Sources of Economic Growth and Input-Output Structural Decomposition Analysis: The Case of Iran

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ABSTRACT

Enormous oil and gas sources and income obtained from export is always having impacts on following specific strategy. These sources are not only eternal, the necessity of attaining economic development, recognition of scientific and practical solution of economic growth specially country industrial production growth, become inevitable. Although for many decades, policy makers' in Iran like many other developing countries tried to follow special strategy such as import substitution or export expansion, oil incomes cause expansion of domestic demand for consumption goods and prevent reaching to stability and competitive phase at international level.

The main aim of this paper is to analyze the source of output growth of particularly industrial growth from a demand side perspective; the analysis will be based on Chenery's factor decomposition approach (1960) input-output framework. Output growth is decomposed into four sources: domestic demand expansion, export expansion, import substitution and intermediate demand expansion. The study will cover the period first and second five year macroeconomic plans (1988-93 & 1993-99). For this period three input-output tables for years of 1988, 1993 and 1999 will be employed.

Keywords: Iran. Input-Output Analysis, Output Growth, Structural Decomposition.

1. Introduction

Specific policy industrialization in Iran formally returns to early 1920s. But from that time till end of second macroeconomic plans before Islamic revolution (1955-1962), special industrial policy wasn't clear in this period operation. Beginning of the third macroeconomic plans (1963-1967) till end of fifth plan (1973-1977) import substitution strategy formally existed in predication of third, forth & fifth plans laws. But in fifth macroeconomic plan, oil price increase in global markets and therefore Iran valuta incomes increase about 4 times, caused this plan has weak operation. During 1978-1977 the revolution itself & 8-year war with Iraq, imposed critical conditions on economy activities. Environmental improvement condition & creating development commitment at national economic level, cause to adjusting & applying five years plans after revolution in the shape of development plans, and different from macroeconomic plans before revolution, starts from 1989. In first development plan (1989-1993), country encountered hard war damages and oil exporting outcome, just provide important part (about 70%) of whole valuta needs. Therefore industrial development strategy in this plan was determined as combinational import substitution and export expansion. In the second development plan (1995-1999) also was accentuated on non oil export which showed plan tendency to outward development strategy. In third plan (2000-2004) for export jumping and achieve readiness to associate with global economy, was accentuated on applying business strategic policy which paid attention to create advantage in modern activities that has competence power in free situation later.

In industrial development context, consequences comparison countries which have percapita incomes similar to Iran shows that in last three decade regardless to many government investments in industrial enterprise, country industrial growth in comparison with world successful countries was very low and Iran industrial can't play pivotal and leading role in growth & development, but also it was adherent and biased of oil part and structure change and goods combining inside industrial part was affected of income obtained from export oil. Country exports survey during 1971 to 2003 shows oil export noticeable ratio in entire country export. More than half of country exports contain oil & gas export and non oil export has low ratio, lower than 30% of total exports and less than 6% of total gross domestic product. Also as regards

that import substitution strategy in macroeconomic plans before revolution and first development plan after revolution was dominant strategy, but passing three decades of exerting substitution import strategy, country still hasn't achieved substitution phase in investment goods yet, and country import combination more than being a thought out strategy, was the result of cross-section changes in economic conditions among in country valuta incomes.

The demand side decomposition of output growth analyses the changes in the output induced by changes in domestic demand, exports, imports and intermediate input use i.e., input-output coefficients. Demand side decomposition is important as it helps in identifying the effects of government policies on growth of output of an industry and structural changes, as the individual components of demand reflect economic policies. Such an analysis is particularly important as demand pattern for different industries change with the passage of time due to changes in economy.

The methodology of demand side decomposition analysis within the input-output framework was originally established by Chenery(1960) and extended by Chenery, Shishido and Watanabe (1962), Syrquin (1976), Chenery (1979) and Chenery, Robinson and Syrquin (1986). The method has since been employed by many researchers to analyze the sources of output growth on both national and regional levels such as: Celasun (1983), Kubo and Robinson (1984), Kubo, Melo and Robinson (1986), Forssell (1988), Urata (1988), Lee and Schluter (1993), Korres (1996), Zakariah and Ahmad (1999), Akita and Hermawan (2000) and Kumari (2005).

