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The Multi-Region Input-Output Table of Indonesia for 1990, Construction, Description and Analysis

Netherlands Economic Institute

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No. 7

THE MULTI-REGION INPUT-OUTPUT TABLE

OF INDONESIA FOR 1990,

CONSTRUCTION, DESCRIPTION AND ANALYSIS

REGIONAL ECONOMIC ANALYSIS FOR REGIONAL INVESTMENT

PLANNING PROJECT

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Jakarta, August 1994

PREFACE

The Regional Economic Analysis for Regional Investment Planning Project (TAP4I/NEI) is attached to Deputy V of BAPPENAS. It is funded by the PMU-TAP 4I Loan Number 3385 IND for Public and Private Provision of Infrastructure and executed by the Netherlands Economic Institute. The project is aimed at strengthening the regional planning capabilities of BAPPENAS in general and Deputy V in particular and further developing the available analytical tools.

The results of the work undertaken in this framework are regularly presented in the Research Memorandum Series. This seventh Memorandum of this series discusses the construction method of the Multi-Region Input-Output Table and describes the characteristics of this new table. The result will be used to update the Simultaneous Supply Demand Model (SSDM), which has been used for the provincial economic projections for Repelita V and Pembangunan Jangka Panjang II (PJP II). This memorandum is prepared by Mr. E. van der Knijff and Mr. W Spit, while Mr. A.W. de Groot and Mr. Wedar H. Adji heavily participated in the data collecting and processing.

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1. INTRODUCTION

In an earlier phase of this project the project staff has produced a Multi-Region Input-Output Table (MRIOT) for Indonesia based on the National Input-Output Table (NIOT) of 1985. During the past years, this table has been used for a number of Input-Output model studies, among which for the projections of regional economic development for Repelita VI and PJP II. Recently BPS published a new NIOT Table for 1990, which allows us to update the MRIOT to the year 1990.

This report describes the process of updating and constructing of the new MRIOT. The followed construction method is similar to the method used for the 1985 MRIOT. As a result the new MRIOT is fully comparable with this previous version. The resulting MRIOT 1990 will be used for the updating of the complete Simultaneous Supply Demand Model. In this context also the updating and/or analysis of some other items linked to the MRIOT is described in this memorandum:

- estimating the wage share in GDP by manufacturing industry and province;

- estimating total household income derived from wages and operating surplus;

- re-estimating the dynamic consumption function on the basis of SUSENAS data for 1990;

- assessing whether the level of estimated interprovincial trade is realistic in view of available knowledge of interprovincial transport flows.

- comparing the trade results derived with the MRIOT for 1990 with the MRIOT as estimated for 1985.

Section 2 will describe the estimation procedure for the MRIOT. Section 3 discusses the regional differences in the role of labor costs in GRDP in the manufacturing sector. Section 4 pays attention to the estimation of household income, while in Section 5 regional income elasticities for consumption are estimated. Section 6 and 7 analyze the interprovincial trade flows of the new MRIOT 1990. First in Section 6 an assessment is made of the plausibility of the interprovincial trade flows in the MRIOT, based on the information from other statistical sources. In Section 7 these interprovincial trade flows in the MRIOT 1990 are compared with the flows of previous MRIOTs, i.e. for the years 1985 and 1980.

More detailed and technical information about the MRIOT estimation procedure is given in Appendix A. In Appendix B the aggregated MRIOT 1990 (at one sector level) is given, while Appendix C gives the transformation matrices for conversion between Social Accounting Matrix (SAM) and NIOT, as used in Section 4.

2. DESCRIPTION OF THE CONSTRUCTION METHOD

The basic principles of the construction of this MRIOT are identical to those applicable for the estimation procedure of the 1985 table as described in the LTA 97 Discussion Paper Series XVII[1]. A manual for this construction has been published in DSP Research Memo #77[2]. This report will present a new manual, because important improvements have been introduced in the construction method. The following steps can be distinguished in the construction:

2.1. General preparations and assumptions

1. Aggregate the National IO table (NIOT) (domestic, producer prices) at the level of 161 sectors to 25 sectors. For exports abroad and consumption also the columns of the table in consumer prices have to be aggregated from the basic table.

2. Aggregate the sectoral GRDP data to a level of 25 sectors. For most of the sectors the data are available, for the manufacturing sector surveys of large and medium scale industry, small and household/cottage industry have to be used. Based on these data also region specific data of output/GDP ratio's and foreign import/GDP ratio's can be derived.

3. Determine the intermediate input by provincial sector, for the industrial sectors province specific info is available, as explained in step 2, for the other sectors, national ratio's are applied. For the industrial sectors scaling to the NIOT levels is necessary in order to keep consistency with the national framework. The foreign import ratio's are applied on the intermediate inputs so that the level of domestic input levels occurs.

4. Intermediate and final output by provincial sector are determined. The intermediate part of total output is equal to the national sector average. Two sectors are exempted from this assumption: migas mining and non-migas mining. Here the intermediate output is equal to total output minus exogenous estimated exports and consumption and change in stocks. The sum of output to private consumption, government consumption and investment as a share of total output per sector is also equal for all provinces.

2.2. Intermediate block of the MRIOT

5. For all 27 provinces the domestic input structure by sector is applied on the total domestic input, through which intermediate domestic demand by sector by province is obtained. This result is confronted with the domestic supply of intermediates by provinces. Trade balances are developed and separated as a table of interregional

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1. See LTA 97 Discussion Paper Series XVII, "Interregional Input-Output tables for Indonesia 1985, Construction, Description Analysis", 1990.

2. See "Transfer LTA97-BAPPENAS and Input-Output Documentation Manual", DSP Research Memo 77, October 1992.

imports by province and interregional exports by province. At the same time the intra-provincial tables are obtained as the per sector smallest value of both supply and demand.

6. The intermediate trade matrices are developed. The rows of the matrix of imports are used as the column totals of the Origin-Destination (O-D) matrices. (25 matrices of 27 by 27 describe the flows between the provinces). The columns of the transposed export matrix form the row totals of the O-D matrices. Since an important assumption in the procedure implies that no cross-hauling at the level of 25 sectors occurs, either the column-sum or the row-sum of a region is zero: either it imports or it exports commodities produced by the concerning sector.

7. The trade flows are distributed over sectors of importing provinces. This, together with the already available intra-provincial tables, results in the 27 tables (675*25) of domestic intermediate demand. These tables are combined to the large intermediate I-0 matrix of 675*675. The aggregated (to one sector) results are shown in Appendix B, Table 1.

2.3. Final demand block of the MRIOT

Two types of final demand categories are distinguished: first, the interregional final demand, consisting of consumption by households and the government and the investment by government and the private sector. The second type, other final demand, consists of export of commodities and services and change in stocks.

8. BPS provides GRDP by expenditure category, these data are partly used as sum of provincial final demand: private consumption and investment. These categories are scaled to the NIOT framework. The other categories can be well estimated endogenous.

9. For the regional specification of the consumption column (i.e. the provincial demand column) SUSENAS survey data are used. These data, 18 expenditure categories by province, are transformed to 25 economic sectors with the aid of a transformation table, developed for SUSENAS 1987 data[3]. The distribution of the consumption over economic sectors of origin results from this procedure, and is applied to the total level of consumption as estimated in step 8. The resulting columns are expressed in consumer prices and have to be transformed in producer prices, with the aid of NIOT ratio's. The resulting columns are subject of a RAS procedure to make their aggregation conform NIOT.

10. Government consumption is determined by the government GRDP. The GRDP of the government is by definition equal to the cell government to consumption government. The other cells of this demand vector are estimated with ratio's from the NIOT. This also determines the total level of demand, which in many cases

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3. See LTA97 Working Paper XVI, "Household Consumption by Region and the Multi-Region Consumption Function", 1991.

diverts from the GRDP by expenditure results of BPS.

11. The specification of investment. First step is the breakdown of investment at the national level in private and government investment, which is not available from the NIOT of BPS. We make this breakdown in the MRIOT since it is important for policy studies. Next, the government investment is distributed over provinces based on earlier findings[4]. The level of total investment is estimated in a procedure combining two types of data: the BPS data on GRDP by expenditure category and the BPS data on GRDP of the construction sector. Based on the latter data a minimum level of total investment is determined (available final output of construction). Where BPS total investment level by province is high enough compared to both government investment and final output of construction, this level is accepted. Where it does not meet one of these criteria, it has been scaled to meet these criteria. The result is scaled to the NIOT.

The distribution over sector of origin is first directed to the construction sector. The remaining part is distributed over sectors according to the national distribution, for both government and private investment.

12. The interregional trade of final products is estimated in a similar way as in case of the interregional intermediate trade. Supply is available from step 3, demand is estimated in the previous steps (national import ratio's are used to derive domestic demand), so both intra provincial trade matrices and a matrix of trade balances by province and sector can be derived. The latter matrix is split in an export matrix, providing the row sums of O-D matrices, and an import matrix, providing column sums of the 25 O-D matrices. The matrices are filled manually, with regard to minimal transport movements. The result is distributed over the 4 categories by province of destination, according the distribution of total (interregional) final demand. Combination of the results with the intra provincial tables leads to a table of 675* 108 cells: the final result of this part of the procedure.

13. Exports of commodities and services are estimated as follows: Export of commodities are available by province. These are transformed into sectoral exports by province. These are expressed in consumer prices, trade and transport margins are redistributed from original sectors to the sectors trade and transport. The result is scaled to the national level. The exports of Jakarta concerning the mining sector are shifted to Jawa Barat.

The export of services is distributed over provinces according to the distribution of GRDP in the concerning sectors over the provinces, in the lowest available level of disaggregation.

The change in stocks is determined as the total output minus the previously determined supply levels. Deviations from national ratio's stocks/total output are

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4. "Regional and Sectoral Investment in Indonesia, Past Performance and Present Potentials", Research Memorandum 6, BAPPENAS, TAP4I/NEI, July 1994.

caused by exogenous estimates of exports. The aggregated result are shown in Appendix B, Table 2 and 3.

2.4. Primary inputs of MRIOT

14. The block of <u>primary cost</u> consists of 5 categories: imports from abroad (step 3); wages, depreciation, net indirect tax and operation surplus. The last four mentioned components are derived by breaking down the value added (GRDP) using national ratio's. In Section 3 we pay more attention to the breakdown of GRDP to primary cost components for the manufacturing sectors, using the information from the industrial surveys.

15. <u>Primary cost of final demand</u> also consists of 5 categories, all of which are zero, except imports from abroad. These are available from step 12.

These steps together complete the construction of the Multi-Region Input-Output Table.

3. RE-ESTIMATE WAGES AS PART OF GDP, BY MANUFACTURING SECTOR AND PROVINCE

In the original estimate of the distribution of GDP over the various primary cost categories (wages, depreciation, operating surplus, net indirect taxes) national ratio's had been used to assess the share of labor costs (wages) in the value added (GDP). In this section the regional differences in labour costs will be taken into account in order to re-estimate sector and province specific shares of wages in value added (GDP) for each of the manufacturing sectors. The sector and province specific data from the survey of Large and Medium scale (L&M) industries will be used.

This survey gives information on both value added and labor costs, by manufacturing sector and province and from this specific wages/GDP ratio's can be estimated (see file SURVEY.wq1[5]). Similar data are available for the small-scale and cottage (S&C) industries, but these are at the national level only and do not differentiate between provinces. In file L&MS&C.wq1 the survey data are combined with information on the relative sizes of the two groups of industries (L&M scale; S&C industries) in the regional manufacturing sectors. The result of the exercise is an estimate of the overall ratio between wages and GDP, by manufacturing sector and province (see Table 3.1.).

This matrix is subsequently used in ALLREGIO.wq1 to re-estimate the division between operating surplus and wages in the sectoral value added by province. An adjustment procedure is applied to assure that the sum over the provinces of wages per sector remains at the national sector level derived from the NIOT.

Since the newly estimated value of wages in GRDP of the sector is related to GRDP, it could exceed the previous total of operating surplus and wages. However, if this would occur, either depreciation or net indirect taxes would be affected. In order to avoid this, the ratio of wages/GRDP has to be limited during the adjustment procedure, to 0.8 (and in one case 0.6).

The resulting new division of value added by sector and province, over the primary cost categories is contained in the lower half of file ALLREGIO.wq1. The new data on labor and operating surplus are reported in Tables 3.2. and 3.3. below. This new division of GDP in the manufacturing sectors is used in the new MRIOT 1990.

The complete MRIOT will be further analyzed in Section 6 and 7 of this memorandum, while in Table 1-3 of Appendix B the complete MRIOT aggregated to one sector is shown. In Table 4 of this same Appendix the results of some final checks of consistencies on the MRIOT are presented, such as the economic identity $GDP = C + I + G + X-M$ at the provincial level.

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5.   All filenames ending at .wq1 are the names of Quattro Pro files.

