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Working Paper

## Customs unions and national budgets

Bank of Finland Discussion Papers, No. 18/1988

**Provided in Cooperation with:**

Bank of Finland, Helsinki

*Suggested Citation:* Haaparanta, Pertti (1988) : Customs unions and national budgets, Bank of Finland Discussion Papers, No. 18/1988, ISBN 951-686-164-4, Bank of Finland, Helsinki, <https://nbn-resolving.de/urn:nbn:fi:bof-201908051328>

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ABSTRACT

It is shown that the Dixit-Norman argument for the creation of an optimal customs union without lump sum transfers presupposes either that there exists a joint fiscal authority in the union or that lump sum transfers between national governments are possible. A necessary and sufficient condition for the establishment of the optimal union is derived. The other contribution of the paper is to extend the Dixit-Norman argument to customs unions with factor mobility i.e. to common markets.

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18/88

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I would like to thank professor Murray Kemp for his comments on an earlier version of this paper.

TIIVISTELMÄ

Raportissa osoitetaan, että Dixit ja Normanin kaavailmassa optimaalisessa tulliliitossa, jossa verojen ja tukien avulla saadaan kaikille kansalaisille hyvinvointin kasvu, tarvittavat budjetit eivät ole välttämättä tasapainossa. Tämän vuoksi tulliliiton avulla on oltava myös yhteinen budjetti tai rahastusjärjestelmä. Raportissa johdetaan myös ne ehdot, joilla täysin desentralisoitu tulliliitto on mahdollinen.

Suomen Pankin tutkimuskeskus  
Helsinki 1988  
ISSN 051-686-144-A  
ISSN 0782-3572



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It is shown that the Dixit-Norman argument for the creation of an optimal customs union without lump sum transfers presupposes either that there exists a joint fiscal authority in the union or that lump sum transfers between national governments are possible. A necessary and sufficient condition for the decentralized implementation of the optimal union is derived. This condition is related to the old discussion of trade creation vs. trade diversion. The other contribution of the paper is to extend the Dixit-Norman argument to customs unions with factor mobility i.e. to common markets.

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TIIVISTELMÄ

Raportissa osoitetaan, että Dixit-Normanin argumentti optimaalisen tulliliiton luomisesta ilman lompasummuksia edellyttää joko yhteisen verotusviraston olemassaolon tai kansallisten hallitusten välillä mahdollisten lompasummien siirron mahdollisuuden. Optimaalisen liiton välttämättömyyden ehto johdetaan vanhaan kaupan luomisen ja kaupan kiertämisen eron perusteella. Artikkelin toinen kontribuutio on laajentaa Dixit-Normanin argumenttiä tulliliiton sijaan tekijäliiton osalta, eli yhteisen markkinan osalta.

Yhteiskuntatieteiden tutkimuskeskus  
Toukokuu 1988  
4-151-152-153-4  
1988

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Dixit and Norman (1980) criticize Myrdal's treatment by arguing that it presupposes an incredible willingness for co-operation between member country governments. They propose an alternative policy. In their model producer prices are equated within member countries. They show how these prices can be chosen to support such levels of production that the total amount of each good produced in the union increases compared to the situation without the union. Then commodity and factor taxes are chosen separately in each country to make the prices facing the consumers the same as before the union. Thus, the amount of goods demanded and factors supplied and the welfare of all consumers remain unchanged. With these taxes the total government revenue (which is used by the government to buy goods) is positive and can be distributed back to consumers.

The problem with the Dixit-Norman argument is that it (implicitly) assumes that there is only one fiscal authority in the union, i.e.

This theorem was actually first discovered by Kemp (1961), p. 175.



## 1. INTRODUCTION

It is well known that the formation of customs unions does not necessarily increase the welfare of the countries forming the union. First Kemp and Wan (1976) and Ohyama (1972)<sup>1</sup> (see also Woodland (1981), ch.11) and later Dixit and Norman (1980) circumvented the problem by showing that one can design the union in such a way that it is Pareto improving. Their point is that the union can, as a whole, gain by removing some of the price differentials existing between the countries within the union and by setting the common external tariff in a proper way. In Ohyama's model all consumer and producer prices are equated within the union. Lump sum transfers between individuals are used to ensure a welfare improvement in all economies of the union.

