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# Structural Changes in the Canadian Economy: the Supply Side in Current Prices 

## By

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## Introduction

This third progress report on the variability of input-output structures of the Canadian economy focuses on the supply side. It covers, in current prices, the output (Make) matrix of the business sector, imports (non resident sector), and government output. The few components of household sector supply have been excluded from the present analysis (non profit organizations) mainly because the results of non profit organizations are presented on a net basis in the final demand matrix. The value of these transactions are nevertheless small and their exclusion only has a minor impact on the results.

The first part of this report will assess the variability of the supply side of the Canadian economy broken down into the three sectors listed above. The second part of the report will then attack in detail the supply of the business sector. For that purpose, the Make matrix will be analyzed both commodity-wise and industry-wise. More specifically, both the product mix and the market share structures will be scrutinized.

It should be recognized that a strong connection exists between the Make and the Use matrices in terms of their variability. In particular, one of the components of overall variability is common to both structures due to the fact that industries' shares of total outputs are equal to their respective shares of total inputs. But these matrices are also otherwise connected in so far as one may expect that the technological structures associated with commodities are more stable than industries' technology. Changes in a given industry's product mix will therefore effect changes in the variability of that industry's input structures, quite independently from other factors such as price substitution and technical progress. Unfortunately, this connection cannot be formally derived in the present scenario,

## GRAPH 1

DECOMPOSITION OF SUPPLY INTO THREE MAJOR SOURCES (WEIGHTED WITHIN AND BETWEEN COMPONENTS OF ENTROPY)

FOR THE CURRENT PRICE TME SERTIES 1961-1971

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where the technology of individual commodities is unknown. We may only hypothesize that input structures could be more stable if they could be expressed commodity-wise by asking establishments to report on their input uses for each commodity they produce. The variability of both the output and the input structures may also be connected through the impact of changes in relative prices.

This report also includes three Appendices. Appendix 1 gives a further description of the entropy yardstick so as to further clarify the interpretation of results. Appendices 2 and 3 give detailed tabulated results by industry and commodity respective1 y .

## 1. Stability in the sources of supply for the Canadian economy.

Graph 1 depicts the importance of each source of supply in the overall variability of the current price supply structure. It was constructed on the basis of the results obtained through a suitable decomposition of the supply structure by supply source. Supply sources, at the $L$ level of aggregation consist of the business sector ( 161 industries), imports ( 1 sector), and various levels of government ( 6 levels). It can be seen that the largest share of total variability is accounted for by the business sector. Imports also account for a significant portion of overall variability while the government share is almost nil. The between source component also appears to be negligible in almost all years which means that at the aggregate level, the share of each sector in total supply is evolving rather smoothly. Surely, at the commodity level, the share of each sector is more volatile.

Table 1 , which follows, presents the usual summary entropy statistics that pertain to a decomposition of total supply, in current prices, by sector. In particular, the contribution of each sector to overall structural change and the raw unweighted

Table 1. Summary Statistics of Variability for the Current Price, L Level, Total Supply, over 1961-1984.

|  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |

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entropy of each sector are given. The raw entropy for each sector is also broken down further into its industries' or subsectors within and between components. The "Business" raw entropy figures for the one year interval, for instance, give the total raw entropy of the Make matrix ( 0.0116 ) decomposed into the product mix or within industries component (0.0085) and the industries output shares or between component (0.0031). The imports sector has only one subsector so that its between component vanishes. One may note from Table 1 that the respective contributions of imports and government to overall variability are scaled down by their weights. The unweighted entropy measures show that imports and government outputs are substantially more volatile than business supply. It may well be that imports act as a buffer between total demand and business supply.

As noted in the previous reports, variability tends to increase significantly with the time horizon indicating that structural changes are cumulating through time rather than fluctuating and offsetting each other.

The time profile of the variability of total supply is very similar to the one of the input structure as reported in the first progress report (Graph 3, p. 7-8). 1 This is not surprising when considering the common factors acting on both sets of structures which are referred to in the introduction. In addition many of the statistical changes uncovered in the first report are also acting on the output structures. The split of the Agriculture and Related Industries starting in 1981 between fieldcrop and livestock is the most noticeable example.

Of course, total variability and the relative sizes of the sectoral contributions to it depend largely on the accounting

1. Durand R. and Markle T., "Measuring The Variability of Input-Output Structures: A Progress Report", Statistics Canada, Input-Output Division, December 1987.
framework being used. If imports for instance, were further broken down by country of origin, then total variability of the supply structure would increase as would imports' relative contribution to total structural change.

## 2. The structure of business output.

### 2.1 General Characteristics

The structure of the make matrix can be decomposed in two different ways. One may consider the variability of industries' respective supply structures (or product mix) along with the variability between the respective industries' shares in total supply as one possible decomposition. The latter set of shares in this first decomposition is identical to the industries' shares of total inputs as already analyzed in the first two progress reports. Indeed the basic accounting framework of the Input-Output tables requires that, for each industry, the total value of inputs is equal to the total value of outputs. Hence, the current analysis that pertains to the industry decomposition of outputs (i.e. product mix) is closely connected with the industry decomposition of inputs (i.e. input mix) in the sense that each industry's share of total output is equivalent to that industry's share of total inputs. The second decomposition runs the opposite way and focuses on the variability of industries' shares of each commodity along with the variability between the respective commodities' shares in total supply.

Both the market share and the product mix structures may be expected to show greater stability than the industries' input structures. One major reason for this is that the Make matrix is sparse as compared to the Use Matrix. Most industries produce only a few commodities so that both the commodity market share structures and the industry output structures are typically composed of a much smaller number of elements than the industry input structures. Similarily, individual commodity structures
are typically composed of a small number of shares due to the fact that only a limited number of industries are involved in the production of any particular commodity.

Furthermore, the industry and commodity classification schemes are closely related. As a result, many commodities are supplied by a single industry ( 141 out of 586 commodities domestically produced commodities in 1984) and hence the corresponding market shares for these industries take on an unchanging value of one. There were 20 such industries out of 161 industries in 1984. Indeed, industries are largely defined by sets of commodities which are almost mutually exclusive. Product mix shares are also stable for all industries producing a single commodity. The number of market shares or product mix shares which fall between zero and one and which are subject to changes is therefore quite limited. Out of a possible number of 94346 shares, there were, in 1984, only 3441 ( $3.7 \%$ ) potentially varying market shares and only 3557 ( $3.8 \%$ ) potentially varying product mix shares. It is expected therefore that the major source of variability of the make matrix is to be found in either the industries' total output shares or the commodities' shares of total output, that is in the row and column margins of the Make matrix, depending on the chosen decomposition. Table 2 gives more details on the product mix and the market share structures for 1983.

Table 2: Structure of the Make Matrix for 1983.

| Product Mix Structure |  | Market Shares Structure |  |
| :---: | :---: | :---: | :---: |

This table can be interpreted as follows: the first two columns describe the product mix and show the number of industries that produced a number of commodities falling within the range given to the left. For instance, 26 industries were producing between 21 and 30 commodities. The remaining two columns describe the market share structures and show the number of commodities that were produced (shared) by a number of industries which falls within the given range. For instance, each of 136 commodities were produced by a single industry and each of 69 other commodities were shared by 11 to 20 industries.

Overall variability of the Make matrix is the same, in theory, whether this variability is decomposed into market shares and commodity shares or into product mix of industries and the industries' shares of total business supply so that it will be reported only once. The significance of the variability results associated with the various components of each decomposition, however, is of great relevance when one considers the projection of input-output structures. A stable market share matrix could be the basis for the projections of the make matrix under known final and intermediate demand of commodities, net of imports. Final demand net of imports would suffice if, in addition, the industries input structures were also stable. More precisely, what would be required is stability of the impact matrix which involves the product of the matrix of intermediate input coefficients with the market share matrix. On the other hand, stable product mix structures could be used to estimate the Make matrix, given an estimate of gross output by industry. These differences will become relevant in a later progress report when applying the RAS balancing method to generate an estimate of all structures from a limited set of information.

### 2.2 Analysis of the results.

## Overall Results

The results that we obtained were somewhat contradictory to our expectations as the variability of the Make matrix appeared to be of a comparable magnitude to that of the Use Matrix. This is shown by Table 3 which gives summary statistics, for the two alternate decompositions of the Make matrix, by commodity and by industry respectively. The share of total variability accounted for by the within industries component for all time horizons is reduced when compared to the input structure, as expected, but only slightly so. This is partly accounted for by the change in the composition of total demand satisfied from domestic business

Table 3: Summary Statistics of Variability for the Current Price, L Level of Aggregation Make Matrix over 1961-1984.

|  | Produc | Mix | Market Sh |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Between Industries | Within Industries | Between Commodities | Within Commodities |  |
| One year time interval |  |  |  |  |  |
| Average Entropy | 0.0031 | 0.0085 | 0.0061 | 0.0054 | 0.0116 |
| Minimum Value | 0.0014 | 0.0045 | 0.0028 | 0.0031 | 0.0060 |
| Maximum Value | 0.0073 | 0.0256 | 0.0218 | 0.0125 | 0.0296 |
| Standard Deviation | 0.0016 | 0.0044 | 0.0040 | 0.0020 | 0.0052 |
| Shares of Total | 27\% | 73\% | 53\% | 47\% | 100\% |
| Two year time interval |  |  |  |  |  |
| Average entropy | 0.0072 | 0.0159 | 0.0133 | 0.0098 | 0.0231 |
| Minimum Value | 0.0030 | 0.0091 | 0.0065 | 0.0057 | 0.0122 |
| Maximum Value | 0.0151 | 0.0339 | 0.0312 | 0.0154 | 0.0456 |
| Standard Deviation | 0.0035 | 0.0066 | 0.0072 | 0.0029 | 0.0090 |
| Shares of Total | 31\% | 69\% | 58\% | 42\% | 100\% |
| Five year time interval |  |  |  |  |  |
| Average entropy | 0.0174 | 0.0319 | 0.0292 | 0.0201 | 0.0494 |
| Minimum Value | 0.0102 | 0.0230 | 0.0179 | 0.0145 | 0.0340 |
| Maximum Value | 0.0275 | 0.0477 | 0.0470 | 0.0271 | 0.0667 |
| Standard Deviation | 0.0050 | 0.0076 | 0.0095 | 0.0040 | 0.0112 |
| Shares of Total | 35\% | 65\% | 59\% | 418 | 100\% |

sources as shown in the third column of Table 3 . The changing composition of demand will effect the product mix structure of multi-product industries as well as their changing market shares of each commodity. The latter, like the product mix, are strongly subject to multi-product establishment moves.

Graph 3 and Graph 4 show the time profile of overall variability for each of the two respective decompositions of the Make matrix. Although the overall variability of the Make matrix is independent of how the structure is decomposed, the between and within components are not. This is seen when comparing Graphs 3 and 4. For most, if not all, time comparisons the components of total variability between commodities represents a greater proportion of overall variability than does the variability between industries. This is also seen in Table 3 where the average proportion of total variability explained by the variability between commodities is greater than $50 \%$ for all time intervals.

As for the total supply, the time profile of overall variability of the Make matrix appears to be similar to the one of the input structures depicted on Graph 3 of the first progress report. This is a first indication that input and output structural changes are connected for the various reasons given in the introduction.

## Detailed Industry Results

Looking at the detailed industry results tabulated in Appendix 2 , we found many cases of large changes in the industries' output mix structure (maximum raw entropy column). On the other extreme, however, we found 20 industries with no change in their output mix over the 1961-1984 period (as indicated by a zero in the average raw entropy column) and 17 industries showing almost no changes (cross entropy value below 0.00099 ). These results indicate a very uneven distribution of variability across industries. The variability of the Make matrix comes from a

## GRAPH 2

## ENTROPY RESULTS FROM AN INDUSTRY DECOMPOSITION OF OUTPUTS

FOR THE CURREATP PRICE TTME SERRIES 1961-1971


FOR THE CURRENT PRICE TTNE SERRIES 1971-1981


## GRAPH 3

## ENTROPY RESULTS FROM A COMMODITY DECOMPOSITION OF OUTPUTS

FOR THE CURRENT PRICE TMOE SMRIRS 1081-1071


FOR THE CURRENT PRICE TMME SERTES 1971-1981


FOR THE CURRTANT PRICI TIME SHRTES 1981-1984

limited number of industries. Typically, these industries produce a large number of commodities. The explanation for the instability of an industry's product mix, in many cases, can be traced back to, and associated with, the reclassification of multi-product establishments out of one industry to an other industry. This occurs when the principal output of an establishment changes, even though the output mix of that establishment may not have changed very dramatically. We also noticed that, in some industries, many products may disappear from their product mix over the time span of one year and/or be replaced by new products. This gave us another indication that establishments were moving across industries. For instance, the Other Metal Fabricating Industries had 93 products in 1971, 22 of which disappeared in the following year in which 13 new products also appeared. The Machine Shops Industry had 63 products in 1974 but only 35 in 1975 two of which were new products. Such changes in the composition of the product mix are not captured by the cross entropy formula. The latter is only slightly biased downward when the changes are from some small shares to zero or the other way around but the bias may be important in those industries where such changes are more numerous and of larger importance. As a consequence, we have decided to initiate a separate study in order to the assess, more fully, the impact of establishment movements across industries.

