OPTIMAL CHOICE OF OWNERSHIP STRUCTURE IN VIETNAM

Pham Quang Ngoc & Pierre Mohnen

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Abstract

Since 1986, Vietnam has made a transition from a centrally planned economy to a market economy. Since then, Vietnam has been under pressure to reduce the size of the state sector and, along with it, the private sector has been looming larger and lager. In this paper we focus on the optimum distribution of economic activity across ownership structure. If labor and capital could reallocate across sectors and types of ownership, what would be the optimum allocation of activities and the achievable level of domestic final demand? We present a multi-sectoral integrated activity analysis model, a variant of the general equilibrium model of Mohnen and ten Raa (1994), and apply it to the data of the input-output tables and the ownership structure of the Vietnamese economy for the year 2000.

Ownership structure and economic activity in a transition country: the case of vietnam in 2000

PHAM QUANG NGOC & PIERRE MOHNEN[1]

1. Introduction

Since 1986 Vietnam has made the transition from a centrally planned to a market economy. One of the most striking features of Vietnam's transition has been the steady growth of output. The general level of economic activity never declined; there was only a temporary slowdown in the pace of expansion under the impact of external shocks and fundamental changes in domestic policy. The economy grew at an average annual rate of 6-7 percent during 1988-89, well above the average rate of 4-5 percent achieved since the unification of North and South Vietnam in 1975. Output growth slowed to 5-6 percent during 1990-1991 and gradually increased to 8-9 percent during 1992-2000. Industrial growth, even if stagnating during the first phase of the transition, grew by 11.2% annually between 1990 and 2000. Forty percent of all industrial output comes from two sectors: food products (27%) and petroleum and other fuels (13%). The other sectors that account for more than 5% of total industrial output are electricity, chemicals, and metals/metal products. Every industrial sub-sector has grown by at least 5% a year in real terms since 1990, reflecting the broad base of industrial expansion. Several sub-sectors have expanded by more than 20% annually, notably oil and gas, steel, chemicals (including fertilizers and rubber goods), garments, footwear and printing.

When Vietnam was a centrally planned economy, government and stated-owned enterprises (SOEs), including co-operatives, were the only two sectors. All economic activity was planned and controlled by government. The labor and capital markets were no exception. Based on the overall plan laid down by the government, the number of workers as well as the capital stocks for each organization was determined by their respective administrative units. A salary budget was allocated to each organization and workers were paid according to a predetermined scale.

The inefficiency of the central planned system resulted in the collapse of many SOEs, forcing the government to embark on economic reform. *Doi Moi* (innovation), unveiled in 1986, represented a significant step towards a market economy. One important feature during the transition was the gradual demise of SOEs and the gradual expansion of private firms.

The Government launched a reform program in the early 1990s and successfully reduced the number of SOEs from some 12,000 to about 6,000 by April 1995 (Webster and Amin, 1998). The state enterprise reforms focused on ensuring autonomy in decision making, releasing the enterprises from constraints of central plan and the credible institution of hard budget constraints. Policies to encourage the private sector included providing access to credit and introducing nondiscriminatory taxation and commercial legislation. The privatization of SOEs started in 1992. This was to be accomplished through sales of enterprise shares to employees on preferential terms, to domestic private and public investors, and to foreign investors on a limited basis.

By the end of 1996, Vietnam had 6,020 State enterprises employing some two million people. These comprised about 1,140 enterprises belonging to State corporations, 500 centrally-controlled State enterprises, and 4,380 locally-controlled State enterprises (Webster and Amin, 1998). Along with the falling number of SOEs, the level of employment in SOEs has decreased dramatically since the launch of Doi Moi (O'Conner, 1996). State sector employment in 1986 account for about 15% of total employment. Between 1986 and the mid-1990s, total state sector employment dropped by over a quarter (Liu, 2004). During 1991 to 1999, employment share of SOEs dropped form 6.5% to 4.8% (Vo, 2000). By contrast, employment in the (formal) private sector more than doubled between 1996 and 2000 (World Bank, 2001) and the number of jobs created by the private sectors was three times higher than those created by SOEs (Liu, 2004).

An important question is how this significant growth performance relates to one important source of structural change, which is the ownership restructuring, meaning the decline of state-owned industrial enterprises along with the growth of private domestic or foreign-owned enterprises. In this paper we focus on the optimum distribution of economic activity across ownership structure. If labor and capital could relocate across sectors and types of ownership, what would be the optimum allocation of activities and the achievable level of domestic final demand? We present a multi-sectoral integrated activity analysis model, a variant of the general equilibrium model of Mohnen and ten Raa (1994), and apply it to the data of the input-output tables and the ownership structure of the Vietnamese economy for the year 2000.

2. The model

To study the optimal allocation of economic activity across sectors and types of ownership we use a multi-sectoral activity analysis model, which is the variant of the general equilibrium model used by Mohnen and ten Raa (1994). The model determines the optimal levels of sectoral activity across different types of ownerships and of domestic final demand from the fundamentals of the economy, i.e. (i) endowments, which are represented by a labor force and stock of capital; (ii) technology, which is given by the combined inputs and outputs of the sectors of the economy; and (iii) preferences, which are reflected by the pattern of domestic final demand.

The idea is to push the economy to its frontier by maximizing the level of domestic final demand. Domestic final demand comprises consumption and investment. In order to concentrate on the ownership structure of economic activity and the mobility in and out of public-owned enterprises, we consider a closed economy model. Trade is taken as exogenously fixed at actual observed levels for all commodities.

The standard model works as follows. The primal program is:

(2-1) $\qquad \max_{s,c,g} e^{\mathrm{T}} fc$ subject to

$$\left(V^{\mathrm{T}} - U\right)s \geq fc + Jg =: F$$
$$Ls \leq N$$
$$Ks \leq M$$
$$-e^{\mathrm{T}}g \leq -e^{\mathrm{T}}g^{t} =: D$$
$$s \geq 0$$

where the endogenous variables (s, c and g) and all other variables and parameters are defined as follows [with dimensions in brackets]:

s activity vector [# of sectors]

c level of domestic final demand [scalar]

g vector of net export [# of tradable commodities]

e unit vector of all components one

T   transposition symbol

f domestic final demand [# of commodities]

X vector of gross output

V make table [# of sectors by # of commodities]

U	use table [# of commodities by # of sectors]
A	matrix of input-output coefficient
J	0-1 matrix placing tradeables [# of commodities by # of tradeables]
F	final demand [# of commodities]
K	capital stock row vector [# of sectors]
L	labor employment row vector [# of sector]
M	capital endowment [scalar]
N	labor force [scalar]
g^t	vector of net exports observed at time t [# of tradable]
D	observed trade deficit [scalar].

Associated to this primal program is the following dual program:

(2-2) $$\min_{p,r,w,\varepsilon \geq 0} rM + wN + \varepsilon D \text{ subject to}$$

$$p\left(V^{\mathrm{T}} - U\right) \leq rK + wL$$
$$pf = e^{\mathrm{T}} f$$
$$pJ = \varepsilon e$$

The variables in the dual program are the shadow prices p of commodities, r of capital, w of labor, and ε of foreign debt (the exchange rate). Since the commodity constraint in the primal program has a zero bound, p does not show up in the objective function of the dual program. p is normalized by the second dual constraint, essentially about unity.

In order to examine the effect of ownership restructuring (privatization) on economic performance we shall run the model under four different scenarios.

Scenario 1. No mobility of labor/capital from the private to the public sector.

(2-3) $$\max_{s,c,g} e^{\mathrm{T}} fc \text{ subject to}$$

$$\left(V_{split}^{\mathrm{T}} - U_{split}\right)s \geq fc + g =: F$$
$$\left(L_1 \sim L_2 \sim zeros\right)s \leq N_1 + N_2$$
$$\left(L_1 \sim L_2 \sim L_3 \sim L_4 \sim L_5\right)s \leq N_1 + N_2 + N_3 + N_4 + N_5$$
$$\left(K_1 \sim K_2 \sim zeros\right)s \leq M_1 + M_2$$
$$\left(K_1 \sim K_2 \sim K_3 \sim K_4 \sim K_5\right)s \leq M_1 + M_2 + M_3 + M_4 + M_5$$
$$s \geq 0$$

s activity vector [# of sectors times # of ownership types]

$V_{split}{}^{\mathrm{T}}$ matrix resulted from splitting columns of V^{T} by types of ownership

U_{split} matrix resulted from splitting columns of U by types of ownership

L_i (i = 1, 2,…,5) labor employment vector in ownership category i [# of sector]

N_i (i = 1, 2,…,5) labor force in ownership category i [scalar].