It should be concerned that in field of export development strategy and using input-output technique to constant price, hasn't done any precise research yet and in this perspective this research subject is new. H.Mirzaei (1997), in Iran, for import substitution strategy survey used three periods (1969-74, 1974-84 and 1984-88) and reviewed form of Chenery model. He find that domestic demand expansion was main source of industrial output growth.

In this study, an attempt has been made to analyse the sources of output growth in Iranian manufacturing industry for the period 1988-99 .The analysis is based on

demand-side decomposition of output growth with in input-output framework. The study is organized as follows. Section 2 discusses the model of demand side decomposition of output growth. The sources of data and construction of variables are given in Section 3. Section 4 discusses the results of demand side decomposition analysis. Section 5 states conclusion.

2. Model of Demand-Side Decomposition of Output Growth

The demand side decomposition of output growth analyses the changes in the output induced by changes in domestic demand, exports, imports and intermediate input use i.e., input-output coefficients. Demand side decomposition is important as it helps in identifying the effects of government policies on growth of output of an industry and structural changes, as the individual components of demand reflect economic policies. Such an analysis is particularly important as demand pattern for different industries change with the passage of time due to changes in economy. This method analyzes major shifts within the economy by means of comparative static examination of the key parameters. The method also enables the structural change to be examined from different perspectives.

The methodology of demand side decomposition analysis within the input-output framework was originally established by Chenery(1960) and extended by Chenery, Shishido and Watanabe (1962), Syrquin (1976), Chenery (1979) and Chenery, Robinson and Syrquin (1986). The method has since been employed by many researchers to analyze the sources of output growth on both national and regional levels such as: Celasun (1983), Kubo and Robinson (1984), Kubo, Melo and Robinson (1986), Forssell (1988), Urata (1988), Lee and Schluter (1993), Korres (1996), Zakariah and Ahmad (1999), Akita and Hermawan (2000)[1] and Kumari (2005).

Chenery (1960), using the properties of input-output system, equated increase in production of sector to the sum of following four components:

1. Anita Kumari, (2005). "Liberalization and Sources of Industrial Growth in India: An Analysis Based on Input-Output Approach*", 15th International Conference on Input-Output Techniques*, 27 June-1 July.

(1) Domestic demand expansion (*DD*):

The expansion of domestic demand includes the direct demand for commodity i plus the indirect effects on sector i of expansion of domestic demand in other sectors i.e., the total effect on the output from each sector of expansion of domestic demand in all sectors.

(2) Export expansion (*EE*):

Export expansion is the total effects on output from sector i of increasing exports (both export of commodity i and exports of other commodities).

(3) Technological Change or intermediate demand expansion due to change in input-output coefficients (*IO*):

Technological Change or intermediate demand expansion due to change in input-output coefficients is the total effect on output from sector i of changing input-output coefficients throughout the economy.

(4) Import Substitution (*IS*):

Import substitution is the total effects on output from sector i of increasing the proportion of demand in each sector that is supplied from domestic production.

So:

$$\Delta X = DD + EE + IO + IS \quad (1)$$

In an open Leontief system, the basic material balance between supply and demand can be written as:

$$X = D + W + E - M \quad (2)$$

where X, D, W, E, and M are respectively vectors of gross output, domestic final demand (includes household consumption expenditure; government consumption expenditure; capital formation; and change in inventory), intermediate demand, export demand, and import. Noting that the intermediate demand of i-th sector can be determined by multiplying the input-output coefficients by total sectoral output as $W = AX$ (where A is the matrix of input-output coefficients).

Let me denotes import ratio, calculated as imports to total domestic supply (Chenery 1979), i.e.,

$$m_i = \frac{M_i}{D_i + W_i} \tag{3}$$

Equation (2) can be rewritten as:

$$X = D + AX + E - m(D + AX) \tag{4}$$
$$= (I - m)D + (I - m)AX + E$$

Now solving equation (4) for *X*, we obtain gross domestic outputs necessary to satisfy a specific level of domestic final demand and exports.

