

Arndt, Sven W.

Working Paper

International sourcing and factor allocation in preference areas

Diskussionsbeiträge - Serie II, No. 325

Provided in Cooperation with:

Department of Economics, University of Konstanz

Suggested Citation: Arndt, Sven W. (1996) : International sourcing and factor allocation in preference areas, Diskussionsbeiträge - Serie II, No. 325, Universität Konstanz, Sonderforschungsbereich 178 - Internationalisierung der Wirtschaft, Konstanz

This Version is available at:

<https://hdl.handle.net/10419/101713>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

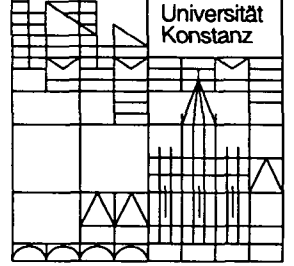
Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Sonderforschungsbereich 178
„Internationalisierung der Wirtschaft“

Diskussionsbeiträge



Juristische
Fakultät

Fakultät für Wirtschafts-
wissenschaften und Statistik

Sven W. Arndt

**International Sourcing and
Factor Allocation in Preference Areas**

W 113 (325)



24. JAN. 1997 Weltwirtschaft
Kiel

W 113 (325) *pmi / g.s. sig ja*

International Sourcing and Factor Allocation in Preference Areas

Sven W. Arndt

728 856

Serie II - Nr. 325

November 1996

A first version of this paper was presented at the Workshop on "International Trade and Factor Movements between Distorted Economies", Konstanz, July 4 - 6, 1996.

I am indebted to Max Corden and to Ron Jones, Sugata Marjit, Albert Schweinberger, and the participants of the Konstanz workshop for valuable comments.

International Sourcing and Factor Allocation in Preference Areas

Sven W. Arndt

The Lowe Institute of Political Economy
Claremont McKenna College

Creation of the North American Free Trade Area (NAFTA) has focused attention on trade in intermediate goods and on offshore sourcing in the context of preferential trade liberalization. Although intermediate goods trade as a general phenomenon has been thoroughly examined¹ in the literature, its role in the trade of preference areas has been relatively minor until the advent of NAFTA.²

Intermediate goods play a key role in the theory of effective protection, the application of which to preferential trade areas (PTAs) suggests that the protective or anti-protective of preferential trade liberalization may depend on the relative roles of intermediate and finished goods covered by the exercise.

This paper combines insights from several strands of the literature in order to ascertain the extent to which the welfare effects of preferential trade liberalization are influenced by the presence of intermediate products. This is done in the specific context of preferential trade liberalization between an advanced, industrialized country like the United States and a developing, industrializing country like Mexico.³

One of the policy "problems" NAFTA was supposed to alleviate was that of the northward migration of unskilled workers. If NAFTA could speed up industrialization and economic growth in Mexico, it might generate enough new

¹ See the literature cited below.

² The U.S.-Canada auto pact and the maquiladora phenomenon are important precursors, even though they involved rather limited preferential trade liberalization.

³ For an application of intermediate goods trade to countries at different stages of development, see Sarkar (1985).

jobs to reduce, and perhaps ultimately eliminate, the flow of Mexican workers to the United States. Such a development was widely believed to be welfare-enhancing from the U.S. perspective. The maquiladora phenomenon had demonstrated the extent to which specialization, not along finished product lines, but in terms of production stages and processes, could exploit the peculiar complementarities of the two countries, create jobs south of the border, and bring welfare gains to both countries.

The critics of NAFTA, on the other hand, saw the issue less in terms of complementarities than of competitive substitution and rivalry. They saw labor migration from Mexico as one type of threat to American workers and globalization as another.

The welfare effect of globalization depends on whether it occurs in a country's exportables or importables industries. This paper focuses on globalization in the importables sector, because it is the less straightforward of the two cases. The issue is examined in the context of preferential trade liberalization between two economically unequal partners. It shows that trade liberalization which leads to offshore sourcing may reduce welfare in the advanced country.