K_i (i = 1, 2,…,5) capital stock vector in ownership category i [# of sector]

M_i (i = 1, 2,…,5) capital endowment in ownership category i [scalar].

Zeros   row vector of zeros of appropriate dimension [# of sector]

~   horizontal concatenation operator.

Here labor and capital will be classified by types of ownership, namely state-central-owned, state-local-owned, 100% domestically private-owned, joint-venture and 100% foreign-owned. Given the privatization, we assume an asymmetric movement of labor employment (from the state owned enterprises (both state central and state local) to the private ones, but not the other way). The asymmetry of capital stock movements is the same as of labor employment.

Scenario 2. No mobility of labor/capital from public sector to private sector

(2-4) $\max_{s,c,g} e^{\mathrm{T}} fc$ subject to

$$\left(V_{split}{}^{\mathrm{T}} - U_{split}\right)s \geq fc + g =: F$$
$$\left(L_1 \sim L_2 \sim L_3 \sim L_4 \sim L_5\right)s \leq N_1 + N_2 + N_3 + N_4 + N_5$$
$$\left(zeros \sim L_3 \sim L_4 \sim L_5\right)s \leq N_3 + N_4 + N_5$$
$$\left(K_1 \sim K_2 \sim K_3 \sim K_4 \sim K_5\right)s \leq M_1 + M_2 + M_3 + M_4 + M_5$$
$$\left(zeros \sim K_3 \sim K_4 \sim K_5\right)s \leq M_3 + M_4 + M_5$$
$$s \geq 0$$

In this scenario, we assume an asymmetric movement of labor from the private owned companies (100% domestically private-owned, 100% foreign-owned and joint-venture) to the public ones (both state central and state local) but not the other way. Movement of capital stocks are the same as of labor employment.

Scenario 3.Immobility of labor/capital across types of ownership

(2-5)
$$\max_{s,c,g} e^{\mathrm{T}} fc \text{ subject to}$$

$$\left(V_{split}^{\mathrm{T}} - U_{split}\right) s \geq fc + g =: F$$
$$\left(L_1 \sim zeros\right) s \leq N_1$$
$$\left(zeros \sim L_2 \sim zeros\right) s \leq N_2$$
$$\left(zeros \sim L_3 \sim zeros\right) s \leq N_3$$
$$\left(zeros \sim L_4 \sim zeros\right) s \leq N_4$$
$$\left(zeros \sim L_5\right) s \leq N_5$$
$$\left(K_1 \sim zeros\right) s \leq M_1$$
$$\left(zeros \sim K_2 \sim zeros\right) s \leq M_2$$
$$\left(zeros \sim K_3 \sim zeros\right) s \leq M_3$$
$$\left(zeros \sim K_4 \sim zeros\right) s \leq M_4$$
$$\left(zeros \sim K_5\right) s \leq M_5$$
$$s \geq 0$$

In this scenario, we assume an immobility of labor and capital stock in the private owned companies (100% domestically private-owned, 100% foreign-owned and joint-venture) and in state ones (both state central and state local). This means that labor and capital stock can move within but not between the ownership sectors.

Scenario 4. Perfect mobility of labor/capital across types of ownership.

(2-6)
$$\max_{s,c,g} e^{\mathrm{T}} fc \text{ subject to}$$

$$\left(V_{split}^{\mathrm{T}} - U_{split}\right) s \geq fc + g =: F$$
$$\left(L_1 \sim L_2 \sim L_3 \sim L_4 \sim L_5\right) s \leq N_1 + N_2 + N_3 + N_4 + N_5$$
$$\left(K_1 \sim K_2 \sim K_3 \sim K_4 \sim K_5\right) s \leq M_1 + M_2 + M_3 + M_4 + M_5$$
$$s \geq 0$$

In this scenario, contrary to the previous scenarios, we assume a perfect mobility of labor employment and capital stock between types of ownership. This means that labor and capital stock can move both within and between ownership types.

Remark 1. We run each scenario for three types of models corresponding to different levels of sectoral breakdowns:

In model I we do not differentiate between types of ownership. This means that the dimension of activity level vector s is [# of sectors].

In model II we aggregate the 52 sectors split by type of ownership into 5 broad sectors: agriculture, forestry and mining, low-tech manufacturing, high-tech manufacturing, heavy industry, and services. The definition of low- and high-tech manufacturing is simply based on the level of sophisticated technology used by these sectors but is not related to R&D intensity as in the definition used for the concept of knowledge-based sectors. The dimension of activity level vector s is thus [5 times # of ownership types].

For model III, we apply the type of ownership split to all 52 sectors of the input-output tables. Now each production sector will be split into five sub-sectors corresponding to five types of ownership. Therefore, the dimension of activity level is [# of sectors times # of ownership types].

Remark 2. We have the V' table disaggregated by type of ownership, but not the U matrix. We use the data on gross output by type of ownership to generate the use matrix by type of ownership. The new use matrix has the dimension of [# of sectors, # of sectors times # of ownership types]. By doing so, we make an assumption that for each production sector, the used technologies would be the same among the five ownership sub-sectors. Therefore, by using the split matrix each column of the original use matrix is split into five columns corresponding to the five types of ownership sub-sectors.

Remark 3. According to the observed data on labor employment, capital stock and gross output by type of ownership, there are a number of ownership sub-sectors which are not active in 2000. We are obliged to make the assumption that the inactive sub-sectors will not be activated at the optimal solution in which the economy would operate at the production possibility frontier.

3. The data

3.1. Review of the economic account compilation in Vietnam

3.1.1. National Accounts

In line with Vietnam's transition to market economy in 1986, the General Statistical Office of Vietnam (GSO) shifted its framework of compiling the country's economic accounts from the Material Product System (MPS) to the United Nations' System of National Accounts (SNA). As shown in Table 1, the GSO through its National Accounts Department (NAD) started compiling the country's annual national accounts on the basis of the SNA in the early 1990s. This initial activity was made possible with technical and financial assistance provided by the United Nations Development Program (UNDP). Later on, Asian Development Bank (ADB) provided a long-term technical assistance grant to help improve the compilation of the national accounts including the construction of I-O tables. Currently available are national accounts time-series data from 1986 onwards.

Lately, the GSO has embarked on the compilation of quarterly national accounts. Available quarterly time-series Gross Domestic Product (GDP) data are for 1998 onwards.

Table 1. History of National & Regional Accounts and I-O Compilation in Viet Nam

Type of Economic Account	Started Compiling	Frequency of Compilation	Available Time Series Data	Compiler
National Accounts				
a) Annual	1992	annual	1986 onwards	NAD, GSO
b) Quarterly	1998	quarterly	1998-2002	NAD, GSO
Sub-National GDP				
a) Provincial GDP	1993	annual	available*	PSO
b) Regional GDP	1993	annual	available*	NAD, GSO
National IO Tables				
a) Benchmark	1992	Every 4-7 years	1989; 1996; 2000	NAD, GSO
b) I-O Update	1993	Annual	1990-1995	NAD, GSO

* unofficial data available upon request

3.1.2. National Input-Output Tables

Compilation of SNA-based national I-O tables started in the early 1990s with the compilation of the 1989-benchmark I-O table. The second national I-O table relates to 1996 with 97 production sectors. Between 1989 and 1996, annual I-O updating had been also undertaken to provide users with more current I-O data. The latest national I-O table is the 2000 one, which is based on almost the same structure as the 1996 one, however, its sector dimension now comprises 112 production sectors.

