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A GENERAL EQUILIBRIUM MODEL OF CUSTOMS UNIONS AMONG ISLAMIC COUNTRIES

BY

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ABSTRACT

This is an age of country-groupings and trade is considered as an important instrument of economic integration among countries. Interdependence among nations in the present day world makes economic cooperation mutually beneficial to the members of an alliance.

The unifying force of Islam among the Muslim countries as evidenced by the world-wide gathering of the Muslim Brethren has no parallel in the world history. It was Francis Bacon who stated that "the four pillars of government are Religion, Justice, Counsel and Treasure". If religion is a pillar of government then by logical extension, it can play a role in the formation of trading bloc and it is this philosophy that has led several OIC governments to work on this common factor.

The Organisation of Islamic Conference (OIC) is both a vision and a strategy. In the changing economic and geopolitical global scenario, Organisation of Islamic Conference promises improved economic and political prospects to the countries of the Organisation.

The OIC member countries are all developing countries and their deals in world trade are far from being fair. For instance, in the case of Pakistan the bulk of its exports go to the advanced countries. Pakistan's major export item, that is cotton and its allied products have to suffer from quota restrictions. Moreover, there is a deterioration in the terms of trade resulting in a deficit in the balance of payments. Iran is the largest producer of crude oil in our nine country model. This factor alone should enable it to earn enough in international markets to propell it into the bracket of high income countries. But this is not so. One of the major reasons is that, politically, Iran is not looked upon favourably by the economically advanced countries. With active cooperation within the OIC, it can build further refining capacity for its crude products and also benefit through transit trade from the member countries.

Iran also imports a large number of consumer products including low technology manufactured products. Within the OIC both Pakistan and Turkey have a fairly developed consumer goods industry and in Turkey high technology manufactured products are being produced. In return, both Pakistan and Turkey who have huge oil import bills can buy Irani oil and also work towards developing joint oil refining capability so that with greater value addition, greater revenues can be earned.

In this study an effort has been made to present a general equilibrium model in which the theory of prices is consistently worked out.

Chapter I states the problem and objectives of the dissertation. The problem is that the existing trade among the Muslim countries is very low compared with their trade with non-muslim countries. The solution suggested is a freer trade among these countries. The tool selected is a Customs Union of Islamic countries. Hence the objective and aim is to explore the pros and cons of establishment of a Customs Union of Islamic countries.

As our dissertation deals with empirical ex-ante estimation of benefits of a customs union, we have given a critical survey of ex-ante studies made from time to time in Chapter II. As very few empirical studies have been done on the customs union of Islamic countries, We have concentrated on the studies made before the establishment of European Economic Commnity. We start our survey with the pioneering study by the Dutch economist Verdoorn and move forward historically. Then comes another Dutch economist Janssen whose work is responsible for our dissertation. Then there is the American economist who has chosen a different analysis which has not been adopted in further studies. Then comes Harry Johnson who has made various contributions in International trade especially in Customs uniion theory. The contribution of GATT in reducing multilateral tariffs resulted in various Rounds. This initiated various studies of which the first is by Balassa and Kreinin and another by Baldwin.Finally, we trace various General Equilibrium Models concerned with International Trade. Although they are not directly

concerned with Customs Union but they are numerical models for tariff reductions. The empirical Studies on Islamic coutries are few and are also touched upon.

Chapter III gives Islamic views on economic integration and a brief account of the efforts for economic integration among muslim countries. In Islam, people are divided into two different classes for the purpose of collecting taxes. There is a world of Muslims called Dar-ul-Islam and the world of foes called Dar-ul-
Harb. So the sources of revenue fall into two categories: a) the taxes imposed on Muslims called Zakat(Sadakat). b) the taxes imposed on non-Muslims called Jizya, Kharaj and a tax on non-Muslim traders called import duty or tariffs called 'Ushur'. However, Ushur is allowed only in retaliation.

Chapter III also discusses integration movements among the muslim countries. The poor record of integration groupings and the evasive tactics of many governments regarding a real liberalisation of inter-group trade are in contrast with the economic rationale for the formation of a customs union. It is agreed that the national markets for most Islamic countries are too small for the establishment of plants of optimum size and for the realisation of economies of scale. Hence the enlargement of the markets and their protection is seen as a pre-requisite for a more rapid industrial development. That is the reason for suggesting a customs union of all the OIC member countries.

In order to explain the nature and model of a customs union, a critical survey of the theoretical literature is given in chapter IV. It describes the theory behind the costs and benefits of a customs union. This theoretical foundation is laid for the subsequent General Equilibrium Model to be used in the study.The theory starts with the work of Viner and progresses historically. The concepts of trade creation and trade diversion are explained by taking an example of a customs union of Pakistan, Iran and Turkey. Consumption effects of a trade union were given by Meade and are explained by a diagram. The traditional partial

equilibrium analysis given by Harry Johnson is explained in Figure 2. Various other refinements in the customs union theory is explained with the help of graphs. Figure 3 and 4 shows a general equilibrium analysis concluding that in certain situations trade diversion may not lead to a fall in welfare. Similarly, Figure 5 shows that relaxation of the assumption of constant costs in the home country can bring welfare gain even under trade diversion. Figure 6, 7 and 8 shows that there are other reasons for existence of a trade union beyond the concept of trade creation.Figure 9 shows the dynamic factors as the reasons for the creation of a customs union. These effects deal with the concept of economies of scale. The theoretical background proves that are a large number of reasons that result in welfare gain from a customs union. Our computable General Equilibrium model starts with the assumptions of the model and the equations are shown in matrix form to save the space.All the three phases of the model are clearly laid out separately.

For the estimation of the model we have to chose a group of the muslim countries.It is possible to formulate some plausible hypothesis on characteristic features of types or groups of countries which will probably either gain or lose from the integration.A group of countries like Benin, Burkina Faso, Chad, comoros, Djibouti, Gambia, Ginnea Bisao, Maldives, Mali, Mauritania, Sierra Leone and PDR Yemen have a GDP of U.S. $1200m. or less and a per capita income of U.S. $ 1000 or less, It is not very likely that these small countries which have developed manufacturing industries could stand successfully in an intra-union competetion. A system of compensation will have to be developed to help such countries.

A second group of countries are the oil-rich countries consisting of Bahrain, Brunei, Kuwait, Qatar, Saudi Arabia, United Arab Emirates, Oman and Libya with a per capita income of US$ 6000 or more. The countries of this group have large financial means at their disposal which allow them to give strong fiscal incentives, subsidies

and other governmental support to their industries. Intra-group trade liberalisation, thus, may be to their advantage.

The majority of the Islamic countries, however, are neither very small nor oil-rich. For an assessment of the potential impact of trade liberalisation, more information about their production structure and trade orientation is required. Thus our model includes only these countries.

An intra-group trade liberalisation is more likely to benefit such a country.

1) the more the manufacturing industry contributes to GNP.
2) the more the manufacturing industry is outward oriented.
3) the more the manufactured exports are suitable to meet the import demand of the integrating countries.

Here it is sufficient to show that it is highly probable that the establishment of a free trade area or customs union would lead to a very uneven distribution of the costs and benefits among different countries of OIC. So it becomes necessary to look after the interests of those countries which are in a danger of losing manufacturing industrial capacity.

Chapter V contains estimation of the model. Our model is comparative static and analyses the transition from the original state of equilibrium to the new state of equilibrium in three phases., namely the consequences of the abolition of all import duties, the consequences of imposing the external tariff, and finally the restoration of equilibrium by adjustments in the terms of trade. With the help of this model, which implies equilibrium in the balance of payments and full employment in the initial and

final situations, we calculated the changes in production and expenditure, and hence the changes in imports and exports in nine countries producing and consuming nine commodities.

Table IV of the chapter shows changes in the production of nine commodities due to the abolition of customs duties among the nine member countries of the customs union. Due to a fall in the prices of imports, there results a net fall in the output of these goods in the member countries. Table V shows changes in expenditures on these goods due to a fall in prices as well as in income. There results a fall in demand for these goods due to a fall in customs revenue. Table VI shows the result of imposition of common external tariff. The effects on the production of nine commodities in the nine countries are positive as there is a rise in the prices of imported commodities from the rest of the world. However, there is no effect on the supply of the specified export good as it is not imported in that country. Hence we find a zero in the main diagonal of this table. Other zeroes in the table indicate that the country is not producing this commodity. Table VII shows the effects on the demand for the nine commodities due to imposition of the common external tariff. There are two opposite effects on demand. As the revenue from tariffs on imports from the rest of the world increases, the demand for imports increases. On the other hand, common external tariff increases the price of imports from the rest of the world, there is a fall in the demand for imports from the rest of the world. The demand for the exported good increases within the customs union due to increase in income from customs revenue. The last column shows that the majority of goods show a fall in demand as price effect is stronger than the income effect. Table IX shows the final results our customs union. They are arrived at by adding together the results of the three phases.

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Any error still remaining in the transcript is the sole responsibility of the author.

CHAPTER 1

INTRODUCTION

THE PROBLEM AND OBJECTIVES

The Charter of the Organisation of Islamic Conference (OIC) reiterates that one of the fundamental principles of the Organisation is cooperation for a community-wide economic progress.[1] In order that each and every individual member state develops its productive capacity at an accelerated pace, an ever increasing pace of such cooperation is generally agreed to be indispensable. It has also been emphasized in the OIC Charter that an integrated economic development is one of the pre-requisites for the unity of the Islamic countries in general.

To achieve this end, member states should establish clear modes and mechanisms of coordinated and cooperative economic actin to accelerate a unified movement towards a high level of economic welfare for the islamic community as a whole. It might be helpful to start from trade as an example as well as a core issue. It is striking but probably not surprising to observe that trade among Muslim countries constitutes a small portion of total foreign trade of muslim countries. The table given in Appendix 1-A shows that only 6 Muslim countries export more than half of their goods to the markets of other Muslim countries. One half of the Muslim countries export and about one third of them import less than 10 % within the Muslim world. This situation can, however, be changed if Muslim countries establish some kind of regional trading bloc as envisioned in the OIC Charter. What could be the implications of such a bloc if it is actually established is a question which has always attracted the attention of the academicians and policy-makers alike. However, despite keen interest in this subject, not many

efforts have been made to understand the effect of different forms of economic integration among Muslim countries on their economies.

Most of available literature is general and descriptive in nature, studying either the structure of trade among Muslim countries or describing merely the probable advantages of economic cooperation among them. Only a few empirical studies have been done using rigorous tools of analysis. They are also limited in their scope and coverage of countries. Dr. A.R.Bhuyan, for example, has developed a model to study the implications of a customs union in South Asia which includes some members of OIC. Dr.Ramzan Akhtar has extended this model to four muslim countries, namely, Pakistan, Bangladesh, Iran and Saudi Arabia. This is a sophisticated study which used econometric tools to estimate foreign trade price elasticities.

The main reason for this study is to fill gap in the literature in ex-ante studies on customs union. It is strange that no ex-ante study was done after the establishment of European Common Market, the latest being done by Janssen in 1961. He estimated the prospective effects of establishing a customs union in Europe. I have picked up from Janssen and tried to estimate the prospective effects of establishing a customs union among muslim countries.

The aim of this study is to analyse the implications of a Customs Union among OIC members. There are different forms of Economic Integration such as Free Trade Area, Customs Union, Common Market, Economic Union and Monetary Union, etc. A Customs Union is preferred over other forms of integration organisations as a Customs Union has a properly developed theory and has been proved successful in practice in the case of European Community.

We have chosen a General Equilibrium framework as we are concerned with more than one countries and commodities. A partial equilibrium analysis will not do due to interdependence of supply and demand forces.

BACKGROUND TO THE LITERATURE

Following the lead provided by Jacob Viner, several contributions to the theory of customs unions have suggested that the desirability of a union be evaluated with reference to:

a) Trade creation; and
b) Trade diversion effects.

At the same time, a number of criteria have been put forward for appraising the chances of trade creation and trade diversion of a customs union. It is generally agreed that on a priori basis, a judgement regarding the net effects of a customs union on trade flows cannot be made. This circumstance lends special interest to empirical studies of trade creation and trade diversion in a customs union. Such investigation can be of an ex-ante or an ex-post nature.

Our interest here is in ex-ante measures only. Among these estimates, Verdoorn, Janssen and Krause should be specially mentioned. Janssen used a general equilibrium model and studied the effects of changing one variable namely eliminating internal tariffs among the member countries on trade flows and terms of trade.

Studies by these economists, however, have been subjected to criticism on theoretical as well as on empirical grounds. It has been observed that their model underestimated prospective trade creation.

Ex-ante methods of evaluating the possible effects of integration on trade flows involve the use of price elasticities. It directly estimates the effects of tariff reduction and of consequent price changes on the domestic demand for intra-area imports. Our model measuring the trade effects will be developed along the lines suggested by Janssen. We will improve upon the model and estimate it with the help of a computer software.

ORGANISATION

The remaining part of the study is organised as below:

Chapter II gives a critical survey of the literature.

Chapter III gives a brief account of the efforts for economic integration among Muslim countries.

Chapter IV traces the theory of customs union in a historical perspective and presents the mathematical model to be used in the study.

Chapter V contains estimation of the model.

Chapter VI provides summary of the main findings and conclusions.

CHAPTER II

SURVEY OF THE LITERATURE

The previous chapter suggests that the desirability of a union be evaluated with reference to its trade-diversion and trade-creating effects. However, a priori judgement regarding the net effects of customs union on trade flows cannot be made. This lends special interest to empirical studies of trade creation and trade diversion in a customs union. Such investigations can be made either on ex-ante or an ex-post basis: one may attempt to evaluate the possible repercussions in advance or after the union has been established.

Prior to the establishment of a regional grouping, one can assess its future impact by applying price elasticities, obtained from other sources, to the projected changes in tariff rates and the degree of discrimination against out- siders. Various assumptions can be made concerning the effects of tariff changes on export prices of the supplying country, yielding different variants of the ex-ante estimates.

As the purpose of this study is to present ex-ante estimates of annual trade creation and trade diversion in a customs union, we will review only the ex-ante studies. As no such studies have been conducted on Muslim countries, our emphasis is on the studies conducted on European Economic Community.

VERDOORN (1952)

The Dutch economist Verdoorn was the first to estimate the effects on the pattern of an expected Customs Union among the six Schuman Plan Countries, the three Scandinavian countries and the Britain. He assumed that costs are constant in all the export industries of every country and assumed an elasticity of substitution between import and domestic production of -1/2 and an elasticity of substitution between exports of different countries to be equal to -2.

The analysis is based on the 1951 trade matrix of the Western European Countries and concerned with the changes in the trade matrix that Customs Union would bring about. He showed that with unchanged exchange rates, intra-european trade would increase by $ 1, 000m. or 19% and imports from rest of the world would fall by $ 600 m. or 6%. So there would be a net trade creation.

We can now proceed to evaluate the gains and losses that would result from these changes. First of all, the $750 million increase in intra-union trade is the result of increased specialization, the gains from which may be estimated on the basis of Verdoorn's change matrix as being equal to $ 68.8 m.illion.

The loss in the union's trade with the outside world shows a reduction in specialisation, giving rise to a loss of welfare which may be estimated on the basis of the change matrix as equal to $68 m. This loss is shared by member and non-member countries and it is reasonable

to assume that each group loses owing to the reduction of its imports. On this basis, all the loss is borne by the outside world and the member countries make a slight gain owing to a redistribution of their reduced overseas imports from low to high duty countries. So far, then, their is no change from the world's point of view whereas the member countries make a gain to the detriment of the outside world of about $74 m. Members of the union, however, gain also from the improvement of their terms of trade. The appreciation of their currencies enable them to obtain a volume of imports diminished by only $146 m. for $611 m. less exports than before, while each country's balance of payments remains unchanged. The balance, $ 465 m. may be regarded as the gain due to the improvement in their terms of trade. The union's total benefit, therefore, from the establishment of the union is $ 540 m. and this is fully matched by the loss of the outside world.

Scitovsky(1958) concludes: "The most striking feature of these estimates is their smallness. The one that is really important, the gain from increased specialisation, estimated at $ 68 m. in 1951 is less than 1/20th of 1% of the G.D.P. of the countries involved. This is ridiculously small and raises the question whether Verdoorn's estimates are realistic and the use we make of them legitimate."

In view of the enormous complexity of an economic system and the fact that so many factors are simultaneously operative in the creation of a customs union, it must be admitted that

Verdoorn 's model is relatively simple and that it takes no account of the factors essential to the operation of the mechanism. These are:

a) Absence of supply factors.

Verdoorn's model deals only with demand and has ignored the factors governing supply. He assumes that supply adjusts itself to demand and that changes in supply have no effect on prices. He bases this on the ground that the resultant change in demand are in fact so slight that the supply can easily adjust itself to them.

b) Partial model

Verdoorn's model is a partial equilibrium model which is confined to changes in imports and exports and provides no guarantee that these changes will be consistent with changes in supply and demand in the home market. Like the supply factors, the demand factors on the home market are also left by Verdoorn completely in the dark. The structure of demand and the existing elasticity on the home market is ignored. In particular, he also disregards the effects of tariff changes on income although these can also have a considerable influence on changes in imports and exports.

JANSSEN (1961)

Another Dutch economist Janssen measured welfare effects of a Customs Union in a General Equilibrium framework. Most of his book is concerned with exposition of the basic

theory underlying the estimates. Janssen first explains the theory of free trade, then explains the effects of tariffs on international trade. He then introduces a three country model of customs union and at the end estimates the possible effects for the establishment of EEC.

This exposition reveals almost no acquaintance with the non-Dutch literature on tariffs and customs union theory at that time. His analysis made the welfare effects dependent upon the levels of the initial partner country tariff and the common external tariff. This characteristic of his analysis resulted in a questionable conclusion that the high tariff country was inevitably worse off in a customs union and the insistence that outsiders do not necessarily lose from the union while the partner might lose if the union tariff is low enough.

The most serious error, however, is the author's repeated assertion that he has proved that the elasticity of demand for imports must be at least unity. No such proof is presented and none is possible. The author seems to have confused himself into believing that the elasticity of substitution must be at least equal to the income elasticity of demand (which necessarily averages unity).

KRAUSE(1963)

Krause used an entirely different technique to assess the prospective effects of the formation of E.E.C. His analysis rests on a comparison of the protectiveness of CET with that of the national tariff that it replaced. The common external tariff was calculated by taking an unweighted average of the French, German, Italian and Benelux tariffs.

Krause argued that the protectiveness of CET cannot be determined by merely comparing the resulting increases and decreases in national tariffs required to reach the calculated level. For a producer within the community who was previously protected by a high tariff, the most serious challenge will come from low cost producers within the community. The essence of economic integration depends on this kind of competetion taking place. Thus prices of the dominant low cost producer in the community will set the competetive level for the entire market. The CET will be protective only to the extent that it protects the firms that can survive the internal competetive struggle.

Krause analysed the protectiveness of the external tariff by estimating the amount of protection it provides to the dominant low cost suppliers within the EEC. The dominant suppliers were identified by looking at the trade flows among the member countries before the establishment of community. It was assumed that the dominant suppliers of a particular product class were to be found in the country which had the largest share of intra-community trade in that product class. One can compare the level of the external tariff for each commodity class with the former national tariff of the country with the largest share of intra-community trade. If the new tariff rate is higher than the old national rate, then the amount of protection it affords is greater than before and vice versa. After a comparison of the common external tariff for 61 three digit SITC commodity classes with the former national tariff protecting the dominant supplier, he concluded that 75% of all manufactured products would have their protection raised and by large amounts. As a result of this higher protection to the "community products", the exports of non-members would suffer substantially resulting in trade diversion.

Krause asserted that if the production of dominant suppliers could be expanded substantially without a significant rise in costs, the new higher external tariff would permit these producers within the EEC (and thus give rise to trade creation) and of producers of this country (USA) and resulting in trade diversion. But as Cooper(1963) pointed out, that is a big if. The assumption of high elasticity, he thought, is open to question.

In criticising Krause's argument, Balassa(1966) noted that the effects of the common market on imports from third countries should properly be considered in two steps:

a) the implications of the averaging of national tariff, and

b) the discriminatory effects of eliminating duties on intra-EEC trade

The averaging of tariffs by itself is likely to reduce rather than increase protection in European Common Market. Low cost dominant suppliers who compete in the world market would receive greater but largely unnecessary protection while the lowering of duties would expose high cost producers to foreign competetion. He further expressed doubts about the possibility of dominant suppliers being able to expand output at constant costs to exploit the possibilities offered by tariff discrimination and to replace third country exporters in the markets of partner countries. He actually showed that the share of dominant suppliers in the intra-EEG trade declined in the period 1958-63.

JOHNSON(1958)

Johnson also calculated the static effects which would result for the U.K. in the presence as opposed to the absence of a free trade area. He measured the effects of the creation of a union along Marshallian lines. He provided a device to device to compute the "maximum loss estimate" from non participation as opposed to participation in a union. From the standpoint of nonmember countries, the loss from trade discrimination on the export side (equal to the gains from free trade foregone because the country is not included in the union) amounts to the loss of income that would result if the productive factors employed in meeting the additional demand created by the union had to be diverted to producing for the domestic or other foreign markets.

The maximum loss which third country would have to incur would be if all prices of export goods to the union had to be reduced so as to exactly offset the external tariff. This maximum loss estimate would be the value of exports of a country to the union, multiplied by the proportion in the prevailing price of the union of the external tariff rate which has to be offset. This loss amounts to $V[t/(1+t)]$ where V stands for the value of exports to the union and t for the ad valorem tariff rate.

It should be noted that the above formulation applies only to the case of a country which has the opportunity to join a union and which is interested in the maximum loss which would result nonparticipation. It was applied to evaluate the gains for the U.K. from a Free Trade Association covering the OEEC countries as opposed to a Common Market, exclusive of the U.K. on the basis of the forecasts of U.K. exports in 1970 under a free trade set up.

