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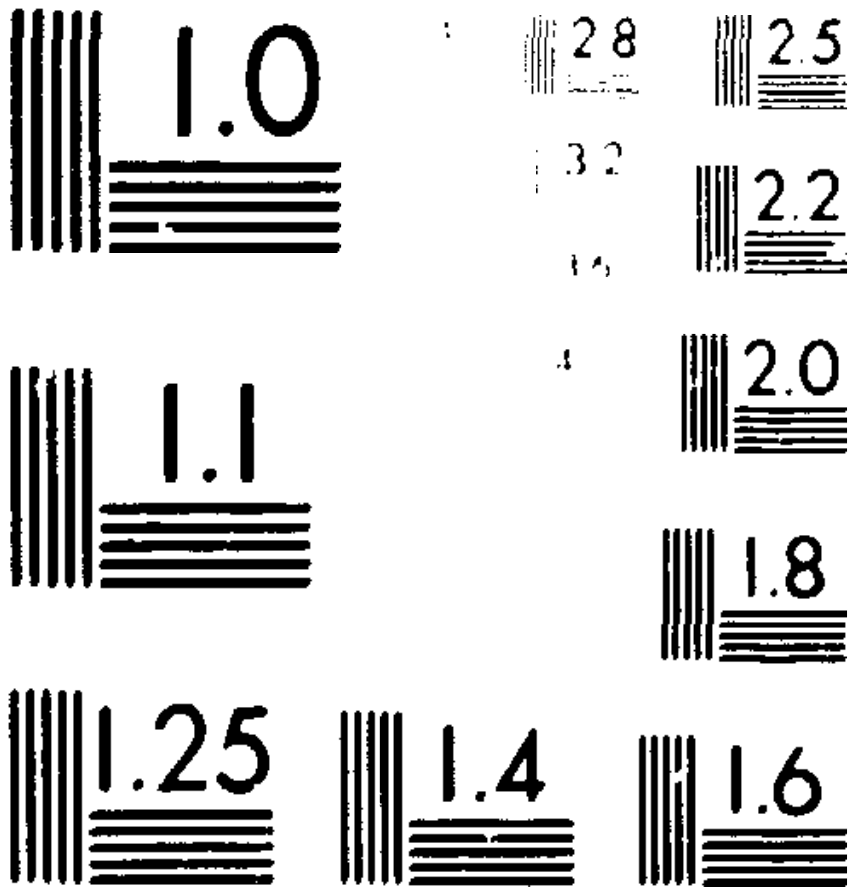
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TECHNOLOGY PROJECTIONS IN THE FRAMEWORK OF THE UNITAD MODEL *

Variability of the input coefficients in the UNITAD regional input-output tables

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Introduction

The purpose of the paper is to provide information which could be used in forecasting of input coefficients in the regional input-output tables of the UNITAD Model.

The UNITAD Model is a system of eleven regional models- five models for developed and six models for developing regions linked into a global model by matrices of international trade and by a model of world financial interrelations. The eleven regional models are basically input-output models, disaggregated into eight sectors (i.e. into agriculture, agrifood industry, energy, basic products, light industry, capital good industry, construction and services).Input- output tables for the eleven regions for 1975 were prepared by a team of the Economics University of Vienna[1]. Parallel to this effort, research aiming at the explanation of the interregional (and intercountry) differences among the input-output coefficients was continuing. First results were discussed at the Expert Group Meeting on the Analysis and Projections of Technological Characteristics in the UNITAD System of Models,which was held in Vienna from 22 to 24 October 1979.

The main results of the first attempt to explain the intercountry differences in input-output coefficients were as follows: (i) these differences can be to a certain degree explained by different levels of economic development (measured by per capita GDP), size of the country (measured by the size of population) and also by population density (measured by the number of inhabitants per square kilometer); and (ii) these differences can also be partly explained by the " output mix", i.e by the industry composition of the output of particular sectors. Out of these four factors influencing the intercountry differences in input coefficients, only the first factor, i.e. GDP per capita,can be used for projections of input coefficients in the regional tables of the UNITAD model. The size of the country and the population density can hardly change within 15 years,(i.e from 1975 to 1990); the industry composition of sectoral outputs could be projected only with a more disaggregated input-output model and would require coefficient projections on a more disaggregated level.

The next steps in the analysis concentrated on the relationship between the values of the input coefficients and the per capita GDP. The results were presented to the Meeting of the AAC Technical Working Group of the Task Force on Long-Term Development Objectives, held in Geneva from 10 to 11 July 1980.[2] In order to eliminate the impact of other factors than the level of economic development, semilogaritmic regression equations, which relate a change in the input coefficient with a change in the per capita GDP were used. In a parallel project, the variation in input coefficients was studied by A Duval, who applied the main

[1] V. Gregor, G. Margreiter, M. Meuler, M. Oettl, L.N. Rastogi; "Construction of Base- Year Matrices for the Regions of the UNITAD Project" Paper presented to the Meeting of the ACC Technical Working Group of the Task Force on Long-Term Development Objectives, Geneva, 10-11 July 1980.

[2] G. Margreiter, J. Skolka, "Trend Projections of Input Coefficients for the UNITAD Regional Tables", Paper presented to the Meeting of the ACC Technical Working Group of the Task Force on Long-Term Development Objectives, Geneva, 10-11 July 1980.

component analysis. The results of these two analytical studies were broadly consistent with results of previous research. It was found that per capita GDP (or a change in per capita GDP) size of the country measured by its population, population density and also availability of natural resources and output mix in particular sectors influence strongly influence the similarities and dissimilarities among vectors of input coefficients in the regional input-output tables of the UNITAD Model.

The results of these studies were then used in the operational proposal which was incorporated into the "input-output module" of the UNITAD Model.[1)]
The weakness of all analytical studies carried until now was, however, that they relied on cross country comparisons only, so that intercountry differences in per capita GDP were finally used as a substitute for changes of this indicator in time. This paper therefore tries to suplement the existing knowledge about intercountry variation in input coefficients by information on their changes in time, in order to improve their projections for 1990. This information should be used, like the information on intercountry variation, rather cautiously. Input coefficients cannot be projected exactly, but some estimates of their future values are possible if one is able to explain partly their variation both among countries and in time.

The pattern of change of input coefficients in time is a rather old topic in the input-output literature[2)]. But most of the studies published until now can hardly be used as a basis for the projections for the UNITAD Model for several reasons. Most of them deal with rather disaggregated input-output tables and their results cannot be translated into the simple framework of the 8x8 matrix. Most of them deal with industrialized countries and explain changes in coefficients at rather high level of economic development. Most of them deal with coefficient change in a period of relatively stable prices and, in particular, of stable energy price.
The paper is divided into eight chapters corresponding to the eight sectors of the UNITAD input-output regional tables. For each sector available information is presented and, finally, recommendations made for the use of this information in coefficient projections for 1990. The final decision on the use of this information, however, should be left to the model builder.