Table 2. SNA-Based I-O Compilation in Vietnam

Kind / Reference Year	Size	Type	Methodology
National Benchmark Tables			
1) 1989	54x54	Competitive/Current price	Direct Full Survey
2) 1996	97x97	Competitive/Current price	Direct Full Survey
3) 2000	112x112	Competitive/Current price	Direct Full Survey
National Updated Tables			
1) 1990	54x54	Competitive/Current price	RAS Method
2) 1991	20x20	Competitive/Current price	RAS Method
3) 1992	20x20	Competitive/Current price	RAS Method
4) 1993	20x20	Competitive/Current price	RAS Method
5) 1994	43x43	Competitive/Current price	RAS Method
6) 1995	45x45	Competitive/Current price	RAS Method

3.2. Sector reclassification

For comparative purposes we have to reclassify the sectors of the available national benchmark I-O tables into a 52-sector and 5-sector classification. Shown in Annex B and C are the details of the 52-sector and 5-sector classification used in reconstructing the 2000 I-O table.

3.2. Sector reclassification

For comparative purposes we have to reclassify the sectors of the available three national benchmark I-O tables into a common classification. As it was shown in table 2, in 1989 there were only 54 sectors involved in the survey. However the number of sectors increased to 97 and 112 in 1996 and 2000 respectively. For the purpose of comparative analysis, all these three tables need to be unified in terms of sector classification. Shown

in Annex A is the revised common 52-sector classification used in reconstructing the three I-O tables.

3.3 Data sources for labor and capital

The data on capacity utilization are from the Statistical Year Books published by the General Statistic Office (GSO) of Vietnam in 1989, 1996 and 2000. The data on sectoral labour and capital stock by type of ownership are available only for 2000 from the enterprise census, conducted on 1st April 2001, and published by the General Statistic Office of Vietnam (2002).

4. Results

Table 3.1 contains the activity levels of the 52 industries for the four scenarios under model I. As indicated in table 3.1, all sectors are active. Because we have chosen to work in a closed economy model, all sectors must be active to satisfy domestic final demand. If we allow for free trade and perfectly elastic foreign demand, the economy would specialize in one or two commodities and import all other tradable commodities. Since we cannot defend the assumption that Vietnam can export as much as she can in some particular products and as we don't know what the world demand actually looks like, we prefer pursuing the analysis in the context of a closed economy.

The optimal activity levels are generally 1 percent to 4 percent higher than the observed ones. The most active sector in all four scenarios is petroleum, natural gas, with an activity level 80% higher than observed under both scenario 1 and 4, 40% and 20% higher in scenarios 2 and 3 respectively. Vietnam still relies on almost 100% imported petroleum and natural gas. Therefore, once net trade is taken as exogenous, even a sizeable increase in the activity of the oil sector represents only small additional demand for labour and capital.

The optimal activity level of domestic final demand is 1.0105 in scenarios 1 and 4; and 1.0052 and 1.0026 for the other two scenarios. What is interesting here is that the same level of welfare (attainable level of domestic final demand) is reached under scenarios 1 and 4, i.e. letting factors move from state to private enterprises or allowing full factor mobility across types of enterprises. This means that ownership restructuring does

contribute to a better economic performance. The lowest level of optimal domestic final demand is in scenario 3: the level of observed domestic final demand can increase by only 0.26 percent when there is a immobility of labour and capital by type of ownership. Asymmetric mobility in favor of state enterprises (i.e. no mobility possible from state to private) reduces by half a percentage point the expansion of domestic final demand.

Table 3.2 shows the shadow prices of the 52 commodities, which would be unit production cost at the optimum activity levels. The zero shadow prices of labor reflect the absence of full employment of labor in all four scenarios. Capital earns a 36.48% rate of return in all types of enterprises under free mobility and when factors can freely move from state to private. The rate of return in private enterprises is slightly higher (38.39%) when instead capital cannot move from public to private but well the other way round. And in the scenario of no mobility only joint ventures lack capital and are ready to pay a unit of capital a return of 42.37 %.

Table 4.1 and 4.2 show the activity levels and the shadow price of 5 sectors x 5 types of ownership structures for the various scenarios. Here we do reclassify the whole economy into five sectors namely, agriculture, forestry and mining; low-tech manufacturing; hi-tech manufacturing; heavy industry; and services. Annex B shows how the 52 sectors have been aggregated into 5 groups. Each sector is again divided into five sub-ownership sectors. Therefore, the activity level now is computed for each type of ownership in each industry. One of the most interesting findings here is that clearly the more flexibility there is in reallocating labour and capital, the better the performance of the economy in its production possibility frontier. As we can see, the economy could increase its welfare by 86% in scenarios 2 and 4 and by 79% in scenario 2. In scenario 3, where capital and labor cannot move out of their ownship type, at the optimum, the whole economy could only improve its welfare by 38%. This time it is the free asymmetric movement from private to state enterprises which yields the same output as under free mobility.

It is interesting to notice that ownership is associated with activities in certain types of industry groups. Agriculture, forestry and mining activities are performed in private joint ventures, low-tech goods are manufactured in local state-owned enterprises, hi-tech goods in 100% domestic privately-owned enterprises, heavy industrial goods in 100%

forign-owned private enterprises, and services mostly in local state-owned firms. Only when factors are not mobile is sectoral activity spread over various types of ownership.

The shadow prices of labor reveal excess amount of labor in all scenarios and all types of ownership enterprises, except under factor immobility, where labor earns at the margin 3890 VND in privately-owned 100% domestic enterprises and 108 000 VNT/year in joint ventures. Under free mobility and scenario 2, capital is so scarce that it earns 4 times its purchase price at the optimum. Under immobility, the scarcity is most severe in state-owned local firms, followed by 100% foreign-owned, state-central owned, 100% domestic private enterprises and joint ventures respectively. Under scenario 1, capital earns a markup in the public sector over the reference rate of return of almost 4 times the purchase price..

Tables 5 show the activity levels and shadow prices for the 52 sector by 5 types of ownership breakdown (model III). For the sake of programming, in the scenario 1, 2, 3 and 4, some of non-tradeable sectors have been aggregated with the domestic final demand. Therefore the activity levels of those aggregated sectors are the same as for domestic final demand. Again we see the impact of ownership restructuring on economic performance. The lower the level of flexibility in reallocation across types of ownership the lower the attainable economic performance at the optimum. As for model I, scenarios and 4 yield the same solution, namely a 9.3 percent increase in domestic final demand from full employment of resources, sectoral reallocation of activity and ownership type choice of production location. Except when constrained to achieve a solution, no activity gets spread over different types of ownership. Na denotes non-active sectors that remain non-active (by construction). We see that activities are generally conducted in state local and 100% domestic private enterprises. Letting factors move from public owned establishments to privately-owned establishments allows a bit more flexibility than allowing mobility from private to public firms. In scenario 3, when labor and capital cannot move out of their ownership structure, there is the lowest level of domestic final achievable when the economy is at its production possibility frontier. The performance can be improved only for 3.4%. Labor is in excess supply in scenarios 1 and 4, and only in short supply for the privately-owned firms in scenario 2 and state-central owned firms in scenario 3. Capital earns a 73.2 percent return in the private sector. In scenario 2 labor

earns 16 percent less in public firms because of the additional labor that can be hired from the private sector. Under no mobility across types of ownership, capital earned its greatest return in 100% domestic privately-owned firms.

5. Conclusion

This paper examines the choice of location by ownership type in the various sectors of the Vietnamese economy in the year 2000. Because the technology is assumed the same in all 5 types of ownership sub-sectors, the only source of improvement vis-à-vis the observed situation comes from factor endowments and factor mobility between the private and the public sector. The analysis shows that the more flexibility the better optimal performance of the economy. The results also show that definitely privatization or the possibility to move out of the public sector into the privare sphere of activity contributes to better performance.