The following three sets of histograms depict the various distributions of entropies, related to industry product mix structures, by decade, and by time interval. One may note, in general, that these distributions are heavily concentrated in the 0 to 0.01 range ( 0.005 mid-point) and more so than was the case for the input structures. It may also be noted that these distributions have a slightly thicker tails than was the case for the input structures. This suggests that the "outstanding" cases play a more important role on the output side than on the input side. It also implies that the information content of the Make matrix is concentrated in some subset of industries whose output

## GRAPH 4

PERCENTAGE DISTRIBUTION OF INDUSTRY OUTPUT ENTROPIES CORRESPONDING TO ONE YEAR TIME INTERVALS

FOR THE CURRENT PRICE TME SERIES 1981-1971


FOR THE CURRENT PRICE TMME SERIES 1971-1981


| FREQ | CUM |
| ---: | ---: |
| 984 | 954 |
| 245 | 1199 |
| 139 | 1338 |
| 79 | 1417 |
| 64 | 1481 |
| 44 | 1525 |
| 17 | 1542 |
| 18 | 1580 |
| 11 | 1571 |
| 8 | 1579 |
| 2 | 1581 |
| 6 | 1587 |
| 2 | 1589 |
| 1 | 1590 |
| 5 | 1595 |
| 3 | 1598 |
| 0 | 1598 |
| 2 | 1800 |
| 2 | 1802 |
| 0 | 1802 |
| 8 | 1810 |


| PERCENT | CUM |
| ---: | ---: |
|  | PEREENT |
| 89.25 | 59.25 |
| 15.22 | 74.47 |
| 8.83 | 83.11 |
| 4.91 | 08.01 |
| 3.98 | 91.99 |
| 2.73 | 94.72 |
| 1.06 | 95.78 |
| 1.12 | 96.89 |
| 0.88 | 97.58 |
| 0.50 | 98.07 |
| 0.12 | 98.20 |
| 0.37 | 98.57 |
| 0.12 | 98.70 |
| 0.06 | 98.78 |
| 0.31 | 99.07 |
| 0.19 | 99.25 |
| 0.00 | 99.25 |
| 0.12 | 99.38 |
| 0.12 | 99.30 |
| 0.00 | 99.50 |
| 0.50 | 100.00 |

FOR THE CURRENT PRICE TINE SERIES 1981-1984


| FREQ | CUME | PERCENT | CUMĖENT |
| :---: | :---: | :---: | :---: |
| 278 | 278 | 57.56 | 57.58 |
| 86 | 344 | 13.66 | 71.22 |
| 43 | 387 | 8.90 | 80.12 |
| 31 | 418 | 6.42 | 86.54 |
| 18 | 436 | 3.73 | 90.27 |
| 9 | 448 | 1.86 | 92.13 |
| 9 | 484 | 1.86 | 94.00 |
| 4 | 488 | 0.83 | 94.82 |
| 4 | 462 | 0.83 | 95.85 |
| 2 | 464 | 0.41 | 96.07 |
| 4 | 468 | 0.83 | 96.89 |
| 1 | 469 | 0.21 | 97.10 |
|  | 470 | 0.21 | 97.31 |
| 0 | 470 | 0.00 | 97.31 |
| 3 | 473 | 0.62 | 97.93 |
| 3 | 476 | 0.62 | 98.55 |
| 2 | 478 | 0.41 | 98.96 |
| 0 | 478 | 0.00 | 83.98 |
| 1 | 479 | 0.21 | 99.17 |
| 0 | 479 | 0.00 | 99.17 |
| 4 | 483 | 0.83 | 100.00 |

## GRAPH 5

## PERCENTAGE DISTRIBUTION OF INDUSTRY OUTPUT ENTROPIES

 CORRESPONDING TO TWO YEAR TIME INTERVALSFOR THE CURRENT PRICE TMME SERIES 1981-1971


FOR THE CURRENT PRICE TIME SERIES 1971-1981


|  |  |
| ---: | ---: |
| FREQ | CUM |
| 782 | 762 |
| 204 | 988 |
| 142 | 1108 |
| 111 | 1219 |
| 71 | 1290 |
| 82 | 1352 |
| 61 | 1413 |
| 37 | 1450 |
| 33 | 1483 |
| 18 | 1501 |
| 15 | 1516 |
| 18 | 1534 |
| 10 | 1544 |
| 9 | 1553 |
| 10 | 1883 |
| 8 | 1571 |
| 7 | 1578 |
| 5 | 1583 |
| 3 | 1586 |
| 3 | 1589 |
| 21 | 1610 |
|  |  |

FOR THE CURRENT PRICE TDME SERIES 1981-1984


## GRAPH 6

## PERCENTAGE DISTRIBUTION OF INDUSTRY OUTPUT ENTROPIES

 CORRESPONDING TO FIVE YEAR TIME INTERVALSFOR THE CURRENT PRICE TIME SERIES 1961-1971


FOR THE CURRENT PRICE TME SERIES 1971-1981

structure need to be surveyed frequently.

Like in the previous reports, we filtered the data, which corresponds to a one year interval, for cases of important structural change. For this purpose, a threshold value of 0.1 nits was chosen. This threshold was chosen somewhat arbitrarily, but also to maintain consistency with previous reports. All cases exhibiting a cross entropy value larger or equal to 0.1 nits were extracted. There were 70 cases which were detected. They are presented in the following table which covers 38 industries out of 161 industries.

Another phenomena which needs to be pointed out is that the unstable industries form subsets of interrelated industries across which establishments move. One such clear example is given by the Industrial Chemicals Industries NEC (no 97) and the Chemical and Chemical Products NEC (no 103). From 1982 to 1983, the output of the former decreased substantially for the two commodities Ammonia, Anhydrous and Aqua (no 423) and Fertilizer Chemicals (no 469) and increased by approximately the same amount for the latter industry for the same commodities. Without these swaps, the entropy values of both industries would have been extremely small. Aggregating these two industries gave an entropy value of 0.029 as opposed to 0.15 for the first (no 97) and 1.02 for the latter (no 103) from 1982 to 1983.

The above case illustrates the necessity of scrutinizing the industrial data thoroughly before carrying out any structural analysis at a disagregated level and, in particular, productivity analysis. In the latter case, the output and input figures for a given pair of years may correspond to widely different technical processes rather than to any advance in productivity.

Table 4: Industries Having Entropy Values Exceeding 0.1 Nits Over a Time Horizon of One Year, Current Price Output Matrix, L level of Aggregation, 1961-1984
$\left.\begin{array}{lll}\hline \begin{array}{lll}\text { Industries } \\ \text { Code Title }\end{array} & \text { Years } & \text { Number of } \\ \text { Cases }\end{array}\right]$

84 Record Players, Radio and TV Receivers
85 Electronic Equipment
86 Office Store and Business Machines
88 Battery
97 Industrial Chemical NEC
103 Chemical and Chemical Products NEC 1979/80, 1982/83
104 Jewellery and Precious Metal 1961/62, 1977/78
107 Floor Tile, Linoleum, Coated Fabric

1963/64, 1976/77, 1979/80, 1980/81, 5 1982/83

1980/81 1
1970/71, 1972/73 2
1971/72 1
1982/83 1
1979/80, 1982/83 2
1961/62, 1977/78 2
1981/82 1

Total number of cases 70
Total number of industries 38

# . 

For the purpose of estimating more stable input-output structures, these establishments moves should somehow be neutralized. One technique, used for own construction account, consists of stating that only one industry is producing a given commodity as is the case for the construction activity. The construction output and the corresponding inputs of all non construction industries are rerouted to the construction industry. The adoption of a similar technique here would imply that industries be defined by mutually exclusive sets of commodities. Such a procedure might then require that additional questionnaires be sent to each establishment that produces a set of commodities which is too diverse to enable classification to a single industry. These questionnaires would elicit details from these establishments regarding the associations between the various inputs used and the various outputs produced.

The above procedure would represent a compromise between the actual situation and the ideal situation in which the inputs associated with each commodity output would be estimated, i.e. a full square commodity by commodity input-output system. The procedure could be further restricted to large establishments of highly concentrated industries. For small establishments of atomistic industries, it may be expected that random movements
of establishments in and out of industries will somehow compensate without introducing any substantial bias.

An associated question which may be raised is the extent to which the large fluctuations observed on the output side are associated with corresponding shifts in the input structure. Graph 7 gives a first, and very general impression, by interval of comparison, of the degree of correlation between the respective entropy observations corresponding to industry output structures and industry input structures. The data actually used to create these histograms are in the form of ratios (i.e. output entropy/ input entropy). For all three of the time intervals, it is immediately apparent that the greatest concentration of these ratios is in the 0 to 0.1 range. This indicates that a significant proportion of industry output entropies are less than $10 \%$ of the absolute values of their respective input counterparts. Furthermore, the proportion of observations falling into this category appears to increase in direct proportion with an increase in the time interval of comparison. In fact there appears to be a general tendency for the distribution of ratios to become more concentrated in the smaller ranges as the time interval increases. For example, the approximate median values of these ratio distributions are $0.8,0.4$ and 0.2 for the one, two and five year intervals respectively. This may be an indication that industry input structures are evolving more rapidly than industry product mix structures.

The above analysis does not allow us to draw any conclusions about the varying magnitudes of structural changes which are implicit in the ratios. We have therefore singled out all cases for which outstanding structural changes occurred simultaneously in an industry's product mix and input mix structures. These cases, for a one year time interval, are cited in Table 5. It is interesting to observe from Table 5 that the observations

## GRAPH 7

## PERCENTAGE DISTRIBUTION OF INDUSTRY ENTROPY RATIOS* FOR THE CURRENT PRICE TIME SERIES 1961-1984

CORRESPONDING TO ONE YEAR TTME INTERVALS



|  |
| :---: |
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|  |  |
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|  |  |
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| Ercent | cumedent |
| :---: | :---: |
| 26.48 | 28.48 |
| 7.20 | 33.88 |
| 5.87 | 46.73 |
| 4.89 | 51.41 85.14 |
| 4.43 | 89.57 |
| 3.13 | 82.70 |
| 2.71 | 88.15 |
| 2.23 | 70.38 |
| 1.78 | 72:97 |
| 1.88 | 75.58 |
| 1.75 | 77.30 |
| 1.30 | 78.80 |
| 0:98 | 81.1 |
| 1.13 | 82.24 |
| 16.888 | 100.00 |

CORRESPONDING TO FTVE YEAR TTME INTERVALS

FREQ
1123
392
288
207
161
130
104
88
72
73
38
43
40
32
30
20
19
21
20
12
130


- FOR ANY INDUSTRY I. RATIOJ=(ENTROPY FOR OUTPUT STEUCTUREC)I/(ENTRROPY FOR INPUT BTRECTURES)S

Table 5: Associated Shifts in the Input and Output Structure of Industries, Current Price L Level of Aggregation Structures, 1961-1984.

| Industries |  | Years | Entropy Inputs | Value Outpurts |
| :---: | :---: | :---: | :---: | :---: |
| code | Title |  |  |  |
| 1 | Agricultre | 1980/81 | 0.45 | 0.40 |
|  | Contract Textile Dyeing | $\begin{aligned} & 1967 / 68 \\ & 1972 / 73 \\ & 1980 / 81 \end{aligned}$ | $\begin{aligned} & 0.19 \\ & 0.26 \\ & 0.18 \end{aligned}$ | $\begin{aligned} & 0.15 \\ & 0.19 \\ & 0.25 \end{aligned}$ |
| 52 | Asphalt Roofing | 1970/71 | 0.13 | 0.21 |
| 58 | Steel Pipe and Tube | $\begin{aligned} & 1982 / 83 \\ & 1983 / 84 \end{aligned}$ | $\begin{aligned} & 0.16 \\ & 0.28 \end{aligned}$ | $\begin{aligned} & 0.20 \\ & 0.17 \end{aligned}$ |
|  | Stamped, Pressed and Coated Metals | 1978/79 | 0.34 | 0.23 |
| 70 | Machine Shops | 1981/82 | 0.16 | 0.30 |
| 73 | Refrigerator Equipment | 1961/62 | 0.17 | 0.13 |
|  | Miscellaneous Transportation Equip. | $\begin{aligned} & 1979 / 80 \\ & 1983 / 84 \end{aligned}$ | $\begin{aligned} & 0.11 \\ & 0.18 \end{aligned}$ | $\begin{aligned} & 0.18 \\ & 0.13 \end{aligned}$ |
| $86$ | Office Store and Business Machines | 1970/71 | 0.40 | 0.49 |
|  | Chemical and Chemical Products NEC | 1982/83 | 0.36 | 1.02 |
|  | Floor Tile, Linoleum, Coated Fabric | 1981/82 | 0.15 | 0.15 |

reported account for 15 of the 70 observations previously shown in Table 4 . Over a two year time horizon, the corresponding number of matching cases, above 0.1 nits, increases to 49.