Dixit and Norman (1980) criticize Ohyama's treatment by arguing that it presupposes an incredible willingness for co-operation between the member country governments. They propose an alternative policy. In their model producer prices are equated within member countries. They show how these prices can be chosen to support such levels of production that the total amount of each good produced in the union increases compared to the situation without the union. Then commodity and factor taxes are chosen separately in each country to make the prices facing the consumers the same as before the union. Thus, the amounts of goods demanded and factors supplied and the welfare of all consumers remain unchanged. With these taxes the total government revenue (which is used by the government to buy goods) is positive and can be distributed back to consumers.

The problem with the Dixit-Norman argument is that it (implicitly) assumes that there is only one fiscal authority in the union, i.e.

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<sup>1</sup>This theorem was actually first discovered by KEMP (1964), p. 176.



that after the union is formed the national fiscal authorities give up their independence to the joint authority. The purpose of this note is to show that if the national authorities are not abolished then, in general, the Dixit-Norman argument requires that lump sum transfers between national authorities are made.<sup>2</sup> A necessary and sufficient condition for a full decentralization is derived and connected to the old discussion of trade creation vs trade diversion. The other purpose of the note is to show that the Dixit-Norman argument can be extended to common markets, i.e. to a customs union where some factors of production are mobile.

<sup>2</sup>The problem of whether lump sum transfers require net transfers also between countries has been treated in GRINOLS (1981). He shows, using results from GRANDMONT and McFADDEN (1972) that there exists transfers which, if evaluated at the world market prices, do not require international transfers.

## 2. GAINS FROM CUSTOMS UNIONS WITH NATIONAL AUTHORITIES

Consider two countries, a and b, which plan to form a customs union. Their joint net imports from the rest of the world before the union are  $m$  at the world market prices  $p$ . Let  $q^i$  be the production in country  $i$ ,  $c^i$  the total consumption,  $p^i$  the consumer prices, and  $w^i$  the factor prices facing the consumers before the union. The union is formed so that it leaves the world market prices unchanged. This is achieved by using commodity and factor taxes to keep all the prices facing the consumers unchanged. Thus, since lump sum transfers are not allowed the individual levels of well-being remain unchanged.

The gains from the union are created by equalizing the producer prices. This is done by observing that if the production possibility sets of individual countries are convex then also the world production possibility set (i.e. the set of total production vectors in the union for which one can find feasible production plans in the individual countries) is convex. It is a non-empty set since  $q^a + q^b$  belongs to it. In general, however,  $q^a + q^b$  does not belong to the efficient frontier of the world production possibility set. Hence, one can find production levels  $q^{i'a}$  and  $q^{i'b}$  such that  $q^{i'a} + q^{i'b} \geq q^a + q^b$  and which can be supported by prices  $p'$ .

Let now the producer prices equal  $p'$ . The gross factor prices are then  $w'$ . Hence, the factor taxes must be set equal to  $(w' - w^i)$  and commodity taxes to  $(p^i - p')$ . The implied tariffs for trade with the rest of the world are  $(p' - p)$ . It is straightforward to show (see Dixit and Norman (1980, ch.6), that with these taxes the total net tax revenue within the union is positive and sufficient to buy the excess supply of  $(q^{i'a} + q^{i'b}) + m - (c^a + c^b)$  of the commodities. The consumers are in this equilibrium at least as well off as they were before the



formation of the customs union.<sup>3</sup>

A problem with this is that this plan may not be feasible for the individual governments, i.e. the national tax revenue may be negative. Thus, for the national authorities to implement the Dixit-Norman plan, there must in some cases be lump sum transfers between authorities. I shall now give a necessary and sufficient condition for the full decentralization.