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Table 3.1 Sector activity levels under four scenarios about factor mobility (see section 2)
Model I – 52 sectors, no ownership structure

Code	Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1	Agriculture (except animal husbandry)	1.0078	1.0039	1.0019	1.0078
2	Animal husbandry	1.0097	1.0048	1.0024	1.0097
3	Forestry	1.0095	1.0047	1.0024	1.0095
4	Fishing	1.0050	1.0025	1.0012	1.0050
5	Coal	1.0086	1.0043	1.0021	1.0086
6	Mineral mining	1.0139	1.0069	1.0035	1.0139
7	Other mining	1.0027	1.0014	1.0007	1.0027
8	Other food stuff	1.0124	1.0062	1.0031	1.0124
9	Processed, preserved fruits and vegetables	1.0074	1.0037	1.0018	1.0074
10	Alcohol, beer and liquors	1.0107	1.0053	1.0027	1.0107
11	Sugar, refined	1.0095	1.0047	1.0024	1.0095
12	Tea, coffee processing	1.0083	1.0041	1.0021	1.0083
13	Cigarettes and other tobacco products	1.0157	1.0078	1.0039	1.0157
14	Processed seafood and by-products	1.0007	1.0003	1.0002	1.0007
15	Milling and grain products	1.0087	1.0043	1.0022	1.0087
16	Ceramics, glass, porcelain	1.0116	1.0058	1.0029	1.0116
17	Bricks, title (all kinds)	1.0125	1.0062	1.0031	1.0125
18	Cement	1.0125	1.0062	1.0031	1.0125
19	Other construction materials	1.0202	1.0101	1.0050	1.0202
20	Paper pulp and paper products and by-products	1.0226	1.0112	1.0056	1.0226
21	Processed wood and wood products	1.0071	1.0035	1.0018	1.0071
22	Chemical products	1.1199	1.0597	1.0298	1.1199
23	Fertilizer, pesticides and veterinary medicine	1.0233	1.0116	1.0058	1.0233
24	Health medicine	1.0310	1.0154	1.0077	1.0310
25	Processed rubber and by-products	1.0159	1.0079	1.0040	1.0159
26	Soap, detergents, perfumes & toilet preparations	1.0114	1.0057	1.0028	1.0114
27	Plastic, plastic products	1.0429	1.0214	1.0107	1.0429
28	Other chemical products	1.0388	1.0193	1.0096	1.0388
29	Other metallic products	1.0426	1.0212	1.0106	1.0426
30	Equipment, machinery	1.0295	1.0147	1.0073	1.0295
31	Electrical and electronic products	1.0315	1.0157	1.0078	1.0315
32	Non-ferrous metal and products	1.0417	1.0207	1.0104	1.0417
33	Ferrous metal and products	1.0417	1.0207	1.0104	1.0417
34	Manufacture of textiles	1.0078	1.0039	1.0019	1.0078
35	Carpet and rugs	1.0123	1.0061	1.0031	1.0123
36	Leather, footwear, bleaching, dyeing of fabrics	1.0039	1.0019	1.0010	1.0039
37	Other industry	1.0171	1.0085	1.0043	1.0171
38	Products of publishing house	1.0123	1.0061	1.0031	1.0123
39	Petroleum, natural gas	1.8152	1.4058	1.2028	1.8152
40	Electricity and gasoline	1.0134	1.0067	1.0033	1.0134
41	Water	1.0124	1.0062	1.0031	1.0124
42	Construction	1.0105	1.0052	1.0026	1.0105
43	Trade	1.0150	1.0075	1.0037	1.0150
44	Personal repairs	1.0104	1.0052	1.0026	1.0104
45	Hotel and restaurants	1.0071	1.0035	1.0018	1.0071
46	Freight and passenger transport	1.0106	1.0053	1.0026	1.0106
47	Communication services	1.0070	1.0035	1.0017	1.0070
48	Banking, credit, treasury, lotto, insurance	1.0133	1.0066	1.0033	1.0133
49	Science and technology	1.0108	1.0054	1.0027	1.0108
50	State management, defense & social security	1.0105	1.0052	1.0026	1.0105
51	Culture, health, education, sport	1.0119	1.0059	1.0030	1.0119
52	Tourism, real estate, business and consultancy services, and other personal services	1.0104	1.0052	1.0026	1.0104
53	Domestic Final Demand	1.0105	1.0052	1.0026	1.0105

Table 3.2   Commodity and factor shadow prices under four scenarios about factor mobility
Model I – 52 sector, no ownership structure

Code	Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1	Agriculture (except animal husbandry)	0.2967	0.2656	0.2665	0.2967
2	Animal husbandry	0.5621	0.5694	0.5198	0.5621
3	Forestry	0.5261	0.5392	0.5616	0.5261
4	Fishing	1.9404	2.0030	2.0970	1.9404
5	Coal	1.0401	0.9999	1.0324	1.0401
6	Mineral mining	1.1486	1.0655	1.0963	1.1486
7	Other mining	0.5130	0.5210	0.5417	0.5130
8	Other food stuff	0.7869	0.7622	0.6922	0.7869
9	Processed, preserved fruits and vegetables	1.2721	1.2700	1.2798	1.2721
10	Alcohol, beer and liquors	0.8644	0.8216	0.7518	0.8644
11	Sugar, refined	1.0026	0.9451	0.8782	1.0026
12	Tea, coffee processing	0.5069	0.4948	0.4880	0.5069
13	Cigarettes and other tobacco products	0.9873	0.9079	0.8976	0.9873
14	Processed seafood and by-products	1.4043	1.4083	1.4569	1.4043
15	Milling and grain products	0.4568	0.4344	0.4358	0.4568
16	Ceramics, glass, porcelain	1.4845	1.4547	1.4684	1.4845
17	Bricks, title (all kinds)	1.6841	1.6960	1.7480	1.6841
18	Cement	2.2461	2.2052	2.2542	2.2461
19	Other construction materials	1.1147	1.1176	1.1431	1.1147
20	Paper pulp and paper products and by-products	1.6175	1.6126	1.5714	1.6175
21	Processed wood and wood products	0.9824	1.0017	1.0059	0.9824
22	Chemical products	1.4050	1.3753	1.3629	1.4050
23	Fertilizer, pesticides and veterinary medicine	1.0110	0.9920	1.0021	1.0110
24	Health medicine	0.9317	0.8664	0.8052	0.9317
25	Processed rubber and by-products	1.5042	1.5315	1.5325	1.5042
26	Soap, detergents, perfumes & toilet preparations	0.9831	0.9398	0.8991	0.9831
27	Plastic, plastic products	0.7944	0.7683	0.6305	0.7944
28	Other chemical products	0.9848	0.9505	0.9185	0.9848
29	Other metallic products	0.8131	0.8033	0.7503	0.8131
30	Equipment, machinery	1.2633	1.2896	1.3030	1.2633
31	Electrical and electronic products	0.9527	0.9127	0.8251	0.9527
32	Non-ferrous metal and products	1.2025	1.2311	1.2388	1.2025
33	Ferrous metal and products	0.7621	0.7547	0.7173	0.7621
34	Manufacture of textiles	0.9583	0.9370	0.8819	0.9583
35	Carpet and rugs	0.8897	0.8447	0.7577	0.8897
36	Leather, footwear, bleaching, dyeing of fabrics	1.0906	1.0676	0.9646	1.0906
37	Other industry	1.2964	1.3256	0.8963	1.2964
38	Products of publishing house	0.9820	0.7976	0.7042	0.9820
39	Petroleum, natural gas	11.5386	12.1211	12.8282	11.5386
40	Electricity and gasoline	1.5562	1.6028	1.6816	1.5562
41	Water	1.1601	0.8179	0.8082	1.1601
42	Construction	1.2071	1.2119	1.2221	1.2071
43	Trade	0.7475	0.7542	0.7618	0.7475
44	Personal repairs	0.8562	0.8738	0.8902	0.8562
45	Hotel and restaurants	1.2937	1.3289	1.3798	1.2937
46	Freight and passenger transport	2.9483	2.9966	3.1133	2.9483
47	Communication services	0.5710	0.3721	0.3700	0.5710
48	Banking, credit, treasury, lotto, insurance	0.4142	0.3917	0.3848	0.4142
49	Science and technology	0.8181	0.8345	0.7285	0.8181
50	State management, defense & social security	1.0588	1.0520	1.0672	1.0588
51	Culture, health, education, sport	0.8039	0.8174	0.8298	0.8039
52	Tourism, real estate, business and consultancy services, and other personal services	0.7255	0.7440	0.7675	0.7255