By putting $\mu = I - m$ (where μ represented the diagonal3 matrix of domestic supply),

$$X = \mu D + \mu AX + E \tag{5}$$
$$X = (I - \mu A)^{-1}(\mu D + E)$$

By taking "Δ decomposition measure" (utilized by Kubo and Robinson 1979) and putting:

$$\Delta X = X_1 - X_0$$

where subscripts 0 and 1 designate the initial year and the terminal year, respectively.

$$= R_1(\mu_1 D_1 + E_1) - X_0 \quad (\text{where } R = (I - \mu A)^{-1})$$
$$= R_1\mu_1 D_1 + R_1 E_1 + R_1\mu_1 D_0 + R_1 E_0 - R_1\mu_1 D_0 - R_1 E_0 - X_0$$
$$= R_1\mu_1\Delta D + R_1\Delta E + R_1\mu_1 D_0 + R_1 E_0 - X_0$$

The last two terms of the above expression can be expanded as follows:

$$R_1\mu_1 D_0 + R_1 E_0 - X_0$$
$$= R_1\mu_1 D_0 + R_1 E_0 - R_1 R_1^{-1} X_0$$
$$= R_1\mu_1 D_0 + R_1 E_0 - R_1(I - \mu_1 A_1)X_0$$
$$= R_1\mu_1 D_0 + R_1 E_0 - R_1 X_0 + R_1\mu_1 A_1 X_0$$
$$= R_1\mu_1(A_1 - A_0)X_0 + R_1\mu_1 A_0 X_0 + R_1\mu_1 D_0 - R_1(X_0 - E_0)$$
$$= R_1\mu_1\Delta A X_0 + R_1\mu_1(A_0 X_0 + D_0) - R_1(X_0 - E_0)$$

From (5):

$$X_0 = \mu_0 D_0 + \mu_0 A_0 X_0 + E_0$$
$$X_0 - E_0 = \mu_0 D_0 + \mu_0 A_0 X_0 = \mu_0(A_0 X_0 + D_0)$$

With substituting we get

$$\Delta X = X_1 - X_0$$

$$= R_1\mu_1\Delta D + R_1\Delta E + R_1\mu_1\Delta A X_0 + R_1\mu_1(A_0X_0 + D_0) - R_1\mu_0(A_0X_0 + D_0)$$

$$= R_1\mu_1\Delta D + R_1\Delta E + R_1\mu_1\Delta A X_0 + R_1(\mu_1 - \mu_0)(A_0X_0 + D_0)$$

Therefore,

$$\Delta X = X_1 - X_0 = R_1\mu_1\Delta D + R_1\Delta E + R_1\mu_1\Delta A X_0 + R_1\Delta\mu(A_0X_0 + D_0) \quad (7)$$

$R_1\mu_1\Delta D$:represented the change in domestic demand

$R_1\Delta E$:represented the change in export demand

$R_1\mu_1\Delta A X_0$:represented intermediate Demand Expansion Effect due to change in input-output coefficient

$R_1\Delta\mu(A_0X_0 + D_0)$:represented the change in import substitution

The above decomposition has been defined by using the terminal year structural coefficients and initial year volume weights. This version is analogous to Paasche price index. The decomposition can also be done by using initial year structural coefficients and terminal year weights. This version is analogous to Laspeyres price index. Thus decomposition based on Laspeyres price index can also be obtained after certain algebric steps as done for Paasche price index and is as follows:

$$\Delta X = R_0\mu_0\Delta D + R_0\Delta E + R_0\mu_0\Delta A X_1 + R_0\Delta\mu(A_1X_1 + D_1) \quad (8)$$

The average of the two alternatives, i.e., Laspeyres measure and and Paasche measure has been used for decomposition of output growth in this study. In several earlier studies, the average of Laspeyres and Paasche's methods of decomposition has been taken. (For example Celasun 1984, Akita & Hermawan 2000)