Table 3.1.:	Ratio's of Labor costs to Value Added for manufacturing industries.								
Economic sector (ISIC) Province	8 (31)	9 (32)	10 (33)	11 (34)	12 (35)	13 (36)	14 (37)	15 (38)	16 (39)
1 D.I. Aceh	0.2795	0.2395	0.4261	0.1384	0.1386	0.2222	0	0.5218	0.2777
2 Sumatera Utara	0.2615	0.3174	0.2968	0.3284	0.2824	0.2248	0.0456	0.1905	0.4083
3 Sumatera Barat	0.3449	0.234	0.3848	0.2209	0.3012	0.1486	0.2591	0.432	0.2777
4 Riau	0.313	0.2774	0.3295	0.055	0.1389	0.2103	0.1379	0.1604	0.2777
5 Jambi	0.365	0.2395	0.2855	0.4804	0.1173	0.4523	0	0.499	0.3564
6 Sumatera Selatan	0.4278	0.7075	0.3453	0.215	1.0142	0.3344	0.0742	0.5117	0.4436
7 Bengkulu	0.3716	0.277	0.504	0.4804	0.1775	0.3516	0	0.4612	0.2777
8 Lampung	0.285	0.267	0.4113	0.1555	0.3243	0.3523	0	0.6939	0.2777
9 D.K.I. Jakarta	0.1962	0.2858	0.4012	0.3921	0.2515	0.2926	0.1292	0.1317	0.2848
10 Jawa Barat	0.2763	0.2406	0.3551	0.2043	0.2082	0.2356	0.0482	0.235	0.3342
11 Jawa Tengah	0.1034	0.1849	0.4119	0.2754	0.213	0.2459	0.0563	0.2772	0.3324
12 D.I. Yogyakarta	0.3108	0.2306	0.4708	0.4079	0.3095	0.4133	0	0.3564	0.3068
13 Jawa Timur	0.1358	0.6012	0.4224	0.1172	0.2692	0.385	0.0828	0.334	0.2656
14 Kalimantan Barat	0.2833	0.2395	0.2618	0.4924	0.0953	0.4512	0.0182	0.4612	0.2777
15 Kalimantan Tengah	0.3846	0.2395	0.3014	0.4804	0.197	0.4512	0	0.4612	0.2777
16 Kalimantan Selatan	0.3874	0.2464	0.2105	0.4568	0.1887	0.1935	0	0.4316	0.2777
17 Kalimantan Timur	0.2638	0.0673	0.2334	0.4531	0.2143	0.2699	0	0.7086	0.2777
18 Sulawesi Utara	0.2798	0.2429	0.4138	0.4258	0.3378	0.4628	0.1398	0.4678	0.2777
19 Sulawesi Tengah	0.3335	0.2424	0.3741	0.4804	0.4684	0.4728	0	0.4612	0.2777
20 Sulawesi Selatan	0.2935	0.2631	0.2601	0.4507	0.3681	0.1422	0.2129	0.1053	0.2926
21 Sulawesi Tenggara	0.2454	0.2395	0.2903	0.4804	0.4684	0.3015	0	0.4516	0.2777
22 Bali	0.3316	0.2753	0.4459	0.4191	0.4236	0.3993	0	0.3439	0.3413
23 Nusa Tenggara Barat	0.337	0.3408	0.4306	0.4804	0.4684	0.4767	0	0.5987	0.2777
24 Nusa Tenggara Timur	0.3854	0.2392	0.4881	0.2258	0.3082	0.2197	0	0.4851	0.2777
25 Maluku	0.3816	0.2395	0.1708	0.3391	0.0336	0.4132	0	0.5327	0.2777
26 Irian Jaya	0.2342	0.0628	0.4037	0.5586	0.9177	0.464	0	0.7639	0.2777
27 Timor Timur	0.2984	0.2395	0.4627	0.4804	0.6824	0.065	0	0.5134	0.2777
Indonesia	0.1752	0.2781	0.3227	0.2229	0.2854	0.2737	0.0588	0.1795	0.3014

Table 3.2.:	Labor costs by manufacturing sector and province (in Rp. bln.), 1990.								
Economic Sector	8	9	10	11	12	13	14	15	16
(ISIC)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)
province									
1 D.I. Acch	29.7	1.8	20.2	7.6	26.3	3.9	0.0	1.7	4.8
2 Sumatera Utara	303.9	17.4	42.1	32.6	141.0	4.9	56.5	65.9	0.6
3 Sumatera Barat	61.3	10.7	30.8	3.6	7.3	12.5	0.5	3.1	0.7
4 Riau	11.2	1.1	15.9	7.3	1.8	0.6	0.1	22.0	0.1
5 Jambi	10.4	0.2	29.1	0.0	6.1	3.0	0.0	0.7	2.4
6 Sumatera Selatan	125.0	9.4	101.7	2.0	215.0	17.2	4.3	12.7	0.8
7 Bengkulu	4.3	0.1	3.3	0.0	0.8	1.1	0.0	0.2	0.1
8 Lampung	75.0	0.7	7.6	0.2	72.4	4.9	0.0	1.8	0.1
9 D.K.I. Jakarta	195.4	394.1	52.7	255.8	349.9	28.1	66.9	897.8	36.0
10 Jawa Barat	314.6	512.1	160.1	71.8	281.4	55.1	151.0	545.7	23.4
11 Jawa Tengah	355.3	144.5	93.3	19.5	47.2	16.1	5.2	49.6	7.0
12 D.I.Yogyakarta	30.7	19.1	13.4	9.3	0.9	3.3	0.0	10.4	1.2
13 Jawa Timur	820.5	272.6	193.3	114.0	195.8	68.8	36.4	303.5	10.6
14 Kalimantan Barat	39.0	1.5	70.6	0.3	8.3	0.1	0.6	2.3	0.5
15 Kalimantan Tengah	5.5	0.2	28.4	0.0	1.0	0.2	0.0	0.2	0.1
16 Kalimantan Selatan	9.9	1.0	55.2	0.6	7.6	0.3	0.0	4.1	0.2
17 Kalimantan Timur	12.5	0.7	111.1	6.6	67.7	0.3	0.0	6.2	0.1
18 Sulawesi Utara	22.4	4.4	6.2	0.6	0.4	0.8	0.3	1.7	0.2
19 Sulawesi Tengah	7.8	0.6	10.8	0.0	0.6	0.7	0.0	0.2	0.1
20 Sulawesi Selatan	47.2	16.0	20.1	4.3	2.1	7.5	3.2	3.9	0.4
21 Sulawesi Tenggara	1.9	0.2	2.7	0.0	0.0	0.2	0.0	0.7	0.1
22 Bali	21.3	21.5	15.1	1.8	0.8	1.5	0.0	1.9	3.6
23 Nusa Tenggara Barat	6.7	2.3	4.9	0.0	0.0	1.7	0.0	0.7	0.1
24 Nusa Tenggara Timur	2.8	2.8	1.5	0.1	0.1	0.6	0.0	0.2	0.0
25 Maluku	3.2	0.0	24.9	0.5	0.9	0.1	0.0	1.5	0.0
26 Irian Jaya	9.0	0.4	6.5	0.4	0.0	0.4	0.0	2.2	0.0
27 Timor Timur	0.4	0.2	0.6	0.0	0.1	0.0	0.0	0.3	0.0

Table 3.3.:	Operating surplus by manufacturing sector and province, 1990.								
Economic Sector	8	9	10	11	12	13	14	15	16
(ISIC)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)
Province									
1 D.L Aceh	24.0	3.8	25.6	22.0	115.4	12.7	0.0	0.0	6.8
2 Sumatera Utara	283.2	23.2	95.1	21.1	231.4	15.7	305.4	84.5	0.3
3 Sumatera Barat	28.5	23.1	46.8	5.2	10.8	67.5	0.1	0.1	1.1
4 Riau	6.9	1.8	30.8	64.3	6.6	2.2	0.2	37.9	0.1
5 Jambi	4.0	0.6	69.4	0.0	32.1	3.3	0.0	0.0	2.2
6 Sumatera Selatan	22.7	0.4	183.2	3.1	49.6	31.6	12.5	0.2	0.4
7 Bengkulu	1.5	0.1	3.1	0.0	2.4	1.9	0.0	0.1	0.2
8 Lampung	58.0	1.1	10.2	0.5	94.1	8.3	0.0	0.0	0.3
9 D.K.I Jakarta	307.9	623.0	74.4	97.2	687.2	63.4	84.4	2068.6	49.0
10 Jawa Barat	260.9	1057.9	276.3	118.6	726.4	167.4	764.1	465.0	23.6
11 Jawa Tengah	1381.3	432.0	126.0	18.9	118.2	46.1	21.8	28.2	7.1
12 D.I.Yogyakarta	19.3	42.0	14.1	3.0	1.2	4.3	0.0	2.2	1.5
13 Jawa Timur	2232.1	61.9	249.7	412.6	346.5	101.4	92.0	92.0	16.1
14 Kalimantan Barat	30.5	3.0	190.3	0.1	55.2	0.2	9.3	0.1	0.6
15 Kalimantan Tengah	1.8	0.3	62.8	0.0	2.5	0.2	0.0	0.0	0.2
16 Kalimantan Selatan	3.0	1.9	198.6	0.1	22.5	1.0	0.0	0.1	0.3
17 Kalimantan Timur	11.5	7.2	349.7	1.2	167.8	0.9	0.0	0.2	0.1
18 Sulawesi Utara	18.0	8.8	8.4	0.1	0.5	0.8	0.3	0.0	0.4
19 Sulawesi Tengah	4.0	1.3	17.1	0.0	0.3	0.7	0.0	0.1	0.1
20 Sulawesi Selatan	34.1	29.0	54.8	0.9	2.2	42.3	1.2	12.2	0.5
21 Sulawesi Tenggara	2.1	0.6	6.2	0.0	0.0	0.3	0.0	0.0	0.2
22 Bali	11.2	36.1	17.7	0.6	0.5	2.0	0.0	0.5	3.5
23 Nusa Tenggara Barat	3.4	2.7	6.2	0.0	0.0	1.7	0.0	0.0	0.1
24 Nusa Tenggara Timur	0.8	6.0	1.5	0.3	0.2	1.9	0.0	0.0	0.1
25 Maluku	1.1	0.1	116.2	0.2	18.1	0.2	0.0	0.0	0.0
26 Irian Jaya	10.4	4.4	9.2	0.1	0.0	0.4	0.0	0.0	0.0
27 Timor Timur	0.3	0.4	0.7	0.0	0.0	0.6	0.0	0.1	0.0

4.   ESTIMATE TOTAL HOUSEHOLD INCOME

Total income of households consist of income from labor (salaries and other labor income) and capital income. Household income is estimated from a combination of data contained in the NIOT for 1990 and the preliminary version of the Social Accounting Matrix (SAM) for 1990. The aim of this activity is to estimate total income for households as part of the primary cost categories wages and operating surplus of the NIOT.

Two categories of income for households can be derived from the SAM for every economic sector: (i) labor income, including salaries and other labor income, and (ii) non-corporate capital income. However, the SAM data cannot be used directly, since the economic sectors used in the SAM are different from those of the NIOT. Thus, the following steps have to be taken, which have been described in detail in the LTA-97 working paper on consumption[6]. The steps are carried out in the worksheet HHINCOME.wq1.

Step A   Estimate household income by economic sector from the SAM, which equals labor and non-labor capital income benefiting households. The latter is estimated from the SAM as being 99.4% of the non-corporate capital income (see Table 4.1.).

Step B   Estimate non-salary labor income, or "imputed wages" by SAM sector, by subtracting wages (derived from NIOT) from labor income by sector (derived from the SAM). This can only be done after translation of the SAM sectors to sectors of the NIOT. For this translation, data from the NIOT at the level of 161 economic sectors are used to distribute the labor and non-corporate capital income as accumulated in SAM sectors over the less aggregated level of the MRIOT sectors. Subsequently, the share of operating surplus of NIOT-sectors that accrues to the households can be estimated. The conversion table from SAM to NIOT sectors is shown in Appendix C.

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6.   "Household Consumption by Region and the Multi Region Consumption Function" Working Paper
          no. XVI, Section 3, October 1991.

Table 4.1.: Factor income by SAM sector, Labor and Non-Labor, 1990 (in Rp. bln).				
SAM Sector	Labour Income	Capital Income	Of which: Non-Corporate a/	Income of Households
36. Foodcrops	18,524	7,022	7,008	25,491
37. Estate crops	4,276	1,473	1,298	5,567
38. Livestock	1,646	2,697	2,598	4,228
39. Forestry	780	2,177	1,108	1,862
40. Fisheries	1,267	2,270	1,941	3,196
41. Coal, ore, migas	1,190	21,678	0	1,190
42. Quarrying	1,025	1,496	1,476	2,492
43. Food processing	2,910	5,624	4,134	7,020
44. Wood, construction	8,157	6,951	1,894	10,041
45. Textile	2,026	2,421	565	2,588
46. Paper, metal, other manuf.	2,914	3,994	922	3,830
47. Chem.,clay, basic metal	3,269	11,308	8,305	11,525
48. Electricity, gas	423	1,047	376	796
49. Trade	22,963	2,202	892	23,850
50. Restaurants	1,651	3,412	3,221	4,854
51. Hotels	386	850	591	974
52. Road Transport	3,267	3,399	3,349	6,596
53. Other transport, communic.	1,031	3,585	2,082	3,101
54. Banking, insurance	3,356	4,955	819	4,170
55. Real estate, business services	840	6,68	5,605	6,413
56. Public adm, other services	14,262	1,276	653	14,911
57. Household services	4,365	1,535	1,264	5,622
Total Factor income	100,527	98,070	50,101	150,338
a/ Of this 99.58% is non-labor factor income of households (derived from SAM)				

	SAM-sector	Operation Surplus (from NIOT)	Wages (from NIOT)	Imputed wages (SAM Labor income - NIOT Wages)	Capital income households (0.9942 * non corp. capital income SAM)	(Imputed wages + capital)/ Operating Surplus
	Table 4.2.:		Estimated share of operating surplus accruing to households, SAM sectors.			
36	Foodcrops	21,252	4,003	14,521	6,967	1.011
37	Estate crops	3,766	1,790	2,486	1,291	1.003
38	Livestock	3,243	1,026	620	2,582	0.987
39	Forestry	2,240	511	269	1,102	0.612
40	Fisheries	2,792	622	644	1,930	0.922
41	Coal, ore, migas	20,747	1,212	(22)	0	-0.001
42	Quarrying	1,230	943	82	1,467	1.259
43	Food processing	4,763	2,527	383	4,110	0.943
44	Wood products, construction	6,032	7,561	596	1,884	0.411
45	Textile products	2,373	1,436	590	562	0.486
46	Paper, metal, others	3,677	2,573	341	916	0.342
47	Chemicals, clay, basic metal	9,839	2,957	311	8,257	0.871
48	Electricity, gas	577	409	13	373	0.670
49	Trade	19,010	5,025	17,938	887	0.990
50	Restaurants	3,440	1,303	349	3,203	1.032
51	Hotels	799	374	12	588	0.751
52	Road transport	3,508	1,836	1,431	3,329	1.357
53	Other transport, communications	2,079	1,002	29	2,070	1.009
54	Banking & insurance	4,587	3,347	9	814	0.180
55	Real estate, business services	6,036	833	7	5,573	0.924
56	Public administration, other services	1,396	13,298	964	649	1.155
57	Household services	2,833	2,391	1,974	1,257	1.140
	TOTAL	126,219	56,978	43,549	49,810	0.740

Step C   Imputed wages and non-corporate capital income by sector are subsequently treated as the share of operating surplus (NIOT) that accrues to households. By adding to this the wages per sector, the total household income per sector can be derived. Consequently, household income can be at maximum equal to the sum of operating surplus and wages. To this end the data on SAM sector level have to be translated to NIOT levels (see Appendix C for conversion).