1) The UNITAD Model: "Main Methodological Features", paper prepared for submission to the ACC Technical Working Group Meeting of the Task Force on Long-Term Development Objectives, New York, 14-15 May 1981.

2) See e.g. K.J. Arrow and M. Hoffenberg, "A Time Series Analysis of Interindustry Demands", North Holland, Amsterdam, 1959; A.P. Carter, "Structural Change in the American Economy", Harvard University Press, Cambridge (Mass.), 1970, P. Sevaldson, "Stability of input-output coefficients"; B.N. Vaccara, "Changes over time in input-output coefficients for the United States" both in A.P. Carter, A. Brody (eds.), "Applications of Input-Output Analysis", North Holland, Amsterdam, 1970, pp. 207- 260.

I. AGRICULTURE

I-1 Inputs into Agriculture

The earlier attempts to analyze the variation in the pattern of inputs into agriculture brought some useful results[1], which can be summarized as follows:

(a) For international comparisons of vectors of inputs into the agriculture, the intrasectoral inputs (i.e. the flows on the main diagonal) should be by definition set equal to zero. These values are, in national tables, influenced by the methodology of input-output compilation (they seem to vary between 0.0 and 0.4).

(b) The share of value added (the value-added coefficient a_{v1}) is decreasing with the level of economic development.

(c) There seem to be two types of agricultural production, an intensive and an extensive one. In the regional tables of the UNITAD Model the former are represented by North America and Other Developed, the latter by Western Europe and Japan. The main differences are in the values of a_{21}, which are low in the extensive type of agricultural production (around 0.05) and high in the intensive one (0.11 and 0.09 respectively), as well in the values of a_{81}, which are high in the former case (0.25 and 0.13 respectively) and low in the latter (0.07).

I-1.1. Postwar Changes in the Inputs into Agriculture in the United States

Comparable input-output tables of the US economy (at current prices) were published recently[2]. The set includes tables for years 1947, 1958, 1961, 1963 and 1967, classified by 23 industries.

Four of these tables (i.e. for 1947, 1958, 1963 and 1967 were aggregated into the 8 x 8 sector framework of the UNITAD model. The resulting vectors of input coefficients for agriculture are presented in Table I-1.[3] The four important input coefficients determined by the earlier studies, i.e. a_{21}, a_{41}, a_{81} and a_{v1} show a rather regular pattern of change over time: one can see an increase in all three intermediate inputs at the expense of a decrease in the value added coefficient.

In order to make their values comparable with the UNITAD regional input-output tables, the value of the main diagonal coefficient (i.e. inputs of agriculture into agriculture), was set equal to zero. The adjusted values of the four important coefficients are given in Table I-2. At the end, one finds the absolute

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1) "Analysis of Coefficients from Input-Output Tables (Part A)", a paper presented to the Expert Group Meeting on the Analysis and Projection of Technological Characteristics in the UNITAD System of Models", Vienna, October 22-24, 1979; G. Margreiter, J. Skolka, op. cit. (1980).

2) "Historical Statistics of the United States", US Department of Commerce, Bureau of Census, Washington, D.C., 1975.

3) The tables contain domestic flows. Intermediate imports (which are rather small) and unallocated flows are acounted in a row at bottom of the matrix of input coefficients. Gross value added is not divided into its components .

Table I- 1

Sector: Agriculture

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs:	Year: 1947	1958	1963	1967
AGRICULTURE	0.3145	0.2849	0.3004	0.2938
AGRO-FOOD	0.0502	0.0577	0.0441	0.0546
ENGERGY AND PETROLEUM PROD.	0.0122	0.0237	0.0258	0.0224
BASIC PRODUCTS	0.0176	0.0292	0.0376	0.0471
LIGHT INDUSTRY	0.0086	0.0078	0.0086	0.0087
CAPITAL GOODS	0.0040	0.0060	0.0063	0.0065
CONSTRUCTION	0.0121	0.0117	0.0100	0.0095
TRADE AND SERVICE	0.1183	0.1332	0.1291	0.1467
INTERMEDIATE INPUTS ALLOC.	0.5419	0.5546	0.5812	0.5967
IMPORTS OR RES. TO BE ALLOC.	0.0119	0.0198	0.0183	0.0168
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADDED	0.4460	0.4255	0.4004	0.3864
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000

magnitude of the difference between the starting (1947) and terminal (1967) year, recalculated from a 20 years period to a period of 15 years. These values could be used for projections of the changes in the input coefficients between 1975 and 1990, at least for regions in which an extensive type of agriculture exists. (One should note that the projected changes do not add up to zero, but the necessary adjustment could be made by a reduction of the energy input i.e. in a_{31} - see also Chapter III.) Next to the absolute difference there is the relative difference (adjusted also for a period of 15 years), which could be also used for coefficient projections.

Table I-2

Changes in important input coefficients of the U.S agriculture between 1947-1967

Input coefficient	Year 1947	1958	1963	1967	15 years change absolute	relative
a_{21}	.0791	.0807	.0916	.0844	.0040	0.0502
a_{41}	.0257	.0408	.0537	.0667	.0308	1.1965
a_{81}	.1727	.1863	.1831	.2106	.0284	0.1646
a_{v1}	.6506	.5950	.5723	.5472	- .0776	- 0.1192

The nature of these changes is again consistent with earlier findings, which also provided some explanation for them (i.e the increase in a_{41} is due to extensive use of fertilizers, the increase in a_{81} due to higher transportation and trade margins, the decline in a_{v1} - which is not fully explained by the four shifts in intermediate inputs in Table I-2- due to higher intermediate inputs in general.

I-1.2 Changes in the West European Countries 1959 - 1965

The two sets of standardized ECE input-output tables for years around 1959 and 1965[1] contain comparable tables for the following seven West European countries: Belgium, France, Federal Republic of Germany, Italy, Netherlands, Norway and Spain. The tables for all countries except for Spain are available for 1959 and 1965, for Spain for 1962 and 1965.

The differences between the vectors of input coefficients of agriculture for these countries are presented in Table I-3. The differences are for each country standardized to one year. The average difference in the last column is standardized to 15 years (i.e. to the length of the projection period of the UNIDO Model from 1975-1990).