Output growth due to the expansion of domestic final demand (DD) can be further decomposed into four components in terms of domestic final demand sectors: household consumption expenditure (DD1); government consumption expenditure

(DD2); capital formation (DD3); and change in inventory (DD4). Thus, equations (7) and (8) can be written as:

$$\Delta X = (DD1 + DD2 + DD3 + DD4) + EE + IO + IS \qquad 9)$$

2.1. Methods of Deflation of Variables

Details of the methods employed for the deflation of output, exports, imports, domestic demand, intermediate demand and input-output coefficients are given below:

To transform variables from nominal value to real value, we have followed the method given by Celasun (1983) in his Turkish study:

X_i: sectoral production (or output) in current prices (including indirect taxes on domestic output and import taxes on imports)

D_i: sectoral domestic final demand in current prices

E_i: sectoral exports in current prices

M_i: sectoral imports in current prices

S_i: sectoral supply for domestic use in current prices (=*Xi*+*Mi*-*Ei*)

a_{ij}: technical coefficient in current prices

P_i^x, P_i^m, P_i^e and P_i^s are the prices indices for X_i, M_i, E_i and S_i, respectively. X_i^*, M_i^*, D_i^*, E_i^*, S_i^* and a_{ij}^* are the values measured in constant 1993 prices. That was obtained as below:

$$X_i^* = \frac{X_i}{P_i^x} \qquad (10)$$

$$M_i^* = \frac{M_i}{P_i^m} \qquad (11)$$

$$E_i^* = \frac{E_i}{P_i^e} \qquad (12)$$

$$P_i^s = \frac{X + M - E}{X^* + M^* - E^*} \qquad (13)$$

$$D_i^* = \frac{D_i}{P_i^s} \qquad (14)$$

$$a_{ij}^{*} = a_{ij}\frac{P_j^x}{P_i^s}\left(=\frac{X_{ij}/P_i^s}{X_j/P_j^x}\right) \tag{15}$$

Material Balances (In current prices):

$$X_{ij} = \sum_j a_{ij}X_j + D_i + E_i - M_i \tag{16}$$

Material Balances (In constant 1993 domestic prices):

$$A^{*} = (a_{ij}^{*}) \qquad \text{where } X^{*} = (I - A^{*})^{-1}(D^{*} + E^{*} - M^{*}) \tag{17}$$

X^{*} provided by Equation (17) is in principle equal to obtained by Equation (10). Due to rounding errors in the estimation of a_{ij}^{*}, D^{*}, E^{*}, M_i^{*} and in the computation of the inverse matrix $(I\text{-}A^{*})^{-1}$, these two sets of estimates for X will be only approximately equal. In the analysis of sources of growth, the estimates obtained by equation (17) are adopted in the calculation of production growth.

3. Source of data

In this research, 3 input-output tables for 1993, 1988 & 1999 [1] were applied and the source of output growth in the period of 1988-1999 from demand side was studied by using growth factors decomposition approach. Three tables are in current price, but for making them comparable and measuring changes, it's needed to have tables in constant price. So nominal value of these variables: sectoral output, import, export, domestic final demand and technical coefficients in both 1988 & 1999 tables are deflated to 1993 constant price. 1999 Sectoral output vector is deflated by using Producer Price Index that prepared by Central Bank of Islamic Republic of Iran. Although Producer Price Index was not available for 1988, GDP deflator index was applied which is close to Producer Price Index (PPI) and was also experienced in other studies[2]. Sectoral Import & export nominal value in 1988 & 1999 input-output tables were converted to real value by Wholesaler Price Index (export & import goods).

1. 1993 & 1999 tables have been updated by RAS method.
1. Zakariah, A., Ahmad, E. (1999);"Source of Industrial Growth Using the Factor Decomposition Approach: Malaysia, 1978-87", The Developing Economics, XXXVII-2, P. 173

4. Results

This section presents the results of decomposing the output growth of each sector output in terms of its four sources of growth: export expansion, import substitution, domestic-demand, and intermediate demand expansion. A source of growth is considered as a dominant source if its contribution to sectoral output growth is the largest among the four sources. If in a particular sector, export expansion is found to be dominant, the sector can then be labeled as an export-oriented sector. Similarly, a sector can be called an import-substituting sector when the import-substitution source appears to be the main contributor to its output growth.

