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Vietnam Economic Structure Change Based on Input-Output Table (2000-2007)

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Abstract

This study presents main findings on Vietnam economic structure change based on Leontief system and the Vietnam input-output tables (2000 and 2007).

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Introduction

I/O models have been widely used to assess the impacts of many changes in an economy. An I/O model is also an important tool to make forecasts and the results from an I/O model are very helpful in many policy-making processes. Many scientific findings in economics have to give credit to the I/O approach developed by Leontief and this study is none of the exceptions.

The input-output (I-O) tables explain and analyze the relationship between producers and consumers and its dependence with other industries, the dimension of intermediate input matrix is commodity by commodity or industry by industry, that mean it has to be quadratic, i.e contain the same number of rows and columns. The gross input may differ from gross output, the difference being changes in inventories. The input-output coefficients (A) calculated based on commodities produced and commodities used.

In Vietnam, some economic models used on input-output analysis in order to seek the direct, indirect and induced impacts on production that result from an exogenous, i.e externally given change in final demand. In Vietnam, for this type of modeling, a commodity by commodity is more appropriate.

In 2008, Vietnam conducted input-output survey for compiling input-output table. The concepts and definitions applied to compile Vietnam input-output 2007 follow the recommendations by United Nation in the 1968 System of National Accounts (SNA) and 1993 SNA. The 2007 input-output table bases on non-square make and use matrixes (138 commodities and 112 industries). A notable point is that 112 industries classification of S.U.T 2007 differs from 112 sectors of input-output table 2000. Therefore, the input-output table 2007 has dimension 138 x 138 of commodity by commodity.

This study presents main findings from 2007 input-output table in comparison with 2000 input-output table

Supply and demand situation:

In 2007, total supply goods and services was about 3,934 billion VND, of which 73,82% was domestic production and the rest of

26.18% was import. Domestic production reduced 5.43% while import increased 5.43% compared with respective figures in 2000.

On the demand side, the share of intermediate demand for goods and services in total demand slightly increased from 42.99% in 2000 to 45.32% in 2007. On other hand, the share of final demand to total demand decreased from 57.01% in 2000 to 54.68% in 2007 due to strongly decrease in consumption.

Table -1 Supply and Demand Situation, 2007 and 2000 *(in VND Billion)*

	2007		2000	
	Value	Percent	Value	Percent
Total supply	**3,934**	**100.00**	**1,219**	**100**
Domestic production	2,904	73.82	966	79.25
Import	1,030	26.18	253	20.75
Total demand	**3,934**	**100.00**	**1,219**	**100.00**
Intermediate demand	***1,783***	45.32	524	42.99
Final demand:	2,151	54.68	695	57.01
Consumption	837	21.28	322	26.42
Invesment	482	12.25	131	10.75
Export	832	21.15	242	19.85

Output Structure.

Table 2 shows output structure from 138 sectors can be aggregated into 22 sectors for 2000 and 2007 input-output tables.

Total economy for Vietnam reached VND 2,904 billion in 2007. Table 2 shows a comparison of the distribution structure of output in 2000 and 2007. The share of crops, livestock & poultry & agriculture services decreased from 13.35% in 2000 to 8.27% in 2007; this structure like Malaysia in 1991. The share of metallic ores & non-metallic minerals, food manufactures, beverage and tobacco manufactures, textiles, garments & leather products sectors in 2007 decreased; the share of other manufacturing sectors in 2007 increased; the share of construction sector in 2007 increased about 1.08% compared with 2000; the share of trade sector in 2007 decreased 1.91% compared with 2000; the share of transportation & communication, finance, insurance, real estate & business services sectors increased 1.51% and 0.2% respectively, while the share of public administration, defense & security, personal, community, social & other services sectors in 2007 decreased 0.3% and 1.62%, respectively.

Input structure

The input structure includes intermediate input and primary input (or value added). Both components give the ratios of input used to produce output by each sector. In national income accounting, primary input would refer to gross value added (GVA).

Table 3 shows a comparison of the input structure of the 22 sectors in 2000 and 2007. In general, production cost in terms of usage of intermediate input hardly changed in year 2007 compared with 2000. In 2000, the amount that industries used for intermediate input was on the average of 0.55 thousand VND for 1 thousand VND of output, in 2007 it increased to an average of 0.62 thousand VND for 1 thousand VND of output. These ratios increased at almost sectors in economic activities; of course these ratios slightly decreased at some sectors as textiles, garment & leather products; rubber & plastic products; non-metallic mineral products; machinery equipment, appliances,

parts & supplies; other manufactured products, construction; trade and public administration, defend & security sectors.

The ratios of intermediate input per output in 2007 were higher than that in 2000, it can be due to the technology of production changed or also due to less effective more than before period or due to both of them. In 2008, the intermediate input ratios of sectors can be higher than more in 2007 due to some sectors that was sole on production and selling their products decided increasing of their price.

