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Comparative Studies Of Indochina Economies
(Cambodia, Thailand and Vietnam): An Input-Output (I-O) Approach

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By:

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FEBRUARY 23, 2009

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Abstract.

The Input-Output (I-O) table is now universally accepted as an effective analytical tool for the conduct of in-depth socio-economic as well as environmental studies, whether national or regional. The reason for its being widely used is because of its capability, in a simple compacted manner, to unravel the interwoven structural interdependent relations existing in an economy and the ability to translate these economic interdependencies into empirical analysis.

The construction therefore of an I-O Account as an integrated sub-account of the country's National Accounts could not be undermined. While the GDP periodically provides the aggregative measures of economic development, its usefulness as an effective analytical database for translating development objectives into specific programs and projects is quite limited. Knowledge and understanding of the economy's structure in all its details thus become an indispensable input in economic planning and policy formulation. And this type of technical information could only be retrieved through the compilation of I-O tables.

This paper, which deals with an economic assessment based on single country or intra-national I-O tables available provides therefore the technical insights into how the proposed research project shall be initiated and pursued. And this can be done by looking first at the I-O data of each country in the Region.

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I.   <u>INTRODUCTION</u>

The Input-Output (I-O) table is now universally accepted as an effective analytical tool for the conduct of in-depth socio-economic as well as environmental studies, whether national or regional. The reason for its being widely used is because of its capability, in a simple compacted manner, to unravel the interwoven structural interdependent relations existing in an economy and the ability to translate these economic interdependencies into empirical analysis.

The construction therefore of an I-O Account as an integrated sub-account of the country's National Accounts could not be undermined. While the GDP periodically provides the aggregate measures of economic development, its usefulness as an effective analytical database for translating development objectives into specific programs and projects is quite limited. Knowledge and understanding of the economy's structure in all its details thus become an indispensable input in economic planning and policy formulation. And this type of technical information could only be retrieved through the compilation of I-O tables.

The principal and ultimate objective of this study is to assess the feasibility of adopting the I-O model as a statistical accounting framework for compiling an integrated database for the conduct of economic research studies such as the proposed project on **"The Impact of Infrastructure Investment in the Indochina Region: An Input-Output Approach"**. For comprehensive yet effective results of this proposed study, construction of an inter-regional I-O (IRIO) table is deemed crucial. Annex Figure A shows the schematic of the proposed Indochina International I-O Table.

This paper, which deals with an economic assessment based on available single country or intra-national I-O tables, provides therefore the technical insights into how the proposed research project shall be initiated and pursued. And this can be done by looking first at the I-O data of each country in the Region.

The first part of this paper deals with (1) a brief discussion of the I-O framework adopted in compiling national I-O tables and (2) an assessment of updated I-O data availability in the Region. The salient findings of the analysis are highlighted in Parts II and III. Part II is a comparative assessment of the macro- and micro-economic structures of the national economies under study. Part III presents an I-O analysis on the total (direct and indirect) impact of changing final demands on such macro-economic variables as production (output), income, employment and imports.

II.   OVERVIEW ON I-O METHODOLOGY and DATA SOURCES

1. The I-O Framework

      The generation of national I-O tables requires the compilation of two types of I-O tables. First, a competitive-import of I-O table is constructed wherein no distinction is made between domestically-produced and imported products that are either consumed in further production or for final consumption. This table is useful for analysis on supply and demand of products, i.e. in product marketing and distribution studies. Fig. 1 shows the accounting framework of the I-O model of the competitive type.

FIG. 1. CONFIGURATION OF I-O TABLE, COMPETITIVE-IMPORT TYPE

FROM \ TO		INTERMEDIATE DEMAND 1 2 … j … n-1 n	FINAL DEMAND			GO
			DOMESTIC 1 …. k …. m	E	M	GO
INTERMEDIATE INPUTS	1 2 : i : n-1 n	X	Y	e	$-m$	x
VALUE ADDED	1 : : p : o	V	0	0	0	v^T
GI = GO		x'	Y^T	e^T	$-m^T$	

NOTATIONS:

X : n x n matrix of input-output transactions, x_{ij}, whether local and/or imported; **(i=j= 1,2,…n)**

Y : n x m matrix of final domestic demand transactions, y_{nk}, whether local and/or imported;

e : column vector of exports

$-m$: column vector of imports, with negative signs

x : column vector of outputs, x_i

V : o x n matrix of gross value added, v_{ij}

v^T : column vector of total GVA = GDP

x' : row vector of gross inputs (= gross outputs), x_j

The second type is the non-competitive-import type wherein domestically-produced products are distinguished explicitly from the imported. Figure 2 shows the configuration of an economy's I-O Table of the conventional type of I-O model. It is a double-entry bookkeeping system that traces, horizontally, the disposition of products from producer to consumer, distinguished whether intermediate and/or final. Vertically, it shows the cost or input structure of economic activities as well as the consumption patterns of the final demand sectors.

FIG. 2. CONFIGURATION OF I-O TABLE, NON-COMPETITIVE TYPE

FROM \ TO			INTERMEDIATE DEMAND 1 2 … j … n-1 n	FINAL DEMAND DOMESTIC 1 …. k …. m	E	M	GO
INTERMEDIATE INPUTS	DOMESTIC	1 2 : i : n-1 n	X^D	Y^D	e	0	x
INTERMEDIATE INPUTS	IMPORTED	1 2 : i : n-1 n	X^M	Y^M	0	-M	0
VALUE ADDED		1 : p : o	V	0	0	0	V^T
GI = GO			x'	Y^T	e^T	$-m^T$	

X^D: n x n intermediate transactions of domestically-produced products; (i=j=1, 2, …n)
Y^D: n x m transactions final demand transactions of domestically-produced products, where m is the number of final domestic demand sectors;
e: is n x 1 column vector of exports;
x: n x 1 column vector of gross output;
X^M : n x n matrix of intermediate transactions of imported products;
Y^M : n x m matrix of final domestic demand transactions of imported products;
-M: n x 1 column vector of total imports, with negative sign;
V: o x n matrix of gross value added;
V^T : o x 1 column vector of total gross value added = GDP;
x' : 1 x n row vector of gross inputs (=gross outputs)

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For effective I-O-based analytical studies, this type of table is most useful especially in highly import dependent economies since it is able to measure the total import requirements by economic activities in order to sustain final demands. It is derived by subtracting estimated import transactions from the basic competitive-imports type of I-O table wherein no distinction is made between domestic and imported products.

For the purpose of this study, the non-competitive types of national I-O tables from the 3 countries under study were referred to. These were made available in uniform 22-sector classification with valuation in US $, expressed in producer's prices.

2. I-O DATA INVENTORY and ASSESSMENT

Table A shows an inventory of latest I-O data availability by country. It can be observed that, of the 5 Indochina countries (6, if Yunnan, China as part of GMS region is included), 3 countries (Thailand, Vietnam and Cambodia) have produced national I-O tables, with CY 2000 as their latest reference years, although Vietnam has already made available its 2005 I-O update. Vietnam's General Statistics Office (GSO) is now in the process of compiling its 2007 survey-based I-O table, while Thailand is now finishing its 2005 I-O compilation in collaboration with IDE-JETRO.

Table A. INVENTORY OF LATEST AVAILABLE I-O DATA IN THE INDOCHINA REGION

Area Coverage	Cambodia	Thailand	Vietnam	Lao PDR	Myan mar
1. National Benchmark	- 2000 IO - (22x22) - Com/Noncom - Non-survey - AREES/NIS	- 2000 IO - (180x180) - Com/Noncom - Survey - NESDB/IDE	- 2000 IO - (112x112) - Com - Survey - GSO	N/A	N/A

2. National Update	- 2005 IO
	- ONGOING
	  (AREES/NIS)
		- 2005 IO
		- ONGOING
		  (NESDB/IDE)
			-2005 IO
			-112X112
				N/A	N/A

3. Regional	N/A	N/A	1) 2000/2005 MRIRIO (8-region)	N/A	N/A
4. Provincial	N/A	2003 Mukdahan Provincial - 20x20 - Non-survey - ADB	1) 2000 Hanoi 2) 2000 HCMC 3) 2000 Danang 3) 2000 Quangtri – ROV IRIO -ADB	2003Savannak het Provincial - 20x20 - Survey - ADB	N/A
		2003 Mukdahan-Savannakhet Inter-Provincial IO Table 20 x 20 sectors (ADB)			

AREES is now working with National Institute of Statistics (NIS) to update Cambodia's (unofficial) 2000 I-O table to relate to a more current period in order for it to be in harmony with the chosen reference year for the proposed MRIRIO project. Construction of a fully-covered Indochina IRIO table depends on the availability of I-O data for the other two economies of Lao P.D.R. and Myanmar. [Research visits made by Dr. Kim show that Yunnan has its own provincial I-O table]

III. ANALYSIS OF RESULTS

Analysis of empirical results is divided into two parts. Part I is a comprehensive assessment of the economic structures of the countries under study. Part II is an impact analysis of the total (direct + indirect) effects of final demand on such economic variables as production, income and employment. Moreover, total import requirements induced by final demands are estimated and analyzed.

