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Analysis of the Contribution to

Socio - Economic Development Strategy

Subject: Project No. NC/VIE/99/008 Contract No. 99/300P

Final Report

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CONTENTS

INTRODUCTION

In this report, we would like to state about the results from the application of I/O Table and modeling technique to study on economic growth and structural transference in the recent "Doi Moi" period, and prospects of economic development of Vietnam in 2001 - 2010.

Part I investigates change of economic structure in 1989 - 1996 based on the I/O Tables of 1989 and 1996 including 20 aggregated branches. Such combination ensures both goal of strategic research and correspondence of the two I/O tables. Obtained results are not only assessments of the past periods, but also large significance in consideration of growth prospect and making future policies for economic development. In the part, a series of coefficients and measurement on the relation between various product branches in structure of intermediate and final demands is finally established. Since then, through comparative static analysis and multiplier decomposition analysis, economic structural change is deeply investigated. Observations of economic development policies drawn from the above analysis are elaborately referred in this part.

Part II and **Part III** show application of the CGE model and Supply Side Model to study possibilities of economic growth of Vietnam in 2001 - 2010. These models are products of the NIPPON project of the Development Strategy Institute. Data counting for model are newly upgraded based on the 1996 I/O table recently publicized by GSO in the end of 1999. The construction of development scenarios is based on newest information of investments at home and abroad as well as import - export possibility.

Results expressed here are not economic forecast but just being scenarios based on simulation of various policies. These are orientating suggestions for thinking of a macro economic framework.

Part IV expresses a macro economic framework for the 2001 - 2010 period. The scenarios stated in this part are comprehensive results drawn from qualitative and quantitative analyses of approaches by the CGE model, Supply Side model, target analysis, growth factor accounting and branch capacity...

Three scenarios would be considered. Each reflects a scenario of development with unexpected instabilities but here it is possible to sketch the most important features. In addition, other different alternatives of development are also presented here.

For easy following, references are put after each part while Appendix in the general end of chapters numbered correspondingly to each part. Estimated data. formula and equation system is also put in the Appendix.

PART I

STRUCTURES AND STRUCTURAL CHANGE OF VIETNAMESE ECONOMY

In this part, based on I/O tables in 1989 and 1996 structures and structural change are reviewed through examining series of coefficients and indicators of relationship between sectors in intermediate consumption structure as well as contributing in final demand. Referring comparative static analysis (detailed in item 3), multiplier decomposition analysis (in item 4), relationships and interactions among intermediate consumption, accumulation, consumption, import-export, in sectors and internal sector are studied perfectly. Conclusions of above said analyses are shown in the end of each item and in the general conclusion.

1. 1. DATABASE

Analyzed data are soured from two I/O Tables in 1989 and 1996 following current producer price published by GSO. The 1989 I/O is constructed in line with the list of 54 sectors, the 1996 I/O Table is according to the list of 97 sectors. On the bases of the two tables and study objective, the tables are directly aggregated in a general list of 20 sectors. The elaborate list includes:

1. Cultivation
2. Animal husbandry and fishery
3. Forestry
4. Mining
5. Animal feed and other food manufactures
6. Manufacture of food, beverage and tobacco
7. Wood and wood products, cellulose, paper

8. Textiles, garment, leather
9. Metallurgy
10. Manufacturing, machinery, equipment
11. Chemicals, fertilizer and rubber
12. Building materials
13. Pottery, glass, ceramics
14. Electricity
15. Gas, gasoline, oil
16. Water production and distribution
17. Construction
18. Transportation, Post and Telecommunication, Trading and Supply
19. Finance, banking, credit, state insurance, technology and sciences, culture, heath care, education, physical training and sport, state management, national defense and security.
20. Others.

Group of Industrial sectors as divided detaily, 13 of 20. forestry, agriculture and fishing comprises 3 sectors and the last, services with 2, respectively.

Because we had no condition to transfer I/O tables to constant price so analyses were implemented in accordance with current one. In addition, imported products were carried out separately with the I/O Table of 1996. Two I/O Tables of 1989 and 1996 with current producer's price and the list of 20 sectors are presented in Appendix 1.2 and 1.3.

Contribution of 20 above-mentioned products into GDP calculated in connection with I/O tables in 1989 and 1996 is shown in Table 1.

Table 1: GDP by industry in GDP

Unit: %

Sectors	As in I/O table of 1989	As in I/O table of 1996
1	28.5	20.4
2	8.9	8.6
3	4.1	1.8
4	1.2	6.0
5	0.4	2.2
6	4.8	4.7
7	1.6	1.1
8	2.3	2.9
9	0.3	0.6
10	2.4	1.1
11	1.0	1.2
12	1.8	1.8
13	0.1	0.2
14	1.2	2.2
15	0	0.1
16	0.2	0.2
17	3.6	6.4
18	17.8	17.5
19	11.5	11.4
20	8.3	9.6
GDP	**100**	**100**

1.2. NOTATION

Applied I/O tables are constructed as follows:

x_{11}	x_{12}	.....	x_{1n}	y_{11}	....	y_{1p}	m_1	x_1
x_{21}	x_{22}	.....	x_{2n}	y_{21}	....	y_{2p}	m_2	x_2
....	.....	X	....	.....	Y	.....	.....	.....
x_{n1}	x_{n2}	.....	x_{nn}	y_{n1}	.....	y_{np}	m_n	x_n
---	---	---	---	---	---	---	---	---
x'''_{11}	x'''_{12}	....	x'''_{1n}	y^m_{11}	.....	y^m_{1p}	m_1	
x'''_{21}	x'''_{22}	....	x'''_{2n}	y^m_{21}	.....	y^m_{2p}	m_2	
...	....	X^m	....	.....	Y^m	.....	....	
x'''_{n1}	x'''_{n2}	....	x'''_{nn}	y^m_{n1}	.....	y^m_{np}	m_n	
.....								
v_{11}	v_{12}	.....	v_{1n}					
.....								
v_{q1}	v_{q2}	.....	v_{qn}					
---	---	---	---					
$\bar{\bar{x}}_1$	$\bar{x}_2$	.....	$\bar{x}_n$					
x_1	x_2	.....	x_n					

Where

- $n = 20$ - Number of sectors
- X - Column vector comprising 20 components x_1, ..., x_{20} is gross output of sectors.
- $p = 5$ - Components of final demand, that are private expenditure, social expenditure, gross fixed capital formation, changes in stock and export.
- $Y = y_{ij}$ - Is sub matrix of the 5 x 20 final demand components y_{ij} is

product quantity of i sector taking part into final demand of j.

$X (x_{ij})$ - Is sub-matrix of the 20 x 20 intermediate products x_{ij} is product quantity of i sector taking part into production of j sector

X^m, Y^m - Are the same as X, Y, specially made for imported products

m - Column vector comprising 20 components m_1, ...m_{20} is quantity of imported product of sectors.

q = 4 - Components of primary inputs, they are deprivation of fixed assets, remuneration of labor, profit and tax on production

$V = (v_{ij})$ - Is matrix of the 4 x 20 primary inputs components of 20 sectors, v_{ij} is the first input quantity of i in sector j.

x - Row vector comprising 20 components x_4, ... x_{20} is total products of sectors.

$A=(a_{ij})$ - Is matrix of the 20 x 20 input coefficients, where

$$a_{ij} = \frac{x_{ij}}{x_j},$$

A^d, A^m - Are the same as A, used for domestic and imported products, separately

$B = (b_{ij})$ - Is matrix of the 20 x 20 output coefficients, where

$$b_{ij} = \frac{x_{ij}}{x_i},$$

B^d, B^m - Are the same as B, used for domestic and imported products

R, R^d, R^m - Are sub-matrices of the 20x20 multipliers for total products, domestic and imported products

$$R = (I - A)^{-1}$$

$$R^d = (I - A^d)^{-1}$$

$$R^m = A^m(I- A^d)^{-1}$$

And correspondingly

$$C = (I- B)^{-1}$$

$$C^d = (I- B^d)^{-1}$$

$$C^m = B^m(I- B^d)^{-1}$$

Where, I is the identity matrix. Matrices A, A^m, B, R are orderly shown in Appendices between 1.5 and 1.11.

1.3. COMPARATIVE STATIC ANALYSIS

1.3.1. Sectoral dependency ratios

From two matrices of the A input coefficient in 1989 and in 1996, we set up two corresponding ones of D coefficient with:

$$d_{ij} = \frac{a_{ij}}{a_{.j}} \times 100$$

Where: $a_{.j} = \sum_{i=1}^{n} a_{ij}$

As a result, $a_{.j}$ is ratio of intermediate consumption in sector j, d_{ij} measures the degree of importance of an input i to intermediate consumption that of sector j. Matrices D of 1989 and 1996 are shown in Appendices 1.12 and 1.13.

Variation of coefficient of intermediate consumption in sectors between 1989 and 1996 is represented in Table 2.

Table 2: Change of total intermediate input in sectors

Unit: %

Sectors (1)	$a_{.j}$ in I/O table of 1989(2)	$a_{.j}$ in I/O table of 1996 (3)	Different (3)-(2)
1	30.9	29.1	-1.8
2	43.2	37.7	-5.5

Sectors (1)	a_{ij} in I/O table of 1989(2)	a_{ij} in I/O table of 1996 (3)	Different (3)-(2)
3	24.6	21.7	-2.9
4	57.9	40.6	-17.3
5	79.8	88.5	+8.7
6	64.5	65.2	+0.7
7	60.1	82.7	+22.6
8	64.6	72.5	+7.9
9	72.5	69.4	-3.1
10	58.2	78.2	+20.0
11	71.9	77.8	+5.9
12	62.1	68.6	+6.5
13	60.5	57.7	-2.8
14	57.6	53.1	-4.5
15	0	39.1	+39.1
16	45.1	69.3	+24.2
17	61.5	68.8	+7.3
18	34.0	36.6	+2.6
19	34.3	36.5	+2.2
20	23.2	37.5	+14.3

Reviewing this table, 20 sectors can be divided into 3 groups (not refer the fifteenth sector of gas, gasoline, oil because it is not founded in 1989).

Group 1: Sectors of strongly increased coefficient a_{ij} are 16, 7, 10, 20, 5, 8, 17.

Group 2: Sectors of ordinarily increased coefficient a_{ij} are 12, 11, 18, 19, 6.

Group 3: Sectors of reduced a_{ij} are 1, 13, 3, 9, 14, 2, 4.

Two sectors of the most increased coefficient a_j are water production and distribution (16) and wood products, cellulose and paper (7). Though studying structure of intermediate consumption of two sectors we find that: two sectors of the last reduced coefficient $\dot{a}_j$ are sector of mining (4), and sector of animal husbandry and fishery (2).

- Water production and distribution.

Sectors	1989		1996	
	a_{ij}	d_{ij}	a_{ij}	d_{ij}
- Electricity	0.35	78	0.28	40
- Chemicals, fertilizer, rubber	0.06	12	0.13	18
- Transportation, trade	0.004	0.83	0.07	10

Analysing variations of the coefficients a_{ij} and d_{ij} in the sector of water production and distribution we find that owing to investment of new construction and improvement of water supply systems in the period 1989 - 1996, electric cost of this sector reduced. Chemicals use for processing water quality was more strictly systematized so chemical expense increased. Besides, it is also due to new construction and improvement of water supply systems, other expenditures in the sector such as costs of metal products, and of internal sector's considerably increased. Therefore, in the sector of water production and distribution, the increase of co-efficient $\dot{a}_j$, to a certain extent, reflects renovation of productive technology.

- Wood processing, products, cellulose, paper

Sectors	1989		1996	
	a_{ij}	d_{ij}	a_{ij}	d_{ij}
- Sector's own consumption costs	0.27	45	0.32	39
- Forestry	0.11	19	0.17	21
- Transportation, trade	0.02	4	0.11	13

For the sector of wood processing, products, cellulose and paper, through analysis of variation of coefficients a_{ij} between 1989 and 1996, technological advance is not found in its production. The coefficient of main product cost as well as others such as of electricity, gasoline, oil, chemicals in the sector's production increase. Thus, for this sector, rapid increase of the coefficient a_j represents backward productive technology.

- Mining

Sectors	1989		1996	
	a_{ij}	d_{ij}	a_{ij}	d_{ij}
- Gasoline, oil	0.1	18	0.02	5
- Chemicals, fertilizer, rubber	0.08	14	0.06	15
- Transportation, trade	0.05	9	0.07	7

Though analysing variation of coefficients a_{ij} and d_{ij} of the sector in 1989 and 1996, productive technological progress is found. Because of new machinery, equipment, gasoline, and oil, costs in the sector of mining decrease. Beside these costs, other expenditures for products of sectors such as chemicals, fertilizer, rubber, machinery, equipment's, electricity in this sector also decrease. So in the sector of mining, the decrease of coefficient a_j in the 1989 - 1996 period shows technological progress in its production.

- Animal husbandry and fishery

Sectors	1989		1996	
	a_{ij}	d_{ij}	a_{ij}	d_{ij}
- Sector's own consumption costs	0.29	67	0.05	14
- Cultivation	0.04	10	0.11	40
- Transportation, trade	0.02	3	0.03	8

Analysing variation of the coefficients a_{ij} and d_{ij} between 1989 and 1996, we find productive advance in the sector of animal husbandry and fishery. Owing to the process of production and better breed preservation, sector's own consumption costs much decrease. The sector's productive system has progresses and this presents that though the coefficient a_j of the sector decreases, others such as coefficients of product costs of cultivation, chemicals, electricity in the sector's production increase:

For the rest sectors, based on coefficients a_{ij} and d_{ij} between 1989 and 1996, analysis of technological advance in sector's production are implemented as the above sketches.

Table 3 is established based on matrix D. Where, to each sector, three largest rated ones of structure of intermediate consumption are given. Comparing column 2 and 3 of the Table, except consumption for products of transportation and trading are going up more and more roles of others are fairly kept on.

Table 3. Key sectors in structure of intermediate consumption

(From the most to the least)

For sectors (1)	Sectors as shown in I/O Table of 1989 (2)	Sectors as shown in I/O Table of 1996 (3)
1	11, 1, 2	11, 1, 18
2	2, 1, 15	1, 5, 2
3	3, 11, 15	3, 8, 11
4	15, 11, 10	18, 20, 11
5	5, 1, 6	1, 18, 5
6	6, 7, 2	2, 1, 6
7	7, 3, 11	7, 3, 18
8	8, 11, 1	8, 11, 18
9	9, 14, 4	9, 4, 14
10	9, 10, 11	10, 9, 18
11	11, 4, 6	11, 18, 12
13	11, 13, 4	4, 11, 14
14	10, 15, 18	10, 14, 20
15	-	15, 4, 18

For sectors (1)	Sectors as shown in I/O Table of 1989 (2)	Sectors as shown in I/O Table of 1996 (3)
16	14, 11, 10	14, 11, 18
17	12, 9, 18	12, 9, 18
18	10, 6, 15	18, 10, 15
19	18, 19, 7	19, 20, 18
20	7, 17, 18	20, 11, 18

From the results of analyses three conclusions are drawn out of follows:

- In the period 1989 - 1996 some sectors of animal husbandry, fishery, mining, good processing, foodstuff, water production and distribution reach progresses in productive technology. The rest do not reveal clearly technological progress in their production.

- Some sector's electric consumption go up such as in sector of wood processing and products, cellulose, paper; sector of pottery, ceramics and glass; sector of transportation; sector of post and telecommunication; sector of supply and trade. In the sector of electricity, due to structural transference between hydro - electricity and thermos - electricity, its coefficient of gasoline and oil consumption decreases strongly while the coefficient of electric consumption raise. In some sectors, their coefficient of consumption of chemicals, fertilizer, rubber go up. They are contivation, mining, textiles, garment, leather, chemicals, fertilizer, rubber, building materials, pottery, ceramics, and glass.

- In almost sectors (except electricity, finance, credit, state management) expenditures on transportation and trade become more important absolute and relative to the other input factors.

1.3.2. Sectoral dependency ratios of imported products

In I/O table of 1996, domestic products and imported products are divided separately. Based on that, we established matrix of the input coefficient for imported products $A^m = (a_{ij}^m)$ and matrix of the rate coefficient D^m for imported products, where:

$$a_{ij}^{m} = \frac{x_{ij}^{m}}{Xj}$$

$$d_{ij}^{m} = \frac{a_{ij}^{m}}{a_{.j}}.100$$

$$a_{.j} = \sum_{i=1}^{n} a_{ij}$$

If $a_{.j}^{m} = \sum_{i=1}^{n} a_{ij}^{m}$ coefficient $h_j = \frac{a_{.j}^{m}}{a_{.j}}.100$ measures the degree of consumption of imported product in total intermediate consumption of sector j. The table of coefficient h_j of 1996 is shown in Appendix 1.21. Matrix $D^m = (d^m_{ij})$ of 1996 is in Appendix 1.14. Based on coefficient h_j, 20 sectors can be divided in to 3 groups.

Group 1: Sectors having high coefficient h_j are 15, 10, 1, 8, 11, 9, 14.

Group 2: Sectors of normal coefficient h_j are 20, 18, 17, 13, 3, 4, 7.

Group 3: Sectors of low coefficient h_j are 19, 16, 2, 12, 6, 5.

Sectors of group 1 have coefficient $h_j > 40\%$. It means that over 40% of sectors' intermediate consumption are that of imported products. Three sectors of highest coefficient h_j are sector of gasoline, oil, gas; sector of manufacturing, equipment, machinery and sector of cultivation. Analyzing structure of consumption of imported products of group 1 sectors, we find that, except for cultivation and electricity, high consumption of imported products are mostly internally sectoral products. This expresses that these sectors imported products to process, assemble mostly. For cultivation, the most consumption of imported products are ones of chemicals, fertilizer and rubber. For electricity, the most consumption of imported products are ones of manufacturing, machinery, equipment. This shows that many products which served domestic production of the two sectors were unsatisfied and must be imported. Sectors of groups 2 have coefficient h_j ranging from 20-40%. Sector of lowest coefficient h_j is food processing, h_j=2%. Other have ones of over 10%.

As same as coefficient d_{ij}, d_{ij}^m measures the degree of importance of imported product i in intermediate consumption of sector j. Many sectors have great coefficient d_{ij}^m. For example, in sector of gasoline, oil, gas, cost of imported gasoline, oil, gas products account for 53% total expenditure. In cultivation, cost of imported chemicals, fertilizer and rubber products account for 46% total expenditure. In sector of chemicals, fertilizer, and rubber, cost of imported chemicals, fertilizer, rubber products account for 39% total expenditure. In metallurgy, cost of imported metallurgy products reach 38% total one. In electricity, cost of imported machinery, equipment products account for 33% total one.

All of these display that many sectors' productions were greatly dependent to imported products. The productive degree of these was atan assembly, processing level.

The following coefficient is applied.

$$g_i = \frac{y_i^m}{y_i}.100 \ , \quad i = 1, \ldots, 20$$

Where, y_i^m - imported products of sector i for final demand.

y_i - final demand of products of sector i (including domestic and imported products)

As a result, coefficient g_i measures degree of import dependency of final demand of sector i. The coefficient g_i of 20 sectors in 1996 is shown in Appendix 1.19. The distribution of import in consumption and investment is shown in Appendix 1.17. Based on the coefficient g_i, 20 studied sectors can be divided into 3 group.

Group 1. Sectors having final demand depending much on imported products are 9, 15, 10, 11, 3, 13. Coefficient g_i of these sectors is more than 40%.

Group 2: Sectors having final demand depending normally on imported products are 1, 12, 8, 7, 18, 6. Coefficient g_i of these sectors is over 10%.

Group 3: Sectors having final demand depending little on imported products are 20, 19, 5, 4, 2, 14, 16, 17. Coefficient g_i of these sectors is less than 10%.

Three sectors having final demand depending most on imported products are sector of metallurgy, sector of gasoline, gas oil and sector of manufacturing, machinery, equipment. For metallurgy, 92% imported products for final demand are spent on changes in stock; for gasoline, oil, gas, 82% imported products for final demand are spent on private consumption. And manufacturing, equipment, machinery, 49% imported products for final demand are spent on personal consumption other 50% are spent on gross fixed capital formation.

Three sectors not using imported products for final demand are electricity, water production and distribution and construction.

Three conclusions are as follows:

- Imported products play an important role in both intermediate demand and final demand. This shows 64% input coefficient of imported product in matrix A^m are not zero, 85% sectors use imported products for final consumption (see Appendices 1.7, 1.17 and 1.21).

- Many sectors have great ratio of imported products in total intermediate consumption. These comprises 2 kinds. The first one is that where products are mainly imported for processing, assembling. They are sector of gasoline, oil and gas, sector of manufacturing, machine, equipment, sector of metallurgy, and sector of chemicals, fertilizer and rubber. The second one is that need imported products for manufacturing (because it is not met by domestic one). They are sector of cultivation (87% imported products for manufacturing are ones of chemicals, fertilizer and rubber), sector of electricity (95% imported products for manufacturing are ones of manufacturing, machinery and equipment).

- In total imported products serving for private consumption, products accounting for big ratio are ones of manufacturing, machinery and equipment

(24%), of cultivation (17%), of textiles, garment, leather (9%). In total imported products for gross fixed capital formation, the majority is ones of manufacturing, machinery and equipment (accounting for 99,5%). In total imported products for changes in stock, products accounting for big ratio are ones of metallurgy (49%), of textiles, garment, leather (13%), of gasoline, oil, gas (10%).

1.3.3. Sectoral transferring ratios

From matrix of the intermediate output $X = (x_{ij})$ of each sector, coefficient k_i is calculated:

$$k_i = \frac{\sum_{j=1}^{n} x_{ij}}{x_i + m_i} \times 100$$

Coefficient k_i measures the degree of transferring products of sector i (including domestic and imported product) to intermediate demand. The higher coefficient k_i is, the more products of sector i are transferred to intermediate demand (means that the less products of sector i are transferred to final demand). Coefficient k_i of 1989, 1996 are shown in Appendices 1.18 and 1.19.

Comparing calculating result of coefficient k_i in reference with two I/O table of 1989 and 1996 (see Table 4), 20 studied sectors can be divided into 3 groups.

Group 1: Sectors of increased coefficient k_i, i.e, in the period of 1989 - 1996, ratio of products of sector (including domestic and imported products) in intermediate demand increase. They are 1, 3, 9, 12, 18, 20.

Group 2: Sectors of not changed many coefficients k_i are 8, 11, 14, 15, 16, 19.

Group 3: Sectors of decreased coefficient k_i are 2, 4, 5, 6, 7, 13, 17.

In sectors of increased coefficient k_i, sector of cultivation, forestry, sector of metallurgy; sector of transportation, post, trading, supply are

specially examined. Increase of coefficient k_i in sectors of cultivation and forestry combines with rapid development of food processing, wood processing, forestry products, cellulose and paper. Increase of coefficient k_i in metallurgy combines with increase of input coefficient of metallurgy in itself and construction. For transportation, post and telecommunication, trading and supply, increase of k_i present that their production are met better.

In sectors of decreased coefficient k_i, sector of food processing, sector of ceramics, pottery, glass, sector of animal husbandry and fishery and sector of wood product, cellulose and paper are found that their coefficient k_i decreased significantly. It means rapid increase of role of these sectors in final demand.

Table 4: Coefficient of transferring product to intermediate demand.

Sectors	As in I/O table of 1989	As in I/O table of 1996
1	19.2	61.4
2	58.2	24.2
3	20.5	81.4
4	45.9	34.8
5	66.3	8.9
6	28.4	19.7
7	89.3	64.0
8	32.1	31.1
9	63.9	94.2
10	32.3	40.1
11	77.9	79.1
12	76.7	90.6
13	109.8	56.5
14	86.4	86.0
15	72.4	72.9
16	64.8	63.9
17	9.4	4.0
18	20.6	44.9
19	19.4	18.1
20	20.0	33.5

For the 1989 I/O table final demand of sector 13 is negatives, meaning that final demand subsidies intermediate, meaning that final demand subsidies intermediate demand. The sectoral transfer ratio k_i for 1989 of sector 13 is greater than 100%.

From matrix of the output coefficient B, matrix $S = (s_{ij})$ is established.

Where:

$$s_{ij} = \frac{b_{ij}}{b_{i.} + \tilde{y}_i} \times 100$$

$$b_{i.} = \sum_{j=1}^{20} b_{ij}$$

$$\tilde{y}_i = \frac{y_i}{y_.}$$

$$y_i = \sum_{k=1}^{5} y_{ik}$$

$$y_. = \sum_{i=1}^{20} y_i$$

Coefficient s_{ij} measures the degree of importance of sector j in receiving products from sector i. The higher coefficient s_{ij} of sector j is the more it takes products from sector i comparing others. Matrix S of 1989, 1996 are shown in Appendices 1.15 and 1.16. The following table 5 is built by the way that for each sector, 3 sectors take its products most are defined.

Analyzing data in tables 4 and 5 we comment as follows:

- In period 1989 - 1996 due to change of economic structure, especially rapid development of sectors as food processing, wood product, cellulose, and paper, metallurgy, many sectors as cultivation, forestry, and metallurgy have contributed better their products to intermediate demand.

- During economic transition period, contribution of transportation, post, trading, supply into manufacturing process is more and more.