Table I-3 Changes in the Input Coefficients for Agriculture for Seven West-European Countries

Inputs from	Belgium	France	Germany	Italy	Netherlands	Norway	Spain	Average (15 years)
1	-.0007	-.0016	.0015	.0050	.0001	-.0007	.0070	.0170
2	.0062	.0020	.0025	.0021	.0018	.0072	.0009	.0618
3	-.0007	-.0006	.0005	-.0005	-.0010	-.0001	.0004	-.0044
4	-.0007	.0012	.0004	-.0003	-.0013	-.0028	.0036	.0011
5	.0003	.0008	.0002	-.0001	-.0004	-.0002	-.0008	-.0002
6	.0015	.0001	.0011	.0004	-.0005	.0002	.0015	.0118
7	-.0002	.0007	.0008	.0000	.0001		.0002	.0051
8	-.0009	.0026	.0028	.0016	-.0005	.0018	-.0038	.0058
VA	-.0047	-.0052	-.0099	-.0081	.0017	-.0056	-.0090	-.0979

The changes in the coefficients a_{21} and a_{v1} are similar to those for the United States; changes in the other two coefficients, i.e. in a_{41} and a_{81} are much smaller than in the U.S. This may reflect the differences between the traditionally intensive European agriculture and the extensive U.S. agriculture, which, as seems, started to use fertilizers to a greater extent only after the war.

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1) Economic Commission for Europe, "Standardized Input-Output Tables of ECE Countries for Years around 1959", New York, 1972; "Standardized Input-Output Tables of ECE Countries for Years around 1965", New York, 1977

II AGROFOOD

All earlier attempts to find any regularities in the variation of the input coefficients among countries have failed. In this study, the changes of the input structure of the agrofood industry were analysed, the U.S time series leading to some conclusions which may be of use in the projections with the UNITAD model.

II-1 Postwar changes in the input structure of the agrofood industry in the United States

Out of the five postwar U.S input-output tables four, i.e. those for 1947, 1958, 1963 and 1967 were aggregated into the 8 x 8 UNITAD framework. The coefficients of the agrofood industry for these four tables are given in Table II-1 below.

Table II-1 Sector: Agro-Food

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs:	Year: 1947	1958	1963	1967
AGRICULTURE	0.4153	0.3159	0.2916	0.2926
AGRO-FOOD	0.1508	0.1651	0.1793	0.1693
ENGERGY AND PETROLEUM PROD.	0.0058	0.0091	0.0087	0.0088
BASIC PRODUCTS	0.0445	0.0648	0.0760	0.0779
LIGHT INDUSTRY	0.0083	0.0067	0.0072	0.0112
CAPITAL GOODS	0.0019	0.0007	0.0008	0.0026
CONSTRUCTION	0.0017	0.0032	0.0019	0.0027
TRADE AND SERVICE	0.0680	0.1223	0.1154	0.1210
INTERMEDIATE INPUTS ALLOC.	0.6967	0.6881	0.6813	0.6865
IMPORTS OR RES. TO BE ALLOC.	0.0429	0.0378	0.0389	0.0274
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADD	0.2602	0.2740	0.2877	0.2859
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000

On the basis of these, the following tentative conclusions can be made (if one disregards the figures for 1947, which differ strongly from the figures for the other three years):

a) Between 1958 and 1967 there was a slight increase in the inputs from basic products, i.e. in a_{42}, at the expense of inputs from agriculture, i.e. of a_{12}. For a period of 15 years the decrease in a_{12} would amount to - 0.0350 and the increase in a_{42} to 0.0200.

b) The values of such important coeficients as those for agrofood, services and value added remained more or less constant.

c) The values of the remaining small coefficients show a certain irregular increase.

III ENERGY

III.1 Energy Inputs into Other Sectors (Energy Input Coefficients)

There exists no reliable empirical base for long-term analysis of changes in inputs of energy. A long period of slowly decreasing real prices of energy in the fifties and sixties was finished by a sudden strong rise in prices in 1974, followed by a slight decrease in real price and another sudden rise in 1980. The adjustment process caused by the first sudden rise is not yet finished, and the adjustment to the second one has just begun. Nothing is known about the time needed for adjustment, nor is anything known about the technical constraints to adjustment. But both, i.e. adjustment period and technical constraints, determine the long-term values of both energy income and energy price elasticities. A few available empirical studies come to different conclusions, which are hardly applicable to the UNITAD Model, since no input-output framework was used in these investigations.

III.1.1 OECD Analysis of Demand on Energy

The OECD analytical studies on future demand for energy focus on income and price elasticities of demand on energy in the industrialized countries. In general, the long-term price elasticities seem to be in the interval between -0.5 to -0.8, probably around -0.6, and the income elasticities in the interval between 0.99 to 1.10, probably at 1.0. Estimates based on two different computational methods for a sample of industrial countries are presented in Table III-1.

Table III-1. Price and Income Elasticities for a Sample of Industrial Countries (1960-78)

Country	Income Elasticity		Long-Term Price Elasticity	
	A	B	A	B
United States	1.02	0.94	-0.38	-0.26
Japan	0.96	1.05	-0.35	-0.32
Germany	1.08	1.20	-0.44	-0.45
France	1.16	1.18	-0.41	-0.48
United Kingdom	0.57	0.82	-0.42	-0.52
Canada	0.89	0.85	-0.28	-0.14
Italy	1.41	1.48	-0.55	-0.38
Austria	1.05	0.95	-0.97	-1.06
Belgium	0.89	0.99	-1.05	-0.94
Denmark	0.98	1.23	-0.63	-0.68
Finland	0.79	0.84	-0.22	-0.41
Netherlands	1.72	1.64	-0.62	-0.54
Sweden	0.94	1.08	-0.22	-0.36

III.1.2 IIASA Energy Projections

The International Institute for System Analysis has recently published an energy projection with a terminal year of 2030[1]. The advantage of the IIASA study is that it covers the whole world and uses a breakdown into seven regions, which are rather compatible with the regional breakdown of the UNITAD Model. These regions are as follows:

NA- North America
SU/EE - Soviet Union and Eastern Europe
WE/JANZ- Western Europe, Japan and other Developed
LA- Latin America
AF/SA- Africa , South and South East Asia
ME/NA - Middle East and North Africa
C/CPA - China and Centrally Planned Asian Economies

For energy projections, the IIASA study is using estimates of income and price elasticities on energy demand. which lie in a certain interval and also differ for the price elasticities for a "high" and "low" economic growth scenario (the UNITAD assumptions about economic growth are closer to the "high" scenario). The values of the "high" scenario income and price elasticities are given in Table III-2.