In order to investigate the differences between various sources of output growth, calculations were made in 1988-1993 & 1993-1999 periods separately.

4-1. Source of output growth in 1988-1993 period

During 1988-93, table 1 shows that total industry export expansion was the major source of contributing 66.4 per cent to output growth, followed by domestic final demand expansion contributing 28.3 per cent, intermediate demand expansion contributing 3.3 per cent and finally import substitution contributing 1.8 per cent.

As table 1 shows in 1988-1993 period all industries' export expansion, 66.4%, is the main output growth sourced, therefore final domestic demand expansion with 28.3%, intermediate demand expansion with 3.3% and import substitution with 1.8 % are in next ranks of effectiveness on output growth.

Food, beverages & tobacco products; paper, printing & publishing products; chemical products; basic metal products; machinery & metal products were showing increase in output and textiles, wearing apparel & leather products; wood products; non metallic mineral products were showing decrease in output. The effective factor on output change (positive or negative) in food, beverages & tobacco products (70.8%) and wood products (-45.1%) was domestic demand expansion; in chemical products (88.6%) and basic metal products (122.9%) was export expansion; in non metallic mineral products (-426.2%) was intermediate demand expansion and finally in textiles,

wearing apparel & leather products (-164.1%), paper, printing & publishing products (48.2%) and machinery & metal products (79.1%) was import substitution.

The contribution of domestic demand expansion to output growth was positive value rial in 6 industries out of 8 industries. From eight available industries, domestic demand extension in six industries, export development in seven industries, intermediate demand extension in two industries and import substitution in five industries had positive value rial.

Import substitution in textiles, wearing apparel & leather products; domestic demand expansion in wood products; and intermediate demand expansion in non metallic mineral products were the main factors of reducing output.

With respect to table 1, in subperiod 1988-1993 textiles, wearing apparel & leather products, chemical products and basic metal products were the export oriented industries.

4-2. Source of output growth during 1993-1999

With regard to table 2, during this subperiod in entire industry, domestic demand expansion with 142.6% has the most affect on output growth and intermediate demand expansion with 64.4%, export expansion with 20.5% and import substitution with 1.24% was in next ranks.

During subperiod 1993-99, all industries except industry wood & wood products were showing increase in output.

In subperiod 1993-1999 all industries had positive output growth and just wood products had reduction in output growth. The effective factor on output change in textiles, wearing apparel & leather products (274,2%); wood products (-8644,8%); paper, printing & publishing products (-915,6%) and basic metal products (188,9%) were domestic demand expansion source, in food, beverages & tobacco products (%-68,9); chemical products (-126,6%) and non metallic mineral products (59,4%) were intermediate demand expansion source and in machinery & metal products (72,8%) were import substitution.

From eight industries, domestic demand expansion in four industries, export expansion in six industries, intermediate demand expansion in four industries and import substitution in seven industries had positive value. Output reduced main factor in wood products were domestic demand expansion.

During this period, export expansion had low ratio in output growth and was ever in third or forth rank of effectiveness on output growth, as it's impossible to introduce an industry as an export oriented industry. But in entire industry is in a better position than import substitution.

5. Conclusion

In table 3, rule and condition sources affection on output growth is shown. In this table a mark indicates 0 to 20 % effect in output growth, two marks indicate 20 to 50% effect in output growth, three marks indicate 50 to 100% effect in output growth and four marks indicate for more than 100% effect in output growth.