	NIOT-Sectors	Wages	Operating Surplus	Share of OS accruing to HH	Operating Surplus for Households	Household Income
1	Foodcrops	4,003	21,252	1.00	21,252	25,255
2	Estate crops	1,790	3,766	1.00	3,766	5,556
3	Livestock	1,026	3,243	0.99	3,203	4,228
4	Forestry	511	2,240	0.61	1,371	1,882
5	Fisheries	622	2,792	0.92	2,574	3,196
6	Non-Migas	1,585	2,339	0.66	1,549	3,134
7	Migas	571	19,639	0.00	0	571
8	Food, beverage, tob.	2,527	4,763	0.94	4,493	7,020
9	Textile	1,436	2,373	0.49	1,153	2,588
10	Wood products	1,122	2,244	0.58	1,297	2,419
11	Paper products	539	770	0.32	247	786
12	Chemical products	1,436	2,692	1.00	2,688	4,124
13	Non-metal products	234	579	1.00	579	813
14	Basic metal	325	1,291	1.00	1,290	1,615
15	Metal products	1,941	2,792	0.32	895	2,836
16	Other manufacturing	93	115	1.00	115	208
17	Petrol refinery	874	1,942	0.76	1,476	2,350
18	LNG	89	3,335	0.76	2,535	2,624
19	Electricity, gas & water	409	577	0.67	387	796
20	Construction	6,439	3,788	0.31	1,183	7,621
21	Trade, horeca	6,232	22,193	1.00	22,193	28,425
22	Transport & communications	3,307	6,643	1.00	6,643	9,951
23	Finance	3,347	4,587	0.18	824	4,170
24	Public administration & Defense	9,691	0	0.00	0	9,691
25	Other services	6,831	10,265	1.00	10,265	17,096
	Total	56,978	126,219	0.73	91,977	148,955

Table 4.3.:   Share of Household income in operating surplus.

As was done for the analysis for the MRIOT of 1985, in this step it has been assumed that in some cases the share of OS that accrues to households equals 0 (e.g. Public administration). In other cases the estimated ratio of the sum of imputed wages and capital income as a ratio of operating surplus is estimated to be above 1 (e.g. for Quarrying, household services, road transport). A combination of these two factors makes that the total household income estimated for the 25 NIOT sectors is slightly below the household income estimated from the SAM (i.e. Rp. 148.96 billion compared to Rp. 150.34 billion, i.e. Rp. 56.98 + 43.55 + 49.81 billion). This discrepancy cannot be corrected unless the difference is allocated to sectors for which the Share of operating surplus to households is still below 1.0.

5. ESTIMATE INCOME ELASTICITIES OF DEMAND

In the regional model the household consumption is made endogenous by using income elasticities of demand by economic sector and by region. In this section new consumption elasticities will be estimated, based on the SAM 1990. In Working Paper XVI of LTA-97[7] the derivation of these income elasticities on the basis of SUSENAS data on household expenditures (for 1985) is explained. The same procedure is used for the updating of the income elasticities of demand using the SUSENAS 1990 data.

SUSENAS reports the average monthly household expenditures by commodity for at maximum 11 income classes, for each province. Thus, a set of 27x11 data is available containing information on average monthly household expenditures per expenditure class and the share of 21 different commodities in total expenditures. Income elasticities of demand can be derived by applying regression analysis on these data, estimating the relation between the share in expenditures of a particular item (w_i) and the national logarithm of the absolute amount of monthly expenditures (Y_{month}):

$$w_i = \alpha_i + \beta_i \ln Y_{month}$$

As in the past, these analyses have been carried out at the level of 21 commodity groups (as used in the SUSENAS data) and on the level of 19 economic sector of origin of the commodity. The data and the results of the regression analyses for commodities and economic sectors of origin can be found in the files CONSPRO2.wq1 and CONSPRO3.wq1 respectively. The results are presented in Tables 5.1. - 5.4.

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7. See previous footnote.

Table 5.1.: Estimated regression coefficients by expenditure category.					
Category	R^2	Standard error	alpha	beta	t-value of beta
A. Food:					
Cereals	0.74	0.0673	1.384	-0.1133	-28.0
Cassava	0.21	0.0357	0.215	-0.0184	-8.6
Fish	0.04	0.0356	0.140	-0.0072	-3.4
Meat	0.24	0.0220	-0.098	0.0123	9.3
Eggs and milk	0.49	0.0108	-0.084	0.0105	16.1
Vegetables	0.59	0.0124	0.212	-0.0150	-20.1
Nuts	0.01	0.0111	0.029	-0.0012	-1.8
Fruits	0.07	0.0153	-0.012	0.0042	4.5
Oil and Fat	0.55	0.0091	0.136	-0.0101	-18.4
Non alcoholic beverages	0.32	0.0147	0.143	-0.0100	-11.3
Spices	0.36	0.0068	0.072	-0.0051	-12.4
Miscellaneous food	0.28	0.0035	-0.017	0.0022	10.3
Prepared food	0.27	0.0278	-0.137	0.0168	10.1
Alcoholic beverages	0.01	0.0042	-0.002	0.0004	1.5
Tobacco and betelnut	0.08	0.0163	0.092	-0.0047	-4.8
B. Non-Food					
Housing, fuel, light, water	0.12	0.0465	-0.032	0.0172	6.2
Miscellaneous goods/services	0.58	0.0488	-0.508	0.0576	19.6
Clothing, food/headwear	0.00	0.0150	0.044	0.0009	0.9
Durables	0.33	0.0680	-0.456	0.0480	11.7
Indirect taxes/insurance	0.34	0.0088	-0.056	0.0063	12.0
Parties and ceremonies	0.10	0.0260	-0.062	0.0085	5.5

From the results in Table 5.1. the income elasticities are estimated by using the following formula:

$$\epsilon^{c_i}_{Y_{month}} = 1 + \beta_i / w_i$$

Table 5.2.:	Income elasticities of demand for categories of commodities, by region.					
Category	Sumatera	Jawa	Kalimantan	Sulawesi	East. Islands	Indonesia
A. Food:						
Cereals	0.350	0.335	0.261	0.470	0.563	0.372
Cassava	-0.094	-0.494	0.489	-0.109	-0.463	-0.835
Fish	0.940	0.910	0.879	0.813	0.935	0.872
Meat	1.586	1.449	1.543	1.344	1.198	1.421
Eggs and milk	1.344	1.238	1.444	1.444	1.515	1.382
Vegetables	0.747	0.565	0.759	0.830	0.761	0.719
Nuts	1.056	0.693	1.236	1.083	0.997	0.952
Fruits	1.213	1.161	1.224	1.014	0.993	1.126
Oil and fats	0.703	0.587	0.682	0.566	0.750	0.632
Non alcoholic beverages	0.772	0.779	0.620	0.707	0.863	0.715
Spices	0.822	0.622	0.731	0.763	0.782	0.751
Miscellaneous food	1.475	1.102	1.565	1.493	1.444	1.306
Prepared food	1.488	1.215	1.380	1.782	1.355	1.332
Alcoholic beverages	1.394	1.573	1.675	0.953	1.069	1.308
Tobacco and betelnut	0.911	0.823	1.002	0.969	0.817	0.901
B. Non-Food:						
Housing, fuel, light, water	1.086	1.114	1.237	1.120	1.096	1.107
Miscellaneous goods and services	1.604	1.630	1.856	1.725	1.606	1.533
Clothing, foot/headwear	1.000	0.930	1.161	1.095	1.007	1.015
Durable goods	3.286	2.345	1.625	2.059	2.494	2.517
Indirect taxes/insurance	1.654	1.621	1.914	1.734	1.573	1.532
Parties and ceremonies	1.554	1.108	1.882	1.414	1.176	1.315

When compared to the results derived from the analysis of SUSENAS 1985 data, some striking differences can be noticed. For instance, a significant change can be seen in the estimated income elasticity of demand for cassava at the national level, from -0.05 in 1985 to -0.84 in 1990; this implies an even stronger reduction in demand for this commodity at increasing household income. Another significant change, though much less pronounced, can be seen for cereals, for which commodity the income elasticity has increased from 0.27 to 0.37, implying a higher increase in demand for these commodities with an increase in household income.

In two other cases the change in estimated income elasticity of demand between 1985 and 1990 is more than 10%, i.e. for Miscellaneous food items (increasing from 1.21 to 1.33) and for Alcoholic beverages (dropping from 1.54 to 1.31). However, in the latter case the t-value of the estimate for the beta-coefficient also significantly changed, dropping from 12.3 to 1.5 only, indicating that the found estimate is statistically not significant.

The expenditures by commodity category are subsequently translated to the 19 economic sectors of origin used in the MRIOT. To this end the conversion matrix as developed on the basis of SUSENAS 1987 data and as used in the update of the consumption vector of the MRIOT model has been taken (see TRANSFOR.wq1).

Table 5.3.: Estimated coefficients by economic sector.					
Economic sector	R^2	Standard error	alpha	beta	t-value of beta
1. Foodcrops	0.89	0.0294	1.078	-0.0834	-47.2
2. Estate crops	0.49	0.0051	0.072	-0.0050	-16.5
3. Livestock	0.37	0.0246	-0.150	0.0187	12.6
4. Forestry	0.12	0.0059	-0.004	0.0022	6.2
5. Fisheries	0.04	0.0251	0.099	-0.0051	-3.4
6. Food, beverages, tobacco	0.64	0.0474	0.971	-0.0637	-22.4
9. Textile	0.00	0.0118	0.035	0.0007	1.0
10. Wood products	0.33	0.0125	-0.084	0.0089	11.8
11. Paper products	0.58	0.0030	-0.031	0.0035	19.7
12. Chemicals	0.57	0.0092	-0.083	0.0107	19.5
13. Non-metal products	0.33	0.0066	-0.045	0.0047	11.8
15. Metal products	0.33	0.0254	-0.171	0.0180	11.8
16. Other manufacturing	0.38	0.0221	-0.162	0.0171	12.9
17. Petrol refinery	0.51	0.0114	-0.080	0.0116	17.0
19. Electricity, water	0.12	0.0051	-0.004	0.0019	6.2
21. Trade, hotels, etc.	0.10	0.0260	-0.062	0.0086	5.5
22. Transport, communications	0.58	0.0101	-0.105	0.0119	19.7
23. Finance	0.34	0.0088	-0.056	0.0064	12.0
25. Other services	0.50	0.0325	-0.219	0.0326	16.7
TOTAL			1.000	0.0000	

Table 5.4.:		Income elasticities of consumption by economic sector of origin.					
Sector		Sumatera	Jawa	Kalimantan	Sulawesi	Eastern	Indonesia
1	Foodcrops	0.564	0.536	0.629	0.608	0.589	0.557
2	Estate crops	0.796	0.715	0.710	0.708	0.842	0.745
3	Livestock	1.487	1.368	1.505	1.387	1.282	1.406
4	Forestry	1.086	1.114	1.237	1.120	1.096	1.107
5	Fisheries	0.940	0.910	0.879	0.813	0.935	0.872
8	Food, beverages, tobacco	0.789	0.746	0.787	0.825	0.832	0.794
9	Textile	1.000	0.930	1.161	1.095	1.007	1.015
10	Wood products	3.286	2.345	1.625	2.059	2.483	2.514
11	Paper products	1.604	1.630	1.856	1.725	1.609	1.533
12	Chemicals	1.331	1.388	1.548	1.441	1.343	1.337
13	Non-metal products	3.286	2.345	1.625	2.059	2.483	2.514
15	Metal products	3.286	2.345	1.625	2.059	2.483	2.514
16	Other manufacturing prod.	2.997	2.192	1.660	2.013	2.376	2.325
17	Petrol refinery	1.259	1.296	1.406	1.306	1.234	1.251
19	Electricity, gas, water	1.086	1.114	1.237	1.120	1.096	1.107
21	Trade, hotels, etc.	1.554	1.108	1.882	1.413	1.176	1.315
22	Transport, communications	1.604	1.630	1.856	1.725	1.609	1.533
23	Finance	1.654	1.621	1.914	1.734	1.575	1.532
25	Other services	1.249	1.282	1.390	1.292	1.225	1.242

A comparison of the above tables with those presenting the results of the 1985 exercise (see Working Paper XVI) shows that at the level of the economic sectors the differences in income elasticity are at maximum 5% in most cases. Only for two sectors the difference is larger, namely Wood products (8% higher) and Finance services (8% lower).