Table III-2. IIASA Assumptions about Income and Price Elasticities of Demand on Energy, Assumption about Growth and Resulting GDP- Energy Elasticities

Region	Elasticity of Demand on Energy				GDP[2]	GDP Annual Rate of Growth[2]
	Income		Price			
NA	0.8	1.0	-0.52	-0.81	0.31	4.3
SU/EE	0.8	1.0	-0.46	-0.85	0.59	5.0
WE/JANZ	0.8	1.0	-0.30	-0.66	0.77	4.3
LA	1.1	1.2	-0.23	-0.44	1.07	6.2
AF/SA	1.2	1.3	-0.24	-0.45	1.20	5.8
ME/NA	1.1	1.2	-0.24	-0.49	1.12	7.2
C/CPA	1.2	1.3	-0.32	-0.50	1.10	5.0

The GDP Energy elasticities are results of assumed price and income elasticities, assumptions about the GDP annual rate of growth (the data in the last column of Table III-2 refer to the period 1975 -1985) and assumptions about the real price of energy. IIASA is assuming that the real price of energy will increase between 1972 and 2030 by a factor of 3 in all regions except the WE/JANZ Region, where an increase by a factor of 2.4 is expected. This corresponds to an annual rate of increase of 1.9 per cent in the former and by 1.5 per cent in the latter case.

1) IIASA, "Energy in a Finite World: A Global Systems Analysis" Ballinger, Cambridge (Mass.), 1981.

2) For the period 1975-1985.

The elasticity values assumed by the IIASA could be used for projections of input coefficients of all sectors (except the energy sector), under the following assumptions:

(a) The change in the coefficient can be, in all sectors, related to the GDP growth rate, i.e. the change in the energy input depends on the income elasticity of energy demand, which is equal for all sectors and is given by the overall rate of growth of the economy.

(b) Changes in the demand for energy by the energy sector itself and changes in the final demand for energy result, together with changes in the intermediary demand by the seven sectors of the UNITAD Model, in a change corresponding to the overall GDP elasticity.

The second assumption will not be used here. On the basis of the first assumption the value of the energy input coefficient for 1990 can be determined as follows:

$$a_{3j}^{90} = a_{3j}^{75} \cdot I_y^{\alpha-1} \, I_p^{\beta} \qquad (j = 1,2,4,\ldots,8,\ j \neq 3) \qquad \text{(FIII-1)}$$

Where:

a_{3j} = energy input coefficient in sector j in 1975 and 1990 respectively

I_y = Index of the GDP increase between 1975 and 1990

I_p = Index of the increase in the real energy price between 1975 and 1990

α = Income elasticity of the energy demand

β = Price elasticity of the energy demand

The formula (FIII-1) can be used in the UNITAD Model in two alternative ways. First, the formula can be directly built into the model. Secondly, the formula can be used for calculation of a ratio $a_{3j}^{90} : a_{3j}^{75}$, with which all values of the energy input coefficients for 1975 are multiplied in order to obtain their values for 1990.

It is also possible to build both steps successively into the UNITAD model.

It is then necessary to use certain assumptions about the future GDP growth and about the rise in the real energy price. Results of such calculations of the multipliers for the regions of the UNITAD Model are, as example, presented in Table III-3 below. In these two alternative calculations, an annual increase in the real energy price of 4 per cent was used in the Case I and of 4.5 per cent in the Case II. In Case I lower values, in Case II higher values of income and price elasticities presented in Table III-2 are used. (E.g. for North America 0.8 and - 0.52 in Case I and 1.0 and -0.81 in Case II.).

One gets a different picture for the developed and developing countries. In the developed countries, a very slow increase in the demand for energy can be expected (provoided that the assumptions about GDP growth, development of the real price of energy and the assumed values of the elasticities will be confirmed by the future development) The high values for the developing countries indicate that it takes more energy to build an economic infrastructure than to operate and upgrade it.

Table III-3. Multipliers of the energy input coefficients

(Example of two Alternative Solutions)

Region	Annual Rate of GDP Growth (in per cent, 1975-90)	Multipliers ($a_{3j}^{90} : a_{3j}^{75}$) Case I	Case II
North America	2.9	.6759	.5858
Western Europe	2.9	.7693	.6468
Eastern Europe	4.0	.6782	.5705
Japan	5.9	.7058	.6468
Other Developed	3.5	.7560	.6468
Latin America	6.9	.9654	.9136
Tropical Africa	4.2	.9824	.8941
Near East	7.8	.9719	.9369
Indian Subcontinent	4.6	.9937	.9096
East Asia	7.6	1.0847	1.0330
China	6.0	.9866	.9343

III.1.3 Energy Demand in Austria in the Seventies

The available Austrian statistical data allow estimation of the values of the GDP elasticities of the demand for energy for Austria during the seventies (i.e. for the period 1973 -1979). The values are defined in the same way as the elasticicies in the fifth column of Table III-2 above.

For the whole economy, the energy GDP elasticity can be estimated as 0.52 (i.e. a value which not very far from that assumed by IIASA for Western Europe).

The values for a few manufacturing industries indicate that the value elasticity in Agrofood and in Light Industry may be close to 0.5, i.e. to the average for the whole economy, but that the elasticities in Basic Products and in Capital Goods may be higher, probably around 0.7.

III.1.4 Energy Coefficient in the OECD Countries

A recent study [1] on the UK "energy coefficient" (i.e. average elasticity of total primary energy requirements to GDP) brings a wealth of data on the development of this coefficient between 1951 and 1980, as does a publication of the International Energy Agency [2].

1) M. Hull, "The Energy Coefficient Revisited", CSO Economic Trends, No 331, May 198

2) 1979 IEA Review of Energy Policies and Programmes of IEA Countries.

The energy coefficients are presented in the following Table:

International Energy Coefficients since 1960

Country	1960- 1973	1973-1978	
Canada	0.98	0.44	
USA	1.07	0.50	
Japan	1 00	0.32	
Denmark	1.38	0.31	
Germany	1.04	0.25	
Greece	1.82	1.28	
Ireland	1.14	0.51	
Netherlands	1.61	0.40	
Norway	1.26	0.38	
Sweden	1.08	0.62	
UK	0 69	-1.29	(not given but implied by other data)

III.2 Inputs into the Energy Sector

The earlier attempts to analyse the variation of the input structure of the energy sector gave almost no usable results. The outcome of the regression analysis aiming at the explanation of coefficient variation by differences in GDP per

ysis brought no clue to the input pattern of the energy sector. One can only state that the important inputs into energy are coming from energy itself, from services and value-added and that there may be some relation between the structure of the inputs into energy and the output mix of the energy sector.

III.2.1 Influence of the Output Mix on the Input Coefficients.