At the same time, if certain assumptions are made, this approach appears to be also applicable to third country which have no possibility of being inside the union. The above tool could, then be computed on the basis of the present trade values and it would indicate for outsiders, the loss in terms of export receipts(resources) necessary to compensate for the discriminatory tariff and still sell exports competetively at the outset of integration. The maximum loss concept should be calculated only on the basis of the export value of a given country (assumed within the union) after at least the production effects of integration have materialised.

Another class of ex-ante studies deals with the estimation of potential impact of tariff reductions on trade and welfare. Although these studies are not directly related with customs union yet these help in the building of a General Equilibrium Model to know the effects of multilateral tariff removals.

BALASSA & KREININ(1967)

The first such study was made by Balassa and Kreinin. It considers the possible repercussion of a 50 % across-the -board cut in duties levied on industrial materials and manufactured goods by the industrial countries including United States, Canada, the EEC, the U.K., the EFTA, and the Japan. The scope of the investigation has been restricted to industrial materials(SITC Classes 2 and 4 plus unwrought metals) and manufactured goods (SITC Classes 5 to 8 less unwrought metals). The year 1960 has been chosen as the base year for the estimates.

They considered the effects of trade liberalisation in three parts.

1. the direct effects of the multilateral tariff reductions,

2. the reduction of discrimination against non-member countries in the ECM and in EFTA, and

3. the indirect effects of trade liberalisation operating through the feedback mechanism.

They have prepared two types of estimates. Variant I assumes that the export prices of manufactured goods in Western Europe would rise by one -third of the tariff reduction while Variant II is calculated with unchanged european export prices. It is shown that among the industrial countries, trade in these commodities would increase by 9.4 and 10.6 %, respectively.

BALDWIN(1976)

Another study on tariff reductions is made by Baldwin. A key assumption of the analytical framework used in the study is that imports are perfect substitutes for domestic production. The usual perfect substitute model may be adequate for dealing with agricultural products and raw materials, but it gives inconsistent results when empirical estimates of elasticities of import demand, domestic demand and supply are compared with the theoretical relationship among these variables that must hold in a perfect substitution model.

Another simplifying assumption made in the analysis is that the compensated cross -price elasticity is zero between any import good and all other goods except for the domestic substitutes for this import good.

The trade and tariff data for the year 1970 was used for the study and the countries covered are the U.S., Japan, Canada, Australia, Norway, Austria, NewZealand, Finland, Switzerland, Sweden and the nine EEC members. The main conclusion emerging from the study is that the United States can participate in a substantial tariff cutting negotiation without causing a significant adverse trade and employment effects in the country.

Baldwin's paper is an admirably careful example of professional empirical study of the effects of tariff elimination. The only question it raises is that, whereas theory stresses the "small triangle" welfare gains from tariff reduction, the implied welfare cost in Baldwin's study is the loss of jobs in the affected industries. If this is the relevant measure, theory needs reshaping. Apart from that, in order to determine whether costs or gains are large or small, we need a standard of comparison.

GENERAL EQUILIBRIUM MODELS

Another class of multi-country General Equilibrium Models were developed due to Scarf's work(1966), which both demonstrated the feasibility of a numerical general equilibrium approach and propelled work of this type forward. An early piece by Miller and Spencer(1977) applied the computational methods developed by Scarf to an assessment of the potential impact from Britain joining the EEC in 1973.

TABLE I
SUMMARY OF MODEL CHARACTERISTICS

Model	Country Coverage	Demand functions	Disaggregation	Production function	Disaggregation
Deardorff & Stern	34 major industrialised and developing countries	Derived from Cobb-Douglas utility functions;CES between domestic and imported goods in the same industry	34 countries and the rest of the world;single consumer demands in each country	CES value-added functions;fixed coefficient intermediate use of CES composites of domestic and imported goods.	22 tradable and 7 nontradable industries in each country, plus a residual rest of the world
Grais,de Melo,and Urata	Turkey	LES demand system	1 household	CES value-added functions;fixed coefficient use of intermediate inputs across sectors,substitution between domestic and imported intermediate inputs within sectors	8 production sectors (including 1 non traded)
Harrison	10 single countries, the EEC,and the rest of the world	Private:derived from nested utility functions (Klein-Rubin,CES,ELES) Public:derived from Cobb-Douglas utility functions	1 private household and 1 public household in each region	CES functions for primary inputs; Cobb-Douglas function for intermediate inputs	Alternatively 7 and 20 production sectors

TABLE 1 (CONTd.)
SUMMARY OF MODEL CHARACTERISTICS

Merceneir and Waelbroeck	11 developing regions, an OECD region, and a residual Centrally Planned Economies region	Derived from ELES utility functions; CES composites of domestic and imported goods	Rural and urban consumer groups in each fully specified region	Constant returns CES production functions; fixed coefficient intermediate production in urban sectors; linear production functions in rural sectors	4 urban, 2 rural production sectors in each fully specified region
Spencer	8 EEC countries and the rest of the world	Derived from 2-stage nested CES utility functions	8 countries and the rest of the world; 1 household in each	Constant returns Cobb-Douglas production functions	2 goods per region
Whalley	8 world regions	Derived from 4-level CES-LES utility functions	8 regions; 1 household in each	Constant returns CES value added functions for for primary inputs; fixed coefficient use of intermediate composite inputs	6 products (including 1 nontraded) per region

TABLE II
SOURCES OF DATA AND ELASTICITIES

Model	Year replicated	Trade data	Production data	Demand data	Extraneous use of Elasticitie
Deardorf and Stern	1976(tariff levels 1979(exchange regimes 1972 (U.S. data) 1970(non-U.S. data)	National Accounts,UN trade data GATT tariff data	UN,OECD,ILO Data	National Accounts	Import demand(best guess), Substitution between domestic and imported goods(own estimation),substitution between capital and labour(literature source and best guess)
Grais de Melo,and Urata	1978	Social Accounting matrix for Turkey	Social Accounting matrix	Social Accounting matrix	Income elasticity of demand, elasticity of substitution between capital and labour, elasticity of transformation between intermediate,domestic and imported goods and between final domestic and imported goods(literature sources and best guess)
Harrison	1975	IMF international financial statistics	Constructed multi-region input-output table	Input-output table	Elasticities of substitution between capital and labour (literature sources)
Mercenier and Waelbroeck	1978	World Bank social accounting matrix of the world economy	Social accounting matrix	Social accounting matrix	Elasticity of substitution between domestic and imported goods,export demand elasticity,elasticity of substitution between capital and labour in urban sectors (literature sources and own estimation)
Spencer	1980	OECD,Eurostat data	EEC National Accounts	EEC National Accounts	Elasticity of demand for specified aggregate goods
Whalley	1977	UN,UNCTAD and OECD trade data	UN National Accounts, UNCTAD data	National Accounts	Elasticities in CES functions and minimum requirements in LES functions(literature sources)

The major features of the multi-country models presented here are summarised in Table I and cover a wide range of applications. The models do not assume identical production and demand parameters across countries. Thus trade is determined on the basis of more than just differences in relative factor endowments. A further characteristic common to most of the models is the use of the Armington(1969) assumption. This treats products produced in different regions as qualitatively different across countries, i.e. heterogenous rather than homogeneous across countries as in a traditional Heckscher-Ohlin model.

The reasons for this treatment are multifold, revealing both the compromises that empirically based economic modelling involved and the realism it brings. One is the problem created by the presence of "cross hauling" in trade data, i.e. the same commodity being simultaneously imported and exported by the same country. This is inconsistent with competetive behaviour in traditional trade models which ignore internal transportation costs in a country and seasonal aspects of trade. While these and other explanations for the presence of cross hauling in the real world are easily listed, the use of Armington assumption is a convenient way of accomodating its presence.

A further reason for using the Armington assumption(1969) is that the key elasticity estimates to which many of the models are calibrated are econometric estimates of import and export demand elasticities. When the Armington assumption is used, calibration becomes more straight forward because there is a demand function for the imported commodity distinct from that of the domestically produced commodity.

Table II provides a summary of the data and the key elasticity parameters used in specifying the models. The models are all calibrated to replicate a base year data set but two sets of key parameters that appear in the models have marked effects on their analysis of policy

impacts. These are international trade elasticity and trade policy parameters used. With the widespread use of the Armington assumption, a common procedure is to relate the elasticities of substitution between the Armington commodities back to empirical estimates of import and export demand elasticities that country that a country faces. This, in turn involves the use of estimates of trade elasticities available in the literature. A widely used source is a compendium of estimates due to Stern, Francis, and Schumachu (1976). This study summarises a number of estimates of trade elasticity producing best guess estimates by product and by region. Many of the elasticity estimates are relatively low (in the neighbourhood of one).

DEARDORF and STERN(1986)

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The first study in our Table is the Michigan model of world production and trade by Deardorf and Stern(1986). This is a disaggregated microeconomy model of world production and trade. It incorporates supply and demand functions and market clearing conditions for 22 tradable industries and 7 nontradable industries in 34 countries.

Supply and demand functions were derived from maximization of profit and utility functions. The input-output table for the U.S. is used to describe technology in all industrialised countries while the input output table for Brazil is applied to the developing countries. Estimates of import demand elasticity and elasticities of substitution between capital and labour were obtained from the literature.

HARRISON(1986)

Harrison(1986) has developed a multi-regional model of world trade, calibrated to the global economy of 1975. This model includes a computationally inexpensive technique that

allows intermediate input substitutability. He also examines the sensitivity of his model's results to varying elasticity parameters.

Primary production in the model is characterised by standard CES technology. Primary factors are intersectoraly but not interregionally mobile, although Harrison also experiments making capital immobile in certain sectors. Intermediate production is represented by Cobb-Douglas technology both to allow for changing international trade co-efficient and to allot a more reasonable share of import demand elasticities to find demand. Demand is represented by single public household and a single private household in each region, the private household having three-stage nested utility functions.

To examine the robustness of the empirical calibration of the model, sensitivity analyses are performed for multilateral tariff reductions. Harrison focussed on three of the model's elasticity parameters: the elasticity of substitution between primary sector and elasticities of input demand and of total demand.

STUDIES RELATING TO ISLAMIC COUNTRIES

Not many studies have been done to analyse the implications of economic integration among Muslim countries. Most of available literature(Masudul Alam, 1989) is general and descriptive in nature, studying either the structure of trade among Muslim countries or describing merely the probable advantages of economic cooperation among them. Only a few empirical studies have been done using rigorous tools of analysis. But they are also limited in their scope and coverage of countries.

Dr. A. R. Bhuyan for example has developed a model to study the implications of a customs union in South Asia which includes some members of OIC. Dr.Ramzan Akhtar has extended this model to four Muslim countries, namely, Pakistan, Bangladesh, Iran and Saudi Arabia. This is a sophisticated study which used econometric tools to estimate foreign trade price elasticities.

Dr. Muhammad A. Gulaid (1985) has analysed trade among the members of Arab League without applying any model of customs union. Similarly Kazim R. Awan(1985) has presented a commodity level analysis among OIC member countries. This is purely a statistical anta on Muslim countries

VOLKER NIENHAUS(1986)

Nienhaus has applied an unconventional method for an automatic conditional trade liberalisation for Islamic countries called a Customs Drawback Union (CDU). As distinct from free trade areas are customs union in a CDU, the national protective tariffs are not abolished but maintained so that all imports, including the intra-group import are formally subject to the same customs duties as before. But in fact the tariffs will lose their protective effects for the intra-group trade if this trade develops in a balanced way. This means that a country may be defeated in some lines of production by intra-group competetion but is successful in other productions so that despite some efficiency improving sectoral and regional reallocation, the manufacturing sector will shrink as a whole. In terms of intra-group trade this implies that additional imports are balanced by additional exports.

The factual neutralisation of tariffs will be achieved by a system of (import) customs certificates(CC) which are sold and purchased at a certificate exchange functioning similar to

conventional stock exchange. Once the governments have set up a legal framework for the CDU, the mechanism will operate through the actions of private-oriented entrepreneurs (importers).

Suppose a company in Country A imports some goods from B. Then in a CDU, the customs administration of A will send the importer a customs duty assessment, specifying the tariff burden of the imports and the period in which the assessment has to be settled. Simultaneously, a CC with a face value equal to the duty assessed and attested by the country of the origin(B).

The CCs can be used to extinguish assessed duties up to the face value of the certificates. In order to do this, the importer has to exchange the received CCs against CCs of those types issued by the other country. The exchange of CCs will take place in a market with their prices freely determined by demand and supply.

If the imports of country A surpass imports of country B there will be a shortage of CCs and their price will go up. This will imply a sort of tariff and imports will go down. In a trade surplus country, the importers will be getting CCs at the minimal price. Then in fact imports are duty free.

This combination of burden and relief of the intra-group trade provides an automatic system of incentives for a reversal of trade flows in case of an unbalanced trade. According to Nienhaus, these trade stimulating and reversing effects are more powerful than incentives in a free trade area.

However, this scheme is meant only to remove disequilibrium in the balance of payments and not to increase trade in the member countries.

CHAPTER III

ISLAMIC VIEWS ON ECONOMIC INTEGRATION

The aim of this chapter is to get an insight into the concept of free trade among the muslim countries and restricted trade with non-muslim countries. This will be a reason for making a customs union among muslim countries from the Islamic point of view.

The Arabian economy mostly consisted of trading people before the advent of Islam. International trade contributed significantly in this economy. The Arabian peninsula had quite a number of active trade centres. Trade routes to Abyssinia were from Hijaz to Palestine, Egypt and then Abyssinia. The ships used to sail from Jeddah through Bab-ul-Mandab to any of the Abyssinian ports.

Zafar and Suhar were old centres for the sea trade of Indians on the coastal soils of the Persian Gulf. Zafar was situated to the east of Hadrawat and was a known market for perfumes. Suhar and Waba were old markets and traders from Sind, India, China and other eastern and western countries gathered there to participate in trade fairs held at these places. Before the dawn of Islam these areas were under the jurisdiction of Jalanzi b. Mustakbar who charged a tax from the traders at the rate of 10 %. It also hosted trade fairs. Among these fairs were those of UKAZ, an oasis between Taif and Nakhlah. The fair was held on 1-20 Dhul-Qadah.

The direction of external trade of Arabian economy was mainly focussed on China and Abyssinia. It is interesting to point out that Caesar gave an introductory letter to Hashim, grand-father of the Prophet (PBUH) to be presented to Najashi, the king of Abyssinia. Hashim sent his brother to Abyssinia. The meeting with Najashi was fruitful and Najashi allowed Arabian Caravans to Abyssinia. Meccan traders took leather, glue, and frankincense to Abyssinia.

Woolen cloth and gowns were also exported to Abyssinia and bartered for foodgrains. The above discussion clearly shows that in the pre-Islamic Arabian economy international trade contributed significantly.

Allah has referred to the caravans of the Quraish which travelled in summer as well as winter. They have become habitual to use to confront summer or winter. Therefore, they should be thankful to Allah.

The advent of Islam introduced new motivations and dimensions to international trade of the Arabian economy which in fact provide micro and macro foundations for a framework regulating trade activities of the Muslim countries. This framework, in turn, provides rationale for economic integration among Muslim countries. The Qur'an has ordered muslims to cooperate among themselves in various verses. For example, the micro level trade provides a livelihood to the traders.

The Qur'an, at various places, has not only allowed but even urged its followers to do business. It says:

And when the prayer is finished, then disperse Ye through the land and seek of the bounty of God.(62.10)

Islam permits trade even during the course of pilgrimage. The following verse refers to this:

It is no crime on you If you seek the bounty of your Lord (during pilgrimage).

But Islam has made certain regulations regarding trade and it is compulsory for the traders doing business within the Muslim territory to abide by these regulations. According to Muslim jurists:

1. The seller should not praise his goods for the qualities they do not possess.
2. The seller should disclose the qualities /good or bad/ of his stock to the prospective buyer.
3. A trader should not hide the weight and quantity of his goods.
4. He should not keep the price a secret in a way that if the buyer comes to know of it, he will refuse buying.

Muslim traders are bound to observe the above Code of ethics.

~~All this~~ is binding on all ~~Muslim~~ Business activities, whether they are living in one country or the other. We assert that this is possible if we can have an economic cooperation like a customs union among the Muslim countries.

Caliph Umar as the head of State was very strict regarding the implementation of these regulations.He used to roam about in the bazars and sometimes, even gave the sellers a beating with his cudgel, saying:

> "Only those should sell in our bazars who know the rules of marketing otherwise undue profits will be charged whether they have done it consciously or unconsciously."

There were certain well known trade centres and trade fairs which helped to a great extent in its promotion. Well-known trade centres were places like Ubulla, Yemen, Damascus, Mecca, Bahrain, etc. Some important trade fairs were those of UKAZ, an oasis between Taif and Nakhlah.The fair was held on 1-20 Dhul-Qadah.

International trade of Arabia constituted a very important part of her economy. The Arabs had trade relations with almost all the known countries. They were great navigators and their ships touched the shores of India, China, Africa, Europe and Russia. Caravan traffic with 'Ship of the Desert', was the common means of travelling and trade between the different Islamic countries, especially the pilgrimage caravan to Mecca.

At the same time,there were some important overland routes that led out of the Empire,

1. those to India and China
2. those to Southern and Central Russia
3. the African trade routes

RELATIONS WITH INDIA

References are missing

The Arabs had trade relations with India since the birth of history. During and after the period of Holy Prophet the Arabs had many kinds of relations with India but trade was the most important. The Arabs used to visit the Indian costs and carry the novelties produced there to Arabia and other countries of the world. The great French orientalist Gustav Lebon has, however, tried to distort the facts and said that before the birth of Islam it was Indians and not Arabs who brought the products of India to the soil of Arabia. And the time when the ships started sailing to India from the ports of Yemen was very close to the beginning of Islam.Lebon seems to be ignorant of the fact that the Hindus considered it a sin to sail beyond their native seas. Moreover, Arab colonies on the coastal line of India refute Lebon's claim.

Goods from different parts of India were taken to Arabia to be sold in different Arabian markets and were sometimes re-exported to other countries. Though Arabia, as a whole, was

a big market for Indian goods, there were certain well-known markets and trade centres for these merchandise. Ubulla, in ancient times,was known as Ard-ul-Hind. It was conquered in 12 H. The victor 'Utbah bin Ghazwan' wrote a letter to Umar describing its importance. He wrote' "All praise is for Allah who gave us victory over Ubulla. This place is a port for ships coming from Amman, Bahrain, Persia, India and China. When in 14 H. the new city of Basra was built near Ubulla, some people wanted to start business there because of its importance as a trade centre. Nafi b. Harith came to Umar and sought permission for starting business. Umar gave his consent and wrote a letter to Utbah.

Zafar and Suhar were old centres for the sea trade of Indians on the coastal soils of the Persian Gulf. Zafar was situated to the east of Hadrawat and was a known market for perfumes. Suhar and Waba were old markets and traders from Sind, India, China and other eastern and western countries gathered there to participate in trade fairs held at these places. Before the dawn of Islam these areas were under the jurisdiction of Jalanzi b. Mustakbar who charged a tax from the traders at the rate of 10 %.

RELATIONS WITH ABYSSINIA.

Arabia had relations with Abyssinia before the birth of Islam. The people of Hijaz used to visit Abyssinia along with their trade caravans. Abraha, who invaded Kabah was the acknowledged Viceroy of Yemen. Yemen came under the control of Abyssinia in 525 A.D with the help of Byzantine Government who were under the impression that this would make their trade and commerce grow and enable them to buy silk from India through Europe. In this connection many Byzantine deputations visited Yemen but the Persian influence on these markets was so perfect that they could not succeed.

It is interesting to note that the Caesar gave a letter of introduction to Hashim, the great grand-father of the Prophet to be presented to Najashi, the king of Abyssinia. Hashim sent his brother to Abyssinia whom Najashi gave a charter that his caravans could enter Abyssinia. Meccan traders took leather, glue and frankincense to Abyssinia. Woolen cloth and gowns were also exported to Abyssinia and bartered for foodgrains.

Trade routes to Abyssinia were from Hijaz to Palestine, Egypt and then Abyssinia. The ships used to sail from Jeddah through Bab-ul-Mandab to any of the Abyssinian ports.

RELATIONS WITH CHINA

Aden was the only trade centre of the Red Sea. The Syrians had the upper hand in the sea trade and they had trade relations with Indian and Chinese traders. They sold their merchandise to chinese traders at Eden and other ports and cities of the Persian Gulf. In turn they brought Chinese silk which used to sell at a very high price.

During the period of Hazrat Umar, both sea and land routes were used for trade with China. But the sea route was preferred by traders. The ports important for trade with China were Malabar, Ceylon, Sumatra, Java and Ton King. The cities which served as trade centres for the traders from Iran and Arabia were Canton, Chuan Kuo, Wang Kuo and Huang Kuo.

Tong King (called Luqin by Arabs) produced precious stones, silk, earthen ware and rice. The Arab traders brought with them pearls, corals, horses, cotton cloth and red cloth of Venus. They were exchanged for Satin, brocade, Chinaware, tea and medicines.

why Capital?

RELATIONS WITH EUROPE

Coins found in Russia from the river Volga to the coasts of the Baltic Sea prove that trade relations of the Arabs started during the Caliphate. The route followed for trade went from Transoxania to the delta regions of Khawarizm at the mouth of Oxus. Another route was through the Caspian Sea and the mouth of Volga. Traders from Damascus, Samarqand, Tehran gathered there and went to Astrakhan and Bulgar on the river Volga. Mohammedans had trade relations with the Bulgarians and other Scandinavian countries. The goods were taken to Finland through the river Volga and the Baltic Sea. The Arabs usually brought different kinds of clothes and garments, flower-vases, carpets and ornaments to Northern Europe.