6.   ASSESSMENT OF NET TRADE FLOWS

In this section the plausibility of the interprovincial trade flows in the new MRIOT will be assessed, comparing them with information from BPS[8].

It has been pointed out frequently that the trade flows in the MRIOT model are net flows, i.e. one province either has a surplus or a deficit in a certain sector, resulting in it being an exporter or an importer for the particular sector. It is assumed that no cross-hauls, i.e. exports and imports within the same economic sector, occur. In reality, however, cross-hauls are likely to take place within a sector, for instance as a result of temporary/seasonal shortages or due to the high level of aggregation of a sector.[9] Therefore, the trade as derived in the MRIOT might be an under-estimation of actual trade within Indonesia.

Unfortunately, no detailed inter-provincial trade statistics are available to check the extent to which trade is under-estimated in the MRIOT. Statistics are published relating to the domestic (and international) cargo flows loaded and unloaded in the various ports of Indonesia, but these are obviously poor, showing the total volume of unloaded cargo to be 30% higher than the volume of loaded cargo (see Table 6.1.); the difference at the commodity level is sometimes considerably higher. If the minimum of loaded and unloaded volume is taken per commodity group, the total (minimum) volume of inter-island shipping can be estimated at 82 million tonnes; the sum of the maximum volumes amounts to 117 million tonnes.

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8.   "Statistik Loading and Unloading at Ports in Indonesia, 1992, BPS.

9.   On the other hand, it can be argued that due to the level of aggregation and the assumed national validity of the input structure of a certain sector, surpluses and/or deficits might have been overestimated. For instance, the rice milling sector is likely to have a different input structure than the vegetable oil industry. Nevertheless, both receive the same input structure of sector 8 Food, beverage and tobacco. This can imply that in one province the necessary inputs are overestimated, while in another province the value of inputs is underestimated. In both cases trade would occur, which in reality might not take place.

Table 6.1.: Maritime shipping of domestic cargo flows, 1992 (in 1,000 tonnes).				
Commodity group	Volume loaded	Volume unloaded	Minimum volume	Maximum volume
Foodcrops	540	509	409	640
Estate crops	569	1,441	496	1,514
Livestock	53	20	20	53
Forestry	4,454	5,295	4,454	5,295
Fisheries	184	203	170	217
Non-Migas mining	8,713	11,836	7,846	12,703
Migas	9,914	12,613	9,914	12,613
Food, beverage, tobacco	3,946	4,178	3,203	4,649
Textile	14	37	14	37
Wood products	3,099	4,245	2,773	4,571
Paper products	310	340	310	340
Chemical products	2,922	5,739	2,915	5,746
Non-Metal Products	4,167	3,067	3,066	4,168
Basic Metal products	1,377	1,768	1,181	1,964
Metal products	1,033	736	736	1,033
Petrol refinery products	34,332	44,872	33,265	45,939
Miscellaneous	11,295	14,711	11,295	14,711
TOTAL	86,922	111,610	82,067	116,913

Despite the apparent inconsistencies, the maritime shipping statistics are the only source of information presently available on domestic trade. They have thus been analyzed on occurrence of cross hauls by comparing the gross transport volumes with the sum of net imports/exports by province of the particular product. To this end the inconsistencies noted above have been corrected by assuming that the pattern of the larger volume (i.e. either imports or exports) can be applied to the smallest volume of the two.

The result of this exercise is presented in Table 6.2. below. It appears, that under this assumption the gross volume transported in maritime shipping is some 70% above the minimum level resulting from the total of net imports/exports by province. In addition, this ratio differs substantially among the economic sectors.

Table 6.2.:	Estimated gross and net interprovincial maritime transport volumes by economic sector.		
SECTOR	Gross Volume	Net Volume	Ratio Gross to Net
Foodcrops	441	214	2.06
Estate crops	437	221	1.97
Livestock	19	19	1.02
Forestry	4,454	2,845	1.57
Fisheries	153	95	1.62
Non-migas mining	8,424	5,876	1.43
Migas	9,914	8,050	1.23
Food, beverage, tobacco	3,167	1,495	2.12
Textile	13	12	1.10
Wood products	2,750	2,193	1.25
Paper products	309	148	2.10
Chemical products	2,833	1,085	2.61
Non-metal products	3,045	2,324	1.31
Basic metal products	1,174	416	2.82
Metal products	727	259	2.80
Petrol refinery products	32,652	18,746	1.74
Miscellaneous	11,066	4,158	2.66
TOTAL	81,577	48,158	1.69

The above result would suggest that by assuming trade to be related to the net surplus or deficit of a province, transport volumes are under-estimated by 1 - 1 / 1.69, or some 40%. Although the unit values of the commodities transported vary considerably among the economic sectors, a tentative analysis using national export unit values has shown that the underestimation in value terms is of a similar order of magnitude.

This conclusion can be tested by comparing the maritime flows estimated above with the trade flows as presently estimated in the MRIOT 1990 (translated in volumes). Before presenting these estimates, it should be noted that the trade flows in the MRIOT in principle cover all modes of transport, i.e. including railway and road transport. The volumes have been estimated by using average unit values by economic sector from the export statistics of 1990. Since the composition of the package of exports can differ substantially from the package of domestic trade, in some cases more commodity specific unit values have been used.

Table 6.3.:	Domestic transport volumes estimated from MRIO-Table, 1990 (in 1,000 tonnes).				

Sector	Unit value 1990 (Rp. 1,000)	Inter-provincial	Idem, %	Inter-regional	Idem, %
Foodcrops	375	16,176	17.7	7,939	17.3
Estate crops	1,700	926	1.0	818	1.8
Livestock	3,075	484	0.5	271	0.6
Forestry	236	5,979	6.5	3,766	8.2
Fisheries	6,205	176	0.2	130	0.3
Non-migas mining	294	7,175	7.8	6,238	13.6
Migas mining	296	13,085	14.3	3,912	8.5
Food, beverage, tobacco	700	12,419	13.6	7,007	15.3
Textile	17,598	116	0.1	85	0.2
Wood products	1,087	1,343	1.5	1,171	2.5
Paper products	1,247	697	0.8	463	1.0
Chemical products	435	5,085	5.6	2,935	6.4
Non-metal products	155	3,414	3.7	2,298	5.0
Basic metal products	1,114	1,289	1.4	610	1.3
Metal products	5,561	1,479	1.6	955	2.1
Other manufacturing products	4,330	45	0.0	23	0.1
Petrol refinery products	333	21,558	23.6	7,309	15.9
TOTAL		91,447	100	45,931	100

In the above table a distinction is made between interprovincial and interregional trade in the MRIOT. Since the regions all consist of island (groups), the interregional transport volume should be (less than) the minimum volume in maritime transport, while inter-provincial transport including road transport is expected to be above the total maritime transport volume.

As can be seen from a comparison of the two tables, the total volume of gross maritime transport flows lies indeed between the interprovincial and interregional level of trade estimated from the model. Moreover, the estimated volume of net interregional transport is comparable to the net maritime flows. At the sector level, however, large differences appear to exist. In particular the estimated interregional trade in Foodcrops is considerably higher than the recorded maritime transport flows (nearly 40 times). The same, though to a lesser extent, is the case for the sector Food, beverage & tobacco.

Thus, although at the aggregate level it can indeed be maintained that the net interregional trade flows estimated with the model are comparable to the net maritime transport flows, this is not the case at the product level. It should thus be concluded that the ratio found

for gross to net transport flows in maritime transport (i.e. 1.69 on aggregate), though giving an indication that trade flows in the MRIOT are under-estimated, cannot indiscriminately be applied to the whole matrix of net trade flows. It can be concluded, though, that sector specific adjustment factors could be used, which are based on the assessed level of over- or under-estimation. For instance, the trade flows of Foodcrops and Food, etc. are clearly overestimated in the MRIOT, while those of other products only represent net flows whereas cross hauls are likely (e.g. as indicated by the maritime shipping statistics).

7. INTERREGIONAL TRADE COMPARISON 1980, 1985 AND 1990

After the construction of the MRIOT 1990, as is described in section 2 and 3, a comparison will be made of the estimated trade flows for 1990, with the flows estimated in earlier MRIOT's for 1985 and 1980. In the past a similar exercise is carried out in order to compare the 1985 and the 1980 MRIOT[10].

It should be emphasized, however, that the estimates of regional trade in Indonesia are based on a limited data base, and several assumptions have to be made in the course of the estimation procedure. Particularly with regard to the geographical direction of trade flows of provincial-sectoral surplusses further analysis is desirable. This implies that some care should be taken in the interpretation of the trade estimates in absolute terms, as presented in this memorandum. However, the broad trading patterns that has emerged may be quite close to the actual pattern of trade relations between the regions and provinces of Indonesia.

First Section 7.1. discusses the significance of the trade flows (in terms of GRDP) for the respective regions. Section 7.2. describes the direction of the interprovincial trade flows, broken down in intermediate and final flows. Section 7.3. pays attention to the its sectoral composition, while in Section 7.4. the market orientation of the individual provinces will be discussed. In Section 7.5. some concluding remarks will be made.

7.1. The significance of trade for the region

During the period 1985-1990, the share of total exports in GDP of Indonesia increased, from 56% in 1985 to 62% 1990 (see Table 7.1.). This increase brought the export ratio back at the level of 1980. The major part of the increase was a result of increased exports to abroad (from 23 to 28%), whereas domestic exports as share of GDP grew only marginally, from 33 to 34%. In this, intra-regional trade increased from 13 to 15%, while inter-regional trade slightly reduced, from 20 to 19% of GDP.

At the same time, imports from abroad increased sharply, from 17% of GDP in 1985 to 26% in 1990. This was the main reason for the increase in total imports relative to GDP from 49 to 61%. The substantial increase in imports from abroad has resulted in a reducing trade surplus of Indonesia, from 7% of GDP in 1985 to only 2% in 1990.

At the regional level, like in 1985, the regions of Sumatera, Kalimantan and Eastern Islands had a high level of exports in GDP in 1990. Like before, Sumatera and Kalimantan are net exporters, while Jawa and Sulawesi are net importers, either from abroad or other regions in Indonesia. A change occurred, however, for the group of Eastern Islands which became a net exporting region, due to a substantial increase in (foreign) exports. This increase more than offset the increase in imports. Also in 1980 the Eastern Islands were a net exporter.

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10. "Inter regional trade of the Indonesian economy from a regional perspective; 1980 and 1985 estimates compared", Discussion Paper Series XV, 1989.

Table 7.1.: Regional trade as a percentage of regional GDP, 1980, 1985 and 1990.

	Sumatera			Jawa			Kalimantan			Sulawesi			Eastern Islands			Indonesia		
	1980	1985	1990	1980	1985	1990	1980	1985	1990	1980	1985	1990	1980	1985	1990	1980	1985	1990
Exports																		
domestic	16.5	34.8	28.4	38.2	31.0	37.9	18.7	35.1	23.7	31.3	33.0	31.6	29.1	34.9	42.1	28.2	32.7	34.2
- intra-regional	6.7	14.0	11.9	15.9	15.0	19.8	4.9	4.4	3.3	4.4	5.9	1.6	2.0	4.4	5.6	11.2	12.8	14.9
- inter-regional	9.8	20.8	16.6	22.3	16.0	18.0	13.8	30.7	20.3	26.9	27.1	30.0	27.1	30.5	36.5	17.0	19.9	19.3
abroad	62.7	44.0	46.3	8.0	9.2	17.3	68.1	55.7	53.5	10.4	8.4	13.4	35.5	15.5	25.7	33.4	23.1	28.2
total	79.2	78.8	74.7	46.2	40.3	55.2	86.9	90.8	77.1	41.6	41.4	45.1	64.6	50.4	67.8	61.7	55.8	62.3
- excl. intra regional	72.5	64.8	62.9	30.3	25.3	35.3	82.0	86.4	73.8	37.2	35.5	43.4	62.7	46.0	62.2	50.5	43.0	47.4
Imports																		
domestic	24.1	31.1	33.3	28.3	30.4	32.8	27.5	36.0	29.7	40.9	45.3	45.3	44.3	49.3	53.1	28.2	32.7	34.2
- intra-regional	6.7	14.0	11.9	15.9	15.0	19.8	4.9	4.4	3.4	4.4	5.9	1.6	2.0	4.4	5.6	11.2	12.8	14.9
- inter-regional	17.4	17.1	21.5	12.4	15.4	13.0	22.6	31.6	26.3	36.5	39.4	43.7	42.3	44.9	47.5	17.0	19.9	19.3
abroad	16.8	11.3	20.9	28.0	21.1	32.1	12.0	10.5	17.5	17.5	11.7	14.3	15.1	11.5	14.1	21.6	16.6	26.3
total	40.9	42.4	54.3	56.3	51.5	64.9	39.5	46.5	47.2	58.4	57.0	59.7	59.4	60.8	67.2	49.9	49.3	60.5
- excl. intra regional	34.2	28.4	42.4	40.4	36.5	45.0	34.6	42.1	43.9	54.1	51.1	58.1	57.4	56.5	61.5	38.7	36.5	45.6
Current Account																		
domestic	-7.6	3.7	-4.9	0.7	0.7	5.1	-8.8	-0.9	-6.0	-9.6	-12.4	-13.7	-15.1	-14.4	-11.0	0.0	0.0	0.0
abroad	45.9	32.7	25.4	-11.9	-11.9	-14.8	56.1	45.2	36.0	-7.1	-3.2	-0.9	20.4	4.0	11.6	11.8	6.5	1.8
Total	38.3	36.4	20.5	-11.3	-11.3	-9.7	47.3	44.4	29.9	-16.7	-15.6	-14.6	5.3	-10.4	0.6	11.8	6.5	1.8

7.2. The direction and nature of regional trade

In Table 7.2. below the structure of domestic trade in intermediate goods of the MRIOT 1990 is compared to the structure found for 1985. It appears that in domestic trade Jawa has become even more important than it already was in 1985, being the origin of more than 50% of interprovincial trade and the destination for even 60% of all interprovincial intermediate trade (in value terms). Concurrently, the importance of both Sumatera and Kalimantan as origin of intermediate goods declined. In the case of Sumatera, the share in exports dropped from 33% to 27%, in the case of Kalimantan from 13 to 8%; Sulawesi and Eastern Islands became more important as exporters of intermediate goods.

