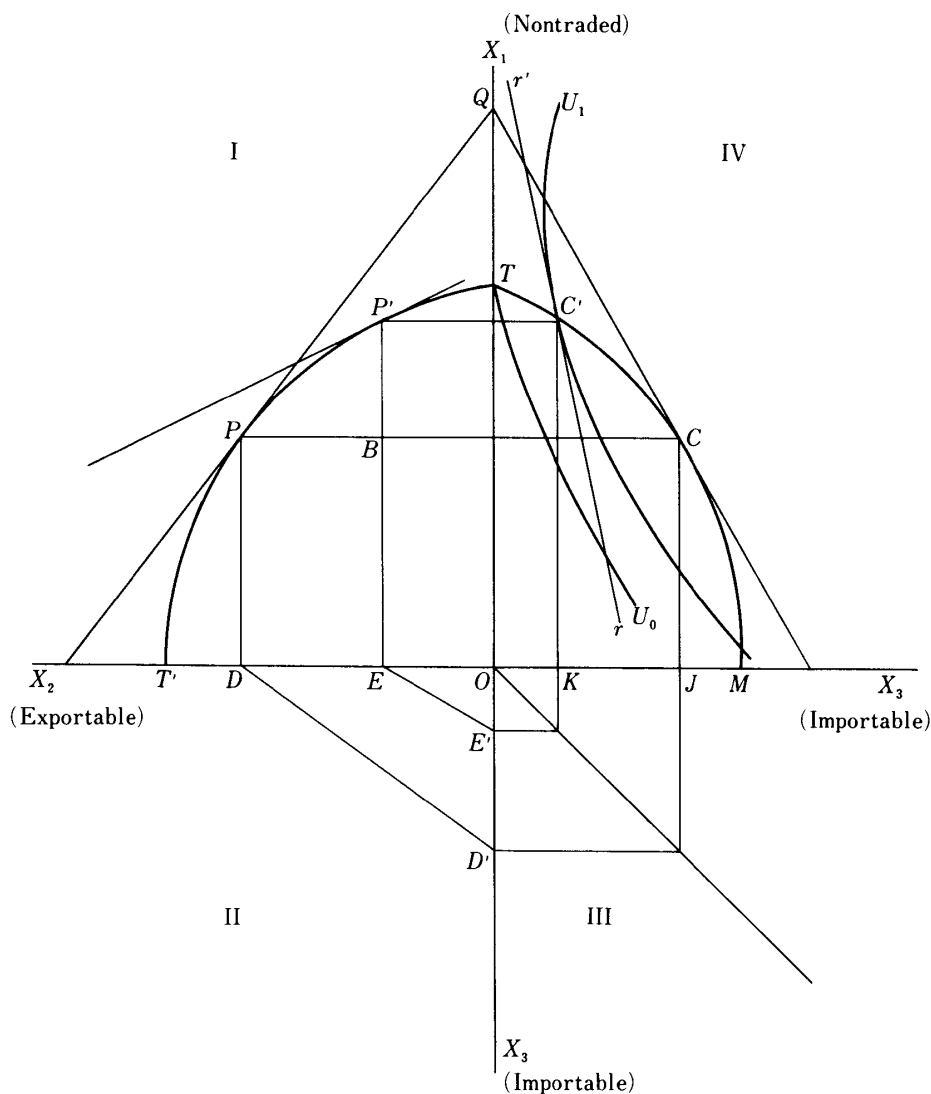


Fig. 1. Welfare Improving Trade Creation.

Initially, the home country is under autarky; it produces and consumes totally the non-traded goods. The consumption equilibrium point is at T , and the level of social welfare is indicated by the social indifference curve U_0 , drawn through point T . After joining a trade creating customs union via a uniform tariff reduction, the home country will trade with the country offering the best terms of trade, i.e. the low-cost producer. In Fig. 1, the terms of trade offered by the low-cost producer of X_3 are given by the line segments DD' or EE' . The corresponding consumption possibility curve is given by TM . Partial tariff reduction under trade creation yields a domestic consumption price ratio as represented by the line rr' .² Consequently, the consumption point shifts from the autarky point T to C' , the intersection

² It should be noted that this domestic price line relevant for consumption is necessarily steeper than the free-trade price line, QC .