The hypothesis, that the input coefficients of the energy sector may depend on the energy output mix, was tested on the data of the 1975 regional tables and data about the shares of various energy forms in these regions in 1975, which are presented in Table III- 4.

Table III-4 The Structure of Energy Production in the UNITAD Regions

(Shares in per cent)

	Gas	Utilities	Coal	Refineries
North America	14.0	69.0	4.0	3.0
Western Europe	6.0	55.0	9.0	30.0
Eastern Europe	28.0	30.0	22.0	20.0
Japan	1.0	51.0	3.0	45.0
Other Developed	4.0	65.0	18.0	11.0
Latin America	26.0	44.0	1.0	29.0
Tropical Africa	59.0	28.0	1.0	12.0
Near East	87.0	4.0	.0	9.0
India	7.0	50.0	26.0	17.0
South East Asia	24.0	44.0	4.0	28.0

Figures for China were not considered, since the input- structure of energy sector in its table differs too much from the structure for other regions, and the reasons o. such differences are not known.

Linear regression equations were calculated for all input coefficients except the a_{13} and a_{23} which have, in general, negligible values. The results of the analysis were rather poor, some correlation was found only for a_{43}, a_{73}, a_{83} and a_{v3}. The interregional variations in the most important coefficient on the main diagonal remained unexplained.

Among the explanatory variables, only the shares of coal and of oil refineries gave significant results. The regression equations would then allow projection of changes in the input coefficients of the energy sector in the following way (in the equations, the changes in coefficient values refer to values in 10^{-4}, changes in shares of coal and refineries are in per cent, and in brackets are the original values of the regression coefficients, which were rounded and adjusted so that the resulting changes in the vector of inputs into energy add up to zero):

$$d\,a_{43} = \underset{(-15.9)}{-16}\ dcoal \qquad R^2 = .24$$

$$d\,a_{73} = \underset{(+12.7)}{+14}\ dref \qquad R^2 = .34$$

$$d\,a_{83} = \underset{(-20.0)}{-20}\ dcoal \ \underset{(-12.7)}{-14}\ dref \qquad R^2 = .27$$

$$d\,a_{v3} = \underset{(+29.3)}{+36}\ dcoal \qquad R^2 = .18$$

The UNITAD Model assumes changes in the output mix of the energy sector. These are presented in Table III-5, together with changes which they would cause in the values of the input coefficients of the energy sector in each region.

Table III-5 Changes in the Output Mix of the Energy Sector and Changes in Input Coefficients between 1975 and 1990

Region	Change in the Output Share (in per cent)		Change in the Coefficient Value (in 10^{-4})			
	Coal	Refineries	a_{43}	a_{73}	a_{83}	a_{v3}
Noth America	+1	-3	-16	-42	+22	+36
Western Europe	-1	-6	+16	-84	+104	-36
Eastern Europe	-4	-2	+64	-28	+108	-144
Japan	-2	-11	+32	-154	+194	-72
Other Developed	+6	-3	-96	-42	-78	+216
Latin America	+1	-9	-16	-126	+106	+36
Near East	+1	+6	-16	+84	-104	+36
Indian Subc.	-5	-6	+80	-84	+184	-180
East Asia	0	-8	0	-112	+112	0

A comparison with regional input-output tables for 1975 shows, that the proposed changes in the coefficients could be applied in two cases: the values of the a_{73} coefficient in the 1975 table are extremely low for Latin America (0.0010) and India (0.0023) and do not allow carrying out the proposed change. The economic interpretation of the results is rather difficult. One can understand that the input from construction into the energy sector may increase with the share of refineries and that the share of value added may increase with the share of coal. It is much less clear why the inputs from basic products should decrease with increasing share of coal and why inputs from services should decrease with increasing shares of coal and refineries. One of the first studies on the variability of the input coefficients, carried out in the framework of the UNITAD project, dealt also with the impact of the product mix on the coefficient values.[1] It does not, however, provide any support for the equations presented above.

III-2. Changes in the inputs in the energy sector in the U.S. between 1947 - 1967

The changes in the input structure in the energy sector can be seen in coefficients in Table III-6 which was calculated from the available U.S. data. Between 1947 to 1967 the input structure the pattern of inputs did change too much. The large coefficients, like those for value added, i.e. a_{v3}, for services , i.e. a_{83} and also for the main diagonal, i.e. a_{33} remained almost stable (one has again disregarded the large deviations for the first year of the time series, i.e for 1947).

Table III-6 Sector: Energy

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs:	Year: 1947	1958	1963	1967
AGRICULTURE	0.0	0.0	0.0	0.0
AGRO-FOOD	0.0012	0.0002	0.0004	0.0004
ENGERGY AND PETROLEUM PROD.	0.3095	0.3247	0.3140	0.3039
BASIC PRODUCTS	0.0665	0.0446	0.0344	0.0357
LIGHT INDUSTRY	0.0039	0.0021	0.0014	0.0027
CAPITAL GUODS	0.0078	0.0049	0.0033	0.0083
CONSTRUCTION	0.0123	0.0118	0.0253	0.0249
TRADE AND SERVICE	0.1707	0.1687	0.1350	0.1769
INTERMEDIATE INPUTS ALLOC.	0.5722	0.5573	0.5641	0.5530
IMPORTS OR RES. TO BE ALLOC.	0.0129	0.0317	0.0295	0.0282
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADDED	0.4149	0.4109	0.4061	0.4189
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000

1) Analysis of Coefficients from Input-Output Tables (Part A), op. cit.

The only pronouced change can be seen in the value of the input coefficient for construction. The coefficient is rather small, but its change is consistent with results of previous studies and reflects the increase in maintenence costs for building which follows rising GDP per capita.

III.2.3 Changes in the West-European Countries 1959-1965

The two sets of standardized ECE Tables for years around 1959 and 1965 are once more used for the following seven West-European countries: Belgium, France, Federal Republic of Germany, Italy, the Netherlands, Norway and Spain. The tables for all countries but Spain are available for 1959 and 1965, for Spain for 1962 and 1965. The tables are rather outdated for any use in projections for 1990, but the change in time, which occured within six years in the early sixties may be of some interest.

The differences between the energy vectors of these tables are presented in Table III- 7. For each country they are standardized to one year's difference, the average is standardised to 15 years (i.e. to the length of the projection period of the UNITAD model, which runs from 1975 to 1990). A comparison of the results for the important coefficients a_{43}, a_{83} and a_{73} with the results of analysis in the preceeding paragraph shows the same direction of change, but differences in the magnitude of change. They also indicate a certain decrese in the value of the main diagonal coefficient, i.e. in a_{33}.