The basic 22-sector tables as well as the 3-sector collapsed tables were referred to in the calculation of the analytical results.

Part 1. STRUCTURAL ANALYSIS

I.1. Supply and Demand

Table I.1 shows the supply and demand situation in Year 2000 of the 3 economies under study. It can be observed that domestic production accounted for the bulk of total supply, averaging 79.3% in 2000. Cambodia's production contributed the least (73.5%) to its total supply as compared to Thailand's (79.7%) and Vietnam's (77.8%). Conversely, Cambodia's dependence on imports, as the other source of supply, exhibited the highest at 26.5%, well above the 3-nation average of 20.7%.

. TABLE I.1 - SUPPLY AND DEMAND SITUATIONS, 2000

ITEM	VALUE (U.S.$Billion)				DISTRIBUTION (%)			
	CAM	THA	VIE	TOTAL	CAM	THA	VIE	TOTAL
TOTAL SUPPLY	*8.5*	*377.4*	*86.1*	*472.0*	*100.0*	*100.0*	*100.0*	*100.0*
1. PRODUCTION	6.3	300.9	66.9	374.1	73.5	79.7	77.8	79.3
2. IMPORTS	2.3	76.5	19.1	97.9	26.5	20.3	22.2	20.7
TOTAL DEMAND	*8.5*	*377.4*	*86.1*	*472.0*	*100.0*	*100.0*	*100.0*	*100.0*
1. DOMESTIC DEMAND	6.7	296.8	69.0	372.5	78.9	78.6	80.2	78.9
a) INTERMEDIATE	2.6	170.8	37.0	210.4	31.0	45.3	43.0	44.6
b) FINAL DOMESTIC	4.1	126.0	32.0	162.1	47.9	33.4	37.2	34.3
i) CONSUMPTION	3.3	94.1	22.7	120.1	39.3	24.9	26.4	25.4

ii) INVESTMENT	0.7	32.0	9.3	42.0	8.7	8.5	10.8	8.9
2. EXPORTS	1.8	80.6	17.1	99.5	21.1	21.4	19.8	21.1

From the demand side, Vietnam's domestic demand showed the highest at 80.2%, hence its export performance appeared to be comparably lower (19.8%) than Cambodia's (21.1%) and Thailand's (21.4%).

One interesting observation is that, while Cambodia's total domestic demand is relatively at par with the other 2 economies, its composition is structurally quite different. Cambodia's economy caters most of its total available supply to meet final demand requirements (47.9%), while its demand for intermediate products for production stands at a low 31.0%. This situation is the reverse of the domestic demand structures of Thailand and Vietnam, as can be observed in the table.

Cambodia's high share of final domestic demand is attributed to its final consumption demand by households and government that accounts for approximately two-fifths (39.3%) of total demand, whereas in Thailand and Vietnam, final consumption demands share is only around 25%.

I.2. Gross Output (Production) Structures

The composition of outputs by economic activity in the 3 countries under consideration appears to be comparatively different. Table I.2 shows that, at the 3-major sector level, production shares in Cambodia are evenly distributed, with its SERVICES sector as the largest contributor at 37.8% of total gross output. Production in Thailand is biased towards more of INDUSTRY (57.3%), followed by SERVICES (37.5%), with its AGRICULTURE sector at a mere 5.2%. Vietnam's output structure appears to be also industry-oriented with 55.7% share.

At the more disaggregated sector grouping, the top output contributors in Cambodia are crops (sector 01), textiles, garments & footwear (07), fishery (03), trade (18), food, beverage & tobacco, and transportation (16). In Thailand, they are: metal products, machinery & equipment (12), miscellaneous manufacturing (13), trade (18), food, beverage & tobacco (06) and textiles, garments & footwear (07). In Vietnam, they are: food, beverage & tobacco (06), crops (01), construction (15), trade (18) and textiles, garments & footwear (07).

Table I.2 - Output Structures

		VALUE (US$Million)			Distribution (%)		
		CAM	THA	VIE	CAM	THA	VIE
	TOTAL GROSS OUTPUT	6,252	300,922	66,928	100.0	100.0	100.0
	I. AGRICULTURE, FISHERY & FORESTR	1,934	15,583	11,471	30.9	5.2	17.1
01	Crops	816	9,414	6,841	13.1	3.1	10.2
02	Livestock & Poultry; Agric svcs	341	2,755	2,248	5.4	0.9	3.4
03	Fishery	622	3,244	1,843	10.0	1.1	2.8
04	Forestry & Logging	155	170	540	2.5	0.1	0.8
	II. INDUSTRY	1,954	172,463	37,276	31.3	57.3	55.7
05	Mining & quarrying	14	3,874	4,191	0.2	1.3	6.3
06	Food, beverage & tobacco	456	27,598	9,559	7.3	9.2	14.3
07	Textiles, garments & footwear	753	20,929	5,396	12.0	7.0	8.1
08	Wood & wood products	77	2,530	732	1.2	0.8	1.1
09	Paper, publishing & printing	9	4,110	794	0.1	1.4	1.2
10	Rubber products	70	3,469	300	1.1	1.2	0.4
11	Non-metallic mineral products	43	4,079	1,818	0.7	1.4	2.7
12	Metal products, machy & equip	14	47,538	4,386	0.2	15.8	6.6
13	Miscellaneous manufacturing[1]	121	37,453	2,540	1.9	12.4	3.8
14	Electricity, gas & water	27	10,260	1,374	0.4	3.4	2.1
15	Construction	370	10,624	6,186	5.9	3.5	9.2
	III. SERVICES	2,364	112,875	18,180	37.8	37.5	27.2
16	Transportation	452	15,960	1,233	7.2	5.3	1.8
17	Post & telecommunication	42	3,421	774	0.7	1.1	1.2
18	Trade	627	36,766	5,679	10.0	12.2	8.5
19	Finance, real estate & biz svces	333	10,304	3,182	5.3	3.4	4.8
20	Public administration	191	14,677	1,570	3.1	4.9	2.3
21	Hotels & restaurants	328	11,855	1,870	5.2	3.9	2.8
22	Other services	392	19,892	3,871	6.3	6.6	5.8

I.3. Gross Input (Production Cost) Structures

Table I.3 shows a comparison of the input structure or the cost of production per unit of output by economic activity, by country. Broken down into its two input categories, Cambodia's average total intermediate input (TII) ratio of 0.42 appears to be comparatively lower than those of Thailand's (0.57) and Vietnam's (0.55). This finding is attributable to Cambodia's high concentration of labor-intensive, and therefore the high value-added, industries such as agriculture and services as against Thailand's and Vietnam's, whose production activities have been directed towards the material-intensive industries such as manufacturing. It can thus be initially concluded that Cambodia's backward linkage with the productive system as user of intermediate inputs is comparatively lower than that of Thailand and Cambodia.

Table I.3 - Input Structures by Sector						
(Direct Input Requirements Per Unit of Gross Output)						
DESCRIPTION OF SECTOR	CAMBODIA		THAILAND		VIETNAM	
	TII	TPI	TII	TPI	TII	TPI
ALL SECTORS	0.42	0.58	0.57	0.43	0.55	0.45
I. AGRICULTURE, FISHERY & FORESTRY	0.28	0.72	0.38	0.62	0.33	0.67
01 Crops	0.22	0.78	0.31	0.69	0.27	0.73
02 Livestock & Poultry; Agric svces	0.39	0.61	0.56	0.44	0.47	0.53
03 Fishery	0.33	0.67	0.43	0.57	0.43	0.57
04 Forestry & Logging	0.18	0.82	0.16	0.84	0.23	0.77
II. INDUSTRY	0.58	0.42	0.69	0.31	0.69	0.31
05 Mining & quarrying	0.35	0.65	0.30	0.70	0.28	0.72
06 Food, beverage & tobacco	0.73	0.27	0.70	0.30	0.79	0.21
07 Textiles, garments & footwear	0.53	0.47	0.67	0.33	0.82	0.18
08 Wood & wood products	0.60	0.40	0.56	0.44	0.74	0.26
09 Paper, publishing & printing	0.37	0.63	0.65	0.35	0.73	0.27
10 Rubber products	0.35	0.65	0.71	0.29	0.66	0.34
11 Non-metallic mineral products	0.60	0.40	0.59	0.41	0.71	0.29
12 Metal products, machy & equipt	0.52	0.48	0.78	0.22	0.77	0.23
13 Miscellaneous manufacturing[1]	0.50	0.50	0.71	0.29	0.69	0.31
14 Electricity, gas & water	0.41	0.59	0.49	0.51	0.29	0.71
15 Construction	0.59	0.41	0.69	0.31	0.73	0.27
III. SERVICES	0.40	0.60	0.40	0.60	0.40	0.60
16 Transportation	0.50	0.50	0.66	0.34	0.48	0.52
17 Post & telecommunication	0.37	0.63	0.29	0.71	0.27	0.73
18 Trade	0.34	0.66	0.18	0.82	0.46	0.54
19 Finance, real estate & biz svces	0.15	0.85	0.17	0.83	0.34	0.66
20 Public administration	0.49	0.51	0.64	0.36	0.46	0.54
21 Hotels & restaurants	0.61	0.39	0.58	0.42	0.46	0.54
22 Other services	0.40	0.60	0.45	0.55	0.33	0.67

Conversely, it thus indicates that Cambodia's economic performance, in terms of value-added, is comparatively high at 58%, buoyed up by its main contributor which is the agriculture, fishery and forestry sector, as against Thailand's (43%) and Vietnam's (45%), brought down by the dominance of the material-intensive industry sector.