- Some sectors have changes in their main clients such as:

+ For products of cultivation in 1989, animal feed and other food manufactures has coefficient s_{ij} of 2%, then increase to 56% in 1996; cultivation in 1989 has coefficient s_{ij} of 18%, decrease to 9% in 1996. This means that processed products of the sector of cultivation increased while costs for the internal sector (seeds, ...) decreased.

+ For products of animal husbandry and fishery in 1989, sector of manufacture of food, beverage and tobacco has coefficient s_{ij} of 15%, then increase to 46% in 1996, sector of animal husbandry and fishery has coefficient s_{ij} of 45% in 1989, decrease to 16% in 1996. This also means that processed products of the sector of animal husbandry increased and costs for the internal sector (breed, ...) decreased.

+ For products of animal feed and other food manufactures in 1989, sector of animal husbandry and fishery has coefficient s_{ij} of 6%, increase to 18% in 1996, sector of animal feed and other food manufactures in 1989 has coefficient s_{ij} of 51%, decrease to 9% in 1996. This shows that the sector of animal husbandry used mush more products of the sector of animal feed and other food manufactures for production (processed food for domestic animals, ...), the sector of animal feed and other food manufactures decreased costs of its products (preliminarily processed or reprocessed products) and increased input products from the sector of cultivation.

+ For products of metallurgy, in 1989, sector of construction has coefficient s_{ij} of 17% then increase to 35% in 1996, sector of machinery, equipment and manufacturing in 1989 has coefficient s_{ij} of 38%, decrease to 17% in 1996. This expresses that in the period 1989 - 1996, the sector of construction used more metals in its production while the sector of manufacture, machinary, equipment decreased its production, manufacturing instead of increasing its processing, assembling.

Table 5. Key sectors in receiving products (From the most to the least)

Products of sectors (1)	As in I/O table of 1989 (2)	As in I/O table of 1996 (3)
1	1, 6, 2	5, 1, 6
2	2, 1, 6	6, 2, 18
3	7, 3, 4	7, 12, 3
4	12, 11, 14	17, 12, 4
5	5, 6, 18	2, 5, 6
6	6, 18, 19	6, 18, 5
7	7, 19, 6	7, 20, 17
8	8, 19, 6	8, 20, 18
9	10, 17, 9	17, 10, 9
10	18, 10, 14	10, 18, 14
11	1, 11, 18	1, 11, 8
12	17, 12, 19	17, 12, 20
13	17, 18, 11	17, 6, 18
14	1, 18, 12	14, 18, 8
15	-	18, 17, 2
16	18, 19, 10	18, 19, 20
17	20, 18, 6	19, 17, 18
18	19, 18, 17	18, 5, 17
19	19, 18, 3	19, 18, 4
20	18, 19, 20	19, 20, 18

1.3.4. Coefficients defining the degree of importance of sector

Based on I/O table, the degree of importance of each sector is defined. According to matrix $R = (r_{ij}) = (I - A)^{-1}$, two vectors p and q comprising 20 components are calculated with:

$$p_j = \frac{\frac{1}{20} \times r_{.j}}{\bar{r}} = \frac{20 \times r_{.j}}{r_{..}}$$

$$q_i = \frac{\frac{1}{20} \times r_{i.}}{\bar{r}} = \frac{20 \times r_{i.}}{r_{..}}$$

Where:

$$r_{.j} = \sum_{i=1}^{20} r_{ij}$$

$$r_{i.} = \sum_{j=1}^{20} r_{ij}$$

$$r_{..} = \sum_{i=1}^{20} \sum_{j=1}^{20} r_{ij}$$

$$\bar{r} = \frac{1}{400} \times r_{..} = \frac{1}{400} \sum_{i=1}^{20} \sum_{j=1}^{20} r_{ij}$$

Coefficient p_j is called backward linking coefficient of sector j.

If sector j has coefficient $p_j > 1$ it means that when final demand increase one unit, sector j has to increase its cost of production many more times than others, i.e. sector j draws heavily from the rest of the industrial sectors. If sectors i has coefficient $q_i > 1$ that is sector i has to increase gross products, much more than others when final demand increase one unit.

Together with two vectors p and q, 2 vectors z and u comprising 20 components and calculated as follows:

$$z_j = \frac{\sqrt{\frac{1}{19} \sum_{i=1}^{20} (r_{ij} - \frac{1}{20} \times r_{.j})^2}}{\bar{r}}$$

$$u_i = \frac{\sqrt{\frac{1}{19} \sum_{j=1}^{20} (r_{ij} - \frac{1}{20} \times r_{i.})^2}}{\bar{r}}$$

Coefficient z_j and u_i are called as coefficients of variation. When value of z_j or u_i is high, total products transferred in or out of respective sectors include small amount of components but they have a large ratio. When value

of z_j or u_i is small, components of respective column and row of matrix of product flow are high homogenous (not much different).

As referring experience of study of many countries, a sector considered important one if it has simultaneously $p_j > 1$ and $q_i > 1$ and small coefficients of z_j and u_i.

Based on I/O Tables of 1989 and 1996, vectors p, q, z, u are calculated with above written formula. Validities of vectors p, q, z and u of 1989 and 1996 are shown in Appendices 1.18, 1.19, and 1.21. We classify the importance of each sector with above said standard, i.e. define backward and forward linking effective of one sector to others.

- Following I/O table of 1989 important sectors are:

  + Wood processing, wood products, cellulose and paper.

  + Textiles, garment, leather.

  + Metallurgy

  + Manufacturing, machinery and equipment.

  + Chemicals, fertilizer and rubber.

  + Electricity.

- Following I/O table of 1996, important sectors are:

  + Wood processing, wood products, cellulose and paper.

  + Metallurgy

  + Manufacturing, machinery and equipment.

  + Chemicals, fertilizer and rubber.

  + Electricity.

Thus, it would be seen in the period 1989 - 1996, the important sector are rather stable.

1.3.5. Analyzing import - export:

From I/O table of 1996, vector $\hat{m}$ comprising 20 components is computed with following formula:

$$\hat{m} = A^m \times (I - A^d)^{-1} \times \hat{y}^d = R^m \times \hat{Y}^d$$

Where, $\hat{Y}^d$ is standardized vector for vector of domestic final demand, that is: Vector of 20 components represents the density of domestic terminal demand of sector i in gross domestic final demands:

$$\hat{Y}_i^d = \frac{y_i^d}{\sum_{k=1}^{20} y_k^d}$$

Vector $\hat{m}$ measures impact of domestic final demand to import intermediate demand, it shows that when domestic final demand increase one unit, which product need to import most for intermediate demand? Validity of vector $\hat{m}$ of 1996 is presented in Appendix 1.13. Calculating result show that when domestic final demand increase, the following products need to import most for intermediate demand:

- Chemicals, fertilizer and rubber.
- Manufacturing, machinery and equipment.
- Gasoline, oil and gas.
- Metallurgy.

From also I/O table of 1996, vector of sectoral net export earning is calculated as follows.

$$E^n = E - A^m \times (I - A^d)^{-1} \times E = (I - R^m) \times E$$

Where, E^n is vector of sectoral net export earning, E is vector of sectoral export. Validity of vector E^n of 1996 is shown in Appendix 1.19. Real contribution of sector for export is defined through vector E^n. Many sectors as sector of metallurgy, sector of manufacturing, machinery and equipment, sector of chemicals, fertilizer and rubber have export products, but no net

export earning or with negative value. Reason is to serve exportation of these sectors which imported great products. So, 20 sectors can be divided into three groups.

Group 1: Sectors of high net export earning comprise sector of transportation, post and telecommunication, trading, supply, textiles, garment, leather, cultivation and food processing.

Group 2: Sectors of normal net export earning comprise sector of animal husbandry and fishery; sector of wood product, cellulose, paper; sector of building material; sector of pottery, glass, ceramics; sector of finance, banking, credit and the others.

Group 3: Sectors of deficit export or no net export earning include sector of metallurgy; sector of manufacturing, machinery, equipment; sector of chemicals, fertilizer and rubber; sector of gasoline, oil, gas; sector of electricity; sector of water production and distribution and construction.

1.4. Multiplier Decomposition Analysis

This part aims to analyze and evaluate how contribution of technology advance and contribution of final demand change are when gross output increases in the period of 1989 - 1996.

System of equations presenting basic relationships in I/O table of 1989 and 1996 is as follow:

$$x + m = A \cdot x + y$$

Where: x: Vector of gross output

m: Vector of import

y: Vector of final demand

A: Matrix of input coefficients.

Then,
$$(I - A).x = (y - m)$$
$$x = (I - A)^{-1}.y - (I - A)^{-1}.m$$
$$= R.y - R.m$$

Where: $R = (I - A)^{-1}$ is matrix of the multipliers of total product flow (including domestic and imported products).

Calling Δx a vector indicating variation of productive validity of 1996 in comparison with that of 1989, we have:

$$\begin{aligned}\Delta x &= x^1 - x^0 \\ &= (R_1 y^1 - R_1 m^1) - (R_0 y^0 - R_0 m^0) \\ &= (R_1 y^1 - R_0 y^0) + (R_0 m^0 - R_1 m^1) \\ &= (R_1 - R_0).y^0 + R^0 .(y^1 - y^0) + (R_1 - R_0).(y^1 - y^0) \\ &+ (R_0 m^0 - R_1 m^1)\end{aligned}$$

Where, index "1" presents year of 1996, "0" presents 1989. So, growth of gross output Δx constitutes 4 components.

- Growth of gross output caused by technology advance is

$$(R_1 - R_0).y^0 = \Delta R \, . \, y^0$$

- That caused by changes in final demand is

$$R^0 .(y^1 - y^0) = R_0 \, . \, \Delta y$$

- That caused by mixed change in technology and final demand is:

$$(R_1 - R_0).(y^1 - y^0) = \Delta R \, . \, \Delta y$$

- That caused by changes in imported products:

$$(R_0 m^0 - R_1 m^1)$$

Calculated results are shown in Appendix 1.20. From results of calculation, two comments are gained as below:

- In all sectors, growth of gross output is mainly caused by increase of final demand.

- Contribution of technology advance in growth of gross output is little. Generally, in the entire economy, contribution of technological advance in growth of gross output is only around 2%:

$(\Delta R.y^0). e / \Delta x.e = 8.098.982 / 508.020.795 = 0,0159$

where: e is the vector of unit (see Appendix 1.20).

1.5. Conclusion

With the limited information source, from the presented analyses, the following conclusions may be acquired, serving the determined orientations of changing the economic structure in the years to come. The conclusions in the general form, wanting to be concretized need more information source in order to carry out the supplementary analyses.

- First, in order to reduce the production costs in the entire economy before having the renovations in the technology of production, on the one hand it is necessary to develop strongly and to enhance the quality of the Transport, Post and Telecommunication, trading, supply sectors, on the other hand, it is also necessary to manage more closely the costs of transport, Posts and Telecommunications, trading and supply in the sectors. In the period from 1989 to 1996, the costs of transport, Posts and Telecommunication trading, supply in almost sectors were increased very much. In 1996, a lot of sectors had the share of costs of transport, post - telecommunication, trading, supply bigger 10% costs of production. There were the following sector of forestry; sector of mining, sector of food processing, sector of wood processing products, cellulose and paper; sector of chemical, fertilizer and rubber; sector of building materials; sector of construction; sector of transport, post - telecommunication, trading, supply; sector of finance, banking, credit and the rest of sectors.

- Secondly, the technology's renovation in period 1989 - 1996 was very slow. The contributions of the progress of technology to the increase of the gross output were also very few. Considering generally the entire economy, the contributions of the technology's progress did not reach 2% in the increase of the gross output. The coefficient a_j of intermediate consumption strongly increased in many sectors. The sectors having the strongly increased coefficients of intermediate consumption have been sector of water production

and distribution; sector of wood processing products, cellulose and paper, and sector of manufacturing machinery, equipment. All these matters prove that the technology's renovation becomes an urgent demand of the economy in the coming period.

Thirdly, the importation plays an important role in the economy, both intermediary demand and final one. In almost sectors, over 10% of the final demands are imported products. There are following sector of metallurgy; sector of oil and gas; sector of manufacturing machinery, equipment and sector of porcelain, pottery, glass. Toward the intermediary demands, in a lot of sectors, the imported products' cost rate in the common costs for the production are great, over 40%. There are sector of oil- gas; sector of manufacture, machinery, equipment; sector of cultivation, sector of textile, garment, leather, sector of chemicals, fertilizer, rubber; sector of metallurgy and sector of electricity. All these issues show that the importation plays an important role in the economy. In order to decrease the role of importation, it is necessary to focus on the research, analysis of the products imported in great quantity for final consumption, and of the sectors producing, using a lot of the above-mentioned imported products. Towards the importation for the final consumption, it is necessary to decrease the importation for private consumption, first of all, to reduce the importation of the machinery, equipment, agricultural products; textiles, garment, leather products. Towards the importation to the intermediate demand, first of all, it is necessary to develop the production of products of sectors, such as: sector of chemicals, fertilizer, rubber; sector of manufacturing machinery, equipment in order to substitute the demands of importation for the production of the sector of cultivation, and sector of electricity.

- Fourthly, the exportation plays a more important role in the economy, if in 1989 the exportation 16% of the gross output in the economy, it occupied 20% in 1996. However, considering the efficiency of the whole economy, in order to speed up the exportation, it is necessary to develop the products for export of the sectors having the high net export earning. They are the products

for export of the sectors of transport, post - telecommunication, trading, supply, mining, of textiles, garment, leather, cultivation and food processing. The net export earning of these sectors have occupied over 75% of the exportation value of the sector.

- Fifthly, after 7 years of renovation, the economic structure of Vietnam has had profound changes. This expressed in changes of position and role of sectors in the entire system of production. Many sectors such as cultivation, forestry, and metallurgy have much more taken part as intermediate products i.e. they have contributed to create general increasing validity of the economy. The other sectors of food processing; pottery, ceramics, glass; animal husbandry, fishery; wood processing, wood products, cellulose and paper have raised their product contribution with higher quality of commodities to the final demand. In the period of 1989 - 1996, two sectors played an important role towards the development of the economy were sector of wood processing products, cellulose and paper, and sector of electricity. This importance is understood upon the signification when the final demands increased upon structure as in the recent period, the above-mentioned two sectors will have to increase their gross output a lot in comparison with other sectors. The loss of important role of the sector of manufacture, machinery and equipment, to a certain extent, reveals a change of economic structure.

1.6. References

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PART II

SIMULATION AND SCENARIO ANALYSIS WITH CGE MODEL

In this part, after providing a brief characteristics and application framework of CGE model, we will first build the data for benchmark equilibrium and the model assumptions for historical test. Then we apply the model to scenario simulations and analyse simulation results. More detail is bellows.

2.1. CHARACTERISTICS AND APPLICATION FRAMEWORK OF CGE MODEL IN VIETNAM

Computable General Equilibrium model (CGE) which considered bellows is revised version of model available in Development Strategy Institute, constructed by Dr. Ezaki, professor of Nagoya university in Japan. Model is consisted of 48 equation systems for 5 economic sectors. Structure of the model encompasses six blocks:

- Block of price relations including equations from (1) to (4)

- Block of labour market equilibrium conditions, from equation (6) to (9)

- Block of capital market equilibrium conditions, from equation (10) to (12), (47) and (48)

- Block of equilibrium in production market, including equation (5) and equations from (13) to (35)

- Block of general equilibrium: equation (46)

- Block of Statistic National Account from equations (36) to (45)

CGE model is constructed basing on current condition on import and characteristics of Vietnam markets.

- Vietnam is a small country in import, that means that import of Vietnam is not big enough to make changes in export prices of the rest of the world (ROW).

- Capital market and labour market are fragmentary or in other words these markets are not perfect, in terms of wages and rent of capital are different in sectors.

- CGE model is constructed for benchmark year of 1996 and consisted of 5 composite sectors: *i)* agriculture (including forestry and fishery; *ii)* manufacture industry; *iii)* other industry; *iv)* constructions and *v)* services. The main data base of the model is withdrawn from input output table of 1996. Total capital stock of economic sectors for the whole economy is estimated by method of growth accounting and international comparison on capital output ratio. The total capital stock is allocated to each of the five sectors by using the share data.

- System of equation of our model is presented in detail in Appendix 2.1, and its corresponding notation in appendix 2.2. The model is constructed on the basic of the 1996 input-output table, so that it is called CGE 96.

- System of equations introducing in our model relates to 5 markets: Labour market, 2) Asset Market, 3) Good market (five above composite markets), 4) Money market 5) Foreign exchange market. The model includes about 143 endogenous variables and 143 equations.

- In labour market of Vietnam, there is not equilibrium between demand for labour and supply of labour, or in other word, if there is adjustment of wages then total supply of labour is not in equilibrium with total demand for

labour. Therefore, the model is constructed basing on 2 approaches to get equilibrium:

First: Full employment but non-competitive in labour market, CGE 96-1.

That is in each of the four non-agricultural sectors, nominal wage *(Wi, i= 2-5)* is given exogenously as policy variable, and labours can move freely between sectors without changing wages of them. Demand for labour (L_i), in each sector is determined by wages (W_i) and total labour income (see eq.6 appendix 2.1.). However, input of agricultural labour (L_1) is the residual by the difference between total supply of labour *(LS)* and total non-agricultural demand for labour see eq. 7, appendix 2.1.).

Second: In contract to case 1 in model-non-competitive labour formulation, our CGE96-2 model can also allows for the case of competitive in non-agricultural labour markets. That is, labour can move freely between sectors outside of agriculture, the labour changes depending on average wage level of sectors non-agriculture (W_n). In our model, equations 6 and 7 are replaced by equations 6-1′, 6-2′, 7-1′, 7-2′. In this case, both total labour supply and agricultural labour input are given exogenously, so that total non-agriculture labours supply (L_n) also exogenous variables. Assume the ratio of wages in each sectors $(W_i/W_n = \lambda_i,\ i=2..5)$ and the average wage (W_n) to be constant (relative wages within non-agricultural are assumed to be constant), then the labour demand of non-agriculture labour market are measured in terms of efficiency units (L^e_i), $(L^e_i = \lambda_i * L_i)$.

In medium term and in the future for Vietnam, investment plays very important role in economic growth. At this point investment is critical. Because financing sources are fundamentally limited or in other words investment budget constraint. In this case our CGE model explores the Law of Walras (eq. (46), by which our model regards the balance between nominal savings

(domestic *S* and foreign *F*) and nominal investment *(I")* as the key equilibrium condition.

Assume, in capital market, there is non-competition between sectors, capital allocation share is considered as exogenous variable. In this case, in eq 48, θi (capital share by sector) is policy variable and $\mu = 0$ (competitive capital share) Or we assume ($\mu > 0$), there is competition capability (μ) depends on ratio (profit + depreciation)/ Ki), then capital flows will be more if there is high this ratio until is equal to average ratio for whole economy.

The last feature of the CGE 96 model is price system. Relative price of goods, expenditure, deflator ... equal 1 (numeraire) for benchmark of year 1996. Import price calculated by USD (PM$) is exogenous variable, price of year n_{+1} as relative in comparison with benchmark year as relative price in comparison with import price calculated by USD.

2.2. DATA BASE AND ASSUMPTIONS FOR SIMULATIONS

Data base for benchmark equilibrium year of 1996 can be divided by 6 groups:

i/ Data which reflecting Inter-branches presented by expenditure coefficient constructed from I/O 1996.

ii/ Gross output by sectors is withdrawn from I/O 1996 and statistics.

iii/ Current gross consumption is withdrawn from I/O 1996 and statistics.

iv/ Export - import data

v/ Price index

vi/ Other macroeconomic parameters.

More detail of each group is presented in appendix 3.

Based on constructed model, exogenous variables in table 1 used as input, we simulated for period 1996-2000 to test the adequate of the model.

Table 1. Assumptions for simulation in the past period 1996-2000

	1996	1997	1998	Average growth rate 96-98
Nominal investment (Billion dong)	79367	96870	96400	
Growth rate of nominal investment (%)	16.63	22.05	-0.49	12.18
Trade balance (Bill.dong, constant p. 94)	-20183	-17752	-17175	
Growth rate of trade balance (%)	12.90	-12.04	-3.25	-1.33
Average nominal income of labour in state sector (1000 dong per month)	543.2	642.1	655.2	
Growth rate of nominal income (%)	13.59	18.21	2.04	11.07
Labour force of economic activities as of annual 1-7 (1000 person)	35792	36994	36018[1]	
Growth rate of labour force (%)	3.48	3.36	-2.64	1.34
Structure of nominal investment by sectors	1995	1996	1997	96-97
Total (Per cent)		100	100	100
Agriculture, forestry and fishery (%)		7.21	7.31	7.27
Manufacturing (%)		17.55	16.77	17.12
Mining, quarrying and other industries (%)		20.24	19.35	19.75
Construction (%)		3.01	2.88	2.94
Services (%)		51.99	53.68	52.92

[1]Survey 1998

The results of simulation for period 1996-2000 in table 2 show that it is very close to the statistical data from 1996 to 1999 and target plan for the year 2000. So it is possible to use this model for simulating economic growth for period 2001-2010.

Table 2: Simulation result

1. Growth rate of gross output	Growth rate 1996-2000 (%)	
	Simulation	2000 (plan)
- Agriculture, forestry, fishery	3.33	3.46
- Manufacture industry	11.44	10.21
- Other industry	11.25	11.04
- Construction	5.57	6.56
- Services	5.34	5.21
2. Growth rate of GDP	6.66	6.21

- **Assumptions for period 2001-2010**

To evaluate possibility of capital investment for period 2001-2005 and 2006-2010 is one of needs to get data for simulation. Total capital investment is divided by domestic and foreign investment.

The foreign inflow includes mainly from FDI and ODA. In period 2001-2005, FDI is expected to attract about 11-22 billion USD, disbursement of ODA is expected about 9 billion USD. Therefore, annual can be attracted average 4-4.5 billion US dollar foreign investment. For period 2006-2010, that numbers are 16 and 9 billions US dollars respectively. So in this period, foreign investment growth rates account for 3.5-4.5%.

Domestic investment depends on domestic saving rate. If share of private and government saving is the same as in period 1996-1999, then domestic investment ratio accounts for around 17-18 % of GDP. Other assumptions are presented in table 3. So growth rate of nominal investment in period 2001-2010 is a bit lower than that in 1991-2000 and is expected about 10-15% annually. Beside that we assume that changes of scale of export also plays important role in simulation.

Table 3: assumption for simulation for period 2001-2010

	2001-2005	2006-2010
Growth rate of labour force	2.5	2.0
Growth rate of increase of nominal wage in non-agricultural sectors	5.0	5.0
Per cent of depreciation of capital stock	4.6	4.6
Growth rate of trade balance gap	2.0-3	2.0-5
Growth rate of nominal investment	10-15	10-15
10-40% investment allocated from 2001	Depends on ratio (profit + depreciation)/ capital stock	
60-90% investment allocated, depending on policy	100	100
- Agriculture, forestry, fishery	7.3	7.3
- Manufacture industry	16.8	16.8
- Other industry	19.4	19.4
- Construction	2.9	2.9
- Services	53.6	53.6

As export growth rate is estimated for period 2001-2010 by MPI about 11%. Analyzing export data and export price index for period 1990-1998 shows that increase of export due to expansion of export scale is annually about 10%[22].

[22] $E_t = 1.102*E_{t-1}*EPI^{1.33}$, where E_t is export turnover of year t; EPI is export price index

2.3. SOME DEVELOPMENT SCENARIO SIMULATIONS UP TO 2005 AND 2010

2.3.1. Simulation of investment impact on economic growth

We have attempted various simulations with assumption that growth rate of nominal investment changes from 5% to 20%. Growth rate of labour *(GLS)* is 2,5% in period 2001-2005 and about 2% for period 2006-2010. In the whole period 2001-2010, growth rate of wage in non-agricultural sectors *(GRL)* is about 5%, net foreign saving *(GF$)* increases 2% in 2001-2005 and 5% in 2006-2010, private saving and government *(DsP, DsG)* increase 2%. Direct expenditure coefficients increase 1% in non-construction sectors. Coefficients of CD functions change as following: Scale of agricultural production *(gA1)* increases by 2%, manufacture industry *(gA2)* and other industries *(gA3)* increases by 5%, constructions *(gA4)* does not increase, and service *(gA5)* increases by 6%. Agriculture export scale *(gE1)* increases 3%, manufacture industry (gE2) and other industry increase by 15%, constructions does not increase, and service increases by 5%.

Total capital investment is allocated as follows: 90% is allocated by plan (of which share of investment of agriculture accounts for 7,3%, manufacture industry accounts for 16,8%, other industry: 19,4%, constructions: 2,9%, service: 52,3%), the rest 10 % is allocated by profit share as indicated in (eq 48) appendix 2.1. The simulation results are depicted in figure 1.

