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A KLEMS Database: Describing the Input Structure of Canadian Industry

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FEATURE ARTICLE 1

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by Joanne Johnson[1]

1 - Introduction

Industrial restructuring, globalized trade, capital intensity, labour hoarding, energy crises, technological advance; these are terms commonly used in newspapers, business seminars, and political debates. They share the common theme of describing industry: how it works, the shocks it sustains, how it adapts to a changing environment. All of these terms are related to the question: What is the make-up of the industrial sector? This question falls naturally into two parts: What does the business sector produce? And what does the business sector use?

This paper describes the KLEMS database - industry data on total output, total input, and major categories of inputs: capital (K), labour (L), energy (E), material (M) and service (S) - that is being offered to illustrate what the business sector uses. Information on industries' output and inputs according to these broad categories affords the opportunity for analysing many attributes of business' input make-up and efficiency in the use of those inputs.

The KLEMS database is useful because it enables users to manipulate a manageable amount of data which covers the range of costs faced by businesses. The Input-Output tables provide detailed commodity information, which is useful for gaining an understanding of the inputs and outputs for individual industries, but is too detailed to permit an evaluation of industry structure through time or across industries with relative ease. Similarly, summary capital and labour input estimates, while certainly less cumbersome to deal with, account for less than half of businesses costs. Intermediate input costs make up the bulk of businesses costs. While the types of intermediate inputs are quite varied, they can be classified into three relatively homogeneous groups: energy, materials and services. This affords one the opportunity to work with a reasonably small amount of data, while still preserving many of the distinctive features of these inputs.

This database permits in-depth answers to questions on the structure and adaptation of industry. For example, do increases in capital primarily result in decreases in labour, or are they more often energy saving? Similarly, increased globalized trade, and the corresponding reduction in tariffs and quotas, begs the question of how the make-up of inputs have changed: have reductions in tariffs on U.S. steel led to the substitution of imported steel for Canadian workers? How do industries adapt to relative price changes, both in the short run and in the long run, such as those of the energy crises in 1973 and 1979 and the drastic fall in energy prices in 1986? To

1. *I would like to thank all members of the Productivity Section who assisted in this study. I would especially like to thank Aldo Diaz and René Durand for their extensive assistance, and Jean-Pierre Maynard, Erik Poole and Jody Proctor for their helpful comments. Finally, I would like to thank Nicole Richer for her extensive time and help in the preparation of this article.*

answer these questions and gain a complete understanding of the input structure of Canadian industry one must ask: How much, in terms of quantity and value, is being used of various types of inputs and how have the relative prices of these inputs changed through time?

In addition to providing a better basic understanding of use of inputs by industry, information on critical inputs would permit a more sophisticated analysis of the efficiency of that use. Multifactor productivity (MFP) estimates are useful for analysing the performance of industry as a whole, but they do not provide insight on the underlying growth in inputs associated with changes in MFP. Data on energy, materials and service inputs would permit analysis of productivity growth similar to that in the U.S. For example, Norsworthy[2] has suggested that slower capital formation has been responsible for a slowdown in productivity from 1973 to 1981 in the U.S. Jorgenson[3] also asserts that higher material prices tend to be associated with increases in productivity growth, but high energy prices lead to productivity decline and were responsible for the slowdown. However, Olson[4] has pointed out that energy cost shares are very small and not likely to account for a large portion of the slowdown. Thus, in order to determine the forces that affect productivity, a richer set of data pertaining to the production function - one that includes energy, materials and service inputs - is necessary.

Another major asset of this database is that it enables a better understanding of labour productivity estimates. Labour productivity estimates, which are valuable for determining how much is produced by workers in Canada, can be misleading if the user is not fully cognizant of the fact that this ratio may increase for a variety of reasons completely unrelated to workers' abilities and efforts. Partial productivity estimates for each category of inputs would provide an indication of some of the causes of changes in labour productivity, i.e. changes in the use of capital, energy, materials or services in production. Thus, partial productivity estimates by broad input categories afford the opportunity for a better understanding of labour productivity and MFP estimates.

The purpose of this paper is to describe how the KLEMS database is generated and what is available to users. Section 1 describes data sources and input commodity classifications. Section 2 explains the various types of estimates available (ie. quantity, price and productivity estimates generated according to the Törnqvist, Laspeyres, Paasche and Fisher index formulas). Section 3 reviews the industry coverage and the differences in the treatment of industries that users should be aware of. Finally, some potential uses of the KLEMS database are cited.