Table 3.2 ***Commodity and factor shadow prices under four scenarios about factor mobility***
Model I – 52 sector, no ownership structure (continued)

Factors	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Labor by ownership				
State-central owned	0.0000	0.0000	0.0000	0.0000
State-local owned	0.0000	0.0000	0.0000	0.0000
Private owned	0.0000	0.0000	0.0000	0.0000
Foreign owned	0.0000	0.0000	0.0000	0.0000
Joint-venture owned	0.0000	0.0000	0.0000	0.0000
Capital by ownership				
State-central owned	0.3648	0.0000	0.0000	0.3648
State-local owned	0.3648	0.0000	0.0000	0.3648
Private owned	0.3648	0.3839	0.0000	0.3648
Foreign owned	0.3648	0.3839	0.0000	0.3648
Joint-venture owned	0.3648	0.3839	0.4237	0.3648

Table 4.1 *Sector activity levels under four scenarios about factor mobility (see section 2)*
Model II – 5 sectors and 5 types of ownership

Scenario 1 Labour and capital can move from state to privat, but not the reverse

Sector code	State Central	State Local	Domes.Private	Foreign 100%	J-V
1 Agriculture, forestry and mining	0	0	0	0	6.10
2 Lowtech manufacturing	0	6.51	0	0	0
3 Hitech manufacturing	0	0	10.20	0	0
4 Heavy industry	0	0	0	132.34	0
5 Services	0	2.38	0	33.54	0
6 Domestic final demand	1.79				

Scenario 2 Labour and Capital can move from private to stat, but not the reverse

Sector code	State Central	State Local	Domes.Private	Foreign 100%	J-V
1 Agriculture, forestry and mining	0	0	0	0	6.37
2 Lowtech manufacturing	0	6.85	0	0	0
3 Hitech manufacturing	0	0	12.19	0	0
4 Heavy industry	0	0	0	140.80	0
5 Services	0	6.93	0	0	0
6 Domestic final demand	1.86				

Scenario 3 Labour and capital cannot move between types of ownership

Sector code	State Central	State Local	Domes.Private	Foreign 100%	J-V
1 Agriculture, forestry and mining	0.92	0	0	0	3.53
2 Lowtech manufacturing	2.73	0.62	1.18	0	1.09
3 Hitech manufacturing	0	0	0	0	4.49
4 Heavy industry	0.32	0	0	88.08	0
5 Services	0	4.00	1.12	0	0
6 Domestic final demand	1.38				

Scenario 4 Labour and capital can freely move between types of ownership

Sector code	State Central	State Local	Domes.Private	Foreign 100%	J-V
1 Agriculture, forestry and mining	0	0	0	0	6.37
2 Lowtech manufacturing	0	6.85	0	0	0
3 Hitech manufacturing	0	0	12.19	0	0
4 Heavy industry	0	0	0	140.80	0
5 Services	0	6.93	0	0	0
6 Domestic final demand	1.86				

Table 4.2 ***The shadow commodity and factor prices under four scenarios about factor mobility***
Model II – 5 sectors and 5 types of ownership

Code	Sector	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1	Agriculture, forestry and mining	0.30	0.31	0.61	0.31
2	Low-tech manufacturing	1.38	1.26	1.52	1.26
3	Hi-tech manufacturing	1.64	1.82	1.16	1.82
4	Heavy industry	0.87	0.97	0.84	0.97
5	Services	0.83	0.78	0.80	0.78
	Labor by ownership				
1	State-central owned	0.00	0.00	0.00	0.00
2	State-local owned	0.00	0.00	0.00	0.00
3	Private owned	0.00	0.00	3.89	0.00
4	Foreign owned	0.00	0.00	0.00	0.00
5	Joint-venture owned	0.00	0.00	108.52	0.00
	Capital by ownership				
1	State-central owned	5.27	4.53	3.70	4.53
2	State-local owned	5.27	4.53	5.43	4.53
3	Private owned	3.93	4.53	2.15	4.53
4	Foreign owned	3.93	4.53	4.06	4.53
5	Joint-venture owned	3.93	4.53	0.92	4.53

Table 5.1.1 Sector activity levels under scenario 1 about factor mobility (see section 2)
Model III – 52 sectors and 5 types of ownership (Na denotes a non-active sector)

Code	Description	State Central	State Local	Domestic Private	Foreign 100%	Joint Venture
1	Agriculture (except animal husbandry)	0	0	Na	0	59.57
2	Animal husbandry	0	0	Na	0	60.51
3	Forestry	0	1.29	Na	0	Na
4	Fishing	7.30	0	Na	0	0
5	Coal	0	129.17	0	0	Na
6	Mineral mining	0	1.75	0	Na	0
7	Other mining	0	0	0	0	1.21
8	Other food stuff	0	0	3.37	0	0
9	Processed, preserved fruits and vegetables	0	0	3.24	0	0
10	Alcohol, beer and liquors	0	0	3.33	0	0
11	Sugar, refined	0	0	3.29	0	0
12	Tea, coffee processing	0	0	3.26	0	0
13	Cigarettes and other tobacco products	0	2.15	Na	0	0
14	Processed seafood and by-products	7.03	Na	0	0	0
15	Milling and grain products	0	0	3.27	0	0
16	Ceramics, glass, porcelain	0	7.32	0	0	0
17	Bricks, title (all kinds)	0	7.37	0	0	0
18	Cement	0	7.37	0	0	0
19	Other construction materials	0	7.83	0	0	0
20	Paper pulp and paper products and by-products	0	0	2.95	0	0
21	Processed wood and wood products	0	0	2.63	0	0
22	Chemical products	0	16.13	0	0	0
23	Fertilizer, pesticides and veterinary medicine	0	8.01	0	0	0
24	Health medicine	0	9.94	0	0	0
25	Processed rubber and by-products	5.01	0	0	0	0
26	Soap, detergents, perfumes & toilet preparations	0	8.58	0	0	0
27	Plastic, plastic products	6.07	0	0	0	0
28	Other chemical products	0	10.48	0	0	0
29	Other metallic products	0	0	4.39	0	0
30	Equipment, machinery	0	0	19.25	0	0
31	Electrical and electronic products	0	0	16.48	0	0
32	Non-ferrous metal and products	0	0	9.33	0	0
33	Ferrous metal and products	0	0	9.33	0	0
34	Manufacture of textiles	0	0	7.29	0	0
35	Carpet and rugs	0	0	7.56	0	0
36	Leather, footwear, bleaching, dyeing of fabrics	0	0	0	0	17.80
37	Other industry	Na	Na	1.15	Na	Na
38	Products of publishing house	0	0	0	0	105.90
39	Petroleum, natural gas	Na	Na	35.56	Na	0
40	Electricity and gasoline	0	0	1715.28	0	0
41	Water	Na	1.20	0	0	Na
42	Construction	1.09	1.09	1.09	1.09	1.09
43	Trade	0	0	2.78	0	0
44	Personal repairs	3.91	0	0	Na	0
45	Hotel and restaurants	9.43	0	0	0	0
46	Freight and passenger transport	0	0	0	0	11.03
47	Communication services	0	Na	0	Na	6.86
48	Banking, credit, treasury, lotto, insurance	0	3.80	0	0	0
49	Science and technology	Na	Na	1.10	Na	Na
50	State management, defense & social security	Na	1.09	1.09	1.09	Na
51	Culture, health, education, sport	0	5.02	0	0	0
52	Tourism, real estate, business and consultancy services, and other personal services	0	0	5.18	0	0
53	Domestic Final Demand	1.09384				

Table 5.1.2 Sector activity levels under scenario 2 about factor mobility (see section 2)
Model III – 52 sectors and 5 types of ownership (Na denotes a non-active sector)