A Model of Globalization

The model combines key features of three literatures: the literature on customs unions and preferential trade liberalization, the literature on the effective rate of protection, and the literature on trade in intermediate products. Trade liberalization here takes place between an advanced country and an economically developing one, a set-up that lends itself particularly well to the globalization of production. There is trade creation and trade diversion. An important feature of trade creation in this setting is the relocation of intermediate goods production between the two partner countries. But, the preferential reduction of tariffs on intermediate goods raises the effective rate of protection on final products and thereby causes trade diversion.

Consider an advanced country, which produces two goods, X and Y . X , the export good, is the capital-intensive good and is assumed to be produced in a

seamless, continuous process that does not lend itself to spatial separation of the constituent manufacturing functions. Offshore sourcing is, by assumption, not an option for producers of the exportable good.⁴

The import good, *Y*, is labor-intensive and is assumed to be produced in two stages, which are separable. Production of good *Y*, therefore, is technologically suited for globalization. Assume for convenience, for example, that the first of the two stages of *Y*-production is the more labor-intensive of the two and that the developing country has overwhelming comparative advantage in it. This assumption has no material implications; reversing the order of factor intensity does not affect the main features of the argument.

Since it is desirable for the starting point of the analysis to match that of traditional customs union theory, we assume that a prohibitive tariff initially prevents *Y*-producers in the advanced country from shifting production of the first phase of their product to the developing country. In other words, *Y* is produced in its entirety in the advanced country, where it competes in the market with substitute products imported from a third country, which is, like the first country, assumed to be relatively highly developed. The developing country is not a viable contender in the world market for the final product, *Y*.

It is assumed further, that prior to formation of the free trade area with the second country, the first country imposes a non-prohibitive tariff on imports of good *Y* from the third country. That tariff will remain unaltered when the free trade area between the first two countries is established.

Creation of the free trade area, therefore, eliminates a prohibitive tariff on imports of the intermediate product from the partner country. This is assumed, for convenience, to be enough to cause production of the good to cease in the first country. Whatever supplies of the intermediate good are needed for production of the final product, *Y*, will be imported from the developing partner country.

The developing country is assumed, again for simplicity, to be unable to compete in the partner and world markets for *Y*. In other words, even with the

⁴ But see Arndt (1996b) for an analysis of that possibility.

non-prohibitive tariff on imports of Y in place in the first country, the third country is still able to outcompete the second country in the first country's market for good Y .

It is assumed, finally, that the third country does not have access to low-cost imports of the intermediate good from the developing country. The need to secure those low-cost supplies from the developing country may be a source of pressures on the third country to draw the second country into its own preferential trade area, but that strategy is not considered here.

The Opportunity Cost Curve

The first thing to ascertain is the extent, if any, to which introduction of global sourcing changes the production possibilities in the first country.⁵ Figure 1 displays three production possibility curves, the innermost of which, curve TT' , is assumed to reflect opportunity costs between exportables and importables prior to formation of the preferential trade area. It is the familiar construction used in traditional customs union theory.

The outermost curve is drawn on the assumption that the country's requirements of the intermediate product are met by imports from the FTA partner and that the resources (labor and capital) released as foreign sourcing takes hold are used in the production of Y . It shows that the resources released by a given reduction in X -output can produce more of Y than before, provided that ample supplies of the intermediate product are available.

This proviso, however, implies that the outermost curve is more a technical than economic relationship in the sense that it does not define the country's consumption opportunities. The problem is that the curve does not take account of the need to pay, with exports of X , for imports of the intermediate product that is

⁵ For related treatments, see Batra and Casas (1973), Hazari, Sgro, and Suh (1981), Ray (1975), Riedel (1976), and Sanyal and Jones (1982). See also Bertrand and Flatters (1971), Ethier (1982), and Schweinberger (1975).

used in the completion of product Y .⁶ There is thus middle curve, located in the space between the two curves described thus far, which is the relevant one in terms of defining the country's consumption possibilities. That curve, like the others, starts in point T on the horizontal axis, because in the absence of technological change, the maximum amount of X which can be produced with the given endowment of labor and capital is unchanged.