2 - Data Sources

The KLEMS database is derived entirely from the multifactor productivity database. Conceptually, the two databases are the same; output values represent the amount paid to firms and thus include subsidies but exclude taxes, while input costs represent the full cost - including all applicable taxes and subsidies - of using each commodity. All input and output values are given in both current and constant prices. The only difference between the two databases is that the productivity database includes detailed commodity data (602 commodities prior to 1987 and

2. *Norsworthy, et. al., "The Slowdown in Productivity Growth." Brookings Papers on Economic Activity. 1979:2.*
3. *Jorgenson, D. W., "Energy Prices and Productivity Growth." Productivity Prospects for Growth. J. M. (ed.) New York: Von Nostrand Reinhold, 1981.*
4. *Olson, M., "The Productivity Slowdown, the Oil Shocks and the Real Cycle." Journal of Economic Perspectives. Fall, 1988.*

485 thereafter), whereas in the KLEMS database, output commodities are combined into one series and input commodities are grouped into five broad categories.

The current price productivity database is derived from the current price Input-Output tables, which delineate the inputs used and outputs sold by each industry. These values are generated by combining elements of the Input-Output tables to calculate the full cost (including all taxes and subsidies for inputs and subsidies only for outputs) of each of the commodities[5]. Readers should note that the current price capital input (as derived from the Input-Output tables) is an estimation based on what the industry would charge itself for using its own capital assets. This is assumed to be the income generated from those capital services, which is the residual income after paying for all other input costs. For further details on how this transformation is performed refer to the appendices at the back of this publication.

The second type of values in the productivity database, the constant price values, serve as estimates of the quantities, since they are calculated as the value of commodities, after removing the effects of nominal price changes. The constant price values of intermediate inputs and all outputs are taken from the Input-Output tables, as in the case of current price values. However, the quantity estimates for capital and labour input are derived from other sources. The constant price values of capital input are derived from data on capital stock owned by industries. In contrast to the measurement of output and other inputs, labour hours are used as quantity estimates rather than constant price values. Labour hours are derived from a combination of surveys[6]. Once again, the sources and manipulation of the data are explained in greater detail in the appendices in this publication.

The KLEMS database is generated from this productivity database. The first component of the KLEMS, gross output, is produced by aggregating all output commodities. The next two components, capital and labour inputs, are single elements in the productivity database, and are taken as such. The last three categories, the intermediate inputs, are generated by combining elements of the productivity database into three groups.

Intermediate commodities are allocated among three classifications of inputs: energy, materials, and services. Energy commodities are fuel and electricity consumed by the establishment for energy purposes only. Any fuel purchased as an input material or for any other non-energy purpose is included in the materials category. In general, material inputs are commodities that can be held in inventory by the producer, while service inputs correspond to actions performed by producers. For example, a producer can hold an inventory of ingots, but can not hold an inventory of laundry, cleaning and pressing services; it can only perform the service of cleaning and pressing the laundry. For an explicit mapping of commodities to categories, refer to the appendix of this article.

5. *The Input-Output tables are available at both producer and purchaser prices. Producer prices are the prices received by the sellers at the boundary of their establishment. Purchaser prices correspond to the market price at the point of delivery. This market price valuation includes two components in addition to the price of the commodity bought: taxes and margins. Margins are payments for other real services, such as retail, wholesale and transportation services that were distinct from the purchased commodity. Given that these margins are distinct from the commodity, the producer price values are used to generate the MFP database*

6. *For a detailed description of how the estimates of hours worked were generated, refer to Jean-Pierre Maynard, "Multifactor Productivity based on Hours Worked" Aggregate Productivity Measures, second 1991 edition, Catalogue 15-204E., pp. 39-49.*

3 - Calculation of the Estimates

The KLEMS database contains four series of estimates for each industry: current price values, volume indices, price indices and productivity indices.

The *current price values* for each of the categories are calculated by summing the current price values for all the commodities of each category.

Volume indices are estimates of the growth in the quantities of some group of commodities. In order to satisfy the needs of various users, the KLEMS data are presently generated using four different formulas for calculating a volume index: the Törnqvist, the Laspeyres, the Paasche and the Fisher Ideal. Each of these formulas are presented in the box to the right.[7]

The Törnqvist volume index is generated in several steps. First, the growth of each commodity within each component of the KLEMS is calculated. Second, these growth rates are weighted according to each commodity's average value share within that component, and summed together. Third, these estimates of the quantitative growth of each component are transformed into indices with base year values set equal to one hundred.

The Laspeyres volume index is calculated by dividing the value of all inputs used in the current year, measured in the previous years prices, by the value of inputs in the previous year, also measured in the previous years prices. On the other hand, the Paasche index is generated by calculating the value of goods in the current and previous year in the current years' prices. The Fisher Ideal index is simply a geometric average of the two.