Code	Description	State Central	State Local	Domestic Private	Foreign 100%	Joint Venture
1	Agriculture (except animal husbandry)	0.80	0	Na	0	38.43
2	Animal husbandry	0	0	Na	0	59.88
3	Forestry	0	1.27	Na	0	Na
4	Fishing	7.26	0	Na	0	0
5	Coal	0	127.95	0	0	Na
6	Mineral mining	0	1.73	0	Na	0
7	Other mining	0	42.48	0	0	0
8	Other food stuff	0	0	3.33	0	0
9	Processed, preserved fruits and vegetables	0	0	3.21	0	0
10	Alcohol, beer and liquors	0	0	3.29	0	0
11	Sugar, refined	0	0	3.26	0	0
12	Tea, coffee processing	0	5.29	0	0	0
13	Cigarettes and other tobacco products	0	2.11	Na	0	0
14	Processed seafood and by-products	7.03	Na	0	0	0
15	Milling and grain products	0	0	3.24	0	0
16	Ceramics, glass, porcelain	0	7.23	0	0	0
17	Bricks, title (all kinds)	0	7.28	0	0	0
18	Cement	0	7.27	0	0	0
19	Other construction materials	0	7.67	0	0	0
20	Paper pulp and paper products and by-products	0	14.30	0	0	0
21	Processed wood and wood products	12.99	0	0	0	0
22	Chemical products	0	15.03	0	0	0
23	Fertilizer, pesticides and veterinary medicine	0	7.83	0	0	0
24	Health medicine	0	9.66	0	0	0
25	Processed rubber and by-products	4.93	0	0	0	0
26	Soap, detergents, perfumes & toilet preparations	0	8.47	0	0	0
27	Plastic, plastic products	5.85	0	0	0	0
28	Other chemical products	0	10.13	0	0	0
29	Other metallic products	0	0	4.23	0	0
30	Equipment, machinery	0	19.75	0	0	0
31	Electrical and electronic products	2.79	0	9.07	0	0
32	Non-ferrous metal and products	4.16	0	0	0	0
33	Ferrous metal and products	4.16	0	0	0	0
34	Manufacture of textiles	2.82	0	0	0	0
35	Carpet and rugs	2.91	0	0	0	0
36	Leather, footwear, bleaching, dyeing of fabrics	0	6.94	0	0	0
37	Other industry	Na	Na	1.13	Na	Na
38	Products of publishing house	0	2.92	0	0	0
39	Petroleum, natural gas	Na	Na	31.44	Na	0
40	Electricity and gasoline	0	0	0	0	48.31
41	Water	Na	1.08	1.08	1.08	Na
42	Construction	1.08	1.08	1.08	1.08	1.08
43	Trade	0	4.85	0	0	0
44	Personal repairs	3.87	0	0	Na	0
45	Hotel and restaurants	9.35	0	0	0	0
46	Freight and passenger transport	0	0.00	0	0	10.91
47	Communication services	0	Na	0	Na	6.80
48	Banking, credit, treasury, lotto, insurance	0	3.74	0	0	0
49	Science and technology	Na	Na	1.08	Na	Na
50	State management, defense & social security	Na	1.08	1.08	1.08	Na
51	Culture, health, education, sport	0	4.96	0	0	0
52	Tourism, real estate, business and consultancy services, and other personal services	0	0	5.12	0	0
53	Domestic Final Demand	1.08151				

Table 5.1.3 Sector activity levels under scenario 3 about factor mobility (see section 2)
Model III – 52 sectors and 5 types of ownership (Na denotes a non-active sector)

Code	Description	State Central	State Local	Domestic Private	Foreign 100%	Joint Venture
1	Agriculture (except animal husbandry)	1.26	0.63	Na	0.93	5.37
2	Animal husbandry	0	0	Na	0	57.47
3	Forestry	0	1.22	Na	0	Na
4	Fishing	7.10	0	Na	0	0
5	Coal	1.07	0	0	0	Na
6	Mineral mining	0	1.63	0	Na	0
7	Other mining	0	41.97	0	0	0
8	Other food stuff	0	5.17	0	0	0
9	Processed, preserved fruits and vegetables	0	5.09	0	0	0
10	Alcohol, beer and liquors	0	5.15	0	0	0
11	Sugar, refined	0	5.13	0	0	0
12	Tea, coffee processing	0	5.11	0	0	0
13	Cigarettes and other tobacco products	0	1.98	Na	0	0
14	Processed seafood and by-products	7.00	Na	0	0	0
15	Milling and grain products	0	5.11	0	0	0
16	Ceramics, glass, porcelain	2.49	0	0	0	0
17	Bricks, title (all kinds)	2.50	0	0	0	0
18	Cement	2.50	0	0	0	0
19	Other construction materials	2.56	0	0	0	0
20	Paper pulp and paper products and by-products	0	13.08	0	0	0
21	Processed wood and wood products	12.60	0	0	0	0
22	Chemical products	3.88	0	0	0	0
23	Fertilizer, pesticides and veterinary medicine	2.59	0	0	0	0
24	Health medicine	3.06	0	0	0	0
25	Processed rubber and by-products	4.62	0	0	0	0
26	Soap, detergents, perfumes & toilet preparations	2.88	0	0	0	0
27	Plastic, plastic products	5.01	0	0	0	0
28	Other chemical products	3.13	0	0	0	0
29	Other metallic products	0	0	0	4.44	0
30	Equipment, machinery	0	0	0	2.75	0
31	Electrical and electronic products	0	0	0	0.00	2.56
32	Non-ferrous metal and products	0.00	0	0	0	2.34
33	Ferrous metal and products	0.00	0	0	0	2.34
34	Manufacture of textiles	1.95	0	0	0	4.27
35	Carpet and rugs	2.77	0	0	0	0
36	Leather, footwear, bleaching, dyeing of fabrics	0	0.00	0	2.24	0
37	Other industry	Na	Na	1.06	Na	Na
38	Products of publishing house	0	2.77	0	0	0
39	Petroleum, natural gas	Na	Na	9.99	Na	1.78
40	Electricity and gasoline	0	0	0	0	45.69
41	Water	Na	0.05	0	13.83	Na
42	Construction	0.42	0	0	400.65	0
43	Trade	2.99	0.00	0	0	0
44	Personal repairs	3.70	0	0	Na	0
45	Hotel and restaurants	9.07	0	0	0	0
46	Freight and passenger transport	0.00	0	0	0	10.43
47	Communication services	0	Na	0	Na	6.60
48	Banking, credit, treasury, lotto, insurance	0	3.54	0	0	0
49	Science and technology	Na	Na	1.04	Na	Na
50	State management, defense & social security	Na	1.03	1.03	1.03	Na
51	Culture, health, education, sport	0	4.71	0	0	0
52	Tourism, real estate, business and consultancy services, and other personal services	0	0	0	21.64	0
53	Domestic Final Demand	1.03465				

Table 5.1.1 Sector activity levels under scenario 4 about factor mobility (see section 2)
Model III – 52 sectors and 5 types of ownership (Na denotes a non-active sector)