I.4. Sources of Intermediate Inputs

Table I.3 shows the absorption coefficients of intermediate inputs in the total cost of production. With the availability of the I-O table of the non-competitive type, these input coefficients are further decomposed by source of inputs, whether domestically-sourced or foreign-sourced. Thus, the I-O table is able to give direct indications on the degrees of dependencies by industries between domestic intermediate inputs (DII) and imported intermediate inputs (MII).

It can be observed from Tabe 1.4 that, in terms of input source, Cambodia's intermediate input structure is comparatively different from Thailand's and Vietnam's. It

appears that, on the average, the proportion of intermediate input consumption in Cambodia is roughly equally divided, i.e. 50% domestic and 50% imported. In Thailand, it is 2:1 in favor of the locally-produced; in Vietnam, 64% of total intermediate inputs are sourced from the domestic economy, while the remaining 36% comes from foreign sources.

Table I.4 - Intermediate Input Structures by Source of Inputs
(Direct Intermediate Input Requirements Per Unit of Gross Output)

SECTOR	CAMBODIA			THAILAND			VIETNAM		
	TIIR	DII	MII	TIIR	DII	MII	TIIR	DII	MII
ALL SECTORS	0.42	0.22	0.21	0.57	0.39	0.18	0.55	0.35	0.20
	100%	51%	49%	100%	68%	32%	100%	64%	36%
I. AGRICULTURE, FISHERY & FORESTRY	0.28	0.14	0.15	0.38	0.33	0.05	0.33	0.22	0.11
01 Crops	0.22	0.15	0.07	0.31	0.24	0.08	0.27	0.17	0.10
02 Livestock & Poultry; Agric svces	0.39	0.22	0.17	0.56	0.56	0.00	0.47	0.39	0.08
03 Fishery	0.33	0.09	0.24	0.43	0.40	0.03	0.43	0.23	0.20
04 Forestry & Logging	0.18	0.10	0.08	0.16	0.16	0.00	0.23	0.15	0.08
II. INDUSTRY	0.58	0.33	0.25	0.69	0.40	0.29	0.69	0.44	0.25
05 Mining & quarrying	0.35	0.18	0.17	0.30	0.29	0.01	0.28	0.21	0.08
06 Food, beverage & tobacco	0.73	0.64	0.09	0.70	0.59	0.10	0.79	0.69	0.10
07 Textiles, garments & footwear	0.53	0.27	0.26	0.67	0.53	0.15	0.82	0.46	0.36
08 Wood & wood products	0.60	0.43	0.17	0.56	0.32	0.23	0.74	0.56	0.18
09 Paper, publishing & printing	0.37	0.09	0.28	0.65	0.34	0.31	0.73	0.44	0.29
10 Rubber products	0.35	0.08	0.27	0.71	0.58	0.14	0.66	0.40	0.26
11 Non-metallic mineral products	0.60	0.11	0.49	0.59	0.45	0.15	0.71	0.47	0.24
12 Metal products, machy & equipt	0.52	0.08	0.44	0.78	0.28	0.51	0.77	0.33	0.43
13 Miscellaneous manufacturing[1]	0.50	0.11	0.39	0.71	0.31	0.41	0.69	0.28	0.41
14 Electricity, gas & water	0.41	0.08	0.34	0.49	0.47	0.02	0.29	0.14	0.15
15 Construction	0.59	0.23	0.36	0.69	0.52	0.17	0.73	0.41	0.32
III. SERVICES	0.40	0.18	0.22	0.40	0.37	0.03	0.40	0.25	0.15
16 Transportation	0.50	0.21	0.29	0.66	0.63	0.02	0.48	0.23	0.25
17 Post & telecommunication	0.37	0.16	0.22	0.29	0.29	0.00	0.27	0.17	0.10
18 Trade	0.34	0.12	0.22	0.18	0.18	0.01	0.46	0.28	0.18
19 Finance, real estate & biz svces	0.15	0.05	0.11	0.17	0.17	0.00	0.34	0.23	0.11
20 Public administration	0.49	0.22	0.27	0.64	0.64	-	0.46	0.30	0.16
21 Hotels & restaurants	0.61	0.44	0.17	0.58	0.53	0.06	0.46	0.34	0.12
22 Other services	0.40	0.14	0.26	0.45	0.37	0.08	0.33	0.19	0.14

TIIR: Total Intermediate Inputs   DII: Domestic Intermediate Inputs   MII: Imported Intermediate Inputs

At the sectoral level, Cambodia's industry sector depend more on domestic sources for their inputs than on imports, as evidenced by high shares recorded by the food, beverage & tobacco industries, textile and garments, and wood processing industries. On the other hand, its services sector depend more on imported inputs, specifically the transportation, communication and trade sectors. In both Thailand and Vietnam, dependence on domestic products as intermediate inputs is relatively high in

all industries except in the manufacture of capital goods where the bulk of inputs are foreign-sourced.

I.5. Gross domestic Product

The sectoral composition of GDP by sector and by country is shown in Table I.5. Similar to its production distribution pattern, GDP in Cambodia comes primarily from the **agriculture and services sectors** that accounted for 77.3% of the country's total GDP in 2000. Its **industry sector** group accounted for only 22.7%, way below Thailand's contribution of 40.6% and Vietnam's 38.2%.

At the 22-sector level of disaggregation, the top contributors to GDP are as follows:

In Cambodia, these are the crops sector with 17.6 % share, folowed by the fishery, trade, textiles & garments and finance & real estate sectors. In Thailand, its trade sector is the biggest contributor recording a high 23% of total GDP in 2000, way above its other top contributors such as other services, miscellaneous manufacturing, metal products, machinery & equipment, finance and real estate, and food, beverage & tobacco sectors. In Vietnam, its crops sector is the biggest contributor with 16.7% share, followed by trade, mining & quarrying, other services, finance & real estate, and food, beverage & tobacco sectors.

Table I.5 - Gross Domestic Product (GDP)

SECTOR		VALUE (US$Million)			Distribution (%)		
		CAM	THA	VIE	CAM	THA	VIE
TOTAL GDP		3,613	130,121	29,945	100.0	100.0	100.0
I. AGRICULTURE, FISHERY & FORESTRY		1,383	9,663	7,647	38.3	7.4	25.5
01	Crops	635	6,456	4,990	17.6	5.0	16.7
02	Livestock & Poultry; Agric svces	207	1,206	1,188	5.7	0.9	4.0
03	Fishery	414	1,859	417	11.5	1.4	1.4
04	Forestry & Logging	127	142	1,052	3.5	0.1	3.5
II. INDUSTRY		820	52,782	11,449	22.7	40.6	38.2
05	Mining & quarrying	9	2,715	3,007	0.3	2.1	10.0
06	Food, beverage & tobacco	123	8,374	1,978	3.4	6.4	6.6
07	Textiles, garments & footwear	354	6,883	988	9.8	5.3	3.3
08	Wood & wood products	30	1,124	188	0.8	0.9	0.6
09	Paper, publishing & printing	6	1,439	218	0.2	1.1	0.7
10	Rubber products	46	999	103	1.3	0.8	0.3
11	Non-metallic mineral products	17	1,668	521	0.5	1.3	1.7
12	Metal products, machy & equipt	7	10,265	1,013	0.2	7.9	3.4
13	Miscellaneous manufacturing[1]	60	10,775	794	1.7	8.3	2.7
14	Electricity, gas & water	16	5,228	971	0.4	4.0	3.2
15	Construction	153	3,313	1,669	4.2	2.5	5.6
III. SERVICES		1,410	67,676	10,849	39.0	52.0	36.2
16	Transportation	227	5,503	638	6.3	4.2	2.1
17	Post & telecommunication	26	2,438	562	0.7	1.9	1.9
18	Trade	413	29,970	3,083	11.4	23.0	10.3
19	Finance, real estate & biz svces	281	8,552	2,094	7.8	6.6	7.0
20	Public administration	98	5,254	852	2.7	4.0	2.8
21	Hotels & restaurants	129	4,945	1,012	3.6	3.8	3.4
22	Other services	235	11,015	2,608	6.5	8.5	8.7

[1] Includes chemicals, plastics, petroleum products, precision equipment & supplies

I.5A. Composition of Gross Value Added

A comparative analysis of the structural composition of GVA shows that, in Cambodia and Vietnam, **compensation of employees** accounts for more than half of their GDPs – 52% in Cambodia and 57% in Vietnam - as compared to Thailand where only a little less than one-third of its GDP went to payments to labor. Table I.5A suggests that it is more appealing to do business in Thailand because its **gross profitability share** (62% of GDP) is relatively higher than in the other two countries – 42% in Cambodia and 32% in Vietnam. On the other hand, it appears that doing business in Vietnam endures from **high tax rates** as evidenced by its significantly high share to GDP (11%) as against 6% in Cambodia and 7% in Thailand.