QUANTITY INDICES

The Tornqvist volume index is a geometric weighted average of the ratios of the current and previous year's quantities

$$T_Q = \prod_{i=1}^{n} (Q_{1i}/Q_{0i})^{wi}$$

which can also be expressed as

$$ln(T_Q) = \sum_{i=1}^{n} w_i * ln(Q_{1i}/Q_{0i})$$

where i *= commodities* 1 *through* n
w_i *= average value shares at time* 0 *and* 1

The Laspeyres volume index is an index of the growth in quantities valued in the previous year's prices

$$L_Q = \frac{\sum_{i=1}^{n} (P_{0i}Q_{1i})}{\sum_{i=1}^{n} (P_{0i}Q_{0i})}$$

The Paasche volume index is an index of the growth in quantities valued in the current year's prices

$$P_Q = \frac{\sum_{i=1}^{n} (P_{1i}Q_{1i})}{\sum_{i=1}^{n} (P_{1i}Q_{0i})}$$

The Fisher Ideal volume index is a geometric mean of the Paasche and Laspeyres indexes

$$F_Q = (L_Q * P_Q)^{1/2}$$

PRICE INDICES

Value, volume and price indexes are related by the identity

$$V_1/V_0 = \frac{P_1}{P_0} * \frac{Q_1}{Q_0}$$

Hence, all price indexes are implicitly defined as

$$P_1/P_0 = \frac{V_1}{V_0 (Q_1/Q_0)}$$

7. *For a description of the properties of index numbers, see W. E. Diewert, Index Numbers, The Palgrave Dictionary of Economics, John Eatwell, et. al. (edt.) London: The MacMillan Press Limited, 1987. pp. 766-779.*

The Törnqvist index formula has been used in the MFP estimates. One of the most attractive features of the Törnqvist formula is that it corresponds exactly to the translog production function, which is a general functional form (i.e. it does not require any restrictive assumptions about factor shares, whereas the Laspeyres and Paasche do).

All volume indices are calculated in a bottom-up fashion; they are initially estimated at the most disaggregated industry level, then weighted according to their contribution to the aggregated industry, and finally summed together[8].

All the *price indices* are derived implicitly from the volume indices and the current price values. To begin, an estimate of the constant price value of each component is computed. This is arrived at by multiplying the base year current price value by the volume index. This produces an estimate of the annual quantities in base year prices. The price indices are subsequently derived by dividing current price values by the constant price values.

The price of capital services is peculiar in the sense that it is a residual ex post (after the fact) price - rather than an ex ante (before the fact) price. Hence, the volume of capital services are assumed to be proportional to the stock of capital given by the net-end-of-previous-year capital stock, valued in constant prices. The value of capital services, on the other hand is assumed to be equal to the residual income generated from capital services. Prices are obtained by dividing current price values by constant price values; thus, the price of capital is the generated income, divided by the real capital stock.

Output/input ratios, or *partial productivity* estimates, are also available for total inputs and each of the five input categories. These are ratios of the output volume index to the input volume index for each input category, or, equivalently, the difference between the growth of output and the growth of each category of inputs.

4 - Industry Coverage and Differences

The KLEMS data are available at the same three levels of industrial aggregation as the MFP estimates: the PS level (13 industries), the PM level (35 industries) and the PL level (112 industries). The KLEMS inputs are the inputs used by all the establishments in each industry; thus, the value of total inputs in current prices sums to the value of gross outputs in current prices.

The concept and/or the method of calculation of inputs and gross output is quite different for some service industries. For most industries, gross output is equal to the value of sales of goods and services *produced*, corrected for changes in inventories, plus any wholesale or retail margins earned on goods purchased for resale. These margins account for the better part of gross output in wholesale and retail trade (and to a lesser extent community business and personal services) industries, but only a small portion in other industries. Hence, while for most industries gross output and total sales corrected for inventory changes are very close, large margins imply a

8. *Note that the Tornqvist index, as it is a geometric average, will vary if calculated in a different number of stages. Thus, the single stage Tornqvist of all inputs will not equal exactly the two stage Tornqvist of all inputs, calculated by weighting the Tornqvist indices for each of the five categories of inputs. This difference, however, is marginal. For a discussion of this topic, see W. E. Diewert, Superlative Index Numbers and Consistency in Aggregation, Econometrica, Vol. 46, No. 4 (July 1978).*

concept of gross output in wholesale and retail trade industries which is closer to value added. Thus, readers should use caution when comparing these industries to others.