For definiteness, consider country a. Let  $n$  denote its net imports in the union from country b. Then the government revenue in a is equal to:

$$(1) \quad (p^a - p')c^a + (p' - p)(c^a - n - q^a) + (w^a - w^a)v^a,$$

where  $v^a$  is the aggregate factor supply in a. The following chain of reasoning gives the desired result:

$$(1) = (p^a - p)c^a - (p' - p)q^a + (w^a - w^a)v^a - (p' - p)n = (p^a c^a - w^a v^a) - (p' q^a - w^a v^a) + p(q^a - c^a) - (p' - p)n.$$

The first term in the last expression is equal to zero since, in the absence of lump sum transfers, consumer expenditure must equal the net factor income. The second term equals zero since gross factor incomes must equal the value of production. Hence, a necessary and sufficient condition for the country a authority to implement the Dixit-Norman plan is

<sup>3</sup>The problem how to ensure that a Pareto superior outcome can be realized without lump sum transfers is a complicated question as is shown by the recent exchange of views between KEMP and WAN (1986) and DIXIT and NORMAN (1986). A sufficient condition to ensure a Pareto superior outcome with commodity taxation is the Weymark condition which requires that in the autarky equilibrium there is one commodity (pure or Hicksian composite) for which all consumers are either net demanders or suppliers. Another issue in this debate has been whether lump sum transfers are really impractical. KEMP and WAN (1988) argue that lump sum transfers in fact require data only on aggregate output before and after the policy change.

$$(2) \quad p(q^a - c^a) - (p' - p)n \geq 0.$$

The second term in (2) can be interpreted in terms of the classic distinction between trade creation and trade diversion. It is the loss of tariff revenue in country a due to the customs union. If the customs union leads to trade diversion then  $(p' - p)n > 0$ . This is because then country a would start to import those goods from country b for which the world market prices are low, i.e. large positive values in the vector  $n$  tend to occur together with large positive values in the vector  $(p' - p)$ . Hence, the ability of national governments to ensure a welfare improvement is hampered with severe trade diversion.

The trade diversion effect is a pure transfer effect between countries. This is since country b gains  $(p' - p)n$  in tariff revenue.

The first term in (2) can be interpreted as a creation or diversion of comparative advantage. From the definition of  $p'$  we know that the aggregate income of the economy increases in the union when measured at the producer prices. This does not, however, necessarily imply an increase in income when measured at the world market prices  $p$ . Income decreases if the union makes country a specialize in the production of goods for which its comparative advantage in world markets is smaller than was the case without the union. We know that without the union  $p(q^a - c^a) = 0$ . Hence, since with a strong diversion of comparative advantage  $p q^a < p q^a$ , the government may run a deficit.

The implementation of a Pareto improvement through national governments when no lump sum transfers between them are allowed is thus impossible if one of the countries is subject to both diversion of trade and diversion of comparative advantage. Neither of the diversion effects is alone sufficient to prevent the decentralization. The effect from the creation of comparative advantage may dominate the trade diversion effect and vice versa.

One of the countries is always subject to the trade diversion effect and the other to the trade creation effect. It is absent only



if  $(p'-p)n = 0$ . In contrast, the comparative advantage effect is always positive for one of the countries and it may be positive for both of them. Hence, the decentralized implementation of an optimal customs union is most likely to succeed when the union allows all the countries to utilize their comparative advantage.

### 3. OPTIMAL COMMON MARKETS

Common markets differ from customs unions in that some or all the factors of production are internationally mobile at least within the union. In a recent paper Wooton (1987) has studied the impacts of increasing factor mobility within a customs union. Since a customs union has imposed external tariffs all the ambiguities of the second best theory are present. Wooton shows, however, that if the customs union has set the common external tariff optimally (in the sense of maximizing the sum of utilities of the representative individuals within the union) then increasing factor mobility improves welfare.

The starting point here is to consider the formation of a customs union when some of the factors are already mobile internationally. This seems to be a relevant topic now as the EC plans to remove the remaining trade barriers (mostly non-tariff barriers) from the trade between member countries as some of the factors of production are already fairly mobile within EC.