Furthermore, corresponding to the one year time interval there are 38 industries for which entropy exceeded 0.1 nits at least once on the output side and an equal number of industries for which this occurred on the input side. Of these two sets of
industries, 23 are common to both sets leaving 15 industries that differ. The total number of industries exhibiting occasional sudden important structural changes on either the input or the output side therefore amounts to 53 out of 161 industries. Again, this is evidence that changes in the industries' output mix effect on their input mix.

More evidence is obtained when examining those cases of "nonmatches", for which entropy exceeds 0.1 nit on only the output side. ' If we find that the corresponding entropy value, on the input side, which is below 0.1 nits, is large relative to the average entropy for that industry over the historical period (say twice as large) then we may redefine this case as a match. Under this less stringent but preferable matching rule, the number of matching cases over the one year time interval increased to 22 out of the 70 cases. The number of matching industries is now 29 of out of 38 industries.

Some of the structural changes, such as is the case for Agriculture, can be attributed to methodological changes. These cases could be identified by a deeper analysis of historical records and would reduce the number of industries with potentially large true structural shifts over a one year time interval to less than one third of all industries.

The above analysis suggests that a trade-off may exists between the frequency of economic surveys and their industry coverage. For instance, a possible modification to the Manufacturing Census might be not to survey all industries in all years but rather to carry out the survey at different frequencies for different groups of manufacturing industries. In addition, if large multiproduct establishments overlapping many industries were submitted special questionnaires as described above, the frequency of surveys could likely be reduced further for many industries.

## Detailed Commodity Results

Looking at the detailed commodity results given in Appendix 3, for a one year time interval, one is immediately striken by the large number of unstable structures. Out of 586 domestically produced commodities, 216 exhibit a maximum entropy exceeding 0.1 nit and 23 have a maximum entropy exceeding 1.0 nit. Entropy reaches a high of 4.23 nits for Chemical Fertilizers (no 469) and is above 3.0 nits for Ammonia, Anhydrous and Aqua (no 423), Butyl an Isobutyl Alcohols (no 447), Glycerine Crude (no 473), Fats and Chemical Mixtures (no 494). Further indication of the relatively visible proportion of dramatic changes in commodity market share structures is seen from Graphs 8, 9 and 10. In particular, the frequency of commodity entropy observations exceeding 0.2 nits is quite noticeable for each of the three decades, and increasingly so with a longer time interval.

Most of the products demonstrating a large degree of instability with respect to their market share structures were typically chemical products, produced by industries which showed large structural changes. The shifting market shares for these products should therefore come as no surprise. The entropy values are nevertheless much larger than was the case for the product mix structures. Market shares thus appear at first sight to be very unstable. Once weighted, however, the average within entropy of the market share decomposition is smaller than the corresponding average within entropy fo the product mix decomposition as was given in Table 3 above and as can be seen by a glance at Graphs 2 and 3. The structure of the business commodity output vector of the economy has 586 elements while the corresponding gross industry output vector has only 161 components so that, other things equal, one would expect the aggregate commodity structure to be more unstable than the industry structure. The fact that the commodity structure

## GRAPH 8

PERCENTAGE DISTRIBUTION OF COMMODITY OUTPUT ENTROPIES CORRESPONDING TO ONE YEAR TIME INTERVALS

FOR THE CURRENT PRICE TIME SERIES 1961-1971


FOR THE CURRENT PRICE TIME SERIES 1971-1981

FREQ
4083
648
327
201
133
118
74
58
41
39
34
24
15
27
20
10
8
10
7
6


FOR THE CURRENT PRICE TMME SERIES 1981-1984


CUM
FREQ
1180
1379
1497
1352
1802
1624
1855
1678
1694
1703
1712
1721
1732
1739
1748
1752
1755
1758
1759
1781
1808


## GRAPH 9

## PERCENTAGE DISTRIBUTION OF COMMODITY OUTPUT ENTROPIES CORRESPONDING TO TWO YEAR TIME INTERVALS

FOR THE CURRENT PRICE TTME SERIES 1961-1971


| FREQ | CUM |
| ---: | ---: |
| 3974 | 3974 |
| 606 | 4580 |
| 333 | 4913 |
| 222 | 5135 |
| 163 | 5298 |
| 113 | 5411 |
| 83 | 5494 |
| 62 | 5558 |
| 47 | 5803 |
| 51 | 5654 |
| 40 | 5894 |
| 28 | 5720 |
| 26 | 5746 |
| 20 | 5786 |
| 31 | 5797 |
| 20 | 5817 |
| 13 | 5830 |
| 14 | 5844 |
| 15 | 5859 |
| 12 | 5871 |
| 149 | 6020 |


| PERCENT | CUM. |
| ---: | ---: |
|  | PERCENT |
| 66.01 | 86.01 |
| 10.07 | 76.08 |
| 5.33 | 81.61 |
| 3.89 | 85.30 |
| 2.71 | 88.01 |
| 1.88 | 89.88 |
| 1.38 | 91.28 |
| 1.03 | 92.29 |
| 0.78 | 93.07 |
| 0.85 | 93.92 |
| 0.86 | 94.38 |
| 0.43 | 93.02 |
| 0.43 | 95.45 |
| 0.33 | 95.78 |
| 0.51 | 98.30 |
| 0.33 | 98.63 |
| 0.22 | 96.84 |
| 0.23 | 97.08 |
| 0.25 | 97.33 |
| 0.20 | 97.52 |
| 2.48 | 100.00 |

FOR THE CURRENT PRICE TIME SERIES 1971-1981


| PERCENT | CUM |
| ---: | ---: |
|  | PERCENT |
| 56.71 | 56.71 |
| 10.80 | 67.31 |
| 6.13 | 73.44 |
| 4.55 | 77.99 |
| 3.17 | 81.16 |
| 2.81 | 83.97 |
| 2.41 | 86.38 |
| 1.41 | 87.79 |
| 1.59 | 89.39 |
| 1.08 | 90.47 |
| 0.81 | 91.28 |
| 0.83 | 92.11 |
| 0.88 | 92.79 |
| 0.53 | 93.32 |
| 0.38 | 93.70 |
| 0.32 | 94.02 |
| 0.32 | 94.34 |
| 0.50 | 94.83 |
| 0.35 | 95.18 |
| 0.25 | 95.43 |
| 4.57 | 100.00 |

FOR THE CURRENT PRICE TME SERIES 1981-1984


| FREQ |
| ---: |
| 656 |
| 124 |
| 93 |
| 87 |
| 38 |
| 23 |
| 18 |
| 20 |
| 8 |
| 16 |
| 9 |
| 13 |
| 10 |
| 11 |
| 2 |
| 7 |
| 11 |
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| 4 |
|  |
| 4 |
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| 3 |
| 3 |


|  |
| :---: |
|  |  |
|  |  |


| PERCENT | CUM. <br> PERCENT |
| :---: | :---: |
| 54.49 | 54.49 |
| 10.30 | 84.78 |
| 7.72 | 72.51 |
| 5.38 | 78.07 |
| 3.16 | 81.23 |
| 1.91 | 83.14 |
| 1.50 | 84.63 |
| 1.88 | 86.30 |
| 0.86 | 86.96 |
| 1.33 | 88.29 |
| 0.75 | 89.04 |
| 1.08 | 90.12 |
| 0.83 | 90.95 |
| 0.91 | 91.86 |
| 0.17 | 92.03 |
| 0.58 | 92.61 |
| 0.81 | 93.52 |
| 0.33 | 93.85 |
| 0.33 | 94.19 |
| 0.25 | 94.44 |
| 5.56 | 100.00 |

## GRAPH 10

## PERCENTAGE DISTRIBUTION OF COMMODITY OUTPUT ENTROPIES CORRESPONDING TO FIVE YEAR TIME INTERVALS

FOR THE CURRENT PRICE TTME SERIES 1981-1971


FOR THE CURRENT PRICE TTME SERIES 1971-1981

contains more information about structural changes than the industry structure means that, even though market share structures are more unstable than product mix structures, their use jointly with the vector of commodity output would yield closer prediction of the Make matrix than the use of the product mix matrix and industry output vector. Unfortunately, information is more easily available on the latter vector than on the commodity output vector.

The impact of multi-product establishments moving across industries on the market share structures is much greater than the impact on the product mix structures. Indeed, were those establishments, whose output mix covers many industries, asked to fill out the special questionnaire alluded to above, then the structure of the Make matrix would be such that each commodity would only be produced by a single industry. Industries' market shares would therefore all be equal to either zero or one and therefore would be perfectly predictable and stable through time.

## APPENDIX 1

## A Further Comment on the Interpretation of Entropy.

This appendix is intended to further develop the reader's appreciation for the entropy measure as an indicator of structural variability. Given that the input-output structures are typically complex in nature, we will expose, in this appendix, the behaviour of the measure with reference to less complicated hypothetical structures. This approach will allow us to comment on the basic nature of the entropy measure. Hopefully, these comments will be general enough to provide the reader with enough insight about the entropy measure so as to facilitate a clear interpretation of the results contained in this report.

Initially, we will discuss various properties of the entropy measure in the context of structures with only two elements. For this purpose, we have generated the full range of possible structural changes in a two-element structure, along with their associated entropy values. Graph A1-1 gives a visual representation of the results that were obtained. It should be recognized however, that the scale chosen for the entropy (vertical) axis has restricted us from representing the more extreme cases of structural change, which are associated with infinitely large entropy levels. Graph A1-1 was created by plotting the entropy value corresponding to each ordered pair: (initial structure, final structure). Since we are dealing with two-element structures, it was convenient notation to also represent the "value" of a structure as an ordered pair of shares. Each entropy value on the graph therefore corresponds to an ordered pair of ordered pairs. For example, the cross entropy value corresponding to an initial structure of $(0.8,0.2)$ which finally became $(0.4,0.6)$ is $C((0.8,0.2),(0.4,0.6))=0.3819$.

The implied ordering of shares within a structure, described above, gives rise to some redundancy, or symmetry on Graph A1-1.
GRAPH A1-1 THREE DIMENSIONAL SURFACE OF
FOR HYPOTHETICAL STRUCTURAL C


This occurs because the entropy measure is independent of how we order the shares, provided that this ordering is consistent over time. In other words, $C((0.8,0.2),(0.4,0.6))$ is identical to $C((0.2,0.8),(0.6,0.4))$ but not to $C((0.2,0.8),(0.4$, $0.6))$. This would seem to suggest that not all of the surface on the graph is really required in order to fully represent all possible two dimensional structural changes. In particular, the section that shows both the initital and final structure varying between $(0.0,1.0)$ and ( $0.5,0.5$ ) conveys exactly the same information as the section that shows both of these structures varying between $(0.5,0.5)$ and (1.0, 0.0).

Although there are some symmetrical aspects about the surface in Graph A1-1, the apparent symmetry of the surface about the 45 degree line defined by the relation: initial structure $=$ final structure, is indeed an illusion, as our entropy measure is not generally symmetric with respect to its arguments. The asymmetry of the cross entropy measure can be clearly seen from Graph A1-2. Each of the two dimensional plots in Graph A1-2 shows a contrasting pair of cross sections taken from the surface in Graph A1-1.

The first plot represents all possible changes involving the structure ( $0.01,0.99$ ). The line associated with a fixed initial structure shows $C((0.01,0.99)$, (final structure)) for all possible values of the final structure. Conversely, the line associated with a fixed final structure shows C (initial structure), ( $0.01,0.99$ ) for all possible values of the initial structure. Most structural changes involving a structure, close to the degenerate case, such as (0.01, 0.99) would be considered dramatic. Even in this case, however, although the two lines on the graph do diverge to some extent, the asymmetry does not appear to be that substantial. This is further reinforced by noting the close resemblance of the two lines in the second plot involving the structure ( $0.5,0.5$ ).

In order to relate the preceding comments to structural changes involving multi-dimensional structures, it will be useful to explore the decomposition property of entropy. Generally speaking, if a multi-share structure is decomposed into mutually exclusive and exhaustive subsets of shares, or "substructures", then we have the following relationship:

| Entropy of <br> shares within <br> = between <br> substructures |  |
| :--- | :--- |
| structures | Substructures | | weight |
| :---: |
| of |$\quad$| entropy between |
| :--- |

or, total entropy $=$ between component + within component

The particular set of substructures chosen in the specification of a decomposition will greatly determine how the total entropy is apportioned amongst the within and between components of total entropy. The critical factor here is the degree of homogeneity that exists between shares within their respective substructures in terms of their variability. This is illustrated in the numerical example given below.

Consider the following case of structural change:

| share <br> number (i) | shares in initial <br> structure $a\left(a_{i}\right)$ | shares in final <br> structure $b\left(b_{i}\right)$ | I change in <br> share $\left(a_{i}\right.$ |
| :---: | :---: | :---: | :---: |
| 1 | 0.25 | 0.2 | -20 |
| 2 | 0.25 | 0.3 | 20 |
| 3 | 0.25 | 0.2 | -20 |
| 4 | $\underline{0.25}$ | $\underline{0.3}$ | 20 |
| Total | 1.0 | 1.0 |  |

The total cross entropy, $c(a, b)=\sum b_{i} \log \left(b_{i} / a_{i}\right)$, for the above structure is 0.02014 nits.