Table 7.2.:	Regional trade matrix intermediate goods, 1985 and 1990 (as percentage of total trade).											
Originating Region	Destination: Sumatera		Jawa		Kalimantan		Sulawesi		Eastern islands		Total Exports	
	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990
Sumatera	11.1	10.2	18.6	14.2	3.3	1.0	0.0	0.9	0.4	0.2	33.3	26.6
Jawa	12.6	9.3	23.8	33.1	3.2	4.0	1.2	1.9	1.6	4.3	42.5	52.6
Kalimantan	0.6	0.5	7.4	5.5	1.6	1.3	2.0	0.5	1.5	0.1	13.1	7.9
Sulawesi	0.0	1.4	3.4	3.1	0.2	0.1	0.9	0.2	0.1	0.2	4.7	5.0
Eastern Islands	0.0	0.2	5.3	6.6	0.4	0.2	0.1	0.2	0.6	0.7	6.4	7.9
Total imports	24.3	21.7	58.5	62.6	8.8	6.6	4.3	3.7	4.1	5.5	100	100

Also as a destination of intermediate goods Kalimantan and Sumatera were less important in 1990 as compared to 1985. Again, the relative drop was largest in Kalimantan (from 9 to 7%); the share of Sumatera dropped from 24 to 22%. It might be noted that the changes over the period 1985-1990 appear to be in most cases in the opposite direction as the changes that occurred in the period 1980-1985. The only exception to this relates to the shares in imports of Sumatera.

Table 7.3.: Regional trade matrix final goods, 1985 and 1990 (as percentage of total trade).

Region	Sumatera		Jawa		Kalimantan		Sulawesi		Eastern islands		Total Exports	
	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990
Sumatera	11.9	7.1	6.9	5.9	3.7	0.2	0.0	0.6	0.0	0.6	22.4	14.4
Jawa	14.6	19.8	26.5	32.7	6.0	8.4	6.8	6.1	9.4	8.1	63.1	75.1
Kalimantan	0.0	0.9	2.8	2.1	0.1	0.4	1.2	0.6	1.1	0.3	5.9	4.3
Sulawesi	0.1	0.1	2.0	1.3	1.1	0.4	0.6	0.2	0.5	0.3	4.3	2.3
Eastern Islands	0.1	0.2	2.8	2.6	0.3	0.1	0.1	0.0	0.8	1.0	4.1	3.8
Total imports	26.7	28.1	41.0	44.6	11.9	9.4	8.7	7.6	11.8	10.3	100	100

With respect to domestic trade in final goods, the position of Jawa is also still dominant. Jawa has even become more important as exporter, as well as importer of final goods, increasing its shares to 75% and 45% respectively. In the case of exports the increase is quite striking, from 63% in 1985, and reversed the decrease that occurred in 1980-1985. The increase has gone together with a substantial decrease in the share of Sumatera, from 22 to 14%. Also the shares of the other regions in exports of final goods decreased. In contrast, Sumatera was the destination of 28% of the trade in final goods in 1990, up from 27% in 1985. The regions Kalimantan, Sulawesi and Eastern Islands, though, became less important as destinations of final goods trade.

Table 7.4.: Regional trade matrix intermediate goods excluding intra-regional trade, 1985 and 1990 (as percentage of total trade).

Region	Sumatera		Jawa		Kalimantan		Sulawesi		Eastern islands		Total Exports	
	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990
Sumatera	*	*	29.9	26.2	5.2	1.9	0.0	1.6	0.6	0.4	35.8	30.1
Jawa	20.4	17.1	*	*	5.2	7.3	1.9	3.5	2.7	7.9	30.1	35.7
Kalimantan	1.0	1.0	12.0	10.1	*	*	3.2	0.9	2.4	0.1	18.6	12.1
Sulawesi	0.0	2.7	5.5	5.6	0.4	0.2	*	*	0.2	0.4	6.1	8.9
Eastern Islands	0.0	0.5	8.5	12.2	0.7	0.3	0.2	0.3	*	*	9.4	13.3
Total imports	21.4	21.2	55.9	54.0	11.6	9.6	5.3	6.3	5.8	8.8	100	100

Table 7.4. again shows the distribution of intermediate trade, but in this case excluding the intra-regional trade (e.g. between provinces of Sumatera). In broad lines, this table confirms the importance of Jawa as origin and destination of inter-regional trade. However, it can be noted that its share in both interregional exports and imports is significantly less than if intra-regional trade is included. Nevertheless, of every Rp. 2 billion of inter-regional trade in intermediate goods, more than Rp. 1 billion is destined for Jawa. A comparison of the

distribution for 1990 with that for 1985 shows more or less similar trends: Jawa has become less important as a destination of intermediate exports, while Sulawesi and the Eastern Islands increased their shares.

Table 7.5.: Regional trade matrix final goods excluding intra-regional trade, 1985 and 1990 (as percentage of total trade).												
Region	Sumatera		Jawa		Kalimantan		Sulawesi		Eastern islands		Total Exports	
	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990
Sumatera	*	*	11.6	10.1	6.2	0.4	0.0	1.0	0.0	0.9	17.8	12.4
Jawa	24.6	33.7	*	*	10.4	14.4	11.4	10.5	15.8	13.8	61.8	72.3
Kalimantan	0.1	1.6	4.5	3.5	*	*	2.0	1.1	1.9	0.5	8.7	6.7
Sulawesi	0.2	0.2	3.4	2.3	1.8	0.6	*	*	0.8	0.6	6.2	3.6
Eastern Islands	0.0	0.3	4.7	4.4	0.6	0.1	0.2	0.1	*	*	5.6	4.9
Total imports	25.0	35.8	24.4	20.3	18.6	15.5	13.6	12.6	18.4	15.8	100	100

Table 7.5. presents the distribution of interregional trade in final goods. Compared to 1985, some drastic changes can be observed in the 1990 trade pattern. For instance, Sumatera has become much more important as a destination of interregional exports of final goods, taking some 35% in 1990, compared to 25% in 1985. The 1990 level is close to the level that had been estimated for 1980.

The importance of Jawa as a destination of final goods dropped; it imported 20% of final goods value in 1990, compared to only 24% in 1985. However, Jawa increased its importance as origin of interregional trade, exporting 72% of all interregional final goods compared to only 62% in 1985; in 1980 the corresponding level was estimated at 81%. The share of Sumatera in interregional exports of final goods dropped from 18% in 1985 to 12% in 1990. However, this was still above the level of 1980 (9%).

7.3. The sectoral composition of regional trade

Table 7.6. presents an overview of the sector composition of inter-regional trade, both for 1985 and 1990. The table shows the percentage shares in inter-regional trade, by region and main sector of origin. In 1990 the largest part of goods and services traded regionally consisted of manufactured goods, notably 44%. This was considerably above the level of 1985 (35%). Other main commodity groups are agricultural products (19%, down from 27%) and "others" (22%, up from 18%).

Jawa is the main source of interregional trade, accounting for 53% of total exports (43% in 1985). Especially for manufacturing products Jawa is the leading exporter with 80% (i.e. 34.9/43.8) of the total export, increasing its share substantially from 61% in 1985. In agricultural products, all other regions has been bigger inter-regional exporters than Jawa, while Eastern Islands has become most important 1990. This latter region is also the largest

exporter of non-migas mining products, while Sumatera is the dominant source of migas mining and petroleum refinery products. In this category the drop in share of Kalimantan is striking (from 7.3 in 1985 to 0.3% in 1990). Jawa is the main source of other products (mainly services).

Table 7.6.: Percentage distribution of inter-regional trade, by main sector and region of origin, 1985 and 1990.												
	Sumatera		Jawa		Kalimantan		Sulawesi		Eastern Islands		Indonesia	
Sector\Year	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990
Agric. prod.	5.5	4.0	7.9	2.5	3.0	2.6	4.1	4.2	6.1	5.6	26.6	18.9
Non-migas mining	0.8	1.7	0.0	0.0	0.2	0.6	0.5	0.9	0.5	1.9	2.0	5.0
Migas mining	6.3	2.5	0.0	0.0	0.0	0.4	0.0	0.0	0.7	0.3	7.0	3.2
Manufacturing	9.9	5.5	21.1	34.9	3.3	3.2	0.1	0.1	0.2	0.1	34.6	43.8
Petr. refinery	4.5	5.2	0.3	1.1	7.3	0.3	0.0	0.0	0.0	0.0	12.1	6.7
Others	1.6	2.9	13.5	14.4	0.8	2.5	1.3	1.2	0.4	1.4	17.7	22.4
Total	28.5	21.7	42.9	53.0	14.5	9.5	6.2	6.4	7.9	9.3	100	100

7.4. The market orientation of the individual provinces

The individual provinces can also be classified according to the market orientation of their exports. Three markets have been distinguished: intra-regional; inter-regional and international. The classification has four groups of provinces:

1. international/inter-regional, or provincial economies which have a ratio of exports to abroad to GDP which is above the national average, while the remaining exports are predominantly inter-regional;

2. international/intra-regional, consisting of provinces with international exports level above the national average and with domestic trade oriented mainly towards the intra-regional market;

3. domestic/inter-regional, consisting of provinces with less than average exports to abroad and an inter-regional orientation for domestic trade;

4. domestic/intra-regional.

Table 7.7. shows how each of the provinces can be classified according to the above criteria.

Table 7.7.:	Market orientation by province, 1990.				
	% share in domestic		Index of exports to abroad to GDP ratio Indonesia=100	Classification 1990	Classification 1985
	intra-regional	inter-regional			
D.I. Aceh	79	21	300	2	1
Sumatera Utara	49	51	106	1	3
Sumatera Barat	45	55	35	3	4
Riau	52	48	280	2	1
Jambi	33	67	100	1	4
Sumatera Selatan	17	83	46	3	3
Bengkulu	42	58	15	3	4
Lampung	24	76	71	3	3
D.K.I. Jakarta	45	55	88	3	3
Jawa Barat	62	38	75	4	4
Jawa Tengah	77	23	41	4	4
D.I. Yogyakarta	63	37	29	4	3
Jawa Timur	27	73	43	3	3
Kalimantan Barat	10	90	129	1	1
Kalimantan Tengah	56	44	57	4	1
Kalimantan Selatan	3	97	160	1	3
Kalimantan Timur	11	89	230	1	1
Sulawesi Utara	10	90	36	3	3
Sulawesi Tengah	10	90	17	3	3
Sulawesi Selatan	5	95	58	3	3
Sulawesi Tenggara	0	100	48	3	3
Bali	25	75	62	3	3
N.T.B.	1	99	7	3	3
N.T.T.	7	93	6	3	3
Maluku	21	79	159	1	3
Irian Jaya	2	98	199	1	1
Timor Timur	23	77	7	3	3
Sumatera	42	58	164	1	1
Jawa	52	48	61	4	3
Kalimantan	14	86	190	1	1
Sulawesi	5	95	48	3	3
Eastern Islands	13	87	91	3	3
Indonesia	44	56	100		

As compared to the corresponding classification in 1985, the only region that changed in the classification is Jawa, which became more inward or intra-regional orientated than in 1985 and thus changed from class 3 to 4. However, only one province in Jawa changed from being more inter-regionally oriented towards more intra-regionally oriented, namely D.I. Yogyakarta.

As in 1985, none of the regions classifies as being international/intra-regional oriented (category 2) in its trade, despite that in the region Sumatera the provinces Aceh and Riau have moved into this category from (category 1). Also four of the other six provinces in Sumatera changed classification, without changing the overall character of this region significantly. Sumatera still is mainly international and inter-regionally oriented in its trade.

Also the character of Sulawesi and Eastern Islands did not change considerably. These regions are not internationally oriented, but having a high share of interregional destinations in their domestic trade. Despite two provinces changing category, Kalimantan remained predominantly internationally/inter-regionally oriented in its trade relations.

Table 7.8. gives the shares of each of the groups of provinces in GDP, exports to abroad, interregional and intra-regional exports respectively. Despite Aceh and Riau moving into category 2 (international/intra-regional), the overall picture of this table did not change significantly from the picture that emerged from 1985 data. According to Table 7.8., in 1990 the provinces of which the export sector is mainly oriented towards the foreign market account for 27% of GDP (22% in 1985) and contributed 58% to total exports to abroad (65% in 1985). In addition, these provinces take account of about 24% of total inter-regional trade (24% in 1985).

The domestically-oriented economies (groups 3 and 4) account for about 72% of GDP (78%). The provinces in group 3 further have a share of over 62% (58%) in inter-regional trade, and a share of 41% (45%) in intra-regional trade.

Table 7.8.: Summary statistics on classification of provinces according to the market orientation of their export sector, 1990.					
Group	Nr. of provinces	Share in GDP (%)	Share in exports to abroad (%)	Share in inter-regional exports (%)	Share in intra-regional exports (%)
International/inter-regional	7	16.6	27.0	18.8	7.6
International/intra-regional	2	10.8	30.9	4.9	7.7
Domestic/inter-regional	14	42.7	24.1	61.7	40.8
Domestic/intra-regional	4	29.9	17.9	14.6	43.8
All provinces	27	100	100	100	100

7.5. Concluding Remarks

The results of the analysis of interprovincial trade in the MRIOT 1990 again reveal the existence of a pronounced regional specialization pattern within the economy of Indonesia, accompanied by large variations in the trade structure of the individual regions and provinces. The regions outside Jawa show generally a much stronger orientation towards the foreign markets, while for Jawa the domestic export markets in the other regions are of prime importance.