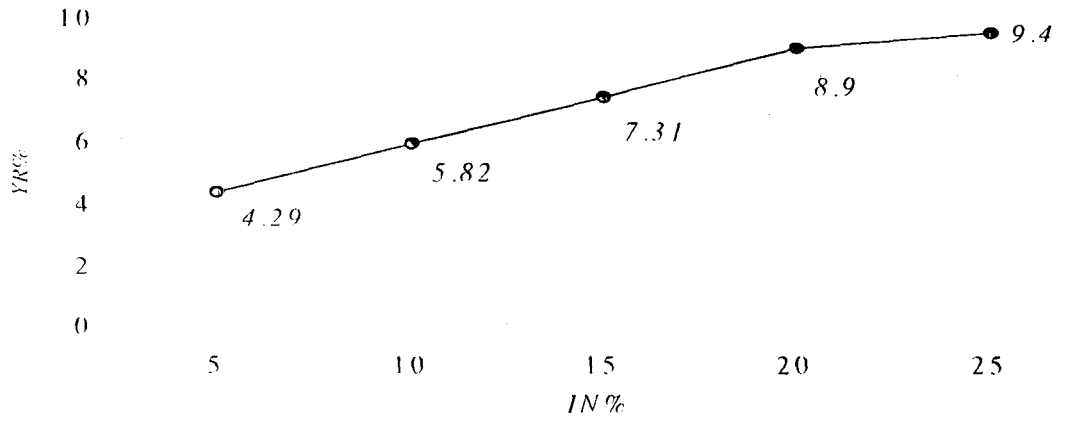

Figure 1. Nominal investment growth rate *(IN)* and GDP growth rate *(YR)*

As mention above, possible growth rate of nominal investment is 15% in coming period. So more detail the simulation with assumption that annually averages growth rate of nominal investment *(GIN)* by 15% is presented in table 4 bellow.

Table 4: Growth rate (%) for GIN=15%

	2001-2005	2006-2010	2001-2010
Gross output	7.33	7.30	7.31
- Agriculture, forestry, fishery	3.39	2.68	3.03
- Industry + Construction	9.19	8.10	8.69
- Manufacture industry	9.29	6.77	8.09
- Other industry	10.15	11.18	10.66
- Construction	6.91	11.35	9.11
- Services	6.14	7.96	7.05
Labour	2.5	2.00	2.25
- Agriculture, forestry, fishery	1.12	0.3	0.71
- Industry + Construction	8.27	8.13	8.20
- Manufacture industry	6.53	5.56	6.04
- Other industry	5.72	3.73	4.72
- Construction	14.5	14.5	14.5
- Services	2.38	0.42	1.04
GDP growth rate	7.13	7.16	7.14
GDP deflator	1.68	1.59	1.64
Labour income of agriculture (PL1)	13.05	11.14	12.00
Growth rate of exchange rate	3.88	7.16	5.51

Table 4 shows that: In period 2001-2005, 2006-2010 and 2001-2010 GDP growth rate is projected 7.13, 7.16 and 7.14%. GDP deflator is projected 4.13%. Labour in industry sectors *(ΣLdi, i =2-5)* may be increased by 8.2 % percent per year, this number for agriculture and service is 0.71 and 1.4%. Labour income of agriculture increases 12%, two-time higher than that one in industry and service sectors *(GRL = 5%)*, providing income redistribution between urban and rural areas. However, GDP growth rate attains mainly due to capital formation as exogenous variable. A part of assets, which is taken from

foreign source with average growth rate of net foreign inflow, is 3,49% in whole period, in which 2% in 2001-2005 and 5% in 2006-2010. Capital inflow will come in because of depreciation of VND in term of US$. An average growth of depreciation of exchange rate is about 5.51%.

So, based on simulation of the above simulation we can see if the annual average growth rate of nominal investment 15% and there is non-competition in labour market, 10% of competitive capital investment then GDP growth rate can reach about 7%. Growth rate of labour is rather high, about 2.3% for whole period. This simulation results into improvement in redistribution income between urban and rural areas.

2.3.2. Simulation the impact of competitive labour market

At present, Vietnam has some advantages in labour force. So that to analyze the impact of labour on economic growth is very important. More detail is below.

This simulation assumes labour in agriculture (LD_i) and labour supply (LS) are exogenous variables, so labour in non-agricultural is also are exogenous variable $(LS_n = \Sigma LD_i = LS - LD_1, i = 2\text{-}5)$, at the same time average wage $(W_n = RLN/L^S_n)$ in industry, construction and service sectors is adjusted to equilibrium condition and equations (6) and (7) are replaced by equations (6-1)' to (7-2)'. If other assumptions are hold the same as in (a) simulation, we have simulation results as following (see table 5).

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used. As a result growth of gross production output and GDP (with $\mu = 40\%$) will be higher 1,16% than in the case $\mu = 10\%$.

2.4. ANALYSING OF SIMULATION RESULTS, AND BASE SIMULATION

As mentioned above, the investment and labour may be use more efficiently in the context of competition, so in case that with the same growth rate of nominal investment (15% per year) results additional GDP- growth rate approximately 1%.

We have attempted varieties of dynamic simulations to combine the share of competitive investment and growth rate of nominal investment. In the case growth rate of nominal investment equals to 13%, the growth rate of GDP is as bellow.

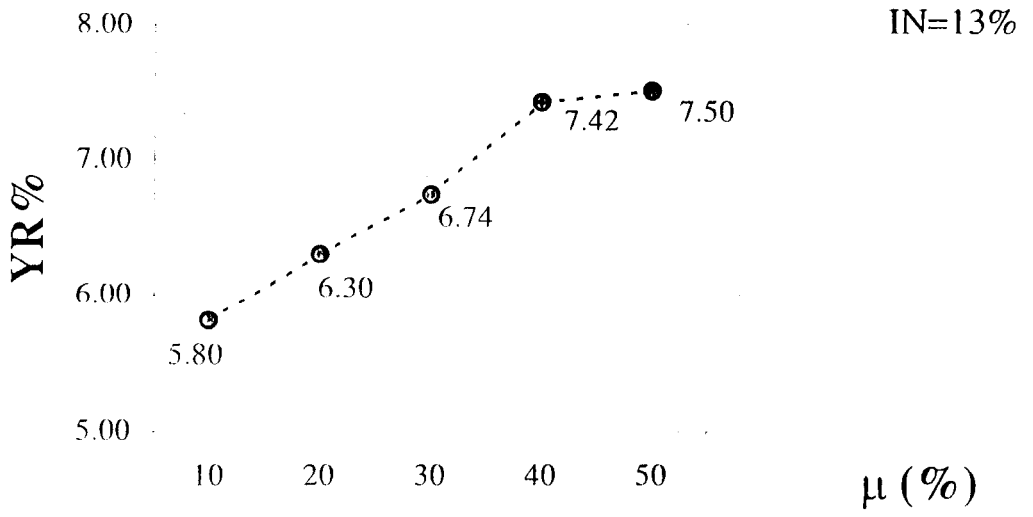

Figure 3. Impact of competitive capital on GDP growth

The results show that if competitive investment equal to 40% (μ) and growth rate of nominal investment equal to 13% (*GIN*), then the growth rate of GDP lightly decreased in compared with 15% growth rate of nominal investment simulation, (see figure 3 and table 6). Base on really growth rate of nominal investment equals to about 12% in period 1996-2000, so this simulation is called the **base simulation** with 13% growth rate of nominal investment and 40% of competitive capital.

Table 6. Growth rate of some indicators

Unit: Per cent

	Period		
	2001-2005	2006-2010	2001-2010
Total of gross output	**7.33**	**8.17**	**7.75**
- Agriculture, forestry and fishing	4.49	4.23	4.36
- Manufacture and Construction	8.96	9.94	9.45
- Manufacturing	9.13	9.69	9.41
- Mining, quarrying and others	9.95	11.11	10.53
- Construction	6.04	9.53	7.77
- Services	6.16	6.75	6.45
Growth rate of labour of economic activities	**2.50**	**2.43**	**2.47**
- Agriculture, forestry and fishing	-0.57	-0.09	-0.33
- Manufacture and Construction	8.47	3.38	5.89
- Manufacturing	7.92	2.45	5.15
- Mining, quarrying and others	9.4	7.9	8.65
- Construction	10	4.45	7.19
- Services	7.56	7.3	7.43
GDP growth rate	**7.27**	**7.58**	**7.42**

So from this result we can conclude that if labour and asset are used more efficient (in competitive condition), then the growth rate of GDP around 7% in period 2001-2010, can be attained with lower growth rate of nominal investment (approximately 13%).

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PART III

ASSESSMENT OF THE POTENTIAL ECONOMIC GROWTH OF VIETNAM IN THE PERIOD 2001 - 2020 BY SUPPLY SIDE MODEL

INTRODUCTION

As in numerous developing countries, the assessment of the potential economic growth in the future is great important that provide Vietnam a basic ground for elaborating a socio - economical strategy of the country on the basic of optimal allocation of resources. One of tools for analysis and assessment is the Supply Side Model. These growth models are appropriate with conditions of data collection of developing countries as Vietnam. In following parts, we shall deal with the nature of the model and some results of simulation from Supply Side Model of Dr. Takaski Omori (Professor, Osaka University). That was constructed (in November 1996) in co-operation with researchers at Development Strategy Institute. The data for the model are based on the 1996 I/O Table that was published by the General Statistical Office at the end of 1999. Other data of labor and capital published for base-year 1996 in the model are in general acceptable.

Results of simulation should be considered under viewpoint of "potential" or "reasonable expectation" not under aspect of "balance". In principle, we may examine some different comparable scenarios.

This part consists of three sections that present the nature and structure of the model as well the results of simulation for the economic growth of Vietnam in the period 2001 - 2020.

3.1 NATURE OF THE MODEL

3.1.1. Growth Model

The supply side model here is from of non-linear dynamical planning. The scope of study of the model is not only for the whole national economy but also for industrial sectors. We consider here 5 sectors:

1. Agriculture (including agriculture, forestry and fishery)
2. Manufacture industry
3. Non-manufacture industry
4. Construction
5. Services

The above sectors have been selected starting from the need of the model with.

The following form:

The objective function is the LES-CD function,

$$TW = (C_1 - \beta_1)^{\alpha 1} . (C_2 - \beta_2)^{\alpha 2} ... (C_5 - \beta_5)^{\alpha 5} \Rightarrow Max$$

where $1 > \alpha_i > 0$ and $\beta_i \geq 0$; $i = 1...5$

which satisfies 6 constraints in the from of equations and in-equalities exhibiting the mutual relationship between macro-economic indicators based on the Figure 1 (Appendix III).

1- Supply - Demand Balance

2- Capital Stock

3- Gross Output (production function)

4- Import - Export for each goods and Trade Balance

5- Identities:

- Investment Commodity

- Consumption

- Investment

6- Foreign assets and terminal conditions.

Endogenous variables are the ones determined in the model presenting main economic indicators as consumption, accumulation, investment, export, import, GDP and gross output of each sector...

Exogenous variables are the ones given from outside of the model.

Lists of variables and equations are given in Appendix III.

Thanks to the development of computing technology, it is possible to modify the model in the following ways and its solution is not difficult:

A: Production function can accommodate the substitutability among production factors instead of the traditional matrix of Leotief-type.

B: Utility function can accommodate substitutability among different goods and services, as well as the difference in income elasticity.

C: Assuming the terms of trade, the model can analyze the development of dynamic comparative advantage.

D: By following for the external deficit/surplus, the model can analyze the dynamic path of net foreign assets.

3.1.2. Dynamic consistency

The distinct feature of the model is that the growth path it calculates is dynamically consistent. This is because the model calculates variables of all periods at one. Investments are determined, not based on what happened in the past, but based on the assumed future conditions on technology, preference and terms of trade. Thus, it is a model of "rational expectation" or

"perfect foresight". Changes in the future exogenous variables can affect present endogenous variables. Such dynamic consistency makes the model a suitable tool for economic planning, as any plan that lacks dynamic consistency does not deserve the name of "plan".

3.1.3. An implication of optimal growth model for market economy

One of important suppositions constructing of the optimal growth model is that the market economy is described as a perfect competition. However, in fact, assumptions of the perfect competition is not guaranteed. Thus, interpretation of model results shows growth potentials and relative degrees of growth constrains.

3.1.4. Difficulties with optimal growth model

The above discussed nature of the model reveals some difficulties as the following:

A: As variables of different time- periods are inter- dependent, the computation burden of the model is much larger than that of models calculated in each period. Moreover, the bigger the number of sectors is, the larger and the harder the model becomes.

B: It is difficult to put up constrained conditions while avoid subjective abtrariness. A way to get rid of the difficulty is that through some solution of the model to find out a balance. However, this would deprive us analysis of other important issues such as: economic development, change of sectoral structure. Thus, assumptions of balanced development would not be referred to. Beside, consideration of growth potential of 10 - 20 years needs a predict of a minimum term of 30 - 40 years. This is to reject or reduce impact of around constrains. Additionally, to get an easy solution for the model, a calculated period of 2.5 years would be set up instead of 1 year to the model.

3.2. STRUCTURE OF THE MODEL

3.2.1. Utility function

The objective function is based on utility of the people, which is defined on the consumption of goods and services. In order to allow for differences in income and price elasticitles, the linear expenditure system is assumed.

3.2.2. Intermediate and investment demand

Production, investment and intermediate inputs are all determined endogenously so that resources are optimally used from the viewpoint of the above objective function. Factor substitutability is assumed between labor and capital, but not among intermediate inputs. As a long-term model, inventory investment is not separated but included in vestment.

3.2.3. Industry and trade structure based on comparative advantage

With the terms of trade, which is virtually exogenous as the ratio between exports and imports price, the model calculates comparative advantage not only for each period but also in a dynamic context. The model first calculates sectoral net exports as the key variable, and then decompose it into exports and imports, with exogenous assumed pace of future import penetration.

3.2.4. Dynamic determination of external account as an option

As for the determination of the current account surplus/deficit, the model has two options. In option one, permissible current account deficit is exogenously set as a ratio to GDP. Option two relaxes such period by period constraints and set a terminal condition for net financial liability. In the

latter, the current account is determined by a comparison between the domestic rate of return and rate of return on foreign assets.

3.2.5. Nominal Variables Based on dual

Although the model does not have nominal variables, the dual variables can be interpreted to indicate relative prices. Thus one can estimate of future nominal variables, given an assumption on overall rate inflation.

3.2.6. Software

The model is solved by "CONOPT" of the "GAMS". Variables and equation list are attached in the Appendix III, The size of a standard version of the model (with option one) is about 800 rows, 900 columns and 3000 non-zero variables. It takes about two to five minutes turn-around time in a Pentium machine to get solution.

3.3. SIMULATION FOR THE 2001-2010 PERIOD

The base year of the model is 1996. Therefore, the results of simulation for the period 1996 - 2000 are compared with real data. This will help for the determination of trends of variables. The main policy variables used for simulation are the rate of decrease of labor costs in production and the rate of increase in labor for each sector.

3.3.1. Variable of simulation

This Supply Side Model, in general, enables us to simulate various hypothetic systems (scenarios) in future. However, in the following basic scenario, emphases will be on increasing speed of technical progress in labour input, labour growth rate in every sector, and net export absolute upperbound level.

Due to simulation parameters take part in constraints of optimal non-linear programming, their influence is really whole sense. Increasing speed

of technical progress of labour input TL (I) results in raise of labour effective EFL (T, I) in each related sector. This impacts on the supply - demand constraints, thereby it changes results of demands and supply of each sector and the whole economy.

Yearly, the given ceiling of increasing labour ratio in each sector, it makes the process of labour mobilization between different sectors unliberal. This rate is determined by labour increase of sectors in the past and will be forecasted in coming time. For it is just a ceiling of increasing labour ratio, its definition is not too difficult and may be very near to the fact.

Similarly, the ceiling of net export increase may be determined by real import - export situation in Vietnam, experiences from similar countries in the region, and commercial prospect to Vietnam in future. Since it is also the ceiling of increase, definition of reasonable level is not too difficult.

It is possible to construct so many different scenarios, however, as mentioned, because of the nature of model is not to predict but it is to assess potentiality, and set forth an "expected scenario", it is necessary to choose only some of them for consideration. Based on these and other approaches, it is possible to offer reasonable economic development scenarios of Vietnam in the period 2001-2010. Such scenarios will be referred in Part IV.

The chosen optimal solution of the Supply Side model as follows is seen as the basis scenario to analyze development potentials of Vietnam in 2001-2010.

3.3.2. Input data of model

* The I/O Table: This is the most important data part of the Supply Side model. The simulation model below uses the I/O Table of 97 sectors in 1996 which was released in the last 1999 and adjusted by GSO on shortcomings found after its issue. The model uses the I/O Table with 5

sectors: agriculture, manufacture, non manufacture, construction, and services.

* ***Matrix of technical coefficient***:

	Agriculture	Manufacture	Non-Manufacture	Construction	Services
Agriculture	0.1064	0.2560	0.0035	0.0035	0.0337
Manufacture	0.1458	0.3266	0.1939	0.4295	0.1657
Non- Manufacture	0.0233	0.0546	0.1242	0.1090	0.0543
Construction	0.0017	0.0002	0.0044	0.0000	0.0012
Services	0.0436	0.1187	0.1388	0.1241	0.1549

* ***Fixed capital assets***: so far, there are not any official data assessing fixed capital assets of the whole national economy and its divided structure. According to the Financial Ministry's data (October 10, 1994), estimated number of fixed capital assets of 1995 is VND 150,000 billion. This number is based on the general inventory of fixed capital assets of state - owned enterprises in 1990 and that of non state - owned enterprises in 1995, all are, in general, too low, and do not really reflect the fact.

Based on the SNA data in 1989 which was estimated by Japanese professors, the number of fixed capital assets of 1999 was VND 148,200 billion. Given these data and others of the 1996 investment and depreciation of fixed capital, the 1996 estimated number of fixed capital assets was VND 679,500 billion. Together with other experts we can estimate the structure of fixed capital assets distribution for 5 sectors and capital matrix divided for these sectors as follows:

	Agriculture	Manufacture	Non-Manufacture	Construction	Services
Agriculture	0	0	0	0	0
Manufacture	9.54	30.61	11.78	6.31	18.26
Non- Manufacture	4.49	17.22	17.67	7.72	11.19
Construction	41.52	151.64	89.78	37.59	168.47
Services	5.61	19.22	9.82	4.21	16.83

* ***Initial Parameters***:

Parameters	Agricul-ture	Manu-facture	Non-Manu-facture	Construc-tion	Services
Initial labor by industry - L0	24.15	3.29	0.987	0.975	6.39
Rate of technical progress of labor input - TL	0.98	0.97	0.98	0.95	0.89
Rate of technical progress of capital - TC	1	1	1	1	1
Upperbound of annual rate of increase in labor - LG	2	1.07	1.07	1.07	1.14
Rate of increase in world price - GPW	1	1	1	1	1
Initial production - A0	118.7	187.7	42.7	33.8	167.5
Initial exports - E0	15.01	46.03	19.51	0.00	26.50
Initial imports - M0	10.60	109.34	14.07	0.00	15.32
Net export upperbound increase - GNE	1.03	1.05	1.06	1	1.08
Initial investment by commodity - Z0	1.56	35.87	0.96	33.20	4.86
Capital stock period1 - K11	81.5	277.2	163.1	73.4	220.1
Initial consumption - C0	46.13	85.95	5.21	0.00	87.94

Parameters	Agricul-ture	Manu-facture	Non-Manu-facture	Construc-tion	Services
Involuntary consumption - CQ	35.22	61.88	2.08	0.00	71.11
One minus depreciation by capital commodity - ETA	1.308	1.104	1.256	0.720	1.002
Import share ceiling - MC	3	2.5	2	1	2
Import share speed - MS	2.5	4.5	4	1	3
Cesproduction function param sigma - SIG	0.5	0.5	0.5	0.5	0.5
Share parameter for capital - SHR	0.055	0.347	0.542	0.313	0.280

* ***Simulated results***: according to the above assumptions, the Supply Side model gives us the following results:

Table 1: GDP growth rate and components

Unit:%

Period	GDP	Consumption	Investment	Export	Import
1996-2000	10.2	7.26	6.9	26.3	17.6
2001-2005	7.0	6.46	9.5	12.1	11.6
2006-2010	7.4	6.24	7.5	11.5	11.1

It is seen that the GDP increase of the 1996 - 2000 period is much higher than the fact (so far, in reality, the GDP increase is calculated as 6,8%). Similarly, the GDP by industry growth rate is also higher. This is easily to understood since the model elaborating "potentiality" of this period

comes from the "potentiality" that formed in "1996" and it is impossible to reflect the "Financial Crisis of Asia" in 1997. Although, as the above mentioned analyses, the Supply Side Model simulates for the long term of 1996-2020, these partial errors should be considered as a background to regulate the next period, that is, GDP growth rate of the next period will be possibly lower than that of this scenario.

Table 2: GDP by industry growth rate

Period	GDP	GDP by Industry				
		Agriculture	Manu-facture	Non- Manu-facture	Construc-tion	Services
1996-2000	10.2	7.1	14.2	10.4	7.8	11.1
2001-2005	7.0	5.31	6.26	8.82	9.89	7.54
2006-1010	7.4	5.66	6.00	9.49	7.52	8.27

For the economic structure: The GDP by industry structure is rather reasonable, appropriate with other analyses (notably, the structure here is estimated at the 1996 constant price).

Actually, in 2000, agriculture will reach 27%, manufacture 18%, non manufacture 10%, construction 4%, and services 41%. Forward the year of 2010 the economic structure will be:

	Agriculture	Manufacture	Non-Manufacture	Construction	Services
1996	30.2	14.7	9.9	4.3	40.9
2000	26.1	17.5	10	3.9	42.5
2005	24.2	16.9	10.9	4.4	43.6
2010	22.3	15.9	12	4.5	45.1

Investment, consumption, export, import by GDP share as follows:

Period	ZTT/GDP	C/GDP	E/GDP	M/GDP	(E-M)/GDP
1996	20.70	0.98	30.6	49.0	-0.18
2000	17.75	0.90	60.3	67.8	-0.12
2005	19.92	0.88	76.2	83.7	-0.17
2010	19.98	0.88	91.8	99.3	-0.24

3.4 CONCLUSION

1. The above scenario could be considered as "Reasonable expectation". Some of factors on external capital and technical progress have not been fully considered.

2. However, with economic potential exhibiting in input data, the model indicates that in the period 2001 - 2010, it is difficult to achieve a high growth rate as in the period 1991 - 2000. To achieve a growth rate as in the scenario, the efficiency of capital utilization must be even very high.

3. Conclusions derived from the model must be considered as only suggestions because it does not take into account uncertain factors that may be occur in reality. The integration of this model with other methods that will be conducted in order to establish development alternatives for the economy of Vietnam in the period 2001 - 2010 will be presented in the Part IV of this report.

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PART IV

MACRO ECONOMIC FRAMEWORK IN 2001 - 2010

In this part, based on studying results of structure and the transference of economic structure (Part I), simulated result from the CGE model (Part II), and Supply Side Model (Part III) and from other approaches (Approaches of target, growth factor accounting, system analysis and development branches capacity) in [1], we will sketch main features of the framework in the period 2001 - 2010. Here, the main contents are development alternatives which are selected to be considered. The most distinguished features may be drawn from obtained results are that under different preconditions, yearly average increase of GDP of the period 2001 - 2020 would oscillate for a fairly large scale depending in internal forces and international background.

Generally, Part I show that after years of renovation, roles and positions of economic sectors have deeply changed, especially the sectors of manufacture and services. For these, their qualities of commodities have clearly changed to meet requirement of higher quality of markets at home and abroad, and this proves technological progress has considerable changes in the past years and these will still develop their influences in coming years.

Based on the CGE model, in Part II simulation of various suppositions of capital and labour market are set forth, however, as above analyses, the most remarkable scenario is that: if increasing investment 13%, labour 2.5% per year, in the entire period 2001 - 2010, increase of export will be 11.6%, and increase of GDP 7.42% per year on average.

Different from simulations of the model CGE, in Part III, consideration of potentials for economic developments is much emphasized on the Supply Side Model. This model shows that, with simulated assumptions in Part III on the basis of economic potentials which shaped in 1996 through its input data, average GDP growth of period 2001 - 2010 will be around 7.2% of which increase of consumption is 6.35%, of investment 8.5%, of export 11.8%, and of import 11.3%. Elaborately GDP increase of the period 2001 - 2005 will be 7%, correlatively, increase of agriculture

5.3%, of manufacture 6.26%, of non - manufacture 9.49%, of construction 9.89%, and services 7.45%; in the period 2006 - 2010, GDP increase will be 7.4%, correlatively, increase of sector are as follow: agriculture 5.66%, manufacture 6%, non - manufacture 9.49%, construction 7.52%, and services 8.27%. The simulated results exhibit that effective of capital and labour uses in this scenario are fairly high, therefore, it is uneasy to reach them.

Calculated results of types of above models are basically dynamic consistence, at the same time, a background shaping the macro - economic framework below.

Following factors are active to speed up high increases of the country.

1/ The reality of ten correctness of the "Doi Moi" policy, which has been advocated by the Communist Party of Vietnam. The continuation of the "Doi Moi" policy in detail will be an important precondition for the development of our country in coming decades.

2/ Considering manufacturing factors, would be realized that, the factor which highly promoted the growth in the period 1991 - 1997 is invested capital. The factor of labor (without skillfulness) mainly contributed in agriculture and service sectors. Technological function in the development isn't yet high, if there is a correct policy in investment to raise this function, it would be an active factor to impact high development in coming decades.

3/ Potentiality of services sector, especially services for production is very large.

4/ To create mutual assistance between different economic sectors.