Table I.5A - Gross Value Added Ratios by Factor Share

Table I.5A - Gross Value Added Ratios by Factor Share
(Contribution Ratio per Unit of Gross Output)

DESCRIPTION OF SECTOR	CAMBODIA				THAILAND				VIETNAM			
	GVA	COE	GOS	NIT	GVA	COE	GOS	NIT	GVA	COE	GOS	NIT
ALL SECTORS	0.58	0.30	0.24	0.03	0.43	0.13	0.27	0.03	0.45	0.25	0.14	0.05
	100%	52%	42%	6%	100%	31%	62%	7%	100%	57%	32%	11%
I. Agriculture, fishery & forestry	0.72	0.38	0.29	0.04	0.62	0.16	0.46	0.00	0.67	0.51	0.11	0.05
	100%	54%	41%	6%	100%	26%	74%	0%	100%	76%	17%	8%
01 Crops	0.78	0.45	0.29	0.04	0.63	0.19	0.43	0.00	0.53	0.41	0.09	0.03
02 Livestock & Poultry; Agric svces	0.61	0.32	0.25	0.03	0.44	0.08	0.36	0.00	0.57	0.36	0.18	0.04
03 Fishery	0.67	0.35	0.28	0.04	0.57	0.13	0.44	0.00	0.77	0.40	0.20	0.17
04 Forestry & Logging	0.82	0.34	0.43	0.05	0.84	0.29	0.53	0.02	0.72	0.29	0.39	0.04
II. Industry	0.42	0.16	0.22	0.04	0.31	0.09	0.19	0.03	0.31	0.13	0.13	0.04
	100%	39%	52%	9%	100%	28%	61%	10%	100%	42%	44%	14%
05 Mining & quarrying	0.65	0.18	0.45	0.03	0.70	0.17	0.44	0.09	0.21	0.07	0.07	0.07
06 Food, beverage & tobacco	0.27	0.10	0.13	0.04	0.30	0.07	0.17	0.06	0.18	0.07	0.07	0.04
07 Textiles, garments & footwear	0.47	0.21	0.22	0.04	0.33	0.11	0.21	0.01	0.26	0.08	0.12	0.05
08 Wood & wood products	0.40	0.15	0.23	0.01	0.44	0.14	0.29	0.01	0.27	0.11	0.13	0.03
09 Paper, publishing & printing	0.63	0.22	0.37	0.03	0.35	0.05	0.29	0.01	0.34	0.18	0.13	0.03
10 Rubber products	0.65	0.15	0.48	0.02	0.29	0.10	0.18	0.01	0.29	0.10	0.14	0.05
11 Non-metallic mineral products	0.40	0.12	0.25	0.03	0.41	0.11	0.29	0.01	0.23	0.12	0.09	0.03
12 Metal products, machy & equipt	0.48	0.11	0.34	0.03	0.22	0.06	0.14	0.02	0.31	0.15	0.13	0.03
13 Miscellaneous manufacturing[1]	0.50	0.11	0.30	0.09	0.29	0.07	0.17	0.05	0.71	0.34	0.32	0.05
14 Electricity, gas & water	0.59	0.08	0.28	0.23	0.51	0.18	0.29	0.04	0.27	0.13	0.11	0.03
15 Construction	0.41	0.19	0.20	0.02	0.31	0.10	0.19	0.02	0.52	0.26	0.21	0.05
III. Services	0.60	0.34	0.23	0.03	0.60	0.20	0.36	0.04	0.60	0.35	0.19	0.06
	100%	57%	38%	5%	100%	34%	60%	6%	100%	59%	31%	10%
16 Transportation	0.50	0.25	0.23	0.02	0.34	0.13	0.21	0.00	0.73	0.32	0.36	0.05
17 Post & telecommunication	0.63	0.28	0.32	0.03	0.71	0.22	0.48	0.02	0.54	0.27	0.20	0.07
18 Trade	0.66	0.33	0.29	0.04	0.82	0.13	0.63	0.05	0.66	0.31	0.23	0.11
19 Finance, real estate & biz svces	0.85	0.40	0.39	0.05	0.83	0.18	0.57	0.08	0.54	0.48	0.06	0.00
20 Public administration	0.51	0.47	0.04	-	0.36	0.33	0.03	-	0.54	0.28	0.21	0.05
21 Hotels & restaurants	0.39	0.20	0.17	0.02	0.42	0.11	0.24	0.07	0.67	0.53	0.13	0.02
22 Other services	0.60	0.47	0.12	0.01	0.55	0.35	0.18	0.02	0.45	0.25	0.14	0.05

By sector, labor income in the labor-intensive agriculture and services sectors of Cambodia and gross operating surplus in its industry sector shared higher than the other components of GDP. In Vietnam, three-fourths (76%) of GVA in the agriculture sector comes from labor income, while in Thailand gross operating surplus in this sector accounted for roughly the same high ratio (74%), with its compensation ratio sharing only 26%. This finding is quite confusing but could be explained by the fact that, in the agriculture sector where self-employed workers are dominant, differentiating compensation from operating surplus in the accounts poses estimation problems; hence, the term **mixed-income** to account both compensation and operating surplus as one factor item. This scenario could be the case in Thailand, thus overstating its operating surplus and understating its labor income contribution in its agriculture sector.

I.6. Demand Structures

Table I.6 shows the structural composition of total demand at the sectoral product group level. As shown in Table I.1, Cambodia's average intermediate demand for products consumed in production is relatively low at 31.0% of its total available supply, compared to Thailand's and Vietnam's national averages of 43.9% and 43.0%, respectively. As such, Cambodia's total supply has been heavily catered to the final demand sectors, most especially the final consumption sectors of households and government. It can thus be initially concluded that Cambodia's direct linkage with the productive system is relatively lower compared with that of Thailand's and Vietnam's.

Table I.6A shows the structural composition of the final demand categories. It can be observed that Cambodia's final is greatly influenced by final consumption, which was buoyed up by the negative share posted by the foreign trade sector (-12.8%). Thailand's and Vietnam's final consumption demands accounted for 72.2% and 75.9% of totals, repectively.

Investment demand in Vietnam is observed to be relatively high with 31.0% as against 20.4% share in Cambodia and 24.6% share in Thailand.

Table I.6 - Demand Structures by Category (Contribution Ratios Per Unit of Total Demand, in %)									
		CAMBODIA			**THAILAND**			**VIETNAM**		
SECTOR		TD = TS	TID	TFD	TD = TS	TID	TFD	TD = TS	TID	TFD
ALL SECTORS		**100.0**	**31.0**	**69.0**	**100.0**	**43.9**	**56.1**	**100.0**	**43.0**	**57.0**
I. AGRICULTURE, FISHERY & FORESTR		**100.0**	**26.4**	**73.6**	**100.0**	**80.9**	**19.1**	**100.0**	**54.4**	**45.6**
01	Crops	100.0	39.7	60.3	100.0	79.2	20.8	100.0	62.5	37.5
02	Livestock & Poultry; Agric svces	100.0	20.5	79.5	100.0	86.2	13.8	100.0	33.1	66.9
03	Fishery	100.0	11.5	88.5	100.0	100.5	-0.5	100.0	41.6	58.4
04	Forestry & Logging	100.0	27.5	72.5	100.0	78.0	22.0	100.0	77.3	22.7
II. INDUSTRY		**100.0**	**38.3**	**61.7**	**100.0**	**46.6**	**53.4**	**100.0**	**42.9**	**57.1**
05	Mining & quarrying	100.0	65.2	34.8	100.0	98.9	1.1	100.0	16.0	84.0
06	Food, beverage & tobacco	100.0	14.5	85.5	100.0	31.6	68.4	100.0	17.9	82.1
07	Textiles, garments & footwear	100.0	30.3	69.7	100.0	36.9	63.1	100.0	37.9	62.1
08	Wood & wood products	100.0	42.0	58.0	100.0	31.1	68.9	100.0	43.4	56.6
09	Paper, publishing & printing	100.0	48.5	51.5	100.0	64.3	35.7	100.0	76.5	23.5
10	Rubber products	100.0	53.5	46.5	100.0	47.2	52.8	100.0	70.4	29.6
11	Non-metallic mineral products	100.0	54.7	45.3	100.0	61.4	38.6	100.0	95.8	4.2
12	Metal products, machy & equipt	100.0	46.2	53.8	100.0	44.5	55.5	100.0	60.8	39.2
13	Miscellaneous manufacturing[1]	100.0	62.7	37.3	100.0	55.3	44.7	100.0	79.8	20.2
14	Electricity, gas & water	100.0	37.7	62.3	100.0	72.5	27.5	100.0	74.5	25.5
15	Construction	100.0	0.0	100.0	100.0	1.4	98.6	100.0	0.0	100.0
III. SERVICES		**100.0**	**23.6**	**76.4**	**100.0**	**31.5**	**68.5**	**100.0**	**37.2**	**62.8**
16	Transportation	100.0	19.7	80.3	100.0	35.2	64.8	100.0	32.3	67.7
17	Post & telecommunication	100.0	27.9	72.1	100.0	50.8	49.2	100.0	65.2	34.8
18	Trade	100.0	25.3	74.7	100.0	38.8	61.2	100.0	52.7	47.3
19	Finance, real estate & biz svces	100.0	52.1	47.9	100.0	51.8	48.2	100.0	62.9	37.1
20	Public administration	100.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	100.0
21	Hotels & restaurants	100.0	17.5	82.5	100.0	13.2	86.8	100.0	12.5	87.5
22	Other services	100.0	10.9	89.1	100.0	16.5	83.5	100.0	9.4	90.6