Table-2 Output by sector, 2000 and 2007 (in Vietnam dong Billion)

Code	Sector	2007		2000	
		Value	Percent	Value	Percent
1	Crops, livestock & poultry & agricultural services	240	8.27	129	13.35
2	Round timber & other forest products	15	0.51	8	0.79
3	Fish & other marine products	84	2.88	26	2.70
4	Metallic ores & non-metallic minerals	137	4.71	59	6.16
5	Food manufactures	294	10.12	115	11.94
6	Beverage and tobacco manufactures	55	1.91	21	2.22
7	Textiles, garments & leather products	181	6.24	77	8.02
8	Wood & paper products	60	2.05	22	2.29
9	Chemicals & chemical products; petroleum, coal & coke products	91	3.13	25	2.58
10	Rubber & plastic products	67	2.31	13	1.34
11	Non-metallic mineral products	79	2.74	26	2.68
12	Basic metals & fabricated metal products	146	5.03	20	2.02
13	Machinery, equipment, appliances, parts & supplies	156	5.39	22	2.30
14	Transport equipment	133	4.57	25	2.60
15	Other manufactured products	71	2.45	10	1.00
16	Electricity and water	79	2.73	19	2.02
17	Construction	295	10.16	88	9.08
18	Wholesale & retail trade	193	6.63	83	8.54
19	Transportation & communication	130	4.47	29	2.96
20	Finance, insurance, real estate & business services	130	4.48	41	4.28
21	Public administration, defence & security	58	2.01	22	2.30
22	Personal, community, social & other services, n.e.c.	209	7.20	85	8.82
	All sectors	2,904	100.00	966	100.00

Demand Structure

Total demand is categorized into intermediate or industry demand and final demand. Intermediate demand refers to demand for goods and services required by industries in the process of production. Final demand relates to personal consumption expenditures, government consumption expenditure, investment and exports.

Table 4 shows the demand patterns expressed as ratios to total demand. On the aggregate, ratio of intermediate demand for goods and services in 2007 accounts for 68%, slightly lower in 2000 of 69%. While, Its residual of 32% represents final demand share in 2007 as against 31% in 2000. As can be gleaned from Table 4, there exist differentials in demand patterns by sector between in 2007 and 2000 of national economic.

Table- 3 Intermediate and primary inputs ratios of sectors, 2007 and 2000

Code	Sector	2007		2000	
		Intermediate	Primary	Intermediate	Primary
1	Crops, livestock & poultry & agricultural services	0.57	0.43	0.32	0.68
2	Round timber & other forest products	0.52	0.48	0.23	0.77
3	Fish & other marine products	0.74	0.26	0.43	0.57
4	Metallic ores & non-metallic minerals	0.35	0.65	0.28	0.72
5	Food manufactures	0.90	0.10	0.84	0.16
6	Beverage and tobacco manufactures	0.79	0.21	0.55	0.45
7	Textiles, garments & leather products	0.79	0.21	0.82	0.18
8	Wood & paper products	0.74	0.26	0.73	0.27
9	Chemicals & chemical products; petroleum, coal & coke products	0.83	0.17	0.66	0.34
10	Rubber & plastic products	0.55	0.45	0.68	0.32
11	Non-metallic mineral products	0.68	0.32	0.71	0.29
12	Basic metals & fabricated metal products	0.84	0.16	0.83	0.17
13	Machinery, equipment, appliances, parts & supplies	0.68	0.32	0.76	0.24
14	Transport equipment	0.79	0.21	0.73	0.27
15	Other manufactured products	0.52	0.48	0.74	0.26
16	Electricity and water	0.38	0.62	0.29	0.71
17	Construction	0.68	0.32	0.73	0.27
18	Wholesale & retail trade	0.32	0.68	0.46	0.54
19	Transportation & communication	0.56	0.44	0.40	0.60
20	Finance, insurance, real estate & business services	0.37	0.63	0.35	0.65
21	Public administration, defence & security	0.36	0.64	0.46	0.54
22	Personal, community, social & other services, n.e.c.	0.40	0.60	0.37	0.63
	All sectors	0.62	0.38	0.55	0.45

Composition of Domestic Final Demand

Table 5 shows the composition of domestic final demand by type of final demand. Households demand for domestic goods and services in 2007 accounted for 31.09% of total final demand - much lower than the national average of 42.59% in 2000. On the other hand, investment and exports recorded higher shares relative to period 2000. The high ratio for exports in 2007 is due to encouraged export policy in this period.