Let  $v^i = (x^i, z^i)$  be the country  $i$  endowment of factors with  $x$  denoting the immobile factors and  $z$  denoting the mobile factors. Let  $u$  and  $y$  denote their respective (after tax) returns (obviously  $y^a = y^b = y$ ). Consider the case where the factor is mobile only between  $a$  and  $b$  and let  $z^*$  be the net transfer of  $z$  from  $a$  to  $b$ . To construct the optimal union fix the migration of  $z$  at its pre-union level  $z^*$ . Then, since the production possibility sets  $(q, x, z)$  are convex in each country, the sets

$$\{q^a, x^a, z^a - z^*\}, \{(q^b, x^b, z^b + z^*)\}$$

are also convex for the fixed  $z^*$ . Then, the world production possibility set (defined above) is also convex and, hence, we can find a point  $q'$  on its efficient frontier such that  $q' = q'^a + q'^b \geq q^a + q^b$ . We can now proceed using the Dixit-Norman argument. We must only be careful to notice that at the producer prices  $p'$  the implied factor



returns  $y^i$  may differ between countries. Hence, they must be taxed to make their after tax returns equal to  $y^a=y^b$ . It is worth noticing that the tax treatment of the mobile factors should, in general, differ between countries.

One way to increase the benefits from the union further would be to choose optimally also the factor mobility. This can be done by defining the world production possibility set to be the collection of pairs  $(q,z)$  such that the implied individual country production plans  $(q^a, x^a, z^a-z), (q^b, x^b, z^b+z)$

are feasible. The world production possibility set is again convex since the production sets in each country are convex. Hence, there exists a price vector  $(p', y')$  which supports a point  $(q', z')$  on the efficient frontier of the world production possibility set. This point  $(q', z')$  can be chosen in such a way that it gives a larger production of each good within the union than prevailed before.  $(p', y')$  maximizes (by definition) the incomes  $pq'^a + yz'$  and  $pq'^b - yz'$ . By setting the tax on the mobile factors equal to  $(y'-y)$  the union with joint fiscal authority can improve the welfare of the members of the union.

This result generalizes Wooton's analysis in two ways. First, it shows how one can choose the factor mobility optimally along with the optimal choice of common external tariffs. Secondly, it shows how the benefits from common markets can be materialized through other means than lump sum transfers between individuals.

The preceding analysis has ignored at least one problem. As was initially pointed out by Mundell (1957), allowing some factors to move internationally may lead to an equalization of producer prices. In Mundell's extreme case, trade is incompatible with factor mobility (even with the mobility of only one factor) if countries have imposed tariffs. Factors move to such an extent that trade ceases and the autarky prices in all countries are equalized. If this happens then, of course, customs unions would not give any benefits by the Dixit-Norman-plan. In this case factor mobility would equalize producer prices and, hence, the total production would be on the efficient frontier of the world production possibility set even without the customs union.

#### 4. CONCLUDING COMMENTS

This paper has shown that optimal customs unions or common markets cannot, in general, be implemented by national governments. Implementation is possible only if lump sum transfers between national authorities are possible. The reason for the failure is explained through two mechanisms: the tax revenues of the governments may be reduced if a) the customs union leads to trade diversion or b) the customs union leads to diversion of comparative advantage. One country is always hit by trade diversion and one by trade creation but it is possible for all countries to gain by the creation of comparative advantage. Hence, it may be possible to implement the customs union in a decentralized way.

The point made is of interest because the classic discussion about trade creation vs. trade diversion has been regarded as irrelevant for the formation of customs union. E.g. Dixit and Norman (1980) argue that the optimal customs union can get rid of the problem. Also they argue that the optimal customs union can be implemented without lump sum transfers within the union through commodity and factor taxes and, hence, would seem to get rid of the necessity of co-operation between countries. It is shown here that even their argument presupposes quite a high degree of co-operation between the countries in the union.

The other contribution of the paper is to show that the Dixit-Norman tax plan extends also to the case where some factors are internationally mobile.



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