Code	Description	State Central	State Local	Domestic Private	Foreign 100%	Joint Venture
1	Agriculture (except animal husbandry)	0	0	Na	0	59.57
2	Animal husbandry	0	0	Na	0	60.51
3	Forestry	0	1.29	Na	0	Na
4	Fishing	7.30	0	Na	0	0
5	Coal	0	129.17	0	0	Na
6	Mineral mining	0	1.75	0	Na	0
7	Other mining	0	0	0	0	1.21
8	Other food stuff	0	0	3.37	0	0
9	Processed, preserved fruits and vegetables	0	0	3.24	0	0
10	Alcohol, beer and liquors	0	0	3.33	0	0
11	Sugar, refined	0	0	3.29	0	0
12	Tea, coffee processing	0	0	3.26	0	0
13	Cigarettes and other tobacco products	0	2.15	Na	0	0
14	Processed seafood and by-products	7.03	Na	0	0	0
15	Milling and grain products	0	0	3.27	0	0
16	Ceramics, glass, porcelain	0	7.32	0	0	0
17	Bricks, title (all kinds)	0	7.37	0	0	0
18	Cement	0	7.37	0	0	0
19	Other construction materials	0	7.83	0	0	0
20	Paper pulp and paper products and by-products	0	0	2.95	0	0
21	Processed wood and wood products	0	0	2.63	0	0
22	Chemical products	0	16.13	0	0	0
23	Fertilizer, pesticides and veterinary medicine	0	8.01	0	0	0
24	Health medicine	0	9.94	0	0	0
25	Processed rubber and by-products	5.01	0	0	0	0
26	Soap, detergents, perfumes & toilet preparations	0	8.58	0	0	0
27	Plastic, plastic products	6.07	0	0	0	0
28	Other chemical products	0	10.48	0	0	0
29	Other metallic products	0	0	4.39	0	0
30	Equipment, machinery	0	0	19.25	0	0
31	Electrical and electronic products	0	0	16.48	0	0
32	Non-ferrous metal and products	0	0	9.33	0	0
33	Ferrous metal and products	0	0	9.33	0	0
34	Manufacture of textiles	0	0	7.29	0	0
35	Carpet and rugs	0	0	7.56	0	0
36	Leather, footwear, bleaching, dyeing of fabrics	0	0	0	0	17.80
37	Other industry	Na	Na	1.15	Na	Na
38	Products of publishing house	0	0	0	0	105.90
39	Petroleum, natural gas	Na	Na	35.55	Na	0
40	Electricity and gasoline	0	0	1715.13	0	0
41	Water	Na	1.09	1.09	1.09	Na
42	Construction	1.09	1.09	1.09	1.09	1.09
43	Trade	0	0	2.78	0	0
44	Personal repairs	3.91	0	0	Na	0
45	Hotel and restaurants	9.43	0	0	0	0
46	Freight and passenger transport	0	0	0	0	11.03
47	Communication services	0	Na	0	Na	6.86
48	Banking, credit, treasury, lotto, insurance	0	3.80	0	0	0
49	Science and technology	Na	Na	1.10	Na	Na
50	State management, defense & social security	Na	1.09	1.09	1.09	Na
51	Culture, health, education, sport	0	5.02	0	0	0
52	Tourism, real estate, business and consultancy services, and other personal services	0	0	5.18	0	0
53	Domestic Final Demand	1.09383				

Table 5.2 *Commodity and factor shadow prices under four scenarios about factor mobility Model III – 52 sectors and 5 types of ownership*

Code	Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1	Agriculture (except animal husbandry)	0.3019	0.3233	0.3061	0.2982
2	Animal husbandry	0.6159	0.6196	0.6431	0.6118
3	Forestry	0.5036	0.5028	0.5284	0.5025
4	Fishing	1.8368	1.8330	1.9500	1.8303
5	Coal	1.1156	1.0727	1.0486	1.1125
6	Mineral mining	1.3141	1.2356	1.1566	1.3134
7	Other mining	0.4875	0.4884	0.5113	0.4863
8	Other food stuff	0.8187	0.8311	0.8210	0.8142
9	Processed, preserved fruits and vegetables	1.2117	1.2369	1.2614	1.2102
10	Alcohol, beer and liquors	0.8872	0.8852	0.8632	0.8823
11	Sugar, refined	0.9978	1.0071	0.9976	0.9859
12	Tea, coffee processing	0.5054	0.5245	0.5157	0.5022
13	Cigarettes and other tobacco products	1.0429	1.0064	0.9581	1.0403
14	Processed seafood and by-products	1.3447	1.3330	1.3838	1.3403
15	Milling and grain products	0.4535	0.4711	0.4628	0.4503
16	Ceramics, glass, porcelain	1.5307	1.4671	1.4213	1.5277
17	Bricks, title (all kinds)	1.6665	1.6307	1.6541	1.6644
18	Cement	2.2809	2.1845	2.1178	2.2797
19	Other construction materials	1.1112	1.0861	1.0929	1.1081
20	Paper pulp and paper products and by-products	1.6042	1.5868	1.5806	1.6016
21	Processed wood and wood products	0.9823	0.9695	0.9825	0.9802
22	Chemical products	1.4892	1.4190	1.3678	1.4848
23	Fertilizer, pesticides and veterinary medicine	1.0426	0.9867	0.9799	1.0211
24	Health medicine	1.0856	0.9995	0.8889	1.0801
25	Processed rubber and by-products	1.4784	1.4409	1.4708	1.4655
26	Soap, detergents, perfumes & toilet preparations	1.0853	1.0181	0.9382	1.0821
27	Plastic, plastic products	0.8661	0.7949	0.6893	0.8637
28	Other chemical products	1.0742	1.0202	0.9594	1.0701
29	Other metallic products	0.8416	0.8512	0.8014	0.8378
30	Equipment, machinery	1.2593	1.2620	1.2546	1.2543
31	Electrical and electronic products	1.0971	1.0963	0.9269	1.0935
32	Non-ferrous metal and products	1.1964	1.1984	1.2419	1.1919
33	Ferrous metal and products	0.8137	0.8140	0.7695	0.8096
34	Manufacture of textiles	0.9975	0.9932	0.9536	0.9925
35	Carpet and rugs	0.9483	0.9466	0.8611	0.9444
36	Leather, footwear, bleaching, dyeing of fabrics	1.1627	1.1319	1.0554	1.1588
37	Other industry	1.7577	1.7784	1.8576	1.7487
38	Products of publishing house	1.1028	1.1557	1.0222	1.0999
39	Petroleum, natural gas	10.7115	10.8003	11.6923	10.7172
40	Electricity and gasoline	1.4506	1.4604	1.5557	1.4497
41	Water	1.5663	n/a	1.1082	n/a
42	Construction	n/a	n/a	1.1907	n/a
43	Trade	0.7360	0.7411	0.7502	0.7342
44	Personal repairs	0.8423	0.8388	0.8588	0.8380
45	Hotel and restaurants	1.2210	1.2226	1.2910	1.2175
46	Freight and passenger transport	2.8298	2.8529	2.9324	2.8287
47	Communication services	0.5206	0.5205	0.4272	0.5178
48	Banking, credit, treasury, lotto, insurance	0.3840	0.3843	0.3976	0.3815
49	Science and technology	0.9305	0.9324	0.9696	0.9256
50	State management, defense & social security				
51	Culture, health, education, sport	0.7644	0.7516	0.7633	0.7616
52	Tourism, real estate, business and consultancy services, and other personal services	0.6953	0.6954	0.7263	0.6930

Table 5.2   Commodity and factor shadow prices under four scenarios about factor mobility
Model III – 52 sectors and 5 types of ownership (continued)

Factors	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Labor by ownership				
State-central owned	0.0000	0.0000	0.0291	0.0000
State-local owned	0.0000	0.0000	0.0000	0.0000
Private owned	0.0000	0.4287	0.0000	0.0000
Foreign owned	0.0000	0.4287	0.3957	0.0000
Joint-venture owned	0.0000	0.4287	0.4141	0.0000
Capital				
State-central owned	0.7310	0.5699	0.2775	0.7316
State-local owned	0.7310	0.5699	0.3018	0.7316
Private owned	0.7310	0.7360	0.8011	0.7316
Foreign owned	0.7310	0.7360	0.2103	0.7316
Joint-venture owned	0.7310	0.7360	0.2950	0.7316

Annex A. Gross output by type of ownership and domestic final demand, by industry/commodity (mill. VND)