4.1. SUSTAINABLE DEVELOPMENT SCENARIO WITH HIGH FEASIBILITY

This scenario (being called basic scenario) has been designed in line with the supposition that in the year of 2000, the influence of regional economic crisis would be reduced in the country, in the initial stage 2005, internal forces will be well developed, and international background developed in average scale, the implementation of AFTA agreements in 2006 will reduce the development scale till 2010. Subject to the good

transference of investment structure, so in the period to 2020 the capital effective will increase. Correlative main macro economic indicators will be:

	2000	*2005*	*2010*	*2020*
GDP Growth rate (%)	**6.8**	**7.2**	**7.0**	**8**
- Agriculture	3.4	3.6	3.3	3.2
-Industry and construction	11.1	10	9.0	9.5
- Services	5.6	6.5	6.6	7.8
	2000	*2005*	*2010*	*2020*
GDP (Bill. VND at constant prices 1994)	272765	385532	540729	1167393
- Agriculture	60901	75123	88364	121080
--Industry and construction	99127	156155	240264	595430
- Services	112837	154254	212100	450883
	2000	*2005*	*2010*	*2020*
Structure of GDP (%)	100	100	100	100
- Agriculture	24.9	21.0	17.3	10.3
- Industry and Construction	33.3	36.9	39.6	43.8
- Services	41.8	42.1	43.2	45.9
Population (Mill. people)	77,9	83,3	88,6	97,7
Exchange rate (VND/USD)	15000	17500	19000	22000
GDP per capita (USD)	400	620	1030	3170
Hypothesis				
	2000	*2005*	*2010*	*2020*
Domestic investment by GDP ratio (%)	17	18	19,5	24
	96-2000	*2001-2005*	*2006-2010*	*2011-2020*
ICOR		4	4	3.6
Inflation (%)		6.8	6.5	6.2
Population increasing (%)		1.3	1.2	1

Advantages of this scenario may be realized by following points:

To double GDP for a 10 years duration, it needs an average growth rate around 7,2% for the period 2001 - 2010. The preconditions for the above said growth rate are fairly real, especially in the initial period of 2001 - 2005, including:

1/ FDI is around USD 10 - 12 billion in the period of 2001 - 2005 and USD 14 - 16 in the period of 2000 - 2010.

2/ ODA is around USD 9 billion for each five years plan

3/ Maintaining the ICOR stable in 4th level, this would be realized by following reasons: The incremental capital output ratio (ICOR) in foreign invested sector is in decreasing tendency:

- 1996: 5.82
- 1997: 5.13
- 1998: 3.94

While GDP share of the FDI sector in GDP of the whole country is in increasing tendency:

- 1995: 6.3%
- 1996: 7.39%
- 1997: 9.07%
- 1998: 10.12%.

4/ To increase domestic investment capital by GDP ratio from around 17% in 2000 to 18% in 2005 and 19.5% in 2010.

5/ To maintain the double development of the national economy for 10 years, it needs the average development of Agriculture around 3.3 - 3.6%, Industry and Construction 9 - 10%, Services around 6.5 - 6.6%. The above mentioned growth rate is not high in comparison with the period of 1991 - 1996 and in general, some countries attained this scale in the process of development.

6/ With averagely annual inflation rate of around 6.5% in the period of 2001 - 2010, the economic structure of 2010 will be the following:

GDP:	100
Agriculture:	17.3
Industry and Construction:	39.6
Services:	43.2

This structure forward 2010 would be rational, if compared with the past data of the neighbouring countries having development as the same as that of our country (Agriculture around 17%, Industry and Construction 40%, Services 43%).

7/ Really, the double development of GDP for 10 years with which some neighbouring countries attained in the past time.

8/ In the case of labor productivity (as GDP / laborer) has still maintained as the 1991 - 1997 period of 5.41% average yearly, the development of GDP would be attained 6.9 - 7.4%.(5.41 + 1.5; 5.41+2, employement in the national economy increases 1.5 - 2% per year according to the rate of education, training).

4.2. CEILING OF GROWTH

This alternative (called comparative alternative), supposes in the period 2001 - 2005, both factors: internal and international being very favorable (the increase of fixed capital around 8% / year, additionally 2.5% labor per year and contribution of sciences and technology progress (including elements of the "Doi Moi" of policies and managerial methods) around 2% to the GDP growth rate. The participation in AFTA would decrease the GDP growth for the period of 2006 - 2010; and by well preparing since 2011, a effectively economic structure would be determined. Profound corrective indicators to the scenario are as follows.

	96-2000	*2001-2005*	*2006-2010*	*2011-2020*
GDP growth rate (%)	**6.8**	**8.0**	**7.5**	**9**
- Agriculture	3.4	4.0	3.5	3.2
- Industry and construction	11.1	10.5	9.5	10.5
- Services	5.6	7.8	7.2	9.1
	2000	*2005*	*2010*	*2020*
GDP (Bill. VND at constant prices 94)	272765	400134	5574444	1359918
- Agriculture	60901	76584	90958	124635
- Industry and Construction	99127	159737	251464	682493
- Services	112837	163813	232022	552790
	2000	*2005*	*2010*	*2020*
Structure of GDP (%)	100	100	100	100
- Agriculture	24.9	20.6	16.7	9.0
- Industry and Construction	33.3	36.3	38.9	42.9
- Services	41.8	43.1	44.4	48.1
Population (Mill. people)	77.9	83.3	88.6	97.7

	96-2000	*2001-2005*	*2006-2010*	*2011-2020*
Exchange rate (VND/USD)	15000	17500	19000	22000
GDP per capita (USD)	400	644	1095	3712
Hypothesis				
	2000	*2005*	*2010*	*2020*
Domestic investment by GDP ratio (%)	17	18	19,5	24
	96-2000	*2001-2005*	*2006-2010*	*2011-2020*
ICOR		3.6	3.7	3.1
Inflation (%)		6.8	6.5	6.2
Population increasing (%)		1.3	1.2	1

Although, for the coming decade, especially in the initial quingneral 2001 - 2005, this alternative is difficult to be realized for the following reasons:

1/ Expected FDI and ODA are difficult to increase. However, if FDI raises to 1.5 time, the average development only reaches 7.8% per year.

2/ ICOR is difficult to be decrease under 4 in middle term due to the modification of investment structure demands longer time, in addition, the State only effects to around 60% investing capital of the society (data of 1999).

3/ In the period 2001 - 2010 the State continue to invest in infra-structure (for example, Ho Chi Minh National Highway, overcoming of floods, inundations in the Central Region of the Country, ...), the sector where capital is slowly re-established. ICOR in this sector is very high, data of 1997 showed that the ICOR co-efficient of economic sectors are as the following:

The whole of the national economy: 4.2

Agriculture, forestry and fishery: 2.4

Industry and Construction: 3.2

Services (including infra-structure): 6.0

Only investment in infrastructure of transportation, post and communication, of which indices got 13 in 1995 and have speeded up in the

period 1996 - 2000 (in 2000, these indices expected around 30). The investment of capital in the sector of which ICOR is high will slow down the growth rate of the whole of national economy.

4.3. NATIONAL ECONOMIC GROWTH IN UNFAVORABLE CONDITIONS

In unfavorable environment, internal factors aren't mobilized, preparation to integrate isn't in time, investment is in unrational use, the ability of development in the period 2001 - 2010 would be lower than 6% of yearly average.

By observing of neighbouring countries data, it would be realized that ICOR is fairly high although these countries have previously developed than our country:

	ICOR	Period
Taiwan	3.67	1991 - 1997
Korea	5.38	1990 - 1997
Indonesia	4.06	1998 - 1997
Thailand	6.14	1991 - 1997
Philippines	6.30	1991 - 1997

If ICOR increase to 4.6 - 5.2 in the period 2001 - 2010 with the same FDI and ODA, and domestic investment by GDP ratio as in basic scenario, the average growth rate of the whole of period will be decreased under 6% per year.

	96-2000	*2001-2005*	*2006-2010*	*2011-2020*
GDP growth rate(%)	**6.8**	**6.1**	**5.5**	**7.2**
- Agriculture	3.4	3.2	2.5	3
- Industry and Construction	11.1	9	8.1	8.7
- Services	5.6	5.0	4.1	6.9
	2000	*2005*	*2010*	*2020*
GDP (Bill. VND at constant prices 1994)	272765	366254	478548	959121
- Agriculture	60901	73684	83367	109881
- Industry and Construction	99127	149185	220219	507166
- Services	112837	143285	174963	342075

	2000	*2005*	*2010*	*2020*
Structure of GDP (%)	100	100	100	100
- Agriculture	24.9	21.7	18.5	11.7
- Industry and Construction	33.3	37.1	41.2	45.8
- Services	41.8	41.2	40.4	42.5
Population (Mill. people)	77.9	83.3	88.6	97.7
Exchange rate (VND/USD)	15000	17500	19000	22000
GDP per capita (USD)	400	589	907	2582
Hypothesis				
	2000	*2005*	*2010*	*2020*
Domestic investment by GDP ratio(%)	17	18	19,5	24
	96-2000	*2001-2005*	*2006-2010*	*2011-2020*
ICOR		4.6	5.2	4.2
Inflation (%)		6.8	6.5	6.2
Population increasing (%)		1.3	1.2	1.0

4.4- OTHER ALTERNATIVES

Basic Scenario:

If:

- FDI from 1750 USD mill. (In 2000) to 3500 USD mill. (In 2010)
- ODA from 1759 USD mill. (In 2000) to 2000 USD mill. (In 2010)
- The ratio of domestic investment capital by GDP (Domestic investment ratio) range from 17% in 2000 to 19.5% in 2010
- ICOR = 4 for period 2001-2010

Then:

GDP growth rate (GDP-GR) as follows:

Period	*2001-2005*	*2006-2010*	*2011-2020*
GDP- GR(%)	**7.2**	**7.0**	**8**

+ *Simulation 1*

(Basic Scenario with new assumption on FDI)

FDI per year	GDP-GR 2001-2005	GDP-GR 2006-2010
500 (Mill. USD)	6.1	6.0
1000	6.4	6.2
1500	6.8	6.4
2000	7.1	6.6

+ ***Simulation 2***

(Basic Scenario with new assumption on ODA)

ODA per year	GDP-GR 2001-2005	GDP-GR 2006-2010
1000 (Mill. USD)	6.6	6.6
1200	6.8	6.7
1400	6.9	6.8
1600	7.1	6.9
1800	7.2	7.0

+ ***Simulation 3***

(Basic Scenario with new assumption on ICOR)

ICOR	GDP-GR 2001-2005	GDP-GR 2006-2010
4.0	7.2	7.0
5.6	5.1	5.3
6.0	4.8	5.0
6.5	4.5	4.6
7.0	4.1	4.3

+ ***Simulation 4***

If:

- The ratio of domestic saving by GDP (domestic saving ratio): 20%, 25%, 30% and 35% in 2010
- TFP = 1.0 / 1.5 / 2.0 in the period 2001-2010
- FDI from USD 500 million in 2000 to USD 1500 million in 2010
- ODA from USD 1000 million in 2000 to USD 1500 million in 2010
- ICOR = 5 in the period 2001-2010.

Then:

Average annual GDP growth rate in the period 2001-2010 as follows:

Domestic Savings Ratio	TFP=1	TFP=1.5	TFP=2
20	4.6	5.1	5.6
25	4.9	5.4	5.9
30	5.2	5.7	6.2
35	5.4	5.9	6.4

+ *Simulation 5*

If:

- Domestic savings ratio (DSR): 20%, 25%, 30% and 35% in 2010

  DSR= 20% / 25%/ 30%/ 35% in the period 2011-2020

- TFP = 1.0 / 1.5 / 2.0 in period 2001-2020

- FDI from USD 500 million in 2000 to USD 1500 million in 2010

  FDI = USD 1500 million every year from 2011-2020

- ODA from USD 1000 million in 2000 to USD 1500 million in 2010

  ODA = USD 1500 million every year from 2011-2020

- ICOR = 5 in the period 2001-2020.

Then:

Average annual GDP growth rate in the period 2001-2020 as follows:

Domestic Savings Ratio (%)	TFP=1	TFP=1.5	TFP=2
20	4.4	4.9	5.4
25	4.8	5.3	5.8
30	5.2	5.7	6.2
35	5.6	6.1	6.6

APPENDIX I

Appendix 1.1

CLASSIFICATION IN 1989 INPUT-OUTPUT TABLES

1. Electricity
2. Coal
3. Mineral mining
4. Other mining
5. Manufacture of ferrous metals
6. Manufacture of non ferrous metals
7. Equipment, machinary
8. Electrical and electronic products
9. Other metalic products
10. Chemical products
11. Fertilizer, insecticide
12. Rubber, rubber products
13. Soap and cleaning materials
14. Pharmaceuticals
15. Plastic, plastic products
16. Other chemical products
17. Cement
18. Bricks, tiles
19. Other construction materials
20. Wood processing, wood products
21. Paper, paper products
22. Ceramics, glass, porcelain
23. Milling and grain products
24. Fishing
25. Sugar
26. Vegetable, fruit canning
27. Tea, coffee processing
28. Tobacco, cigarettes
29. Aquatic, products
30. Alcoholic, other beverages
31. Other food stuff
32. Manufacture of textiles
33. Carpets and rugs
34. Leather, footwear, bleaching, dyeing of fabrics
35. Water
36. Other industry
37. Agriculture (except 38)
38. Animal husbandry
39. Forestry
40. Construction
41. Freight transport

42. Passenger transport
43. Communication
44. Trade
45. Restaurants
46. Material supply
47. Other materials
48. Finance, insurance
49. Public administration, defence
50. Science, reseach
51. Culture, health, education, sport
52. Dwellings, other per.services
53. Personnal repairs
54. Other non-profit services
55. Petroleum, natural gas

CLASSIFICATION IN 1996 INPUT-OUTPUT TABLES

1. Paddy (all kinds)
2. Raw rubber
3. Coffee beans
4. Sugarcane
5. Other crops, n.e.c
6. Pig
7. Poultry
8. Other livestock and poultry, n.e.c
9. Irrigation services
10. Other agriculture services
11. Forestry
12. Fishery
13. Coal
14. Uranium and thorium
15. Metallic ore
16. Stone and other non-metallic minerals
17. Crude oil, natural gas (except exploration)
18. Processed, preserved meat and by-products
19. Processed vegetable and animals oils and fats
20. Milk, butter and other dairy products
21. Cakes, jams, candy, coca, chocolate products
22. Processed and preserved fruits and vegetables
23. Alcohol, beer and liquors
24. Non-alcohol water and soft drinks

25. Sugar, refined
26. Coffee, processed
27. Tea, processed (all kinds)
28. Cigarettes and other tobacco products
29. Processed seafood and by- products
30. Other manufactures, n.e.c.
31. Glass and glass products
32. Ceramics and by- products
33. Paper pulp and paper products and by- products
34. Processed wood and wood products
35. Cement
36. Bricks, tiles (all kinds)
37. Concrete, mortar and other cement products
38. Other building materials
39. Basic organic chemicals
40. Basic inorganic chemicals
41. Fertilizer
42. Pesticides and veterinary medicine
43. Health medicine
44. Processed rubber and by- products
45. Soap, detergents, perfumes & other toilet preparations
46. Plastics (including semi - plastic products)
47. Other plastic products
48. Paint, ink, varnish and other painting materials
49. Other chemicals products
50. Health instrument and apparatus
51. Precise and optics equipment, meter (all kinds)
52. Home appliances and its spare parts
53. Motor vehicles, motor bikes bicycles and spare parts
54. General - purpose machinery
55. Special - purpose machinery, accounting & office machines
56. Other transport means (except motor cars, motorbikes and bicycles)
57. Electrical machinery and equipment
58. Machinery & equipment used for broadcasting, television and information activities
59. Non-ferrous metals and products
60. Ferrous metals and products
61. Fibers, thread and weaving of cloths (all kinds)
62. Ready - made clothes, sheets (all kinds)
63. Carpets
64. Weaving and embroidery of textile - based goods (except carpet)
65. Products of leather tanneries
66. Leather goods
67. Animal feeds
68. Products of printing activities except products of publishing

69. Products of other industrial activities
70. Products of publishing house (newspaper, periodicals and books)
71. Other physical goods, n.e.c.
72. Gasoline
73. Lubricants (already refined)
74. Electricity
75. Gas
76. Water
77. Construction
78. Trade
79. Repair of small transport means, motorbikes and personal household and appliances
80. Hotels and restaurants
81. Land transportation services
82. Railway transport services
83. Water transport services
84. Air transport services
85. Communication services
86. Tourism
87. Banking, credit, treasury, lotto
88. Insurance and retirement subsidy
89. Science and technology
90. Real estate, business and consultancy services
91. State management, defence & compulsory social security
92. Education and training
93. Health care, social relief
94. Culture and sport
95. Association
96. Personal and community services
97. Houshold services

THE AGGREGATION SCHEMES OF 20 SECTORS IN 1989 I/O AND 1996 I/O TABLES

	List of 20 sectors	1989 I/O Tables	1996 I/O Tables
1	Cultivation	37	1, 2, 3, 4, 5, 9, 10
2	Animal husbandry and fishery	24, 38	6, 7, 8, 12
3	Forestry	39	11
4	Mining	2, 3, 4,	13, 14, 15, 16, 17
5	Animal feed and other	23	30, 67

Appendix 1.1

	List of 20 sectors	1989 I/O Tables	1996 I/O Tables
	food manufactures		
6	Manufacture of food, beverage and tobacco	25, 26, 27, 28, 29, 30, 31	18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29
7	Wood and wood products, cellulose, paper	20, 21	33, 34
8	Textiles, garment, leather	32, 33, 34	61, 62, 63, 64, 65, 66
9	Metallurgy	5, 6	59, 60
10	Manufacturing, machinery, equipment	7, 8, 9	50, 51, 52, 53, 54, 55, 56, 57, 58
11	Chemicals, fertilizer and rubber	10, 11, 12, 13, 14, 15, 16	39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49
12	Building materials	17, 18, 19	35, 36, 37, 38
13	Pottery, glass, ceramics	22	31, 32
14	Electricity	1	74
15	Gas, gasoline, oil	55	72, 73, 75
16	Water production and distribution	35	76
17	Construction	40	77
18	Transportation, Post and Telecommunication, Trading and Supply	41, 42, 43, 44, 45, 46, 53	78, 79, 80, 81, 82, 83, 84, 85
19	Finance, banking, credit, state insurance, technology and sciences, culture, heath care, education, physical training and sport, state management, national defense and security	48, 49, 50, 51	87, 88, 89, 91, 92, 93, 94
20	Others	36, 47, 52, 54	68, 69, 70, 71, 86, 90, 95, 96, 97

Appendix 1.2

1989 I/O TABLE BY 20 SECTORS IN PRODUCER PRICE

Unit: Mill.VND Sectors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	971439	166684	32964	605	112192	487614	2850	48360	5	332	31367	155	21	5	0	0
2	642837	1094747	379	29	2069	367630	169	9959	0	118	4693	5793	588	81	0	1
3	636	827	52669	36457	4104	13182	109710	747	98	1188	1199	24955	2574	16	0	0
4	338	1789	331	8207	6032	32743	11120	8848	13274	15996	45361	103777	6282	41456	0	3
5	666	22540	2342	120	188272	65006	1501	6602	0	887	520	564	21	19	0	1
6	893	33841	4835	4577	17002	552596	5442	5100	1081	7322	33380	4871	513	393	0	47
7	5823	11732	3541	3589	1512	106916	268041	19266	796	36081	11226	54099	1449	622	0	61
8	1981	1935	2600	10773	2068	32956	5927	682753	374	12253	22318	3759	336	378	0	49
9	1201	3068	2772	3272	1576	77426	4135	3511	92958	312543	8361	19349	3166	7845	0	807
10	78209	35377	32517	52567	6823	45955	35351	23671	6477	215548	15752	25586	3670	132745	0	943
11	1100629	26832	46780	56204	15842	102417	43374	75724	2217	55765	313175	23528	7247	1498	0	3985
12	5446	4535	1530	2558	454	7522	5504	3450	8390	5478	2945	196145	1864	1180	0	173
13	1261	1321	397	80	828	15032	4152	709	54	2633	10851	713	6797	553	0	9
14	94862	6444	4879	27844	10580	32660	19260	44785	15077	36911	31849	45149	1855	37956	0	25699
15	55946	106693	46417	72056	7240	34108	10024	13080	4922	15593	9083	51615	4115	95435	0	59
16	939	2192	2	489	1488	4728	973	3940	889	5089	2746	1161	496	452	0	385
17	9556	2289	10652	18874	1914	19157	3340	6601	0	2346	128	5236	1488	33	0	62
18	93599	56321	26839	37884	9894	87372	23832	24948	9057	32866	23833	87086	3713	60630	0	274
19	6944	15583	42148	43380	4200	31433	18552	26259	5022	24113	23139	22002	3605	1680	0	300
20	25880	44637	12714	31898	2251	22641	16363	23451	1729	23818	18045	22473	1445	965	0	80
T.I.C.	**3099085**	**1639387**	**327308**	**411463**	**396341**	**2139094**	**589620**	**1031764**	**162420**	**806880**	**609971**	**698016**	**51245**	**383942**	**0**	**32938**
Depreciation	100640	35794	119946	54768	13784	122530	26051	58400	6859	58568	37208	64317	6758	117278	0	8060
C.E.	6210594	686062	422614	208272	57467	469571	271409	379953	33063	315613	104011	206541	20133	17520	0	4189
Operation surplus	34425	1420242	231036	30846	15063	165557	53106	64596	14722	122069	51830	72396	3196	125053	0	27750
Indirect taxes	584820	11746	232258	5435	13994	418559	40543	62239	7053	84255	44970	82492	3368	22905	0	129
GDP	**6930479**	**2153844**	**1005854**	**299321**	**100308**	**1176217**	**391109**	**565188**	**61697**	**580505**	**238019**	**425746**	**33455**	**282756**	**0**	**40128**
GO	**10029564**	**3793231**	**1333162**	**710784**	**496649**	**3315311**	**980729**	**1596952**	**224117**	**1387385**	**847990**	**1123762**	**84700**	**666698**	**0**	**73066**

Where: C.E. is compensation of employees
P.F.E. is final rivate expenditure
F.S.E. is final social expenditure
C.I.S. is change in stock
G.F.C.F. is gross fixed capital formation
T.I.C. is total intermediate cost

Appendix 1.2

1989 I/O TABLE BY 20 SECTORS IN PRODUCER PRICE

17	18	19	20	Total Intermediate cost	FINAL DEMAND								GO	Sectors
					Final expenditure			Capital formation			Export	Import		
					Total	P.F.E.	F.S.E.	Total	C.I.S.	G.F.C.F.				
4852	35391	5498	61757	1962091	6497037	6497037	0	22542	22542	0	1741289	193395	10029564	1
12468	49913	7070	12329	2210873	1397766	1397766	0	141801	101998	39803	48082	5291	3793231	2
11371	10534	147	4146	274560	656937	656937	0	30479	0	30479	380651	9465	1333162	3
22533	24459	2884	2460	347893	59701	59701	0	-168213	-168213	0	518028	46625	710784	4
10986	35762	16891	10211	362911	176171	176171	0	8033	8033	0	0	50466	496649	5
32086	276668	80170	30360	1091177	2032806	2032806	0	61689	61689	0	658208	528569	3315311	6
92384	73214	135068	98209	923629	93811	93811	0	-173527	-173543	16	190559	53743	980729	7
14683	26497	36269	17827	875736	974710	974710	0	172018	172018	0	702052	1127564	1596952	8
142686	83834	36797	20297	825604	10850	10850	0	-250143	-250143	0	705153	1067347	224117	9
76310	480811	86359	26655	1381326	1704272	1704272	0	1115655	526386	589269	69767	2883635	1387385	10
56405	217170	129381	45138	2323311	815903	815903	0	-219291	-219291	0	61593	2133526	847990	11
602522	16683	72839	2552	941770	0	0	0	269237	269237	0	17653	104898	1123762	12
24272	21808	3835	3682	98987	121515	121515	0	-130377	-130377	0	0	5425	84700	13
16047	51382	42776	30294	576309	90389	90389	0	0	0	0	0	0	666698	14
74130	251681	46721	9000	907918	166494	166494	0	179754	179754	0	0	1254166	0	15
356	11452	7044	2539	47360	25706	25706	0	0	0	0	0	0	73066	16
1970	44790	17936	68165	214537	312871	312871	0	1697525	0	1697525	66471	0	2291404	17
138445	193194	374988	67112	1351887	4193208	4193208	0	186867	138187	48680	834218	7545	6558635	18
38230	217616	278928	27752	830886	3431659	1486697	1944962	0	0	0	17191	14244	4265492	19
35874	105600	83153	66077	539094	1596158	1336715	259443	-127081	-127081	0	688865	81212	2615824	20
1408610	**2228459**	**1464754**	**606562**	**18087859**	**24357964**	**22153559**	**2204405**	**2816968**	**411196**	**2405772**	**6699780**	**9567116**	**42395455**	T.I.C.
49498	327026	367924	81828	1657237										Depreciation
719967	1933452	1785783	589715	14435929										C.E.
96236	1315362	335138	1276290	5454913										Operation surplus
17093	754336	311893	61429	2759517										Indirect taxes
882794	**4330176**	**2800738**	**2009262**	**24307596**										GDP
2291404	**6558635**	**4265492**	**2615824**	**42395455**										GO