Gross output and inputs are also calculated differently in the financial industries. Operating surplus for all industries, except for financial industries, refers only to operating revenue. Thus, capital gains and interest earned on investments are not included in this surplus, but interest paid on borrowing is included as an expense. However, this treatment of interest payments and earnings is inappropriate for financial institutions as the interest differential is a primary source of income for these industries[9]. Hence, for financial industries, interest paid is removed as an expense, and interest earned, net of interest paid, is included in revenues received. Consequently, readers must be careful when comparing these industries to other industries that would be less affected by developments in the financial sector.

The final industries that undergo special treatment are the construction industries. All other industries are comprised of establishments engaging primarily in the same or similar types of activities[10]. However, for the Input-Output definition of the construction industry, construction activity is separated from all industries and transferred to the construction industry. Construction estimates further differ from other estimates in that gross output is calculated net of intra-industry sales. Therefore, the estimates for construction industries correspond only to inter-industry and final demand construction sales. In consequence, these measures are not subject to changes in the vertical integration of establishments within the industry as are those of other industries.

Readers should note that the exact concept of output has significant implications for productivity estimates. The measure of MFP in the KLEMS - gross output productivity - is estimated as the growth of gross outputs minus the growth of all inputs. In this case, the more firms buy inputs from other establishments, the more they push upstream the productivity gains associated with the production of their output. Hence, productivity gains of establishments are associated with production processes they cover. The larger this coverage (the less establishments buy from other establishments) the greater the productivity gains that accrue to them[11].

5 - Some Applications Using the KLEMS Database

The KLEMS data are suitable for examining a wide variety of issues. The KLEMS database is useful for demonstrating the typical costs faced by firms. For example, one can discern that over 50% of manufacturing costs are material input costs, and almost one quarter are attributable to labour. One can also see how various shocks affect the costs faced by firms. For example, continuing increases in the price of energy have pushed the share of energy costs up from 1.6% in the 1960s to 1.7% in the 1970s and 2.3% in the 1980s.

One can also use the KLEMS data to break down the changing value of inputs into quantity and price effects. For example, we can see that the constant price value of capital inputs has grown

9. *For a detail explanation of how the input-output estimates are calculated for the service industries, see Service Industries in the Canadian Input-Output Accounts, Statistics Canada, catalogue 15-601, No. 2.*

10. *For a detailed explanation of how industries are classified, see the Standard Industrial Classification, 1980, Statistics Canada, catalogue 12-501.*

11. *For more details on the sensitivity of productivity measures to output, see Aldo Diaz, "Alternative Concepts of Output and Productivity", Aggregate Productivity Measures, 1989, Catalogue 15-204, pp. 97-106, and René Durand, "Aggregation, Integration and Productivity Analysis: An Overall Framework", Aggregate Productivity Measures, 1989, Catalogue 15-204, pp. 107- 118.*

at more than twice the rate of labour inputs, while the price of labour has grown at almost double the rate of capital. We can use the estimates of quantity and price growth rates to estimate substituting effects among inputs.

We can also use the KLEMS to gain some insight on the growth of inputs. Productivity growth implies that firms are becoming more efficient at using their inputs. Hence, the growth of each type of input can grow slower relative to output. Recalling that intermediate inputs are themselves outputs of other firms, productivity growth also implies that intermediate inputs can be offered at lower prices in times of strong productivity growth. This leads to a fall in their prices relative to the price of labour, and thus, may induce a substitution effect.

Changing levels of vertical integration in producing any given output are also evident from the KLEMS data. Thus, we may find that labour and capital inputs grow slower than output even in times of slow productivity growth, as firms continually specialize their production process.

The KLEMS data also enable one to estimate the correlation of the growth of each input with respect to productivity growth. This affords the opportunity to relate changes in productivity growth to changes in the input make-up of firms.

6 - Conclusion

This article has presented a description of the KLEMS database that is now available to users, as well as some potential uses and limitations that users should be aware of. The database contains industry data on total output, total input and each of the five input categories. The data cover the entire 1961 to 1990 time frame and will be updated annually following the release of the MFP data.

Price, quantity, value and partial productivity estimates are available at three industrial aggregation levels. User can choose estimates generated according to any of the four index formulas: the Törnqvist, the Laspeyres, the Paasche or the Fisher Ideal. The alternative indices, calculated according to these formulas, offer the user a great deal of flexibility in choosing the measures they require.

Given that the KLEMS database is generated from the database used to produce the MFP numbers, the two databases are conceptually the same. Inputs and outputs are thus valued in a fashion which is most appropriate for production analysis. Hence, the KLEMS database is suitable for analysing a wide range of issues in any business sector industry.