Jawa's dominant position in interregional trade increased substantially in 1990; it dominates trade in final goods, and especially in the manufacturing it is in some sectors virtually the sole supplier to the other regions. Jawa is also dominant as destination for domestic exports, particularly of intermediate goods from the other regions. In the period 1985-1990 Jawa appears to have recovered lost ground from the period 1980-1985. Sumatera and Kalimantan appear to have lost their shares in inter-regional trade. At the same time the small and stable role of Sulawesi and especially the increasing role of the Eastern Islands as inter-regional exporter can be noticed. The latter increase results especially from the interregional export of non-migas mining products.

Appendix A.:   Technical Description of the Estimation Procedure of the Multi-Region Input-Output Table for Indonesia, 1990

Introduction

The update procedure of the Multi-Region Input-Output Table (MRIOT) is mainly carried out on Lotus multiple spreadsheet, where useful macro's are used. A minimal internal memory of 8 MB is required for some big spreadsheets. If less capacity is available some files will have to be cut in parts, which makes the work (even) more complicated. The procedure is divided over five parts of the matrix: the intermediate block, the interregional final demand block, the block other final demand and the blocks primary cost for intermediate and final demand. This description is also presented in this sequence.

At the end of the preparation of each part of the MRIOT Fortran programs are used to obtain the right final format. They run with the command "NDPRUN 'name of translated program file'". In several cases Supercalc4 is used to make CSV files, which works easier in case of large files than the printfile option of LOTUS3.0. Sheets with extension WK3 cannot be imported by SC4, so save Lotus files to be used in SC4 as WK1 file. In the /File,Extract option of Lotus this is not directly possible. Then extract it as WK3 file and load it again and save it as WK1 file. In some cases the Norton Editor is used. Large files cannot be read at once, still parts can be edited and the editor saves the whole file including the changes (but please do check this, e.g. with the size of the file).

General preparations

1.   Aggregate the National Input Output Table from 161 sectors to 25 sectors

The domestic National Input Output Table (NIOT) is available on prcdz.wk1 for consumer prices, on prddz.wk1 for producer prices, prdiz.wk1 for imports producer prices. The aggregation scheme is on file ag161-25.wk3. Post multiply the NIOT with the scheme first, than pre-multiply the result with the transposed scheme. (the primary block only needs post-multiplication, the final block only needs pre-multiplication) The result elaborating prddz.wk1 is NIOT25.wk3, further for consumption and exports columns in consumer prices are needed, for the private consumption also imports from abroad are used.

2.   Estimate manufacturing GRDP by sector

Sources are BPS statistics of Large & Medium scale resp. Small and Cottage industry. The basic workfile is OUTIND.WK3. The first sheet shows the GRDP of both categories from the GRDP data of BPS, the value added of L&M by 9 ISIC sectors and the same for the S&C industry. The result of the scaling procedure (i.e. scaling to the GRDP by sector definition of BPS) is in the first sheet below.

3.   Determine ratio Output/GRDP and Import/GRDP

In the second sheet of OUTIND and following, the ratio between output and GRDP and import and GRDP is estimated for the 9 sectors of manufacturing. The sources are again both surveys, sheet B describes L&M industries, sheet C the small-scale industry (of cottage

industry this info is not available) Results for output are on sheet D, results of import are in sheet E (here only L&M results are used, data for S&C lacking or not reliable).

4. Scale data to the NIOT level

The GRDP, Import and Output data are used in GDPROV.wk3. This is a basic file in which many elaborations of basic data occurs.

Sheet A scales GRDP data to the NIOT level. Sheet B GRDP by expenditure category is imported and scaled to national levels. Only that for private consumption and that of investment are used. In sheet C the output/GRDP ratio's from file OUTIND.WK3 are imported. These are used to determine output levels for manufacturing sectors. For the other sectors output levels are derived from GRDP levels with NIOT ratio's. Similarly the intermediate import from abroad is determined in this sheet. Subsequently domestic intermediate demand is derived (Input(=output)- GRDP- imports). Also the intermediate output is derived in this sheet: national ratio's intermediate/total output are applied. Note that intermediate output of the mining sectors is derived in a different way: output minus exports minus change in stocks minus private consumption.

5. Construction of the intermediate bloc

5.a. Trade balances, intra-provincial blocks

Intermediate input and output by province is used in file MRIOT25, in which the intermediate block of the MRIOT is prepared. In sheet A of this file the NIOT25 is inserted, and also the table of intermediate inputs and outputs by provincial sector. The following 27 sheets are used for the provincial IO matrices. The last sheet is used to check results and collect provincial input columns to be extracted.

After making domestic demand tables for each province, the column of row-sums is considered as demand for the products of the respective sectors. Subtracting this column from the supply column results in a trade-balance by sector (column AD). Based on this balance the intra-provincial matrix is derived: if supply is sufficient the domestic demand cell is equal to the intra-regional cell (the self support ratio is >1, column AA). Is there a deficit, then the self-support ratio is < 1. This ratio then is used to derive the intra provincial cells on the concerning row. Columns AD are all transposed to sheet B, AF4. The resulting balance matrix is split in an export matrix (af33) and an import matrix (af61).

5.b. Origin Destination matrices

The export and import matrices are extracted to file INTRAD1.WK3. This file is combined in the file INTRAD.WK3, first sheet (c1). The export matrix is transposed (to af3). The following sheets contain the OD matrices for all 25 sectors. The columns of the transposed export matrix can be easily transposed to the following sheets (B:ad3 to Z:ad3) and serve there as columns of row sums of OD matrices.

The same is done with the rows of the import matrix: transpose to B:b31 to Z:b31. Column ac and row 30 serve as control instruments while filling the cells of the matrix.

Cells either refer to column sum or row sum. In each column and row there is a balancing cell to meet total demand or supply respectively. If making new estimates leads to small deviations of balances, there will be an automatic proper solution. Large differences, for instance provinces changing from surplus to deficit or reverse, will result in negative cells. So after each change check all cells to be non negative, and check row and column-sums.

The result of all matrices is collected at sheet A with macro \m. Be sure that the destination block (c61 to ae735) is empty when you start the macro pressing 'altM'.

5.c.   The trade matrices: sectors of destination

This matrix is extracted to file INTEXDES.wk3, which again is combined in file MRIOT25.WK3, first sheet, A110. This matrix is transposed to the following sheets as row total for each row in the input table (which starts at c...) These tables, one for each province, are filled with macro's, indicated with the letter of the sheet, to start with \c for sheet c. Sheet b is filled by hand, so that it is clear how it works. Note that the intra provincial matrix shifts 25 cells downwards with every next province. The macro's do their jobs accurately. The first column of every sheet remains always there, so never delete that otherwise the macro's don't work. The size of the spreadsheet is very large if completely filled, it will need at least 8 MB internal memory. So now all the cells of the intermediate matrix are present.

5.d.   Combine the results

With the Fortran program REPLACE, the result file can be transformed into an AG4 format (i.e. the flexible aggregation program for aggregation and model studies). Before we are able to do this, the intermediate matrix needs to be transformed to one big ASCI file.

It is still a matter of organization to put these intermediate matrix in one ASCI file. A rather complicated procedure needs to be followed for this, since the intermediate block is too wide to export it at once from LOTUS3. Maximum is 256 cells, whereas the table is 675 cells wide. The way to do this will be described below.

Copy the results of the first 10 provinces to the last sheet. Extract this matrix (with the name 'first.wk3'). Read it, save it as First.WK1, save it, delete FIRST.WK3, start SC4, import FIRST.WK1, export it as first.csv.

Do this again for the provinces 11-20, name it SECOND.csv and for the last 7 provinces, name it THIRD.CSV. Copy the files First.csv as fort.1 to the directory combine, Second.csv as fort.2. Start the Fortran program COMBI1 (NDPRUN combi1). The result is fort.3, in which fort.1 and fort.2 are put next to eachother. Rename fort.3 as fort.1, copy THIRD.CSV to this dir as fort.2. Start the Fortran program COMBI2 in the similar way and the complete table in ASCI format is the result under the name fort.3.

This file has to be copied to the dir in which the Fortran program REPLACE resides. Name it fort.2. The old intermediate table (with the name base 1.AG4, ag4 format) has to be available as fort.1. Run the Fortran program REPLACE (NDPRUN replace). The program asks four dimensions: 25 25 27 27 and the same for the result. The result is the new intermediate table of the dimension 675 by 675 in AG4 format, i.e. the format of

input files for the aggregation program AG4. In the Norton Editor the year can be adapted. The table is too big for the editor, but just change the first row and save it again and the table is ready.

6.   Construction of the (inter-regional) final demand bloc

In the file GDPROV.WK3 the final domestic demand for each province by final demand category is prepared, but some preparations are carried out in other files.

6.a.   Private consumption

Exogenous info is used for the estimation of the consumption pattern by province (the level is derived from GRDP by expenditure cat. Susenas'90 data (expenditures per capita) are available in file consprov.wk3. They are already translated into sectors from the expenditure categories (file consprov.wk3). In hhconpr.wk3 this matrix of consumption by sector of origin is imported. It is expressed in consumer prices. First is it scaled up to total consumption per province in bln Rp. Next, it is translated into producer prices with the aid of the NIOT columns, both in consumer and in producer prices (on sheet B).

The result is subject to a RAS procedure, in order to obtain consistency with NIOT and level of consumption by province. The result is as cons2.WK3 imported in GDPROV. In this file import from abroad is subtracted and domestic consumption by province is ready: extract as domcons.wk3 This file is imported in find90r.wk3 for determination of trade balances (see step 7).

6.b.   Government consumption

In GDPROV sheet H, the estimation of domestic demand takes place. The delivery from government to govt consumption is equal to the GRDP of the government (sector 24). The other demand is related to this level with NIOT ratio's, which also determines the level of government consumption. The domestic demand is estimated directly. The import from abroad is a fixed % of the domestic demand, equal to the ratio in NIOT (cell AE32). The domestic demand is extracted to file gvtcons.wk3, which is also used in file find90r.wk3.

6.c.   Investment

File GDPROV.WK3 sheet G contains the estimate of investment. Fixed points are the NIOT, the government investment by province and the input from the construction sector. These constraints are to be met in the procedure. For most provinces the total level of investment can be derived from the GRDP by expenditure data from BPS. For the small provinces BPS seems to underestimate the total investment level, regarding our estimation of government investment and the BPS data on GRDP of construction. These facts lead to a complex estimation procedure, which is not straight, i.e. in several steps manual adaption have taken place for individual provinces.

The procedure starts with a disaggregation of the NIOT investment in government and private investment. This breakdown is based on information of Research Memorandum

Series No. 6 on investments[11]. All needed information from this memorandum is on file inv-ed.wk3.

Both government and private investment is broken down in foreign imports and domestic supply (column I and J in sheet G). Next the delivery of the construction sector to investment by province is estimated. The share of final output is applied on it, the only other final demand is from government consumption and is subtracted. The result is construction to investment (column P). In column R investment by province is inserted from sheet B, GRDP by expenditure cat. The total investment has to be at least 1.2 as high as the demand for construction. If the investment level is too low regarding this constraint, 1.2 times the construction delivery is taken for the total level of investment (column V). Next the government investment is subtracted. In one province still a negative value appears for the resulting private investment (Sultra). This is given an indicative value of 250 bln Rp. In column Z the scaling to NIOT takes place for total investment. Government investment (AA) is subtracted to obtain a final estimate for private investment (AB).

Next the construction to investment by province has to be broken down into construction to private and government investment. Per province the total share of construction is calculated in column AD. In column AE this is multiplied with cell G36, which is the at the national level the share of construction in the private investment divided by the share of construction in total investment. However, some of the resulting shares are inconvenient, and are replaced by more convenient ratio's. The inconvenience results as the level of construction to government investment is higher than the level of government investment. The share of construction in private investment is scaled up to prevent this. The resulting levels construction to government investment and private investment, and the total levels of investment are used in matrices located at b51 and b91, where the provincial breakdown to sectors of origin is estimated. The domestic share is the NIOT share, the resulting domestic demand is located at AF51 and AF91 respectively and extracted to files govinves.wk3 and prinves.wk3. They are also used in the file FIND90R.WK3.

7.   Trade due to final demand

In file find90r.wk3 the trade-balance between the provinces is estimated. In sheet A the final supply (excl exports and change in stocks) is inserted (from GDPROV.wk3, sheet C). Sheet B contains domestic consumption, C Government consumption and D,E government and private consumption respectively. Sheet A-/-sum (Sheet B...E) is the trade balance by sector and province. Sheet G shows the relative self support, to determine the intra provincial tables, like it was done for the intermediate deliveries. Sheet H shows the final result, but before achieving this the trade pattern still has to be determined.

Sheet I to L show the intra provincial transactions in the 4 categories respectively. Sheet M consists of a matrix of exports and a matrix of imports: the table in sheet F separated in import (negative) and export (positive) values. These matrices are exported to a file fintrad1.wk3, and later inserted in file fintrad.wk3, containing the OD matrices of final

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11.   "Regional and Sectoral Investment in Indonesia, Past Performance and Present Potentials", Research Memorandum Series No. 6, BAPPENAS, TAP4I/NEI, July 1994.

demand.

Fintrad1.wk3 is combined in sheet A. The exports are transposed and its columns form the row totals of the 25 OD matrices, similar as in the intermediate OD matrices. The rows of the import matrices are the column sums of the OD matrices. The matrices are filled in a way similar to that in the procedure for the intermediate deliveries. The resulting trade matrix is transposed to location A:d61 with macro \m. This matrix is extracted to file Finexdes.wk3. The columns are separated by 3 empty columns in order to ease distribution over 4 categories in file fintrad.wk3.