Code	Description	State Central (%)	State Local (%)	Domestic Private (%)	Foreign 100% (%)	Joint Venture (%)	Domestic final demand
1	Agriculture (except animal husbandry)	46.50	46.23	-	05.48	01.80	18772154
2	Animal husbandry	46.50	46.23	-	05.48	01.80	20098230
3	Forestry	15.62	84.38	-	-	-	1278119
4	Fishing	14.31	81.10	-	01.80	02.79	10077049
5	Coal	96.02	00.83	01.01	02.14	-	602830
6	Mineral mining	20.87	64.16	08.96	-	06.01	-2
7	Other mining	11.93	02.40	01.17	00.01	84.49	75153
8	Other food stuff	19.87	20.12	32.94	13.68	13.39	10243085
9	Processed, preserved fruits and vegetables	19.87	20.12	32.94	13.68	13.39	733664
10	Alcohol, beer and liquors	19.87	20.12	32.94	13.68	13.39	10252566
11	Sugar, refined	19.87	20.12	32.94	13.68	13.39	3683252
12	Tea, coffee processing	19.87	20.12	32.94	13.68	13.39	780845
13	Cigarettes and other tobacco products	44.66	53.12	00.76	-	01.46	4828515
14	Processed seafood and by-products	14.31	81.10	-	01.80	02.79	204281
15	Milling and grain products	19.87	20.12	32.94	13.68	13.39	47980548
16	Ceramics, glass, porcelain	41.65	15.08	13.59	05.23	24.45	341076
17	Bricks, title (all kinds)	4165	15.08	13.59	05.23	24.45	-34298
18	Cement	41.65	15.08	13.59	05.23	24.45	-8594
19	Other construction materials	41.65	15.08	13.59	05.23	24.45	7662
20	Paper pulp and paper products and by-products	33.50	08.22	40.71	12.79	04.78	1192592
21	Processed wood and wood products	08.12	14.57	40.47	26.49	10.35	1620151
22	Chemical products	36.00	12.85	11.95	15.14	24.07	-782533
23	Fertilizer, pesticides and veterinary medicine	41.65	15.08	13.59	05.23	24.45	309765
24	Health medicine	36.00	12.85	11.95	15.14	24.07	5659158
25	Processed rubber and by-products	22.78	04.46	36.54	26.66	09.56	1326311
26	Soap, detergents, perfumes & toilet preparations	36.00	12.85	11.95	15.14	24.07	4252856
27	Plastic, plastic products	22.78	04.46	36.54	26.66	09.56	124424
28	Other chemical products	36.00	12.85	11.95	15.14	24.07	549059
29	Other metallic products	15.57	04.34	31.50	25.69	22.90	15388829
30	Equipment, machinery	10.67	06.22	06.57	39.94	36.60	13285998
31	Electrical and electronic products	19.35	05.19	07.77	24.51	43.18	7528450
32	Non-ferrous metal and products	31.84	01.82	14.71	03.04	48.59	2350625
33	Ferrous metal and products	31.84	01.82	14.71	03.04	48.59	390381
34	Manufacture of textiles	37.63	08.39	14.67	32.44	06.85	11630026
35	Carpet and rugs	37.63	08.39	14.67	32.44	06.85	2207899
36	Leather, footwear, bleaching, dyeing of fabrics	15.26	14.84	18.83	45.25	05.81	5909767
37	Other industry	-	-	100.00	-	-	1396104
38	Products of publishing house	55.10	37.57	05.70	00.57	01.05	-39522
39	Petroleum, natural gas	-	-	23.32	-	76.68	2376069
40	Electricity and gasoline	88.76	00.67	00.07	08.21	02.29	4259650
41	Water	-	92.66	00.17	07.17	-	384235
42	Construction	51.40	26.51	20.10	00.20	01.78	86501290
43	Trade	35.06	23.02	40.83	00.39	00.70	26397894
44	Personal repairs	27.94	08.10	62.15	-	01.81	1761197
45	Hotel and restaurants	11.28	42.15	15.55	01.28	29.73	12579504
46	Freight and passenger transport	52.48	05.55	31.99	00.06	09.93	7178702
47	Communication services	84.50	-	0.00	-	15.50	1455300
48	Banking, credit, treasury, lotto, insurance	51.12	29.48	07.56	09.67	02.18	5124786
49	Science and technology	-	-	100.00	-	-	2424509
50	State management, defense & social security	-	77.82	11.11	11.07	-	23233945
51	Culture, health, education, sport	07.31	22.05	20.88	05.70	44.05	35218442
52	Tourism, real estate, business and consultancy services, and other personal services	34.07	21.22	21.11	04.78	18.82	18836835

Annex B. Sector Classification and Aggregation

Code	Description	Code 2000
1	Agriculture (except animal husbandry)	01-06
2	Animal husbandry	07-12
3	Forestry	13
4	Fishing	14, 15
5	Coal	16
6	Mineral mining	17
7	Other mining	18-21
8	Other food stuff	22-25
9	Processed, preserved fruits and vegetables	26
10	Alcohol, beer and liquors	27-29
11	Sugar, refined	30
12	Tea, coffee processing	31, 32
13	Cigarettes and other tobacco products	33
14	Processed seafood and by-products	34
15	Milling and grain products	35, 36
16	Ceramics, glass, porcelain	37, 38
17	Bricks, title (all kinds)	39
18	Cement	40
19	Other construction materials	41, 42
20	Paper pulp and paper products and by-products	43
21	Processed wood and wood products	44
22	Chemical products	45, 46
23	Fertilizer, pesticides and veterinary medicine	47-50
24	Health medicine	51
25	Processed rubber and by-products	52
26	Soap, detergents, perfumes and other toilet preparations	53, 54
27	Plastic, plastic products	55, 56
28	Other chemical products	57,58,59
29	Other metallic products	60-64, 66
30	Equipment, machinery	65, 67-69
31	Electrical and electronic products	70-72
32	Ferrous metal and products	73
33	Non-Ferrous metal and products except machinery and equipments	74
34	Manufacture of textiles	75-77
35	Carpet and rugs	78, 79
36	Leather, footwear, bleaching, dyeing of fabrics	80, 81
37	Other industry	82, 83, 85
38	Products of publishing house (newspapers, periodicals and books)	84
39	Petroleum, natural gas	86
40	Electricity and gasoline	87
41	Water	88
42	Construction	89, 90
43	Trade	91
44	Personal repairs	92
45	Hotel and restaurants	93, 94
46	Freight and passenger transport	95-98
47	Communication services	99
48	Banking, credit, treasury, lotto, insurance and retirement subsidy	101-103
49	Science and technology	104
50	State management, defense & compulsory social security	107, 111
51	Culture, health, education, sport	108-110
52	Other services (Tourism, Real estate, business and consultancy services, and other personal services)	100, 105, 106, 112

Annex C. Sector Reclassification (from 52 to 5 sectors)

Code	Description (52 sectors)	Description (5 sector)
1	Agriculture (except animal husbandry)	Agriculture, forestry and mining (1-7)
2	Animal husbandry	
3	Forestry	
4	Fishing	
5	Coal	
6	Mineral mining	
7	Other mining	
8	Other food stuff	Low-tech manufacturing (8-21)
9	Processed, preserved fruits and vegetables	
10	Alcohol, beer and liquors	
11	Sugar, refined	
12	Tea, coffee processing	
13	Cigarettes and other tobacco products	
14	Processed seafood and by-products	
15	Milling and grain products	
16	Ceramics, glass, porcelain	
17	Bricks, title (all kinds)	
18	Cement	
19	Other construction materials	
20	Paper pulp and paper products and by-products	
21	Processed wood and wood products	
22	Chemical products	Hi-tech manufacturing (22-33)
23	Fertilizer, pesticides and veterinary medicine	
24	Health medicine	
25	Processed rubber and by-products	
26	Soap, detergents, perfumes and other toilet preparations	
27	Plastic, plastic products	
28	Other chemical products	
29	Other metallic products	
30	Equipment, machinery	
31	Electrical and electronic products	
32	Ferrous metal and products	
33	Non-Ferrous metal and products except machinery and equipments	
34	Manufacture of textiles	Low-tech manufacturing (34-38)
35	Carpet and rugs	
36	Leather, footwear, bleaching, dyeing of fabrics	
37	Other industry	
38	Products of publishing house (newspapers, periodicals and books)	
39	Petroleum, natural gas	Heavy industry (39-42)
40	Electricity and gasoline	
41	Water	
42	Construction	
43	Trade	Services (43-52)
44	Personal repairs	
45	Hotel and restaurants	
46	Freight and passenger transport	
47	Communication services	
48	Banking, credit, treasury, lotto, insurance and retirement subsidy	
49	Science and technology	
50	State management, defense & compulsory social security	
51	Culture, health, education, sport	
52	Other services (Tourism, Real estate, business and consultancy services, and other personal services)	