## GRAPH A1-2

TWO DIMENSIONAL CROSS ENTROPY PLOTS OF HYPOTHETICAL STRUCTURAL CHANGES

INVOLVING THE STRUCTURE: $(0.01,0.99)$


INVOLVING THE STRUCTURE: $(0.5,0.5)$


Consider now the following two decompositions:

Decomposition 1:

| substructure (j) | original share number (i) | original shares in structure: |  | \% change in shares | implicit shares in substructure: |  | \% change in implicit shares |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | initial ( $\mathrm{a}_{\mathrm{i}}$ ) | $\underset{\left(b_{i}\right)}{\text { final }}$ |  | $\underset{\left(a_{i}^{\prime}\right)}{\text { initial }}$ | $\begin{aligned} & \text { final } \\ & \left(b_{i}{ }^{\prime}\right) \end{aligned}$ |  |
|  | 1 | 0.25 | 0.2 | -20 | 0.5 | 0.5 | 0 |
|  | 3 | 0.25 | 0.2 | -20 | 0.5 | 0.5 | 0 |
| subtotal | - | 0.5 | 0.4 | -20 | 1.0 | 1.0 | - |
|  | 2 | 0.25 | 0.3 | 20 | 0.5 | 0.5 | 0 |
|  | 4 | 0.25 | 0.3 | 20 | 0.5 | 0.5 | 0 |
| subtotal | - | 0.5 | 0.6 | 20 | 1.0 | 1.0 | - |

The substructures in this decomposition each contain subsets of shares that are completely homogeneous with respect to their variability; shares 1 and 3 have both decreased by $20 \%$ whereas shares 2 and 4 have both increased by $20 \%$. Accordingly, the associated aggregate shares for substructures 1 and 2 , which appear above as subtotals, varied in direct proportion to their component shares. The entropy between the two substructures is therefore:

$$
C((0.5,0.5),(0.4,0.6))=0.0214 \text { nits. }
$$

The within entropy component is calculated on the basis of changes in the implicit structures of each of the substructures. The shares in these implicit structures are obtained by prorating the original shares contained in a given substructure so that they sum to one. In this case, the initial and final implicit structures are identical for each of the two substructures. In other words, there is no variability between the shares in either of the substructures and therefore the within entropy component for each, $C((0.5,0.5),(0.5,0.5))$, is equal to zero. Hence all of the variability of this structure is explained by the variability between substructures (i.e. 0.0214 nits).

Decomposition 2:


In this second decomposition, the initial and final structure of substructures in the overall structure are identical. The between component of entropy $C((0.5,0.5),(0.5,0.5))$, is therefore equal to zero.

Here again we must consider the implicit structures of each substructure in order to calculate the within entropy component. Clearly both implicit structures of substructures 1 and 2 have changed in an identical manner. The entropy associated with each of these substructures, $C((0,5,0.5),(0.4,0.6)),\left(\sum b_{i}^{\prime} 10 g\right.$ ( $b_{i}^{\prime} / a_{i}^{\prime}$ ')) is 0.0214 nits. Since each substructure has an equal weight of 0.5 in the overall structure, as shown by the relevant subtotals, the weighted contribution of each substructure to the within component of total entropy is $(0.5) \times(0.0214)=0.0107$. Therefore in this special case (i.e. where both substructures have the same cross entropy values) the within component of total entropy is equal to the unweighted entropy of either substructure. ( 0.0214 nits).

The preceding discussion clarifies how, through decomposition, the overall entropy of a structure can be concentrated into either the between or the within component, depending on how the decomposition is originally specified. This result is extremely useful for the appraisal of changes in the entropy of a structure due to aggregation. Calculating the entropy of an aggregated structure is effectively the same as subtracting, from the entropy of the dissagregated structure, the respective (weighted) contributions to the within component of the particular substructures that were aggregated. This means that if the aggregation scheme does not involve any aggregation accross substructures, then the between entropy component associated with the aggregated structure will be identical to the between component associated with the dissagregated structure. This is perfectly reasonable since only the variability contained in the dissagregated substructures, which were then aggregated, would have been removed.

Consider, for example, the aggregation of individual shares witin the substructures which were defined in the previous numerical example. If this aggregation were done according to the scheme used in the first decomposition, then there would be no effect on overall entropy. This occurs because all of the variability in the structure is explained by the variability between the substructures of decomposition 1 , which would be unaffected by aggregation. On the other extreme, if aggregation were done according to the second decomposition in the above example, then the overall entropy of the aggregated structure would be zero. This time, all of the variability in the dissaggregated structure is explained by the variability within the substructures. This is also precisely the variability that is eliminated through aggregation. Furthermore, if we aggregated the shares within substructure 1 only, then entropy would be reduced by exactly $50 \%$ of the original entropy value (or 0.012 nits) since substructure 1 accounts for exactly $50 \%$ of the overall final structure $b$. The variability of the aggregated structure would then be completely explained by the (weighted) variability of the shares in substructure 2 .

The above comments imply, in general, that if the aggregation of a structure involves aggregating together shares that tend to change in the same fashion then the resulting reduction in total variability is not likely to be large. Most of the variability will, in this case, be attributable to the variability between the aggregates. Contrastingly, if the aggregates are composed of shares that are relatively heterogeneous, in terms of their variability, then total variability is likely to be noticeably reduced. In this case the variability within the structures underlying these aggregates, which is large, has been removed.

If it were always possible to represent a multi-share structure in terms of two aggregates (whose component shares were homogeneous in terms of their variability) then any structural change could be easily related to a specific two-element structural change. Such an aggregation scheme would require that all of total variability be concentrated in the variability between aggregates. Consider for example the following structural change.

| share <br> (i) | share in <br> initial <br> structure (ai) | share in <br> final <br> structure b ( $b_{i}$ ) | \% change in share ( $\mathrm{a}_{\mathrm{i}}$ ) |
| :---: | :---: | :---: | :---: |
| 1 | 0.10 | 0.11 | 10 |
| 2 | 0.40 | 0.44 | 10 |
| 3 | 0.10 | 0.09 | -10 |
| 4 | 0.10 | 0.09 | -10 |
| 5 | 0.10 | 0.11 | 10 |
| 6 | 0.05 | 0.045 | -10 |
| 7 | 0.15 | 0.135 | -10 |
| Total | 1.0 | 1.0 |  |

We can now form two aggregates as required; one for shares that increased by $10 \%$ and one for shares that decreased by $10 \%$.

| aggregates | original shares <br> in agoregate | initial structure <br> of agoregates | final structure <br> of agoregates | \% change <br> in agoregate |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | $1,2,5$ | 0.6 | 0.66 | 10 |  |
| 2 | $3,4,6,7$ | $\underline{0.4}$ | $\underline{0.36}$ | -10 |  |
| Total |  | 1.0 |  | 1.0 |  |

The corresponding entropy value can now be located on Graph A1-1 as $C((0.6,0.4),(0.66,0.36))=0.025$ nits. As noted in a previous progress report, this entropy value is roughly equivalent to a weighted percentage change in shares, which in this case is $3 \%$ (i.e. $66(10)+.36(-10)$ ).

In practice, there are likely many structural changes that cannot be represented as two simple aggregates representing homogeneous sets of shares. However, even if such groupings are imperfect, the concept that overall entropy can be interpreted in terms of the sum of its components is useful for the analysis of changes in large structures.

## APPENDIX 2

Descriptive Summary Reports of Entropy Results from the Decomposition of Total Supply by Source at the L level of Aggregation for One, Two, and Five Year Time Intervals.

MAXIMUM
WEIGHTED
ENTROPY



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0808
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000 －N
 MINIMUM
WEIGHTED
ENTROPY 6
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 88 $0-8$
0.8
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.00001 \begin{tabular}{l}
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## 



AVERAGE MINIMUM
RAW


AGRICULTURAL \＆RELATED SERVICES IND LOGG MINES

GOLD MINES MINES
岂

SALT MINES
FEED INDUSTRY
VEGETABLE OIL MILLS（EXC．CORN OIL）
BREAD \＆OTHER BAKERY PRODUCTS IND． CANE \＆BEET SUGAR INDUSTRY SOFT DRINK INDUSTRY DISTILLERY PRODUCTS BREWERY PRODUCTS INDUSTRY WINE INDUSTRY TOBACCO PRODUCTS INDUSTRIES RUBBER PRODUCTS INDUSTRIES PLASTIC PRODUCTS LEATHER TANNERIES

MISC LEATHER \＆ALLIED PROD IND．
MAN－MADE FIBRE YARN \＆WOVEN CLOT
WOOL YARN \＆KNITTED FABRIC INDUSTRY
 CONTRACT TEXTILE DYEING \＆FINISHING CLOTHING INDUSTRIES EXC．HOSIERY HOSIERY VENEER AND PLYWOOD INDUSTRIES SASH，DOOR \＆OTHER MILLWORK IND WOTHER WOOD INDUSTRIES
OTHOUSEHOLD FURNITURE IND OFFICE FURNITURE INDUSTRIES


AVERAGE
WEIGHTED
ENTROPY

UNBOUNDED
STANDARD.
ENTROPY*



BOUNDED
STANDARD.
ENTROPY*

[^0]MAXIMUM
RAW
ENTROPY

[^1]MINIMUM
RAW
ENTROPY

## AVERAGE RAW ENTROPY

|  | OTHER FURNITURE \& FIXTURE IND. |
| :---: | :---: |
|  | PULP \& PAPER INDUSTRIES |
|  | ASPHALT ROOFING INDUSTRY |
|  | PAPER BOX \& BAG INDUSTRIES |
|  | OTHER CONVERTED PAPER PRODUCTS IND. |
|  | PRINTING \& PUBLISHING IND |
|  | PLATEMAKING, TYPESETTING \& BINDERY |
|  | PRIMARY STEEL INDUSTRIES |
|  | STEEL PIPE \& TUBE INDUSTRY |
|  | IRON FOUNDRIES |
|  | NON-FERROUS SMELTING \& REFINING IND |
|  | ALUMINUM ROLLING CASTING, EXTRUDING |
|  | COPPER ROLLING CASTING \& EXTRUDING |
|  | OTHER METAL ROLLING, CASTING ETC |
|  | POWER BOILER \& STRUCT. METAL IND |
|  | ORNAMENTAL \& ARCH. METAL PROD. IND. |
|  | STAMPED, PRESSED \& COATED METALS |
|  | WIRE AND WIRE PRODUCTS INDUSTRIES |
|  | HARDWARE, TOOL \& CUTLERY INDUSTRIES |
|  | HEATING EQUIPMENT INDUSTRY |
|  | MACHINE SHOPS INDUSTRY |
|  | OTHER METAL FABRICATING INDUSTRIES |
|  | AGRICULTURE IMPLEMENT INDUSTRY |
|  | COMMERCIAL REFRIGERATION EQUIPMENT |
|  | OTHER MACHINERY \& EQUIPMENT IND |
|  | AIRCRAFT \& AIRCRAFT PARTS INDUSTRY |
|  | MOTOR VEHICLE INDUSTRY |
|  | TRUCK, BUS BODY \& TRAILER INDUSTRY |
|  | MOTOR VEHICLE PARTS \& ACCESSORIES |
|  | RAILROAD ROLLING STOCK INDUSTRY |
|  | SHIPBUILDING AND REPAIR INDUSTRY |
|  | MISC. TRANSPORTATION EQUIPMENT IND. |
|  | SMALL ELECTRICAL APPLIANCE INDUSTRY |
|  | MAJOR APPLIANCES (ELEC \& NON-ELEC.) |
|  | RECORD PLAYERS, RADIO \& TV RECEIVER |
|  | ELECTRONIC EQUIPMENT INDUSTRIES |
|  | OFFICE, STORE \& BUSINESS MACHINES |
|  | COMMUNICATIONS, ENERGY WIRE \& CABLE |
|  | BATTERY INDUSTRY |
|  | OTHER ELECT. \& ELECTRONIC PRODUCTS |
|  | CLAY PRODUCTS INDUSTRY |
|  | CEMENT INDUSTRY |
|  | CONCRETE PRODUCTS INDUSTRY |
|  | READY-MIX CONCRETE INDUSTRY |
|  | GLASS \& GLASS PRODUCTS INDUSTRIES |
|  | NON-METALIC MINERAL PRODUCTS NEC |
|  | REFINED PETROLEUM \& COAL PRODUCTS |
|  | INDUSTRIAL CHEMICALS INDUSTRIES NEC |
|  | PLASTIC \& SYNTHETIC RESIN INDUSTRY |