APPENDIX

The following table presents the commodity classifications for the energy, material and service input categories. In general, material inputs are commodities that could be held in inventory by the producer, while services are actions performed by a producer. Energy inputs are commodities such as fuel and electricity consumed by the establishment for energy purposes only.

For most industries, energy commodities are used only as a source of energy. However, in some manufacturing industries, certain energy commodities such as coal, natural gas and heavy fuel oil may be used as material inputs, rather than as a source of energy. Thus, in order to generate a KLEMS database based on use of inputs, energy commodities are allocated to either energy or material use.

The input-output commodity estimates for manufacturing industries are derived from the annual Census of Manufacturers survey. The use of energy commodities is identified on this questionnaire, and thus, is used to estimate the its use as a material or energy input. This allocation is performed in two stages. First, for the 1972 to 1990 period, the detailed responses to this survey are used to calculate the value of fuels used as energy, versus material inputs. This proportion is then applied to the input-output estimate for each energy commodity.

For the 1961 to 1971 period, the detailed responses to the Census of Manufacturers survey are not available. However, estimates for total energy commodities devoted to energy use, and total material commodities, by industry, are available from this survey. This information can be used to estimate the total energy and total material use of energy commodities. This was accomplished by calculating the total value of energy commodities from the input-output tables. Then, the proportion of inputs used for energy purposes (from the Census of Manufacturers survey) was applied to this total input-output estimate. This energy use estimate was then subtracted from the input-output total to arrive at an estimate of the total material inputs. The non-energy material commodities are then subtracted from this estimate of material inputs. Thus, what remains is the total energy use of all energy commodities and the total material use of all energy commodities. This provides the breakdown for both types of use for energy inputs. The total use of each energy commodity is provided by the input-output estimate of energy inputs. With these two pieces of information, it is possible to make a reliable estimate of the proportion between energy and material use of each energy commodity.

	Use of fuel		
Commodity type			
	e_1	m_1	t_1
	e_2	m_2	t_2
	. .	. .	. .
	T_e	T_m	T

This estimate was arrived at by setting up the following matrix, where the row totals (total energy use for each commodity, from the input-output tables) and the column totals (use of total fuels as energy or material inputs, from the Census of Manufacturing Survey) are known. The breakdown of use by commodity was estimated by first putting in the known proportions of energy and

material use from 1972 and 1973. Then each of the cells were recalculated such that the proportion that each commodity contributes to each type of use remained constant, but they summed to the column (use) totals. Then, the cells were recalculated such that the proportionate use of each commodity was maintained, but that these uses summed to the row (commodity) totals. This process was repeated iteratively (25 times) to arrive at a final estimate of the energy and material use of each energy commodity.

Readers will note that repair construction input commodities are classified as services, as opposed to material commodities. This is because when a firm purchases repair construction, it is purchasing the services of those in the construction industry, to fix something they own. The firm is not purchasing an existing structure held in inventory by the producer.

Historical Link Commodities (485 level)[12]

Energy Commodities

31 Coal
33 Natural gas
322 Gasoline
323 Diesel & fuel oil, aviation fuel
326 Other liquid petroleum gases
430 Electric power
432 Coke

Material Commodities

1 Cattle & calves
2 Hogs
3 Poultry
4 Other live animals
5 Wheat, unmilled
6 Corn, barley, other grains
7 Fluid milk, unprocessed
8 Eggs in the shell
9 Honey & beeswax
10 Fresh fruit, excl tropical
11 Vegetables, fresh or chilled
12 Hay & straw
13 Seeds, excl oil seeds
14 Nursery stock, etc
15 Soybeans, canola & oth oil seeds
16 Raw tobacco
17 Mink skins, ranch undressed
18 Raw wool
19 Serv incidental to agric. & forestry
20 Logs, poles, pilings, bolts, etc
21 Pulpwood
22 Fuelwood & other crude wood
23 Custom forestry
24 Fish & seafood, fresh, chilled
25 Hunting & trapping products
26 Gold & alloys in primary forms
27 Radioactive ores & concentrates
28 Iron ores & concentrates
29 Bauxite & alumina
30 Other metal ores & concentrates
31 Coal
32 Crude mineral oils
33 Natural gas
34 Sulphur, crude & refined
35 Asbestos, crude & milled
36 Gypsum
37 Salt
38 Peat
39 Clays
40 Natural abrasives & indust. diamonds
41 Oher crude minerals
42 Sand (excl silica) & gravel
43 Stone, crude
44 Services incidental to mining
45 Meat, fresh, chilled, frozen
46 Cured meat
47 Prepared meat products
48 Animal fat & lard
49 Margarine & shortening
50 Sausage casings
51 Feeds from animal by products
52 Raw animal hides & skins
53 Animal by products for industrial use
54 Custom work, meat & food
55 Poultry, fresh, chilled, frozen
56 Milk & other dairy products
57 Fresh cream
58 Butter
59 Cheese
60 Ice cream
61 Mayonnaise, salad dressing & mustard
62 Fish products
63 Fruit & products, frozen, preserved
64 Fruit & jam in airtight cont.
65 Vegetables, frozen, preserved
66 Vegetables & juice, in airtigh cont.
67 Soups in airtight containers
68 Infant & junior foods, canned
69 Sauces, pickles, etc
70 Vinegar
71 Pre-cooked & frozen products, etc
72 Feed supplements and premixes
73 Complete feeds
74 Feeds from grain by products
75 Feeds from vegetable by product
76 Pet feeds
77 Wheat flour
78 Starches
79 Breakfast cereal products
80 Biscuits
81 Plain bread & rolls
82 Other bakery products
83 Cocoa & chocolate
84 Nuts
85 Confectionery
86 Sugar
87 Oil-cake feeds
88 Crude vegetable oils
89 Nitrogen function compounds
90 Other flours & processed grain
91 Maple sugar, syrup & oth syrup