Appendix 1.3

1996 I/O TABLE BY 20 SECTORS IN PRODUCER' PRICE

Unit = million VND

Sectors	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	5887315	4044652	1773	1406	35066692	5409395	14958	825073	1085	2013	281469	1767	306	0
2	26512	1973737	0	835	72895	5842582	1405	23520	99	279	216056	30	12	0
3	74892	495278	559979	75812	572	3599	2914496	8641	150	7684	55249	962927	15819	0
4	15087	86648	569	1250455	3427	59610	166950	14703	299233	34367	529617	2335434	266994	192155
5	71082	2427576	0	191	1193078	531645	5058	1017	26	592	9597	17007	151	0
6	42467	32834	369	227174	554169	4391391	7876	20911	1237	6315	26957	12848	436	4747
7	219389	183314	54103	166038	94358	586088	5355548	516225	83238	197463	273220	1266489	29375	5682
8	20406	19528	1223	59801	2396	53006	211105	10222024	2047	34748	50358	16095	1378	209738
9	291702	134935	70990	511096	8542	701155	317165	298188	2517004	2959750	396545	319972	23512	295826
10	707307	588358	65271	859442	38467	218039	576133	371069	70026	5156055	140378	434114	42643	3187335
11	11604496	460676	164025	1611134	499816	1114711	874014	2404866	23861	586197	6555899	589810	171642	12799
12	151988	116033	34265	56156	1310	9184	33280	45682	21915	17543	81301	1295364	17280	19948
13	12265	253	258	4090	5636	242863	96316	3539	3949	10006	79466	45794	48106	6217
14	356005	86710	6347	701431	340217	464676	601310	1118230	283570	160347	452030	801203	76699	1580432
15	428744	1377606	102432	499134	51140	218119	268830	448770	41907	144811	100354	286271	49632	97541
16	8894	376	99	40777	6781	55921	13152	45121	5831	12484	13884	28712	1637	7131
17	110656	993	2746	153225	2229	44104	27000	75126	1460	27517	19497	65066	9137	189833
18	1775348	1139056	185422	1810371	5614330	1991199	1776832	1836364	255730	725142	1154307	1344921	55497	281716
19	156322	57460	20323	1097140	72206	386983	211523	389302	49735	130998	119860	129549	22280	23655
20	42521	507691	8747	1689698	63146	837491	423505	993869	60957	438787	305972	194699	29096	307470
Total intermediate cost	**22003404**	**13733711**	**1278941**	**10815406**	**43691407**	**23161764**	**13896456**	**19662240**	**3723060**	**10653098**	**10862016**	**10148072**	**861632**	**6422225**
Compensation of employees	48495403	20514097	3587030	3390095	3459145	5484758	1661331	4753157	1010081	1905091	1618693	1446058	278517	4115349
Tax on production	2851006	662328	740747	4033989	785365	3667050	415958	878954	157511	439868	711211	1100251	102285	593396
Depreciation	1551780	1226485	146543	2510833	854284	1046349	366338	1170320	244658	278589	322382	1004208	145226	234293
Operation surplus	721378	249725	133551	5913460	560147	2158681	463215	670114	232541	350911	451322	1095545	104892	734336
GDP	**53619567**	**22652635**	**4607871**	**15848377**	**5658941**	**12356838**	**2906842**	**7472545**	**1644791**	**2974459**	**3103608**	**4646062**	**630920**	**5677374**
GO	**75622971**	**36386346**	**5886812**	**26663783**	**49350348**	**35518602**	**16803298**	**27134785**	**5367851**	**13627557**	**13965624**	**14794134**	**1492552**	**12099599**

Where: GFF is Gross fixed capital formation

CIS is Changes in stocks

Appendix 1.3

199€ I/O TABLE BY 20 SECTORS IN PRODUCER' PRICE

15	16	17	18	19	20	Total intermediate cost	FINAL DEMAND						Expot	Import	GO
							Final consumption			Capital Formation					
							Total	Private	Social	Total	GFF	CIS			
24	8756	9324	71909	256200	1037534	52921657	19170734	19170734	0	818993	0	818993	13331809	10620218	75622969
73	0	496	622446	24476	953	8806406	22870807	22870807	0	588006	90000	498006	4141804	20676	36386347
15	0	88961	9428	4675	1985	5280160	1088896	1088896	0	13703	0	13703	101203	597151	5886813
44177	3166	3853497	65515	48156	188328	9458090	297907	297907	0	388445	0	388445	17044126	524782	26663784
98	0	5447	315725	37167	27469	4642928	36525542	36525542	0	161064	0	161064	10611386	2590580	49350338
919	1578	26132	2274139	276834	56764	7966104	21335487	21335487	0	912377	0	912377	10210879	4906237	35518603
869	2170	1315312	541087	1044672	1392134	13326770	2789273	2789273	0	68608	0	68608	4627699	4009047	16803307
139	3823	78025	254152	123595	483260	11846847	7480720	7480720	0	915639	0	915639	17828482	10936899	27134789
153	76713	6080174	750992	108595	1430470	17293479	432007	432007	0	583128	0	583128	54026	12994788	5367852
2660	47026	2235145	4542823	1367434	1416796	22066513	15856227	15856227	0	14681108	13758145	922963	2299209	41275517	13627548
1370	166756	1239703	818156	1376198	2330354	32606493	5633156	5633156	0	1016278	0	1016278	1960096	27250389	13965624
385	10135	12847012	227431	242531	542133	15770874	0	0	0	926227	0	926227	719928	2622902	14794129
105	267	742948	180337	78603	61577	1622595	997537	997537	0	-138456	0	-138456	388665	1377797	1492544
1573	361921	488709	1196472	793537	537938	10409359	1690242	1690242	0	0	0	0	0	0	12099599
102659	16636	1686897	2819687	843566	609500	10194240	3144433	3144433	0	646377	0	646377	0	13543051	441995
263	38468	53932	224101	178148	104245	839958	474122	474122	0	0	0	0	0	0	1314079
2	6165	412101	347334	469587	202768	2166544	0	0	0	51543403	51543403	0	0	0	53709949
9619	90113	4286902	7469709	2790480	1914095	36507150	21447518	21447518	0	2939056	1210716	1728342	20333023	8781008	72445742
2866	38890	557430	1254118	4278221	405220	9404068	38036630	19231520	18805110	0	0	0	4511000	4878000	47073711
4804	38014	946328	2522051	2825494	2524706	14765046	25959977	22342875	3917102	385991	0	385991	3013542	3408024	40716532
172773	**910597**	**36954475**	**26507609**	**17168169**	**15268229**	**287895284**	**225231215**	**202809003**	**22722212**	**76449947**	**66602264**	**9847685**	**111176877**	**150337066**	**550416257**
232391	134346	10373879	24795187	26531134	11173292	174959034									
3792	18964	1584428	8175549	497382	2647743	30067777									
17780	97154	1903868	5113653	598527	10290352	29123622									
15259	153018	2893295	7853740	2278486	1336917	28370533									
269222	**403482**	**16755470**	**45938129**	**29905529**	**25448304**	**262520966**									
441995	**1314079**	**53709945**	**72445738**	**47073698**	**40716533**	**550416250**									

Appendix 1.4

IMPORT FLOW MATRIX

(in producer's price) Unit: Mill.VND

Sectors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	56415	360	0	0	195982	336327	2914	452344	0	295	26479	13	0	0	0
2	0	407	0	0	0	306	0	12	0	0	0	0	0	0	0
3	0	0	0	0	0	117	56945	0	0	0	0	0	0	0	0
4	0	0	0	73979	0	122	12	0	1546	3	414	14946	227	52857	33692
5	8	184280	0	0	112865	17377	0	0	0	0	32	139	0	0	0
6	26	285	0	921	84248	656951	158	250	3	482	77	201	0	0	30
7	393	5	61	12361	599	34086	1299936	81127	849	4018	15615	208964	39	356	0
8	3	5431	0	11811	0	5722	15453	5103337	95	536	12724	479	265	892	0
9	77214	16443	70465	181561	5365	533946	110165	164947	1423300	1419410	81670	112931	11537	5929	92
10	571552	575042	52556	580489	16434	77949	236544	211435	29495	3546443	55483	215214	30939	2424523	700
11	10153460	120700	35454	683685	396255	545318	546450	1780154	12679	381639	4276211	371831	118787	4343	464
12	0	0	15140	169	317	1053	2098	5275	0	100	616	240855	89	240	0
13	91	1	70	1898	0	198018	4365	1488	985	4884	44536	28345	29296	607	36
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	417049	1376464	100187	470783	44739	196045	268060	404039	39586	137012	95387	249107	41631	53117	91375
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	119120	30946	27815	240569	95270	154929	163096	153588	14614	42984	47302	131552	3449	15991	716
19	65099	27683	5926	48006	29263	87421	75589	144742	19338	34296	38718	51560	7904	755	354
20	301	153	11	16926	122	46330	60954	109348	3231	4225	8667	11751	3445	29151	0
Total	**11460730**	**2338200**	**307685**	**2323160**	**981457**	**2892018**	**2842740**	**8612087**	**1545720**	**5576326**	**4703929**	**1637888**	**247606**	**2588761**	**127459**

Appendix 1.4

IMPORT FLOW MATRIX

16	17	18	19	20	Total	FINAL DEMAND						GO	Sectors
						Final consumption			Capital Formation				
						Total	Private	Social	Total	GFF	CIS		
0	0	21570	423	0	1093123	8825300	8825300	0	67102	0	67102	**9985525**	1
0	0	0	0	0	725	19679	19679	0	272	54	218	**20675**	2
0	87	74	0	0	57224	533216	533216	0	6710	0	6710	**597151**	3
0	20457	338	0	19881	218474	0	0	0	306308	0	306308	**524782**	4
0	0	1747	0	6488	322936	2239260	2239260	0	28384	0	28384	**2590580**	5
52	1271	262475	4229	2284	1013943	3899486	3899486	0	-7189	0	-7189	**4906240**	6
611	26605	116678	196185	627908	2626396	1315388	1315388	0	67263	0	67263	**4009047**	7
25	3512	37710	240	148853	5347090	4789450	4789450	0	800359	0	800359	**10936899**	8
21523	4177857	322850	23437	840971	9601613	277828	277828	0	3115347	0	3115347	**12994788**	9
32794	1115645	4077870	988941	839269	15679315	12456773	12456773	0	13139430	12906319	233111	**41275518**	10
76207	858399	383373	73766	1633280	22452453	3831272	3831272	0	597750	0	597750	**26881474**	11
236	1908528	21475	0	10178	2206368	0	0	0	416534	0	416534	**2622902**	12
221	484197	73133	395	4602	877170	553204	553204	0	-52577	0	-52577	**1377797**	13
0	0	0	0	0	0	0	0	0	0	0	0	**0**	14
16348	1681726	2774759	838916	587710	9884038	3012636	3012636	0	646377	0	646377	**13543051**	15
0	0	0	0	0	0	0	0	0	0	0	0	**0**	16
0	0	0	0	0	0	0	0	0	0	0	0	**0**	17
10515	556931	925888	164987	164496	3064756	5526409	5526409	0	189843	60911	128931	**8781008**	18
2125	206588	395784	808933	92605	2142686	2735314	2341314	394000	0	0	0	**4878000**	19
1178	89658	45221	3638	627834	1062145	2320847	2320847	0	25031	0	25031	**3408023**	20
161834	**11131461**	**9460946**	**3104090**	**5606358**	**77650454**	**52336062**	**51942062**	**394000**	**19346943**	**12967284**	**6379659**	**149333459**	Total

Appendix 1.5 A COEFFICENT MATRIX OF 1989

Sectors	1	2	3	4	5	6	7	8	9	10
1	0.096858	0.043942	0.024726	0.000851	0.225898	0.147079	0.002906	0.030283	0.000022	0.000239
2	0.064094	0.288605	0.000284	0.000041	0.004166	0.110889	0.000172	0.006236	0.000000	0.000085
3	0.000063	0.000218	0.039507	0.051291	0.008263	0.003976	0.111866	0.000468	0.000437	0.000856
4	0.000034	0.000472	0.000248	0.011546	0.012145	0.009876	0.011339	0.005541	0.059228	0.011530
5	0.000066	0.005942	0.001757	0.000169	0.379085	0.019608	0.001530	0.004134	0.000000	0.000639
6	0.000089	0.008921	0.003627	0.006439	0.034233	0.166680	0.005549	0.003194	0.004823	0.005278
7	0.000581	0.003093	0.002656	0.005049	0.003044	0.032249	0.273308	0.012064	0.003552	0.026006
8	0.000198	0.000510	0.001950	0.015157	0.004164	0.009941	0.006043	0.427535	0.001669	0.008832
9	0.000120	0.000809	0.002079	0.004603	0.003173	0.023354	0.004216	0.002199	0.414774	0.225275
10	0.007798	0.009326	0.024391	0.073956	0.013738	0.013861	0.036046	0.014823	0.028900	0.155363
11	0.109738	0.007074	0.035090	0.079073	0.031898	0.030892	0.044226	0.047418	0.009892	0.040194
12	0.000543	0.001196	0.001148	0.003599	0.000914	0.002269	0.005612	0.002160	0.037436	0.003948
13	0.000126	0.000348	0.000298	0.000113	0.001667	0.004534	0.004234	0.000444	0.000241	0.001898
14	0.009458	0.001699	0.003660	0.039174	0.021303	0.009851	0.019638	0.028044	0.067273	0.026605
15	0.005578	0.028127	0.034817	0.101375	0.014578	0.010288	0.010221	0.008191	0.021962	0.011239
16	0.000094	0.000578	0.000002	0.000688	0.002996	0.001426	0.000992	0.002467	0.003967	0.003668
17	0.000953	0.000603	0.007990	0.026554	0.003854	0.005778	0.003406	0.004133	0.000000	0.001691
18	0.009332	0.014848	0.020132	0.053299	0.019922	0.026354	0.024300	0.015622	0.040112	0.023689
19	0.000692	0.004108	0.031615	0.061031	0.008457	0.009481	0.018917	0.016443	0.022408	0.017380
20	0.002580	0.011768	0.009537	0.044877	0.004532	0.006829	0.016685	0.014685	0.007715	0.017168
Total	**0.308995**	**0.432187**	**0.245513**	**0.578886**	**0.798030**	**0.645217**	**0.601206**	**0.646083**	**0.724711**	**0.581583**

Appendix 1.5 A COEFFICENT MATRIX OF 1989

11	12	13	14	15	16	17	18	19	20	Sectors
0.036990	0.000138	0.000248	0.000007	0.000000	0.000000	0.002117	0.005396	0.001289	0.023609	1
0.005534	0.005155	0.006942	0.000121	0.000000	0.000014	0.005441	0.007610	0.001657	0.004713	2
0.001414	0.022207	0.030390	0.000024	0.000000	0.000000	0.004962	0.001606	0.000034	0.001585	3
0.053492	0.092348	0.074168	0.062181	0.000000	0.000041	0.009834	0.003729	0.000676	0.000940	4
0.000613	0.000502	0.000248	0.000028	0.000000	0.000014	0.004794	0.005453	0.003960	0.003904	5
0.039364	0.004335	0.006057	0.000589	0.000000	0.000643	0.014003	0.042184	0.018795	0.011606	6
0.013238	0.048141	0.017107	0.000933	0.000000	0.000835	0.040318	0.011163	0.031665	0.037544	7
0.026319	0.003345	0.003967	0.000567	0.000000	0.000671	0.006408	0.004040	0.008503	0.006815	8
0.009860	0.017218	0.037379	0.011767	0.000000	0.011045	0.062270	0.012782	0.008627	0.007759	9
0.018576	0.022768	0.043329	0.199108	0.000000	0.012906	0.033303	0.073310	0.020246	0.010190	10
0.369314	0.020937	0.085561	0.002247	0.000000	0.054540	0.024616	0.033112	0.030332	0.017256	11
0.003473	0.174543	0.022007	0.001770	0.000000	0.002368	0.262949	0.002544	0.017076	0.000976	12
0.012796	0.000634	0.080248	0.000829	0.000000	0.000123	0.010593	0.003325	0.000899	0.001408	13
0.037558	0.040177	0.021901	0.056931	0.000000	0.351723	0.007003	0.007834	0.010028	0.011581	14
0.010711	0.045931	0.048583	0.143146	0.000000	0.000807	0.032351	0.038374	0.010953	0.003441	15
0.003238	0.001033	0.005856	0.000678	0.000000	0.005269	0.000155	0.001746	0.001651	0.000971	16
0.000151	0.004659	0.017568	0.000049	0.000000	0.000849	0.000860	0.006829	0.004205	0.026059	17
0.028105	0.077495	0.043837	0.090941	0.000000	0.003750	0.060419	0.029456	0.087912	0.025656	18
0.027287	0.019579	0.042562	0.002520	0.000000	0.004106	0.016684	0.033180	0.065392	0.010609	19
0.021280	0.019998	0.017060	0.001447	0.000000	0.001095	0.015656	0.016101	0.019494	0.025260	20
0.719314	**0.621142**	**0.605018**	**0.575886**	**0.000000**	**0.450798**	**0.614737**	**0.339775**	**0.343396**	**0.231882**	Total

Appendix 1.6 A COEFFICIENT MATRIX OF 1996

Sectors	1	2	3	4	5	6	7	8	9	10
1	0.07785	0.11116	0.00030	0.00005	0.71057	0.15230	0.00089	0.03041	0.00020	0.00015
2	0.00035	0.05424	0.00000	0.00003	0.00148	0.16449	0.00008	0.00087	0.00002	0.00002
3	0.00090	0.01361	0.09512	0.00284	0.00001	0.00010	0.17345	0.00032	0.00003	0.00056
4	0.00020	0.00238	0.00010	0.04690	0.00007	0.00168	0.00994	0.00054	0.05575	0.00252
5	0.00094	0.06672	0.00000	0.00001	0.02418	0.01497	0.00030	0.00004	0.00000	0.00004
6	0.00056	0.00090	0.00006	0.00852	0.01123	0.12364	0.00047	0.00077	0.00023	0.00046
7	0.00290	0.00504	0.00919	0.00623	0.00191	0.01650	0.31872	0.01902	0.01551	0.01449
8	0.00027	0.00054	0.00021	0.00224	0.00005	0.00149	0.01256	0.37671	0.00038	0.00255
9	0.00386	0.00371	0.01206	0.01917	0.00017	0.01974	0.01888	0.01099	0.46890	0.21719
10	0.00935	0.01617	0.01109	0.03223	0.00078	0.00614	0.03429	0.01368	0.01305	0.37836
11	0.15345	0.01266	0.02786	0.06042	0.01013	0.03138	0.05201	0.08863	0.00445	0.04302
12	0.00201	0.00319	0.00582	0.00211	0.00003	0.00026	0.00198	0.00168	0.00408	0.00129
13	0.00016	0.00001	0.00004	0.00015	0.00011	0.00684	0.00573	0.00013	0.00074	0.00073
14	0.00471	0.00238	0.00108	0.02631	0.00689	0.01308	0.03579	0.04121	0.05283	0.01177
15	0.00567	0.03786	0.01740	0.01872	0.00104	0.00614	0.01600	0.01654	0.00781	0.01063
16	0.00012	0.00001	0.00002	0.00153	0.00014	0.00157	0.00078	0.00166	0.00109	0.00092
17	0.00146	0.00003	0.00047	0.00575	0.00005	0.00124	0.00161	0.00277	0.00027	0.00202
18	0.02348	0.03130	0.03150	0.06790	0.11376	0.05606	0.10574	0.06768	0.04764	0.05321
19	0.00207	0.00158	0.00345	0.04115	0.00146	0.01090	0.01259	0.01435	0.00927	0.00961
20	0.00056	0.01395	0.00149	0.06337	0.00128	0.02358	0.02520	0.03663	0.01136	0.03220
Total	**0.29096**	**0.37744**	**0.21726**	**0.40562**	**0.88533**	**0.65210**	**0.82701**	**0.72461**	**0.69358**	**0.78173**

Appendix 1.6 A COEFFICIENT MATRIX OF 1996

11	12	13	14	15	16	17	18	19	20	Sectors
0.02015	0.00012	0.00021	0.00000	0.00005	0.00666	0.00017	0.00099	0.00544	0.02548	1
0.01547	0.00000	0.00001	0.00000	0.00017	0.00000	0.00001	0.00859	0.00052	0.00002	2
0.00396	0.06509	0.01060	0.00000	0.00003	0.00000	0.00166	0.00013	0.00010	0.00005	3
0.03792	0.15786	0.17889	0.01588	0.09995	0.00241	0.07175	0.00090	0.00102	0.00463	4
0.00069	0.00115	0.00010	0.00000	0.00022	0.00000	0.00010	0.00436	0.00079	0.00067	5
0.00193	0.00087	0.00029	0.00039	0.00208	0.00120	0.00049	0.03139	0.00588	0.00139	6
0.01956	0.08561	0.01968	0.00047	0.00197	0.00165	0.02449	0.00747	0.02219	0.03419	7
0.00361	0.00109	0.00092	0.01733	0.00031	0.00291	0.00145	0.00351	0.00263	0.01187	8
0.02839	0.02163	0.01575	0.02445	0.00035	0.05838	0.11320	0.01037	0.00231	0.03513	9
0.01005	0.02934	0.02857	0.26342	0.00602	0.03579	0.04162	0.06271	0.02905	0.03480	10
0.46943	0.03987	0.11500	0.00106	0.00310	0.12690	0.02308	0.01129	0.02923	0.05723	11
0.00582	0.08756	0.01158	0.00165	0.00087	0.00771	0.23919	0.00314	0.00515	0.01331	12
0.00569	0.00310	0.03223	0.00051	0.00024	0.00020	0.01383	0.00249	0.00167	0.00151	13
0.03237	0.05416	0.05139	0.13062	0.00356	0.27542	0.00910	0.01652	0.01686	0.01321	14
0.00719	0.01935	0.03325	0.00806	0.23226	0.01266	0.03141	0.03892	0.01792	0.01497	15
0.00099	0.00194	0.00110	0.00059	0.00060	0.02927	0.00100	0.00309	0.00378	0.00256	16
0.00140	0.00440	0.00612	0.01569	0.00000	0.00469	0.00767	0.00479	0.00998	0.00498	17
0.08265	0.09091	0.03718	0.02328	0.02176	0.06858	0.07982	0.10311	0.05928	0.04701	18
0.00858	0.00876	0.01493	0.00196	0.00648	0.02959	0.01038	0.01731	0.09088	0.00995	19
0.02191	0.01316	0.01949	0.02541	0.01087	0.02893	0.01762	0.03481	0.06002	0.06201	20
0.77777	**0.68595**	**0.57729**	**0.53078**	**0.39089**	**0.69295**	**0.68804**	**0.36590**	**0.36471**	**0.37499**	Total

Appendix 1.7 A^M COEFFICIENT MATRIX OF 1996

Sectors	1	2	3	4	5	6	7	8	9	10
1	0.000746	0.000010	0.000000	0.000000	0.003971	0.009469	0.000173	0.016670	0.000000	0.000022
2	0.000000	0.000011	0.000000	0.000000	0.000000	0.000009	0.000000	0.000000	0.000000	0.000000
3	0.000000	0.000000	0.000000	0.000000	0.000000	0.000003	0.003389	0.000000	0.000000	0.000000
4	0.000000	0.000000	0.000000	0.002775	0.000000	0.000003	0.000001	0.000000	0.000288	0.000000
5	0.000000	0.005065	0.000000	0.000000	0.002287	0.000489	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000008	0.000000	0.000035	0.001707	0.018496	0.000009	0.000009	0.000000	0.000035
7	0.000005	0.000000	0.000010	0.000464	0.000012	0.000960	0.077362	0.002990	0.000158	0.000295
8	0.000000	0.000149	0.000000	0.000443	0.000000	0.000161	0.000920	0.188074	0.000018	0.000039
9	0.001021	0.000452	0.011970	0.006809	0.000109	0.015033	0.006556	0.006079	0.265153	0.104157
10	0.007558	0.015804	0.008928	0.021771	0.000333	0.002195	0.014077	0.007792	0.005495	0.260241
11	0.134264	0.003317	0.006023	0.025641	0.008029	0.015353	0.032520	0.065604	0.002362	0.028005
12	0.000000	0.000000	0.002572	0.000006	0.000006	0.000030	0.000125	0.000194	0.000000	0.000007
13	0.000001	0.000000	0.000012	0.000071	0.000000	0.005575	0.000260	0.000055	0.000183	0.000358
14	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15	0.005515	0.037829	0.017019	0.017656	0.000907	0.005520	0.015953	0.014890	0.007375	0.010054
16	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18	0.001575	0.000850	0.004725	0.009022	0.001930	0.004362	0.009706	0.005660	0.002722	0.003154
19	0.000861	0.000761	0.001007	0.001800	0.000593	0.002461	0.004498	0.005334	0.003603	0.002517
20	0.000004	0.000004	0.000002	0.000635	0.000002	0.001304	0.003628	0.004030	0.000602	0.000310
Total	0.151551	0.064260	0.052267	0.087128	0.019888	0.081423	0.169177	0.317382	0.287959	0.409195