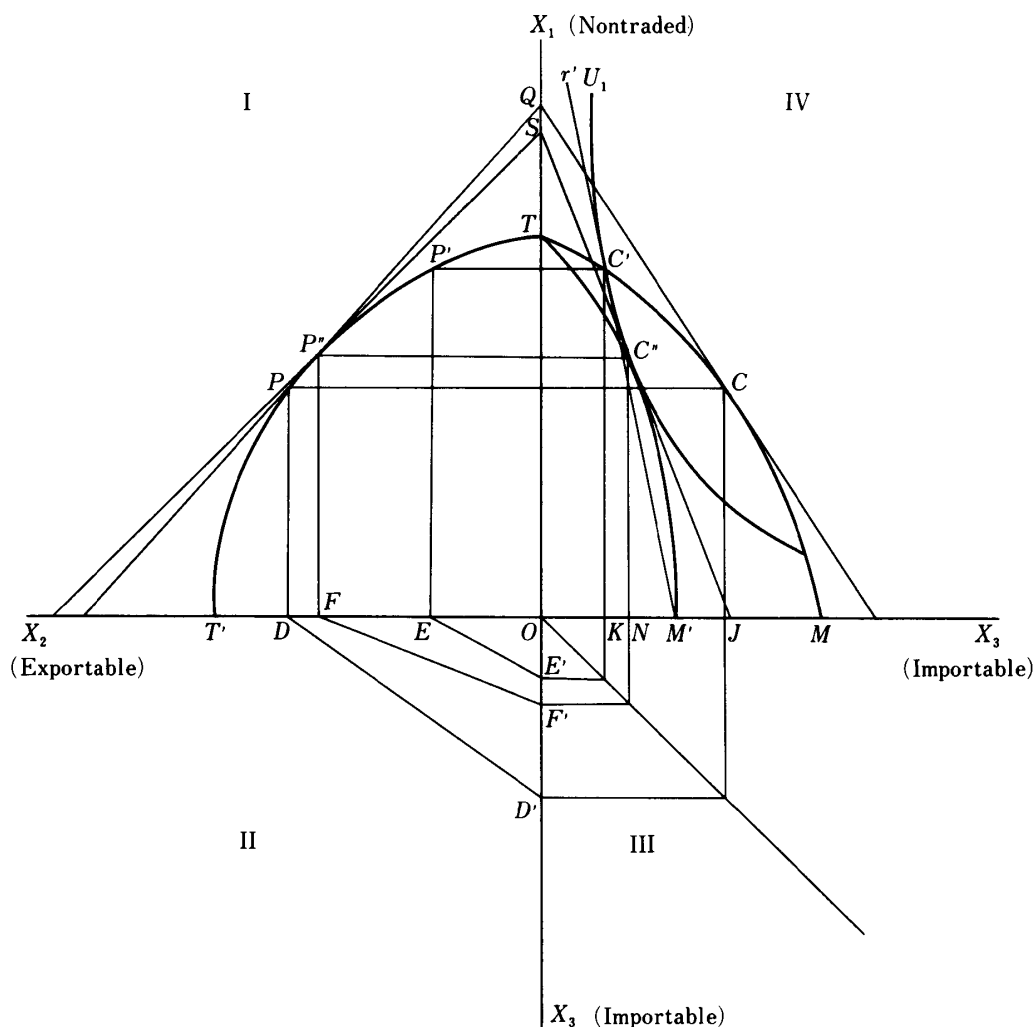


Fig. 2. Welfare Effects of Trade Diversion.

between the consumption possibility curve TM and the domestic price line rr' . Note that C' is on the social indifference curve, U_1 . Regarding the production side of the economy, production in the present framework is dictated by the production price ratio, P_2/P_1 (where P_2 and P_1 denote, respectively, the prices of commodities 1 and 2). However, as consumers begin to substitute the imports for the nontraded good in conjunction with the changing consumption price ratio, the demand for the nontraded good will decrease, its price will decrease, and, consequently, the production price ratio will increase. The production price ratio will continue to rise until the new, equilibrium production level of P' is reached. At this point EP' amount of the nontraded commodity is produced, as well as consumed, and OE of the exportable good is produced and traded for $OK (= OE')$ of the importable good.