Table-4 Intermediate and final demand ratios, 2007 and 2000

Code	Sector	2007 (ratio)		2000 (ratio)	
		Intermediate	Final demand	Intermediate	Final demand
1	Crops, livestock & poultry & agricultural services	0.62	0.38	0.55	0.45
2	Round timber & other forest products	0.55	0.45	0.77	0.23
3	Fish & other marine products	0.46	0.54	0.42	0.58
4	Metallic ores & non-metallic minerals	0.25	0.75	0.13	0.87
5	Food manufactures	0.51	0.49	0.18	0.82
6	Beverage and tobacco manufactures	0.11	0.89	0.13	0.87
7	Textiles, garments & leather products	- 0.23	1.23	0.28	0.72
8	Wood & paper products	0.84	0.16	0.59	0.41
9	Chemicals & chemical products; petroleum, coal & coke products	0.59	0.41	0.71	0.29
10	Rubber & plastic products	0.22	0.78	0.88	0.12
11	Non-metallic mineral products	0.99	0.01	0.95	0.05
12	Basic metals & fabricated metal products	0.60	0.40	0.82	0.18
13	Machinery, equipment, appliances, parts & supplies	0.40	0.60	0.22	0.78
14	Transport equipment	0.05	0.95	0.54	0.46
15	Other manufactured products	0.25	0.75	0.36	0.64
16	Electricity and water	0.66	0.34	0.74	0.26
17	Construction	0.08	0.92	- 0.00	1.00
18	Wholesale & retail trade	0.60	0.40	0.47	0.53
19	Transportation & communication	0.53	0.47	0.38	0.62
20	Finance, insurance, real estate & business services	0.43	0.57	0.66	0.34
21	Public administration, defence & security	0.04	0.96	0.00	1.00
22	Personal, community, social & other services, n.e.c.	0.15	0.85	0.10	0.90
	All sectors	0.68	0.32	0.69	0.31

Table-5 Composition of Domestic Final Demand: 20007 and 2000 *(in VND Billion)*

Sector	2007		2000	
	Value	Percent	Value	Percent
Private consumption expenditure	564	31.09	296	42.59
Government consumption expenditure	66	3.64	26	3.74
Gross capital formation	352	19.40	131	18.85
Exports	832	45.87	242	34.82
Total	***1,814***	100.00	***695***	100.00

Backward and Forward Linkage

Economic fluctuations vary by the way 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 inverse matrix of input coefficients, input-output analysis could be extended to measure the indirect effects, both backward and forward, of the production sectors. Backward and forward linkages of an industry are mean to measure the inter-sectoral linkages of a particular industry to other industries as user of inputs and as provider of inputs to other industries.

Backward Linkage

Backward linkage is a measure of the relative importance of a sector as purchaser of raw material inputs from the entire production system. At the sectoral level, this is estimated as the ratio of the sum of the column elements of the inverse matrix to the average of the whole system. This ratio is called the index of the power of dispersion.

Forward Linkages

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, 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. Note that, usually these index calculated base on the input-output table at non-competitive – import type.

Table 6 present backward linkage and forward linkage of Vietnam economic in 2007 and 2000, these indices shows strongly input structure changed of Vietnam economic in 20007 compared with 2000, especially sectors with indices of the power and sensitive of dispersion more than unity are crop, livestock & poultry $ agricultures; food manufactures; wood and paper products; Non-metallic mineral products; Machinery, equipment, appliances, parts & supplies, while sectors with indices of the power and sensitive of dispersion in 2000 smaller than unity. Index of dispersion of food manufactures sector is biggest and their level is stronger than before time.

Impact analysis of final demand

An important feature of I-O analysis is that it provides the link between final demand and production. Given a bill of final demand, I-O analysis makes it possible to determine the output requirements needed to meet that final demand through the equation:

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

Where: X is the vector of output, A^d is coefficient matrix of domestic input, $(I - A^d)^{-1}$ is the inverse matrix and Y^d is the matrix of domestic final demand.

Final demand for goods and services has repercussive or multiplier 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.

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Table-6 Backward linkage and forward linkage of Vietnam economic: 2007 and 2000

Code	Sector	2007		2000	
		BL	FL	BL	FL
1	Crops, livestock & poultry & agricultural services	1.10	1.60	0.92	1.38
2	Round timber & other forest products	0.94	0.91	0.83	0.99
3	Fish & other marine products	1.36	0.87	0.93	0.83
4	Metallic ores & non-metallic minerals	0.78	0.98	0.86	0.88
5	Food manufactures	1.64	1.64	1.46	0.93
6	Beverage and tobacco manufactures	1.27	0.68	1.15	0.78
7	Textiles, garments & leather products	0.63	0.48	1.22	1.01
8	Wood & paper products	1.12	1.26	1.19	1.04
9	Chemicals & chemical products; petroleum, coal & coke products	0.97	1.05	0.76	0.96
10	Rubber & plastic products	0.79	0.74	1.08	1.11
11	Non-metallic mineral products	1.11	1.05	1.21	1.18
12	Basic metals & fabricated metal products	0.99	1.19	1.16	1.25
13	Machinery, equipment, appliances, parts & supplies	1.01	1.05	0.99	0.81
14	Transport equipment	0.97	0.66	1.11	1.10
15	Other manufactured products	0.94	0.78	1.05	0.83
16	Electricity and water	0.89	1.10	0.82	1.08
17	Construction	1.07	0.75	1.15	0.71
18	Wholesale & retail trade	0.82	1.50	0.97	1.57
19	Transportation & communication	0.90	1.17	0.75	0.90
20	Finance, insurance, real estate & business services	0.88	1.05	0.77	1.14
21	Public administration, defence & security	0.89	0.65	0.80	0.71
22	Personal, community, social & other services, n.e.c.	0.93	0.85	0.80	0.81