Table III-7 Changes in the Input Coefficients of the Energy Sector for Seven West- European Countries

Input from	Belgium	France	Germany	Italy	Netherlands	Norway	Spain	Average (15 years)
1	-.0008	-.0003	-.0009	-.0001	-.0002	-.0000	-.0005	-.0027
2		-.0001	.0002	-.0008			-.0000	-.0007
3	.0031	-.0029	.0001	.0006	-.0103	.0036	-.0070	-.0127
4	-.0029	-.0011	-.0057	.0001	.0011	.0241	.0005	.0160
5	-.0006	.0000	.0004	-.0008	-.0002	-.0006	.0005	-.0009
6	-.0001	.0023	.0002	.0007	-.0315	-.0000	.0011	.0027
7	.0001	-.0001	.0000	.0006	.0003		.0025	.0033
8	.0010	.0039	-.0019	-.0048	.0008	.0004	.0090	.0086
VA	.0003	-.0019	.0076	.0042	.0048	-.0276	-.0041	-.0136

The results for Europe are quite different than for the United States. That only means that the forecasting of the structure of inputs into the energy sector remains (in perticular after the increases in energy prices in the seventies) a very difficult task.

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1) UN Economic Commission for Europe, op. cit (1972, 1977)

IV BASIC PRODUCTS

IV.1 Results of Previous Studies

Previous studies, carried out in the framework of the UNITAD Project gave a few useful results. It has been found that among the inputs into the Basic Products sector the following three are really important: a_{44}, a_{84} and a_{v4}. The first one should increase with rising GDP per capita (it reflects the degree of processing of ores and other raw materials), the other two should decrease. Analysis of changes in time for the period 1959 - 1965 for seven west-european countries confirmed, however, this finding only for the coefficient on the main diagonal, i.e. for a_{44}, but not for the other two important coefficients, which remain stable during that period.

IV.2. Changes in the Input Structure of basic products in the United States between 1947-1967

Changes in the input structure in the U.S. sector of basic products can be seen in Table IV- 1, which was calculated from the available U.S. data. The results for the three important coefficients contradict both the results of cross country comparisons as well as the analysis of changes in time in seven West- European countries. The intra-industry inputs, i.e. a_{44} were decreasing, and the service inputs, i.e. a_{84}, increasing.

The inconsistencies in the results of analytical studies lead then to the proposal to base, at least for manufacturing, the projections for developing countries on some assumption about the technology transfer.

Table IV- 1 Sector: Basic Products

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs:	Year: 1947	1958	1963	
AGRICULTURE	0.0015	0.0003	0.0004	
AGRO-FOOD	0.0187	0.0042	0.0055	
ENGERGY AND PETROLEUM PROD.	0.0257	0.0287	0.0329	.317
BASIC PRODUCTS	0.3516	0.3443	0.3325	0.3261
LIGHT INDUSTRY	0.0227	0.0230	0.0251	0.0259
CAPITAL GUODS	0.0244	0.0290	0.0267	0.0304
CONSTRUCTION	0.0033	0.0024	0.0037	0.0058
TRADE AND SERVICE	0.1113	0.1260	0.1213	0.1315
INTERMEDIATE INPUTS ALLOC.	0.5597	0.5584	0.5483	0.5560
IMPORTS OR RES. TO BE ALLOC.	0.0272	0.0322	0.0332	0.0406
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADDED	0.4130	0.4092	0.4184	0.4032
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000

IV.3. The Convergence of Technology in the Developing Regions to the Technology in the Industrialized Regions

Technology used in manufacturing industries is rather quickly transfered from country to country . The vehicles of technology transfer are licenses, patents, direct foreign investment and in particular investment by multinational companies. It can be therefore assumed, that the vectors of input coefficients of the Basic Products sector of the developing regions will converge to the vectors of the developed regions.

One of the result of the previous analytical studies was the definition of "vectors of unit change", which relate the change in the input coefficients to the cross-country differences in GDP per capita. The disadvantage of this approach, which was even built into one version of the UNITAD Model [1], is that the resulting change in the coefficients is very small.

This approach can, however, be combined with the hypothesis of convergence so that the difference between the input vectors for a developed and developing region is compared with the unit change vector and the "convergence distance" defined. This convergence distance may be then related to some indicator of economic distance between the regions, like e.g. the capital labour ratio or some other suitable measure.

In the case of Basic Products, the convergence distance could be defined for the following regions:

a) East Asia and Japan: The distance between the a_{44} coefficients amounts to 0.1254. It reflects large differences in the degree of processing of raw material. The a_{44} value in the "Unit change vector" (or incremental technology vector) is equal to 0.00586; the ratio of the two is equal to 21.4. The distance between the a_{v4} coefficients is extremely large and would give a huge convergence distance, the difference between a_{84} is very small, giving a very short convergence distance. It may be e.g useful to define the convergence distance between these two regions to be equal to 20 units, to relate it to some indicator of difference in the level of economic development, and to assume for each unit a change in the coefficient vector defined by the "unit change vector".

b) Latin America and North America: The distance between the a_{44} coefficients is equal to 0.0574 and is thus 9.8 times larger than the corresponding element of the "Unit change vector" . The values of the a_{84} coefficients are again close, and it would be useful to outweight the projected change in the a_{44} coefficient by an equal reduction in the a_{v8} coefficient. Alternatively one could use for the projection the complete "unit change vector."

c) Near East and Western Europe: The distance between the a_{44} coefficients is equal to 0.0862 and is thus 14.7 greater than the corresponding element of the "unit change vector". The distance between the a_{84} coefficients is equal to 0.0835 and is 29.6 times greater than the corresponding element of the unit change vector. It would be probably better to base the coefficient projection on the distance between the a_{44} coefficients.

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1) "The UNITAD Model: Main Methodological Features", UNIDO/IS.227, 6 May, 1981.

V LIGHT INDUSTRY

V.1 Results of previous studies

Studies carried out earlier in the framework of the UNITAD Project, gave a few useful results. Among the input coefficients of the light industry the following three are important: a_{15}, a_{45} and a_{85}. The second one is increasing, the other two are decreasing with rising GDP per capita.

V.2 Changes in the Structure of the U.S. Economy

The four postwar U.S. input- output tables, aggregated into the 8 x 8 sector framework of the UNITAD Model, gave vectors of input coefficients of the light industry, which are reproduced in Table V-1. The increase in the inputs form basic products, i.e. in a_{45} and the decrease in the inputs from agriculture, i.e. in a_{15} are fully consistent with the results of previous studies. They reflect the substitution of natural fibres by artificial fibres. Contrary to the results of earlier studies the inputs form services, i.e. a_{85}, remained more or less constant. The intrasectoral flows, i.e. a_{55} were not constant and show a certain tendency to decline.