12 The Historical Link Commodity Coding Structure is used to Reconciliate the 1961-1987 (602) and 1987-1990 (627) Commodity Code Classifications

92 Prepared cake & other mixes
93 Dehydrated soup mixes & bases
94 Roasted coffee
95 Tea
96 Potato chips & flakes
97 Other food preparations & ice
98 Soft drink concentrates
99 Carbonated soft drinks
100 Distilled alc. beverages,incl coolers
101 Beer, incl coolers
102 Wine, incl coolers
103 Unmanufactured tobacco
104 Cigarettes
105 Other tobacco products
106 Waterproof footwear
107 Passenger car tires
108 Truck, bus & off-highway tires
109 Other tires, tubes & repair material
110 Conveyor & transmission belting
111 Other rubber products
112 Hose & tubing, mainly rubber
113 Plastic containers & closures
114 Other plastic products
115 Leather & misc leather goods
116 Footwear, excl waterproof
117 Leather gloves
118 Luggage
119 Handbags, wallets, etc
120 Cotton yarn
121 Cotton woven fabric
122 Tire cord fabric
123 Bedding, towels & cloths
124 Wool & wool mix yarn & thread
125 Wool & wool mix woven fabric
126 Felt
127 Man-made staple fibres
128 Polyamide resins, incl nylon
129 Yarn, filament & staple fibres
130 Tire yarn
131 Fabrics, excl cotton
132 Cotton thread
133 Man-made thread
134 Rope & twine
135 Narrow fabrics, incl lace
136 Textile floor covering
137 Textile dyeing & finishing serv
138 Awnings, tarpaulins, etc
139 Tents, sleeping bags, sails etc
140 Other household textile products
141 Other textile products
142 Hosiery
143 Knitted fabrics
144 Knitted clothing
145 Clothing, excl knitted
146 Dressed furs
147 Fur apparel, incl artificial
148 Custom tailoring
149 Wood chips
150 Lumber, treated wood
151 Wood waste
152 Custom wood work & millwork
153 Plywood & veneer
154 Wood const. prod.,excl prefab. build
155 Wood prefabricated buildings
156 Wood containers
157 Caskets & coffins
158 Other wood products
159 Household furniture
160 Office furniture
161 Commercial, instit. & oth furniture
162 Portable lighting fixtures
163 Pulp
164 Newsprint paper
165 Other paper
166 Tissue & sanitary paper stock
167 Wrapping & sack paper
168 Paper board, incl boxboard
169 Building board & asphalt build prod
170 Paper & textile hygiene prod
171 Vanillin
172 Paper waste & scrap
173 Vinyl floor & wall covering
174 Paper bags, boxes, plastic bags
175 Coated paper prod. incl wallpaper
176 Backed aluminum foil
177 Paper containers for commercial use
178 Stationery & photographic paper
179 Paper end products, incl household
180 Newspapers, magazines & periodicals
181 Books, greeting cards, maps, etc
182 Banknotes, cheques, stamps, et
183 Other printed matter
184 Advertising in print media
185 Specialized publishing service
186 Printing plates, type, etc
187 Ferro-alloys
188 Iron & steel ingots, billets, etc
189 Steel castings
190 Steel bars & rods
191 Flat iron&steel,incl galv,tinplate
192 Iron&steel railway const. material
193 Tar & pitch
194 Carbon & graphite products
195 0il & gas casing & drill pipe
196 Oil & gas line pipe
197 Other iron & steel pipes & tubes
198 0ther cast iron products
199 Iron & steel pipe fittings
200 Nickel in primary forms
201 Copper primary forms
202 Lead in primary forms
203 Zinc in primary forms
204 Aluminum in primary forms
205 Tin in primary forms & fabric. mat.