Abbreviations:

TD: Total Demand   TS: Total Supply   TID: Total Intermediate Demand   TFD: Total final Demand

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	Commodity Group	CAMBODIA				THAILAND				VIETNAM			
		TFD	FCE	GDCF	NE	TFD	FCE	GDCF	NE	TFD	FCE	GDCF	NE
	TOTAL FINAL DEMAND (U.S.$Million)	3.6	3.3	0.7	(0.5)	###	94.0	32.0	4.1	29.9	22.7	9.3	(2.1)
	PERCENT	100	92.4	20.4	(12.8)	100	72.2	24.6	3.2	100	75.9	31.0	(6.9)
	I. AGRICULTURE, FISHERY & FORESTRY	24.4	31.0	1.7	21.4	1.5	2.9	(0.9)	0.9	10.8	15.1	2.2	9.8
01	Crops	8.4	10.8	0.2	7.3	1.0	1.8	(0.7)	0.7	5.3	5.2	1.9	7.3
02	Livestock & Poultry; Agric svces	4.6	7.6	1.5	0.3	0.2	0.4	0.1	0.1	3.1	6.2	0.3	0.3
03	Fishery	9.4	12.3	·	7.8	0.3	0.7	·	0.0	2.2	3.3	0.0	1.9
04	Forestry & Logging	2.0	0.3	·	6.0	(0.0)	0.0	(0.3)	0.0	0.3	0.4	(0.0)	0.3
	II. INDUSTRY	27.8	9.1	53.1	52.2	###	31.3	50.4	80.2	52.6	31.9	78.6	66.0
05	Mining & quarrying	0.1	0.0	0.5	0.1	0.1	0.0	(1.1)	0.6	7.4	0.0	0.4	21.1
06	Food, beverage & tobacco	6.8	5.6	·	11.7	9.5	11.8	(2.8)	11.7	16.1	23.1	3.2	13.6
07	Textiles, garments & footwear	10.3	2.4	·	29.1	7.0	7.1	0.7	9.5	7.9	3.4	0.3	18.1
08	Wood & wood products	0.8	0.1	0.2	2.3	1.0	0.5	1.0	1.5	0.9	0.5	0.1	1.9
09	Paper, publishing & printing	0.1	0.1	0.1	0.2	0.6	0.2	0.1	1.2	0.4	0.7	0.0	0.3
10	Rubber products	1.0	0.0	0.4	2.9	1.0	0.4	(0.5)	2.2	0.2	0.2	0.3	0.1
11	Non-metallic mineral products	0.6	0.0	0.2	1.9	0.8	0.0	1.4	1.4	0.2	0.1	(0.0)	0.4
12	Metal products, machy & equipt	0.1	0.0	0.7	0.1	17.8	4.2	7.0	37.9	4.4	1.3	7.3	7.0
13	Miscellaneous manufacturing[1]	1.4	0.5	0.3	3.7	9.4	4.7	12.1	13.8	1.8	1.0	0.3	3.6
14	Electricity, gas & water	0.3	0.4	0.5	·	1.2	2.4	0.0	0.3	0.7	1.5	0.0	·
15	Construction	6.3	·	50.3	·	5.1	0.0	32.5	0.0	12.6	·	66.7	·
	III. SERVICES	31.4	40.3	3.7	26.4	###	53.5	16.6	18.9	24.8	34.1	3.1	24.2
16	Transportation	6.2	8.6	1.4	3.7	4.8	4.6	2.3	6.0	1.9	1.2	0.2	3.7
17	Post & telecommunication	0.5	0.7	·	0.5	0.6	0.9	·	0.6	0.6	0.5	(0.0)	1.0
18	Trade	8.0	8.0	2.2	10.2	10.8	14.1	14.1	5.6	6.1	5.0	2.9	9.4
19	Finance, real estate & biz svces	2.8	3.7	·	2.4	2.6	5.0	0.1	0.7	2.5	3.6	0.0	2.3
20	Public administration	3.3	5.7	·	·	7.1	15.6	·	·	3.2	6.9	0.0	·
21	Hotels & restaurants	4.7	3.6	·	8.6	4.8	7.6	·	3.6	3.4	3.1	0.0	5.7
22	Other services	6.0	9.9	·	1.0	3.5	5.7	·	2.4	7.2	13.8	(0.0)	2.2
	Total Domestically Sourced	83.6	80.4	58.4	###	89.1	87.7	66.1	###	88.2	81.1	83.8	100.0
	Total Imported	16.4	19.6	41.6	-	10.9	12.3	33.9	-	11.8	18.9	16.2	-
	TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

Table I.6A - Final Demand Structures by Category of Final Demand (Contribution Ratios Per Unit Final Demand, in %)

FCE: Final Consumption Expenditure (Private + Government)
GDCF: Gross Domestic Capital Formation (Fixed Capital + Change in Inventories)
NE: Net Exports (= Exports less Imports)

I.7. Self-Sufficiency Rates

Self-sufficiency rate of product **i** is defined as the ratio of its total gross output to its corresponding total domestic demand. That is,

$$SSR_i = TGO_i / TDD_i$$

where: SSR_i is the self-sufficiency rate of product i; TGO_i is the total gross output of product i, and TDD_i is the total domestic demand of product i, estimated as equal to its total intermediate demand plus its corresponding total final domestic demand, which is. sum of final consumption and gross domestic capital formation.

SSRs are calculated based on the competitive type of I-O table wherein each cell element contains either the domestically-produced or the imported product transaction value or both. A product with SSR equal to or greater than unity means that its production capacity is sufficient to meet its local demand; otherwise, the need for importation..

TABLE I.7 - SELF-SUFFICIENCY RATIOS (Output as ratio to Total Domestic Demand)				
	PRODUCT	CAMBODIA	THAILAND	VIETNAM
	TOTAL ECONOMY	0.931	1.033	0.970
I	AGRICULTURE, FISHRY, FORESTRY	1.224	0.948	1.140
01	Crops	1.153	0.923	1.181
02	services	1.017	0.804	1.025
03	Fishery	1.290	0.984	3.265
04	Forestry & Logging	2.796	0.426	0.356
II	INDUSTRY	0.653	0.971	0.920
05	Mining & quarrying	0.357	0.367	5.634
06	Food, beverage & tobacco	1.425	1.267	1.214
07	Textiles, wearing apparel & footwear	1.667	1.190	1.253
08	Wood & wood products	1.778	1.425	1.544
09	Paper, publishing & printing	0.087	0.864	0.783
10	Rubber products	0.611	1.714	0.776
11	Non-metallic mineral products	0.543	1.121	0.895
12	Metal products, machinery & equipme	0.027	0.813	0.505
13	Miscellaneous manufacturing[1]	0.134	0.971	0.342
14	Electricity, gas & water	0.400	0.985	0.973
15	Construction	1.000	0.985	1.000
III	SERVICES	1.104	1.104	0.989
16	Transportation	1.074	1.300	1.135
17	Post & telecommunication	1.137	0.989	1.222
18	Trade	1.414	1.130	0.878
19	Finance, real estate & business servi	0.802	0.801	0.951
20	Public administration	1.000	2.751	1.000
21	Hotels & restaurants	1.572	1.164	1.523
22	Other services	0.920	1.165	0.957
NOTE: Total Domestic Demand = Intermediate Demand + Final Demand - Exports				

Table I.7 shows that, among the 3 economies, Cambodia appears to be the least self-sufficient with SSR of 0.93, despite its high SSRs in the agriculture and services sectors. This finding is attributed to significantly low SSR of 0.65 posted by the industry group. Most notable industrial sectors with exceedingly low SSRs are: metal products, machinery & equipment (sector 12) with SSR of 0.03, paper, publishing & printing (09) with SSR of 0.09; and miscellaneous manufacturing (13} with SSR of 0.13. Forest products register the highest SSR (2.80) as the biggest bulk of its output was exported.

Thailand's economy is viewed as self-sufficient with its average SSR of 1.03, although its agriculture and industry sectors exhibited < unity SSRs. High SSRs by the services sector   have buoyed up the overall SSR. In Vietnam, its production in the agriculture sector is seen as self-sufficient to meet local demand, but less self-sufficient to satisfy domestic demands for industrial and services products.