Let us trace the concept of Tariffs in Islam.

THE CONCEPT OF CUSTOMS DUTY IN ISLAM

In Islam, people are divided into two different classes for the purpose of collecting taxes. There is a world of Muslims called Dar-al-Islam and the world of foes called Dar-al-Harb. So the sources of revenue fall into two categories:

a) The taxes imposed on muslims called Zakat (Sadaqat) and Ushr.
b) The taxes imposed on non-muslims called Jizya, Kharaj and a tax on non-Muslim traders called import duty or tariffs called 'Ushur'.

As is shown above, in the pre-Islamic days, the Arabs and the neighbouring Byzantine and the Sassanian trade caravans were accustomed to sell their commodities in one another's territory. It was customary for the market chiefs to impose a duty at the rate of 10 % on the

goods brought for trading by foreign traders in their territory. This kind of trade levy looks like the present day customs duty. There does not appear to have any sharp distinction between the market toll at octroi posts and between the trade levy on goods imported for sale. The term 'ushr' and perhaps 'maks' equally applied to both.

On the system of 'ushur' collection on merchandise goods, we have numerous traditions in which the Prophet condemned it in severest terms. To quote a few traditions from the Prophet:

1) The collector of Maks will not enter paradise.
2) The collector of Maks will not be questioned for anything. He will be caught as such and thrown in hellfire.

In his agreement with some Arab tribes when they embraced Islam enmass after the conquest of Meccah, the Prophet decreed that they would no more be subjected to the payment of Ushur which was a common practice. Thus the Fuqaha generally held the system of market levy to be a Jahili practice which the prophet abolished. Thus we assert that Islam rejects any customs duties among Muslims and this becomes a plus point in the formation of customs union among the Muslim countries in which they will be having a free trade among themselves. This clearly means that during the early period of Islam there was no trade-toll on the internal movement of commodities. This position is fully reflected in Mawardi's assertion that nothing lies on the internal movement of trade commodities and that in the Dar al Islam this kind of levy is unlawful.

As regards the common external tariff, it was brought to Umar's notice that in the commercial centres of the Harb territories the Muslim traders had to pay the toll of the tenth on

their saleable commodities according to the pre-Islamic custom. In reciprocity the second Caliph ordered collection of the same rate from the Harbi traders coming to the Muslim land.

Soon after the conquest of Iraq, Umar sent instructions to Sa'd b. Abi Waqqas, the general, ordering him not to distribute the conquered lands among the fighters and also decreed in unambiguous terms:

> "No ushur (customs duty) will be imposed upon a Muslim, or on a dhimmi, if the former had paid the Zakat, and the latter Jiziya in accordance with the pact made with them. Ushur is only on the people of herb. If they seek your permission to trade in your land, only then ushur is obligatory upon them."

With the increased trade activities within the Muslim territory and particularly between he Muslim and Herb lands, the second Caliph appointed Ushur collectors. Ibn Hudayr was the first person to be appointed as administrator of Ushur during the Caliphate. He himself states that he had clear instructions from the Caliph to impose a levy of 10 % on the harbi traders, 5 % on the dhimmi traders and 2.5 % on the Muslim traders.

The rationale behind different rates of the above levy as imposed by Umar on different categories of traders was that the rate of 10 % on Harbi traders was to reciprocate and to balance the same rate collected from the Muslim traders in the Herb lands. On being reported that the Muslim traders were subjected to the levy of one tenth in the Herb territories, the second Caliph sent instructions to Abu Musa al-Ashari:

> "You also collect from them as they collect from the Muslim traders".

The matter with the Harbi traders has been considered by the Fuqaha in detail. They recommend collection of Ushur from the commodities of Harbi traders at every entry to the Muslim land, whether they carry the same commodity or a different one. The reason is that on his return to the Harb land, he is no longer entitled to retain the legal and financial facilities earlier accorded to him by the Muslim authority. His re-entry to the Muslim territory will be regarded a fresh entry.

It should be noted that the second Caliph, while fixing the rate of commercial levy on incumbents took adequate care to ensure free flow of essential commodities to the market. Abd Allah b. Umar reports that the second Caliph collected 5% levy from the Nabitian Christians for olive and wheat to help increase their import to Madinah whereas the same Nabitians paid 10 % for cotton goods. He did not always stick to imposing the 10% duty on the Harbi traders, irrespective of the nature of the commodities. This shows that our modern customs union need nor stick to a duty of 10%.

There is no report that the second Caliph encountered any opposition from the companions, nor was he reminded of any tradition of the Holy Prophet condemning the system of Ushur because the Muslim traders discharged their Zakat obligation and the dhimmis paid according to the terms settled with them. In Abu Yusuf's version the second Caliph is reported to have even consulted the Companions when he imposed this levy on the people of Herb, for the first time.

THE DEVELOPMENT OF THE CONCEPT OF ECONOMIC COOPERATION AMONG MUSLIM COUNTRIES

In addition to Islamic motivation and dimensions mentioned earlier, existing relations and interactions, existing realities and present international situation also desire integration among Muslim countries. Trade commands a special place in regional cooperation. The OIC member countries face a formidable set of impediments and setbacks in expanding trade amongst themselves as well as with the outside world. One of the major features of their economy is that the member countries are exporters of primary commodities and importers of manufactures.

This common profile of their exports and imports inevitably narrows the trade potential that they can exploit. Such potentials are further undermined by the lack of an appropriate level of basic infrastructure necessary for trade, i.e. information, communication and transport networks, permanent commercial and marketing ties, financing arrangements, preferential arrangements, standardization, packaging, supply availability, competitiveness and so forth.

Looking at our model, one will find that all the nine member countries of our model are producing and exporting different commodities. This gives a property of complementarity to our model. This is essential for a customs union to result in increased trade after the elimination of tariffs. Given the nature of their exports and imports, the member countries have so far failed to take advantage of their resource endowments related to one of the major commodity categories that offer significant prospects for the expansion of trade among them - namely food and agriculture. Yet, the situation illustrated by food imports as a proportion of a country's total imports bill seems to have deteriorated over time for a significant number of member countries, implying their increased external dependence and having serious implications for regional food security. An Agricultural country like Pakistan is also importing food.

Thus, increasing reliance on food imports points to a critical fact - that food in particular and agriculture in general offers a promising area for generating intra-member trade while attenuating the food security problem at a regional level. Any regional agreement in reducing tariff and non-tariff barriers or restrictions will provide incentives for expanding regional trade and hence increase the efficient utilisation of global human and physical resources within the region.

There is also a great potential in the Industrial sector. There are countries like Pakistan, Malaysia and Turkey which are industrialising at a faster rate. A cooperation among the Muslim countries can result in basic industries like Iron and Steel and other Metallurgical Industry. The development of this Industry results in economies of scale due to indivisibilities. If produced at a larger scale, these industries will become feasible and can compete with the rest of the world.

A recent study at IRTI has shown that for the oic countries, the total value of merchandise exports are equal to the value of merchandise imports. This is a helpful sign for increased amount of cooperation among the Muslim countries.

Moreover, the fact that all the Muslim countries are geographically contagious. This also gives a signal for increased amount of cooperation among the Muslim countries. The above arguments are the objective realities that are taking us to economic cooperation among the Muslim countries.

In an Islamic economy, the competitive spirit will be accompanied by an over-riding sense of cooperation which is more than just an act. It is at once a mood and a motive, a principle and a psychology. The element of struggle will not be altogether absent from an Islamic society. Only it will be differently oriented.

A purposive relationship based on good will and cooperation is found in the Individual-Society-State relationship. It is the State which enforces the Islamic law and makes individuals fulfil their obligations towards society but it is the individuals who select their rules to enforce the Shariah.

In the moral sphere Islamic faith is essentially a unity. It is at once worship and waste; secular conduct of life is not divorced from religious beliefs of muslims. In social sphere its distinguishing feature lies in its complete human equality, just and coherent unity of existence and mutual responsibility of individuals and societies in Islamic scheme of things, nobody would be allowed to exploit the other; everybody would be allowed to exploit the other; everybody should be given equal opportunity to go up the social ladder.

The free-market mechanism is based on effective demand, making resources available to those who need them. As such in an Islamic economy, price offered by the market cannot be accepted as a matter of rule. Competition as implicit in the market needs to be supplemented by conscious control, supervision and cooperation. This is where Islam enters. The key lies in mutual good will and cooperation, while the market price emerges from the wholly unsurpassed interaction of competing buyers and sellers. Islamic equitable price need to emerge from the supervised competition, conscious control and cooperative interaction of the buyers and sellers. Such a system is to be established in all the muslim countries and a customs union will help in this direction.

With a positive attitude to economic enterprise and socially-oriented purposive rights of ownership, individuals and groups in the brotherhood of man are enjoined to cooperate with one another in patterning life on earth in accordance with the will of Allah. Economic relations, especially those in production and exchange of wealth, should be cooperative in nature.

"Rivalry and cut-throat competition makes no sense in this context" (73:27). Cooperation is seen as the basic value in Islam's economic philosophy. (8:36)

Unlike earning pecuniary profits, which is an individualistic aim, social service calls for mutual consultation, cooperation and joint action. The individual entrepreneur will, therefore, be drawn towards other fellow entrepreneurs in order to devise a course of action which ensures simultaneous and harmonious attainment of both the ends, individual and social.

Cooperation among producers may take such forms as dissemination of knowledge regarding the needs of society in general or specific industries through machinery voluntarily set up for this purpose by the producers themselves or through the agency of the state. Dissemination of such knowledge may go a long way to assist the individual producers in taking correct policy decisions,especially in the formative stage of the firm.

Later on it may take the form of joint research projects, labour welfare schemes and mutual consultations on such policy matters as quality and price of the product and advertisement, etc. As this cooperation is motivated by social service and satisfactory profits, it will be different from monopolistic combinations or collusions detrimental to public interest. Such joint ventures are going to occur among producers of muslim countries also in the fields of food production, industrial output, skilled manpower, scientific research and modern technology.

This cooperation leads to the idea of Islamic Common Market.

ISLAMIC COMMON MARKET

The oft-suggested idea of setting up an Islamic Common Market (ICM) was first mooted at the Second Islamic Summit Conference in Lahore in 1974. It was agreed that the establishment of such a market could be at best a long-term objective and the proposal needed careful and deep consideration. During this period we have made some progress towards greater cooperation among OIC member countries. The number of economic cooperation schemes made between member states, I believe must be the basis for a future ICM.

By definition, a common market is a scheme of economic integration where the memers agree to abolish all the tariffs on each other's exports, follow a common tariff policy towards their imports from the rest of the world, and allow a free flow of commodities as well as productive factors (capital, labour, entrepreners and technology) amongst one another. Yet even those member states who are part of formal regional integration schemes could not manage to prepare themselves to take such substansive steps on the road to more advanced forms of economic integration like common markets.

There seems to be three schools of thought as far as an ICM is concerned.

a) Some states simply oppose such a market and prefer simple bilateral trade between members.

b) Another group supports the idea of an ICM but rather passively and unenthusiastically.

c) The third group is actively promoting the setting-up of at least a basic structure which would later be developed into a full-fledge common market.

The later group stresses that a vital prerequisite for this is increasing economic, industrial and commercial cooperation and development of all Muslim states. This would largely depend upon the exchange of information, the development of communications, the relations between the private sectors. the promotion of trade fairs and exhibitions for the products and services of Muslim states, common educational programmes and scientific exchange and research between member countries.

There are those who emphasise that in view of the prevailing political climates in various Muslim states,it would be difficult to unify the diverse economic structures. Political and ideological differences between some member states will further hinder the process of economic integration between OIC states. This process, however, could be given a stimulus if member states established economic and industrial cooperation on a regional basis to start with.

Others still say that the greatest barrier to establishing greater economic cooperation between Muslim states is the lack of popular and political will.

Despite that, the most significant progress towards both increased intra-trade and as ICM has come within the framework of OIC's "Plan of Action to Strengthen Economic Cooperation Among the Member States", which was adopted by the Third Islamic Summit Conference in Taif, Saudi Arabia, and within the extensive follow-up action of the Standing Committee on Economic and Commercial Cooperation (COMECEC), which became operational in 1984 after the Fourth Summit in Casablanca and in its meeting in March 1987 in Istanbul, Turkey.

The Plan of Action specified the targets to be achieved in 10 major areas of cooperation - food and agriculture; trade; industry; transport; communication and tourism; population and health; and technical cooperation.

Concrete achievements are at last filtering through. COMCEC established "The Longer Term Trade Financing Scheme" which is being run by the 44-member Islamic Development Bank (IDB) as a fund. The $600 m. fund, the first ever of its kind to be launched by the IDB, became operational after the Fifth Summit Conference in Kuwait. The objective of the scheme is to increase trade among OIC memers countries in non-traditional items with emphasis on exports. It will provide partial funding for periods ranging from 18 months to five years. Other schemes coming forward are Export Credit Guarantee Scheme amomg the OIC countries, the establishment of a Trade Information Network and a Trade Peferential System. These are the steps which, I believe, will eventually lead to the establishment of a basic ICM.

EXISTING ECONOMIC COOPERATION AMONG ISLAMIC COUNTRIES

Economic Integration movements are not a new phenomena in the Muslim World. Almost all the members of the OIC are members of one or the other regional grouping meant for economic integration. According to an UNCTAD list, Islamic countries are members of the following groups:-

1) Arab League (AL)
2) Council of Arab Economic Unity (CAEU)
3) Arab Common Market (ACM)
4) Arab Gulf Cooperation Council (AGCC)
5) Organisation of Islamic Conference (OIC)
6) Central African Customs and Economic Union (UDEAC)
7) Economic Community of West African States (ECOWAS)
8) Organisation of African Unity (OAU)
9) Preferential Trade Area for Eastern and Southern Africa (PTA)

10) West African Economic Community (CEAO)

11) Association of South East Asian Nations (ASEAN))

12) South Asian Association for Regional Cooperation (SAARC)

13) Economic Cooperation Organisation (ECO)

The trend in the number of such regional groupings has increased over time. Practically a member can join more than one such groupings. Assuming that each organisation has its own principles, rules and regulations depending upon the requirements of original commitments and objectives, contradictions may arise among them. Once a country joins a particular grouping, the non-members automatically become a third party while these countries could be the members in a different grouping. Conflicts arising from the different set of objectives and rules specific to the organisations lead to practical inertia and a host of managerial problems. If not all of these, the members would choose their favoured ones leaving the others "dead on the paper".

Such a situation could be better termed as an inflation of organisations which eventually transform into pseudo grouping. The standard measure to cope with the internal balances is to reduce and control the rate of inflation by way of eliminating the sources of inflation. The same must hold true with respect to inflation in the number of such grouping. Thus the number should be lowered to a realistic level with a view to realise progress and efficiency in the field. Therefore, some organisations may have to be dissolved in order for others to progress by reducing their operational and financial costs. One step in this direction could be for the OIC to create a single Customs Union among all the Islamic Countries. This arrangement can be further expanded to include areas such as expanded trade, establishment of joint ventures and joint action towards an integrated market and economic union.

Let us now have a look at some of the Economic Groups among OIC member countries. An assessment of their experiences support the view that the main reason for integration are political rather than economic costs and benefits.

1. ARAB LEAGUE

The initial step towards Arab multilateral economic cooperation was taken by the Arab League on September 7, 1953 when it drew up a trade and transit treaty, the primary purpose of which was to facilitate trade and transit movements among the Arab countries. The signatory countries were then Egypt, Iraq, Jordan, Lebanon, Saudi Arabia, Syria and Northern Yemen--Kuwait joined later, U.A.E. joined in 1971. The treaty was amended on 15 December 1954, 25 January 1956, 29 May 1957 and 14 January 1959. These amendments pertained to modifications in the lists of goods covered by the treaty and to clarifications concerning certain of its provisions.

The main provision of this treaty relates to the extension of preferential treatment in customs duties. Agricultural and animal produce were to be exempted from these duties. Industrial and intermediate products where the local value added was not less than 50% of the total cost of production became subject to a reduction of 25% and 50% respectively in the applicable duty. The treaty specified that current transfers were to be facilitated subject to existing regulations while free capital transfers were to be permitted provided they were destined for development projects. Thus, as it stood, this treaty fell far short of establishing a free trade area or a customs union. It did not provide for elimination of all customs duties nor did it deal with other trade barriers particularly those of an administrative nature such as quotas and licensing. Further, it did not call for the establishment of a common external tariff vis-a-vis the rest of the world. It was a very limited move in the direction of closer multilateral trade

relationship. Even then it was not effectively applied by the signatory countries.

2. CAEU (COUNCIL OF ARAB ECONOMIC UNITY)

On June 3, 1957 another attempt at multilateral cooperation was initiated. The treaty of Arab Economic Unity was drawn up establishing the Council of Arab Economic Unity (CAEU). The treaty was not approved, however, until mid 1962 and the initial efforts of the council to effect multilateral cooperation could not begin until August 3, 1964. At that time a decision was taken to establish an Arab Common Market (ACM). While the ultimate objective was a full economic union, this was to be attained in stages beginning with the gradual implementation of a free trade area among the signatory countries. In practice, only four countries namely Egypt, Iraq, Jordan and Syria out of 13 agreed to implement a free trade area at the end of 1970 which was in operation at least as far as the abolition of customs duties is concerned.

Important obstacles which still remain in the face of the free movement of goods among these four countries pertain to trade regulation of an administrative nature, e.g. licensing, ad hoc decisions by public sector organizations. Existing evidence indicates that these regulations have continued to act as hindrances to the free movement of goods. To that extent a truly free trade area among these four countries has not yet been fully established.

3. ARAB COMMON MARKET(ACM)

Egypt, Iraq, Jordan and Syria formed the Arab Common Market in 1964 and abolished all tariffs on locally produced agricultural, animal and mineral products in 1971 and on manufactured goods in 1973. Libya joined the ACM in 1977, Mauritania in 1980, PDR Yemen in 1982 but have not implemented free trade provisions yet.

The results of trade liberalisation programme are disappointing. The share of the inter-ACM exports in total exports of the ACM countries grew in 1970, but fell again in the recent years. For Jordan alone, inter-ACM exports account for 15% of total exports in 1983;for Syria the share is 2% and for all other ACM members it is less than 1%. Asking for the reasons, one has to note that the ACM became a free trade area only formally. In practice, non-tariff barriers remained major obstacles to a more rapid expansion of intra-ACM trade. Tariff concessions were often offset by non-tariff restrictions which became a widely used instrument for the continuation of protective policies for domestic industries.

4. ARAB GULF COOPERATION COUNCIL (AGCC)

Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates set up the Gulf Cooperation Council (GCC) in 1981. In March 1983, they abolished customs duties on intra-GCC trade in agricultural and animal products processed from locally obtained raw materials and on manufactured goods made from imported raw material if domestic value added constitutes at least 40% of the cost of the finished product and the national own at least 51% of the equity of the firm producing it.

In 1982 (the year before the abolition of tariffs), the ratio of intra- GCC trade reached a maximum of 26.9% in Bahrain and ranged from 0.6 to 8.0% of total exports for the other countries. By the end of 1983, the maximum was to 24.3% in Bahrain and between 0.2 and 4.4% in the other countries. Since the GCC members did not harmonise their general industrialisation and fiscal policies, complaints are heard about distortions in the intra-group competetion. Most countries are worried of opening their markets to Saudi made goods which benefit from generous government subsidies and other incentives.

5. ECONOMIC COMMUNITY FOR WEST AFRICAN STATES (ECOWAS)

Sixteen countries formed Economic Community of West African States in 1975. In 1979, a trade liberalisation programme was started. It is said that ECOWAS continues to exist on paper only. The existence of two smaller integration groupings within the ECOWAS region (MRU and CEAO) turn out to be the cause of major problems. Certain important provisions of the ECOWAS treaty are incompatible with the rules and regulations in force in MRU and CEAO. For example, the MRU has introduced and CEAO envisages a Common External Tariff on imports from outside the respective group. A number of countries are outside MRU and CEAO but inside ECOWAS which strives for the reduction and abolition of tariff for trade among all its members.

Another problem that strains the relationship in ECOWAS is the rule of origin which prescribes that tariffs are abolished only for products where at least 35% of the value added is contributed by firms in ECOWAS countries whose equity is held at least 20% in 1981, 35% in 1983 and 51% in 1989 by ECOWAS nationals. Ivory Coast and Senegal at present account for a high proportion of the manufactured exports among community members. Other members cannot compete with them due to this ownership provision[2].

6 PREFERENTIAL TRADE AREA (PTA)

On 22 May 1981, Ministers of Trade, Finance and Planning from fifteen countries in the Eastern and Southern Africa adopted a draft treaty on the PTA.The fifteen states are Angola, Botswana, the Comoros, Djibouti, Ethiopia, Kenya, Lesotho, Malawi, Mauritania, Mozambique, Swaziland, Tanzania,Uganda, Zambia and Zimbzbwe.

The objectives of the PTA for attaining improved commercial and economic cooperation in the region are naturally fraught with a number of difficult economic problems, though these may not be insurmountable in the long run.The level of industrialization among the countries in the region is low; only two countries, namely Kenya and Zimbabwe, have a manufacturing sector which can export a limited variety of cosumer goods.All the countries in the region have already started import substitution of these goods.

Tariff and non-tariff barriers are only one factor restricting inter-African trade.Other impediments are the limited ability to produce (especially processed and semi-processed goods) at prices which compete with developed nations ; to transport products quickly, efficiently and cheaply; and to pay for imports in a mutually - acceptable currency capable of financing further imported inputs.

The PTA is still in the phase of institution building to provide facilities for encouraging inter-state trade among the members. The strategy of the PTA seems to be conventional: it is a strategy based on marketing integration through the removal of trade barriers, both tariff and non-tariff, rather than either consolidating transport and communications system or leading to inter-state divisions of production based on comparative advantage, or a combination of these. The experience of ECOWAS as well as ASEAN in South-east Asia seems to teach us that economic integration amongst a group of developing countries will take many years to find a shape or operational stage, let alone become successful. We can argue that PTA is exactly the kind of association which many informed observors of Africa identify as the only solution to the continent's intractable problems. But these same problems make it unlikely that the PTA will succeed, at least in the short run.