206 Precious met. in prim.forms excld gold
207 Other non-ferrous base metals
208 Other inorg. bases & metal. oxides
209 Metal scrap
210 Aluminum & alum.alloy fabricated mat.
211 Copper fabricated materials
212 Copper alloy fabricated materials
213 Lead & lead alloy fabricated mat.
214 Nickel & nickel alloy fabricated mat.
215 Zinc & zinc alloy fabricated mat.
216 Soldering rods & wire
217 Fabricated steel plate
218 Tanks
219 Power boilers
220 Iron & steel structural materials
221 Prefab. metal bldgs & structures
222 Other metal building products
223 Flat iron & steel, alloy, oth coated
224 Corrugated metal culvert pipe
225 Iron & steel stampings
226 Metal roofing, siding, ducts, etc
227 Metal containers & closures
228 Iron & steel wire & cable
229 Iron & steel wire fencing & screen
230 Chain, excl motor veh. & power trans.
231 Welding rods & wire electrodes
232 Kitchen utensils & wire products
233 Hardware
234 Machine tools & accessories
235 Hand & measuring tools
236 Scissors, razor blades, ind.cutl., etc
237 Hhold equip. excl range. microw. refrig.
238 Other heating equipment
239 Non-elect. furnaces & heat equip
240 Oil & gas burners, etc
241 Commercial cooking equipment
242 Custom metal working
243 Iron & steel forgings
244 Valves
245 Plumbing fixtures & fittings
246 Gas & water meters
247 Fire fight. & traffic contr. equip
248 Control panels, regulators, etc
249 Firearms & military hardware
250 Bulldozers, farm & garden tractors
251 Other agricultural machinery
252 Bearings & power trans. equip
253 Pumps, compressors & blowers
254 Conveyors, elevators & hoist. mach.
255 Ind. trucks & mat. handlings equip
256 Fans & air circ. units, not indust,
257 Pkg., air pur. & oth gen.purp. mach.
258 Industrial furnaces, kilns & ovens
259 Industry specific machinery
260 Power driven hand tools
261 Refrigeration & air cond. equip
262 Scales & balances
263 Vending machines
264 Computers,office mach.excl photo & fax
265 Aircraft
266 Aircraft engines
267 Aircraft parts & equipment
268 Aircraft services & repairs
269 Automobiles, incl vans
270 Trucks, road tractors & chassis
271 Buses & chassis
272 Motor homes,motorcycles,off-hwy veh.
273 Mobile homes
274 Trailers & semi-trailers
275 Truck & bus bodies
276 Motor vehicle engines & parts
277 Motor vehicle electric equip
278 Other motor vehicle parts
279 Locomotive & railway rolling stock
280 Urban transit rolling stock
281 Parts for rlwy&u.trans. rollin
282 Ships, boats & parts, excl pleasure
283 Ship repairs
284 Snowmobiles
285 Pleasure & sporting craft
286 Small hhold appliances, incl microwave
287 Electric furnace&oth elect.heat equip
288 Household refrigerators & freezers
289 Hhold cooking equip, excl microwave
290 Radio, TV, stereo,VCR & unrec. tape
291 Telephone & rel. equip, incl facsimile
292 Broadcasting & radio comm. equip
293 Radar & radio navigation equip
294 Electronic equipment components
295 Electronic alarm & signal syst
296 Welding machinery & equipment
297 Power gen.&marine prop.eq.,elect. moto
298 Transformers, ballast & converters
299 Industrial electric equipment
300 Batteries
301 Wire & cable, insulated, excl alum.
302 Aluminum wire & cable
303 Wiring materials & electrical meters
304 Lighting fixtures, bulbs & tubes
305 Cement
306 Lime
307 Concrete products, incl sand & lime
308 Ready-mix concrete
309 Bricks & other clay bldg. products
310 Porcelain insulators
311 Ceramic household products
312 Refractory products
313 Natural stone building products
314 Gypsum building products
315 Mineral wool building products
316 Asbestos products
317 Other non-met. mineral basic prod.
318 Glass & other glass products
319 Gass containers