I.8 Industrial Interdependence

Economic fluctuations vary by the ways different industries are related to each other. Some industries depend heavily on many other industries while some rely on a few others. Changes therefore in some industries will effect greater reactions than changes in others. With the availability of the Leontief inverse, analysis could be extended to measure the total (direct plus indirect) linkage effects, both backward and forward.

Backward – Forward Linkages

Backward linkage is a measure of the relative importance of a sector as a user of raw material inputs from the entire production system. At the sectoral level, it is estimated as the ratio of the sum of the column elements of the inverse matrix to the average of the whole system. This normalized ratio is called the index of the power of dispersion, μ_j. It is defined in equation form as:

$$\mu_j = \frac{\sum_{i=1}^{n} r_{ij}}{\frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}}$$

where the r_{ij}'s are the elements in the Leontief inverse, **(I-A)$^{-1}$.** The higher the value of μ_j in any j^{th} sector, the stronger is its influence as user of intermediate inputs.

Forward linkage indicates the relative importance of a sector as a supplier of raw materials to the entire production system. It is measured by the index of sensitivity, μ_i, expressed as a ratio of the sum of the elements along any i^{th} row of the inverse matrix to the average of the entire system. In its normalized form:

$$\mu_i = \frac{\sum\limits_{j=1}^{n} r_{ij}}{\dfrac{1}{n}\sum\limits_{i=1}^{n}\sum\limits_{j=1}^{n} r_{ij}}$$

The higher the value of μ_i in any i^{th} sector, the greater is its influence as a supplier of intermediate inputs to the entire production system.

Table 1.8 - DEGREE OF INDUSTRIAL INTERPENDENCIES

SECTOR DESCRIPTION		CAM		THA		VIE	
		BL	FL	BL	FL	BL	FL
I. Agriculture, Fishery & Forestry		0.92	1.03	0.96	0.74	0.91	0.94
01	Crops	0.96	1.53	0.82	1.20	0.85	1.28
02	Livestock & Poultry; agric'l services	1.03	0.99	1.22	0.74	1.11	0.86
03	Fishery	0.91	1.17	1.01	0.77	0.90	0.81
04	Forestry & Logging	0.90	1.00	0.76	0.66	0.82	1.10
II. Industry		1.11	0.94	1.04	1.21	1.15	1.12
05	Mining & quarrying	0.98	0.86	0.89	1.00	0.87	0.88
06	Food, beverage & tobacco	1.43	0.99	1.20	1.33	1.34	1.03
07	Textiles, wearing apparel & footwear	1.10	1.04	1.15	0.93	1.18	0.98
08	Wood & wood products	1.21	0.91	0.90	0.69	1.17	0.79
09	Paper, publishing & printing	0.90	0.83	0.92	0.89	1.13	1.04
10	Rubber products	0.89	0.87	1.13	0.74	1.08	0.87
11	Non-metallic mineral products	0.92	0.85	1.04	0.80	1.17	1.17
12	Metal products, machinery & equipt	0.89	0.84	0.86	1.26	1.01	1.31
13	Miscellaneous manufacturing[1]	0.92	0.93	0.89	1.87	0.96	1.35
14	Electricity, gas & water	0.89	0.90	1.06	1.25	0.82	1.09
15	Construction	1.03	0.81	1.13	0.63	1.12	0.68
III. Services		0.97	1.03	1.01	1.05	0.94	0.94
16	Transportation	1.02	1.10	1.21	1.05	0.91	0.79
17	Post & telecommunication	0.96	0.90	0.88	0.82	0.85	0.85
18	Wholesale & Retail Trade	0.93	1.37	0.79	1.62	0.95	1.53
19	Finance, real estate & business svcs	0.86	1.37	0.77	0.62	0.91	0.68
20	Public administration	1.03	0.81	1.23	0.99	0.97	1.34
21	Hotels & restaurants	1.30	0.97	1.16	0.72	1.05	0.75
22	Other services	0.95	0.95	0.96	1.43	0.86	0.80
	BL: BACKWARD LINKAGE						
	FL: FORWARD LINKAGE						

For a better appreciation of these total (direct plus indirect) linkages, the sectors are classified according to their calculated degrees of interdependencies, whether high or low. Linkages exhibiting indices ≥ unity are defined as high, while those below unity are considered as low. Chenery and Clark (1965) classify industries into four (4) groups, as shown below:

GROUP I: HIGH μ_J, HIGH μ_i GROUP II: HIGH μ_J, LOW μ_i

GROUP III: LOW μ_J, HIGH μ_i GROUP IV: LOW μ_J, LOW μ_i

Sectors classified under Groups I and II are those whose production processes are characterized by relatively high usage of intermediate inputs. These are mostly manufacturing industries which depend to a large extent on the outputs of the other industries in the system. An expansion in these industries would result a considerable reaction on the whole system. This is particularly most pronounced for industries in Group I since, in addition to having high values of μ_J, they are also characterized by large values of μ_i, which means that a major portion of their outputs is absorbed by the system of production.

Those sectors classified under (III) and (IV) are both characterized by low values of u and they maintain a cost structure which is biased towards the use of primary inputs more than the use of intermediate inputs. Those sectors belonging to category 4 where both u and w have low values, means that the industries concerned do not draw extensively from the system of productive sectors and their products do not find as much extensive utilization in the system as the typical industry. The major part of their outputs is channeled directly to final consumption.

Table 1.8a - Industrial Grouping Based on Backward-Forward Linkage Effects

		FORWARD LINKAGE					
		HIGH			LOW		
		GROUP I			GROUP II		
		CAM	THA	VIE	CAM	THA	VIE
BACKWARD LINKAGE	HIGH	Textiles	Food mfr	Food mfr	Livestock	Livestock	Livestock
		Transport	EGW	Paper	Wood	Fishery	Food mfr
			Transport	Non-metal	Construct'n	Textiles	Textiles
				Metal prod	Public adm	Rubber	Wood
					Hotel/Resto	Non-metal	Rubber
						Construct'n	Construct'n
						Public adm	Hotel/Resto
						Hotel/Resto	
		GROUP III			GROUP IV		
		CAM	THA	VIE	CAM	THA	VIE
	LOW	Crops	Crops	Crops	Forestry	Forestry	Fishery
		Fishery	Mining	Forestry	Mining	Wood	Mining
		Trade	Metal prod	Misc Mfg	Paper	Paper	EGW
		Finance	Misc Mfg	Trade	Rubber	Commun	Transport
			Trade	Public adm	Non-metal	Finance	Commun'tion
			Other svcs		Metal prod		Finance
					Misc Mfg		Other svcs
					EGW		
					Commun'tion		
					Other svcs		

This special grouping, as exemplified in Table I.8a shown above, is particularly useful to economic planners and policy makers in the assessment and setting of industrial priorities in national development. For example, sectors under Group I could be considered the top priority sectors since their linkages within the productive system are ranked high, both as user and provider of inputs.

Table I.8a shows that, in Cambodia's economy, 10 out of 22 sectors under study belong to Group IV which means that these sectors have both low backward and forward linkages. This group is mostly dominated by the import-dependent industries of mining, paper & rubber industries as well as the manufacture of capital goods. Forestry belongs to this group as this sector is a least user of intermediate inputs while substantial amount of its production goes directly to foreign exportation.

It can be observed that, as one's economy becomes more industrialized, its linkages improves from Group IV to Group I, as in the case of Thailand's economy

where its sectoral composition under each group is decreasing as their linkages become stronger.

Part 2. IMPACT ANALYSIS

Final demand for products has repercussive effects on the economy. In the first round, an increase in demand for a product of a particular sector will require additional output requirement for that sector. Subsequently, the first-order increases in output would require further inputs to generate them. The increased demand therefore translates to an increase in output, which in turn result to increases in income of the sectors involved and so on. These total multiplier effects of final demand for goods and services on economies are best measured through I-O analysis. Given the I-O table's Leontief inverse, it is possible to quantify the direct as well as the indirect effects of changes in exogenous final demand on such economic variables as output, income, employment and import requirements.

2.1. Impact on Production

The calculation of total (direct + indirect) outputs required to sustain final demands is carried out using the popular estimating equation, in matrix form:

$$\mathbf{X} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{Y}$$

where: $\mathbf{X}$ is a matrix of total output requirements induced by final demand; $\mathbf{Y}$ is the final demand matrix; and $(\mathbf{I} - \mathbf{A})^{-1}$ is the Leontief inverse matrix.

Table II.1 summarizes the total impact of the final demand categories on the gross outputs of the 3 major sectors in each country. It can be observed that Cambodia's production is highly induced by its final consumption demand, C, accounting for a 53.4% of total output as against Thailand's and Vietnam's contribution ratios of 46.4% and 42.8%, respectively. On the other hand, production contribution ratios to meet export demand is observed to be relatively lower in Cambodia (37.9%) compared to Thailand's and Vietnam's export-output proportions of 42.3% and 38.4%, respectively. Vietnam's share of production to satisfy investment demand is highest

among the 3 countries at 18.7% as against 11.3% in Thailand and a low 8.6% in Cambodia.