7. ASSOCIATION OF SOUTH EAST ASIAN NATIONS (ASEAN)

Indonesia, Malaysia, Philippines, Singapore and Thailand created the association of South East Asian Nations in 1967. Brunei joined in 1984. Unlike the aforementioned groupings, ASEAN is not a form of integration but just an economic cooperation grouping. In the field of trade, preferential trading arrangements came into force in 1978. The intra-ASEAN trade as a proportion of total ASEAN trade rose from 16% in 1977 to 23% in 1983. This, however, is not a success of the preferential trading arrangement because only 2% of the intra-ASEAN trade is subject to preferential treatment. Given member countries' obsession with their national interests, most items offered for tariff cuts under the preferential arrangements are marginally traded or completely non-tradable.

CONCLUSION

The poor record of integration groupings of these developing countries and the evasive tactics of many governments regarding a real liberalisation of inter-group trade are in contrast with the economic rationale for the formation of free trade areas or custom unions. It is usually agreed that the national markets for most developing countries are too small for the establishment of plants of optimum size and for the realisation of economies of scale. Hence the enlargement of the markets and their protection is seen as pre-requisite for a more rapid industrial development. For this purpose,

~~That's why~~ we are suggesting a customs union of all OIC member countries.

It is possible to formulate some plausible hypothesis on characteristic features of types or groups of countries which will probably either gain or lose from the integration. A group of

countries Benin, Burkina faso, Chad, Comoros, Djibouti, Gambia, Ginnea Bissau, Maldives, Mali, Mauritania, Sierra Leone and PDR Yemen have a GDP of US $ 1200 m. or less and a per capita income of US$ 1000 or less. It is not very likely that these small countries have developed manufacturing industries could stand successfully in an intra-union competetion. A system of compensation will have to be devised to help such countries.

A second group of countries are the oil-rich countries consisting of Bahrain, Brunei, Kuwait, Qatar, Saudi Arabia, United Arab Emirates, Oman and Libya with a per capita income of US$ 6000 or more. The countries of this group have large financial means at their disposal which allow them to give strong fiscal incentives, subsidies and other governmental support to their industries. Intra-group trade liberalisation, thus, may be to their advantage.

The majority of the Islamic countries, however, are neither very small nor oil-rich. For an assessment of the potential impact of trade liberalisation, more information about their production structure and trade orientation is required. Thus our model includes only these countries. An intra-group trade liberalisation is more likely to benefit such a country:

1) the more the manufacturing industry contributes to GNP.
2) the more the manufacturing industry is outward oriented.
3) the more the manufactured exports are suitable to meet the import demand of the integrating countries.

Here it is sufficient to show that it is highly probable that the establishment of a free trade area or customs union would lead to a very uneven distribution of the costs and benefits among different countries of OIC. So it becomes necessary to look after the interests of those countries which are in a danger of losing manufacturing industrial capacity.

CHAPTER IV

THEORETICAL MODEL OF A CUSTOMS UNION

The Theory of Customs Unions has been defined as that "level of tariff theory which deals with the (welfare) effects of geographically discriminatory changes in trade barriers. "The pioneering study of the theory of Customs Unions was made by Jacob Viner(1950). It was generally considered that since the formation of a union involved moving closer to free trade, world welfare must have increased. But the discussion of the Theory of the Second Best illustrates the fallacy in the argument. Viner also showed the argument to be incorrect. He introduced, instead, the key concepts of Trade Creation and Trade Diversion Effects. These effects are shown on both Production and Consumption. We start with the effects on production.

EFFECTS ON PRODUCTION

According to Viner's analysis of production effects, if a union shifts production from a higher cost source to a lower cost source, it creates trade and constitutes a movement towards freer trade. On the other hand, if production is shifted in the reverse direction from lower cost source to higher cost source. It constitutes trade diversion and is a movement away from free trade. Given that such shifts may take place, the efficiency with which resources are utilised will be altered and the overall effect may be to increase or decrease production efficiency. The meaning of trade diversion and creation can be shown by means of simple numerical example given in Table I.

TABLE-I			
PRODUCTION COST OF CYCLES IN THREE COUNTRIES			
COUNTRY	PAKISTAN	IRAN	TURKEY
PRODUCTION COST: (RS.)	1400	1200	1000

Before Union, at a 50 per cent duty, Pakistani producers were supplying cycles to their domestic consumers at a relatively high cost. If Pakistan and Iran join as partners in a customs union, Pakistani producers would be displaced by the low cost Iranian producers. Where international trade did not exist before, it has now been created. This trade creation results in an increase in the efficiency of world production.

The new intra-union supply may, however, displace a member's imports from a low cost foreign source. If Pakistan, for example, had been importing cycles from Turkey at a price of Rs.1000 plus a 50 % duty. With the elimination of this duty on intra-union trade, Iranian producers with a cost of Rs.1200 could now displace the imports from Turkey. The actual cost to Pakistan is now Rs.500 higher than before. Trade has been diverted from a low cost source to a high cost source. This trade diversion reduces the efficiency of world production, since to produce the same output as before, a larger quantity of resources has to be used. Alternatively, one could say that to acquire the same quantity of imports as before, Pakistan must now use a larger amount of resources in producing the exports in exchange for the imports.

Countries trading various commodities can face both trade creation and diversion. Whether the favourable effects of trade creation are greater or less than the adverse effects of trade diversion will depend not only on the change in the volume of trade but also on the change in the unit cost. Even a large volume of trade created, if the cost savings are small could be

offset by a comparatively small volume of trade diverted, if the differences in unit cost are relatively small. The relevance of both these elements to the question of net gain or loss in world efficiency suggests the following points to be considered in evaluating the production effects of a customs union.

1. If the economies merged in a customs union are competetive in the sense that they produce a wide range of similar goods, there will be many opportunities for the substitution of the products of one union member with those of the others, and thus for trade creation rather than diversion. From this, we conclude that primary producing countries should form customs union among themselves rather than with industrial countries. This is a plus point for a customs union among Islamic countries.

2. Any gain from the union of competetive economies would be augmented by the existence of large differences in unit costs. Not only would there be a large gain for each unit of goods traded, but there would also be a substantial reallocation of resources.

3. Tariff levels are another determinant of the effects of customs union on world efficiency of production. A prohibitive tariff has greater chances for trade creation. There are two cases:

   a) If pre-union tariffs of members are high, thus restricting imports in general, their removal will permit the substitution of many low cost sources of supply within the union for high cost domestic suppliers. This would favour trade creation.

   b) After the union is established, a low tariff against the outsiders will be favourable to efficiency, for this will minimise trade diversion. There will be

less likelihood that low cost outside producers will be excluded from the union market, whereas with a high tariff wall around the union, its market will tend to be reserved for relatively high cost suppliers inside the union.

4. Other things equal, the larger the market formed by a customs union, the more numerous will be the opportunities for a more productive reallocation of resources. This point also goes in favour of our proposition as there are about 45 Islamic countries as members of OIC.

EFFECTS ON CONSUMPTION

Meade (1955) was the first to point out the consumption effects of a customs union ignored by Viner. This effect takes place due to a change in consumption which results from a change in price after the formation of a customs union. Let there be three countries, Pakistan, Iran and Turkey. Let Pakistan and Iran form a customs union. Then, according to Meade, we can measure the potential gain in living standards in these countries through increased trading by comparing ratios of the marginal utilities of the products. Before the formation of the union, the ratio of marginal utilities in Pakistan between the two goods, paper and tools was higher than the ratio in Iran because Pakistan's tariff raised the price of tools by 10%, whereas Iran's tariff raised the price of paper by 30%. This gives Pakistan a possibility of gains from increased trade. As trade expands, the additional gain declines as the ratios of the marginal utilities approach each other. In the union, Pakistan removes its tariff on tools and will increase the use of tools and lowers that of some other. In Iran, imports of paper rises and the use of tools falls. This can be explained with the help of Figure 1.

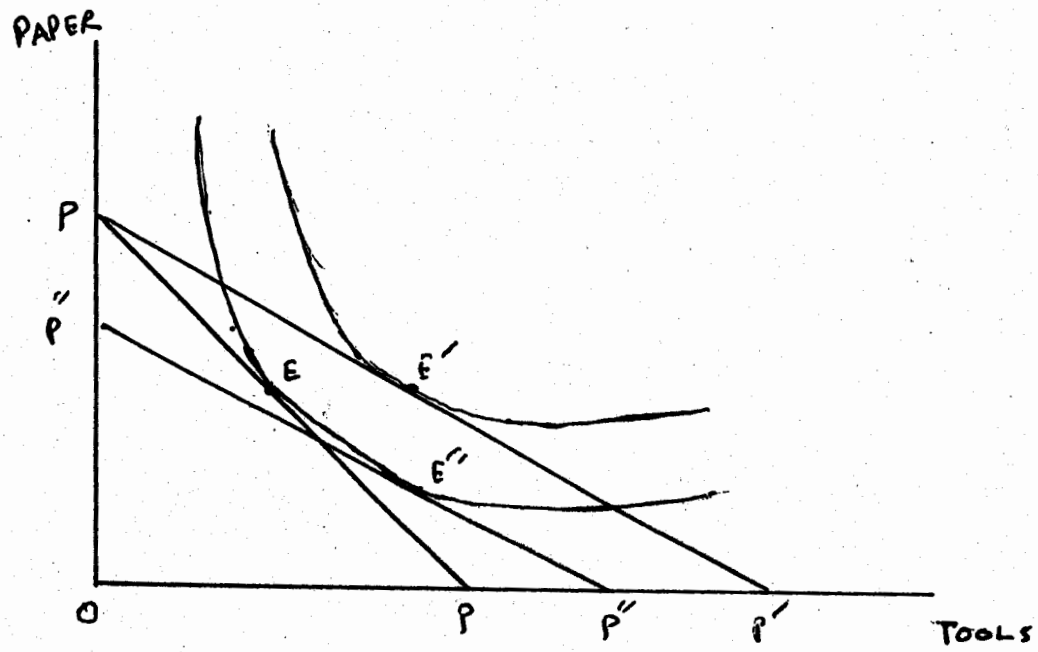


FIGURE I

Before the customs union, the original price line is PP. When the tools become cheaper relative to paper, the line moves to PP'. The new relative price line at original level of real income is P"P". The resultant equilibrium point is E" at which the consumption of tools goes up and of paper falls.

The elimination of the divergence between the marginal value and marginal cost of tools yields consumers an increase in welfare. But there is an offsetting loss of welfare from the reduced consumption of paper. Since the divergence between marginal value and marginal cost for paper remains at the original level, there is a loss of welfare corresponding to this divergence on each unit by which the consumption of paper is reduced. In other words, the full consumption effect is composed of two elements--the gain from larger consumption of (previously taxed) imports from the partner country and the loss from reduced consumption of third country imports which are still subject to duty. On balance, the consumption effect may therefore be negative, in which case the Viner-type trade diversion loss understates the unfavourable effects of customs union or vice versa.

PARTIAL EQUILIBRIUM ANALYSIS

Both the production and consumption effects can be shown in figure 2 introduced by Harry Johnson(1957). The domestic demand for the product is represented by DD and domestic supply by SS, with foreign supply curves for two countries A and B being AA' and BB'. A represents a potential union member and B represents the rest of the world. Now let a tariff of BT be imposed by the home country on imports from A and B. Imports of M2 M3 will come from country B with no imports from country A.

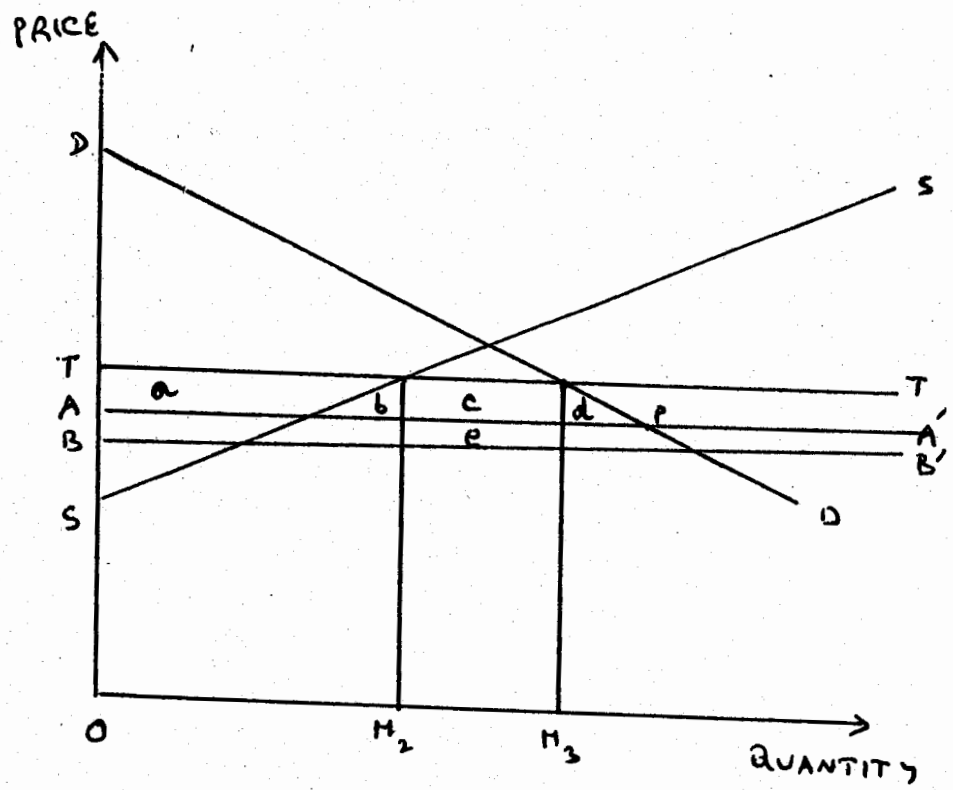
Consumer's surplus increases by ATHP, the total tariff revenue (area c + area e) is lost, and producer's surplus declines by area (a). A part of the lost tariff revenue (area c) accrues to consumers because of the lower price of the product. The remainder (area e) is the net loss from diverting imports to a higher- cost source.

The increase of consumer's surplus in A exceeds the loss of producer's surplus and the transferred tariff revenue(c) by the triangles (b + d). These two areas represent the net gain in welfare resulting from trade creation. Area b is the positive production effect and area d is the positive consumption effect. Area (e), the net loss from diverting imports to a higher cost source, represents a payment to the higher cost producers in B. The net welfare effect depends on whether the gain from trade creation (b + d) is greater or less than the loss from trade diversion (e).

The diagram also shows the following effects of customs union:

1) The more elastic the demand curve and supply curve for the home country, the greater will be the gain from trade creation. It can be seen from the figure that the flatter the curves, the greater will be the areas b and d.
2) Trade diversion will be less if the elasticity of demand in the union for foreign goods and the elasticity of supply of the foreign goods is low,

3) The more inelastic is foreign demand for union export and the more inelastic is the supply of foreign exports, the greater will be the terms of trade gains for the union.



DD = DEMAND CURVE

SS = SUPPLY CURVE (DOMESTIC)

AA' = SUPPLY CURVE (FOREIGN)

BB' = " " "

BT = TARIFF

M_2M_3 = IMPORTS

FIGURE 2

GENERAL EQUILIBRIUM ANALYSIS

It was Gehrels(1956-57) who first presented the general equilibrium analysis for customs unions. He showed the substitution effects in consumption and contradicted Viner's conclusion that trade diversion always results in a fall in welfare. Let us first take Viner's case as shown in Figure 3. Country A is completely specialised in the production of Y. It produces at point A on the Y-axis and trades at point d on the terms of trade line shown by AC. Consumption in country A consumes the two goods in a constant proportion given by ray OR from the origin.

Country A now forms a customs union with country B. This leads to trade diversion. A's terms of trade deteriorate, The new line is AB. The country moves from point d to e and finds herself on a lower Community indifference curve given by I 2.

However, if substitution is allowed, trade diversion may not result in a fall in welfare. There are two contradictory forces:

i) a deterioration in the terms of trade implying a lowering of welfare.

ii) an increased consumption implying an increase in welfare. So the result of trade diversion is no longer the same as shown in figure 4.

Country A is initially at point d under free trade condition. With a duty on good x, the domestic price ratio is indicated by the line TT. Consumption is at point f, where another Community indifference curve I2 is tangent to the price line. Tariff leads to a fall in consumption of x which is substituted by Y and to a lowering in consumer's welfare. Country A now forms a customs union with country B. This leads to trade diversion and to a worsening of terms of trade. The new terms of trade line is now given by AB. This need not lead to a

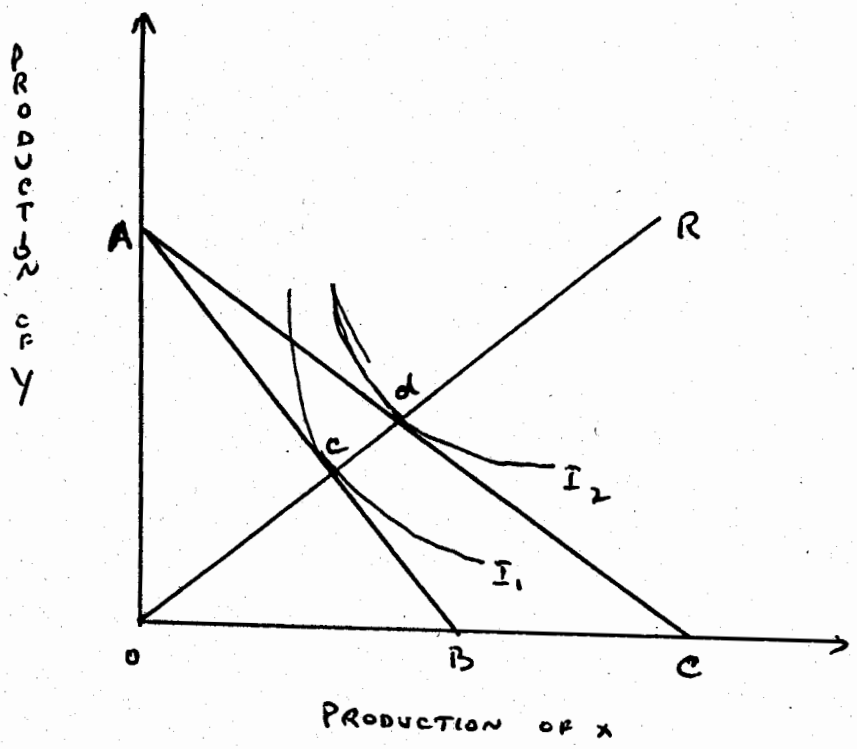


FIGURE 3

lowering in welfare for consumers because at the price ratio AB, good x is now cheaper than at the tariff-inclusive price ratio TT. Commodity x will, therefore, be substituted for Y in consumption and we move to point e which is on the same indifference curve as f. Hence country A is as well off after the customs union as before. So a case can be made for a country to form a trade-diverting customs union and yet gain an increase in welfare if the consumption effects are taken into account.

Melvin(1969) and Bhagwati(1971) relaxed Viner's assumption of constant costs in the home country and proved that a trade diverting customs union can bring welfare gain. This is shown in Figure 5 . AB is the home country's production possibility curve. With a uniform tariff on the import of commodity Y from both the external and the partner country, the home country imports from the former at international price ratio H1 C1 E, the consumption is C1 (along the ray O C1 C2 R, since fixity of the consumption pattern is assumed) and production is at the tariff-inclusive price ratio DPE at point H1. On the formation of a customs union, the tariff is eliminated on partner country imports. Production shifts to H2 at tangency of the production possibility curve AB to the partner country price ratio H2 C2 P. Equilibrium consumption is then at C2, and welfare has increased (U2 > U1) despite the fixity of the consumption pattern.

So against a terms of trade loss of a trade diverting customs union we have a welfare gain on both on account of consumption and production . In this way the prospects of a welfare gain from a customs union are further increased.