Appendix 1.7 A^M COEFFICIENT MATRIX OF 1996

11	12	13	14	15	16	17	18	19	20	Sectors
0.001896	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000298	0.000009	0.000000	1
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	2
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000002	0.000001	0.000000	0.000000	3
0.000030	0.001010	0.000152	0.004368	0.076226	0.000000	0.000381	0.000005	0.000000	0.000188	4
0.000002	0.000009	0.000000	0.000000	0.000000	0.000000	0.000000	0.000024	0.000000	0.000159	5
0.000005	0.000014	0.000000	0.000000	0.000068	0.000040	0.000024	0.003623	0.000090	0.000056	6
0.001118	0.014125	0.000026	0.000029	0.000000	0.000465	0.000495	0.001611	0.004168	0.015421	7
0.000911	0.000032	0.000177	0.000074	0.000000	0.000019	0.000065	0.000521	0.000005	0.003656	8
0.005848	0.007633	0.007729	0.000490	0.000208	0.016379	0.077786	0.004456	0.000498	0.020654	9
0.003973	0.014547	0.020729	0.200380	0.001584	0.024956	0.020772	0.056289	0.021008	0.020612	10
0.306195	0.025134	0.079586	0.000359	0.001050	0.057992	0.015982	0.005292	0.001567	0.040113	11
0.000044	0.016280	0.000060	0.000020	0.000000	0.000179	0.035534	0.000296	0.000000	0.000250	12
0.003189	0.001916	0.019628	0.000050	0.000082	0.000168	0.009015	0.001009	0.000008	0.000113	13
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	14
0.006830	0.016838	0.027892	0.004390	0.206732	0.012440	0.031311	0.038301	0.017821	0.014434	15
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	16
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	17
0.003387	0.008892	0.002311	0.001322	0.001620	0.008002	0.010369	0.012780	0.003505	0.004040	18
0.002772	0.003485	0.005295	0.000062	0.000801	0.001617	0.003846	0.005463	0.017184	0.002274	19
0.000621	0.000794	0.002308	0.002409	0.000000	0.000897	0.001669	0.000624	0.000077	0.015420	20
0.336822	**0.110712**	**0.165894**	**0.213954**	**0.288371**	**0.123154**	**0.207251**	**0.130594**	**0.065941**	**0.137692**	Total

Appendix 1.8 B COEFFICIENT MATRIX OF 1989

Sectors	1	2	3	4	5	6	7	8	9	10	11
1	0.096858	0.016619	0.003287	0.000060	0.011186	0.048618	0.000284	0.004822	0.000000	0.000033	0.003127
2	0.169470	0.288605	0.000100	0.000008	0.000545	0.096917	0.000045	0.002625	0.000000	0.000031	0.001237
3	0.000477	0.000620	0.039507	0.027346	0.003078	0.009888	0.082293	0.000560	0.000074	0.000891	0.000899
4	0.000476	0.002517	0.000466	0.011546	0.008486	0.046066	0.015645	0.012448	0.018675	0.022505	0.063818
5	0.001341	0.045384	0.004716	0.000242	0.379085	0.130889	0.003022	0.013293	0.000000	0.001786	0.001047
6	0.000269	0.010207	0.001458	0.001381	0.005128	0.166680	0.001641	0.001538	0.000326	0.002209	0.010068
7	0.005937	0.011963	0.003611	0.003660	0.001542	0.109017	0.273308	0.019645	0.000812	0.036790	0.011447
8	0.001240	0.001212	0.001628	0.006746	0.001295	0.020637	0.003711	0.427535	0.000234	0.007673	0.013975
9	0.005359	0.013689	0.012369	0.014600	0.007032	0.345471	0.018450	0.015666	0.414774	1.394553	0.037306
10	0.056372	0.025499	0.023438	0.037889	0.004918	0.033123	0.025480	0.017062	0.004668	0.155363	0.011354
11	1.297927	0.031642	0.055166	0.066279	0.018682	0.120776	0.051149	0.089298	0.002614	0.065761	0.369314
12	0.004846	0.004036	0.001361	0.002276	0.000404	0.006694	0.004898	0.003070	0.007466	0.004875	0.002621
13	0.014888	0.015596	0.004687	0.000945	0.009776	0.177473	0.049020	0.008371	0.000638	0.031086	0.128111
14	0.142286	0.009666	0.007318	0.041764	0.015869	0.048988	0.028889	0.067174	0.022614	0.055364	0.047771
15	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16	0.012851	0.030000	0.000027	0.006693	0.020365	0.064709	0.013317	0.053924	0.012167	0.069649	0.037582
17	0.004170	0.000999	0.004649	0.008237	0.000835	0.008360	0.001458	0.002881	0.000000	0.001024	0.000056
18	0.014271	0.008587	0.004092	0.005776	0.001509	0.013322	0.003634	0.003804	0.001381	0.005011	0.003634
19	0.001628	0.003653	0.009881	0.010170	0.000985	0.007369	0.004349	0.006156	0.001177	0.005653	0.005425
20	0.009894	0.017064	0.004860	0.012194	0.000861	0.008655	0.006255	0.008965	0.000661	0.009105	0.006898

Appendix 1.8 B COEFFICIENT MATRIX OF 1989

12	13	14	15	16	17	18	19	20	Total	Sectors
0.000015	0.000002	0.000000	0.000000	0.000000	0.000484	0.003529	0.000548	0.006157	**0.195631**	1
0.001527	0.000155	0.000021	0.000000	0.000000	0.003287	0.013158	0.001864	0.003250	**0.582847**	2
0.018719	0.001931	0.000012	0.000000	0.000000	0.008529	0.007902	0.000110	0.003110	**0.205946**	3
0.146004	0.008838	0.058324	0.000000	0.000004	0.031702	0.034411	0.004057	0.003461	**0.489450**	4
0.001136	0.000042	0.000038	0.000000	0.000002	0.022120	0.072007	0.034010	0.020560	**0.730719**	5
0.001469	0.000155	0.000119	0.000000	0.000014	0.009678	0.083452	0.024182	0.009158	**0.329133**	6
0.055162	0.001477	0.000634	0.000000	0.000062	0.094199	0.074653	0.137722	0.100139	**0.941778**	7
0.002354	0.000210	0.000237	0.000000	0.000031	0.009194	0.016592	0.022711	0.011163	**0.548380**	8
0.086334	0.014127	0.035004	0.000000	0.003601	0.636659	0.374064	0.164187	0.090564	**3.683808**	9
0.018442	0.002645	0.095680	0.000000	0.000680	0.055003	0.346559	0.062246	0.019212	**0.995633**	10
0.027746	0.008546	0.001767	0.000000	0.004699	0.066516	0.256100	0.152574	0.053229	**2.739786**	11
0.174543	0.001659	0.001050	0.000000	0.000154	0.536165	0.014846	0.064817	0.002271	**0.838051**	12
0.008418	0.080248	0.006529	0.000000	0.000106	0.286564	0.257473	0.045277	0.043471	**1.168678**	13
0.067720	0.002782	0.056931	0.000000	0.038547	0.024069	0.077069	0.064161	0.045439	**0.864423**	14
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	**0.000000**	15
0.015890	0.006788	0.006186	0.000000	0.005269	0.004872	0.156735	0.096406	0.034749	**0.648181**	16
0.002285	0.000649	0.000014	0.000000	0.000027	0.000860	0.019547	0.007828	0.029748	**0.093627**	17
0.013278	0.000566	0.009244	0.000000	0.000042	0.021109	0.029456	0.057175	0.010233	**0.206123**	18
0.005158	0.000845	0.000394	0.000000	0.000070	0.008963	0.051018	0.065392	0.006506	**0.194793**	19
0.008591	0.000552	0.000369	0.000000	0.000031	0.013714	0.040370	0.031788	0.025260	**0.206090**	20

Appendix 1.9 B COEFFICIENT MATRIX OF 1996

Sectors	1	2	3	4	5	6	7	8	9	10
1	0.07785	0.05348	0.00002	0.00002	0.46370	0.07153	0.00020	0.01091	0.00001	0.00003
2	0.00073	0.05424	0.00000	0.00002	0.00200	0.16057	0.00004	0.00065	0.00000	0.00001
3	0.01272	0.08413	0.09512	0.01288	0.00010	0.00061	0.49509	0.00147	0.00003	0.00131
4	0.00057	0.00325	0.00002	0.04690	0.00013	0.00224	0.00626	0.00055	0.01122	0.00129
5	0.00144	0.04919	0.00000	0.00000	0.02418	0.01077	0.00010	0.00002	0.00000	0.00001
6	0.00120	0.00092	0.00001	0.00640	0.01560	0.12364	0.00022	0.00059	0.00003	0.00018
7	0.01306	0.01091	0.00322	0.00988	0.00562	0.03488	0.31872	0.03072	0.00495	0.01175
8	0.00075	0.00072	0.00005	0.00220	0.00009	0.00195	0.00778	0.37671	0.00008	0.00128
9	0.05434	0.02514	0.01323	0.09521	0.00159	0.13062	0.05909	0.05555	0.46890	0.55138
10	0.05190	0.04317	0.00479	0.06307	0.00282	0.01600	0.04228	0.02723	0.00514	0.37836
11	0.83093	0.03299	0.01174	0.11536	0.03579	0.07982	0.06258	0.17220	0.00171	0.04197
12	0.01027	0.00784	0.00232	0.00380	0.00009	0.00062	0.00225	0.00309	0.00148	0.00119
13	0.00822	0.00017	0.00017	0.00274	0.00378	0.16272	0.06453	0.00237	0.00265	0.00670
14	0.02942	0.00717	0.00052	0.05797	0.02812	0.03840	0.04970	0.09242	0.02344	0.01325
15	0.97002	3.11679	0.23175	1.12928	0.11570	0.49349	0.60822	1.01533	0.09481	0.32763
16	0.00677	0.00029	0.00008	0.03103	0.00516	0.04256	0.01001	0.03434	0.00444	0.00950
17	0.00206	0.00002	0.00005	0.00285	0.00004	0.00082	0.00050	0.00140	0.00003	0.00051
18	0.02451	0.01572	0.00256	0.02499	0.07750	0.02749	0.02453	0.02535	0.00353	0.01001
19	0.00332	0.00122	0.00043	0.02331	0.00153	0.00822	0.00449	0.00827	0.00106	0.00278
20	0.00104	0.01247	0.00021	0.04150	0.00155	0.02057	0.01040	0.02441	0.00150	0.01078

Appendix 1.9 B COEFFICIENT MATRIX OF 1996

11	12	13	14	15	16	17	18	19	20	Total	Sectors
0.00372	0.00002	0.00000	0.00000	0.00000	0.00012	0.00012	0.00095	0.00339	0.01372	**0.69981**	**1**
0.00594	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.01711	0.00067	0.00003	**0.24203**	**2**
0.00939	0.16357	0.00269	0.00000	0.00000	0.00000	0.01511	0.00160	0.00079	0.00034	**0.89695**	**3**
0.01986	0.08759	0.01001	0.00721	0.00166	0.00012	0.14452	0.00246	0.00181	0.00706	**0.35472**	**4**
0.00019	0.00034	0.00000	0.00000	0.00000	0.00000	0.00011	0.00640	0.00075	0.00056	**0.09408**	**5**
0.00076	0.00036	0.00001	0.00013	0.00003	0.00004	0.00074	0.06403	0.00779	0.00160	**0.22428**	**6**
0.01626	0.07537	0.00175	0.00034	0.00005	0.00013	0.07828	0.03220	0.06217	0.08285	**0.79310**	**7**
0.00186	0.00059	0.00005	0.00773	0.00001	0.00014	0.00288	0.00937	0.00455	0.01781	**0.43659**	**8**
0.07387	0.05961	0.00438	0.05511	0.00003	0.01429	1.13270	0.13991	0.02023	0.26649	**3.22168**	**9**
0.01030	0.03186	0.00313	0.23389	0.00020	0.00345	0.16402	0.33336	0.10034	0.10397	**1.61926**	**10**
0.46943	0.04223	0.01229	0.00092	0.00010	0.01194	0.08877	0.05858	0.09854	0.16686	**2.33477**	**11**
0.00550	0.08756	0.00117	0.00135	0.00003	0.00069	0.86839	0.01537	0.01639	0.03665	**1.06602**	**12**
0.05324	0.03068	0.03223	0.00417	0.00007	0.00018	0.49777	0.12083	0.05266	0.04126	**1.08713**	**13**
0.03736	0.06622	0.00634	0.13062	0.00013	0.02991	0.04039	0.09889	0.06558	0.04446	**0.86031**	**14**
0.22705	0.64768	0.11229	0.22068	0.23226	0.03764	3.81655	6.37945	1.90854	1.37897	**23.06414**	**15**
0.01057	0.02185	0.00125	0.00543	0.00020	0.02927	0.04104	0.17054	0.13557	0.07933	**0.63920**	**16**
0.00036	0.00121	0.00017	0.00353	0.00000	0.00011	0.00767	0.00647	0.00874	0.00378	**0.04034**	**17**
0.01593	0.01856	0.00077	0.00389	0.00013	0.00124	0.05917	0.10311	0.03852	0.02642	**0.50392**	**18**
0.00255	0.00275	0.00047	0.00050	0.00006	0.00083	0.01184	0.02664	0.09088	0.00861	**0.19977**	**19**
0.00751	0.00478	0.00071	0.00755	0.00012	0.00093	0.02324	0.06194	0.06939	0.06201	**0.36263**	**20**

Appendix 1.10 R MATRIX OF 1989

Sectors	1	2	3	4	5	6	7	8	9	10
1	1.12459	0.07849	0.03619	0.01898	0.43049	0.22683	0.02258	0.07607	0.01110	0.01338
2	0.10561	1.41686	0.00701	0.00958	0.06377	0.21264	0.00866	0.02819	0.00795	0.00775
3	0.00267	0.00249	1.04362	0.06024	0.02008	0.01577	0.16525	0.00859	0.01395	0.01291
4	0.01526	0.00574	0.00874	1.03464	0.04034	0.03032	0.03393	0.02955	0.13062	0.06051
5	0.00229	0.01481	0.00438	0.00400	1.61529	0.04200	0.00629	0.01414	0.00307	0.00391
6	0.01343	0.02008	0.01215	0.02605	0.08165	1.21601	0.02303	0.02142	0.02458	0.02336
7	0.00910	0.01127	0.01197	0.02897	0.02261	0.06556	1.39137	0.04262	0.02945	0.05903
8	0.01179	0.00490	0.00965	0.04145	0.02579	0.03152	0.02628	1.75928	0.01771	0.03074
9	0.01729	0.01499	0.02545	0.07208	0.04648	0.07724	0.05561	0.04226	1.77145	0.48907
10	0.02771	0.02494	0.04283	0.12942	0.06560	0.05269	0.09287	0.06652	0.12630	1.24267
11	0.20635	0.03832	0.07632	0.16599	0.18377	0.12731	0.13440	0.16788	0.07458	0.11581
12	0.00412	0.00436	0.00753	0.02197	0.01039	0.01320	0.01805	0.01287	0.08639	0.03310
13	0.00342	0.00150	0.00195	0.00398	0.00672	0.00885	0.00917	0.00418	0.00286	0.00528
14	0.02427	0.00915	0.01326	0.06569	0.06146	0.03516	0.04795	0.07167	0.14897	0.08574
15	0.01921	0.04552	0.04436	0.12940	0.05033	0.03767	0.03951	0.03739	0.08680	0.05186
16	0.00120	0.00132	0.00076	0.00267	0.00648	0.00336	0.00287	0.00578	0.00854	0.00752
17	0.00241	0.00221	0.00976	0.03142	0.00999	0.01025	0.00924	0.01036	0.00648	0.00627
18	0.02576	0.02928	0.03453	0.09095	0.06388	0.06016	0.06230	0.05512	0.11649	0.07732
19	0.01129	0.01084	0.04200	0.08556	0.03137	0.02811	0.04748	0.04495	0.06420	0.04912
20	0.01142	0.02034	0.01565	0.06052	0.02063	0.02155	0.03549	0.03703	0.03047	0.03625
Total=r.j	**1.63920**	**1.75741**	**1.44814**	**2.08356**	**2.85710**	**2.31621**	**2.23233**	**2.53587**	**2.76195**	**2.41159**

Appendix 1.10 R MATRIX OF 1989

11	12	13	14	15	16	17	18	19	20	Sectors
0.09118	0.01395	0.01915	0.00729	0.00000	0.00836	0.01953	0.02561	0.01653	0.03688	1
0.03748	0.01658	0.02055	0.00527	0.00000	0.00451	0.02010	0.02451	0.01232	0.01499	2
0.01588	0.04741	0.04810	0.00801	0.00000	0.00440	0.02834	0.00747	0.00915	0.01032	3
0.10653	0.13241	0.11123	0.08519	0.00000	0.03884	0.06342	0.01872	0.01473	0.01070	4
0.00722	0.00443	0.00405	0.00248	0.00000	0.00154	0.01160	0.01237	0.00992	0.00843	5
0.08826	0.02268	0.02813	0.01408	0.00000	0.01171	0.03446	0.06125	0.03642	0.02148	6
0.04912	0.09604	0.04778	0.01970	0.00000	0.01273	0.09257	0.03022	0.05871	0.06113	7
0.08522	0.02047	0.02564	0.01250	0.00000	0.01117	0.02506	0.01643	0.02387	0.01771	8
0.07520	0.08160	0.12557	0.13796	0.00000	0.07989	0.16280	0.07294	0.04503	0.03343	9
0.08798	0.08780	0.10593	0.28395	0.00000	0.12388	0.09259	0.10952	0.05255	0.03114	10
1.65166	0.09096	0.19691	0.04929	0.00000	0.11165	0.09454	0.08282	0.07857	0.05175	11
0.01709	1.22320	0.04735	0.01324	0.00000	0.01042	0.33218	0.01230	0.02862	0.01345	12
0.02457	0.00373	1.09150	0.00304	0.00000	0.00274	0.01462	0.00592	0.00335	0.00333	13
0.08977	0.07625	0.05978	1.08811	0.00000	0.39301	0.04913	0.02624	0.02648	0.02318	14
0.05470	0.09426	0.08982	0.17818	1.00000	0.06917	0.07623	0.05389	0.02784	0.01522	15
0.00705	0.00294	0.00863	0.00295	0.00000	1.00696	0.00254	0.00321	0.00294	0.00177	16
0.00723	0.01262	0.02539	0.00461	0.00000	0.00319	1.00743	0.00960	0.00745	0.02832	17
0.08477	0.13172	0.09181	0.12636	0.00000	0.05667	0.11997	1.05254	0.11412	0.04188	18
0.06830	0.05054	0.07651	0.02479	0.00000	0.01880	0.04679	0.04788	1.08308	0.02009	19
0.05054	0.04177	0.03810	0.01649	0.00000	0.01097	0.03698	0.02576	0.02998	1.03215	20
2.69974	**2.25135**	**2.26195**	**2.08350**	**1.00000**	**1.98062**	**2.33090**	**1.69921**	**1.68167**	**1.47732**	**41.510**

Appendix 1.11 R MATRIX OF 1996

Sectors	1	2	3	4	5	6	7	8	9	10
1	1.09589	0.18844	0.00354	0.01175	0.80419	0.24505	0.01494	0.06857	0.00686	0.01178
2	0.00734	1.06082	0.00216	0.00669	0.01196	0.20379	0.00795	0.01062	0.00390	0.00648
3	0.00725	0.02063	1.11037	0.01070	0.00724	0.01370	0.28939	0.01717	0.01321	0.01651
4	0.02135	0.01784	0.01143	1.07130	0.02026	0.02379	0.04773	0.03499	0.12847	0.06604
5	0.00224	0.07325	0.00054	0.00156	1.02781	0.03257	0.00257	0.00228	0.00123	0.00178
6	0.00456	0.00555	0.00263	0.01617	0.02175	1.14760	0.01138	0.01039	0.00786	0.00947
7	0.02013	0.01798	0.02185	0.02981	0.02263	0.04572	1.49713	0.07191	0.05882	0.06960
8	0.00471	0.00373	0.00235	0.01031	0.00549	0.00840	0.03823	1.61488	0.00968	0.01564
9	0.05198	0.04246	0.04836	0.10840	0.05612	0.09467	0.16164	0.12732	1.96320	0.72788
10	0.04687	0.05279	0.03634	0.10906	0.05932	0.06556	0.17182	0.12773	0.13227	1.70023
11	0.33292	0.09802	0.07078	0.16021	0.27414	0.17312	0.21463	0.33438	0.06643	0.18538
12	0.00658	0.00646	0.00874	0.00914	0.00629	0.00618	0.01212	0.01151	0.01319	0.01183
13	0.00270	0.00116	0.00092	0.00235	0.00291	0.01014	0.01151	0.00387	0.00314	0.00432
14	0.02681	0.01598	0.01118	0.05544	0.03460	0.04137	0.09498	0.11181	0.13715	0.08817
15	0.01906	0.06228	0.03152	0.04286	0.02476	0.03601	0.06332	0.05969	0.03913	0.05080
16	0.00101	0.00071	0.00051	0.00311	0.00153	0.00305	0.00320	0.00469	0.00356	0.00391
17	0.00340	0.00160	0.00146	0.00941	0.00375	0.00433	0.00725	0.00941	0.00538	0.00772
18	0.07424	0.07527	0.05750	0.12779	0.19465	0.13042	0.24636	0.19639	0.14878	0.18607
19	0.01006	0.00790	0.00825	0.05733	0.01331	0.02367	0.03692	0.04012	0.03333	0.03706
20	0.01767	0.02723	0.01031	0.09377	0.02350	0.05106	0.07415	0.09572	0.05306	0.09160
Total=r.j	**1.75675**	**1.78010**	**1.44073**	**1.93718**	**2.61619**	**2.36021**	**3.00722**	**2.95346**	**2.82864**	**3.29229**

Appendix 1.11 R MATRIX OF 1996

11	12	13	14	15	16	17	18	19	20	Sectors
0.05730	0.01155	0.01278	0.00747	0.00424	0.02177	0.00996	0.01984	0.01608	0.03801	1
0.03683	0.00653	0.00744	0.00337	0.00257	0.00838	0.00586	0.01901	0.00544	0.00489	2
0.02588	0.11210	0.02673	0.00780	0.00318	0.01010	0.04114	0.00686	0.01170	0.01629	3
0.10336	0.21081	0.22836	0.05032	0.14245	0.04831	0.16001	0.02119	0.01923	0.03025	4
0.00538	0.00307	0.00166	0.00098	0.00091	0.00187	0.00209	0.00728	0.00215	0.00190	5
0.01460	0.01135	0.00846	0.00578	0.00684	0.00972	0.01047	0.04247	0.01228	0.00671	6
0.07670	0.16136	0.05629	0.03076	0.01135	0.03542	0.09505	0.02737	0.05157	0.07124	7
0.01992	0.01313	0.01076	0.03880	0.00331	0.02179	0.01151	0.01073	0.01036	0.02575	8
0.18219	0.14867	0.12743	0.29406	0.02927	0.26977	0.32344	0.09868	0.06675	0.13632	9
0.12421	0.15257	0.13343	0.53477	0.03817	0.25893	0.16143	0.14727	0.09536	0.10592	10
1.96016	0.16465	0.29072	0.08035	0.03740	0.30910	0.13372	0.06486	0.10028	0.16172	11
0.01895	1.10436	0.02153	0.01230	0.00340	0.01909	0.27137	0.00857	0.01304	0.02091	12
0.01337	0.00669	1.03644	0.00274	0.00101	0.00384	0.01789	0.00433	0.00372	0.00385	13
0.10345	0.10745	0.09843	1.18863	0.01683	0.36989	0.07176	0.03952	0.04058	0.04318	14
0.04618	0.05865	0.06943	0.03529	1.31210	0.04594	0.07605	0.06815	0.04026	0.03679	15
0.00386	0.00423	0.00305	0.00248	0.00152	1.03243	0.00364	0.00451	0.00538	0.00398	16
0.00765	0.01042	0.01157	0.02168	0.00193	0.01404	1.01357	0.00758	0.01349	0.00793	17
0.23499	0.19666	0.12499	0.10621	0.05635	0.17014	0.19412	1.15530	0.11179	0.10724	18
0.03470	0.03332	0.03822	0.01892	0.01876	0.05087	0.03500	0.02891	1.10857	0.02183	19
0.07816	0.05953	0.06336	0.06823	0.03192	0.07742	0.06242	0.05881	0.08727	1.08804	20
3.14785	**2.57710**	**2.37109**	**2.51093**	**1.72350**	**2.77882**	**2.70049**	**1.84125**	**1.81528**	**1.93277**	**Total=r.j**

Appendix 1.12 D MATRIX OF 1989

Unit: %

Sectors	1	2	3	4	5	6	7	8	9	10
1	31.35	10.17	10.07	0.15	28.31	22.80	0.48	4.69	0.00	0.04
2	20.74	66.78	0.12	0.01	0.52	17.19	0.03	0.97	0.00	0.01
3	0.02	0.05	16.09	8.86	1.04	0.62	18.61	0.07	0.06	0.15
4	0.01	0.11	0.10	1.99	1.52	1.53	1.89	0.86	8.17	1.98
5	0.02	1.37	0.72	0.03	47.50	3.04	0.25	0.64	0.00	0.11
6	0.03	2.06	1.48	1.11	4.29	25.83	0.92	0.49	0.67	0.91
7	0.19	0.72	1.08	0.87	0.38	5.00	45.46	1.87	0.49	4.47
8	0.06	0.12	0.79	2.62	0.52	1.54	1.01	66.17	0.23	1.52
9	0.04	0.19	0.85	0.80	0.40	3.62	0.70	0.34	57.23	38.73
10	2.52	2.16	9.93	12.78	1.72	2.15	6.00	2.29	3.99	26.71
11	35.51	1.64	14.29	13.66	4.00	4.79	7.36	7.34	1.36	6.91
12	0.18	0.28	0.47	0.62	0.11	0.35	0.93	0.33	5.17	0.68
13	0.04	0.08	0.12	0.02	0.21	0.70	0.70	0.07	0.03	0.33
14	3.06	0.39	1.49	6.77	2.67	1.53	3.27	4.34	9.28	4.57
15	1.81	6.51	14.18	17.51	1.83	1.59	1.70	1.27	3.03	1.93
16	0.03	0.13	0.00	0.12	0.38	0.22	0.17	0.38	0.55	0.63
17	0.31	0.14	3.25	4.59	0.48	0.90	0.57	0.64	0.00	0.29
18	3.02	3.44	8.20	9.21	2.50	4.08	4.04	2.42	5.58	4.07
19	0.22	0.95	12.88	10.54	1.06	1.47	3.15	2.55	3.09	2.99
20	0.84	2.72	3.88	7.75	0.57	1.06	2.78	2.27	1.06	2.95