For the thre changing important coefficients the following change for a period of 15 years emerges from the set of the postwar U.S. tables:

	absolute change	relative change
a_{15}	- 0.0258	- 0.4322
a_{45}	0.0421	0.4991
a_{55}	0.0222	0.0699

Table V-1 Sector: Light Industry

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs:	Year: 1947	1958	1963	1967
AGRICULTURE	0.0597	0.0391	0.0341	0.0253
AGRO-FOOD	0.0143	0.0045	0.0038	0.0032
ENGERGY AND PETROLEUM PROD.	0.0100	0.0088	0.0086	0.0094
BASIC PRODUCTS	0.0943	0.1282	0.1342	0.1404
LIGHT INDUSTRY	0.3177	0.3015	0.3068	0.2861
CAPITAL GOODS	0.0103	0.0171	0.0149	0.0175
CONSTRUCTION	0.0021	0.0008	0.0019	0.0027
TRADE AND SERVICE	0.0996	0.1048	0.0976	0.1013
INTERMEDIATE INPUTS ALLOC.	0.5894	0.6092	0.6062	0.5882
IMPORTS OR RES. TO BE ALLOC.	0.0226	0.0274	0.0308	0.0294
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADDED	0.3879	0.3634	0.3629	0.3822
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000

V 3. Changes in the Input Structure in the West-European Countries between 1959-1965

The differences between the input vectors of the light industry, calculated from the ECE standardized input-output tables for years 1959 and 1965, are presented in Table V-2. Two of the important coefficients (a_{15} and a_{45}) show the same tendency as in the investigations quoted above, the third one (a_{85}) remained more or less stable in that period.

Table V-2 Changes in the Input Coefficients of the Light Industry for Seven West-European Countries

Inputs from	Belgium	France	Germany	Italy	Netherlands	Norway	Spain	Average (15 years)
1	-.0029	-.0012	-.0042	-.0045	-.0028	-.0030	-.0119	-.0305
2	-.0005	-.0013	-.0009	-.0010	-.0010	.0004	.0005	-.0027
3	-.0008	-.0001	-.0001	.0003	-.0010	-.0008	.0000	-.0025
4	.0021	.0015	-.0013	-.0017	.0041	.0007	.0091	.0134
5	-.0013	-.0036	-.0010	.0066	.0037	-.0012	-.0105	-.0074
6	.0005	.0011	.0049	-.0017	-.0020	.0006	-.0003	.0031
7	.0002	.0006	-.0002	-.0001	-.0001		.0008	.0004
8	.0037	.0041	-.0006	.0033	-.0001	-.0018	-.0105	.0000
VA	-.0009	-.0031	.0034	-.0011	-.0008	.0051	.0245	.0272

V. 4. The Convergence of Technology between Developing and Developed Regions

The hypothesis of convergence in technology between developing and developed Regions was briefly explained in paragraph IV.1. An attempt to find "convergence distance" between a few regions will be again made for the light industry.

The convergence distance could be estimated for the following regions:

a) East Asia and Western Europe: The input coefficients of the light industry are rather similar in general pattern, The differences between the three important coefficients and the resulting distances look as follows:

coefficient	difference	unit change vector	distance
a_{15}	-0.0590	-0.00284	20.8
a_{45}	0.0560	0.00329	17.0
a_{85}	-0.0387	-0.00155	24.9

The dispersion of distances is suprisingly small, it seems to be around the value of 20.

b) Latin America and North America : The similarity of the pattern of the input coefficients is less pronounced. Differences between the three important coeffi- and the resulting distances look as follows:

coefficient	difference	unit change vector	distance
a_{15}	- 0.0285	- 0.00284	9.7
a_{45}	0.0514	0.00329	15.6
a_{85}	- 0.0626	- 0.00155	41.6

The distances for the two first coefficients, i.e for a_{15} and a_{45} could serve as basis for the determination of the value of distance which could be used in projections.

VI Capital Goods

VI.1 Results of previous studies

Earlier studies carried out in the framework of the UNITAD Project gave very few useful results. The important coefficients are a_{46}, a_{76} and to some degree also a_{56}. The analysis of standardized input-output tables for seven ECE countries did not show any clear pattern of change. Also the input coefficients of the capital goods industry for the post-war input-output tables of the United States were compared (see below in paragraph V.2) but the results are ratger poor. For that reason, the convergence hypothesis was applied, it gave a useful result for Japan and East Asia (see below in paragraph VI.3)

V.2 Changes in the Structure of the U.S. Economy 1947 - 1967

The postwar input-output tabes of the United States, aggregated into the 8 x 8 sector framework of the UNITAD Model, contain vectors of input structure of the capital goods industry, which are reproduced in Table VI-1. One has to disregard the values for year 1947 which strongly differ from the values for the other three years. In the 9 year period between 1958 and 1947, there was a certain decline in the inputs from basic products, i.e. in a_{46}, in the inputs from light industry, i.e. a_{58} and in the intra-industry flows, i.e. in a_{66}, which were outweighted by an increase in the inputs of services, i.e. in a_{86}. The direction of change is, however, not regular, because the 1963 values for a_{58} and a_{68} are higher than the 1958 values. Useful conclusions can hardly be drawn.

Table VI-1 Sector: Capital Goods

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs:	Year: 1947	1958	1963	1967
AGRICULTURE	0.0	0.0000	0.0	0.0
AGRO-FOOD	0.0000	0.0000	0.0000	0.0000
ENGERGY AND PETROLEUM PROD.	0.0099	0.0081	0.0084	0.0084
BASIC PRODUCTS	0.2244	0.1756	0.1730	0.1689
LIGHT INDUSTRY	0.0514	0.0383	0.0349	0.0343
CAPITAL GOODS	0.2089	0.2519	0.2760	0.2533
CONSTRUCTION	0.0027	0.0017	0.0015	0.0028
TRADE AND SERVICE	0.0757	0.0992	0.0883	0.1011
INTERMEDIATE INPUTS ALLOC.	0.5734	0.5750	0.5865	0.5691
IMPORTS OR RFS. TO BE ALLOC.	0.0021	0.0119	0.0090	0.0203
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADDED	0.4244	0.4130	0.4044	0.4104
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000

VI. 3. The Convergence of Technology between Developing and Developed Regions

The hypothesis of technology convergence between developing and developed regions was explained in paragraph IV.1. Also for the capital goods industry an attempt will be made to find the distance for a few regions.

a) East Asia and Japan: The input vectors of the capital goods industry are very similar, the technological distance seems to be very small. Japanese technology is probably quickly implemented in the neighbouring countries.

b) Latin America and North America: There are some similarities in the input patterns. The differences between the three important coefficients and the resulting distances look as follows:

coefficient	difference	unit change vector	distance
a_{46}	0.0212	0.00063	33.6
a_{56}	0.0141	0.00100	14.1
a_{86}	-0.0229	-0.00253	9.1

If these results are compared with the pattern of change in the postwar U.S. economy (see paragraph VI.2) one can see that they are fully contadictory. This only shows, how confused the problem is and how difficult it will be to forecast input coefficients for the sector of basic products.