As it is mentioned in introduction, in first & second economic development plans were accentuated export expansion and import substitution strategies. Therefore as in table 3, in 1988-1993 period, export expansion strategy were main output growth factor and is in next domestic demand expansion rank. But in 1993-1999 period, despite of overemphasis on export expansion strategy, practically growth of industry part output and its subparts were under affect of domestic final demand expansion and intermediate demand expansion factors, export expansion and import substitution had a little role on economic output growth. The result of output structural decomposition estimation shows that in both two periods of research (1988-1993 & 1993-1999) industry part growth from the all named industries side was positive and domestic demand expansion, export expansion & intermediate demand expansion in first period and domestic demand extension, export development & import substitution in second period helped the industry part growth. The industry part rate of growth from the all sources, the growth during second period is about to 3 times greater than first period. Export development in first period had the most impact on industry output growth and

in second period had the positive impact. Import substitution in both periods had a little share that had negative impact during first period and positive impact in second period. As it cited, export development in first period and domestic demand extension in second period, had the most share on the industry output growth.

Totally it is concluded that the Iran domestic demand which has been developed because of the oil export income injection to country economic, was the main factor of creating and developing industry production in country. Export development had impact on industry production growth just in conditions that domestic demand was limited.

Table 1

Sources of Output Growth in Iranian Manufacturing Industry during 1988-93

(In constant price 1993)

Million Rial (%)

Sources / Industries	DD	EE	IO	IS	Total	DD1
Food/Beverages/tobacco	3695212 (70.8)	47150 (0.9)	25249 (48.4)	-1053921 (-20.2)	5212595 (100)	3308438 (63.4)
Textiles/wearing apparel/Leather	24776 (-0.6)	3302971 (-88.9)	-944057 (25.4)	-6098501 (164.1)	-3714811 (100)	-606637 (16.3)
Wood Products	-439768 (45.1)	34679 (-3.5)	-390953 (40.1)	-178510 (18.3)	-974553 (100)	-555597 (57.0)
Paper/Printing/Publishing	193207 (46.08)	60746 (14.4)	-37078 (-8.8)	202405 (48.2)	419280 (100)	-133368 (-31.8)
Chemical Products	1122607 (34.6)	2875595 (88.6)	-1291985 (-39.8)	537293 (16.5)	3243511 (100)	-219472 (-6.7)
Non-Metallic Mineral Products	212556 (-159.2)	-76708 (57.4)	-568823 (426.2)	299531 (-224.4)	-1334444 (100)	330272 (-247.4)
Basic metal products	58802 (2.6)	2751047 (122.9)	-1127040 (-50.3)	553983 (24.7)	2236793 (100)	-8260 (-0.3)
Machinery/Metal Products	-940389 (-12.4)	226555 (2.9)	2297090 (30.3)	5995833 (79.1)	7579090 (100)	-16578 (-0.2)
Total manufacturing industry	3927004 (28.3)	9222037 (66.4)	461305 (3.3)	258113 (1.8)	13868461 (100)	2098855 (15.1)

* DD: Domestic Demand Expansion, EE: Export Expansion, IO: intermediate Demand Expansion, IS: Import Substitution, DD1: Household Consumption Expenditure Expansion

Table 2

Sources of Output Growth in Iranian Manufacturing Industry during 1993-99

(In constant price 1993)

Million Rial (%)

Sources / Industries	DD	EE	IO	IS	Total	DD1
Food/Beverages/tobacco	626586 (67.7)	489352 (52.9)	-637352 (-68.9)	446349 (48.2)	924936 (100)	9102923 (659.8)
Textiles/wearing apparel/Leather	48697961 (274.2)	8063640 (45.4)	-21819772 (-122.8)	-17182214 (-96.7)	17759614 (100)	-26561313 (-149.5)
Wood Products	-1237122 (8644.8)	86749 (-606.1)	1096696 (-7663.5)	39366 (275.0)	-14310 (100)	362633 (-2534.0)
Paper/Printing/Publishing	-2145128 (-915.6)	-252609 (-107.8)	1086689 (463.8)	1543119 (659.6)	234271 (100)	2410800 (1029.06)
Chemical Products	6084106 (119.7)	1465889 (28.8)	-6435333 (-126.6)	3966506 (78.06)	5081169 (100)	805254 (15.8)
Non-Metallic Mineral Products	-143339 (-3.7)	21819 (0.5)	2261052 (59.4)	1662248 (43.7)	3801781 (100)	-61273 (-1.6)
Basic metal products	3761530 (188.9)	-2425393 (-121.8)	-2664504 (-133.8)	3318717 (166.7)	1990350 (100)	151640 (7.6)
Machinery/Metal Products	-46517 (-0.5)	561815 (6.1)	1981961 (21.5)	6690192 (72.8)	9187452 (100)	754471 (8.2)
Total manufacturing industry	55598077 (142.6)	8011264.2 (20.5)	-25130561 (-64.4)	486486 (1.24)	38965265 (100)	-16034855 (-41.1)