Finexdes.wk3 is combined in sheet H, A682. The distribution over final demand categories by province is calculated in sheet I, below the private consumption sheet. First all interregional imports by category are calculated (at D30 in the for sheets concerned I,J,K,L). These values are transposed to sheet I, D58 with the aid of macro \f. It has to be executed 27 times to fill the whole matrix. Be sure to start the macro with the cursor at I:c30.

The relative distribution of the trade over categories is calculated in the matrix below, d88, which is repeated 27 times to ease multiplication with info on the previous sheet about total level of interprovincial trade. A scaler multiplication of both matrices is carried out in the upper part of sheet H, and gives the final result of interregional trade. When a computer with limited internal memory is used, the multiplication can best carried out in parts, and apart from the first row, changed into values, to limit used memory. Finally the intra provincial blocs are inserted with macro \t. Be sure to start with the cursor on d3 in sheet H and on d3 in sheet I. Start it in the latter position: I:d3. It places 9 provinces at one time, so it has to be executed 3 times. The final bloc is ready for use. Send it to worksheet FINAL90.WK1, import it in SC4 and export it as CSV file.

With the Fortran program REPLACE, the result file can be transformed into an AG4 format (i.e. of the flexible aggregation program AG4, used for aggregation and model studies). Rename this file as fort.2, and the old base2.ag4 being renamed to fort.1. The result of the program REPLACE is the file fort.1. Rename this file to base2.ag4 and the second block of the new MRIOT is ready.

8.   Preparation of the other final demand bloc

8.a.   Exports of commodities

The work is done in the file EXPROV.wk1. The exports of commodities are loaded from the database. The zero values have to be inserted, in order to get 25 values by province. The trade and transport margins are subtracted from the values of sector 1 to 20, 23 to 25. The resulting values are distributed over the sectors 21 and 22, with the shares as calculated from NIOT. The technique is similar with the one described for the private consumption.

After redistribution of the trade and transport margin, the sum of the sectors is scaled to the national level. The result is extracted to file export.wk3 and combined in file GDPROV.wk3 in sheet E. There some manual changes are carried out. Exports registered in DKI Jakarta, actually originate from Jabar or Jateng. This can be seen in the resulting table with change in stocks, which shows large negative values for Jakarta and large positive values for Jabar. These values are balanced, not only in the manufacturing sector, but also

in trade and transport. The original matrix of exports is on the right hand: subtracting it from the elaborated one shows the differences (With regard to the mining sector this most clearly has to be corrected, because of the zero values of GRDP for mining in Jakarta).

8.b.   Exports of services

The export of services from NIOT is broken down into provinces in file GDPROV.wk3, at sheet E. The detailed level of GRDP services is used from sheet A, the corresponding sector wise data are extracted from the NIOT, partly from the 66 sector table as published. Through this detailed approach more reliable results are obtained. Note that 'metal products' also exports services: this is maintenance of ships and airplanes and is distributed over Jakarta and Jawa Barat and Jawa Timur (for Tanjung Priok, Cengkareng and Surabaya resp.).

8.c.   Change in Stocks

This is determined in sheet E as the difference between output per provincial sector and the sum of intermediate output, interregional final output and exports. The difference in stock/output ratio between national and corresponding regional sectors is due to exogenous info about exports.

Results of 8 a, b and c are combined in FIND2.WK3. In this file on sheet B a print file is prepared, which is used to make the base3.ag4 file with the special Fortran program REPLACE (dimension 25 3 27 1). Type 'NDPRUN REPLACE'. Fort.1 is the old file in ag4 format, fort.2 is the print file, fort.3 is result, renamed to base3.ag4, if desirable change the year in the heading with Norton Editor).

9.   Preparation of the block of imports/primary cost categories

The primary inputs block is made in file NIOT90.WK3. Sheet A contains the NIOT 1990 25 sectors. Sheet B the GRDP by provincial sector at b3, imports by provincial sector at ab3, both originate from GDPROV.wk3 (via prvgdp.wk3 and prvimpor.wk3 resp). The breakdown of GRDP into categories is according to national averages, down at sheet B. In sheet C the print file is prepared which is used in the program REPLACE, in order to obtain base4.ag4 (dimensions 5 25 4 27).

10.   Preparation of the primary block of final demand

Only the imports of the interregional final demand matter, since all other rows are assumed empty. Final imports are obtained from GDPROV.wk3, sheet H, b38. Add zero's for the other categories, make a printfile and use REPLACE to obtain a new version of base5.ag4 (dimension = 5,4,1,27).

N.B. In general: keep in mind that input files for REPLACE (fort.2) have a 'logical' I-O format. It reads row by row from the file. For instance for the base1.ag4 first the whole output row of ACEH Foodcrops is read, then the next row etc. The resulting AG4 format has a different format. It works province wise: of province 1, first the whole input structure is written (675*25), then the input structure of the second province etc. This is also the case with the other parts of the MRIOT. Write columns of final demand as columns, write rows as rows.

Appendix B.   The Multi Region Input-Output Table 1990

Table 1.:The Intermediate Trade Flows, billions of Rupiah, current prices

FROM	TO	ACEH	SUMUT	SUMBAR	RIAU	JAMBI	SUMSEL	BNGKL	LMPNG	DKIJAK	JABAR	JATGH	YOGYA	JATIM	KALBAR	KALTGH
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ACEH	1	2116	585	40	12	13	101	0	12	80	95	10	0	6	0	0
SUMUT	2	223	6419	111	95	10	119	37	31	402	68	335	24	189	11	33
SUMBAR	3	3	73	1639	6	3	16	13	11	115	33	86	3	6	25	13
RIAU	4	889	221	175	2110	6	80	48	117	923	21	406	0	1	0	0
JAMBI	5	1	40	0	6	669	30	0	27	119	36	62	0	2	0	0
SUMSEL	6	3	134	1	77	51	5270	20	0	581	844	497	0	0	106	30
BNGKL	7	0	24	0	0	0	37	297	57	79	13	9	0	5	0	0
LMPNG	8	1	1	0	13	2	4	7	1863	132	27	14	0	2	0	0
DKIJAK	9	406	309	185	512	52	610	54	118	14254	417	1320	69	900	102	91
JABAR	10	29	82	23	128	8	232	3	22	1634	18445	1832	93	190	15	5
JATGH	11	14	19	0	2	38	155	16	0	751	1688	11449	96	1794	0	0
YOGYA	12	1	1	0	0	0	62	0	0	16	23	6	926	139	0	0
JATIM	13	10	42	23	0	9	88	16	28	165	207	127	26	18410	101	37
KALBAR	14	3	4	0	0	0	3	1	0	173	73	28	1	27	1428	36
KALTGH	15	0	24	0	0	0	0	0	0	39	19	12	0	21	51	517
KALSEL	16	3	129	0	0	0	7	2	0	156	81	70	1	47	0	0
KALTIM	17	4	5	0	0	0	0	2	0	291	336	132	5	432	0	99
SULUT	18	0	0	0	0	0	17	0	0	3	26	19	0	108	0	1
SULTGH	19	0	0	0	0	0	4	0	0	10	6	7	0	188	0	0
SULSEL	20	3	334	0	0	0	48	1	97	176	56	55	0	93	0	1
SULTRA	21	0	0	0	0	0	6	0	0	164	52	6	0	111	0	0
BALI	22	2	3	0	0	0	26	1	31	67	42	29	9	281	1	7
NTB	23	0	0	0	0	0	8	0	0	70	12	14	0	272	0	0
NTT	24	0	0	0	0	0	9	0	0	67	14	19	0	236	0	0
MLK	25	1	2	0	0	0	0	1	0	40	111	16	0	193	0	0
IRJA	26	0	0	0	0	0	0	0	0	490	41	89	3	184	4	1
TIMTIM	27	0	0	0	0	0	1	0	0	7	2	9	0	37	0	0
domestic import		1596	2012	559	849	194	1686	224	548	6950	4144	5206	330	5449	416	356
SUM domestic		3713	8432	2397	2959	863	6955	521	2409	21204	22589	16655	1256	23858	1844	673
primary costs:																
foreign imports		323	1410	182	632	85	769	66	156	8718	6217	2722	193	3971	170	120
wages		1083	3379	1087	1240	419	2382	332	1105	9277	9679	6717	737	9987	865	484
depreciation		454	853	268	646	105	667	74	213	2613	2428	1791	151	2465	219	106
net ind. taxes		99	514	169	163	48	326	30	120	1375	1381	1401	97	2330	120	60
oper. surplus		5674	6600	2088	10856	900	5156	461	1979	14323	20716	13846	1165	18433	1676	892
GDP		7309	11346	3590	12905	1472	8533	917	3417	27589	34166	23756	2149	33215	2880	1523
SUM prim input		7632	12755	3773	13537	1557	9301	984	3573	36305	40403	26479	2342	37186	3051	1643
SUM total input		11346	21187	6170	16497	2420	16257	1504	5983	57509	62992	43134	3598	61044	4895	2516

Table 1.:The Intermediate Trade Flows, billions of Rupiah, current prices (continued)

FROM	TO	KALSEL	KALTIM	SULUT	SULTGH	SULSEL	SULTRA	BALI	NTB	NTT	MLK	IRJA	TIMTIM	domestic export	SUM domestic
		16	17	18	19	20	21	22	23	24	25	26	27		
ACEH	1	0	2	0	0	0	0	0	0	0	1	0	0	959	3074
SUMUT	2	15	53	0	0	0	0	0	0	0	3	1	0	1780	6179
SUMBAR	3	0	3	1	1	0	0	0	0	0	1	5	1	420	2259
RIAU	4	0	1	2	2	0	0	0	0	0	0	6	1	2902	5012
JAMBI	5	0	1	0	0	0	0	0	0	0	0	2	0	327	996
SUMSEL	6	32	29	114	1	152	30	48	0	0	0	4	1	2557	7827
BNGKL	7	0	2	0	0	0	0	0	0	0	1	0	0	228	524
LMPNG	8	0	1	11	0	0	0	0	0	0	0	2	0	218	2082
DKIJAK	9	77	426	66	55	180	36	137	59	76	79	149	17	6500	20754
JABAR	10	9	33	21	20	107	31	157	65	14	22	39	17	5006	23450
JATGH	11	0	0	6	6	0	0	83	50	39	62	111	19	4950	16399
YOGYA	12	0	1	0	0	0	0	0	0	0	0	2	0	273	1199
JATIM	13	80	417	18	20	76	21	141	46	48	36	29	16	1626	20238
KALBAR	14	0	1	1	1	0	0	0	0	0	0	4	1	354	1762
KALTGH	15	137	47	0	0	0	0	0	0	0	0	1	0	352	869
KALSEL	16	964	6	1	1	0	0	0	0	0	1	5	1	514	1476
KALTIM	17	93	4731	1	74	95	0	0	0	0	0	5	1	1574	6304
SULUT	18	0	12	713	0	14	0	0	0	0	2	1	0	202	915
SULTGH	19	0	1	4	372	24	0	0	0	0	0	0	0	245	617
SULSEL	20	0	13	5	17	1784	7	0	0	0	16	25	1	949	2733
SULTRA	21	0	1	0	0	0	217	36	0	0	1	0	0	379	595
BALI	22	7	39	1	1	4	4	1256	9	5	31	45	4	646	1904
NTB	23	0	2	0	0	4	3	3	434	0	1	1	0	391	825
NTT	24	0	2	0	0	0	1	9	0	343	2	0	0	362	705
MLK	25	0	0	36	1	6	2	31	16	13	527	29	13	514	1041
IRJA	26	0	0	1	0	0	0	3	1	1	2	464	9	808	1272
TIMTIM	27	0	0	0	0	0	0	0	7	0	0	7	70	71	141
domestic import		449	1095	290	201	663	134	656	246	197	268	467	102		35266
SUM domestic		1413	5826	1002	574	2447	351	1912	680	540	795	931	172	35266	133173
primary costs:															
foreign imports		116	446	96	65	276	37	224	76	59	76	104	26		27339
wages		697	1519	585	360	1457	328	1030	436	391	476	850	114		56976
depreciation		197	761	130	74	341	70	248	86	72	124	225	19		15400
net ind. taxes		96	195	63	36	197	30	136	46	32	59	90	8		9204
oper. surplus		1517	8607	875	587	2985	519	1993	884	735	1007	1580	142		126219
GDP		2507	11082	1652	1056	4980	948	3407	1453	1231	1668	2746	283		207801
SUM prim input		2623	11528	1748	1121	5258	986	3632	1530	1290	1744	2849	309		235140
SUM total input		4037	17354	2751	1695	7705	1337	5544	2210	1830	2538	3780	481		368313

