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**THE OECD TECHNOLOGY CONCORDANCE (OTC): PATENTS BY INDUSTRY OF  
MANUFACTURE AND SECTOR OF USE**

**Daniel K.N. Johnson**

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**THE OECD TECHNOLOGY CONCORDANCE (OTC):  
PATENTS BY INDUSTRY OF MANUFACTURE AND SECTOR OF USE**

Daniel K.N. Johnson\*

While patent data are now readily available for most nations, these data are still of minimal use for economic analysis due to their mode of presentation. Patents are recorded for administrative purposes using the International Patent Classification (IPC) system, which categorises inventions by product or process. Instead, most economic researchers and analysts are interested in the particular sectors of the economy responsible for the invention or its subsequent use. The OECD Technology Concordance (OTC) presented here, like its predecessor the Yale Technology Concordance, is a tool that bridges definitions, allowing researchers to transform IPC-based patent data into patent counts by sector of the economy. This paper presents the methodology, some sample output and empirical tests of the method. It should be noted that the methodological work on the distribution of patent data by industry at the OECD is an early stage and further improvement of the OTC is expected in the future.

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Il est facile aujourd'hui de se procurer des données sur les brevets dans la plupart des pays, mais leur mode de présentation leur enlève presque toute pertinence pour l'analyse économique. Les brevets sont enregistrés à des fins administratives selon le système de Classification internationale des brevets (CIB), dans lequel les inventions sont regroupées par produits ou procédés. Par contre, la plupart des données et des analyses économiques portent sur les secteurs de l'économie à l'origine d'une invention ou sur ceux qui en sont les utilisateurs. A l'instar du *Technology Concordance de Yale* en usage avant lui, le *Technology Concordance* de l'OCDE (OTC) présenté ici est un outil qui établit un lien entre les deux logiques et permet aux chercheurs, à partir des données sur les brevets classées selon le système CIB, de répertorier les brevets par secteur économique. On trouvera dans le présent document, la méthodologie, quelques exemples d'application, et des essais empiriques de la méthode. Il convient de noter que le travail méthodologique de répartition par industrie des données sur les brevets en est à ses débuts à l'OCDE et que des améliorations devraient être apportées à l'OTC dans l'avenir.

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## **LIST OF ABBREVIATIONS AND TERMS**

EPO	European Patent Office
IOM	Industry of manufacture (economic sector responsible for creation of the patented technology)
IPC	International Patent Classification (product or process as defined by international patent law)
ISIC	International Standard Industrial Classification, Revision 3 (economic sector as defined by international standards)
TC	OECD Technology Concordance (translating IPC into IOMs and SOUs as defined by ISIC)
SIC	Standard Industrial Classification (economic sector as defined by Canadian government officials, version E dated 1980)
SOU	Sector of use (economic sector responsible for first use of the patented technology)
YTC	Yale Technology Concordance (translating IPC into IOMs and SOUs as defined by SIC)

## Introduction

While patent data are now readily available for most nations, these data are still of minimal use for economic analysis due to their mode of presentation. Patents are recorded for administrative purposes using the International Patent Classification (IPC) system, which categorises inventions by product or process. Instead, most economic researchers and analysts are interested in the particular sectors of the economy responsible for the invention or its subsequent use. The OECD Technology Concordance (OTC) presented here, like its predecessor the Yale Technology Concordance, is a tool that bridges definitions, allowing researchers to transform IPC-based patent data into patent counts by sector of the economy. This paper presents the methodology, some sample output, and empirical tests of the method.

In particular, economists and policy makers are interested in patents counted by economic sector in order to analyse trends across time and across sectors. For example, the propensity to patent, or the inventive productivity of a sector (in terms of patents per unit of R&D) may be useful in determining future sectors for government support. The effect of international trade on subsequent invention can also be determined using data configured for similar sectors. All such applications are impossible without a concordance like the OTC.

## Methodology

The goal of the OTC is one of translation, mapping one classification system into another. In particular, it maps patent product or process categories into the economic sectors responsible for their creation and subsequent use. This translation could be done by reading each patent and making individual assignments, but is extremely laborious. Instead, the OTC (like the original Yale Technology Concordance before it), makes use of Canadian Intellectual Property Office data to make the translation.