* DD: Domestic Demand Expansion, EE: Export Expansion, IO: intermediate Demand Expansion, IS: Import Substitution, DD1: Household Consumption Expenditure Expansion

Table 3

Rule and Condition Effect of Resource in Output Growth

Description	First Subperiod (1988-93)				Second Subperiod (1993-99)			
	DD	EE	IO	IS	DD	EE	IO	IS
Food/Beverages/tobacco	+++	+	++	--	+++	+++	---	++
Textiles/wearing apparel/Leather	+	+++	--	----	++++	++	----	---
Wood Products	--	+	--	-	----	++++	++++	++++
Paper/Printing/Publishing	++	+	-	++	----	----	++++	++++
Chemical Products	++	+++	--	+	++++	++	----	+++
Non-Metallic Mineral Products	++++	---	----	++++	-	+	+++	++
Basic metal products	+	++++	---	++	++++	----	----	++++
Machinery/Metal Products	-	+	++	+++	-	+	++	+++
Total manufacturing industry	++	+++	+	-	++++	++	---	+

* DD: Domestic Demand Expansion, EE: Export Expansion, IO: intermediate Demand Expansion, IS: Import Substitution.

** Sign +: positive effect, sign -: negative effect

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Appendix 1

Table 4

Sector Classifications

Major Sectors	**59 Subsectors**
1. Agriculture	1.Agriculture
2. Livestock/hunting	2.Livestock and hunting
3. Forestry	3.Forestry
4. Fishery	4.Fishery
5. Crude petroleum/natural gas	5.Crude petroleum and natural gas
6. Mining	6.Coal mining 7.Other mining
7. Food/Beverages/tobacco	8.Food Manufacturing 9.Beverage 10.Tobacco Manufacturing
8. Textiles/Wearing apparel/Leather	11.Textiles 12.Wearing apparel 13.Leather and fur 14.Carpets and rugs 15.Footwear excl. rubber and plastic shoes
9. Wood Products	16.Lumber and plywood 17.Wood products 18.Furniture and fixture of wood
10. Paper/Printing/Publishing	19.Paper and paper products 20.Printing and publishing
11. Chemical Products	21.Basic chemicals 22.Fertilizers and pesticides 23.Synthetic fibers 24.Paints, varnishes 25.Medicine

	26.Soap, detergents and kindred products 27.Petroleum refinery products 28.Other products of oil and coal 29.Tires, tubes and other rubber products 30.Plastic products
12. Non-Metallic Mineral Products	31.Pottery, china and earthenware 32.Glass and glass products 33.Structural clay products, bricks , cement and plaster 34.Other non metallic mineral products
13. Basic metal products	35.Basic iron and steel products 36.Basic nonferrous metal products
14. Machinery/Metal Products	37.Fabricated metal products except mach. and equip. 38.Structural metal products 39.Electrical industrial mach, and apparatus 40.Motor vehicles 41.Radio, TV and communication equip 42.Ship, railroad, aircraft and other transport equipment 43.Professional and scientific equip. 44.Other industrial products
15. Electricity	45.Electricity
16. Gas	46.Gas
17. Water supply	47.Water supply
18. Construction	48.Residential & Nonresidential building 49.Governmental & Private building 50.Other construction
19. Transportation and warehousing	51.Transportation and warehousing
20. Communication	52.Communication

21. Trade	53.Trade
22. Restaurants & Hotels	54.Restaurants 55.Hotels
23. Financial & Insurance services	56.Financial & Insurance services
24. Public Services	57.Defense Services 58.Public administration
25. Other Services	59.Other Services