Table 2.:The Final Demand Trade Flows, billions of Rupiah, current prices

FROM \ TO		ACEH 1	SUMUT 2	SUMBAR 3	RIAU 4	JAMBI 5	SUMSEL 6	BNGKL 7	LMPNG 8	DKIJAK 9	JABAR 10	JATGH 11	YOGYA 12	JATIM 13	KALBAR 14	KALTGH 15
ACEH	1	2514	104	38	58	0	3	0	6	15	12	16	1	10	0	1
SUMUT	2	217	9085	65	273	125	371	51	3	118	378	123	6	44	0	3
SUMBAR	3	7	57	2985	42	1	96	6	14	3	22	34	2	34	0	1
RIAU	4	1	2	19	2239	6	9	7	29	106	0	9	0	0	22	10
JAMBI	5	1	7	1	11	1000	19	0	1	34	2	17	1	5	0	0
SUMSEL	6	26	56	10	164	2	5269	17	39	152	47	117	29	162	0	6
BNGKL	7	0	0	0	4	0	3	814	1	15	12	16	1	16	0	1
LMPNG	8	20	0	6	23	10	36	5	3141	79	89	2	0	15	8	2
DKIJAK	9	325	696	181	1256	91	469	115	313	21085	1487	1662	164	1815	185	84
JABAR	10	101	268	59	372	35	105	36	134	130	28864	220	26	528	110	30
JATGH	11	48	85	17	96	27	378	12	44	408	1422	18641	65	372	66	80
YOGYA	12	1	3	1	1	0	2	0	1	32	0	96	1894	6	79	0
JATIM	13	126	6	44	139	62	152	34	10	8	1057	48	52	31411	238	311
KALBAR	14	0	1	0	2	0	0	0	6	39	33	3	0	3	2332	8
KALTGH	15	1	2	0	4	0	0	0	1	14	38	0	0	2	4	1342
KALSEL	16	7	15	0	37	0	4	3	11	14	34	49	8	33	16	1
KALTIM	17	17	35	3	66	1	8	8	24	18	76	65	8	171	48	12
SULUT	18	0	0	0	7	0	5	0	2	0	20	26	1	17	0	1
SULTGH	19	0	0	0	1	0	1	0	0	0	2	3	0	5	4	0
SULSEL	20	0	0	0	8	0	4	0	2	141	126	22	1	14	20	1
SULTRA	21	0	0	0	0	0	0	0	0	9	9	0	0	0	26	0
BALI	22	0	0	0	11	0	8	0	3	145	121	42	2	27	0	1
NTB	23	0	0	0	2	0	1	0	0	119	31	6	0	4	0	0
NTT	24	0	0	0	0	0	0	0	0	34	20	2	0	1	0	14
MLK	25	2	4	0	9	0	0	1	3	14	50	1	0	10	0	0
IRJA	26	0	0	0	3	0	2	0	1	54	57	12	1	8	6	0
TIMTIM	27	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
domestic import		903	1339	425	2607	362	1675	297	648	1700	5145	2590	369	3301	830	548
SUM domestic		3417	10425	3409	4846	1363	8944	1110	3789	22785	33830	21431	2263	34712	3162	1890
primary costs:																
foreign imports		201	1775	220	3153	217	423	111	287	4198	2267	2348	218	3547	231	109
wages		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
depreciation		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
net ind. taxes		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
oper. surplus		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUM total input		3617	12200	3629	7999	1580	7387	1222	4076	26963	36097	23779	2481	38259	3393	1999

Table 2.:The Final Demand Trade Flows, billions of Rupiah, current prices (continued)

FROM \ TO		KALSEL 16	KALTIM 17	SULUT 18	SULTGH 19	SULSEL 20	SULTRA 21	BALI 22	NTB 23	NTT 24	MLK 25	IRJA 26	TIMTIM 27	domestic export	SUM domestic
ACEH	1	0	0	0	0	0	0	0	0	0	1	0	0	265	2778
SUMUT	2	0	0	2	1	6	2	4	2	2	4	1	0	1801	10886
SUMBAR	3	0	0	6	5	4	3	3	4	6	1	2	1	355	3339
RIAU	4	0	0	0	0	2	8	0	0	0	0	0	0	234	2472
JAMBI	5	0	0	1	0	1	0	1	0	0	0	0	0	106	1106
SUMSEL	6	1	0	36	27	46	18	33	28	35	7	15	8	1083	6352
BNGKL	7	0	0	0	0	0	0	0	0	0	1	0	0	71	884
LMPNG	8	9	8	0	0	1	0	0	0	0	0	0	0	313	3453
DKIJAK	9	91	478	124	96	341	176	234	133	109	129	110	62	10909	31995
JABAR	10	36	113	71	54	97	45	62	61	66	36	30	17	2842	31526
JATGH	11	70	52	10	18	48	32	106	61	66	35	18	9	3624	22465
YOGYA	12	1	1	1	0	1	0	0	0	0	1	0	0	228	2122
JATIM	13	270	205	66	142	365	118	304	187	216	239	28	51	4478	35888
KALBAR	14	0	0	1	0	1	0	1	0	1	0	0	0	100	2432
KALTGH	15	0	0	1	1	1	0	0	1	1	0	0	0	73	1415
KALSEL	16	1552	0	7	19	14	4	3	4	7	1	2	2	294	1846
KALTIM	17	16	2687	38	29	55	14	22	14	19	4	7	4	801	3488
SULUT	18	0	8	1537	14	2	0	7	0	0	1	0	0	112	1648
SULTGH	19	0	0	0	932	0	0	5	3	2	0	0	0	25	957
SULSEL	20	0	44	25	9	3592	6	0	0	0	74	0	0	494	4086
SULTRA	21	0	0	1	0	0	605	0	1	0	0	4	0	50	655
BALI	22	0	0	0	0	0	1	2704	71	95	46	0	0	571	3275
NTB	23	0	0	0	0	0	0	0	1108	0	0	0	0	162	1271
NTT	24	0	0	0	0	0	0	0	0	946	11	8	3	95	1040
MLK	25	0	0	3	1	8	1	8	8	15	951	6	1	144	1096
IRJA	26	0	0	0	0	0	0	0	0	0	1	1148	7	151	1300
TIMTIM	27	0	0	0	0	0	0	0	0	0	4	0	313	7	319
domestic import		492	907	394	418	991	431	797	577	648	592	232	167		29387
SUM domestic		2044	3594	1931	1351	4583	1036	3501	1685	1594	1544	1360	480	29387	180095
primary costs:															
foreign imports		182	1629	121	83	303	127	262	141	124	96	90	31		22496
wages		0	0	0	0	0	0	0	0	0	0	0	0		0
depreciation		0	0	0	0	0	0	0	0	0	0	0	0		0
net ind. taxes		0	0	0	0	0	0	0	0	0	0	0	0		0
oper. surplus		0	0	0	0	0	0	0	0	0	0	0	0		0
SUM total input		2227	5223	2052	1434	4886	1163	3763	1826	1716	1640	1470	511		202591

Table 3.: Other final Demand, billions of Rupiah, current prices		foreign export		change in
province	no.	goods	services	stocks
ACEH	1	6075	33	-615
SUMUT	2	2982	240	-1100
SUMBAR	3	230	91	251
RIAU	4	10304	73	-1365
JAMBI	5	366	28	-76
SUMSEL	6	936	97	1045
BNGKL	7	20	14	62
LMPNG	8	593	51	-196
DKIJAK	9	4221	1450	-911
JABAR	10	6024	682	1309
JATGH	11	2219	260	1791
YOGYA	12	92	60	125
JATIM	13	2879	660	1381
KALBAR	14	923	69	-312
KALTGH	15	206	18	9
KALSEL	16	983	67	-337
KALTIM	17	6796	109	657
SULUT	18	112	40	36
SULTGH	19	32	13	76
SULSEL	20	660	76	149
SULTRA	21	105	6	-25
BALI	22	216	314	-164
NTB	23	1	25	88
NTT	24	9	12	65
MLK	25	644	28	-270
IRJA	26	1110	30	68
TIMTIM	27	0	5	15
total		48739	4550	1756

Table 4.: Provincial Balances of Trade, billions of Rupiah, current prices

province	no.	DOMESTIC INTERMEDIATE		DOMESTIC FINAL		ABROAD	ABROAD INTERM	ABROAD FINAL	TRADE BALANCES			CHECK GDP = C+I(+stocks)+G+X-M				
		export	import	export	import	export	import	import	DOMESTIC	ABROAD	TOTAL	GDP	C+I+G	X-M	change in stocks	balance
ACEH	1	959	1598	265	903	6108	323	201	-1277	5584	4307	7309	3617	4307	-615	-0
SUMUT	2	1760	2012	1801	1339	3222	1410	1775	209	37	246	11346	12200	246	-1100	0
SUMBAR	3	420	559	355	425	321	182	220	-209	-80	-289	3590	3629	-289	251	0
RIAU	4	2902	849	234	2607	10376	632	3153	-320	6591	6271	12905	7999	6271	-1365	-0
JAMBI	5	327	194	106	362	394	85	217	-124	91	-32	1472	1580	-32	-76	-0
SUMSEL	6	2557	1686	1083	1675	1033	769	423	279	-159	120	8533	7367	120	1045	0
BNGKL	7	228	224	71	297	34	66	111	-222	-144	-366	917	1222	-366	62	0
LMPNG	8	218	546	313	648	644	156	287	-663	200	-463	3417	4076	-463	-196	0
DKIJAK	9	6500	6950	10909	1700	5671	8716	4198	8760	-7243	1517	27589	26983	1517	-911	-0
JABAR	10	5006	4144	2842	5145	6706	6217	2267	-1442	-1778	-3220	34186	36097	-3220	1309	-0
JATGH	11	4950	5206	3624	2590	2479	2722	2348	778	-2591	-1813	23756	23779	-1813	1791	0
YOGYA	12	273	330	228	369	153	193	218	-198	-258	-456	2149	2481	-456	125	-0
JATIM	13	1826	5449	4478	3301	3538	3971	3547	-2446	-3979	-6426	33215	38259	-6426	1381	-0
KALBAR	14	354	416	100	830	992	170	231	-791	591	-201	2880	3393	-201	-312	0
KALTGH	15	352	356	73	548	224	120	109	-479	-5	-484	1523	1999	-484	9	0
KALSEL	16	514	449	294	492	1050	116	182	-133	751	618	2507	2227	618	-337	-0
KALTIM	17	1574	1095	801	907	6905	446	1629	372	4830	5202	11082	5223	5202	657	0
SULUT	18	202	290	112	394	151	96	121	-370	-65	-436	1652	2052	-436	36	0
SULTGH	19	245	201	25	418	45	65	83	-350	-103	-453	1056	1434	-453	76	0
SULSEL	20	949	663	494	991	737	278	303	-211	155	-56	4960	4886	-56	149	-0
SULTRA	21	379	134	50	431	111	37	127	-136	-53	-190	948	1163	-190	-25	-0
BALI	22	648	656	571	797	529	224	262	-234	43	-191	3407	3763	-191	-164	-0
NTB	23	391	246	162	577	26	78	141	-269	-192	-462	1453	1826	-462	88	-0
NTT	24	362	197	95	648	20	59	124	-388	-163	-552	1231	1718	-552	65	0
MLK	25	514	268	144	592	672	76	96	-202	500	299	1668	1640	299	-270	0
IRJA	26	808	467	151	232	1140	104	90	260	947	1207	2746	1470	1207	68	0
TIMTIM	27	71	102	7	167	5	26	31	-192	-52	-243	283	511	-243	15	0
total		35286	35286	29387	29387	53289	27339	22496	0	3454	3454	207801	202591	3454	1756	-0

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Appendix C. Transformation matrices from SAM sectors to NIOT sectors

1.   Transformation from NIOT to SAM sectors, in terms of operating surplus and wages.

SAM Sector	NIOT at 25 sector level
36. Foodcrops	1. Foodcrops
37. Estate crops	2. Estate crops
38. Livestock	3. Livestock
39. Forestry	4. Forestry
40. Fisheries	5. Fisheries
41. Coal, ore, migas	6. 0.474 (OS) / 0.405 (wages) * 6. Non migas mining + 7. Migas mining
42. Quarrying	0.526 / 0.395 * 6. Non-migas mining
43. Food processing	8. Food, beverage, tobacco
44. Wood, construction	10. Wood products + 20. Construction
45. Textile	9. Textile
46. Paper, metal, others	11. Paper prod + 15. Metal prod. + 16. Other manufacturing
47. Chem, clay, basic metal	12. Chemical prod. + 13. Non-metal prod. + 14. Basic metal + 17. Petrol refinery + 18. LNG
48. Electricity, gas	19. Electricity, gas and water
49. Trade	0.809/0.731 * 21. Trade/hotel/etc + 0.159/0.142 * 22. Transport
50. Hotels	0.155/0.209 * 21. Trade/hotel/etc
51. Restaurants	0.036/0.06 * 21. Trade/hotel/etc
52. Road transport	0.528/0.555 * 22. Transport
53. Other transport/communications	0.313/0.303 * 22. Transport
54. Bank/insurance	23. Finance
55. Real estate, bus. services	0.588/0.122 * 25. Other services
56. Public adm., other services	0.136/0.528 * 25. Other services + 24. Public Administration
57. Household services	0.276/0.35 * 25. Other services

2.   Transformation from SAM sectors to NIOT sectors, for the part of Operating
      Surplus that contributes to household income being the sum of capital income and
      imputed wages.

NIOT at 25 sector level	SAM sectors
1. Foodcrops	36.
2. Estate crops	37.
3. Livestock	38.
4. Forestry	39.
5. Fisheries	40.
6. Non-Migas mining	42. + 0.01 * 41
7. Migas mining	0.99 * 41
8. Food, beverages, tobacco	43.
9. Textile	45.
10. Wood products	44. (part of capital income + total imputed wages, see 20)
11. Paper products	part 46
12. Chemicals	part 47
13. Non-metal products	part 47 (value set at 1)
14. Basic Metal	part 47
15. Metal products	part 46
16. Other manufacturing	part 46 (value set at 1)
17. Petrol refinery	part 47
18. LNG	part 47
19. Electricity, gas, water	48.
20. Construction	44. (part of capital income, no imputed wages)
21. Trade, hotels, etc	50. + 51. + part of 49.
22. Transport, communications	52. + 53 + part of 49.
23. Finance	54.
24. Public Administration	part of 56. (value set at 0)
25. Other services	55. + 57. + part of 56.

The 'set' values are derived from the analysis carried out for the MRIOT for 1985. For
petrol refinery and LNG the values have not been set at 0, in order to reduce the gap in
household income derived from SAM and NIOT information.