Suppose that an amount of X -production equal to the distance X_1T is abandoned and the resources thus released are shifted into Y production. Point Y_1 on the traditional opportunity cost curve (TT') indicates the amount of Y -output that would be forthcoming if all phases of production were carried out at home.

Point Y_2 on the outermost opportunity cost curve represents the quantity of Y -output that would be forthcoming if only the last phase of Y -production were undertaken at home and if no current output were used to pay for imports of the intermediate product. This is clearly a larger amount of Y -output than without offshore sourcing.

But suppose that exports of X are used up in the purchase of the intermediate good from the partner country. Consider for illustrative purposes that an amount X_2Y_2 of exports of X are needed in order to acquire the quantity of the intermediate product that goes into Y_2 units of Y -output. Then, the bundle of goods X and Y that is available for consumption or further trade is given by X_2 rather than Y_2 .

The location of the "net" opportunity cost curve, that is, the value-added opportunity cost curve, between the other two curves depends on the price of the intermediate product in terms of exports of X . The higher the price of the intermediate good, the closer the position of this curve to the traditional opportunity cost curve. When imports of the intermediate good are free or payment is postponed, the value-added curve is coincident with the outermost curve.

It will be coincident with the traditional curve when the cost of importing the intermediate good matches the cost of producing it at home. Curves interior to

⁶ The curve would be relevant for current consumption if imports of the intermediate stage or product were paid for with debt and the burden of that debt were ignored.

curve TT' are of no economic interest because the price of imports of the intermediate product exceeds the cost of domestic production.

It is clear that an important source of welfare gains will reside in the globalization effect represented by the outward movement of the production possibility curve. This is an effect that traditional customs union theory is unable to capture, in view of its focus on trade in finished products.

Before moving the analysis to the effects of trade liberalization, a final characteristic of the two new curves needs to be noted. There will come a point on the outermost curve, such as Y_n , when X -production has shrunk to such low quantities, while imports of the intermediate product have become ever larger, that all of the output of X , namely, X_n , will be needed to pay for imports of the intermediate product. At that point, the country's consumption possibilities are defined by point T'' , that is, even though X -output is still positive, none of it is available for discretionary consumption decisions. Consumers have only the quantity $X_n Y_n (=OT'')$ of Y available for discretionary consumption choices. When that limiting output bundle is reached, it will be impossible to shift further resources from X -production into Y -production, because there will not be enough X to pay for imports of the intermediate good.

The Welfare Effects of Preferential Trade Liberalization

Inasmuch as the traditional customs union literature deals with final products, trade creation and diversion are dependent on shifts in specialization in and consumption of final products. The tariff barriers that are preferentially eliminated are those on final products. The discussion above suggests, that the presence of intermediate goods gives preferential elimination of tariffs an effect that is unknown in the basic model.

There will be trade creation, whether it involves final or intermediate products; if the trade agreement shifts production from the high-cost home country to the lower-cost partner country. There will be trade diversion, if the trade agreement shifts production of good Y from the third country to the partner

country. That possibility is initially excluded by the assumption that the partner country is not a viable supplier of good Y .⁷

This assumption was introduced in order to focus the analysis on the welfare effect of changes in the effective protection afforded the final product, Y , brought about by the elimination of the tariff on imported intermediate goods and the consequent decision to engage in global sourcing.⁸ The implication of partner trade in both the intermediate and the final product is taken up in a later section.

It now remains to determine the effect of the PTA on welfare. So long as the PTA remains small relative to the third country, its formation will not affect the world price between X and Y and so long as the PTA does not alter the tariff on imports of Y from the third country, the domestic price of Y in terms of X will also remain unaffected.

Figure 2 presents two pivotal cases of preferential trade liberalization. In the initial position, the world price between the two final products is P_w ; there is a tariff on imports of good Y from the third country, which leads to a tariff-inclusive domestic relative price of P_d . Given these prices, production occurs at point n and consumption at point m .