Cooper and Massell (1965) in their classic article challenged the welfare analysis of customs union by comparing it with unilateral tariff reduction (UTR). They concluded that a non-preferential tariff policy is necessarily superior to customs union as a trade liberalizing

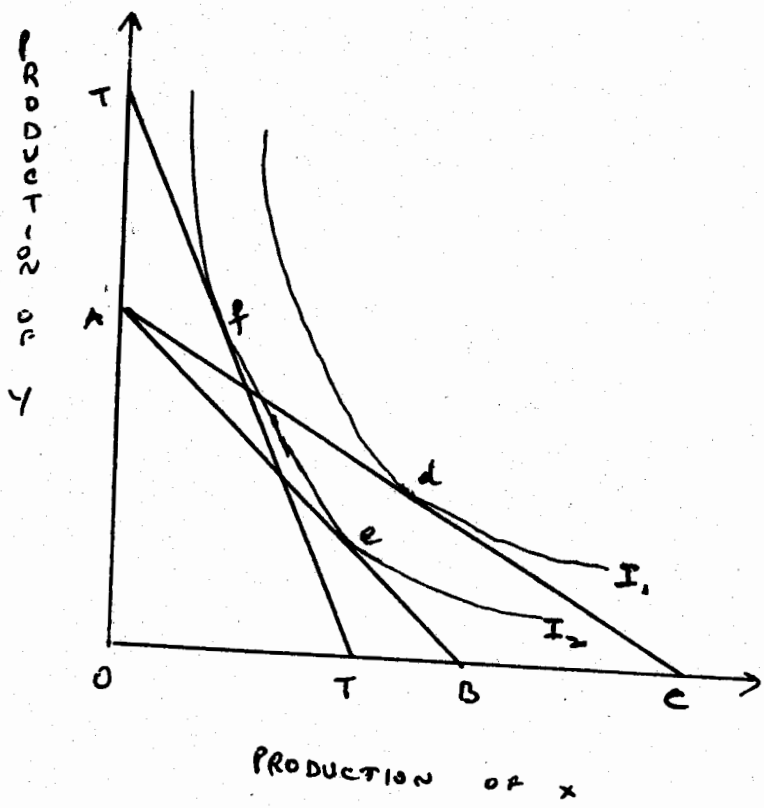


FIGURE 4

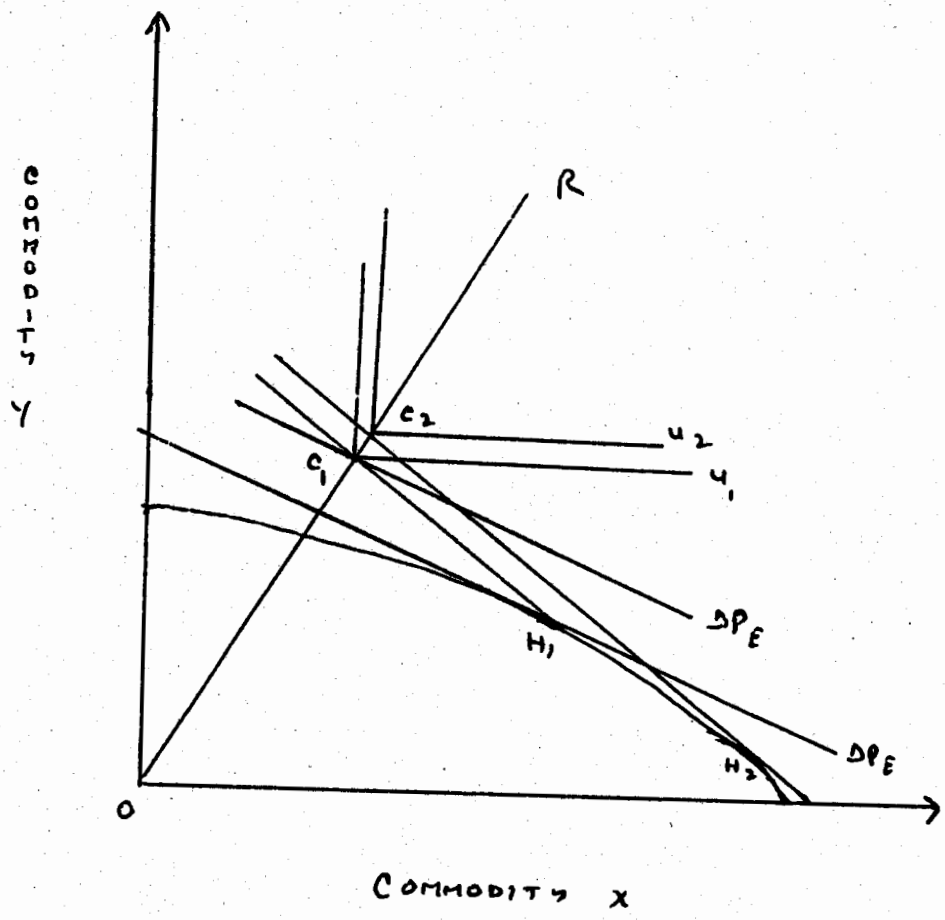


FIGURE 5

device. In Figure 6, Dh is the home demand curve, Sh is the home supply curve, S h+p is the supply curve of the home plus partner countries, and Sw is the world supply curve.

We start with a tariff PPt. This excludes competitors both in the partner country and the outside world. Price is OPt, domestic production and consumption is OQ1. After the customs union, price drops to OP't. Consumption expands to OQ3 and domestic production shrinks to OQ2. Suppliers from the partner country have displaced home production in the amount Q1 Q2, with a saving in cost equal to the triangle p. This is trade creation.

Suppose that, instead of forming a customs union, the country considering this step had lowered their tariff on all imports by an amount that would yield the same price, quantity consumed and level of domestic production as would result from the formation of a customs union. In terms of the figure, this would mean a non-preferential reduction of the tariff from PPt to PP't. Price in the domestic market would fall to OP't, consumption would expand from OQ1 to OQ3, and domestic production would shrink to OQ2, the values realised from establishment of a customs union. But in this instance, imports in the amount Q2 Q3 would come not from the other country of the proposed customs union but from outside supplier. The relevant import-supplier would be Sw not S h+p. Imports would then be obtained at a unit cost of OP instead of OP't, or a total cost of Q2 EF Q3 instead of Q2 BC Q3, and customs revenue would amount to EBCF. So a policy of a non-preferential reduction of the tariff yields an even greater cost saving and is hence to be preferred.

To find other reasons for the existence of a customs union, Cooper-Massell(1965) and Harry Johnson(1965) have introduced the concept of a public good. But their purpose is different. Cooper-Massell are concerned with the problem of "how membership in a customs union may enable a less developed country to achieve more economically the ends served by

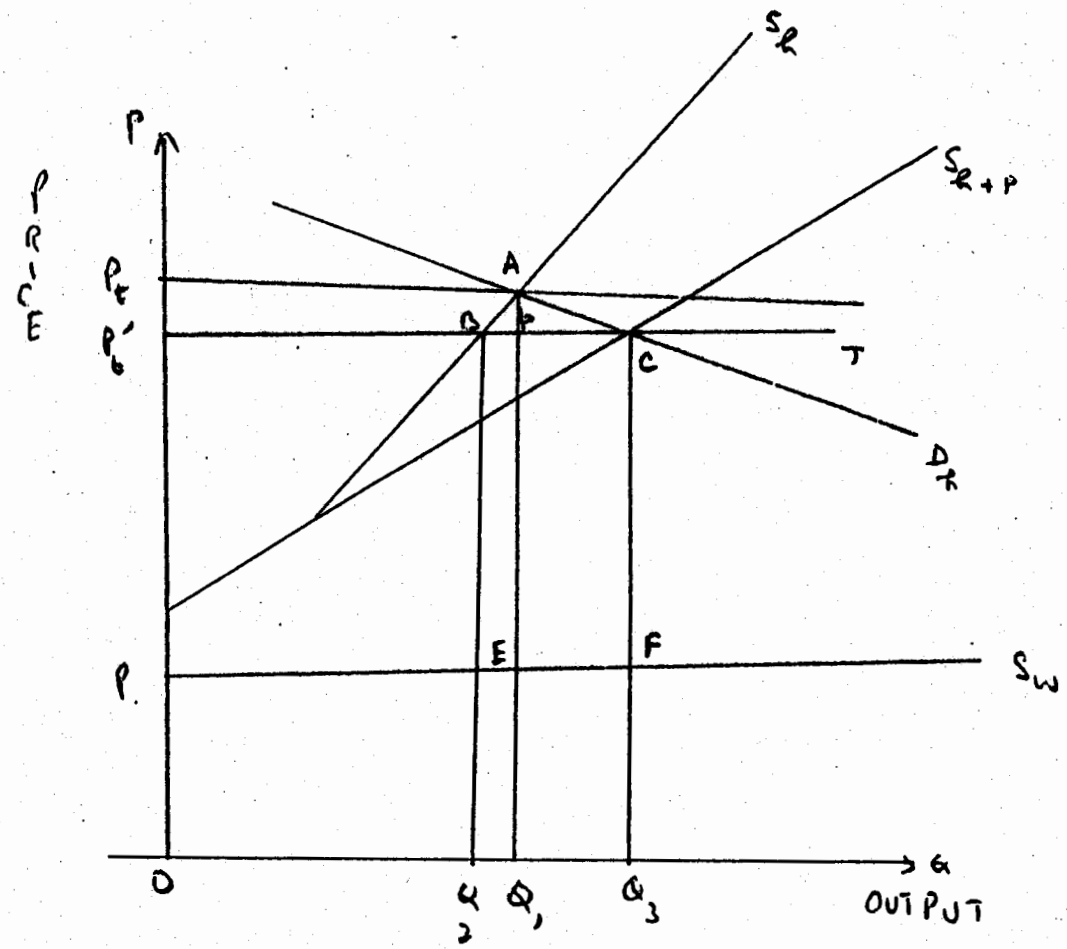


FIGURE 6

protection". Johnson is primarily concerned with establishing a theory that explains why governments behave as they do in their commercial policies.

Johnson's method is to assume that a government seeks to maximise the economic welfare of the community, defined in terms of public and private goods. He assumes the public good to take the form of " a collective preference for industrial production" which yields a flow of satisfaction to the electorate independent of the satisfaction they derive directly from the consumption of industrial products. The demand for collective consumption of industrial production, conceived as a homogeneous aggregate, and the cost of supplying it are shown in Figure 7, the former being represented by VV and the latter by Sh- Sh+u. Sh Sh represents the home supply curve, Sw St the world supply curve and DD the private demand curve for industrial production.

Under free trade, domestic production is OM, domestic consumption is OC and imports M M". Since the marginal value of the public good is greater than its marginal cost by PK so protection is required. The marginal excess cost of protection can be divided into a production and consumption cost component; the former being given as the difference between Sh Sh and Sw St, the latter as that between P Sh+u and P Sh. Welfare is maximised at point S where the marginal value of the public good is equal to its marginal cost. Output is OM', MM' greater than under free trade. Consumption is OM", and (1+t)Sf the domestic price including the necessary tariff. Tariff protection has increased welfare by PKS but this is still PSI less than that attainable with a direct production subsidy, the more efficient protection mechanism.

The analysis predicts that should the constraint on direct product subsidization be relaxed, output would increase to OM"' as would consumption from A' to A. The relevance of Johnson analysis for customs union theory is that it predicts their superiority as compared to unilateral

CUSTOMS UNION AND PUBLIC GOODS APPROACH

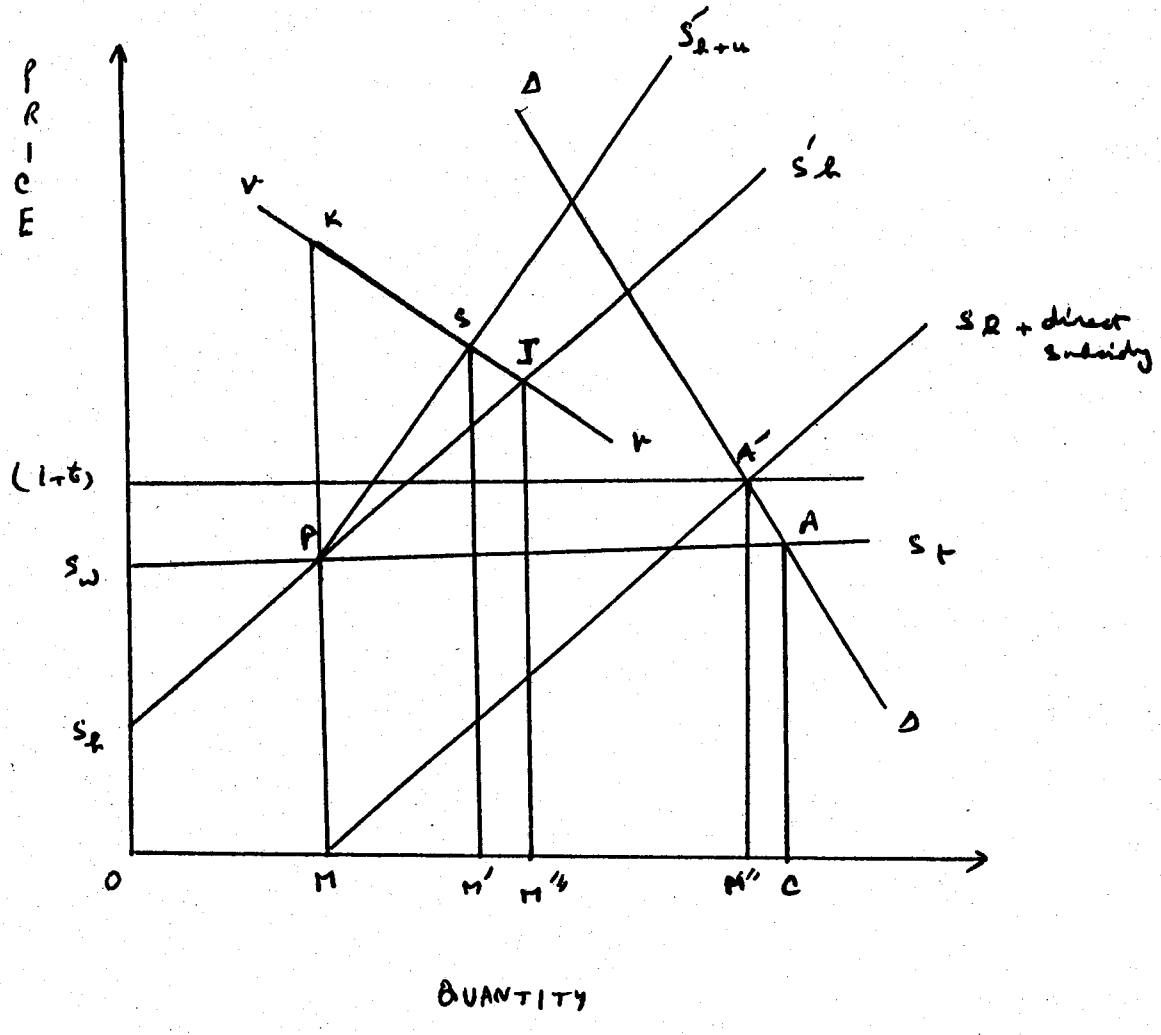


FIGURE 7

tariff policy when public goods are included in the community's social welfare function. This is due to the motivation, the public good provides for the tariff which enables a comparison of customs union and unilateral tariff policy as alternative mechanism of protection rather than trade liberalisation. Customs union in this case results in a welfare gain because of its potentialities for satisfying demand for public consumption at a lower cost in terms of foregone private consumption through a re-allocation of domestic resources from the less efficient import - competing sector to the more efficient export sector.

Cooper-Massell(1965) in another study of a developing economy stipulated a social preference for "industry" as the public good. The model assumes a heterogenous economy of individual producers of different industrial products, each producing under constant cost but at different levels of efficiency. The aggregate domestic supply curve of industrial production thus will take the form of a step function, with different industries ranked in ascending order according to costs. Such supply-of-industry curves for countries A and B are shown in figure 8. Since all industries are assumed to be uneconomic by definition, the cost of producing any particular item OK for shoes in country B or OH for coats in country A constitutes a measure of the private product foregone by producing each unit of the good at world market prices. To produce any given amount of industrial product at home, each country must impose an appropriate set of tariffs, one for each industry.

The curves Sa and Sb represent the supply curves of countries A and B respectively before joining a customs union. With customs union, there are new industries for the union as a whole shown by SU. Let us assume that prior to union the optimal levels of industrial output in both A and B are OM. In the latter country, OL of shoes are produced with tariff OK, and LM of pants with tariff OK' while in the former, OL of coats are produced with tariff OH and LM of shirts with tariff OH'.

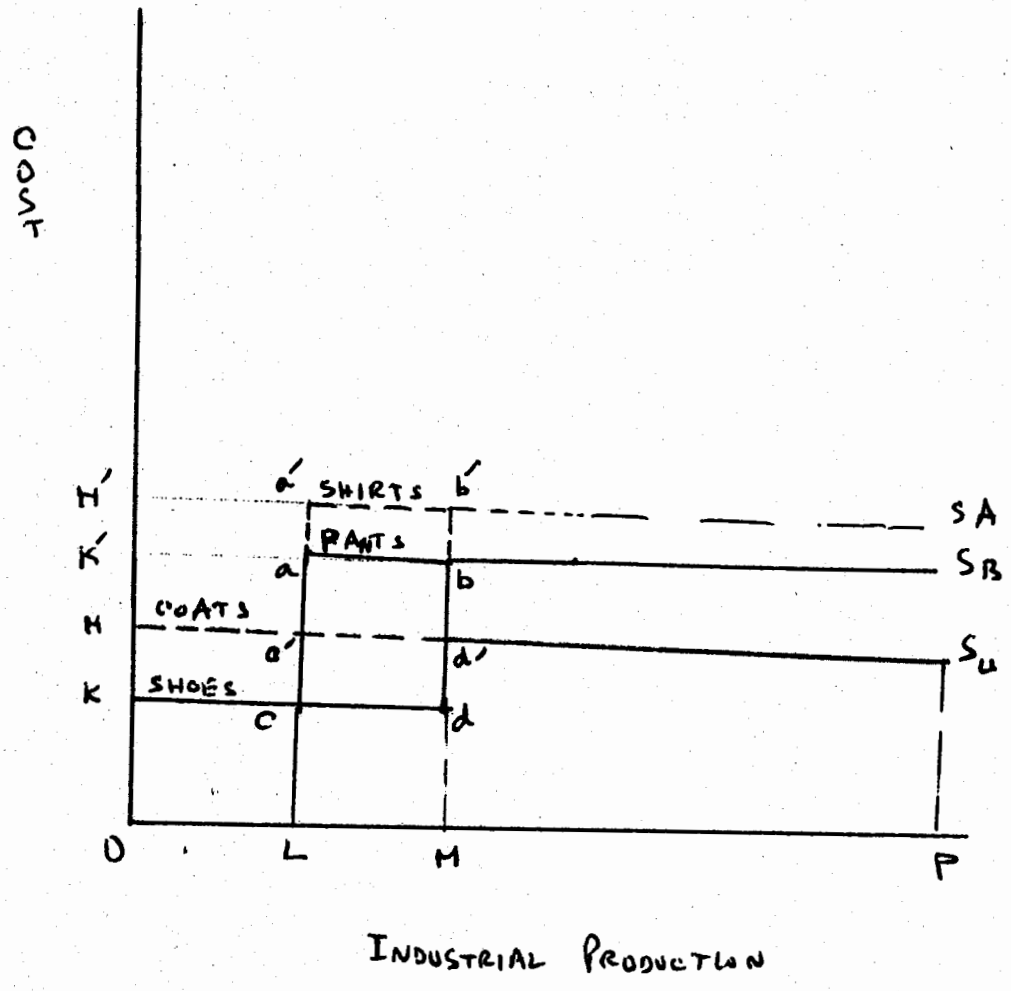

COST
H'
K'
H
K
a'
SHIRTS
b'
PANTS
a
b
COATS
a'
d'
SHOES
c
d
S_A
S_B
S_U
O
L
M
P
INDUSTRIAL PRODUCTION

FIGURE 8

With customs union and the new supply curve SU, it is possible for both countries to produce the same amount of industrial products, but at the lower cost in terms of private products. This is accomplished by having each partner specialise on that product in which it has an intra-union comparative advantage, so that OM of shoes is produced in country B and MP of coats produced in A. By producing twice as many shoes and coats and thus foregoing production of higher cost pants and shirts, a saving of real product equal to abdc in country B and a'b'd'c' in country A is achieved.

Johnson and Cooper-Massell analyses, by including public goods in the welfare criteria, represent a step forward in making an economic case for customs unions as opposed to unilateral tariff policy.

The effects of customs union on production and consumption surveyed so far are static. They involve a reallocation of resources in existing industries using existing supplies of the factors and existing technology.

Dynamic factors are the long term consequences of increased market size for the growth rates of the integrating region 3. The relationship between market size and growth rate is thought to operate through the following avenues:

1. Economies of scale, particularly internal to the plant;
2. External economies which include the enlarged pool of technological and managerial skills, economies of specialisation, inter-industry transmission of innovation and better use of discoveries and basic research;

3. More competetive market structure;
4. Elimination of risks and uncertainty from foreign transactions leading to expanded trade and investments.

The dynamic consequences are considered to be favourable to world welfare, for they result in higher incomes in the customs union. Moreover, through their positive effects on imports into the region, they are supposed to counter the static diversionary effect on non-participating countries.

That there were substantial gains from the economies of scale produced by a customs union was frequently used as an argument for British membership of the EEC prior to 1973. Using Harvey Leibenstein arguments on X-efficiency, it was pointed out that the UK economy needed a good shake up to reduce X-inefficiency 4.

Krause(1972) views these arguments as economic rationalizations for politically motivated decision but feels it difficult to refute. Krause also points out that the evidence rests on 'no theoretical rationale' and on the assumption that the supply curve is the average cost curve instead of the marginal cost curve.

The basic proposition of the "economies of scale" advocates that it may be better to concentrate production in an inefficient area than to produce partly in a high cost and partly in a low cost area. Otherwise, the economies of scale would be achieved in any case, so it is only in these circumstances that economies of scale provide an argument for a customs union.