VII Construction

VII Construction in the UNITAD Regional Input - Output Tables.

The earlier attempts to analyse the variation in the inputs into and from construction in the framework of the UNITAD Project gave very poor results. No explanation was found for the pattern of inputs into construction, it seems, that each region has its own construction technology, which differs from that for all other regions. The flows from construction to other sectors increase no doubt with GDP per capita level, but the level of the inputs from construction is generally low and their increase very small.

VII.4 Structural Change in the U.S. Economy between 1947 and 1967

The vectors of the input coefficients for the postwar U.S. input-output tables aggregated into the 8 x 8 sector framework, are given in Table VII -1. The large coefficients have a rather pronounced pattern of change. There was an increase in the share of value added, i.e. in a_{v7} and a decline in the inputs of basic products, i.e. in a_{47} and from the light industry, i.e. in a_{58}. These changes, adjusted for a 15 years period, look as follows:

	absolute change	relative change
a_{47}	- 0.0064	- 0.0254
a_{57}	- 0.0158	- 0.1764
a_{v7}	0.0229	0.0518

Table VII-1 Sector: Construction

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs	Year: 1947	1958	1963	1967
AGRICULTURE	0.0031	0.0034	0.0038	0.0025
AGRO-FOOD	0.0004	0.0002	0.0003	0.0
ENGERGY AND PETROLEUM PROD.	0.0216	0.0221	0.0229	0.0203
BASIC PRODUCTS	0.2509	0.2542	0.2447	0.2424
LIGHT INDUSTRY	0.0897	0.0714	0.0716	0.0546
CAPITAL GOODS	0.0285	0.0396	0.0431	0.0421
CONSTRUCTION	0.0002	0.0001	0.0002	0.0002
TRADE AND SERVICE	0.1946	0.1810	0.1791	0.1813
INTERMEDIATE INPUTS ALLOC.	0.5892	0.5923	0.5660	0.5577
IMPORTS OR RES. TO BE ALLOC.	0.0	0.0	0.0	0.0009
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADDED	0.4107	0.4176	0.4336	0.4414
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000

VII.2 Construction in the ECE Standardized Input-Output Tables

A comparison of vectors of input coefficients in the two sets of the ECE standardized input-output tables gave for the construction sector results which can be seen in Table VII-2.

One can see a pronouced decline in inputs from basic products, i.e. in a_{47}, and a decline in the value added share, i.e. in a_{v7}, outweighted by an increase in inputs from Capital goods, i.e. in a_{67} and from services, i.e. in a_{87}.

A comparison with the development in the United States confirms, however, the finding that the input structure of agriculture in each region is a particular one and has little in common with other regions. In the case of the United States and seven European countries, opposite direction of change was found for such important coefficients as for the value-added share and the inputs from the light industry, i.e. for a_{v7} and a_{57} respectively, a parallel decline was found only for the inputs form basic products, i.e. for a_{47}.

Table VII-2 Changes in the Input Coefficients for Agriculture for Seven West-European Countries

Inputs from	Belgium	France	FRG	Italy	Netherlands	Norway	Spain	Average (15 years)
1	.0001	.0002	-.0000	-.0001	.0002	-.0003	-.0000	.0001
2	.0001		.0001			-.0000	-.0003	-.0004
3	.0007	-.0007	-.0006	-.0006	-.0023	-.0018	-.0001	-.0146
4	-.0004	-.0028	-.0093	-.0067	.0008	-.0035	.0021	-.0395
5	-.0014	.0016	.0020	-.0034	.0001	.0004	.0046	.0215
6	-.0009	-.0002	.0144	.0020	.0003	.0028	.0042	.0619
7			.0004		.0010			.0044
8	.0044	.0048	.0102	-.0034	.0112	-.0022	-.0143	.0486
VA	-.0025	-.0028	-.0171	.0093	-.0112	.0047	.0016	-.0820

VIII Services

All previous studies have thrown little light on the factors which shape the input structure of the service sector. The only factor which seems to play a certain role would be the population density. This variable differs strongly among countries and among regions, but is rather stable in time.

The last attempt to find some explanation of the variation in the input structure of services was made in the framework of this study and relied on the set of postwar U.S. input-output tables. The vectors of input coefficients of the U.S. service sector, in an aggregation of the UNITAD Model, are presented in Table VIII-1.

The input structure of services is dominated by two large coefficients. By the value added share, i.e. by a_{v8} and by the intrasectoral inputs, i.e. by a_{88}. The former coefficient showed between 1947 and 1967 a rather erratic pattern of change. The latter shows a steady increase, which seems to be outweighted by declines in inputs from agriculture, agrofood and construction. The corresponding three coefficients are, however, rather small and their variation is probably also influenced by the variation in the value-added share, which shows no regular pattern.

Table VIII-1 Sector: Services

Changes in the Input Structure of the U.S. Economy : 1947 - 1967

Inputs:	Year: 1947	1958	1963	1967
AGRICULTURE	0.0134	0.0098	0.0089	0.0063
AGRO-FOOD	0.0116	0.0102	0.0090	0.0087
ENGERGY AND PETROLEUM PROD.	0.0192	0.0231	0.0246	0.0221
BASIC PRODUCTS	0.0407	0.0361	0.0351	0.0377
LIGHT INDUSTRY	0.0109	0.0160	0.0126	0.0144
CAPITAL GOODS	0.0161	0.0275	0.0122	0.0135
CONSTRUCTION	0.0386	0.0332	0.0241	0.0224
TRADE AND SERVICE	0.1462	0.1942	0.1973	0.2077
INTERMEDIATE INPUTS ALLOC.	0.3371	0.3504	0.3283	0.3331
IMPORTS OR RES. TO BE ALLOC.	0.0055	0.0063	0.0063	0.0058
WAGES	0	0	0	0
CONSUMPTION OF FIXED CAPITAL	0	0	0	0
TAXES LESS SUBSIDIES	0	0	0	0
NET OPERATING SURPLUS	0	0	0	0
VALUE ADDED	0.6573	0.6432	0.6653	0.6610
GROSS OUTPUT	1.0000	1.0000	1.0000	1.0000