Under the stated assumptions, preferential trade liberalization between the first and second countries relocates the first stage of Y -production to the second country and causes the opportunity cost curve of the first country to rotate out. Two such curves are shown in the figure: the lower of the two new curves moves the tangency point between the unchanged domestic relative price of Y in terms of X to the right of the line connecting points n and m , while in the upper curve the tangency point moves to the left of the line.

In the lower case, welfare has increased as a result of offshore sourcing due to preferential trade liberalization, while in the upper case, welfare has declined.⁹

⁷ See Arndt (1996a) for a free trade agreement in which discriminatory liberalization enables the developing country, through the capture of scale economies, to compete with otherwise more efficient third countries in the partner country's market.

⁸ See Corden (1971) on the effective rate of protection and Ray (1975) for an application of the concept.

⁹ This result is similar to one derived by Johnson (1967) for the case of technological change in a protected industry.

In each case, the result is due to two forces. The first, represented by the greater reduced cost of the intermediate input, is welfare-enhancing. The second, which represents the higher effective rate of protection afforded the Y -industry, causes resources to be reallocated inefficiently - away from the X -industry, in which the country has comparative advantage, into the Y -industry, in which it does not. Note that points n_l and n_u in the figure represent allocative realignments that reduce the country's degree of specialization. In the second case, this despecialization effect due to the rise in the effective rate of protection is large enough to produce a net effect that is welfare-reducing.

Whether the net result of globalization due to preferential tariff liberalization is welfare-enhancing or reducing depends on the magnitude of the tariff on imports of Y and on the relationship between the original and the new opportunity cost curve. That relationship is affected by the evolution of the cost of the intermediate good in terms of the export good. If the cost of the intermediate good rises as more of it is demanded, implying a weakening effective protection effect, the new opportunity cost curve will be drawn back faster as it begins to approach the Y -axis and the point of tangency will be more likely to lie to the right of the nm -line. Perverse specialization will be less pronounced.

Final Goods from the Partner Country

The preceding has assumed that the developing partner country is not a viable competitor in the world markets for good Y . Now suppose that the developing country is a higher-cost producer of good Y than the third country, from which all of the first country's imports of Y come before the preference area is established, but that it is a viable producer under preferential protection. Figure 3 illustrates the case for a trade-diverting preference area. The pre-PTA situation is described as before by production at point n and consumption at point m . When allowance is not made for offshore sourcing, establishment of the PTA reduces the domestic price of Y from P_d to P_f , so that the latter lies somewhere between the former and the world price, P_w . The decline in the relative price of Y shifts production to n' and consumption to m' , which lies on a

lower indifference curve in the case of a trade-diverting PTA and thus represents a welfare loss.

Into this standard case of trade-diverting preferential trade liberalization we introduce the assumption that Y -production is separable into its component phases. If the developing country is assumed to be the low-cost producer of the intermediate good, then trade liberalization will induce the first country to source the input from the partner. The production possibility curve shifts out as before, moving the first country away from specialization in good X , as the production point moves up to the northwest on the new production possibility curve (n'').

The overall effect, however, is to make the PTA less trade-diverting than it would have been without offshore sourcing. Globalization appears to have muted the negative welfare effects of a trade-diverting preference area and is capable, under the right circumstances, of converting it into a trade-creating one.

The intuition here is the following. In the standard model, preferential trade liberalization is, *ceteris paribus*, more likely to be trade-diverting on balance, the closer the partner country's price of the import good (Y) is to the pre-PTA, MFN-tariff-inclusive domestic price in the first country. The closer the price line P_f comes to price line P_d , that is, the more likely is the PTA to be trade-diverting on balance.

Offshore sourcing allows the first country to reduce the home costs of producing Y , hence increasing home production of Y and reducing imports of Y from the high-cost partner country. As long as the two partner countries are small relative to each other, the price-ratio P_f will not be affected by these maneuvers. If the first country is large relative to its partner, then these post-PTA adjustments will cause the post-PTA relative price of Y to fall (as cheaper imports of the intermediate good reduce production costs of Y in the first country). The price-line rotates in a clockwise direction, that is, closer to the world price ratio, and that is a movement that reduces the likelihood of net trade diversion.