Appendix 1.12 D MATRIX OF 1989

11	12	13	14	15	16	17	18	19	20	Sectors
5.14	0.02	0.04	0.00	0.00	0.00	0.34	1.59	0.38	10.18	**1**
0.77	0.83	1.15	0.02	0.00	0.00	0.89	2.24	0.48	2.03	**2**
0.20	3.58	5.02	0.00	0.00	0.00	0.81	0.47	0.01	0.68	**3**
7.44	14.87	12.26	10.80	0.00	0.01	1.60	1.10	0.20	0.41	**4**
0.09	0.08	0.04	0.00	0.00	0.00	0.78	1.60	1.15	1.68	**5**
5.47	0.70	1.00	0.10	0.00	0.14	2.28	12.42	5.47	5.01	**6**
1.84	7.75	2.83	0.16	0.00	0.19	6.56	3.29	9.22	16.19	**7**
3.66	0.54	0.66	0.10	0.00	0.15	1.04	1.19	2.48	2.94	**8**
1.37	2.77	6.18	2.04	0.00	2.45	10.13	3.76	2.51	3.35	**9**
2.58	3.67	7.16	34.57	0.00	2.86	5.42	21.58	5.90	4.39	**10**
51.34	3.37	14.14	0.39	0.00	12.10	4.00	9.75	8.83	7.44	**11**
0.48	28.10	3.64	0.31	0.00	0.53	42.77	0.75	4.97	0.42	**12**
1.78	0.10	13.26	0.14	0.00	0.03	1.72	0.98	0.26	0.61	**13**
5.22	6.47	3.62	9.89	0.00	78.02	1.14	2.31	2.92	4.99	**14**
1.49	7.39	8.03	24.86	0.00	0.18	5.26	11.29	3.19	1.48	**15**
0.45	0.17	0.97	0.12	0.00	1.17	0.03	0.51	0.48	0.42	**16**
0.02	0.75	2.90	0.01	0.00	0.19	0.14	2.01	1.22	11.24	**17**
3.91	12.48	7.25	15.79	0.00	0.83	9.83	8.67	25.60	11.06	**18**
3.79	3.15	7.03	0.44	0.00	0.91	2.71	9.77	19.04	4.58	**19**
2.96	3.22	2.82	0.25	0.00	0.24	2.55	4.74	5.68	10.89	**20**

Appendix 1.13 D MATRIX OF 1996

Unit: %

Sectors	1	2	3	4	5	6	7	8	9	10
1	26.76	29.45	0.14	0.01	80.26	23.35	0.11	4.20	0.03	0.02
2	0.12	14.37	0.00	0.01	0.17	25.23	0.01	0.12	0.00	0.00
3	0.34	3.61	43.78	0.70	0.00	0.02	20.97	0.04	0.00	0.07
4	0.07	0.63	0.04	11.56	0.01	0.26	1.20	0.07	8.04	0.32
5	0.32	17.68	0.00	0.00	2.73	2.30	0.04	0.01	0.00	0.01
6	0.19	0.24	0.03	2.10	1.27	18.96	0.06	0.11	0.03	0.06
7	1.00	1.33	4.23	1.54	0.22	2.53	38.54	2.63	2.24	1.85
8	0.09	0.14	0.10	0.55	0.01	0.23	1.52	51.99	0.05	0.33
9	1.33	0.98	5.55	4.73	0.02	3.03	2.28	1.52	67.61	27.78
10	3.21	4.28	5.10	7.95	0.09	0.94	4.15	1.89	1.88	48.40
11	52.74	3.35	12.83	14.90	1.14	4.81	6.29	12.23	0.64	5.50
12	0.69	0.84	2.68	0.52	0.00	0.04	0.24	0.23	0.59	0.16
13	0.06	0.00	0.02	0.04	0.01	1.05	0.69	0.02	0.11	0.09
14	1.62	0.63	0.50	6.49	0.78	2.01	4.33	5.69	7.62	1.51
15	1.95	10.03	8.01	4.62	0.12	0.94	1.93	2.28	1.13	1.36
16	0.04	0.00	0.01	0.38	0.02	0.24	0.09	0.23	0.16	0.12
17	0.50	0.01	0.21	1.42	0.01	0.19	0.19	0.38	0.04	0.26
18	8.07	8.29	14.50	16.74	12.85	8.60	12.79	9.34	6.87	6.81
19	0.71	0.42	1.59	10.14	0.17	1.67	1.52	1.98	1.34	1.23
20	0.19	3.70	0.68	15.62	0.14	3.62	3.05	5.05	1.64	4.12

Appendix 1.13 D MATRIX OF 1996

11	12	13	14	15	16	17	18	19	20	Sectors
2.59	0.02	0.04	0.00	0.01	0.96	0.03	0.27	1.49	6.80	1
1.99	0.00	0.00	0.00	0.04	0.00	0.00	2.35	0.14	0.01	2
0.51	9.49	1.84	0.00	0.01	0.00	0.24	0.04	0.03	0.01	3
4.88	23.01	30.99	2.99	25.57	0.35	10.43	0.25	0.28	1.23	4
0.09	0.17	0.02	0.00	0.06	0.00	0.01	1.19	0.22	0.18	5
0.25	0.13	0.05	0.07	0.53	0.17	0.07	8.58	1.61	0.37	6
2.52	12.48	3.41	0.09	0.50	0.24	3.56	2.04	6.08	9.12	7
0.46	0.16	0.16	3.27	0.08	0.42	0.21	0.96	0.72	3.17	8
3.65	3.15	2.73	4.61	0.09	8.42	16.45	2.83	0.63	9.37	9
1.29	4.28	4.95	49.63	1.54	5.16	6.05	17.14	7.96	9.28	10
60.36	5.81	19.92	0.20	0.79	18.31	3.35	3.09	8.02	15.26	11
0.75	12.76	2.01	0.31	0.22	1.11	34.76	0.86	1.41	3.55	12
0.73	0.45	5.58	0.10	0.06	0.03	2.01	0.68	0.46	0.40	13
4.16	7.90	8.90	24.61	0.91	39.75	1.32	4.51	4.62	3.52	14
0.92	2.82	5.76	1.52	59.42	1.83	4.56	10.64	4.91	3.99	15
0.13	0.28	0.19	0.11	0.15	4.22	0.15	0.85	1.04	0.68	16
0.18	0.64	1.06	2.96	0.00	0.68	1.12	1.31	2.74	1.33	17
10.63	13.25	6.44	4.39	5.57	9.90	11.60	28.18	16.25	12.54	18
1.10	1.28	2.59	0.37	1.66	4.27	1.51	4.73	24.92	2.65	19
2.82	1.92	3 38	4.79	2.78	4.17	2.56	9.51	16.46	16.54	20

Appendix 1.14 D^m MATRIX OF 1996

Unit: %

Sectors	1	2	3	4	5	6	7	8	9	10
1	0.256	0.003	0.000	0.000	0.449	1.452	0.021	2.301	0.000	0.003
2	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.001	0.410	0.000	0.000	0.000
4	0.000	0.000	0.000	0.684	0.000	0.001	0.000	0.000	0.042	0.000
5	0.000	1.342	0.000	0.000	0.258	0.075	0.000	0.000	0.000	0.000
6	0.000	0.002	0.000	0.009	0.193	2.836	0.001	0.001	0.000	0.005
7	0.002	0.000	0.005	0.114	0.001	0.147	9.354	0.413	0.023	0.038
8	0.000	0.040	0.000	0.109	0.000	0.025	0.111	25.955	0.003	0.005
9	0.351	0.120	5.510	1.679	0.012	2.305	0.793	0.839	38.229	13.324
10	2.598	4.187	4.109	5.367	0.038	0.337	1.702	1.075	0.792	33.290
11	46.145	0.879	2.772	6.321	0.907	2.354	3.932	9.054	0.341	3.582
12	0.000	0.000	1.184	0.002	0.001	0.005	0.015	0.027	0.000	0.001
13	0.000	0.000	0.005	0.018	0.000	0.855	0.031	0.008	0.026	0.046
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	1.895	10.023	7.834	4.353	0.102	0.846	1.929	2.055	1.063	1.286
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.541	0.225	2.175	2.224	0.218	0.669	1.174	0.781	0.393	0.403
19	0.296	0.202	0.463	0.444	0.067	0.377	0.544	0.736	0.519	0.322
20	0.001	0.001	0.001	0.157	0.000	0.200	0.439	0.556	0.087	0.040
Total	**52.1**	**17.0**	**24.1**	**21.5**	**2.2**	**12.5**	**20.5**	**43.8**	**41.5**	**52.3**

Appendix 1.14 D^m MATRIX OF 1996

11	12	13	14	15	16	17	18	19	20	Sectors
0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.081	0.002	0.000	1
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3
0.004	0.147	0.026	0.823	19.500	0.000	0.055	0.001	0.000	0.130	4
0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.042	5
0.001	0.002	0.000	0.000	0.017	0.006	0.003	0.990	0.025	0.015	6
0.144	2.059	0.005	0.006	0.000	0.067	0.072	0.440	1.143	4.113	7
0.117	0.005	0.031	0.014	0.000	0.003	0.010	0.142	0.001	0.975	8
0.752	1.113	1.339	0.092	0.053	2.364	11.305	1.218	0.137	5.508	9
0.511	2.121	3.591	37.752	0.405	3.601	3.019	15.384	5.760	5.497	10
39.368	3.664	13.786	0.068	0.269	8.369	2.323	1.446	0.430	10.697	11
0.006	2.373	0.010	0.004	0.000	0.026	5.165	0.081	0.000	0.067	12
0.410	0.279	3.400	0.009	0.021	0.024	1.310	0.276	0.002	0.030	13
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14
0.878	2.455	4.832	0.827	52.887	1.795	4.551	10.468	4.886	3.849	15
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17
0.435	1.296	0.400	0.249	0.414	1.155	1.507	3.493	0.961	1.077	18
0.356	0.508	0.917	0.012	0.205	0.233	0.559	1.493	4.712	0.607	19
0.080	0.116	0.400	0.454	0.000	0.129	0.243	0.171	0.021	4.112	20
43.3	16.1	28.7	40.3	73.8	17.8	30.1	35.7	18.1	36.7	Total

Appendix 1.15 S MATRIX OF 1989

Unit: %

Sectors	1	2	3	4	5	6	7	8	9	10
1	18.09	3.10	0.61	0.01	2.09	9.08	0.05	0.90	0.00	0.01
2	26.15	44.53	0.02	0.00	0.08	14.95	0.01	0.41	0.00	0.00
3	0.19	0.25	15.81	10.94	1.23	3.96	32.93	0.22	0.03	0.36
4	0.09	0.50	0.09	2.28	1.68	9.10	3.09	2.46	3.69	4.44
5	0.18	6.15	0.64	0.03	51.35	17.73	0.41	1.80	0.00	0.24
6	0.06	2.31	0.33	0.31	1.16	37.68	0.37	0.35	0.07	0.50
7	0.63	1.26	0.38	0.39	0.16	11.52	28.88	2.08	0.09	3.89
8	0.20	0.19	0.26	1.08	0.21	3.30	0.59	68.47	0.04	1.23
9	0.14	0.37	0.33	0.39	0.19	9.33	0.50	0.42	11.20	37.66
10	5.06	2.29	2.10	3.40	0.44	2.97	2.29	1.53	0.42	13.94
11	46.91	1.14	1.99	2.40	0.68	4.37	1.85	3.23	0.09	2.38
12	0.57	0.47	0.16	0.27	0.05	0.79	0.58	0.36	0.88	0.57
13	1.27	1.33	0.40	0.08	0.84	15.19	4.20	0.72	0.05	2.66
14	16.39	1.11	0.84	4.81	1.83	5.64	3.33	7.74	2.60	6.38
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	1.98	4.62	0.00	1.03	3.14	9.97	2.05	8.31	1.87	10.73
17	2.33	0.56	2.60	4.60	0.47	4.67	0.81	1.61	0.00	0.57
18	3.39	2.04	0.97	1.37	0.36	3.17	0.86	0.90	0.33	1.19
19	0.48	1.09	2.93	3.02	0.29	2.19	1.29	1.83	0.35	1.68
20	3.36	5.79	1.65	4.14	0.29	2.94	2.12	3.04	0.22	3.09

Appendix 1.15 S MATRIX OF 1989

11	12	13	14	15	16	17	18	19	20	Sectors
0.58	0.00	0.00	0.00	0.00	0.00	0.09	0.66	0.10	1.15	**1**
0.19	0.24	0.02	0.00	0.00	0.00	0.51	2.03	0.29	0.50	**2**
0.36	7.49	0.77	0.00	0.00	0.00	3.41	3.16	0.04	1.24	**3**
12.60	28.84	1.75	11.52	0.00	0.00	6.26	6.80	0.80	0.68	**4**
0.14	0.15	0.01	0.01	0.00	0.00	3.00	9.75	4.61	2.78	**5**
2.28	0.33	0.03	0.03	0.00	0.00	2.19	18.86	5.47	2.07	**6**
1.21	5.83	0.16	0.07	0.00	0.01	9.95	7.89	14.55	10.58	**7**
2.24	0.38	0.03	0.04	0.00	0.00	1.47	2.66	3.64	1.79	**8**
1.01	2.33	0.38	0.95	0.00	0.10	17.19	10.10	4.43	2.45	**9**
1.02	1.65	0.24	8.58	0.00	0.06	4.94	31.10	5.59	1.72	**10**
13.35	1.00	0.31	0.06	0.00	0.17	2.40	9.26	5.51	1.92	**11**
0.31	20.54	0.20	0.12	0.00	0.02	63.09	1.75	7.63	0.27	**12**
10.97	0.72	6.87	0.56	0.00	0.01	24.53	22.04	3.88	3.72	**13**
5.50	7.80	0.32	6.56	0.00	4.44	2.77	8.88	7.39	5.23	**14**
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**15**
5.79	2.45	1.05	0.95	0.00	0.81	0.75	24.14	14.85	5.35	**16**
0.03	1.28	0.36	0.01	0.00	0.02	0.48	10.92	4.37	16.61	**17**
0.86	3.16	0.13	2.20	0.00	0.01	5.02	7.00	13.59	2.43	**18**
1.61	1.53	0.25	0.12	0.00	0.02	2.66	15.15	19.42	1.93	**19**
2.34	2.91	0.19	0.13	0.00	0.01	4.65	13.69	10.78	8.57	**20**

Appendix 1.16 S MATRIX OF 1996

Unit: %

Sectors	1	2	3	4	5	6	7	8	9	10
1	9.42	6.47	0.00	0.00	56.10	8.65	0.02	1.32	0.00	0.00
2	0.21	15.63	0.00	0.01	0.58	46.27	0.01	0.19	0.00	0.00
3	1.41	9.33	10.55	1.43	0.01	0.07	54.92	0.16	0.00	0.14
4	0.13	0.77	0.01	11.11	0.03	0.53	1.48	0.13	2.66	0.31
5	0.53	17.95	0.00	0.00	8.82	3.93	0.04	0.01	0.00	0.00
6	0.34	0.27	0.00	1.84	4.49	35.55	0.06	0.17	0.01	0.05
7	1.59	1.33	0.39	1.20	0.68	4.25	38.79	3.74	0.60	1.43
8	0.14	0.13	0.01	0.41	0.02	0.36	1.45	70.23	0.01	0.24
9	1.68	0.78	0.41	2.95	0.05	4.05	1.83	1.72	14.54	17.09
10	2.98	2.48	0.27	3.62	0.16	0.92	2.42	1.56	0.29	21.69
11	35.10	1.39	0.50	4.87	1.51	3.37	2.64	7.27	0.07	1.77
12	0.96	0.73	0.22	0.35	0.01	0.06	0.21	0.29	0.14	0.11
13	0.75	0.02	0.02	0.25	0.35	14.90	5.91	0.22	0.24	0.61
14	3.39	0.83	0.06	6.69	3.24	4.43	5.73	10.66	2.70	1.53
15	4.20	13.51	1.00	4.89	0.50	2.14	2.64	4.40	0.41	1.42
16	1.06	0.04	0.01	4.84	0.81	6.64	1.56	5.36	0.69	1.48
17	0.87	0.01	0.02	1.21	0.02	0.35	0.21	0.59	0.01	0.22
18	3.64	2.33	0.38	3.71	11.50	4.08	3.64	3.76	0.52	1.48
19	0.92	0.34	0.12	6.44	0.42	2.27	1.24	2.29	0.29	0.77
20	0.22	2.63	0.05	8.75	0.33	4.34	2.19	5.15	0.32	2.27

Appendix 1.16 S MATRIX OF 1996

11	12	13	14	15	16	17	18	19	20	Sectors
0.45	0.00	0.00	0.00	0.00	0.01	0.01	0.12	0.41	1.66	1
1.71	0.00	0.00	0.00	0.00	0.00	0.00	4.93	0.19	0.01	2
1.04	18.14	0.30	0.00	0.00	0.00	1.68	0.18	0.09	0.04	3
4.70	20.75	2.37	1.71	0.39	0.03	34.23	0.58	0.43	1.67	4
0.07	0.13	0.00	0.00	0.00	0.00	0.04	2.33	0.27	0.20	5
0.22	0.10	0.00	0.04	0.01	0.01	0.21	18.41	2.24	0.46	6
1.98	9.17	0.21	0.04	0.01	0.02	9.53	3.92	7.57	10.08	7
0.35	0.11	0.01	1.44	0.00	0.03	0.54	1.75	0.85	3.32	8
2.29	1.85	0.14	1.71	0.00	0.44	35.11	4.34	0.63	8.26	9
0.59	1.83	0.18	13.41	0.01	0.20	9.40	19.11	5.75	5.96	10
19.83	1.78	0.52	0.04	0.00	0.50	3.75	2.47	4.16	7.05	11
0.51	8.17	0.11	0.13	0.00	0.06	80.98	1.43	1.53	3.42	12
4.88	2.81	2.95	0.38	0.01	0.02	45.59	11.07	4.82	3.78	13
4.31	7.64	0.73	15.07	0.01	3.45	4.66	11.41	7.57	5.13	14
0.98	2.81	0.49	0.96	1.01	0.16	16.54	27.64	8.27	5.98	15
1.65	3.41	0.19	0.85	0.03	4.57	6.40	26.60	21.15	12.38	16
0.15	0.51	0.07	1.49	0.00	0.05	3.24	2.73	3.70	1.60	17
2.36	2.75	0.11	0.58	0.02	0.18	8.78	15.30	5.71	3.92	18
0.70	0.76	0.13	0.14	0.02	0.23	3.27	7.37	25.13	2.38	19
1.58	1.01	0.15	1.59	0.02	0.20	4.90	13.06	14.63	13.07	20

Appendix 1.17

THE DISTRIBUTION OF IMPORTED PRODUCTS FOR FINAL DEMAND

Unit: %

Sector	Import of final demand	Of which	
		Final expenditure	Capital formation
1	100	99.2	0.8
2	100	98.6	1.4
3	100	98.8	1.2
4	100	0	100
5	100	98.7	1.3
6	100	100.2	-0.2
7	100	95.1	4.9
8	100	85.7	14.3
9	100	8.2	91.8
10	100	48.7	51.3
11	100	86.5	13.5
12	100	0	100
13	100	110.5	-10.5
14	-	-	-
15	100	82.3	17.7
16	-	-	-
17	-	-	-
18	100	96.7	3.3
19	100	100	0
20	100	98.9	1.1
Total	100	73.0	27.0

Appendix 1.18 VECTORS OF 1989

i	q	u	k
1	1.0972	2.4897	19.19
2	0.9754	3.0213	58.20
3	0.7346	2.2227	20.45
4	0.9499	2.1621	45.93
5	0.8539	3.4638	66.33
6	0.8578	2.5654	28.39
7	1.0311	2.9247	89.29
8	1.0586	3.7450	32.14
9	1.6509	3.7635	63.93
10	1.3717	2.5610	32.34
11	1.7822	3.3695	77.92
12	0.9202	2.6511	76.65
13	0.5785	2.3401	109.83
14	1.1541	2.3401	86.44
15	1.0607	2.0527	72.39
16	0.5201	2.1617	64.82
17	0.5802	2.1500	9.36
18	1.1735	2.1407	20.59
19	0.8922	2.2572	19.41
20	0.7575	2.1672	19.99

Appendix 1.19

VECTORS OF 1996

i	q	u	g	k (%)	m^	E^n (Mill.VND)
1	1.1188	2.4532	0.26687	61.363	0.0032	12747414
2	0.6004	2.0021	0.00072	24.189	0.0000	4141605
3	0.7464	2.1027	0.44852	81.434	0.0002	73335
4	1.0375	1.9676	0.01728	34.787	0.0006	16958896
5	0.4953	1.9315	0.04794	8.939	0.0009	10540814
6	0.5767	2.1463	0.11992	19.706	0.0030	9839751
7	1.0439	2.7456	0.18471	64.033	0.0077	3678966
8	0.7935	3.0240	0.21315	31.117	0.0157	13527224
9	2.1357	3.6481	3.17368	94.178	0.0282	-1908741
10	1.7960	3.0960	0.77950	40.192	0.0460	-2736114
11	2.2009	3.4705	0.51443	79.111	0.0665	-6669986
12	0.6694	2.0958	0.25303	90.549	0.0065	653582
13	0.4800	1.9473	0.40123	56.530	0.0026	241095
14	1.1387	2.1947	0.00000	86.031	0.0000	0
15	0.9365	2.3909	0.96523	72.894	0.0290	-2946360
16	0.4603	1.9436	0.00000	63.920	0.0000	0
17	0.4912	1.8993	0.00000	4.034	0.0000	0
18	1.6445	1.9683	0.12782	44.945	0.0090	19303694
19	0.6996	2.0418	0.06429	18.102	0.0063	3904257
20	0.9344	1.9547	0.07990	33.462	0.0031	2705828

Appendix 1.20 MULTIPLIER DECOMPOSITION ANALYSIS

i	X^1-X^0	$(R_1-R_0)*Y_0$ (Mill. VND)	$R_0*(Y_1-Y_0)$ (Mill. VND)	$(R_1-R_0).(Y_1-Y_0$	$R_0.M_0-R_1.M_1$
1	65593405	-72833	64417703	18921459	-17672923
2	32593116	-1561568	53188145	-16446270	-2587192
3	4553651	220945	7155389	1329205	-4151888
4	25953000	429324	30180298	6612888	-11269511
5	48853689	-164912	80125633	-28035464	-3071568
6	32203292	-692393	49616316	-10298582	-6422049
7	15822578	197978	27472753	2097791	-13945945
8	25537837	-589545	51369317	-7974519	-17267415
9	5143735	2251244	38442657	27301817	-62851983
10	12240163	2398650	61113966	26325216	-77597669
11	13117634	2332858	56151634	24977348	-70344206
12	13670367	-313812	23256954	-4992127	-4280649
13	1407844	-13212	3859389	-238765	-2199568
14	11432901	358555	18625651	3522453	-11073759
15	441995	227803	22050308	657145	-22493261
16	1241013	2604	1850670	-143812	-468449
17	51418545	-45132	53341096	-911243	-966176
18	65887107	2302135	66285164	30329214	-33029406
19	42808219	-189041	55176945	-2717149	-9462537
20	38100708	1019334	38379082	12132081	-13429789

Appendix 1.21

VECTORS OF 1989

j	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
p	0.78979	0.84675	0.69774	1.00389	1.37660	1.11599	1.07557	1.22182	1.33075	1.16194	1.30078	1.08474	1.08984	1.00387	0.48182	0.95429	1.12307	0.81871	0.81025	0.71180
z	2.40931	3.01984	2.21066	2.15709	3.46216	2.56691	2.93168	3.71982	3.73429	2.73992	3.45484	2.55181	2.26627	2.34585	2.15475	2.22957	2.14354	2.21209	2.28154	2.17876

VECTORS OF 1996

j	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
p	0.74169	0.75154	0.60826	0.81786	1.10453	0.99646	1.26962	1.24693	1.19423	1.38998	1.32899	1.08803	1.00105	1.06010	0.72765	1.17320	1.14012	0.77736	0.76640	0.81600
z	2.09579	1.96954	2.07114	1.97971	2.36049	2.13139	2.78019	2.99683	3.64626	3.34290	3.62091	2.03358	1.94132	2.37238	2.45197	2.02895	1.91343	2.13569	2.04574	2.01051
h	52.09	17.03	24.06	21.48	2.25	12.49	20.46	43.80	41.52	52.34	43.31	16.14	28.74	40.31	73.77	17.77	30.12	35.69	18.08	36.72

APPENDIX II

Appendix II

APPENDIX 2.1 CGE MODEL SYSTEM EQUATIONS

All equations are described for year t, so that index t is ignored in every equation. All letters with bar on the top are exogenous variables. I denote production sector.