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| 00000 | $\bigcirc$ |



MINIMUM
WEIGHTED
ENTROPY
AVERAGE
WEIGHTED
ENTROPY


| BOUNDED | UNBOUNDED |
| ---: | ---: |
| STANDARD. | STANDARD. |
| ENTROPY* | ENTROPY* |



| AVERAGE | MINIMUM | MAXIMUM |
| :--- | :---: | :---: |
| RAW | RAW | RAW |
| ENTROPY | ENTROPY | ENTROPY |





|  |
| :---: |

UNBOUNDED
STANDARD．
ENTROPY＊

ナトゥ


BOUNDED
STANDARD．
ENTROPY＊




## 


MINIMUM
WEIGHTED
ENTROPY

DESCRIPTIVE SUMMARY REPORT OF ENTROPY RESULTS

$$
\begin{aligned}
& \text { AVERAGE } \\
& \text { WEIGHTED } \\
& \text { ENTROPY }
\end{aligned}
$$


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UNBOUNDED
STANDARD．
ENTROPY＊
BOUNDED
STANDARD．
ENTROPY＊ 

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RAW
ENTROPY
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RESIDENTIAL CONSTRUCTION ROAD，HIGHWAY \＆AIRSTRIP CONST． GAS \＆OIL FACILITY CONSTRUCT DAMS \＆IRRIGATION PROJECTS OTHER ENGINEERING CONSTRUCTION AIR TRANSPORT \＆SERVICES INCIDENTAL RAILWAY TRANSPORT \＆REL．SERVICES WATER TRANSPORT \＆REL．SER URBAN TRANSIT SYSTEM INDUSTRY INTERURBAN \＆RURAL TRANSIT SYSTEMS TAXICAB INDUSTRY OTHER TRANSPORT \＆SERV．TO TRANSP． PIPELINE TRANSPORT INDUSTRIES STORAGE AND WAREHOUSING INDUSTRIES
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OTHER BUSINESS SERVICE IN OTHER BUSINESS SERVICE INDUSTRIES
PROFESSIONAL BUSINESS SERVICES ADVERTISING SERVICES
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DESCRIPTIVE SUMMARY REPORT OF ENTROPY RESULTS
FROM AN INDUSTRY DECOMPOSITION OF CURRENT PRICE SUPPLY AT THE L LEVEL OF AGGREGATION
FOR FIVE YEAR TIME INTERVALS FOR $1961 / 1984$
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| 1 | AGRICULTURAL \& RELATED SERVICES IND |
| :---: | :---: |
| 2 | FISHING \& TRAPPING INDUSTRIES |
| 3 | LOGGING \& FORESTRY INDUSTRIES |
| 4 | GOLD MINES |
| 5 | OTHER METAL MINES |
| 6 | IRON MINES |
| 7 | ASBESTOS MINES |
| 8 | NON-METAL MINES EX COAL \& ASBESTOS |
| 9 | SALT MINES |
| 10 | COAL MINES |
| 11 | CRUDE PETROLEUM \& NATURAL GAS |
| 12 | QUARRY \& SAND PIT INDUSTRIES |
| 13 | SERVICE RELATED TO MINERAL EXTRACT |
| 14 | MEAT \& MEAT PRODUCTS (EXC. POULTRY) |
| 15 | POULTRY PRODUCTS INDUSTRY |
| 16 | FISH PRODUCTS INDUSTRY |
| 17 | FRUIT AND VEGETABLE INDUSTRIES |
| 18 | DAIRY PRODUCTS INDUSTRIES |
| 19 | FEED INDUSTRY |
| 20 | VEGETABLE OIL MILLS (EXC. CORN OIL) |
| 21 | BISCUIT INDUSTRY |
| 22 | BREAD \& OTHER BAKERY PRODUCTS IND. |
| 23 | CANE \& BEET SUGAR INDUSTRY |
| 24 | MISC. FOOD PRODUCTS INDUSTRIES |
| 25 | SOFT DRINK INDUSTRY |
| 26 | DISTILLERY PRODUCTS INDUSTRY |
| 27 | BREWERY PRODUCTS INDUSTRY |
| 28 | WINE INDUSTRY |
| 29 | TOBACCO PRODUCTS INDUSTRIES |
| 30 | RUBBER PRODUCTS INDUSTRIES |
| 31 | PLASTIC PRODUCTS INDUSTRIES |
| 32 | LEATHER TANNERIES |
| 33 | FOOTWEAR INDUSTRY |
| 34 | MISC. LEATHER \& ALLIED PROD. IND. |
| 35 | MAN-MADE FIBRE YARN \& WOVEN CLOTH |
| 36 | WOOL YARN \& WOVEN CLOTH INDUSTRY |
| 37 | BROAD KNITTED FABRIC INDUSTRY |
| 38 | MISC. TEXTILE PRODUCTS INDUSTRIES |
| 39 | CONTRACT TEXTILE DYEING \& FINISHING |
| 40 | CARPET, MAT \& RUG INDUSTRY |
| 41 | CLOTHING INDUSTRIES EXC. HOSIERY |
| 42 | HOSIERY INDUSTRY |
| 43 | SAWMILLS, PLANING \& SHINGLE MILLS |
| 44 | VENEER AND PLYWOOD INDUSTRIES |
| 45 | SASH, DOOR \& OTHER MILLWORK IND. |
| 46 | WOODEN BOX \& COFFIN INDUSTRIES |
| 47 | OTHER WOOD INDUSTRIES |
| 48 | HOUSEHOLD FURNITURE INDUSTRIES |
| 49 | OFFICE FURNITURE INDUSTRIES |



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OTHER FURNITURE \＆FIXTURE IND．
PULP \＆PAPER INDUSTRIES
ASPHALT ROOF ING INDUSTRY
PAPER BOX \＆BAG INDUSTRIES
OTHER CONVERTED PAPER PRODUCTS IND．
PRINTING \＆PUBLISHING IND．
PLATEMAKING，TYPESETTING \＆BINDERY
PRIMARY STEEL INDUSTRIES
STEEL PIPE \＆TUBE INDUSTRY
IRON FOUNDRIES
NON－FERROUS SMELTING \＆REFINING IND
ALUMINUM ROLLING CASTING，EXTRUDING
COPPER ROLLING CASTING \＆EXTRUDING
OTHER METAL ROLLING，CASTING ETC．
POWER BOILER \＆STRUCT．METAL IND．
ORNAMENTAL \＆ARCH．METAL PROD．IND．
STAMPED，PRESSED \＆COATED METALS
WIRE AND WIRE PRODUCTS INDUSTRIES
HARDWARE，TOOL \＆CUTLERY INDUSTRIES
HEATING EQUIPMENT INDUSTRY
MACHINE SHOPS INDUSTRY
OTHER METAL FABRICATING INDUSTRIES
AGRICULTURE IMPLEMENT INDUSTRY
COMMERCIAL REFRIGERATION EQUIPMENT
OTHER MACHINERY \＆EQUIPMENT IND．
AIRCRAFT \＆AIRCRAFT PARTS INDUSTRY
MOTOR VEHICLE INDUSTRY
TRUCK，BUS BODY \＆TRAILER INDUSTRY
MOTOR VEHICLE PARTS \＆ACCESSORIES
RAILROAD ROLLING STOCK INDUSTRY
SHIPBUILDING AND REPAIR INDUSTRY
MISC．TRANSPORTATION EQUIPMENT IND．
SMALL ELECTRICAL APPLIANCE INDUSTRY
MAJOR APPLIANCES（ELEC \＆NON－ELEC．
RECORD PLAYERS，RADIO \＆TV RECEIVER
ELECTRONIC EQUIPMENT INDUSTRIES
OFFICE，STORE \＆BUSINESS MACHINES
COMMUNICATIONS，ENERGY WIRE \＆CABLE
BATTERY INDUSTRY
OTHER ELECT．\＆ELECTRONIC PRODUCTS
CLAY PRODUCTS INDUSTRY
CEMENT INDUSTRY
CONCRETE PRODUCTS INDUSTRY
READY－MIX CONCRETE INDUSTRY
GLASS \＆GLASS PRODUCTS INDUSTRIES
NON－METALIC MINERAL PRODUCTS NEC
REFINED PETROLEUM \＆COAL PRODUCTS
INDUSTRIAL CHEMICALS INDUSTRIES NEC
PLASTIC \＆SYNTHETIC RESIN INDUSTRY
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## A2－11 MAXIMUM WEIGHTED ENTROPY

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DESCRIPTIVE SUMMARY REPORT OF ENTROPY RESULTS
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| 148 | ACCOMMODATION \& FOOD SERVICE IND. |
| 149 | MOTION PICTURE \& VIDEO INDUSTRIES |
| 150 | OTHER AMUSEMENT \& RECREATIONAL SERV |
| 151 | LAUNDRIES \& CLEANERS |
| 152 | OTHER PERSONAL SERVICES |
| 153 | PHOTOGRAPHERS |
| 154 | MISC. SERVICE INDUSTRIES |
| 155 | OPERATING SUPPLIES |
| 156 | OFFICE SUPPLIES |
| 157 | CAFETERIA SUPPLIES |
| 158 | LABORATORY SUPPLIES |
| 159 | TRAVEL \& ENTERTAINMENT |
| 160 | ADVERTISING \& PROMOTION |
| 161 | TRANSPORTATION MARGINS |
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| AVERAGE WITHIN FOR BUSINESS SUPPLY |  |

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## APPENDIX 3

Descriptive Summary Reports of Entropy Results from a Commodity Decomposition of Business Supply, at the $L$ level of Agregation for One, Two, and Five Year Time Intervals



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FRUITS，FRESH，EX．TROPICAL
VEGETABLES，FRESH

HAY，FORAGE，AND STRAW SEEDS EX．OIL AND SEED GRADES
NURSERY STOCK \＆RELATED MAT． HOPS INC．LUPULIN
TOBACCO，RAW
WOOL IN GREASE
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OTHER CRUDE WOOD MATERIALS
FISH LANDINGS

## HUNTING \＆TRAPPING PRODUCTS

 IRON ORES \＆CONCENTRATES IRON ORES \＆CONCENTRATES
METAL ORES＋CONCENTRATES N．E．S CRUDE MINERAL OILS
NATURAL GAS

> SULPHUR，CRUDE \＆REFINED
ASBESTOS，UNMFG．．CRUDE \＆FIBROUS GYPSUM

> CLAY\＆OTHER CRUDE REFRACTORY MAT
NATURAL ABRASIVES\＆INDUST．DIAMOND
CRUDE MINERAL NES
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FISH PRODUCTS $\quad$ FRUIT, BERRIES, DRIED, CRYSTALIZED
 VEGETABLES\&PREPARATIONS CANNED SOUPS CANNED
INFANT\&JUNIOR FOODS, CANNED
PICKLES, RELISHES, OTHER SAUCES

OTHER FOOD PREPARATIONS
PRIMARY OR CONCENTRATED FEEDS
FEED FOR COMMERCIAL LIVESTOCK
FEEDS, GRAIN ORIGIN, N.E.S.
FEEDS OF VEGETABLE ORIGIN NES
PET FEEDS
WHEAT FLOUR
MEAL\&FLOUR OF OTHER CEREALS\&VEG
BREAKFAST CEREAL PRODUCTS
BISCUITS
BREAD \& ROLLS
OTHER BAKERY PRODUCTS
COCOA \& CHOCOLATE
NUTS, KERNELS \& SEEDS PREPARED
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VEG. OILS \& FATS, CRUDE
 MALT, MALT FLS SUGUP
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POTATO CHIPS\&SIMILAR PRODUCTS
MISC.FOOD NES
SOFTDRINK CONCENTRATES\&SYRUPS ALCOHOLIC BEVERAGES DISTILLED ALCOHOL, NATURAL, ETHYL BREWERS \&DISTILLERS GRAINS
ALE BEER, STOUT \& PORTER WINES
FOOTWEAR EX. RUBBER \& PLASTIC
LEATHER GLOVES\&MITTENS EX SPORT
LEATHER BELTING, SHOE STOCK
LEATHER HANDBAGS, WALLETS ETC.
YARN, COTTON

YARNS MIX\&BLENDED\&COTTON WASTE
FABRICS, BROAD WOVEN OF COTTON

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BLANKETS，BEDSHEETS，TOWELS\＆CLOTHS YARN OF WOOL AND HAIR FABRERMAKERS FELTS

POLYAMIDE RESINS（NYLON）
YARNS，SILK，FIBREGLASS

THREAD，OF MAN－MADE FIBRES
 OTHER CORDAGE，TWINE \＆ROPE NARROW FABRICS LACE FABRICS，BOBBINET \＆NET
FELT，CARPET CUSHION FELT，CARPET CUSHION
CARPET ING\＆FABRIC RUGS，MATS，ETC． TEXTILE DYEING \＆FINISHING SER． AWNINGS，OF CLOTH \＆ TENTS，HAMMOCKS，SLEEP BAGS\＆SAILS TARPAULINS \＆OTHER COVERS
VEGETABLE TEXTILE FIBRES NES MISC．TEXTILE FAB．MAT．INC．RAGS LACES AND TEXTILE PROD．N．E．S．
FABRICS，KNITTED\＆NETTED，ELASTIC
FABRICS，KNITTED，NES FABRICS，KNITTED，NES
KNITTED WEAR CLOTHING APPAREL ACCESSORIES\＆OTHER MISC． FURS，DRESSED － CUSTOM TAILORING PULPWOOD CHIPS
LUMBER \＆TIMBER
 WOOD WASTE
CUSTOM WOOD WORKING \＆MILLWORK
VENEER AND PLYWOOD
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GAS METERS AND WATER METERS TAXI\&PARK METERS, BLOCKS\&LADDERS
FIREARMS \& MILITARY HARDWARE COLLAPSIBLE TUBES, METAL