Upon application for protection, patents are assigned a product code which helps lawyers and patent examiners in grant and litigation decisions. Unfortunately, while the international standard IPC system has existed since 1976, the patent class system is useful almost exclusively for legal purposes. It is of little use to researchers who wish to combine patent data with other data sets, since the product definitions correspond with no other classification system. For example, the IPC grouping B05 includes all goods or processes involved in “spraying or atomising in general; applying liquids or other fluent materials to surfaces, in general”, and so will include products and processes from a variety of different industries, from cosmetics atomisers to agricultural pesticide sprayers. An abbreviated list of IPC groupings is presented in Appendix A.

Fortunately, between 1972 and 1995, the Canadian Intellectual Property Office simultaneously assigned IPC codes along with an industry of manufacture (IOM) and sector of use (SOU) code to each of over 300 000 granted patents. For example, in the IPC of B05 (sprayers and atomisers), a cosmetics atomiser might have an IOM in the glass container industry or metal valve industry, while a pesticide sprayer might have an IOM in the chemical fertiliser or agricultural machinery industry. Sectors of use (SOU) would also differ, with the cosmetics atomiser used in the personal hygiene or cosmetics sector, and the pesticide sprayer used in field crop sectors. The original Yale Technology Concordance (YTC) utilised tabulated information on all 300 000 patents to determine the probability that a patent with a specific IPC has a particular IOM-SOU combination. Since other nations only report IPC information, those probabilities allow researchers to infer the IOM-SOU details of a patent based purely on the legal-technological details offered by the IPC grouping.

The original IOM and SOU assignments made by the Canadian Intellectual Property Office used the Canadian standards for industrial classification, a system known as the Standard Industrial Classification

system (the 1980 SIC-E version). Unfortunately, economic sectors are defined internationally using a slightly different system (the International Standard Industrial Classification system, or ISIC, Revision 3). Therefore, the OTC presented here incorporates another concordance or translation, presenting results according to the international standard ISIC.

Results of the OTC are therefore merely results of the original YTC translated or concorded once again, so that the industries of manufacture and sectors of use are consistent with ISIC definitions.

Despite the fact that the OTC (and original YTC) is based on Canadian data, its use will not superimpose the industrial structure of Canadian inventions when applied to patent data for other nations. The probabilities of the OTC indicate a technical relationship between IPC (a product/process definition) and IOM or SOU (an industry definition), but permit enormous flexibility for the data to display the industrial composition of patenting in any nation. For further information on the construction, statistical validity and application of the original YTC, see papers in Evenson and Johnson (1997), Johnson and Evenson (1997, 1999), or Johnson and Santaniello (2000). Tests of the validity of the OTC are presented later in this paper.

It is conceptually expedient if the methodology of the OTC is presented in two stages, the translation of IPC to SIC-based sectors, and the translation of SIC-based sectors into ISIC-based sectors.

### **Translation of IPC to SIC-based sectors**

This process is borrowed completely intact from the original YTC, as originally presented by Kortum and Putnam (1997) and subsequently reprogrammed to include simultaneous IOM-SOU assignments as described in Johnson (1999). After reading all 300 000 patents that have information on IPC, IOM and SOU, probabilities were calculated for each IPC to determine the likelihood of any random patent in that IPC having a particular IOM-SOU combination. Thus, with the introduction of a new sample of patents with IPC data attached, it is straightforward to use the probabilities to predict the number of patents with each IOM-SOU combination. This processing transforms a vector of patent data (patents listed by IPC) into a matrix of interrelated patent data (IOM rows and SOU columns).