Price relations:

(1) $PM_i = (1 + \overline{tm_i}).\ \overline{PM\$_i}\ .\ ER$

(2) $PE\$_i = \dfrac{PX_i \cdot (1 + \overline{te_i})}{ER}$

(3) $P_i = \dfrac{(PX_i \cdot D_i + PM_i \cdot M_i)}{Q_i}$, where $Q_i = \overline{B_i} \cdot M_i^{\beta_i} \cdot D_i^{1-\beta_i}$

(4) $PN_i = PX_i - \sum_{j=1}^{m} P_j \cdot \bar{a}_{ji} - PX_i \cdot \bar{t}_{di}$.

Production functions:

(5) $X_i^S = (1 - \overline{GXO_i}) \bullet \bar{A}_i \bullet L_i^{\alpha_i} \bullet K_i^{1-\alpha_i}$

Labour market conditions:

(6) $L_i = \dfrac{\alpha_i \cdot PN_i \cdot X_i^S}{W_i}$, where W_i are exogenous (i - 2 ... 5)

(7) $L_1 = \overline{L^S} - \sum_{i=2}^{5} L_i$ (Labour in aggregated Agriculture is residual)

(6-1)' $L_i = \dfrac{\alpha_i \cdot PN_i \cdot X_i^S}{W_i}$ (i = 2 ... 5)

(6-2)' $W_i = \lambda_i \bullet W_n$ and $L_i^e = \lambda_i . L_i$ (i = 2 ... 5)

(7-1)' $\sum_{i=2}^{5} L_i^e = L_n$ in position $W_n = W_n^e$,

where W_n^e = average labour income of non- agricultural sectors

(7-2)' $L_n = \overline{L^S} - L_1$, where L_1 is exogenous

(8) $W_1 = \dfrac{\alpha_1 \cdot PN_1 \cdot X_1^S}{L_1}$ (W_1= average labour income of agriculture)

(9) $W = \dfrac{\sum W_i \cdot L_i}{L^S}$

Appendix II

Capital market conditions:

(10) $K_i = \overline{K_i}$ (Endogenous or exogenous depend on θ, eq. 48)

(11) $R_i = \dfrac{(1-\alpha_i)\cdot PN_i \cdot X_i^s}{K_i}$

(12) $R = \dfrac{\sum R_i \cdot K_i}{\overline{K^s}}$, where $\overline{K^s} = \sum \overline{K_i}$

Income and saving:

(13) $Y_L = (1-\overline{t_{YL}})\cdot W \cdot \overline{L}^s$

(14) $Y_K = (1-\overline{t_{YK}})\cdot R \cdot \overline{K}^s$

(15)

$$Y_G = \overline{t_{YL}}\cdot W\cdot \overline{L}^s + \overline{t_{YK}}\cdot R\cdot \overline{K}^s + \sum_{i=1}^{m}\overline{t_{di}}\cdot PX_i\cdot X_i^s + \sum_{i=1}^{m}\overline{t_{mi}}\cdot PM\$_i\cdot M_i\cdot ER + \sum_{i=1}^{m}\overline{t_{ei}}\cdot PX_i\cdot E_i$$

(16) $S = \overline{Sp}\cdot(Y_L + Y_K) + \overline{S_G}\cdot Y_G$

Private consumption expenditure:

(17) $C_i = \dfrac{\gamma_i\cdot(1-\overline{S_p})\cdot(Y_L+Y_K)}{P_i}$, where $(\sum \gamma_i = 1)$

(18) $C = \sum_{i=1}^{m} C_i$

(19) $PC = \dfrac{\left[(1-\overline{sp})\cdot(Y_L+Y_K)\right]}{C}$, where $(PC\cdot C \equiv \sum P_i\cdot C_i)$

Government consumption expenditure:

(20) $G = \dfrac{(1-\overline{S_g})\cdot Y_G}{PG}$.

(21) $G_i = \overline{b_{Gi}}\cdot G$, $\sum_{i=1}^{m}\overline{b_{Gi}} = 1$

(22) $PG = \sum_{i=1}^{m}\overline{b_{Gi}}\cdot P_i$, $PG\cdot G \equiv \sum_{i=1}^{m} P_i\cdot G_i$

Capital formation:

(23) $I = \dfrac{\bar{I}''}{PI}$, where $\bar{I}''$ - exogenous

(24) $I_i = \overline{b_{Ii}}\cdot I$ $(\sum \overline{b_{Ii}} = 1)$

(25) $PI = \sum \overline{b_{Ii}}\cdot P_i$ $(PI\cdot I \equiv \sum P_i\cdot I_i)$

Net capital foreign inflows:

(26) $F = F\$\cdot ER$ or $F = \bar{I}'' - S$

(27) $F\$ = F\$(.)$ or $F\$ = \dfrac{F}{ER}$

Demand side:

Appendix II

(28) $Q_i = \sum \overline{a_{ij}} \cdot X_j^S + C_i + G_i + I_i$

(29) $d_i = \frac{1}{B_i} \cdot \left[\frac{\beta_i}{1-\beta_i} \cdot \frac{PX_i}{PM_i} \right]^{\beta_i}$, where: $d_i = \frac{D_i}{Q_i}$

(30) $D_i = d_i \cdot Q_i$, where $Q_i = \sum_{j=1}^{m} \overline{a_{ij}} \cdot X_j^S + C_i + G_i + I_i$.

(31) $M_i = \frac{\beta_i}{1-\beta_i} \cdot \frac{PX_i}{PM_i} \cdot D_i$

(32) $E_i = \overline{E_i} \cdot \left(\frac{\Pi_i}{PE\$_i} \right)^{\eta_i}$

(33) $X_i^D = D_i + E_i$

Equilibrium conditions:

(34) $X_i^D = X_i^S$ νμ $PX_i = PX_i^e$, where PX^e in equilibrium position

(35) $\sum PM\$_i \cdot M_i - \sum PE\$_i \cdot E_i - F\$ = 0$

and $ER = ER^e$, where ER^e in equilibrium position

Relations of SNA (System of National accounts) and macroeconomic closures:

(36) $E = \sum E_i$

(37) $PE = \frac{\sum PX_i \cdot \left(1 + \overline{te_i}\right) \cdot E_i}{E}$

(38) $M = \sum M_i$

(39) $PM = \frac{\sum \left(\frac{PM_i}{\left(1 + \overline{tm_i}\right)} \right) \cdot M_i}{M}$

(40) $GDP^n = Y_L + Y_K + Y_g =$

$$\sum \left(PX_i - \sum P_i \bullet \overline{a_{ij}} \right) \bullet X_i^S + \sum \overline{tm_i} \bullet \overline{PM\$_i} \bullet ER \bullet M_i + \sum \overline{te_i} \bullet PX_i \bullet E_i$$
$$= PC \cdot C + PG \cdot G + PI \cdot I + PE \cdot E - PM \cdot M$$

(41) $GDP = C + G + I + E - M$

(42) $GDP = GDP^n / GDP$

(43) $GDP_i^n = \left(PX_i - \sum P_i \cdot \overline{a_{ij}} \right) \cdot X_i^S$

(44) $GDP_i = \left(1 - \sum \overline{a_{ij}} \right) \cdot X_i^S$

(45) $PGDP_i = \frac{GDP_i^n}{GDP_i}$

Walras law for equations: (8), (11), (25), (26), (34) and (35):

Appendix II

$$(46)\ W.\left(L^D-\overline{L^S}\right)+R.\left(\sum K_i-\overline{K^S}\right)+\sum PX_i.\left(X_i^D-X_i^S\right)$$
$$+\left(S+F-I^n\right)+ER.\left(\sum \overline{PM\$_i}.M_i-\sum PE\$_i.E_i-F\$\right)\equiv 0$$

Inter - temperal change for time t (t = 1(1996), ..., 15 (2010))

$$(47)\ K_{t+1}^S=K_t^S+I_t-\delta\bullet K_t^S$$

$$(48)\ \left(\frac{K_i}{K^s}\right)_{t+1}=\left(\frac{K_i}{K^s}\right)_t.\left[1+\mu.\frac{(R_{i,t}-R_t)}{R_t}\right]$$

or $\left(\frac{K_i}{K^S}\right)_{t+1}=\theta i$ (Policy variables)

Walras law is expended:

$$(46')\ W.(L^D-L^S)+R.(\sum K_i-\overline{K}^S)+\sum PX_i.(X_i^D-X^S)+(M^D-M^S)+(\sum \overline{PM\$_i}.M_i-\sum PE\$_i.E_i-F\$)\equiv 0$$

Where: $S + F - I^n = \Delta M^d - \Delta M^S = M^d - M^S$

$\Delta M^d = M^d - M^d_{-1}$, $\Delta M^S = M^S - M^S_{-1}$, $M^d_{-1} \equiv M^S_{-1}$

$$\frac{M^d}{PGDP}=\overline{M_0}\bullet GDP^v$$

and $M^S=\overline{M^S}$ (or $I^n=\overline{I^n}$ or $F=\overline{F}$)

APPENDIX 2.2

List of variables and parameters

Denote:	Meaning:
PX_i	Output price of domestic produced commodity
PM_i	Import price in local currency
$PM\$_i$	Import price in US dollar
$PE\$_i$	Export price in US dollar
P_i	Price of composite good
PN_i	Price of net output, or value added per unit of output
W_i	Wage rate
W_n	Average wage rate of non - agricultural sectors
W	Overall average wage rate
R_i	Rental rate of capital
R	Overall average rental rate of capital
ER	Exchange rate per US dollar
PC	Deflator of private consumption expenditure
PG	Deflator of government consumption expenditure
PI	Deflator of gross capital formation
PE	Deflator of export
PM	Deflator of import
$PGDP$	Deflator of gross domestic product

Quantity variables:

Denote	Meaning
X_i^s	Supply of gross output
X_i^D	Demand for gross output
L_i	Demand for labour
L_i^c	Labour demand in compatible with equilibrium
K_i	Existing supply of capital stock
C_i	Government consumption demand for gross output
G_i	Government demand for gross output
I_i	Investment demand
Q_i	Quantity of composite goods
D_i	Domestic demand for gross output
M_i	Import demand
E_i	Export demand by foreign country
L^s	Total labour supply
L_n^s	Total labour supply of non-agricultural sectors
L^D	Total demand for labour in performing unit
K^S	Total supply of capital stock
K^D	Total demand for capital stock
$K^D{}_i$	Existing demand for capital stock
$K^D{}_i$	Total real private consumption expenditure

Appendix II

C	Real government consumption expenditure
G	Real gross capital formation
I	Real export
E	Real import
M	Real GDP
GDP	

Ratio variable

d_i	Domestic demand ratio of composite goods

Nominal variables

Y_L	Labour income
Y_K	Capital income
Y_G	Government income
S	Gross national saving
I^n	Nominal gross investment
GDP^n	Nominal GDP
F	Nominal foreign inflows
$F\$$	Net capital inflow in US dollar
M^D	Demand for money (M2)
M^S	Supply of money (M2)

Parameters

Function parameters:

$\bar{A}_t$ = parameter that will dynamically reflect disembodied technical progress

α_i = the share of labour income in total value added.

λ_i = uneven wage rate of non agricultural sector i to their an average

a_{ij} = coefficient of intersectoral intermediate input;

$\bar{B}_i$ = scale factor Cobb - Dauglass composite goods function.

β_i = import share of Cobb - Dauglass composite goods function

E_t^0 = scale factor of export production function

η_i = price elasticity of export function

$\bar{M}^0$ = scale factor for real demand for money

υ = elasticity of real demand for money with respect to real GDP

γ_i = the share of consumer goods of Cobb-Douglass utility function

Share and ratios:

$\bar{h}_{G_i}$ = share of real government consumption expenditure

h_{Ii} = share of real investment in sector i

Appendix II

$\bar{s}_l$ = saving rate of labour income
$\bar{s}_K$ = saving rate of capital income
$\bar{s}_G$ = saving rate of government income
δ = depreciation rate of capital stock
μ = is intersectoral mobility of investable funds;

Tax parameters:
$\overline{t_{YL}}$ = labour income tax
$\bar{t}_{YK}$ = capital income tax
$\overline{td_i}$ = indirect tax
$\overline{tm_i}$ = import tax
$\overline{te_i}$ = export tax

APPENDIX 2.3
DATA FOR BENCHMARK CALIBRATION (1996)

	Aggregated agriculture (A)	Manufacturing (M1)	Other industries (M2)	Construction (C)	Services (S)	Whole economy
1. Coefficient of intersectoral intermediate input						
Aggregated agriculture (A)	0.1064	0.2560	0.0035	0.0035	0.0337	0.1210
Manufacturing (M1)	0.1458	0.3266	0.1939	0.4295	0.1657	0.2347
Other industries (M2)	0.0233	0.0546	0.1242	0.1090	0.0543	0.0565
Construction (C)	0.0017	0.0002	0.0044	0.0000	0.0012	0.0011
Services (S)	0.0436	0.1187	0.1388	0.1241	0.1549	0.1154
2. Gross output and factors of production						
Gross output (Billion VND)	118692	187679	42717	33829	167499	550416
Employment (Million person)	24775	2581	891	750	6795	35792
Capital asset (Billion VND, esti.)	***43376***	***132854***	***102107***	***33103***	***256414***	***567854***
Nominal investment (Billion VND)	1558	35870	959	33199	4864	76450
3. Consumption expenditure						
Private consumption (Billion VND)	46133	85948	5208	0	65520	202809
Government cons. (Billion VND)	0	0	0	0	22422	22422
Share of indirect tax to gross output	0.0372	0.0474	0.1105	0.0327	0.0642	0.0543
Other consumption parameters	Labour income tax = 0	Capital income tax = 0.283	Propensity to save of Gover. income = 0.153	Propensity to save of labour income 0.174	Real govern. consumption exp. 45398 Billion VND	Saving 46807 Billion VND
4. Export and import						
Export and import turnover (Billion VND)	114282	250983	37277	33831	156327	592700
Domestic production (Billion VND)	103679	141645	23209	33829	141003	443365
Import (Billion VND)	10603	109338	14068	2	15324	149335
Export (Billion VND)	15013	46034	19508	0	26496	107051
5. Price (benchmark year)						
Numaric:						
- Output price of domestic production	1	1	1	1	1	1
- Import price in local currency (VND)	1	1	1	1	1	1
- Import price in US$	1	1	1	1	1	1
- Export price in US$	1	1	1	1	1	1

Appendix II

Continue

	Aggregated agriculture (A)	Manufacturing (M1)	Other industries (M2)	Construction (C)	Services (S)	Whole economy
- Other	Deflator of private con. expend. (PC) 1	Deflator of gov. con. exp (PG) 1	Deflator of capital formation (PI) 1	Average deflator of export (PE) 1	Average deflator of import (PM) 1	Deflator of GDP (PGDP) 1
Value added per unit of output	0.6420	0.1965	0.4248	0.3011	0.5259	0.4170
Wage rate (Million VND.)	2.9070	7.3217	22.7894	7.1768	9.9239	4.8839
Rental rate of capital	0.0818	0.0700	0.0912	0.0683	0.1376	0.0963
6. Some parameters						
	Gross domestic product (GDP) 265445 Billion VND	Labour income (YL) 171200 Billion VND	Capital income (YK) 41003 Billion VND	Net - foreign inflow (F) 26714 Billion VND	Moey supply (M2S) 62222 Billion VND	Elasticity for demand of money (v) 1

APPENDIX III

APPENDIX III

LIST OF VARIABLES AND EQUATIONS OF SUPPLY SIDE MODEL

I. List of variables of supply side model

(1) General notes
Variables are classified either andogeous (EN) or exogenous (EX)
Those marked EN* are calculated in the model, but virtually exogenous
Rates are expressed in annual rates
Stock variables express levels at the beginning of each period
EXP(X) denotes e to the power of X
ORD(T) denotes the number of time period
SUM(I,X(I)) denotes summatiom of X with respect to I
(2) T: TIME PERIOD, T = 1 - 15
<TB = INITIAL PERIOD(1996), TT = TERMINAL PERIOD(2030)>
K&I: COMMIDITY OR INDUSTRY, K or I = 1 - 5

"AGR": AGRICULTURE
"MANU": MANUFACTURE
"NON-MANU": NON - MANUFACTURE
"CON": CONSTRUCTION
"SER": SERVICES

(3) List of Variables

Variables	on	Status	
A	T,I	EN	Production
A0	I	EX	Initial production
AA	I	EX*	Efficiency paramater
AKI	K,I	EX	Intermediate input coefficient in 1996
BT	T	EN	Trade balance
C	T,K	EN	Consumption
C0	K	EX	Initial consumption
CQ	K	EX	Involuntary consumption
CSH	K	EN*	Voluntary consumption share
CT	T	EN	Consumption total
DD0	K	EX*	Domestic demand
DELT		EX	Welfare discount ratio
DEPR	T,I	EN*	Capital depreciation ratio by industry
DIS	T	EN*	Discount factor
E	T, K	EN	Exports
E0	K	EX	Initial exports
EFC	T, I	EX*	Efficiency of capital
EFL	T, I	EX*	Efficiency of labor
ERT	T, K	EN*	Import depreciation ratio by commodity
ETA	K	EX	One minus depreciation by capital commodity
F	T	EM	Net foreign asset
F0		EX	Initial net foreign asset

Appendix III

Variables	on	Status	
FE		EX	Terminal level of net foreign asset(option2)
FEV		EN	Terminal net foreign asset
FSUB		EX	Intertemporal substitution of utility
GDP	T	EN	Gross domestic product
GDPI	T, I	EN	Gross domestic product by commodity
GL		EX	Growth rate of labor
GNE	K	EX	Net exprt absolute level upperbound increase
GPW	K	EX	Rate of increase in world price
ICOR	T	EN	Incremental capital-ouput ratio
ICORI	T, I	EN	Incremental capital-ouput ratio by commodity
INVR	T	EN	Investment ratio to gdp
ISHR	T, I	EN	Industry share in gdp
K0	K, I	EN	Initial capital matrix in 1996
KCF	T, I	EN	Capital coefficient by commodity
KCFT	T	EN	Macro capital coefficient
KI	T, I	EN	Capital by industry
KI0	I	EX	Initial capital by industry
KP	T,K,I	EN	Capital stock
KTT	T	EN	Totoal capital stock
L	T, I	EN	Labor
L0	I	EX	Initial labor by industry
LAB	T	EX*	Labor supply
LG	I	EX	Upperbound of annual rate of increase in labor
LT0		EX	Initial labor by industry
M	T,K	EN	Imports
M0	K	EX	Initial imports
MC	K	EX	Import share ceiling
MS	K	EX	Import share speed
NEUP	T,K	EX	Upper bound of exports
NEX	T,K	EN	Net exports by commodity
NY		EX	Number of year per period
PER		EX	Maximum rate of deficit
PW	T,K	EX*	World price
PW0	K	EX	Initial world price
RI	T	EX*	Rate of return for net foreign asset
RIC		EX	Rate of return for nfa ifc
SHR	I	EX	Share parameter for capital
TA	K,I	EX	Rates of technical proggress with respect to intermediate input
TC	I	EX	Rate of technical progress of capital
TL	I	EX	Rate of technical progress of labor input
TWU		EN	Utility maximand
W	T	EN	Welfare
Z	T,K,I		Investment
Z0	K	EX	Initial investment by industry
ZIND	T,I	EN	Investment by industry
ZT	T,K	EN	Investment commoditywise
ZTT	T	EN	Investment total

II. List of equations of supply side model

DISCOUNT FACTOR:

DIS(T) = (DELT**NY)**(1-ORD(T))

RATE OF RETURN FOR NET FOREIGN ASSET:

RI(T) = RIC

LABOR SUPPLY:

LAB(T) = LT0*GL**(NY*(ORD(T)-1))

WORLD PRICE:

PW(T,K) = PW0(K)*GPW(K)**(NY*(ORD(T)-1))

UPPER BOUND OF EXPORTS:

NEUP(T,K) = (E0(K)-M0(K))*GNE(K)**(NY*(ORD(T)-1))

VOLUNTARY CONSUMPTION SHARE:

CSH(K) = (C0(K)-CQ(K))/SUM(I,C0(I)-CQ(I))

DOMESTIC DEMAND:

DD0(K) = C0(K)+Z0(K)+SUM(I,AKI(K,I)*A0(I))

EFFICIENCY OF LABOR:

EFL(T,I) = 1/TL(I)**((ORD(T)-1)*NY)

EFFICIENCY OF CAPITAL:

EFC(T,I) = 1/TC(I)**((ORD(T)-1)*NY)

TOTAL FACTOR PRODUCTIVITY:

AA(I)=A0(I)/KI0(I)**SHR(I)/L0(I)**(1-SHR(I))

INSTANTANOUS WELFARE:

W(T) =E= ((C(T,"AGR")-CQ("AGR"))**CSH("AGR")
*(C(T,"MLI")-CQ("MLI"))**CSH("MLI")
*(C(T,"MHV")-CQ("MHV"))**CSH("MHV")
*(C(T,"SER")-CQ("SER"))**CSH("SER"))**0.500

OBJECTIVE FUNCTION - MAXIMAND:

TWU - SUM(TM DIS(T) * W(T)) * FEW * FEV

SUPPLY - DEMAND BALANCE:

A(T,K) =G= C(T,K)+ZT(T,K)+NEX(T,K)
+ SUM(I, AKI(K,I)*A(T,I)*TA(K,I)**(NY*(ORD(T)-1)))

CAPITAL ACCUMULATION:

Z(T,K,I)*NY =G= (KI(T+1,I)-ETA(K)**NY*KI(T,I))*K0(K,I)/KI0(I)

LABOR IMMOBILITY:

```
        L(T+1,I) =L= L(T,I)*LG(I)**(NY)
TOTAL LABOR AVAILABILITY
        LAB(T) =G= SUM(I,L(T,I))
PRODUCTION:
        A(T,I)   =L=   AA(I)*(KI(T,I)*EFC(T,I))**SHR(I)   *(L(T,I)*EFL(T,I))**(1-
SHR(I))
UPPER LIMIT OF NET IMPORTS:
        NEX(T,"AGR") =G=-NEUP(T,"AGR")
        NEX(T,"MLI") =G= NEUP(T,"MLI")
        NEX(T,"SER") =L= NEUP(T,"SER")
        NEX(T,"SER") =G= -NEUP(T,"SER")
INVESTMENT AGGREGATION OVER COMMODITY:
        ZT(T,K) =E= SUM(I,Z(T,K,I))
INVESTMENT AGGREGATION OVER INDUSTRY:
        ZTT(T)  =E= SUM(K,ZT(T,K))
AGGREGATION OF GDP:
        GDP(T)  =E= CT(T) + ZTT(T) + SUM(K,NEX(T,K))
AGGREGATION OF CONSUMPTION:
        CT(T)   =E= SUM(K,C(T,K))
TRADE BALANCE:
        BT(T) =E= SUM(K,NEX(T,K)*PW(T,K))
TRADE BALANCE LOWER LIMIT (OPTION 1):
        BT(T+1) =G= -1.0*GDP(T+1)*PER
ACCUMULATION OF NET FORIEGN ASSET:
        F(T+1) =E= F(T)*RI(T)**NY+BT(T)*NY
ACCUMULATION OF NFA AT END (OPTION 2):
        FEV    =E= F("2030")*RI("2030")**NY+BT("2030")*NY
IMPORTS:
        M(T,K) = MC(K)*ERT(T,K)/(ERT(T,K)+(MC(K)-1)*EXP(MS(K)))
       *(C.L(T,K)+ZT.L(T,K)  +  SUM(I,A.L(T,I)*AKI(K,I)*TA(K,I)**(NY*(ORD(T)-
1))))*M0(K)/DD0(K)
EXPORTS:
        E(T,K) = NEX.L(T,K)+M(T,K)
CAPITAL STOCK
        KP(T,K,I) = KI.L(T,I)/KI0(I)*K0(K,I)
```

Appendix III

TOTAL CAPITAL STOCK:

KTT(T) = SUM(I, KI.L(T,I))

INVESTMENT BY INDUSTRY:

ZIND(T,I) = SUM(K, Z.L(T,K,I))

DEPRECIATION RATIO BY INDUSTRY:

DEPR(T,I) = (ZIND(T,I)-(KI.L(T+1,I)-KI.L(T,I))/NY)/KI.L(T,I)

TOTAL DEPRECIATION:

DEPRT(T) = (ZTT.L(T)-(KTT(T+1)-KTT(T))/NY)/KTT(T)

GDP BY INDUSTRY:

GDPI(T,I) = A.L(T,I)*(1-SUM(K,AKI(K,I)*TA(K,I)))

CAPITAL COEFFICIENT:

KCFT(T) = SUM(I,KI.L(T,I))/GDP.L(T)

CAPITAL COEFFICIENT BY INDUSTRY:

KCF(T,I) = KI.L(T,I)/GDPI(T,I)

ICOR BY INDUSTRY:

ICOR(T) = ZTT.L(T)*NY/(GDP.L(T+1)-GDP.L(T))

INDUSTRY SHARE TO GDP:

ISHR(T,I) = GDPI(T,I)/GDP.L(T)

INVESTMENT RATIO:

INVR(T) = ZTT.L(T)/GDP.L(T)