TABLE II.1. IMPACT ON PRODUCTION					
CAMBODIA's ECONOMY					
	C	I	E	TOTAL	
PRODUCT GROUP	%	%	%	%	$Billion
I. AGRICULTURE	67.3	1.0	31.7	100	1.93
II. INDUSTRY	21.3	21.2	57.5	100	1.95
III. SERVICES	68.7	4.4	26.9	100	2.36
Total Induced Output	53.4	8.6	37.9	100	6.25
Total Output Multiplier	**1.24**	**1.25**	**1.32**		**1.27**
THAILAND's ECONOMY					
	C	I	E	TOTAL	
PRODUCT GROUP	%	%	%	%	$Billion
I. AGRICULTURE	62.5	(3.2)	40.6	100	15.58
II. INDUSTRY	32.9	14.0	53.0	100	172.46
III. SERVICES	64.7	9.1	26.2	100	112.88
Total Induced Output	46.4	11.3	42.3	100	300.92
Total Output Multiplier	**1.69**	**1.61**	**1.58**		**1.63**
VIETNAM's ECONOMY					
	C	I	E	TOTAL	
PRODUCT GROUP	%	%	%	%	$Billion
I. AGRICULTURE	64.1	4.4	31.5	100	11.47
II. INDUSTRY	30.0	28.5	41.4	100	37.28
III. SERVICES	55.7	7.8	36.5	100	18.18
Total Induced Output	42.8	18.7	38.4	100	66.93
Total Output Multiplier	**1.56**	**1.61**	**1.51**		**1.55**

By sector, more than two-thirds of production in Cambodia by both its agriculture & forestry (67.3%) and services sectors (68.7%) is heavily induced by final consumption demand, more intense than Thailand's and Vietnam's. Moreover, Cambodia's production in its industry sector to meet export demand shares a high ratio of 57.5%, higher than Thailand's (53.0%) and Vietnam's (41.4%) contributions.

On the whole, however, Cambodia's total (direct and indirect) output multipliers, calculated as the ratio of total induced output to total final demand, are shown to be comparatively lower in Cambodia than in Thailand and Vietnam in all final demand

categories. Cambodia's relatively low total multiplier effects are attributed to its high dependence on imported inputs as can be observed in Table I.1 (Supply and Demand Table).

2.2. IMPACT ON INCOME

The value added or income induced by the components of final demand can be calculated using the matrix equation:

$$\mathbf{V} = \beta (\mathbf{I} - \mathbf{A})^{-1} \mathbf{Y} = \beta \mathbf{X}$$

Where $\mathbf{V}$ is matrix of value added induced by final demand; and
β is matrix of value added coefficients

II.2. IMPACT ON INCOME

CAMBODIA

Income Type	C %	I %	E %	TOTAL %	TOTAL $Billion
1. COMPENSATION	60.6	6.4	33.0	100.0	1.87
2. OPERATING SURPLUS	51.6	8.4	40.0	100.0	1.52
3. INDIRECT TAXES	51.5	6.6	41.9	100.0	0.22
Total Induced Income (GVA)	56.3	7.3	36.5	100.0	3.61
Total Income Multiplier	**0.76**	**0.61**	**0.74**		**0.74**

THAILAND

Income Type	C %	I %	E %	TOTAL %	TOTAL $Billion
1. COMPENSATION	57.5	9.3	33.2	100.0	40.12
2. OPERATING SURPLUS	48.8	12.1	39.1	100.0	80.42
3. INDIRECT TAXES	48.7	10.8	40.5	100.0	9.58
Total Induced Income (GVA)	51.5	11.1	37.4	100.0	130.12
Total Income Multiplier	**0.81**	**0.68**	**0.60**		**0.71**

VIETNAM

Income Type	C %	I %	E %	TOTAL %	TOTAL $Billion
1. COMPENSATION	52.0	11.9	36.1	100.0	17.04
2. OPERATING SURPLUS	37.4	17.1	45.5	100.0	9.68
3. INDIRECT TAXES	43.7	15.5	40.8	100.0	3.23
Total Induced Income (GVA)	46.4	14.0	39.6	100.0	29.95
Total Income Multiplier	**0.75**	**0.54**	**0.70**		**0.69**

Table II.2 shows that, while Cambodia's production exhibits relatively low output multiplier effects because of its high dependence on imports, its impact on income generation, however, appears to be significantly higher (0.74) than the income effects in Thailand (0.60) and Vietnam (0.70). This finding is attributed to Cambodia's relatively high overall GVA ratio (0.58) compared to Thailand's (0.43) and Vietnam's GVA ratio of 0.45), as Cambodia's productive economy is more concentrated on labor-intensive than material-intensive industries. By category of final demand, Cambodia's total income effect due to export demand registers the highest income multiplier at 0.74, meaning that, 74 dollars is earned for every 100 dollars worth of export.

The total income multiplier effects due to consumption demand in Cambodia and Vietnam are comparatively even, but lower than Thailand's. Cambodia's total income effect due to export demand is significantly higher than Thailand's and Vietnam's. Cambodia's income multiplier due to investment demand is lower than Thailand but appears to be higher Vietnam's.

II.3. Impact on Employment

Table II.3 shows the calculated effects of final demand on employment for Cambodia and Vietnam. Due to lack of employment data, Thailand is temporarily excluded in the analysis.

The impact on employment is calculated as:

$$\mathbf{L} = \hat{\mathbf{E}} \, \mathbf{X}$$

where: $\mathbf{L}$ is the calculated matrix of sectoral employment induced by final demand; $\hat{\mathbf{E}}$ is diagonal matrix of estimated sectoral labor-output ratio $\varepsilon_j = e_j / x_j$

where e_j is employment of sector j and x_j is gross output of sector j.

Table II.3 shows that, of Cambodia's economy's total employment numbering 5,275.2 thousand workers in year 2000, 61.8% was induced by final consumption

demand; 34.8% was induced by export demand, while a measly 3.4% was due to investment demand.

By sector, 65.6% of persons engaged in agriculture and forestry and 65.0% of persons working in the services sector were induced by final consumption demand. On the other hand, 60.1% of persons engaged in the industry sector were induced by exports demand, while consumption demand induced only 21.9% or a little over one-fifth of the sector's employment requirements.

The table shows that total employment multipliers in Cambodia appear to be higher than Vietnam's in all final demand categories. This finding reinforces the previous finding the labor-intensiveness of Cambodia's industries.

II.4. IMPACT ON EMPLOYMENT

CAMBODIA					
	C	I	E	TOTAL	
					Employees
SECTOR	%	%	%	%	(Thousand)
I. AGRICULTURE	64.0	4.5	31.5	100.0	3,889.0
II. INDUSTRY	22.4	22.4	55.2	100.0	444.2
III. SERVICES	68.6	3.2	28.2	100.0	941.9
Total Induced Employment	61.3	5.8	32.9	100.0	5,275.2
Total Employment Multiplier (Thousand Employees/US$Million Final Demand	1.20	0.71	0.97		1.07

VIETNAM					
	C	I	E	TOTAL	
					Employees
SECTOR	%	%	%	%	(Thousand)
I. AGRICULTURE	48.5	14.5	36.9	100.0	25,044.9
II. INDUSTRY	30.7	26.4	42.9	100.0	4,445.4
III. SERVICES	56.7	7.4	35.8	100.0	7,211.5
Total Induced Employment	48.0	14.6	37.5	100.0	36,701.8
Total Employment Multiplier (Thousand Employees/US$Million Final Demand	0.96	0.69	0.81		0.85

II.4. Impact on Imports

The non-competitive type of I-O table enables the quantification and assessment of the total imports needed to sustain final demand. The total import requirements induced by the components of final demand are obtained using the matrix equation:

$$\mathbf{M} = \hat{\mathbf{\Pi}}\ \mathbf{X}$$

where $\mathbf{M}$ is the matrix of total intermediate import requirements induced by final demand, $\hat{\mathbf{\Pi}}$ is the diagonal matrix of total imported intermediate input coefficients and $\mathbf{X}$ is the matrix of total output requirements induced by the components of final demand.

Table II.4 shows the total (direct and indirect) imports need by industries to meet each category of final demand. A little more than half (50.4%) of total imports by industries was induced by consumption demand, 12.9% by investment demand and 36.6% by demand for export products.