Given that the partner country will produce a given quantity of the good anyway, it may be cheaper to produce it all there, even though at all levels of production the partner is less

CUSTOMS UNION AND ECONOMIES OF SCALE

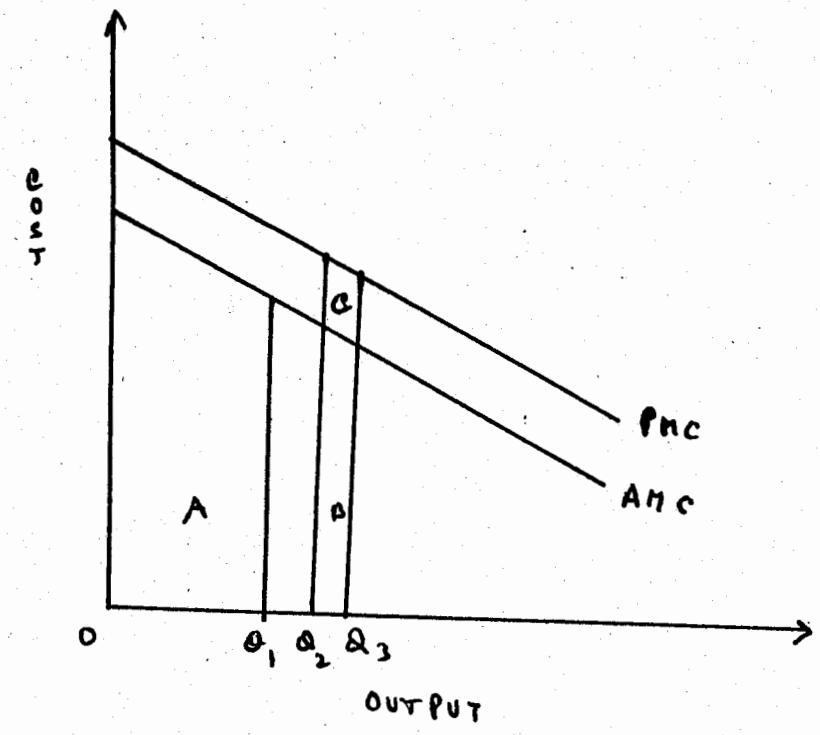


FIGURE 9

efficient than alternative producer. The figure 9 produces this case. Partner's marginal cost curve(PMC) is at all levels higher than the alternative producer's (AMC). Partner will produce Q2 whatever may happen. The country joining the union wishes to import Q1. Is it better to import it from the alternative (or produce it oneself if the domestic production is the alternative) with a resource cost of A or to import it from the partner? The cost of production in the partner country is (B+C), where Q3-Q2=Q1. Now (B+C) is less than A so it is desirable to produce in a high cost area. However, according to Krause, dynamic factors do not count much as a rationale for a customs union.

With this background we can explain our General Equilibrium model to estimate the effects of a customs union on the economies of member countries.

ASSUMPTIONS OF THE MODEL

The following are the main assumptions of the model:-

1. A customs union implies the removal of quantitative restrictions as well as the mutual abolition of import duties. Since, the effects of the removal of quantitative restrictions is difficult to measure, the model is confined to the consequences of the changed tariff structure.

2. Full employment prevails before and after the union is created, in other words, the volume of total production remains constant.

3. The members seek to maintain equilibrium in their balance of payments, i.e. in each country the changes in the value of imports must be equal to the changes in

the value of exports. Moreover, we assume that equilibrium exists in the balance of payments in the initial position, that is to say, the expenditure is equal to income.

4. Should disequilibrium occur in the balance of payments as a result of the modified tariff structure, these are corrected by adjusting the rate of exchange.

5. Domestic prices expressed in domestic currency remains unchanged.

6. Customs Union is composed of 9 countries namely Pakistan, Iran, Turkey, Bangladesh, Sudan, Tunisia and Morocco, Indonesia and malaysia.

7. The products are divided into 9 categories namely rice, petroleum products, cotton, jute, cotton yarn, cotton cloth, phosphate, natural rubber and wood. These commodities are numbered 1 to 9 respectively in the tables. The selection of nine countries and nine products result in a square matrix and help in the solution of model. In the import market, substitution takes place only between the products in the same category. This is shown by the elasticities of demand for imports.

8. The outsiders make no change in the value of their currency;i.e. corrections in their exchange rates are zero. The other corrections are expressed in the outsider's representative currency, dollar.

9. The prices of the export products in the country of origin and at the frontier of the importing country are equal to unity. The market price in the importing country is then 1+t, so that the market value of the imports is equal to the value of the imports plus the revenue from the import duty.

10. All countries forming customs union produce all 9 products. However, only one product may be called the export product, is both consumed and exported at the same time. The other 8 products are partly imported from other member countries. Pakistan exports rice, Iran petroleum products, Turkey cotton, Bangladesh jute, Sudan cotton yarn, Tunisia cotton cloth, Morocco phosphate, Indonesia rubber and Malaysia wood.

11. Elasticities of substitution of supply and demand are assumed to be equal as are elasticities of income for all countries and products.

We discuss the effects of customs union in three phases. In the first phase, we consider the consequences of abolishing all import duties on the countries forming a customs union. In this case, holding other things constant, prices in the import-competing industries would fall resulting in a decrease in their profits and cut down their production. The production factors thereby released can be put to work in the export industry. This happens on the supply side.

On the demand side, the abolition of the import duties entails two autonomous changes:1) an autonomous change in prices; and 2) a change in income resulting from the removal of the revenue from the import duties.

Let us consider Country 1. The reduction of income leads to a drop in demand for all products which, expressed in percentages, is the same for all products if the income elasticities are identical for all goods.

We assume provisionally that the balance of payments is in equilibrium in the initial situation, that is to say, the expenditure is equal to income. The expenditure equals the value of the consumption of the home product plus the market value of the import product.

We assume that the prices of the export products in the country of the origin and at the frontier of the importing country are equal to unity. The market price in the importing country is then 1+ t, so that the market value of the import product is equal to the value of the imports plus the revenue from the import duty(t).

The prices of products 2 to 9 amounting to 1+t in the initial situation, are reduced to 1 by the abolition of the import duty(t). The relative change is, therefore, t/1+t. The demand

for each of these products will now react to this change of price in accordance with the elasticity of demand.

The demand for product 1 will drop in accordance with the indirect elasticity of demand, in relation to the change in the price of product 2 to 9. The part of product 1which is not consumed by country 1 is exported, so that the supply of product 1 on the export market will increase by the same amount as domestic consumption decreases. Since product 2 to 9 are imported, their demand will go up.

The effect of the drop in price on real income is bound up in the formulae for the elasticities of demand and the effect on nominal income of the abolition of the import duty is expressed in the term yY, where y is the income elasticity of demand for the product and Y is the value of that product

The second phase analyses the consequences of the imposition of the common external tariff. Here the model tries to show that the adjustment of production requires a few years before a new equilibrium is achieved.

The situation in our case may not be one of equilibrium as the outsiders have no reason to make any changes in imports and exports. Moreover, changes in exports and imports in the member countries need not compensate each other. Price changes will, therefore, be necessary to create equilibrium in supply and demand. These changes will be discussed in the third phase.

COMPUTABLE GENERAL EQUILIBRIUM MODEL

Now we present our computable Macroeconomic General Equilibrium Model. It is a multi-equations model based on 9 OIC member countries and an outsider. The model for first phase showing abolition of import duties is given below:

$$Y = E \text{ --------} 1$$

Equation 1 shows the national income equilibrium condition with the value of output(Y) equal to the value of expenditure(E).

The model has 9 commodities. Country 1 exports commodity 1 only while meeting the domestic demand for products 2 to 9 partly from imports and partly from domestic production. Imports are subject to an ad valorem import duty(t). The price of a product in the domestic market is assumed as unity so the price of the imported commodity is (1+t).

In the first phase, we first calculate the changes in the value of output. This is done in 81 equations each for output and expenditure for 9 countries shown in matrix form. These 81 equations show that the change in the value of output (dY) of 9 goods depends on the sum of own and cross elasticity of supply (a) of these respective goods(729) times the change in their prices (dp) due to abolition of import duties, whole multiplied by the initial values of output. Similar is the case for expenditure. The equations show that the change in the value of expenditure on each good depends on the sum of own and cross elasticity of demand (n) of these respective goods(729) times the change in their prices (dp) due to abolition of import duties, whole multiplied by the initial value of expenditures.

We consider the elasticities of substitution of supply and demand together with the income elasticity of demand as the fundamental data from which the other elasticities, in particular the direct and indirect elasticities of supply and demand may be deduced. We have chosen the elasticity of substitution of supply and demand equal to one.

In order to calculate the micro-economic consequences of the customs union for various industries, it is important to ascertain the level of import duty which is imposed on the product concerned in the initial situation. Such a data is available in the directory of tariff schedules published by the Ankara centre. The Common External Tariff is assumed to be the average of the existing tariffs on imports.

We do not include the outsiders' structure of production and expenditure. This has been omitted because it would be pointless to attempt to specify the consequences of the customs union on the production and expenditure of such a completely heterogeneous group as the outsid ers. Nevertheless, by making a simplified assumption it is possible to round off the model and

determine the effects of the customs union on trade with the outsiders.

Although the outsiders participate directly in the third phase, their role is a secondary one because the two equilibrium conditions relate only to the export products of the union countries and not to the export product of the outsiders. The outsiders played the part of producers and consumers of products from other countries and thus helped to restore the disturbed balance.

The outsiders fulfill this task in expanding or reducing their imports because an increase in expenditure plus a decrease in the production of a home commodity competing with imports is equivalent to an increase in imports. We also assume that the outsiders will react to changes in the prices of the products imported from the member countries in accordance with the partial elasticities of imports.

As an example, we show the case of country 1 only, with equations represented in matrix form.

Let Y be a vector of change in money value(dy) for 9 commodities. For 9 countries, this comes to 81 equations, H is a diagonal matrix of initial values of these commodities(QP) for these 81 items, where Q stands for quantity and P for prices. E is a matrix of own and cross price elasticities(a) and P is a vector of changes in prices(dp) of these commodities. Then we can write,

$$Y = H\,E\,P \quad (1)$$

where

$$Y = \begin{bmatrix} dy1 \\ dy2 \\ --- \\ dy9 \end{bmatrix},$$

$$H = \begin{bmatrix} QP1 & 0 & 0 & --- & 0 \\ 0 & QP2 & 0 & --- & 0 \\ 0 & 0 & QP3 & -- & 0 \\ ---------- & & & & \\ 0 & 0 & 0 & --QP9 & \end{bmatrix}$$

$$E = \begin{bmatrix} a1 & a2 & ------- & a9 \\ a10 & a11 & -- & a18 \\ a19 & a20 & -- & a27 \\ ---------- & & & \\ a73 & a74 & ---- & a81 \end{bmatrix}, \quad P = \begin{bmatrix} dp1 \\ dp2 \\ -- \\ dp9 \end{bmatrix}$$

On the demand side, a change in money expenditure(dE) is the sum of own and cross price elasticity of demand (n) respective goods times the change in their prices due to abolition of tariffs(dP)whole multiplied by the initial value of expenditure(XP). In matrix form,

$$\begin{bmatrix} dE1 \\ dE2 \\ --- \\ --- \\ dE9 \end{bmatrix} = \begin{bmatrix} XP1 & 0 & 0-- & 0 \\ 0 & XP2 & -- & 0 \\ --------- & & & \\ --------- & & & \\ 00- & XP9 & & \end{bmatrix} \begin{bmatrix} n1 & n2 & ---- & n9 \\ n10 & n11 & --- & n18 \\ ---------- & & & \\ ---------- & & & \\ n72 & n73 & -- & n81 \end{bmatrix} \begin{bmatrix} dP1 \\ dP2 \\ --- \\ --- \\ dP9 \end{bmatrix}$$

The change in prices in various commodities due to abolition of import duties will be calculated as follows:

$$P = \begin{bmatrix} dP1 = 0 \\ dP2 = -t/(1+t) \\ dP9 = 0 \\ dP10 = -t/(1+t) \\ dP18 = 0 \\ dP81 = -t/(1+t) \end{bmatrix}$$

In the second phase, we show the changes after the imposition of common external tariff. These equations show the changes in the value of output due to a tariff on imports from outsiders only.

We use the following equations to show the supply side:

$$\begin{bmatrix} dY1 \\ dY2 \\ \vdots \\ dY9 \end{bmatrix} = \begin{bmatrix} QP1\ 0 & \cdots & 0 \\ 0 & QP2 & 0 \\ \cdots & \cdots & \cdots \\ 0 & 0 & QP9 \end{bmatrix} \begin{bmatrix} a1\ 0\ 0 & \cdots & 0 \\ 0\ a2 & \cdots & 0 \\ \cdots & \cdots & \cdots \\ 0 & \cdots & a81 \end{bmatrix} \begin{bmatrix} dP9 \\ dP9 \\ \vdots \\ dP9 \end{bmatrix}$$

On the demand side, the equations show the effect on the change in nominal expenditure after a tariff on the imports from outsiders. We have:

$$\begin{bmatrix} dE1 \\ dE2 \\ \cdots \\ \cdots \\ dE9 \end{bmatrix} = \begin{bmatrix} XP1\ 0\ \cdots\ 0 \\ 0\ XP2\ \cdots\ 0 \\ \cdots\ \cdots\ \cdots\ \cdots \\ \cdots\ \cdots\ \cdots\ \cdots \\ 0\ 0\ \cdots\ XP9 \end{bmatrix} \begin{bmatrix} n1\ 0\ 0\ \cdots\ 0 \\ 0\ n2\ 0\ \cdots\ 0 \\ \cdots\ \cdots\ \cdots\ \cdots \\ \cdots\ \cdots\ \cdots\ \cdots \\ 0\ 0\ 0\ \cdots\ n81 \end{bmatrix} \begin{bmatrix} dP10 \\ dP10 \\ \cdots \\ \cdots \\ dP10 \end{bmatrix}$$

In the second phase, there are no duties on imports from member countries, so the prices of home products competing with imports are equal to unity. While the change in price of the imported good from outsider will be equal to common external tariff, i.e., dP10=t10.

The model of the third phase now indicates that in the state of equilibrium, the sum of changes in suply after the establishment of a customs union must be equal to the sum of changes in demand. This is essential because a disequilibrium appears between supply and demand after the second phase as the changes in supply and demand have opposite signs and increase in demand is reinforced by a decrease in supply, and vice versa. The changes in production and demand resulting from the first and second phases are denoted by dY and dE respectively. In matrix form, the equilibrium in our 10 country model is shown as:

dY1		QP1 0 --- 0		a1 a2 --- a9	dP1	
dY2		0 QP2 -- 0		a10 a11 --a19	dP2	
---	+	----		----------	---	=
---		----------		----------	---	
dy		0 QP9		a72 a73--a81	dP9	

dE1		XP1 0 --- 0		n1 n2 --- n9	dP1
dE2		0 XP2 -- 0		n10 n11 --n18	dP2
---	+	----------		----------	---
---		----------		----------	---
dE9		0 0--XP9		n72 n73 --n81	dP9

The deficit in demand dE, which is the primary effect resulting from the abolition of import duties and the imposition of an external tariff, must be compensated by a rise in demand brought about by price changes.

For the solution of the model, we will use the changes in production and expenditure resulting from the first and second phases. As a result we get 81 equations containing the price changes as 81 unknown variables. This gives us the solution values of 81 dPs.

Using the prices found, we then calculate the changes in supply and demand for the 9 commodities. The changes in production and expenditures are now calculated by inserting the

prices found in the relevant equations and then multiplying the resultant changes by income and expenditure in the initial situation.

We can now gather-in the harvest of all changes brought about by the customs union. The final result is found by adding together the changes in the three phases.

We have chosen in our model an adjustment of the export price level as the instrument designed to restore equilibrium. It might be asked what the relation is between a price change and a possible alteration of the exchange rate. In the present case, the relation is particularly straightforward, since the percentage devaluation or appreciation with respect to dollar is equal to the fall or rise in price of the exported product. As the total volume of production remains unchanged, the remuneration of the production factors must increase or decrease by the same percentage as the value of the production at factor cost. Now, it makes no difference whether we let all prices in national currency rise by a certain percentage, with the outsiders'prices remaining constant, or whether we keep our own price level constant, and appreciate the value of our currency.

CHAPTER V

ESTIMATION OF THE MODEL

Having demonstrated the theoretical model in the previous chapter, we illustrate the operations of the customs union model by taking statistical data of the selected nine member countries.These countries are Indonesia,Malaysia, Bangladesh, Pakistan, Iran, Turkey, Sudan, Tunisia and Morocco. The selection of these countries was made on geographical basis. I have tried to cover the whole Muslim world stretching from Indonesia to Morocco. For the estimation of the model, we needed the output of our 9 commodities in the 9 countries. The commodities are selected on the basis of value of output produced and exported. The commodities selected are Natural Rubber, Wood, Jute, Rice, Petroleum, Cotton, Cotton Yarn, Cotton Cloth and Phosphate. It is assumed that each country exports only one commodity. So Pakistan exports rice, Iran exports petroleum, Turkey exports cotton, Bangladesh jute, Sudan cotton yarn, Tunisia cotton cloth, Morocco phosphate, Indonesia natural rubber and Malaysia wood. The data is available in the various U.N publications for the year 1990. The prices of these commodities were taken from International Financial Statistics by I.M.F. The value of these commodities given in dollars is shown in Table-1.

TABLE I

THE STRUCTURE OF PRODUCTION IN THE NINE MEMBER COUNTRIES (1990)

($ U.S.m.)

COMMODITIES → COUNTRIES ↓	1	2	3	4	5	6	7	8	9
PAKISTAN	2019.7	1042.8	1921.1	0.41	1049.9	660	4.5	0	5328
IRAN	774.4	9520.9	154.4	0.82	206.2	550	2.1	0	1554
TURKEY	138	3757.2	771.9	0	543.7	205	20	0	3330
BANGLADESH	11579	272.2	14.5	370.3	103.1	75	2.9	0	6660
SUDAN	0.4	212	198	0	0	103	0	0	4884
TUNISIA	0	275.5	0	0	28.1	39	32	0	666
MOROCCO	1.7	1141	13.2	0	32.8	12	39.8	0	444
INDONESIA	18702.2	43.2	4	10	347	9.5	23.4	47.1	39072
MALAYSIA	729.3	1670	0	0	42.2	248	0	53.3	11100

Source: U.N.O. National Income Statistics, 1990 (7)
U.N.O. Statistical Yearbook, 1990 (8)
I.M.F. national financial Statistics,
Yearbook, 1990. (9)

The rows in Table 1 shows countries and the columns show commodities. It shows production value of the nine selected commodities numbered 1 to 9 (rice, petroleum, cotton, Jute, cotton yarn, cotton cloth, phosphate, Natural rubber and wood.) respectively in the nine member countries in U.S. million dollars for the year 1990. For example, Pakistan produced rice of $ 2019.7 m. petroleum of $ 1042.8 m. cotton of $ 1921.1m. jute of $0.41m. cotton yarn of 1049.9m. cotton cloth of $660m. phosphate of $4.5m. A zero shows that Pakistan is not producing any amount of natural rubber, while Pakistan is producing wood of $5328m. Similar is the case for other countries. As rubber is produced only in Indonesia and Malaysia, so we find a zero for the other seven countries. Similarly, Jute is produced mainly in Bangladesh so a small value appears in some of the countries like Pakistan, Iran and Indonesia. Other points to note are that rice

is not produced in Tunisia, cotton is not produced in Tunisia and Malaysia while Bangladesh, Morocco and Indonesia produce only a small amount. Phosphate is not produced in Sudan and Malaysia. We have included cotton yarn in our list of commodities as it is largely produced in our member countries. Incidentally, it has been allotted to Sudan as an export commodity which is not producing any cotton yarn.

For the calculation of expenditures, we add value of imports to domestic output. The trade data is taken from Direction of Trade Statistics by I.M.F. and is shown in Table 2.

TABLE II

MOVEMENT OF TRADE IN 9 GOODS BETWEEN THE MEMBER COUNTRIES MUTUALLY (IN $ U.S.m.) 1990

IMPORTS FROM → EXPORTS TO ↓	PAKISTAN	IRAN	TURKEY	BANGLADESH	SUDAN	TUNISIA	MOROCCO	INDONESIA	MALAYSIA
PAKISTAN	---	140	21	10.3	12.5	1.2	2.5	6	45.3
IRAN	77.3	---	945	32.9	0	0	0	0	6.3
TURKEY	0	590	---	0.2	27	1.8	0.4	0	0
BANGLADESH	39.7	3.5	1.5	---	3	0	1.6	4	0
SUDAN	19.7	0	8.9	12.3	---	0	0	0.4	0
TUNISIA	0	39	0	7	5	---	0	0	0
MOROCCO	0	14	0	2.2	0.4	0.2	---	0	0
INDONESIA	0.3	97	8.3	0.2	20	2.5	0	---	0
MALAYSIA	3.7	44	0.4	0.2	20	2.5	0	0	---

SOURCE: I.M.F. DIRECTIONS OF TRADE STATISTICS, 1990 [10]

Table II shows the value of import and export of the selected nine commodities for the nine member countries in U.S.million dollars for the year 1990. The rows of Table II show imports from other member countries and columns show exports to other member countries. It is assumed in the model each country exports only one commodity to the member countries of our customs union. So Pakistan exports rice, Iran petroleum, Turkey cotton, Bangladesh Jute, Sudan cotton yarn, Tunisia cotton cloth, Morocco Phosphate, Indonesia natural rubber and malaysia Wood.For example, Pakistan exports rice of $140m. to Iran, $41m. to Turkey, $10.3m. to Bangladesh, $12.5m. to sudan, $1.2m. to Tunisia, $2.5m. to Morocco, $6m. to Malaysia, 445.3m. to Malaysia.

The table shows that Pakistan does not import cotton from Turkey, cloth from Tunisia and phosphate from Morocco. Malaysia is not exporting its wood to Morocco and Indonesia. Morocco is exporting its phosphate only to Iran, Bangladesh, Sudan and Tunisia. Tunisia is exporting cloth only to Iran, Bangladesh and sudan. Iran is exporting its petroleum to Pakistan, Turkey, Bangladesh and Malaysia. Pakistan and Indonesia are the only countries that are exporting their products to all the other member countries.

The structure of expenditure of the nine member countries on various goods is given in Table 3. This table is calculated by adding the values of goods produced and imported by the respective countries in U.S. million dollars for the year 1990. The commodities are shown in the columns and countries in the rows. For example, in the case of Pakistan represented in row one, column one shows the expenditure made on rice is (2019.7+0=2019.9)as rice is produced and not imported. Column two shows the value of output and imports added as expenditure made on petroleum is (1042.8+140=1182.8), column three shows expenditures made on cotton is (1921.1+21=1942.1), column four shows expenditures on jute is (0.41+10.3=10.71),

column five shows expenditure on cotton yarn is (1049.9+12.5=1062.4), column six shows expenditures on cotton cloth is (660+1.2=661.2), column seven shows expenditures on phosphate is (4.5+2.5=7.0), column eight shows expenditures on natural rubber is (0+6=6)as natural rubber is not produced in Pakistan and column nine shows expenditures made on wood is (5328+45.3=5373.3).