This section assesses the total (direct and indirect) effects of changes in final demand on the economy. In particular, it examines the impact of the final demand components on production and value added using the collapsed 22-**sector National I-O table** of the non-competitive type

Table 7 present the effects of each component of final demand to production in 2007 and 2000. If Vietnam economic in before period (2000), the production was induced biggest by investment (1.61), but this period the output was induced biggest by household consumption expenditure (1.80), the next of this induced to production is investment (1.69). In this period

the final demand induct to production stronger than before period.

Primary input induced by component of final demand.

Part 7 presented the linkage between final demand and production, but the final result of any economic activity to be created income. Part 8 present the linkage between final demand and production income and this relation presented as follow:

$$V = v.(I-A^d)^{-1}.Y^d$$

Where: V is matrix of value added, v is coefficient matrix of value added.

Table 8 shows Government consumption expenditure propagated to gross value added (GVA) being biggest, Of course, percent of Government consumption expenditure induced to GVA is only 2,06%; So in this period (The period presented by the input-output table 2007) Government expenditure will be best induced to gross value added .

Table -7 The effects of final demand to production

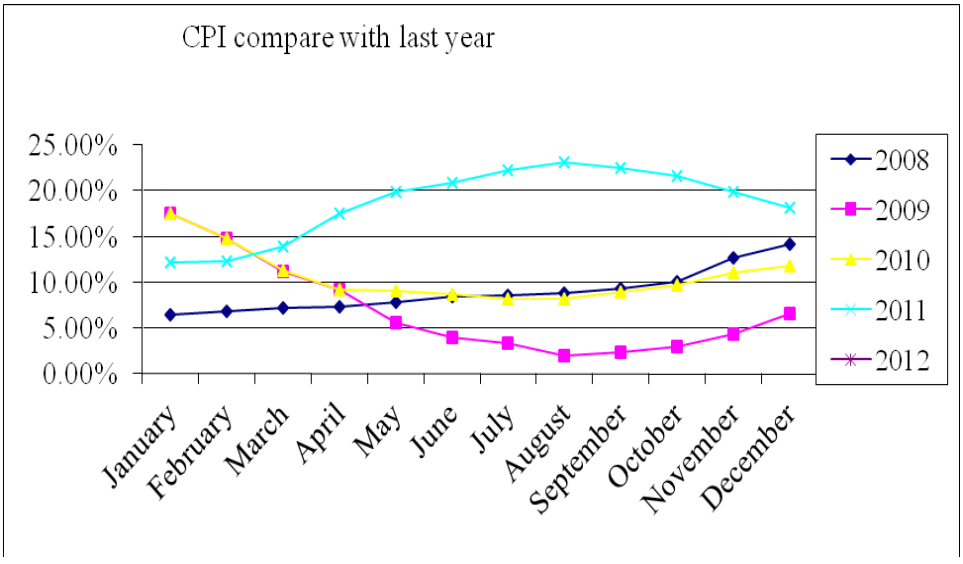
	2007	**2000**
Household consumption expenditure	1.80	1.49
Government consumption expenditure	1.44	1.13
Investment	1.69	1.61
Export	1.53	1.46

Table 8. Gross value added induced by final demand

	2007		**2000**	
	GVA induced by:	Percent allocated to GVA induced by:	**GVA induced by:**	Percent allocated to GVA induced by:
Household consumption expenditure	0.71	40.08	0.67	41.5
Government consumption expenditure	0.83	2.06	0.73	4.9
Investment	0.50	16.25	0.48	13.8
Export	0.55	41.61	0.62	39.8
Total		100.00		100.00

Concluding Remarks

Regarding economic structure of this stage, it shows that the ratios of intermediate input per gross input increasing more than last stage, but, total factor productivity of economy stronger decreased if comparing with last stage; so we can see the supply size of Vietnam economy is bad. Another hand, from tables (7) and (8), we also can see the output requirement for a unit of final demand increase comparing with last stage. So, if stronger increasing of final demand while the week of supply will lead to inflation. We can see these points as follow:



Resource: Calculating of Pham Do Chi

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