TRACTORS, FARM \& GARDEN TYPE MECHANICAL POWER TRANS EQUIP. PUMPS, COMPRESSORS\&BLOWERS ETC.
 FANS, AIR CIRCULATORS\&AIR UNITS PKG.MACH, LUB.EQ\&OTH.MISC.MACHENS MACH. IND. SPECIFIED\&SPECIAL PURP. POWER DRIVEN HAND TOOLS METAL END REFRIGAIR CON.EQ, EX. HOUSEHOLD SCALES \& BALANCES VENDING MACHINES AIRCRAFT, ALL TYPES AIRCRAFT ENGINES SPECIALIZED AIRCRAFT EQUIPMENT
 TRUCKS, CHASSIS, TRACTORS, COM. BUSES AND CHASSIS MILITARY MOTOR VEH, MOTORCYCLES
 OTH. TRAILERS\&SEMI-TRAILERS, COM.
BODIES AND CABS FOR TRUCKS MODIES VEHICLE ENGINES AND PARTS
MOTOXILIARY ELECTRIC EQUIPMENT
AUS MOTOR VEH. ACCESS, PARTS\&ASSEMB

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| 394 | AVIATION GASOLINE |
| 395 | MOTOR GASOLINE |
| 396 | FUEL OIL |
| 397 | LUBRICATING OILS AND GREASES |
| 398 | BENZENE, TOLUENE AND XYLENE |
| 399 | BUTANE, PROPANE\&OTH.LIQ.PET.GAS |
| 400 | NAPHTHA |
| 401 | ASPHALT AND COAL OILS, N.E.S. |
| 402 | PETROCHEMICAL FEED STOCK |
| 403 | FERTILIZERS |
| 404 | PLASTIC RESINS\&MAT., NOT SHAPED |
| 405 | FILM\&SHEET, CELLULOSIC PLASTIC |
| 406 | ETHANOLAMINES |
| 407 | ETHYLENE GLYCOL, MONO |
| 408 | PHARMACEUT ICALS |
| 409 | PAINTS \& RELATED PRODUCTS |
| 410 | VEG. OILS, OTH. THAN CORN OIL, REF. |
| 411 | GLYCERIN, REFINED |
| 412 | DENTIFRICES, ALL KINDS |
| 413 | SOAPS, DETERGENTS,CLEANING PRODUC |
| 414 | INDUSTRIAL CHEMICAL PREP. N.E.S. |
| 415 | TOILET PREPARATIONS \& COSMETICS |
| 416 | CHLORINE |
| 417 | OXYGEN |
| 418 | PHOSPHORUS |
| 419 | CHEMICAL ELEMENTS, NES |
| 420 | SULPHURIC ACID |
| 421 | CARBON DIOXIDE (GAS AND DRY ICE) |
| 422 | INORGANIC ACIDS\&OXYGEN |
| 423 | AMMONIA, ANHYDROUS AND AQUA |
| 424 | CAUSTIC SODA (SOD. HYDROXIDE)DRY |
| 425 | CALCIUM CHLORIDE |
| 426 | SODIUM CHLORATE |
| 427 | ALUMINUM SULPHATE |
| 428 | SODIUM PHOSPHATES |
| 429 | SODIUM CARBONATE (SODA ASH) |
| 430 | SODIUM CYANIDE |
| 431 | SODIUM SILICATE |
| 432 | METALLIC SALTS\&PEROXYSALTS,NES |
| 433 | PHOTOGRAPHIC\&INORGANIC CHEM.N.E. |
| 434 | ETHYLENE |
| 435 | BUTYLENES |
| 436 | BUTADIENE |
| 437 | ACETYLENE |
| 438 | STYRENE MONOMER |
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PERCHLOROETHYLENE
FLUORINATED HALOGEN HYDROCARBONS
HYDROCARBONS\&THEIR DERIVATIVES
METHYL ALCOHOL
PROPYL AND ISOPROPYL ALCOHOLS
BUTYL AND ISOBUTYL ALCOHOLS
PENTAERYTHRITOL
ALCOHOLS AND THEIR DERIVATIVES
PHENOL
PHENOLS, PHEN. ALCOHOLS\&DERIVATVES
ETHERS, ALCOHOL PEROXIDES, ETC
METYL-ETHYL, ALDEHYDE-FUNCTIONS, N
ACETONE
ACETIC ACID
ACETIC ANHYDRIDE
ADIPIC ACID
CITRIC ACIDS
STEARIC AND ORGANIC ACIDS
HEXAMETHYLENEDIAMINE
SODIUM GLUTAMATE, MONO
DICYANDIAMIDE
ORGANO-INORGANIC COMPOUNDS ETC
ORGANIC CHEMICALS, NES
TITANIUM DIOXIDE
BLACK, ACETYLENE AND CARBON
PIGMENTS, LAKES \& TONERS, PROPER
IRON OXIDES
FERTILIZER CHEMICALS
SYNTHETIC RUBBER
ANTIFREEZE COMPOUNDS
ADDITIVES FOR MINERAL OILS, NES
GLYCERINE, CRUDE
RUBBER\&PLASTICS COMPOUNDING AGTS
EXPLOSIVES, FUSES AND CAPS
AMMUNITION, NON-MILITARY
AMMUNITION \& ORDNANCE, MILITARY
PYROTECHNIC ARTICLES \& FIREWORKS
CRUDE VEG. MATERIALS \& EXTRACTS
PHTHALIC ANHYDRIDE
AGRICULTURAL CHEMICALS
ADHESIVES
AUTOMOTIVE CHEM. EX. ANTIFREEZE
CONCRETE ADDITIVES
BOILER CHEMICALS
COMPOUND CATALYSTS
METAL WORKING COMPOUNDS
PRINTING AND OTHER INKS
TEXTILE SPECIALTY CHEMICALS
POLISHES, WAXES, COMPOUNDS \& ETC
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MAXIMUM
WEIGHTED
ENTROPY

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WAXES，ANIMAL \＆VEGETABLE，OTHER
ESSENTIAL OILS，NATURAL OR SYN．
TANNING MATERIALS AND DYESTUFFS
FATS AND CHEMICAL MIXTURES
EMBALMING CHEM．\＆PREPARATIONS
MATCHES
AIRCRAFT\＆NAUTICAL INSTRUMENTS
LAB\＆SCIENTIFIC APPARATUS ETC
MISC．MEASURE\＆CONTROL INSTRUMENTS
MEDICAL\＆RELATED INSTRUMENTS ETC．
IND．MILITARY\＆CIVIL DEF．SAFETY EQ
WATCHES，CLOCKS，CHRONOMETERS ETC．
PHOTOGRAPHIC EQ\＆SUPPL．INCL．FILM
JEWELRY，FINDINGS，MET．\＆GEM STONES
PLATED\＆SILVERWARE，CUTLERY，ETC．
BROOMS，BRUSHES，MOPS\＆OTH．CLEAN．EQ
BICYCLES，CHILDRENS VEH．\＆PARTS
SPORTING，FISHING\＆HUNTING EQUIP．
TOYS AND GAME SETS
FABRICS，IMPREG．EX．RUBBER－COATED
TILING，RUBBER，PLASTIC
ADVERTISING GOODS
SHADES\＆BLINDS
FUR DRESSING \＆DYEING SERVICES
CUSTOM WORK，MISCELLANEOUS
ICE

URBAN TRANSIT
TAXICAB TRANSPORTATION
 SERV．INCIDENTAL ION WATER TRANSPORTAT
SERV．INCIDENTAL TO WATER TRANS．
RAILWAY TRANSPORTATION
TRUCK TRANSPORTATION WATER TRANSPORTAT
SERV．INCIDENTAL TO WATER TRANS．
RAILWAY TRANSPORTATION
TRUCK TRANSPORTATION BUS TRANSPORT，INTERURBAN\＆RURAL
URBAN TRANSIT
OTHER TRANSPORTATION SERV．INCIDENTAL TO TRANSPORT WATER TRANSPORTATION TRANS
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NON－RESIDENTIAL CONSTRUCTION REPAIR CONSTRUCTION
RESIDENTIAL CONSTRUCTION
NON－RESIDENTIAL CONSTRUCTION
ROAD HIGHWAY AIRSTRIP CONST GAS AND OIL FACILITY CONST．

 PHONO RECORDS AND ARTIST MATERIA ROAD HIGHWAY AIRSTRIP CONST．








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NATURAL RUBBER \& ALLIED GUMS
SUGAR RAW
COCOA BEANS, UNROASTED
GREEN COFFEE
TROPICAL FRUIT
UNALLOCATED IMPORTS \& EXPORTS
GOVERNMENT GOODS \& SERVICES
COMMODITY INDIRECT TAXES
SUBSIDIES
OTHER INDIRECT TAXES
WAGES AND SALARIES
SUPPLEMENTARY LABOUR INCOME
NET INCOME UNINCORP BUSINESS
OTHER OPERATING SURPLUS



MAXIMUM
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UNBOUNDED
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ENTROPY*

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| OTHER CONFECTIONERY BEET PULP |  |
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| SUGAR |  |
|  | MOLASSES，SUGAR REFINERY PROD． |
| OILSEED，MEAL \＆CAKE |  |
|  | VEG．OILS \＆FATS，CRUDE |
|  | NITROGEN FUNCTION COMPOUNDS NES |
|  | MALT，MALT FLOUR\＆WHEAT STARCH |
| MAPLE SUGAR\＆SYRUP |  |
|  | PREPARED CAKE \＆SIMILAR MIXES |
|  | SOUPS，DRIED\＆SOUP MIXES\＆BASES |
|  | COFFEE，ROASTED，GROUND，PREPARED |
| TEA |  |
|  | POTATO CHIPS\＆SIMILAR PRODUCTS |
|  | MISC．FOOD NES |
|  | SOFTDRINK CONCENTRATES\＆SYRUPS |
|  | CARBONATED BEV．，SOFT DRINKS |
|  | ALCOHOLIC BEVERAGES DISTILLED |
|  | ALCOHOL，NATURAL，ETHYL |
|  | BREWERS \＆DISTILLERS GRAINS |
|  | ALE BEER，STOUT \＆PORTER |
| WINES |  |
| TOBACCO PROCESSED，UNMANUFACT． |  |
| CIGARETTES |  |
| TOBACCO MFG EX．CIGARETTES |  |
| FOOTWEAR，RUBBER AND PLASTIC |  |
|  | TIRES \＆TUBES，PASSENGER CARS |
|  | TIRES \＆TUBES，TRUCKS \＆BUSES |
|  | TIRES \＆TUBES，N．E．S |
| TIRES，RETREADING |  |
| RECLAIMED RUBBER |  |
|  | RUBBER BELTS \＆COATED FABRICS |
|  | RUBBER SHEETING SHOE STOCK ETC |
|  | HOSE \＆TUBING，MAINLY RUBBER |
|  | RUBBER WASTE \＆SCRAP |
|  | RUBBER END PRODUCTS NES |
|  | PLASTIC PIPE FITTINGS \＆SHEET |
|  | PLASTIC CONTAINERS\＆BOTTLE CAPS |
|  | PREFAB．BLDGS\＆STRUCTURES NES |
|  | PLASTIC HOSE，PAILS\＆END PROD．NES |
| LEATHER |  |
| FOOTWEAR EX．RUBBER \＆PLASTIC |  |
| LEATHER GLOVES\＆MITTENS EX SPORT |  |
| LEATHER BELTING，SHOE STOCK |  |
| LUGGAGE |  |
| LEATHER HANDBAGS，WALLETS ETC． |  |
| YARN，COTTON |  |
|  | YARNS MIX\＆BLENDED\＆COTTON WASTE |
|  | FABRICS，BROAD WOVEN OF COTTON |

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UNBOUNDED
STANDARD．
ENTROPY＊





| MINIMUM | MAXIMUM |
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| RAW | RAW |
| ENTROPY | ENTROPY |



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NETS \＆NETTING
BLANKETS，BEDSHEETS，TOWELS\＆CLOTHS
YARN OF WOOL AND HAIR
FABRICS，BROADWOVEN，WOOL，HAIR\＆MIX
PAPERMAKERS FELTS
MAN MADE FIBRES
POLYAMIDE RESINS（NYLON）
YARNS，SILK，FIBREGLASS
TIRE YARNS
FABRIC，WOVEN，TEXTILE FIBRES
FABRICS，BROAD WOVEN，MIX\＆BLENDS
RAGS\＆WASTE，COTTON\＆TEXTILE MAT．
WOOL\＆FINE ANIMAL HAIR，SPINNING
THREAD，OF COTTON FIBRES
THREAD，OF MAN－MADE FIBRES
YARN\＆THREAD，OTHER VEG．FIBRES
BALER AND BINDER TWINE
OTHER CORDAGE，TWINE \＆ROPE
NARROW FABRICS
LACE FABRICS，BOBBINET \＆NET
FELT，CARPET CUSHION
CARPETING\＆FABRIC RUGS，MATS，ETC．
TEXTILE DYEING \＆FINISHING SER．
AWNINGS，OF CLOTH \＆PLASTIC
TENTS，HAMMOCKS，SLEEP BAGS\＆SAILS
TARPAULINS \＆OTHER COVERS
TEXTILE CONTAINERS
VEGETABLE TEXTILE FIBRES NES
MISC．TEXTILE FAB．MAT．INC．RAGS
HOUSEHOLD TEXTILES，NES
LACES AND TEXTILE PROD．N．E．S．
HOSIERY
FABRICS，KNITTED\＆NETTED，ELASTIC
FABRICS，KNITTED，NES
KNITTED WEAR
CLOTHING
APPAREL ACCESSORIES\＆OTHER MISC．
FURS，DRESSED
FUR PLATES，MATS AND LININGS
FUR APPAREL
CUSTOM TAILORING
PULPWOOD CHIPS
LUMBER \＆TIMBER
RAILWAY TIES
WOOD WASTE
CUSTOM WOOD WORKING \＆MILLWORK
VENEER AND PLYWOOD
MILLWORK（WOODWORK）

## MAXIMUM WEIGHTED ENTROPY



AVERAGE
WEIGHTED
ENTROPY

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UNBOUNDED
STANDARD.
ENTROPY*

BOUNDED
STANDARD.
ENTROPY*


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## WOOD FABRICATED MAT.FOR STRUCT.