Concluding Remarks

Traditionally, the analysis of preferential trading arrangements has focused on trade in final goods. Economic interaction in North America, on the other hand, involves significant amounts of trade in intermediate products. The foregoing analysis has considered some aspects of preferential trade liberalization in the presence of intermediate goods.

If preferential trade liberalization shifts production from high-cost domestic to lower-cost partner-country firms, the resulting "trade creation" is one of the sources of welfare gains in the standard model. That continues to hold in the present context.

If the product is an intermediate good, however, then changes in its price also have downstream effects on the cost of production of goods of which it is a part. If the final good is an import-competing good, which is protected from foreign competition by a tariff, then reduction in the cost of inputs that results from preferential elimination of tariffs on imported inputs increases the effective rate of protection afforded the import-competing final product and leads to an increase in its production. This is specialization in the perverse direction.

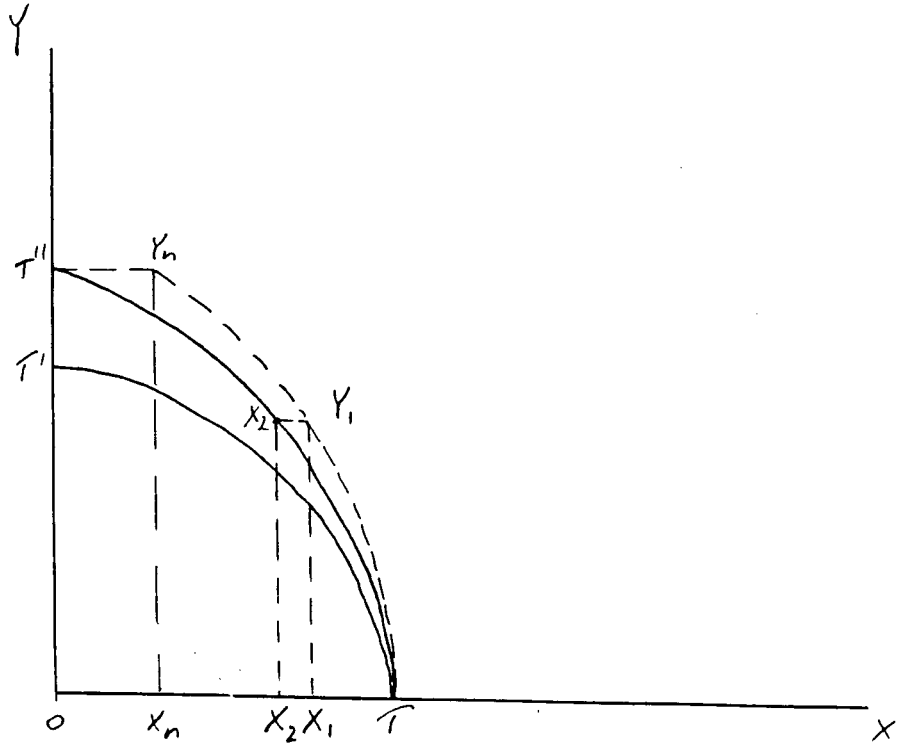


Figure 1

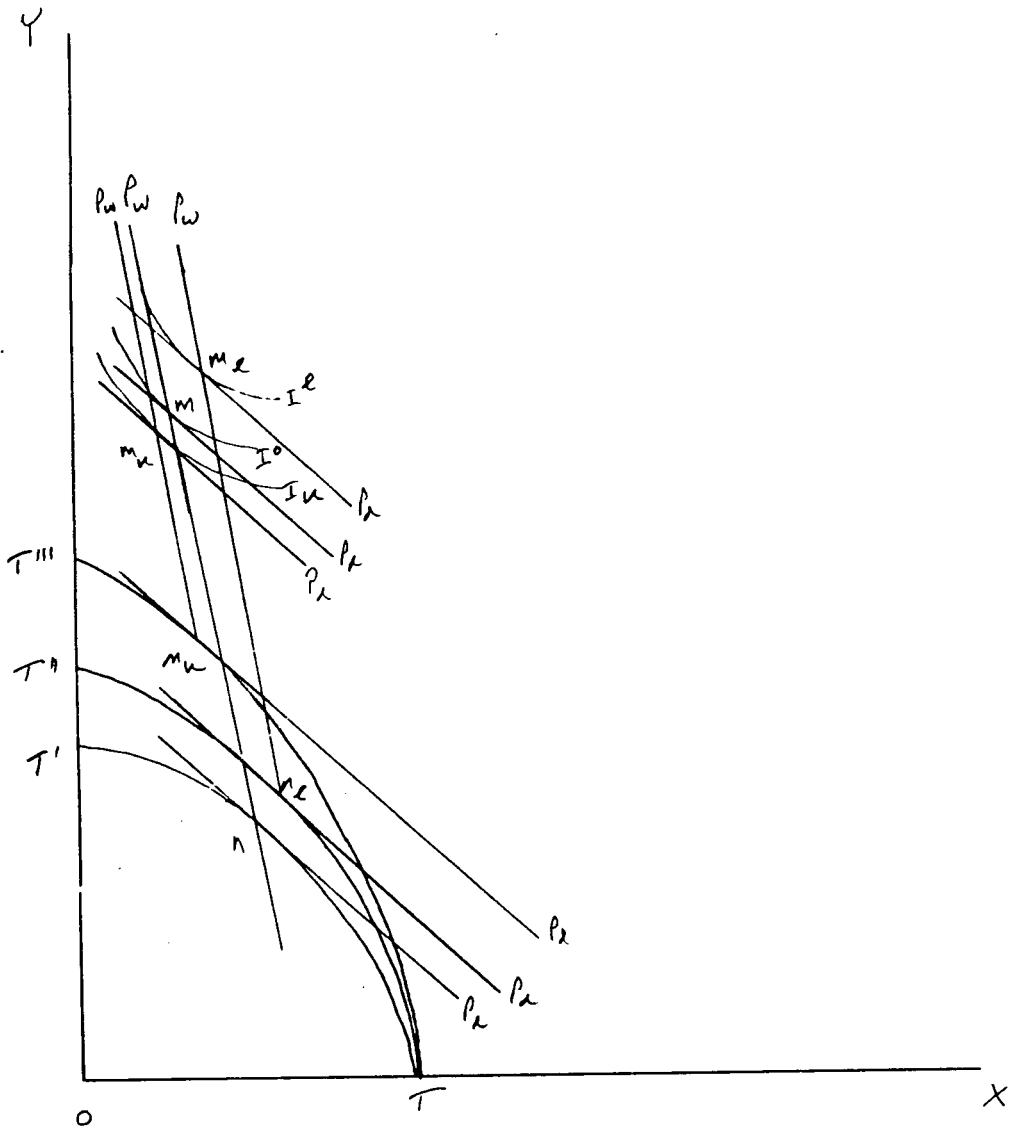


Figure 2

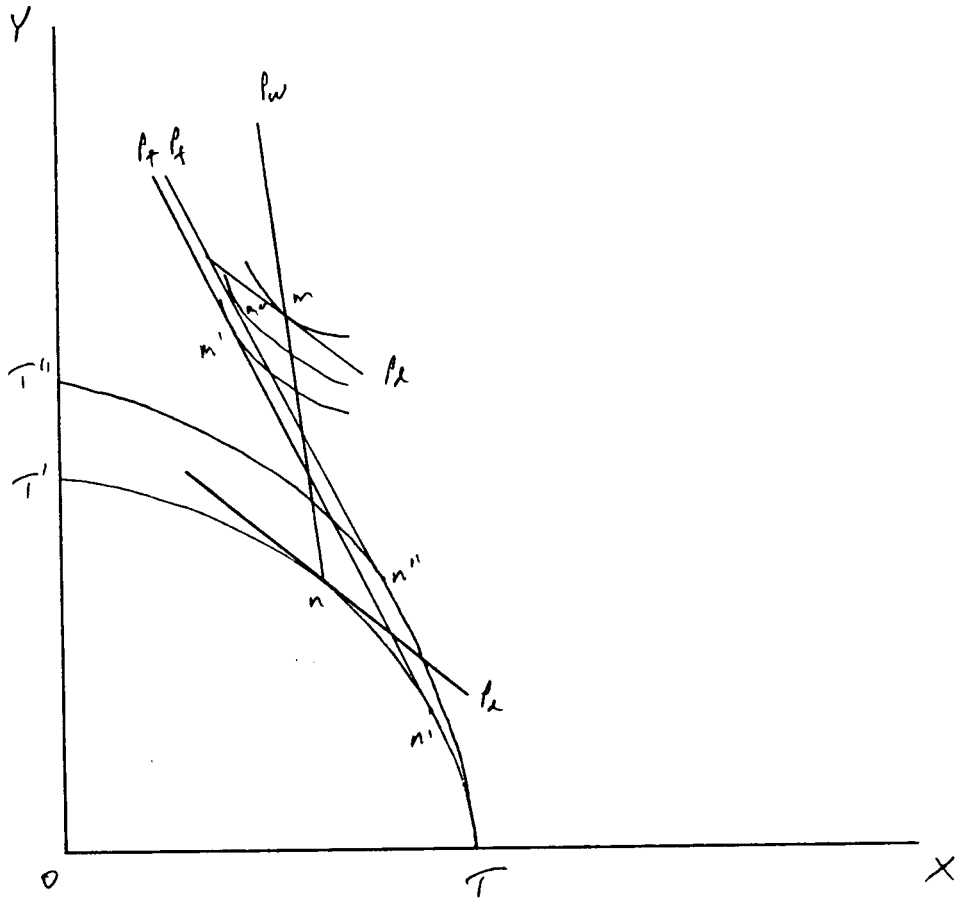


Figure 3

REFERENCES

- Arndt, S.W. (1996a), "North American Trade: An Assessment," *Open Economies Review*, 7 (January).
- Arndt, S.W. (1996b), "Globalization and the Gains from Trade," in K.-J. Koch (ed.), *Festschrift in Honor of Hans-Jürgen Vosgerau* (Konstanz).
- Batra, R.N. and F.R. Casas (1973), "Intermediate Products and the Pure Theory of International Trade: A Neo-Heckscher-Ohlin Framework", *American Economic Review*, 63 (June).
- Bertrand, T.J. and F. Flatters (1971), "Tariffs, Capital Accumulation and Immizerizing Growth," *Journal of International Economics* 1.
- Corden, W. M. (1971), *The Theory of Protection* (Oxford: Clarendon Press).
- Ethier, W. J. (1982), "National and International Returns to Scale in the Modern Theory of International Trade," *American Economic Review*, 72 (June).
- Hazari, B.R., P.M. Sgro, and D.C. Suh (1981), *Non-Traded and Intermediate Goods and the Pure Theory of International Trade* (London: Croom Helm).
- Johnson, H.G. (1967), "The Possibility of Income Losses from Increased Efficiency or Factor Accumulation in the Presence of Tariffs," *Economic Journal*, 77 (March).
- Ray, A. (1975), "Traded and Non-Traded Intermediate Inputs and Some Aspects of the Pure Theory of International Trade," *Quarterly Journal of Economics*, 89 (May).
- Riedel, J. (1976), "Intermediate Products and the Theory of International Trade: A Generalization of the Pure Intermediate Good Case," *American Economic Review*, 66 (June).
- Sanyal, K. and R.W. Jones (1982), "The Theory of Trade in Middle Products," *American Economic Review*, 72 (March).
- Schweinberger, A.G. (1975), "Pure Traded Intermediate Products and the Heckscher-Ohlin Theorem," *American Economic Review*, 65 (September).