Since consumption at point C' under trade creation yields a higher level of social welfare. It follows that trade creation is necessarily welfare improving. The

increase in the home country's social welfare is simply the difference between the social utility levels, $U_1 - U_0$.

The welfare effects of trade diversion are depicted in Fig. 2 which reproduces from Fig. 1 the essential features of the economy under trade creation. Switching from the position of trade creation to trade diversion, the home country now completely abolishes only the tariff imposed against the imported good from the high-cost producer; the tariff against the low-cost producer remains intact, however. The consequent shift in imports from the low-cost producer to high-cost producer amounts to a deterioration in the home country's terms of trade, because the home country must now trade more of its exportable good for equal amounts of imports. It is interesting to note that this deterioration in the terms of trade (from DD' to FF' in quadrant II of Fig. 2) implies a "shrinkage" in the consumption possibility frontier from TM to TM' . Home country's consumption of the nontraded good and the importable good under trade diversion must be restricted to this shrunk-in locus.

Suppose now the home country trades with the high cost producer at the terms of trade represented by FF' so that consumption price ratio is given by SC'' . Note that C'' , like C' , is also on the social indifference curve U_1 .³ On the production side, increasing substitution by consumers of the imported good for the nontraded good results in lower prices of the nontraded goods and, hence, higher production price ratio, P_2/P_1 , where P_i indicates the price of the i th good. Consequently the production point shifts from P' and P'' , where the production price line SP'' is tangential to the production possibility curve. Thus, FP'' amount of the nontraded good and OF of the exported good are now produced, indicating a reduction in the production of the nontraded good and expansion in the production of the exported good.

Since the new consumption point C'' under trade diversion is also on the social indifference curve U_1 , apparently, joining a trade-diverting customs union leaves the home country's welfare unaffected. It follows that with terms of trade better than those given by FF' , the home country's consumption point will be on a higher social utility level as its consumption possibility curve will shift out to a position superior to TM' . Conversely, facing terms of trade worse than those represented by FF' , the social welfare of the home country will suffer as a result of trade diversion. Thus, the well-known proposition that trade diversion may be welfare improving is generalized to the case in which the exported good is not consumed domestically, the imported good is not produced locally and the non-traded good, along with the exported good, is produced locally.

³ Note that the consumption point C'' is at the tangency between the consumption price line SC'' and the new consumption possibility curve TM' . At C'' , NC'' amount of the nontraded good and ON of the imported good are consumed.

III. CONCLUDING REMARKS

We have examined the welfare effects of trade-creating and trade-diverting customs unions when the home country produces a non-traded good. A simple, geometrical framework recently developed by Hazari et al. (1980) was adapted to derive our results. A distinguishing feature of this framework is the separation of the production possibility set and the consumption possibility set, owing to the twin assumptions that no consumption of the exportables or production of importables occurs in the home country. While these assumptions greatly simplify the geometrical analysis, they can be defended by several theoretical concerns. As aptly pointed out by Jones (1974), this simple framework highlights the distinction between tradeables and non-tradeables and facilitates an analysis of market interactions.

Furthermore, the results concerning the effects of devaluation on the balance of trade and the terms of trade from this simple model closely approximate those obtained in the more general case, in which part of the exportables is consumed at home and the importables are partially supplied by local production. The Jones' argument was further strengthened in view of the similarities between our results and the earlier results obtained by Yu (1979), which were derived in a somewhat more general and complicated mathematical model incorporating nontraded goods. By way of summarizing, it is notable that while trade creation in the present framework necessarily improves welfare, trade diversion, however, may not necessarily be welfare decreasing.

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