PREFAB. BLDGS, WOOD
CONTAINERS, CLOSURES\&WOOD PALLETS
CASKETS, COFFINS\&OTHER MORT.GOODS MISC. WOOD $\qquad$ HOUSEHOLD FURN. INCL. CAMP\&LAWN OFFICE FURN\&VISIBLE RECORD EQUIP
SPECIAL PURPOSE FURNITURE MISC. FURNITURE AND FIXTURES
PORTABLE LAMPS RESIDENTIAL TYPE PULP


OTHER PAPER
FINE PAPER FINE PAPE SAN $\begin{array}{r}1 \\ 2 \\ 2 \\ \frac{n}{4} \\ \frac{2}{3} \\ \hline\end{array}$ PAPER BOARD TOWELS, NAPKINS \& TOILET PAPER
 TILES, VINYL-ASBESTOS
PAPER CARTONS,BAGS, CANS\&BOTTLES PAPER CARTONS, BAGS, CANS\&BOTTLES
CONVERTED PAPER, GUM, WAX OR PRINT CONVERTED ALUMINUM FOIL PAPER CONTAINERS, NES OFFICE AND STATIONER PAPER END PRODUCTS
NEWSPAPERS, MAGAZINES\&PERIODICALS NEWSPAPERS, MAGAZINES\&PERIODICALS
BOOKS, PAMPHLETS,MAPS\&PICTURES BANKNOTES,BONDS,DRAFTS ETC

ADVERTISING, PRINT MEDIA ICE SPECIALIZED PUBLISHING SERVICE PRINTING PLATES, SET TYPE ETC.
FERRO-ALLOYS

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\begin{aligned}
& \text { IRON, STEEL INGOTS } \\
& \text { STEEL BLOOMS, BILLETS \& SLABS } \\
& \text { STEEL CASTINGS } \\
& \text { STEEL BARS AND RODS } \\
& \text { STEEL PLATES, NOT FABRICATED } \\
& \text { CARBON STEEL SHEETS NOT COATED } \\
& \text { TINPLATE } \\
& \text { GALVANIZED STEEL SHEET \& STRIP } \\
& \text { RAILS\&RLY TRACK MATERIALS, STEEL } \\
& \text { COAL TAR }
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ENTROPY＊



MAXIMUM
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ENTROPY


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$\qquad$ GRINDING BALLS，INGOT MOULDS ETC NICKEL IN PRIMARY FORMS

COPPER\＆COPPER ALLOYS，PRIME FORMS LEAD，PRIMARY FORMS

ZINC\＆ZINC ALLOYS PRIMARY FORMS
ALUMINUM\＆ALUMINUM ALLOYS PRIME． TIN\＆TIN ALLOYS PRIMARY FORMS PRECIOUS METAL\＆ALLOYS PRIME．FORM
OTH．NON－FERROUS BASE METALS ALUMINUM FLUORIDES\＆SODIUM ALUM． INORGANIC BASES\＆ME MATERIALS NES

ALUMINUM\＆ALUMINUM ALLOYS，CAST COPPER PROD．CAST，ROLLED\＆EXTRUDED LEAD\＆LEAD ALLOY PROD．CAST，R\＆E NICKEL\＆NICKEL ALLOY FAB．MATERIAL TIN\＆TIN ALLOY FAB．MATERIALS
ZINC DIE CASTING\＆OTH ZINC MAT SOLDERS INC．BLOCK，RODS，WIRE，ETC．
PLATES，STEEL，FABRICATED TANKS

## POWER BOILERS BOILERS MARINE TYPE

BEAMS AND OTHER STRUCT．STEEL SCAFFOLDING EQUIP．，

METAL PRODUCTS NES
STEEL SHEET\＆STRIP COATED OR FAB． CULVERT PIPE，CORRUGATED METAL METAL BASIC PROD．\＆RANGE BOILERS METAL AWNINGS，ASH CANS，PAILS ETC KITCHEN CINERS\＆BOTTLE CAPS OF METAL WIRE \＆WIRE ROPE，OF STEEL WIRE FENCING，SCREENING EX．AUTO TIRE\＆POWER TRANS． RODS，WIRE\＆ELECTRODES，WELDING SPRINGS FOR UPHOLSTERY\＆MISC．VEH
BOLTS，NUTS，SCREWS，WASHERS ETC． BUILDERS HARDWARE

FITTINGS，FURN．CABINETS\＆CASKETS

## MAXIMUM WEIGHTED ENTROPY



## MINIMUM WE IGHTED ENTROPY










AVERAGE
WEIGHTED
ENTROPY
UNBOUNDED
STANDARD.
ENTROPY*
BOUNDED
STANDARD.
ENTROPY*

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MOTOR VEH. ACCESS, PARTS\&ASSEMB.



## MINIMUM WEIGHTED ENTROPY

AVERAGE
WEIGHTED
ENTROPY

UNBOUNDED
STANDARD．
ENTROPY＊



## ENTROPY



| COMOTIVES，CARS\＆TENDERS，RLY．SER |  |
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ETHYLENE
BUTYLENES
BUTADIENE
ACETYLENE
STYRENE MONOMER CARBON TETRACHLORIDE
VINYLCHLORIDE MONOMER
TRICHLOROETHYLENE DENTIFRICES，ALL KINDS
SOAPS，DETERGENTS，CLEANING PRODUC
INDUSTRIAL CHEMICAL PREP．N．E．S．
TOILET PREPARATIONS \＆COSMETICS
CHLORINE
OXYGEN
PHOSPHORUS
CHEMICAL ELEMENTS，NES
SULPHHRIC ACID
CARBON DIOXIDE（GAS AND DRY ICE）
INORGANIC ACIDS\＆OXYGEN
AMMONIA，ANHYDROUS AND AQUA
CAUSTIC SODA（SOD．HYDROXIDE）DRY
CALCIUM CHLORIDE
SODIUM CHLORATE
ALUMINUM SULPHATE
SODIUM PHOSPHATES
SODIUM CARBONATE（SODA ASH）
SODIUM CYANIDE
SODIUM SILICATE
METALLIC SALTS\＆PEROXYSALTS，NES PHOTOGRAPHIC\＆INORGANIC CHEM．N．E． ETHYLENE
BUTYLENES
BUTADIENE
ACETYLENE
STYRENE MONOMER ETHYLENE
BUTYLENES
BUTADIENE
ACETYLENE
STYRENE MONOMER TRICHLOROE BUTANE，PRATHA
FERTILIZERS
PLASTIC RESINS\＆MAT．，NOT SHAPED
FILM\＆SHEET，CELLULOSIC PLASTIC
ETHANOLAMINES
ETHYLENE GLYCOL，MONO
PHARMACEUTICALS
PAINTS \＆RELATED PRODUCTS
VEG．OILS，OTH．THAN CORN OIL，REF．
GLYCERIN，REFINED
DENTIFRICES，ALL KINDS
SOAPS，DETERGENTS，CLEANING PRODUC
INDUSTRIAL CHEMICAL PREP．N．E．S．
TOILET PREPARATIONS \＆COSMETICS
RHIORINE
LUBRICATING OILS AND GREASES
BENZENE，TOLUENE AND XYLENE
BUTANE，PROPANE\＆OTH．LIQ．PET．GAS
NAPHTHA
ASPHALT AND COAL OILS，N．E．S．
PETROCHEMICAL FEED STOCK
FERTILIZERS
PLASTIC RESINS\＆MAT．，NOT SHAPED
FILM\＆SHEET，CELLULOSSIC PLASTIC
ETHANOLAMINES
ETHYLENE GLYCOL，MONO
PHARMACEUTICALS
PAINTS \＆RELATED PRODUCTS
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MAXIMUM
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## MAXIMUM WE I GHTED ENTROPY

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DESCRIPTIVE SUMMARY REPORT OF ENTROPY RESULTS
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 AVERAGE
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NATURAL RUBBER \& ALLIED GUMS COCOA BEANS, UNROASTED GREEN CDFFEE
TROPICAL FRUIT

UNALLOCATED IMPORTS \& EXPORTS GOVERNMENT GOODS \& SERVICES
COMMODITY INDIRECT TAXES SUBSIDIES

OTHER INDIRECT SUPPLEMENTARY LABOUR INCOME
NET INCOME UNINCORP BUSINESS OTHER OPERATING SURPLUS


UNBOUNDED
STANDARD.
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## AVERAGE RAW ENTROPY

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CATTLE AND CALVES
SHEEP AND LAMBS POULTRY
WHEAT, UNMILLED

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|  |  | MILK, WHOLE, FLUID, HONEY AND BEESWAX NUTS, EDIBLE, NOT SHELLED


HAY, FORAGE, AND STRAW
SEEDS EX. OIL AND SEED GRADES
NURSERY STOCK \& RELATED MAT. OIL SEEDS, NUTS AND KERNELS
HOPS INC. LUPULIN

TOBACCO,RAW
 LOGS AND BOLTS POLES,PIT PROPS FENCE-POSTS ETC PULPWOOD OTHER CRUDE WOOD MATERIALS
CUSTOM FORESTRY CUSTOM FORESTRY
FISH LANDINGS

HUNTING \& TRAPPING PRODUCTS
GOLD \& ALLOYS IN PRIMARY FORM
RADIO-ACTIVE ORES\&CONCENTRATES IRON ORES \& CONCENTRATES BAUXITE + ALUMINA METAL ORES + CONCENTRATES N.E.S.
COAL. COAL MINERAL OILS
NATURAL GAS
SULPHUR, CRUDE \& REFINED
ASBESTOS, UNMFG., CRUDE\& FIBROUS
GYPSUM
SALT
PEATMOSS
CLAY\&OTHER CRUDE REFRACTORY MAT
NATURAL ABRASIVES\&INDUST.DIAMOND
CRUDE MINERAL NES
SAND AND GRAVEL

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## MINIMUM WEIGHTED ENTROPY

AVERAGE
WEIGHTED
ENTROPY

UNBOUNDED
STANDARD．
ENTROPY＊＊

BOUNDED
STANDARD．
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MAXIMUM
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MINIMUM
WEIGHTED
ENTROPY

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UNBOUNDED
STANDARD．
ENTROPY＊




AVERAGE
RAW
ENTROPY
OTHER CONFECTIONERY


SOUPS，DRIED\＆SOUP MIXES\＆BASES
COFFEE，ROASTED，GROUND，PREPARED
区

POTATO CHIPS\＆SIMILAR PRODUCTS
MISC．FOOD NES


CARBONATED BEV．，SOFT DRINKS
ALCOHOLIC BEVERAGES DISTILLED
ALCOHOL，NATURAL，ETHYL
BREWERS \＆DISTILLERS GRAINS
BREWERS \＆DISTILLERS GRAINS
ALE BEER，STOUT \＆PORTER
WINES TOBACCO PROCESSED，UNMANUFACT
CIGARETTES

TOBACCO MFG EX．CIGARETTES


TIRES \＆TUBES，N．E．S．
TIRES，RETREADING


HOSE \＆TUBING，MAINLY RUBBER
SヨN SLIJnooyd aNヨ yヨagny
PLASTIC PIPE FITTINGS \＆SHEET
PLASTIC CONTAINERS\＆BOTTLE CAPS
PREFAB．BLDGS\＆STRUCTURES NES
PLASTIC HOSE，PAILS\＆END PROD．NES