TABLE 111

THE STRUCTURE OF EXPENDITURE (1980) THE NINE MEMBER COUNTRIES

($ U.S.m.)

COMMODITIES → COUNTRIES ↓	1	2	3	4	5	6	7	8	9
PAKISTAN	2019.7	1182.8	1942.1	10.71	1062.4	661.2	7	6	5373.3
IRAN	851.7	9520.9	1099.4	33.72	206.2	550	2.1	0	1560.3
TURKEY	138	4347.2	771.9	0.2	570.7	206.8	20.4	0	3330.0
BANGLADESH	11618.7	275.7	16	370.3	106.1	75	4.5	4	6660.0
SUDAN	20.1	212	206.9	12.3	0	103	0	0.4	4884.0
TUNISIA	0	314.5	0	7	33.1	39	32	0	666.0
MOROCCO	1.7	1155	13.2	2.2	33.2	12.2	39.8	0	444.0
INDONESIA	18702.5	140.2	12.3	10.2	351	11.9	23.8	47.1	39074.0
MALAYSIA	733	1714	0.4	0.2	62.2	250.5	0	53.3	11100

SOURCE: THIS TABLE WAS COMPILED BY ADDING TABLES I AND II.

Table III shows that Iran and Turkey are neither producing natural rubber nor importing it from Indonesia. Sudan is neither producing nor importing cotton yarn.

In order to calculate the micro-economic consequences of the customs union for the various branches of industry, it is particularly important to ascertain the level of the import duty which is imposed on the product concerned in the initial situation. This level varies from one product to another. The tariff data for the OIC member countries are available in a SESRTCIC study 6.

With Table IV, we start with the estimation of the model.

TABLE IV

CHANGES IN PRODUCTION AFTER ABOLITION OF IMPORT DUTIES (PHASE-I)

(1990) ($ U.S. m.)

COMMODITIES → COUNTRIES ↓	1	2	3	4	5	6	7	8	9	TOTAL CHANGE IN VALUE
PAKISTAN	1029.4	-532.1	-3859	-0.06	-535.8	-310.4	1.87	0	-3891	-8101
IRAN	-434.1	940.9	-86.2	0.03	-136.6	-213	0.57	0	-293.6	-222
TURKEY	-67.7	-1845	130.4	0	-320.5	-100.5	-3.4	0	-969.2	-3176
BANGLADESH	4630	-287.6	-3.3	148.1	-12.2	30	-3.3	0	-4130.1	371.6
SUDAN	0.17	-105	-209.6	0	0	-108.6	0	0	-1774.9	-2198
TUNISIA	0	-127.6	0	0	-9.6	5.6	-3.1	0	-42.1	-176.8
MOROCCO	-0.3	-931.3	-6	0	-7.7	3.4	11.3	0	-24.9	-955.6
INDONESIA	4804.9	-24.2	-0.6	-5.8	-132	-3.8	6	12.1	-10279	-5622
MALAYSIA	128.5	-1634.6	0	0	-41.2	4.6	0	1	207.3	-1334

SOURCE: THE ESTIMATES ARE BASED ON THE MODEL FOR PHASE I.THE PRODUCTION DATA USED IS GIVEN IN TABLE I. THE ELASTICITIES OF SUPPLY ARE CALCULATED BY THE FORMULA DERIVED IN APPENDIX IV-II. THE CHANGES RESULT DUE TO FALL IN PRICES AFTER THE ABOLITION OF IMPORT DUTIES AMONG THE CUSTOM UNION MEMBERS.

TABLE IV shows changes in the production of nine commodities due to the abolition of customs duties among the nine union members.These changes are

calculated with the help of direct and cross price elasticities of supply. All direct price elasticities are taken as positive and all cross price elasticities have a negative sign. Prices in the domestic market go down as a result of the abolition of the customs duties. As prices fall, a change in price has a negative sign. Since each country has an export commodity that is not imported so it shows no change in price. For Pakistan, the change in output of rice is calculated below as given in the first equation of phase one of the model.

$$dY = QP1[a1dp1 + a2dp2 + a3dp3 + a4dp4 + a5dp5 + a6dp6 + a7dp7 + a8dp8 + a9dp9]$$

$$dY = 2019.7[1.84(0) + (-0.087)(-0.51) + (-0.13)(-0.73) + (-0.0003)(-0.33) + (-0.07)(-0.31) + (-0.03)(-0.49) + (-0.004)(0) + (0)(-0.38) + (-0.53)(-0.62)] = 1029.439$$

Here dy = change in output of rice in Pakistan

a1 = direct price elasticity of supply

a2--a9 = cross price elasticities of supply

dpi = change in the price of ith commodity due to abolition of import duty.

The first term in the bracket shows positive direct price elasticity of demand for rice as 1.84. This is calculated with the formula given in appendix IV-B.

The formula for direct value elasticity is:

$$a1 = S(1-qx1) + 1$$

Here S stands for elasticity of substitution of supply which is assumed as one. qx stands for the share represented by the value of the production of a certain product in the total value of the products in any country. Putting the values, we get

$$a1 = 1(1 - 2019.7/12026) + 1 = 1.84$$

The formula for indirect(cross) elasticity of supply is:

$$a2 = -s\ qx2$$

Putting the values, we get

$$a2 = -1(1042.8/12026) = 0.087$$

The change in the price level due to abolition of tariffs(dP)is calculated by the following formula:

$$dp = t/1 + t$$

Putting the values, we get

$dp1 = 0$ as the commodity is not imported, so there is no change in the price of rice.

$$dp2 = 1.05/1 + 1.05 = 0.51$$

The other values of table IV are calculated in the same way. The values in the principal diagonal give positive changes while the output of other commodities shows a fall in output. In some cases there are no changes as the country is not producing the concerned commodity. Since the prices in the import-competing industries fall, these industries will suffer losses as a result of which they will be forced to cut down their production. The production factors thereby released can be put to work in the export industry which has

shown an increase in output. This is the reason of having positive values in the main diagonal which shows the exported commodity. The last column shows the net change in the production of nine commodities. All countries except Bangladesh have shown a fall in output due to a fall in prices as a result of abolition of customs duties. The net change of production in Bangladesh is positive as it imposes no duty on the import of rice and so has no effect on the price due to abolition of duty. Rice being the largest valued commodity shows an increase in output affecting the overall result.

TABLE V shows changes in the expenditure of nine commodities due to the abolition of customs duties among the nine union members. These changes are calculated with the help of direct and cross price elasticities of demand and income elasticity of demand. All direct price elasticities are taken as negative and equal to one, all cross price elasticities are taken as zero while income elasticity of demand is taken as plus one. Prices in the domestic market go down as a result of the abolition of the customs duties. As prices fall, a change in price has a negative sign. Since each country has an export commodity that is not imported so it shows no change in price. Income elasticity of demand is taken as one.

For Pakistan, the change in demand for rice is calculated below as given by the first equation of phase one of the model. The equation is:

$$dE1 = XP1[n1dp1 + n2dp2 + n3dp3 + n4dp4 + n5dp5 + n6dp6 + n7dp7 + n8dp8 + n9dp9 + udy]$$

$$= 2019.7[1(0) + 0(-0.51) + 0(-0.73) + 0(-0.33) + 0(-0.51) + 0(-0.49) + 0(0) + 0(-0.38) + 0(-0.62) + 1(-3.15) = -6362.1$$

The other values are calculated in the same way. The change in Pakistan's income due to abolition of tariffs is calculated as below:

$$dy = qy1(dp1) + qy2(dp2) + qy3(dp3)\text{---}qy9(dp9)\text{-}qm(t)$$

$$= qy1 + qy2 + qy3 + qy4 + qy5 + qy6 + qy7 + qy8 + qy8(-t/1 + t)\text{-}$$

$$qm(t)$$

where qy = production share, it indicates the share of the value of the particular product in the value of the total expenditure.

qm(t) = changes in revenue from the import duty as a percentage of the national expenditure. For example, if the import duty is t = 20% and the imports amount to half the total expenditure, qm = 0.5, the revenue from the import duty will be 0.5x20% of the national expenditure. The numerical value for the change in Pakistan's income (dy)due to abolition of import duties is calculated below:

$$dy = (1 + 0.88 + 0.99 + 0.04 + 0.99 + 0.99 + 0.64 + 0 + 0.99) \quad (-0.48)\text{-}$$

$$0.02(0.93) = -3.13\text{-}0.02 = -3.15$$

The rest of the values are calculated in the same manner and is shown in table V.

TABLE V

CHANGES IN EXPENDITURE AFTER ABOLITION OF IMPORT DUTIES

(PHASEI)

(1990)

($ U.S. m.)

COMMODITIES → COUNTRIES↓	1	2	3	4	5	6	7	8	9	Total change
Pakistan	-6362	-3123	-4674	-30.2	-2805	-1759	-22.1	-17	-13594	-32385.3
Iran	-979	-14091	-1264	-48.9	-227	-633	-3.11	0	-1950	-51573.31
Turkey	-211	-6651	-1436	-0.31	-844	-316	-34.5	0	-5428	-14920.81
Bangladesh	-31254	-540	-37.8	-996	-258	-202	-10.4	-8.3	-14519	-47825.5
Sudan	-40.6	-322	-263	-19.4	0	-131	0	-0.8	-8010	-8786.8
Tunisia	0	-107	0	-4.4	-13.2	-24.6	-16.3	0	-360	-525.5
Morocco	-2.4	-1271	-16.9	-3.4	-46.2	-18.1	-65.7	0	-657	-2080.7
Indonesia	-28428	-156	-16.2	-12.3	-299	-16.5	-36.2	-72	-49233	-78269
Malaysia	-374	-874	-0.2	-0.1	-31.7	-128	0	-27	-5661	-7096

SOURCE: This table is based on the model of expenditure for phase I.The elasticities of demand are calculated by the results derived in Appendix II.The changes result due to a fall in prices and income due to abolition of customs duties among the members.

The results in the table have a negative sign showing a fall in demand. This happens due to a fall in income resulting from the removal of the revenue from the import duties. The reduction in income leads to a drop in demand for all products as the income elasticity is identical for all products. For Pakistan,the demand for rice falls by $6362m. The demand for petroleum falls by $3123m. The expenditures on cotton fall by $4674m. The expenditures on jute fall by $30.2m. The expenditure on cotton yarn falls by $1759m. The expenditure on phosphate falls by $22.1m. The expenditure on rubber falls by $16.6m. and the expenditure on wood falls by $13594m. The total reduction in expenditures due to abolition of import duties are $32385.3m. The zeroes in the table

show that this product is neither produced in this country nor imported from the member countries.

From now on we start with the second phase of our model. This phase shows imposition of the common external tariff. Table VI shows the effects on production on nine commodities in the nine member countries in $U.S.m. These changes are calculated with the help of direct and cross price elasticities of supply. All direct price elasticities are taken as positive and all cross price elasticities are given a negative sign. Prices in the domestic market go up as a result of the imposition of common external tariff on imports from rest of the world. The effects on the production of commodities in the nine member countries are positive due to a rise in their prices. As we have associated one export commodity to each of the country, so a rise in the price of this commodity has no effect on the supply in that particular commodity as this is not imported. Hence we find a zero in the main diagonal of our table. Other zeroes in the table show that the country is not producing this commodity. The common external tariff is taken as average of import duties of nine commodities in the nine countries which comes to 50 %. So the change in price due to this duty is 33 %.

TABLE VI

CHANGES IN PRODUCTION AFTER PHASE II, 1990 OF COMMON EXTERNAL TARIFF

($ U.S.m)

COMMODITIES→ / COUNTRIES↓	1	2	3	4	5	6	7	8	9	TOTAL
PAKISTAN	0	344	634	0.1	346.5	218	346.5	0	1758	3647.1
IRAN	255.6	0	51	0.3	68	182	0.7	0	613	1070.6
TURKEY	46	1240	0	0	179	68	20	0	1099	2652
BANGLADESH	3821	90	4.8	0	34	25	1	0	2198	6173.8
SUDAN	0.1	0	65	0	0	34	0	0	1612	1711.1
TUNISIA	0	91	0	0	9.3	0	10.6	0	220	330.9
MOROCCO	0.6	377	4.4	0	10.8	4	0	0	146.5	543.3
INDONESIA	6172	14.4	1.3	3.3	115	3	8	0	12894	19211
MALAYSIA	241	551	0	0	14	82	0	17.6	0	905.6

SOURCE: This table is based on the model of production for phase II.The common external tariff is put at 50 % calculated as the average of existing tariffs on the nine commodities.The elasticities of supply for the export product is taken as zero while others are taken as one.

For Pakistan, the change in output of petroleum is calculated below as given by the second equation of phase two of the model.

$$dy2 = qp2[a2(dp2)]$$
$$= 1042.8[1(0.33)]$$
$$= 344.1$$

Here dy2 =change in output of petroleum in Pakistan.

a2=price elasticity of supply

dp2=change in price of petroleum due to imposition of common external tariff.

The other values in table VI are calculated in the same way.

Table VII shows changes in the expenditure of nine commodities due to imposition of common external tariff. These changes are calculated with the help of direct and cross price elasticities of demand and income elasticity of demand. All direct price elasticities of demand are taken as zero, all cross price elasticities are taken as negative and equal to one while income elasticity of demand is taken as plus one. Table VII shows the effects on the demand for the nine commodities due to the imposition of common external tariff. There are two opposite effects on demand. One is the income effect and the other is the price effect. As the revenue from the tariff on imports from the rest of the world increases, demand for imports increases. On the other hand, common external tariff increases the prices of imports from the rest of the world. Thus there is a fall in the demand for imports from the rest of the world. The demand for exported commodity within the customs union increases due to increase in income. The majority of goods show a fall in demand as price effect is stronger than income effect. The last column shows the net effect with a fall in demand for all commodities as tariff is imposed on imports from the rest of the world.

TABLE VII

CHANGES IN EXPENDITURE AFTER IMPOSITION OF COMMON EXTERNAL TARIFF (PHASE II)

(1990) ($ U.S. m.)

COMMODITIES→ COUNTRIES↓	1	2	3	4	5	6	7	8	9	TOTAL
PAKISTAN	101	-331	-541	-3	-297.6	-185	-2	-1.7	-1505	-2765.3
IRAN	-247	381	-319	-10	-60	-160	-0.6	0	-453	-868.6
TURKEY	-41	-1435	23	-.1	-171	-62	-6	0	-999	-2691.1
BANGLADESH	-3486	-91	-5	11	-32	-23	-1.4	-1	-1998	-5626.4
SUDAN	-6	2	-66	-4	0	-33	0	-0.2	-1563	-1670.2
TUNISIA	0	-98	0	-2	-10.3	0.8	-10	0	-206	-326.1
MOROCCO	-0.5	-358	-4	-0.7	-10	-4	0.8	0	-138	-514
INDONESIA	-5798	-43.5	-4	-3.2	-109	-4	-7	0.9	-12113	-18080.6
MALAYSIA	-235	-549	-0.1	-0.1	-20	-80.2	0	-17	111	-789.4

SOURCE: This table is based on the model of expenditures for phase II.The price elasticities of demand are taken as minus one while for the export commodity, a price rise has no effect due to common external tariff as it was not imported from rest of the world..The income elasticity of demand is also one.

Table VIII shows the operation of phase III of the model.The situation which arises after the second phase is not one of equilibrium, for supply and demand are no longer balanced. The changes in supply and demand always have the opposite sign, so that the increase in supply is reinforced by the fall in demand. The model of the third phase now indicates that, in the state of equilibrium, the sum of the changes in supply must be equal to the sum of changes in demand. To calculate the resultant gap between demand and supply, we have added together the changes that have occurred in the two phases in the nine member countries. The sum of changes in production of nine commodities in the two phases is shown in table VIII. The last row of this table shows the total change in the production of a commodity for the customs union as a whole.

TABLE VIII

SUM OF CHANGES IN PRODUCTION AFTER TWO PHASES

(1990)($ U.S. m.)

COMMODITIES → COUNTRIES ↓	1	2	3	4	5	6	7	8	9	TOTAL CHANGE IN VALUE
PAKISTAN	1029.4	-188.1	-3225	0.4	-189.3	-92.4	348.37	0	-2133	-4449.63
IRAN	-178.5	940.9	-35.2	3.03	68.6	-31	1.27	0	-319.4	-1088.5
TURKEY	-21.7	-605	130.4	0	-141.5	-32.5	-16.6	0	-129.8	-523.9
BANGLADESH	8451	-197.6	1.5	148.1	21.8	55	-2.2	0	-1932.1	6545.5
SUDAN	0.27	-105	-144.6	0	0	-74.6	0	0	-162.9	-486.83
TUNISIA	0	-36'.6	0	0	-0.3	5.6	7.5	0	-1554.9	-1578.7
MOROCCO	0.3	-554.3	-1.6	0	3.1	7.4	11.3	0	-121.6	-412.2
INDONESIA	10976.9	-9.8	0.7	-2.5	-17	-0.8	14	12.1	2615	13588.6
MALAYSIA	369.5	-1083.6	0	0	-27.2	86.6	0	18.6	207.3	-428.8
total change in value	20627.17	-1839.1	-3273.8	149.03	-281.8	-76.7	396.84	30.7	-2389.8	13342.54

SOURCE: THE TABLE IS CALCULATED BY ADDIND THE VALUES OF TABLE IV AND VI.

The sum of changes in the expenditure on nine commodities in the two phases is shown in table IX. The last row of this table shows the total change in the expenditure of a commodity for the customs union as a whole.

Our model in not in equilibrium as the change in production is not equal to change in expenditre. For example, change in production in rice in all the nine countries shows an increase in production of $ 20627.17 m. while the expenditures on rice shows a decline of $ 77364.5 m.

TABLE IX

SUM OF CHANGES IN EXPENDITURE AFTER THE TWO PHASES

(1990)($ U.S.m.)

COMMODITIES → COUNTRIES ↓	1	2	3	4	5	6	7	8	9	TOTAL CHANGE IN VALUE
PAKISTAN	-6262	-3454	-5215	-33.2	-3102.6	-1944	-24.1	-18.7	-15099	-25152.6
IRAN	-1226	-13710	-1583	-58.9	-287	-793	-3.71	0	-2403	-20064.61
TURKEY	-252	-8086	-1413	-0.41	-1015	-378	-40.5	0	-6427	-17611.91
BANGLADESH	-34740	-631	-42.8	-985	-290	-225	-11.8	-9.3	-16517	53451.9
SUDAN	-46.6	-320	-329	-23.4	0	-164	0	-1	-9573	-10457
TUNISIA	0	-205	0	-6.4	-23.5	-25.4	-26.3	0	-566	-852.6
MOROCCO	-2.9	-1629	-20.9	-4.1	-56.2	-22.1	-66.5	0	-795	-2596.7
INDONESIA	-34226	-199.5	-20.2	-15.5	-408	-20.5	-33.2	-72.9	-61346	-96341.8
MALAYSIA	-609	-1423	-0.3	-0.2	-51.7	-208.2	0	-44	-5550	-7886.4
TOTAL CHANGE IN VALUE	-77364.5	-29657.5	-8624.2	-1127.11	-5234	-3780.2	-206.11	-145.9	-118276	-244415.52

SOURCE: THE TABLE IS CALCULATED BY ADDING THE VALUES OF TABLE V AND VII.

In order to correct this disequilibrium, the prices will have to undergo relative changes. The price of a product for which there is a deficit demand after the two phases will have to be relatively lower, whereas the price of the producet for which there is a surplus demand will have to be relatively higher. The deficit in demand which is the primary effect resulting from the abolition of import duties and the imposition of the external tariff, must be compensated by a rise in demand brought about by price changes. The necessary change in demand and supply for product 1 in the various countries (various terms of the first equation of the model in phase three) can indeed be written as

a function of the relative price changes if we substitute our equations in the first equation.

The model is solved by filling-in the values found in tables VIII and IX, and by substituting them in first nine equations. Solving these nine equations simultaneously, we get the values of the unknowns, the prices. Using these prices, we have calculated the changes in demand and supply of these products given in table X.

TABLE X

CHANGES IN PRODUCTION AND EXPENDITURE THAT CREATE EQUILIBRIUM

(PHASE III)

($ U.S.m.)

	PRODUCTION	EXPENDITURE
COMMODITY I	2792119	4695023
COMMODITY II	3320385	3066960
COMMODITY III	722088	835943
COMMODITY IV	-156463	666671
COMMODITY V	307164	456841
COMMODITY VI	-82095	336154
COMMODITY VII	-3909	24675
COMMODITY VIII	14760	11720
COMMODITY IX	-57989	3779608

Source:This table is based on the model of phase III.

Table X shows changes in production and expenditure required to maintain equilibrium in supply and demand. To calculate the resultant gap between supply and

demand, we have added together the changes that have occurred in the two phases in the nine countries for the nine commodities. The table shows that the production of some commodities will increase and for some decrease to maintain equilibrium of supply and demand. For example, the production of commodity IV, VI, VII and IX should be reduced to maintain equilibrium.

TABLE XI

CHANGES IN PRODUCTION, EXPENDITURE AND IMPORTS AFTER THE CUSTOMS UNION, 1990

($ U.S. m.)

	PRODUCTION	EXPENDITURE	IMPORTS
COMMODITY I	2771491.8	4617658.5	1846167.5
COMMODITY II	3318545.9	3037302.5	-281243.4
COMMODITY III	718814.2	827318.8	108504.6
COMMODITY IV	-156313.97	665543.89	821857.86
COMMODITY V	3062.2	451607	144724.8
COMMODITY VI	-82171.7	332373.8	414545.5
COMMODITY VII	-3512.16	24468.89	27980.16
COMMODITY VIII	14790.7	11574.1	-26364.8
COMMODITY IX	-60378.9	3661332	3721710.9

Source: The table is based on the model for phase III. Imports are taken as the difference between expenditure and domestic production.