For example, consider a sample of only 12 patents, six each in IPC categories A01B and A01C (making a vector of patent data two rows long). Assume that the YTC has determined the following probabilities for each IPC:

- Patents in A01B have 0.75 probability of having IOM=1, SOU=1
- Patents in A01B have 0.10 probability of having IOM=1, SOU=2
- Patents in A01B have 0.15 probability of having IOM=2, SOU=1
- Patents in A01C have 0.5 probability of having IOM=1, SOU=2
- Patents in A01C have 0.25 probability of having IOM=1, SOU=3
- Patents in A01C have 0.25 probability of having IOM=3, SOU=2

Probabilities within each IPC sum to one, meaning that all patents will be transferred into an IOM-SOU combination. For this example, the results will be:

Table 1. **Sample output of Yale Technology Concordance**

	SOU 1	SOU 2	SOU 3	Total by IOM
IOM 1	4.5	3.6	1.5	9.6
2	0.9	0	0	0.9
3	0	1.5	0	1.5
Total by SOU	5.4	5.1	1.5	12

From this result the researcher can tell not only how important each inventing industry (IOM) is relative to the total, and not only how important each using sector (SOU) is relative to the total, but also how important each interaction between IOM and SOU is relative to the total.

A sample of the actual probability table assigning IPCs to IOM-SOU combinations is presented in Appendix B. A list of Canadian SIC-based sector definitions is included in Appendix C.

One limitation of this statistical assignment is that the accuracy of the results is dependent upon the nature of the original IOM and SOU decisions made by officials at the Canadian Intellectual Property Office. Since decisions were made by patent examiners trained as experts in their respective fields, the accuracy is undoubtedly very high. However, service sectors were never considered to be possible originating sectors for inventions, so YTC results and all that use the same information (including this study) are limited by that decision. Thus, IOMs will always be primary or secondary activities, while SOUs may be primary, secondary or tertiary economic activity.

### **Translation of SIC-based sectors to ISIC-based sectors**

In order to present results compatible with international data on other variables, the IOM and SOU sectors must be defined by ISIC categories. Since these are not always equivalent to the Canadian SIC-based sector definitions, another concordance was required. Unfortunately, there is no available set of patent data that have both SIC and ISIC assigned, in order to calculate probabilities as above. Therefore, while the Yale Concordance could rely upon previous Canadian patent records to calculate IOM and SOU for new patents, this project required a completely new step.

For this project, researchers read through the definitions of each ISIC sector, compared them by definition to each SIC sector, and decided upon the best ISIC for each SIC sector. This stage of the OTC is therefore based on the written ISIC and SIC definitions, as provided by Statistics Canada. Some SIC sectors appeared to span multiple ISIC categories, which raised difficult questions. For example, SIC sector 0119 may be found in ISIC sector 0121, but may also be found in ISIC sector 0122. The primary problem became how to share a single SIC among possible ISIC categories. While Statistics Canada provides a guide between SIC and ISIC definitions, it provides no probabilistic information, simply indicating which SIC categories may be found in which ISIC categories and vice versa. With no probabilities to draw upon, this research decided upon one ISIC category as a destination for each SIC sector. To ensure accuracy, two researchers independently compared each definition, and the results are the consensus of that research.

Subtotals were defined for sectors of special interest. A complete list of the sector definitions chosen for this research, defined by ISIC groupings, can be found in Appendix D. The SIC-to-ISIC concordance developed, along with the original Statistics Canada information for those sectors, can be found in Appendix E.

Unfortunately, it is difficult to test the decisions made during this research step, because no probabilistic ISIC-SIC concordance exists. While errors have probably been inserted by forcing each SIC into a single ISIC, the successful tests of the OTC results, as shown below, can be seen as a functional test of the merit of this stage.

### **Applying the OTC to user-provided data**

The following files are required to apply the OTC software to user-provided data, which are available on the DSTI Web site<sup>1</sup>:

- OTC Software: Qbasic.exe & OTC.bas
- OTC data: biprob1.dat & biprob4.dat
- OTC macro: Macro\_OTC.xls & Result\_of\_macro.xls

The OTC software and data are designed for easy use by subsequent researchers. Application requires user-provided data on patents, a DOS operating system (or a DOS-shell from Windows 3.x, 95, 98 or 2000) operating system, and Microsoft Excel 97 or higher.

### ***Input file***

The input file must be in a comma-delimited text file (see the file SAMPLE.IN as an example):

- *First line lists:* the number of lines in the file, the total number of patents with IPC data and the number of patents in the sample (*the latter two elements may be the same, but if the sample includes patents with missing IPC data, they may differ*).
- *Other lines list:* the first four characters of the IPC code (between “ ”), the number of patents with this IPC code (it can be fractional).