LEATHER GLOVES\＆MITTENS EX
LEATHER BELTING，SHOE STOCK
LEATHER HANDBAGS，WALLETS ETC．
YARN，COTTON
YARNS MIX\＆BLENDED\＆COTTON WASTE
FABRICS，BROAD WOVEN OF COTTON
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| ENTROPY | ENTROPY |


DESCRIPTIVE SUMMARY REPORT


## TIRE CORD \＆TIRE FABRICS

NETS \＆NETTING
BLANKETS，BEDSHEETS，TOWELS\＆CLOTHS YARN OF WOOL AND HAIR HAIR\＆MIX FABRICS，BROADWOVEN，WOOL，HAIR\＆MIX PAPERMAKERS FELTS
MAN MADE FIBRES（NYLON） POLYAMIDE RESINS（NYLON）
YARNS，SILK，FIBREGLASS TIRE YARNS FABRIC，WOVEN，TEXTILE FIBRES FABRICS，BROAD WOVEN，MIX\＆BLENDS
RAGS\＆WASTE，COTTON\＆TEXTILE MAT． WOOL\＆FINE ANIMAL HAIR，SPINNING THREAD，OF COTTON FIBRES THREAD，OF MAN－MADE FIBRES
YARN\＆THREAD，OTHER VEG．FIBRES BALER AND BINDER TWINE OTHER CORDAGE，TWINE \＆ROPE
NARROW FABRICS LACE FABRICS，BOBBINET \＆NET
FELT，CARPET CUSHION CARPETING\＆FABRIC RUGS，MATS，ETC． TEXTILE DYEING \＆FINISHING SER． TENTS，HAMMOCKS，SLEEP BAGS\＆SAILS TARPAULINS \＆OTHER COVERS
VEGETABLE TEXTILE FIBRES NES MISC．TEXTILE FAB．MAT．INC．RAGS LACES AND TEXTILE PROD．N．E．S． FABRICS，KNITTED\＆NETTED，ELASTIC FABRICS，KNITTED，NES KNITTED
 FURARE，DRESSED FUR PLATES，MATS AND LININGS
FUR APPAREI
 PULPWOOD CHIPS
LUMBER \＆TIMBER
 WOOD WASTE
CUSTOM WOOD WORKING \＆MILLWORK
VENEER AND PLYWOOD
MILLWORK（WOODWORK）
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## MAXIMUM WE I GHTED ENTROPY

## MINIMUM WE I GHTED ENTROPY

AVERAGE
WEIGHTED
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UNBOUNDED
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DESCRIPTIVE SUMMARY REPORT OF ENTROPY RESULTS


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NAT．\＆SYN．GRAPHITE\＆CARBON PROD．
MECHANICAL STEEL TUBING LIN COUNTRY GIPE，TRANS．NAT．GAS \＆OIL 21ヨ SQากOW 1O5NI＇S77Vタ SNIGNI89 CAST\＆WROUGHT IRON PIPE\＆FITTINGS COPPER\＆COPPER ALLOYS，PRIME．FORMS

LEAD，PRIMARY FORMS
TIN\＆TIN ALLOYS PRIMARY FORMS
PRECIOUS METAL\＆ALLOYS PRIME

ALUMINUM FLUORIDES\＆SODIUM ALUM．




COPPER ALLOY PROD．CAST，ROLL，EXTR


TIN\＆TIN ALLOY FAB．MATERIALS


TANKS

BOWER BOILERS


PREFAB．BLDGS\＆STRUCT
STEEL SHEET\＆STRIP COATED OR FAB．
CULVERT PIPE，CORRUGATED METAL
METAL BASIC PROD．\＆RANGE BOILERS
METAL AWNINGS，ASH CANS，PAILS ETC
KITCHEN UTENSILS
CONTAINERS\＆BOTTLE
CONTAINERS\＆BOTTLE CAPS OF METAL
WIRE \＆WIRE ROPE，OF STEEL
CHAIN，EX．AUTO TIRE\＆POWER TRANS．


SPRINGS FOR UPHOLSTERYMISC．VEH．
BUILDERS HARDWARE
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ENTROPY


## MINIMUM WE IGHTED ENTROPY

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AVERAGE
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ENTROPY






AVERAGE
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 BASIC HARDWARE, NES
CUTTING\&FORMING TOOLS
MEASURING, EDGING, MECHANICS TOOL
SCISSORS, RAZOR BLADES, IND. CUTLER
DOMESTIC EQUIPMENT, NES
HEATING EQ, HOT WATER\&STEAM ETC.
HEATING EQ, WARM AIR EX.PIPES\&ETC
UNIT\&WATER TANK HEATERS NON-ELEC
FUEL BURNING EQUIPMENT
COM. APPLIANCES, COOK\&WARMING FOOD
CUSTOM METAL WORKING
FORGINGS OF CARBON\&ALLOY STEEL
VALVES
PIPE FITTINGS, NOT IRON \& STEEL
GAS METERS AND WATER METERS
FIRE FIGHT\&TRAFFIC CONTROL EQUIP
TAXI\&PARK METERS, BLOCKS\&LADDERS
FIREARMS \& MILITARY HARDWARE
COLLAPSIBLE TUBES, METAL
TRACTORS, FARM \& GARDEN TYPE
OTHER AGRICULTURAL MACHINERY
MECHANICAL POWER TRANS.EQUIP.
PUMPS, COMPRESSORS\&BLOWERS ETC.
CONVEYORS, ESCAL, ELEV\&HOIST MACH
IND.TRUCKS, TRACTORS, TRAILERS ETC
FANS, AIR CIRCULATORS\&AIR UNITS
PKG.MACH, LUB. EQ\&OTH.MISC.MACH.
INDUSTRIAL FURNACES, KILNS\&OVENS
MACH.IND.SPECIFIED\&SPECIAL PURP.
POWER DRIVEN HAND TOOLS
METAL END PRODUCTS, NES
REFRIG\&AIR CON.EQ, EX. HOUSEHOLD
SCALES \& BALANCES
VENDING MACHINES
OFFICE MACHINES AND EQUIPMENT
AIRCRAFT, ALL TYPES
AIRCRAFT ENGINES
SPECIALIZED AIRCRAFT EQUIPMENT
MODIFICATIONS, CONVERSIONS, SERV.
PASSENGER AUTOMOBILES \& CHASSIS
TRUCKS, CHASSIS, TRACTORS, COM.
BUSES AND CHASSIS
MILITARY MOTOR VEH, MOTORCYCLES
MOBILE HOMES
OTH.TRAILERS\&SEMI-TRAILERS, COM.
BODIES AND CABS FOR TRUCKS
MOTOR VEHICLE ENGINES AND PARTS
AUXILIARY ELECTRIC EQUIPMENT
MOTOR VEH. ACCESS, PARTS\&ASSEMB.
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## AVERAGE WEIGHTED ENTROPY




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LUBRICATING OILS AND GREASES
BENZENE，TOLUENE AND XYLENE
BUTANE，PROPANE\＆OTH．LIQ．PET．GAS NAPHTHA ASPHALT AND COAL OILS，N．E．S． PLASTIC RESINS\＆MAT．，NOT SHAPED FILM\＆SHEET，CELLULOSIC PLASTIC ETHANOLAMINES ETHYLENE GLYCOL，MONO
PAINTS \＆RELATED PRODUCTS PAINTS \＆RELATED PRODUCTS
VEG．OILS，OTH．THAN CORN OIL，REF．
GEFE GLYCERIN，REFINED SOAPS，DETERGENTS，CLEANING PRODUC INDUSTRIAL CHEMICAL PREP．N．E．S．
TOILET PREPARATIONS \＆COSMETICS CHLORINE
OXYGEN
CHEMICAL ELEMENTS，NES
 INORGANIC ACIDS\＆OXYGEN AMMONIA，ANHYDROUS AND AQUA
CAUSTIC SODA（SOD．HYDROXIDE）DRY CALCIUM CHLORIDE
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 ETHYLENE

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CARBON TETRACHLORIDE
VINYLCHLORIDE MONOMER TRICHLOROETHYLENE



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DESCRIPTIVE SUMMARY REPORT OF ENTROPY RESULTS

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STANDARD.



AVERAGE MINIMUM
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## PERCHLOROE THYLENE

PERCHLOROETHYLENE HYDROCARBONS\&T
HYDROCARBONS\&THEIR DERIVATIVES METHYL ALCOHOL PROPYL AND ISOPROPYL ALCOHOLS
BUTYL AND ISOBUTYL ALCOHOLS PENTAERYTHRITOL

## PHENOL

 PHENOLPHENOLS, PHEN. ALCOHOLS\&DERIVATVES
ETHERS, ALCOHOL PEROXIDES, ETC METYL-ETHYL, ALDEHYDE-FUNCTIONS, N ACETONE

ACETIC ANHYDRIDE
ADIPIC ACID
CITRIC ACIDS ORGANIC ACIDS HEXAMETHYLENEDIAMINE SODIUM GLUTAMATE, MONO DICYAND I AMIDE ORGANO-INORGANIC COMPOUNDS ETC
ORGANIC CHEMICALS, NES ORGANIC CHEMICALS, NES
TITANIUM DIOXIDE

BLACK, ACETYLENE AND CARBON IRON OXIDES

FERTILIZER CHEMICALS
SYNTHETIC RUBBER
ANTIFREEZE COMPOUNDS OILS, NES
GLYCERINE, CRUDE RUBBER\&PLASTICS
EXPLOSIVES, FUSES AND CAPS EXPLOSIVES, FUSES AND CAPS

AMMUNITION \& ORDNANCE, MILITARY
 CRUDE VEG. MATERIALS \& EXTRACTS
PHTHALIC ANHYDRIDE AGRICULTURAL CHEMICALS

## ADHESIVES <br> AUTOMOTIVE CHEM. EX. ANTIFREEZE



COMPOUND CATALYSTS
METAL WORKING COMPOUNDS
PRINTING AND OTHER INKS
TEXTILE SPECIALTY CHEMICALS


## MAXIMUM WEIGHTED ENTROPY

MINIMUM
WEIGHTED
ENTROPY


AVERAGE
WEIGHTED
ENTROPY




| AVERAGE | MINIMUM | MAXIMUM |
| :---: | :---: | :---: |
| RAW | RAW | RAW |
| ENTROPY | ENTROPY | ENTROPY |

 WAXES, ANIMAL \& VEGETABLE, OTHER




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MAXIMUM
RAW
ENTROPY

[^14]AVERAGE
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ENTROPY 

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PIPELINE TRANSPORTATION
HIGHWAY AND BRIDGE MAINTENANCE
STORAGE
RADIO \& TELEVISION BROADCASTING
TELEPHONE \& TELEGRAPH
POSTAL SERVICES
ELECTRIC POWER
GAS DISTRIBUTION
COKE
WATER AND OTHER UTILITIES
WHOLEESALING MARGINS
REPAIR SERVICE
RENTAL OF OFFICE EQUIPMENT
RETAILING MARGINS
IMPUTED SERVICE, BANKS
OTH REAL EST (NON-RENT) \&FIN.SERV
INSURANCE \& W.C.B.
IMPUTED RENT OWNER OCPD. DWEL.
CASH RESIDENTIAL RENT
OTHER RENT
GOVT.ROYALTIES ON NAT. RESOURCES
EDUCATION SERVICES
HOSPITAL SERVICES
HEALTH SERVICES
MOTION PICTURE ENTERTAINMENT
OTHER RECREATIONAL SERRVICES
SERVICES TO BUSINESS MANAGEMENT
ADVERTISING SERVICES
LAUNDRY, CLEANING\&PRESSING SERV.
ACCOMMODATION SERVICES
MEALS
SERV.MARG. ON ALCOHOLIC BEVERAGES
PERSONAL SERVICES
PHOTOGRAPHIC SERVICES
SERVICES TO BLDGS. \& DWELLINGS
RENTAL DATA PROCESSING EQUIP.
OTHER SERV.TO BUSINESSES\&PERSONS
RENTAL OF AUTOMOBILES \& TRUCKS
TRADE ASSOCIATION DUES
RENTAL AO MACH\&EQ. INCL. CONST.MAC
SPARE PARTS\&MAINT.SUPPL.MACH\&EQ.
OFFICE SUPPLIES
CAFETERIA SUPPLIES
TRANSPORTATION MARGINS
LABORATORY EQUIP. AND SUPPLIES
TRAVELLING AND ENTERTAINMENT
ADVERTISING \& PROMOOTION
PURCHASED REPAIR SER.FOR MACH\&EQ
COTTON RAW \& SEMI-PROCESSED

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MINIMUM
RAW
ENTROPY
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00000000000000 NATURAL RUBBER \＆ALLIED GUMS
SUGAR RAW
COCOA BEANS，UNROASTED
GREEN COFFEE
TROPICAL FRUIT
UNALLOCATED IMPORTS \＆EXPORTS
GOVERNMENT GOODS \＆SERVICES
COMMODITY INDIRECT TAXES
SUBSIDIES
OTHER INDIRECT TAXES
WAGES AND SALARIES
SUPPLEMENTARY LABOUR INCOME
NET INCOME UNINCORP BUSINESS
OTHER OPERATING SURPLUS



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