Table XI shows the final results of our customs union. They are arrived at by adding together the results of the three separate phases. They show how the changes in imports and exports under incomplete specialization are caused by the reaction of demand as well as the reaction of supply to the autonomous and induced price changes. As a result, even where the values of the fundamental elasticities are moderate, marked changes took place in the imports and exports from and to the various countries.

Table XI shows that there is a marked increase in the production of rice, petroleum products, cotton, cotton yarn and natural rubber in our customs union. Trade among the members is going to increase in rice, cotton, jute, cotton yarn, cotton cloth, phosphate and wood.The model shows a fall in the imports of Petroleum and natural rubber among the union members due to the fact that the expenditures on these commodities has fallen as a result of a fall in customs revenue after the customs union.

WELFARE EFFECTS

Short run welfare of a union member changes due to trade creation and trade diversion. Regionally speaking, the less-developed member countries may in general present a picture of similar factor endowments, supply and demand structures and even a set of similar production functions. Even after the formation of the union, they would produce and trade the same products. Therefore, a trade diversion is less likely. Most of the traditional commodities they have been producing, consuming and exporting will not substantially deviate from their traditional and regular courses and therefore will not change directions. A corollary for this structural argument is that their volume of imports and the composition will not be changing either. A prospective regional integration among non-oil exporting member countries is therefore not expected to affect the conventional structure of production, import and export significantly. That is why, we have included only one oil producing country, Iran in our model and this has affected the production pattern of our member countries.

We can identify different post-union probabilities depending upon the comodity groupings.

a) **PRIMARY GOODS:**

If these goods are produced by all the members, the production pattern will not be changing significantly. Each will produce and export the same and therefore no trade creation and trade diversion is expected. If, however, they are being produced by some of the members in the region during the pre-union period, there is expected to be some changes following the unionisation.

If, however, one of the members produces, under protection, a certain commodity before the union, for which it has no comparative advantage, the unionisation will remove the protective measures and the inefficient production will disappear and the member in question will start to import it from the relatively efficient producers within the union. This encourages and increases the volume of intra-union trade by removing the import substitution.

This is what has happened in our model. The primary goods like rice and cotton are produced under protection in the member countries other than Pakistan and Bangladesh. The inefficient producers are replaced by the efficient ones rsulting in a net increase in imports. Table XI shows that imports of rice (commodity I) have increased by $ 1796 m. and the imports of cotton (commodity III) have increased by $ 99m. in our customs union.

b) **NON-DURABLE CONSUMER GOODS:**

These commodities are, in general, produced in almost all less developed countries and have been protected against outside competetion by high tariff rates. Production is,

however, carried out for domestic market. Removal of barriers in the post-union period will lead to adjustments, restructuring of individual firms as well as shifting of resources towards the least-cost and efficient producer inside the union. As long as these goods are similar and substitutes for each other, trade creation is expected as a result.

c) DURABLE CONSUMPTION GOODS:

Production of such goods like textile do not require intensive use of heavy and sophisticated technology. These are labour intensive and increase the level of employment. So import substitution is practiced. Removal of restrictions would then certainly cause increases in the trade volume.

In our customs union model, imports of cotton yarn (commodity V) has increased by $ 144 m. and the imports of cotton cloth (commodity VI) has increased by $ 412 m. as shown in table XI.

TERMS OF TRADE EFFECT:

Terms of trade of our customs union model vis-a-vis the non-members is expected to be improving if the opportunities provided by the integration is optimally used. The rest of the world might be lowering their export prices to the region in order to save their share in the union market. This is a strategy on the part of the non-members to eliminate the possible detrimental effects of the movement in general and the common external tariff policy, in particular adopted by the prospective union. Assuming the union export prices are unchanged, falling import prices from the non-members will definitely turn the terms of trade in favour of the union.

Another factor for such an improvement can be found in the nature of the products exported by the union along with the exercise of union bargaining power. If the union has a kind of monopoly or oligopoly power in the supply of a strategic commodity, then there may be a possibility to exercise its influence to increase its export price. Assuming no increase in the indices of import prices, the terms of trade will again improve. Being a monopsony power in international markets of certain products will result in a similar development. Hence, there will take place an improvement in the terms of trade due to the monopoly element in respect of commodities like rice, petroleum, jute and rubber produced and exported by our union members.

CONSUMPTION EFFECTS:

In order to create a welfare-increasing economic integration, the participating countries should substantially divert their trade relations from the rest of the world to the union members. This naturally means that the regional production of specialised commodities should be supported by the union market in the first place.In other words, a high proportion of total demand and expenditure of the integrated region must be directed to support the regional production. This is going to happen in our customs union as there takes place an increase in expenditure on all the nine commodities. This is shown in table XI. The largest increase in consumption expenditure in our customs union takes place in the case of rice which is $ 4585 m, then on wood ($3657m.), petroleum ($3019m.)and jute(1206m.).

THE SIZE OF THE CUSTOMS UNION:

As a proposition, it can be said that"the greater the size of a customs union, the greater will be the likelihood of extensive optimal reallocation of resources in favour of the lowest cost suppliers."13

It is certainly true that if a customs union includes more countries, the probability of including more producers is also high. This in turn will increase the probability of the presence of low-cost suppliers. Such a causation will have a higher probability of trade creation. The size of the customs union is more comprehensive than the number of countries involved. It involves in addition to the number of countries, the amount of population, competing firms, total gross national product (GNP)and tastes.

It seems to be that the level of total GNP of participating countries would be the best indicator of the size of a union since it is more comprehensive and covers most of the variables covered in the size. Subsequently, we can generalise the proposition in terms of GNP: the greater the GNP of the union, the greater is the possibility that positive production and consumption effects will result. At present, there are more than forty members in OIC. So there are greater chances of trade creation when we visualise a common market of all the Islamic countries.

TRANSPORTATION COST:

The success of a customs union in the short-run is also a function of the existing transportation and communication network. Inefficiencies in the system of transportation and communication network cause high destination charges and thereby high prices. This

in turn adversely affects the potential of intra-union competetion and trade.

Transportation cost is not necessarily an increasing function of geographical distance. This is true within a country as well as between the countries. Therefore it will not be possible to take the advantage of geographical proximity. The rate at which infrastructure is increasing in underdeveloped countries indicates a falling trend in the transportation and communications cost. This is a positive factor in the success of a customs union of Islamic countries.

The only weakness in our estimation technique is the calculation of elasticities of demand and supply for the nine commodities in the nine countries. Empirical estimation of 729 price elasticites of demand and supply and nine income elasticities was a huge task. Instead, we calculated these numerically with the help of formula derived in the appendices. The possible extension of our work is the econometric estimation of these elasticities and extension of the model to all the members of OIC.

CHAPTER VI

SUMMARY AND CONCLUSION

SUMMARY

This is an age of country-groupings and trade is considered as an important instrument of economic integration among countries. Interdependence among nations in the present day world makes economic cooperation mutually beneficial to the members of an alliance.

The unifying force of Islam among the Muslim countries as evidenced by the world-wide gathering of the Muslim Brethren has no parallel in the world history. It was Francis Bacon who stated that "the four pillars of government are Religion, Justice, Counsel and Treasure". If religion is a pillar of government then by logical extension, it can play a role in the formation of trading bloc and it is this philosophy that has led several OIC governments to work on this common factor.

The Organisation of Islamic Conference (OIC) is both a vision and a strategy. In the changing economic and geopolitical global scenario, Organisation of Islamic Conference promises improved economic and political prospects to the countries of the Organisation.

The OIC member countries are all developing countries and their deals in world trade are far from being fair. For instance, in the case of Pakistan the bulk of its exports

go to the advanced countries. Pakistan's major export item, that is cotton and its allied products have to suffer from quota restrictions. Moreover, there is a deterioration in the terms of trade resulting in a deficit in the balance of payments. Iran is the largest producer of crude oil in our nine country model. This factor alone should enable it to earn enough in international markets to propell it into the bracket of high income countries. But this is not so. One of the major reasons is that, politically, Iran is not looked upon favourably by the economically advanced countries. With active cooperation within the OIC, it can build further refining capacity for its crude products and also benefit through transit trade from the member countries.

Iran also imports a large number of consumer products including low technology manufactured products. Within the OIC both Pakistan and turkey have a fairly developed consumer goods industry and in Turkey high technology manufactured products are being produced. In return, both Pakistan and Turkey who have huge oil import bills can buy Irani oil and also work towards developing joint oil refining capability so that with greater value addition, greater revenues can be earned.

In this study an effort has been made to present a general equilibrium model in which the theory of prices is consistently worked out.

Chapter I states the problem and objectives of the dissertation. The problem is that the existing trade among the Muslim countries is very low compared with their trade with non-muslim countries. The solution suggested is a freer trade among these countries. The tool selected is a Customs Union of Islamic countries. Hence the objective and aim is to explore the pros and cons of establishment of a Customs Union of Islamic countries.

As our dissertation deals with empirical ex-ante estimation of benefits of a customs union, we have given a critical survey of ex-ante studies made from time to time in Chapter II. As very few empirical studies have been done on the customs union of Islamic countries, We have concentrated on the studies made before the establishment of European Economic Commnity. We start our survey with the pioneering study by the Dutch economist Verdoorn and move forward historically. Then comes another Dutch economist Janssen whose work is responsible for our dissertation. Then there is the American economist who has chosen a different analysis which has not been adopted in further studies. Then comes Harry Johnson who has made various contributions in International trade especially in Customs uniion theory. The contribution of GATT in reducing multilateral tariffs resulted in various Rounds. This initiated various Studies of which the first is by Balassa and Kreinin and another by Baldwin.Finally, we trace various General Equilibrium Models concerned with International Trade. Although they are not directly concerned with Customs Union but they are numerical models for tariff reductions. The empirical Studies on Islamic coutries are few and are also touched upon.

Chapter III gives Islamic views on economic integration and a brief account of the efforts for economic integration among muslim countries. In Islam, people are divided into two different classes for the purpose of collecting taxes. There is a world of Muslims called Dar-ul-Islam and the world of foes called Dar-ul-Harb. So the sources of revenue fall into two categories: a) the taxes imposed on Muslims called Zakat(Sadakat). b) the taxes imposed on non-Muslims called Jizya, Kharaj and a tax on non-Muslim traders called import duty or tariffs called 'Ushur'. However, Ushur is allowed only in retaliation.

Chapter III also discusses integration movements among the muslim countries. The poor record of integration groupings and the evasive tactics of many governments regarding a real liberalisation of inter-group trade are in contrast with the economic rationale for the formation of a customs union. It is agreed that the national markets for most Islamic countries are too small for the establishment of plants of optimum size and for the realisation of economies of scale. Hence the enlargement of the markets and their protection is seen as a pre-requisite for a more rapid industrial development. That is the reason for suggesting a customs union of all the OIC member countries.

In order to explain the nature and model of a customs union, a critical survey of the theoretical literature is given in chapter IV. It describes the theory behind the costs and benefits of a customs union. This theoretical foundation is laid for the subsequent General Equilibrium Model to be used in the study.The theory starts with the work of Viner and progresses historically. The concepts of trade creation and trade diversion are explained b taking an example of a customs union of Pakistan, Iran and Turkey. Consumption effects of a trade union were given by Meade and are explained by a diagram. The traditional partial equilibrium analysis given by Harry Johnson is explained in Figure 2. Various other refinements in the customs union theory is explained with the help of graphs. Figure 3 and 4 shows a general equilibrium analysis concluding that in certain situations trade diversion may not lead to a fall in welfare. Similarly, Figure 5 shows that relaxation of the assumption of constant costs in the home country can bring welfare gain even under trade diversion. Figure 6, 7 and 8 shows that there are other reasons for existence of a trade union beyond the concept of trade creation.Figure 9 shows the dynamic factors as the reasons for the creation of a customs union. These effects deal with the concept of economies of scale. The theoretical background

proves that are a large number of reasons that result in welfare gain from a customs union. Our computable General Equilibrium model starts with the assumptions of the model and the equations are shown in matrix form to save the space.All the three phases of the model are clearly laid out separately.

For the estimation of the model we have to chose a group of the muslim countries.It is possible to formulate some plausible hypothesis on characteristic features of types or groups of countries which will probably either gain or lose from the integration.A group of countries like Benin, Burkina Faso, Chad, comoros, Djibouti, Gambia, Ginnea Bisao, Maldives, Mali, Mauritania, Sierra Leone and PDR Yemen have a GDP of U.S. $1200m. or less and a per capita income of U.S. $ 1000 or less. It is not very likely that these small countries which have developed manufacturing industries could stand successfully in an intra-union competetion. A system of compensation will have to be developed to help such countries.

A second group of countries are the oil-rich countries consisting of Bahrain, Brunei, Kuwait, Qatar, Saudi Arabia, United Arab Emirates, Oman and Libya with a per capita income of US$ 6000 or more. The countries of this group have large financial means at their disposal which allow them to give strong fiscal incentives, subsidies and other governmental support to their industries. Intra-group trade liberalisation, thus, may be to their advantage.

The majority of the Islamic countries, however, are neither very small nor oil-rich. For an assessment of the potential impact of trade liberalisation, more information about their production structure and trade orientation is required.

Thus our model includes only these countries.

An intra-group trade liberalisation is more likely to benefit such a country.

1) the more the manufacturing industry contributes to GNP.
2) the more the manufacturing industry is outward oriented.
3) the more the manufactured exports are suitable to meet the import demand of the integrating countries.

Here it is sufficient to show that it is highly probable that the establishment of a free trade area or customs union would lead to a very uneven distribution of the costs and benefits among different countries of OIC. So it becomes necessary to look after the interests of those countries which are in a danger of losing manufacturing industrial capacity.

Chapter V contains estimation of the model. Our model is comparative static and analyses the transition from the original state of equilibrium to the new state of equilibrium in three phases., namely the consequences of the abolition of all import duties, the consequences of imposing the external tariff, and finally the restoration of equilibrium by adjustments in the terms of trade. With the help of this model, which implies equilibrium in the balance of payments and full employment in the initial and final situations, we calculated the changes in production and expenditure, and hence the changes in imports and exports in nine countries producing and consuming nine commodities.

Table IV of the chapter shows changes in the production of nine commodities due to the abolition of customs duties among the nine member

countries of the customs union. Due to a fall in the prices of imports, there results a net fall in the output of these goods in the member countries. Table V shows changes in expenditures on these goods due to a fall in prices as well as in income. There results a fall in demand for these goods due to a fall in customs revenue. Table VI shows the result of imposition of common external tariff. The effects on the production of nine commodities in the nine countries are positive as there is a rise in the prices of imported commodities from the rest of the world. However, there is no effect on the supply of the specified export good as it is not imported in that country. Hence we find a zero in the main diagonal of this table. Other zeroes in the table indicate that the country is not producing this commodity. Table VII shows the effects on the demand for the nine commodities due to imposition of the common external tariff. There are two opposite effects on demand. As the revenue from tariffs on imports from the rest of the world increases, the demand for imports increases. On the other hand, common external tariff increases the price of imports from the rest of the world, there is a fall in the demand for imports from the rest of the world. The demand for the exported good increases within the customs union due to increase in income from customs revenue. The last column shows that the majority of goods show a fall in demand as price effect is stronger than the income effect. Table IX shows the final results our customs union. They are arrived at by adding together the results of the three phases.

CONCLUSION

Our model shows that a customs union of our selected nine countries producing and consuming nine commodities will result in a marked increase in

production of rice, petroleum products, cotton, cotton yarn, and natural rubber. Trade among the members is going to increase in the case of rice, cotton, jute, cotton yarn, cotton cloth, phosphate and wood.

This proves the feasibility of establishing a customs union among the Muslim countries by taking the production, demand and trade data for the selected nine commodities in the nine countries for the year 1990. An incease in the size of the model is going to result in a larger trade creation.

Appendix 1-A

Percentage of total imports/exports No. of Countries of individual Muslim Countries with the other Muslim Countries.

	Exports	Imports
-More than 50%	6	2
40-49%	2	0
30-39 %	2	1
20-29 %	5	8
10-19 %	8	18
Less than 10 %	21	15

** Monzer Kahf. International Trade Pattern of the Muslim Countries PP.285-96 in "The Muslim World and the Future Economic Order.

APPENDIX IV-A11

DERIVATION OF ELASTICITIES OF DEMAND

The model made use of direct and indirect elasticities of demand. Since only the elasticities of substitution of demand and the income elasticity are assumed to be given, it is necessary to determine the relation between the various elasticities.

The elasticity of substitution of demand 0 indicates by what percentage the demand ratio between two products rises or falls if their price ratio rises or falls by 1%.

$$\frac{qs2(s1 - s2) = -qs2\ 012(p1 - p2)}{qsn(s1 - sn) = -qsn\ 01n(p1 - pn)}$$

After summation,we have

$$(qs2 + qs3 + -- + qsn)s1 - qs2\ s2 - -- - qsn\ sn$$

$$= -(qs2\ 012 + --- + qsn\ 01n)p1 + qs2\ 012\ p2 + -$$

Since the sum of the value sharesis unity,it becomes

$$s1 - (qs2\ s2 + -- + qsn\ sn)$$
$$= -(qs2\ 012 + -- + qsn\ 01n)p1 + qs2\ 012\ p2 + ---)$$

If we disregad all income effects, the total expenditure remains unchanged and therefore, the weighted sum of the relative changes is equal to zero. As we are considering the substitution effectonly, we assume income to be constant, and thus the term between bracket on the left hand side is zero

So we write

$$s1^* = -(qs2\ 012 + -- + qsn\ 01n)p1 + qs2\ 012\ p2 + -$$

where s1* represents the change in S1 as a result of the substitution effect.

Apart from a substitution effect, the price changes also have an effect on income. This incomeeffect indicates by what percentage the demand for a particular product will rise or fall if real income rises or falls by 1%. This average change in price can be calculated by weighting the price changes of the individual types of products with the corresponding value shares, i.e. with the share of each relevant commodity in the market.

Let ui be the elasticity of income for a product i. In the equation which gives the relation between a percentage change in demand for product i and the average percentage change in price, this elasticity must then be given a minus sign., since the effect on real income of a rise in price is negative and the effect of a fall in price is positive. The relative change in demand for product 1 as a result of the income effect shown by s** is :

$$s1^{**} = -\ u1(qs1\ p1 + --- + qsn\ pn)----$$

The total change as a result of the price changes is

$$s1 = s1^* + s1^{**} = -(qs1\ u1 + qs2\ 012 + --- qsn\ 01n)p1 -$$

$$qs2(u1 - 012)p2 - ----qsn(u1 - 01n)pn\ -----$$

From this, we can derive the direct and indirect elasticities of demand:

The direct elasticity of demand is:

$$\ln 1 = -(qs1\ u1 + qs2\ 012 + \text{---} + qsn\ 01n)$$

and the indirect elasticity of demand are:

$$\frac{2n1 = -qs2(u1 - 012)}{nn1 = -qsn(u1 - 01n)}$$

If we assume that all 0 terms and all u terms are equal to the average u, the direct elasticities of demand are thus:

$$ini = -qsi\ u - (1 - qsi)0$$

and the indirect elasticities of demand are:

$$ini = -qsj\ (u - 0)$$

It is clear from these formulae that, if $0 = u = 1$, the direct elasticity of demand is -1and the indirect elasticities of demand 0. This is what we used in the solution of our model.

APPENDIX IV-B 12

DERIVATION OF ELASTICITIES OF SUPPLY

The derivation of direct and indirect elasticities of supply is similar to the derivation of demand. Starting from the definition of the elasticity of substitution of supply:

$$S12 = \frac{d\ X1/X2/X1/X2}{d\ P1/P2/P1/P2} = \frac{x1 - x2}{p1 - p2}$$

We can again give the complete set of definitions for the elasticities of supply relating to the product 1:

$$\frac{x1 - x2 = S12(p1 - p2)}{x1 - xn = S1n(p1 - pn)}$$

We multiply both sides with the pertaining production share, i.e. the share represented by the value of the production of a certain product in the total value of the products.

$$\frac{qx2(x1 - x2) = qx2\ S12(p1 - p2)}{qxn(x1 - xn) = qxn\ S1n(p1 - pn)}$$

Summation gives:

$$(qx2 + \dots qxn)x1 - qx2\ x2 - \dots - qxn\ xn =$$

Or

$$(qx2\ S12 + \dots + qxn\ S1n)p1 - qx2\ S12\ p2 \dots$$

$$x1 - (qx1\ x1 + \dots qxn\ xn) = (qx2\ S12 + \dots +$$

$$qxn\ S1n)p1 - qx2\ S12\ p2 - \dots - qxn\ S1n\ pn$$

Since the total supply remains unchanged, and hence the weighted sum of the relative changes is zero, the term between brackets on the left side is equal to zero.

$$x1 = \frac{(qx2\ S12 + \text{--} qxn\ S1n)p1 - qx2\ S12\ p2 \text{--}}{-\ qxn\ S1n\ pn}$$

Since, in the case of supply, the income effect is irrelevant, we can immediately find the direct and indirect elasticities of supply.

Direct elasticities of supply:

$$1a1 = qx2\ S12 + \text{----} + qxn\ S1n$$

Indirect elasticities of supply:

$$\frac{2a1 + -\ qx2\ S12}{na1 = -\ qxn\ S1n}$$

If we assume that all Sij terms are equal to the average elasticity of substitution, then

$$iai = (1 - qxi)S$$

Since our analysis is in value terms, the direct "value elasticity" is one greater than the volume elasticity. So we have

$$1a1 = S(1 - qx1) + 1$$

We have calculated elasticity of supply according to the above formula.

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