TABLE II.4 . IMPACT ON INTERMEDIATE IMPORT REQUIREMENTS

CAMBODIA	C	I	E	TOTAL	
	%	%	%	%	$Billion
I. AGRICULTURE	71.1	0.9	27.9	100	0.28
II. INDUSTRY	15.6	30.0	54.4	100	0.49
III. SERVICES	71.5	3.7	24.9	100	0.52
Total Import Requirements	50.4	12.9	36.6	100	1.29
Total Import Multiplier	0.24	0.39	0.26		0.26
net foreign exchange earning			0.74		
THAILAND	C	I	E	TOTAL	
	%	%	%	%	$Billion
I. AGRICULTURE	61.7	-3.7	42.0	100	0.85
II. INDUSTRY	25.6	13.1	61.3	100	50.22
III. SERVICES	68.2	5.6	26.2	100	2.99
Total Import Requirements	28.6	12.4	59.0	100	54.06
Import Multiplier	0.16	0.21	0.40		0.26
net foreign exchange earning			0.60		
VIETNAM	C	I	E	TOTAL	
	%	%	%	%	$Billion
I. AGRICULTURE	64.1	3.9	32.0	100	1.29
II. INDUSTRY	23.8	35.7	40.5	100	9.25
III. SERVICES	54.1	8.5	37.4	100	2.79
Total Import Requirements	34.0	27.0	39.0	100	13.33
Import Multiplier	0.20	0.39	0.30		0.27
net foreign exchange earning			0.70		

In terms of multipliers, investment demands in Cambodia and Vietnam exhibit the highest multiplier effects due to the fact that, in these countries, durable and other fixed capital assets are import-dependent. On the other hand, it is the export demand in Thailand that shows the highest import multiplier effect more than the other final demand categories. In all countries, consumption-induced registered the lowest import-multiplier effects, which suggest that consumer products are more relatively dependent on domestic than on imports.

One interesting finding in Table II.4 is the import inducement coefficient or the import multiplier of export demand. While the import content of export goods cannot be directly measured in the I-O transactions table, it can be indirectly estimated with the availability of the Leontief inverse. The table shows that, in Cambodia, its export demand exhibited an import multiplier of 0.264, meaning that, in order to sustain US $1,000 worth of exports, the economy's production sectors need to import US$264 worth of intermediate inputs. In other words, the net foreign exchange earning amounts to only US$736, calculated as the gross export receipt of US $1,000 less the import "leakage" of US$264.

Part 3. Analysis Summary

1. Cambodia is more dependent on imports to supply its total demand than the supply situation in Thailand and Vietnam;

2. Cambodia's structure of demand is more biased towards more demand for consumption products than intermediate products compared with Thailand's and Vietnam's high direct demand for more intermediate than consumption goods.

3. Cambodia's production structure is more concentrated on high value-added sectors such as agriculture and services; hence its higher value added ratios than Thailand and Vietnam;

4. Direct labor income in both Cambodia and Vietnam accounts for the biggest contributor to their GDPs while gross operating surplus represents the biggest contributor to Thailand's GDP; in terms of tax rates, it appears that Vietnam charges the highest indirect tax rates among the 3 countries;

5. Among the 3 countries, Thailand, on the whole, appears to be the only self-sufficient economy; Cambodia's self-sufficiency in its industry sector is significantly very low compared with Thailand and Vietnam;

6. Degrees of interindiustrial independencies in Cambodia, as measured by the total (direct and indirect) backward and forward linkage indexes, are comparatively lower than in Thailand and Vietnam, the fact that Cambodia is more dependent on imports than on its domestic production to supply intermediate requirements;

7. Impact analysis shows that, in Cambodia, while its output multipliers are lower than those of Thailand and Vietnam, its total (direct and indirect) income effects are found to be relatively higher due to its higher overall GVA ratio, the fact that its productive economy is largely dominated by the high-value added sectors of agriculture and services; it is this reason that employment multipliers in Cambodia thus appear to be higher compared to Vietnam's;

8. In terms of import multipliers, total import requirements to sustain overall final demand appear to be at even par in the 3 countries; however, by category of final demand, the structure varies; import multipliers in Cambodia and Vietnam are highest to sustain investment demand, whereas in Thailand it is its demand for exports that require more importations than its investment;

9. Net export earnings, estimated as the difference between the per unit gross earning and per unit import requirement to produce export goods, are then calculated to be, as follows:

Cambodia – 0.74 ; Thailand – 0.60; Vietnam – 0.70

References

1. Kwang Moon Kim, Bui Trinh, Hidefumi Kaneko, Francisco T. Secritario "Structural Analysis of the National Economy of Vietnam: Comparative Time Series Analysis Based on Vietnam's IO Tables for Years 1989, 1996 & 2000" presented at PAPAIOS, The 18th Conference, Chukyo University, November 10-11, 2007.
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3. Kwang Moon Kim, Bui Trinh, Francisco T. Secritario, Hidefumi Kaneko "Compilation and Empirical Analysis of 2000 National Input-Output Table in Cambodia"
4. www.ide.go.jp and *www.nesdb.go.th*

ANNEX FIGURE A
TRUNCATED SCHEMATIC OF INDOCHINA INTER-NATIONAL INPUT-OUTPUT TABLE

FROM \ TO		INTERMEDIATE DEMAND			FINAL DEMAND			ROW		GO
		C^1	…..	C^N	C^1	…..	C^N	ROW		GO
		1 … j … n	…..	1 … j … n	1 … k … m	…..	1 … k … m	E	M	
C^1	1 : i : n	X^{11}	…..	X^{1N}	F^{11}	…..	F^{1N}	E^{1W}	0	X^1
	:	:	:	:	:	:	:	:	:	:
C^N	1 : i : n	X^{N1}	…..	X^{NN}	F^{N1}	…..	F^{NN}	E^{NW}	0	X^N
ROW	1 : i : n	$^IM^{W1}$	…..	$^IM^{WN}$	$^FM^{W1}$	…..	$^FM^{WN}$	0	$-M^W$	0
GVA	1 : p : o	V^1	…..	V^N	0	…..	0	0	0	V
GI = GO		$X^{1'}$	…..	$X^{N'}$	Y^1	…..	Y^N	$E^{.W}$	$-M^{W.}$	

The notations used in Figure A are defined as follows:

X^{11}: n x n matrix where each element, x_{ij}^{11}, represents the value of product i of C^1 consumed by its own production sector j, **(i = j = 1 2 …n)**

X^{1N}: n x n matrix where each element, x_{ij}^{1N}, represents the value of product i of C^1 consumed by production sector j of C^N;

F^{11}: n x m matrix where each element, f_{ik}^{11}, represents the value of product i of C^1 consumed by own final domestic sector k, where (k1: private consumption expenditure, k2: government consumption expenditures, k3: fixed capital formation, & k4: change in inventories)

F^{1N}: n x m matrix where each element, f_{ik}^{1N}, represents the value of product i of C^1 consumed by final domestic k of C^N;

$\mathbf{E^{1W}}$: n x 1 vector of exports by C^1 to ROW;

$\mathbf{X^1}$:   n x 1 vector of gross outputs in C^1;

$\mathbf{X^{N1}}$: n x n matrix where each element, $\mathbf{x_{ij}^{N1}}$, represents the value of product i of C^N consumed by production sector j of C^1;

$\mathbf{X^{NN}}$: n x n matrix where each element, $\mathbf{x_{ij}^{NN}}$, represents the value of product i of C^N consumed by its own production sector j

$\mathbf{F^{N1}}$: n x m matrix where each element, $\mathbf{f_{ik}^{N1}}$, represents the value of product i of C^N consumed by final domestic sector k of C^1 ;

$\mathbf{F^{NN}}$: n x m matrix where each element, $\mathbf{f_{ik}^{NN}}$, represents the value of product I of C^N consumed by it own final domestic sector k ;

$\mathbf{E^{NW}}$: n x 1 vector of exports by C^N to ROW;

$\mathbf{X^N}$: n x 1 vector of gross outputs in C^N;

$\mathbf{{}^I M^{W1}}$: n x n matrix where each element, $\mathbf{{}^I m_{ij}^{W1}}$, represents the value of ROW imports of product i consumed by production sector j of C^1.

$\mathbf{{}^I M^{WN}}$: n x n matrix where each element, $\mathbf{{}^I m_{ij}^{WN}}$, represents the value of ROW imports of product i consumed by production sector j of C^N.

$\mathbf{{}^F M^{W1}}$: n x n matrix where each element, $\mathbf{{}^F m_{ik}^{W1}}$, represents the value of ROW imports of product i consumed by final domestic sector k of C^1.

$\mathbf{{}^F M^{WN}}$: n x n matrix where each element, $\mathbf{{}^F m_{ik}^{WN}}$, represents the value of ROW imports of product i consumed by final domestic sector k of C^N.

$\mathbf{-M^{W.}}$: n x 1 vector of total value of imports of product i by Indochina's economy, with negative sign;

$\mathbf{V^1}$: p x n matrix where each element, $\mathbf{v_{pj}^1}$, is the value added p generated by production sector j of C^1;

$\mathbf{V^N}$: p x n matrix where each element, $\mathbf{v_{pj}^N}$, is the value added p generated by production sector j of C^N;

$\mathbf{V}$: p x 1 vector of total value added

$\mathbf{X^{1'}}$: 1 x n vector of gross inputs (=gross outputs) in C^1;

$\mathbf{X^{N'}}$: 1 x n vector of gross inputs (=gross outputs) in C^N;

$\mathbf{Y^1}$: 1 x m vector of total final domestic demand in C^1;

$\mathbf{Y^N}$: 1 x m vector of total final domestic demand in C^N.

$\mathbf{E^{.W}}$: total value of exports by Indochina's economy to ROW;

$\mathbf{-M^{W.}}$: total value of imports by Indochina's economy from ROW.