320 Mirror & glass household produts
321 Abrasive products
322 Gasoline
323 Diesel & fuel oil, aviation fuel
324 Lubricating oils & greases
325 Benzene, toluene & xylene
326 Other liquid petroleum gases
327 Naphtha
328 Asphalt & products
329 Petrochemical feed stock
330 Fertilizers, excl nitrogenous
331 Polymers
332 Cellulosic plastic film & sheet
333 Monoethylene glycol
334 Pharmaceuticals
335 Paints & related products
336 Refined vegetable oils
337 Oral care products
338 Soaps, detergents & oth cleaning prod
339 Other industrial chemical prep.
340 Pers. care prod.,bleach,fabric soft.
341 Chlorine
342 Oxygen
343 Phosphorous
344 Other chemical elements
345 Sulphuric acid
346 Other inorg. acids & oxygen comp.
347 Ammonia
348 Caustic soda
349 Sodium chlorate
350 Sodium phosphates
351 Sodium carbonate
352 Oher metallic salts & peroxysalts
353 Other inorganic chemicals
354 Ethylene
355 Butylenes
356 Butadiene
357 Styrene
358 Vinyl chloride
359 Other hydrocarbons & derivatives
360 Methyl alcohol
361 Other alcohols & derivatives
362 Others, alcohol peroxides, etc
363 Other phenols, aldehydes & ket
364 Organic acids & derivatives
365 Organic-inorganic compounds
366 Other organic chemicals
367 Titanium dioxide
368 Carbon
369 Pigments & dyes
370 Nitrogenous fertilizers
371 Synthetic rubber
372 Antifreezing preparations
373 Additives & automobile chemicals
374 Rubber & plastic compounding agents
375 Explosives & non-military ammo.
376 Military ammo. & ordinance
377 Crude vegetable materials & extracts
378 Insecticides & herbicides
379 Adhesives
380 Catalysts
381 Metal working industrial chemicals
382 Printing & other inks
383 Polish, cream & wax products
384 Other oils, fats & waxes
385 Aircraft&naut.navig.instr.,excl radio
386 Scient., measuring & medical instr.
387 Industrial safety equipment
388 Watches, clocks, etc
389 Photographic & photocopy equip & film
390 Jewelry, metal tableware, etc
391 Brooms, brushes, mops, etc
392 Bicycles, baby carriages & strollers
393 Recreational equipment
394 Toys & games, incl electronic
395 Impregnated & coated fabrics
396 Floor & wall covering, excl vinyl
397 Advertising goods
398 Shades & blinds
399 Fur dressing & dyeing services
400 Custom work, miscellaneous
401 Animal hair, feathers, etc
402 Other metal end products
403 Sewing needs
404 Recordings, musical instr.&art. supply
405 Art & decor. goods, misc end prod
430 Electric power
432 Coke
433 Water, waste disp. & other utilities
464 Spare parts & maint.suppl. mach. & equip
465 Office supplies
466 Cafeteria supplies
468 Laboratory equipment & supplies
471 Raw cotton
472 Natural rubber & gums
473 Raw sugar
474 Cocoa beans
475 Coffee, not roasted
476 Tropical fruit

Service Commodities

406 Repair construction
407 Residential construction
408 Non-residential building construction
409 Road, highway & airport construction
410 Gas & oil facility construction
411 Dams & irrigation projects
412 Railway & telecommunications const.
413 Other engineering construction
414 Air transportation
415 School bus & other transport
416 Other serv incidental to transport

417 Water transportation
418 Serv incidental to water transort
419 Railway transportation
420 Truck transportation
421 Bus transport, interurban & rural
422 Urban transit
423 Taxicab transportation
424 Pipeline transportation
425 Highway and bridge maintenance
426 Storage
427 Radio & television broadcasting
428 Telephone & other telecommunications
429 Postal services
431 Gas distribution
434 Wholesaling margins
435 Repair service for mach & equip
436 Rental of office equipment
437 Retailing margins
438 Imputed service, banks
439 Other finance & real estate services
440 Insurance & workers' compensation
442 Cash residential rent
443 Other rent
445 Education services
446 Hospital services
447 Other health & social services
448 Motion picture prod., dist. & exhibit.
449 Other recreational services
450 Professional serv to bus. management
451 Advertising services
452 Laundry, cleaning & pressing services
453 Accommodation services
454 Food services
455 Serv margin on alcoholic beverages
456 Personal services, incl childcare
457 Photographic services
458 Services to buildings & dwellings
459 Computer services
460 Other services to business & persons
461 Rental of automobiles & trucks
462 Trade association dues
463 Rental, oth mach & equip incl const.
467 Transportation margins
469 Travelling and entertainment
470 Advertising & promotion