The input file should be placed in the same directory (or folder) as the OTC software and data. Make sure that the OTC package of software and data is unzipped.

### ***Running OTC software***

From the DOS prompt in that directory:

- Type “Qbasic /run OTC” to process data through the OTC, providing names for your input and output files when asked.
- Upon completion, exit the program <alt-F><X>.

In Excel, open the file **MACRO\_OTC.XLS** and enable all macros when prompted. Make sure that the previous **output file** and the file **result\_of\_macro.xls** are in the same directory (or folder):

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1. <http://www.oecd.org/oecd/pages/home/displaygeneral/0,3380,EN-documents-571-1-no-10--no,FF.html>



- Click on **Run OTC** button, the macro will then prompt for the correct **path** and for the **name of the output file**.
- When the macro is completed, message box pop-ups with the Excel filename of the finalised patent counts (located in the same folder).

### **Results for European Patent Office applications 1998-99**

A sample of 24 931 patent applications filed with the European Patent Office (EPO) in 1998 and 1999 has been processed through the OTC. Processing time depends upon the computer, but should take less than 20 minutes from initial input to final formatted output. The full table of results constitutes a matrix 126 rows by 126 columns, and can be found in the accompanying Excel file. A summary of the results (row and column totals only, for easier presentation) is presented in Appendix F for all EPO patents 1998-99. A similar summary for six applicant nations in each year follows in Appendix G. A sample of the full results (interactions between rows and columns in the chemical sectors 26-34) is included in Appendix H, and full examples for six applicant nations in both 1998 and 1999 are available on the OECD Web site at: <http://www.oecd.org/sti/working-papers>.

Notice, for example, that the manufacturing of machinery (sector 44) accounts for over one-quarter of all patents created (by IOM) but uses less than 15% of all new inventions, making it a “net supplier” of inventions. In contrast, motor vehicles (sector 59) are a slight “net demander” of inventions.

When combined with R&D expenditure data, which are measured in ISIC-defined terms as well, we can investigate differences (and changes) in propensities to patent per expenditure unit over time, across sectors or across nations. Assuming a lag of two years between research expenditure and publication of a related patent application, Appendix I presents 1998 patent applications per unit of 1996 R&D in national currencies for assignees/applicants in three nations.

### **Empirical tests of results**

An alternative method of finding IOM and SOU information for a set of patents would be to read patents and assign industry data individually to each recorded patent. We use this as a method of verifying the results of the OTC, tabulating patents into IOM-SOU combinations by hand to comparing the results. For a complete test of accuracy, researchers on this project read and assigned IOM and SOU values to a random sample of 400 US patents and 1 500 EPO patents, to be sure that the OTC results were transferable across nations. Each patent was judged based on its title alone, assigned a most probable industry of manufacture and most probable first sector of use. The sample was then processed through the OTC for comparison with the “hand-count” method.

Unfortunately, this testing process has two enormous drawbacks: time and accuracy. To make a decision about the IOM and SOU of each individual patent requires considerable time, as well as training for the reader. The hand-examination of 1 900 patents which we performed took approximately one person-week to accomplish, compared to a time of under one minute using the software routine. While the OTC process required less than 20 minutes to process nearly 25 000 patents, researchers cannot be expected to assign much more than one or two patents per minute with accuracy. That difference translates into a more than 1 200% increase in efficiency with the OTC, making large-scale projects feasible.

The second, and perhaps even greater, limitation of this test is the ability of researchers to make accurate decisions about IOM and SOU assignments. Even after training, our research team obviously does

not have the technical expertise of a patent office, and so undoubtedly erred in some assignments. In addition, our team had access only to patent titles, while patent examiners have the entire patent document upon which to base their decisions. To make the test practical, our team chose from among a list of aggregated industries for each patent (based on the sectors presented above), while Canadian patent officers typically chose between 10 000 disaggregated sectors. Thus, the assignments performed as a test of the OTC should be considered only at the current level of industry aggregation.

Finally, recall that the OTC assigns patents in probabilistic fashion; that is, it uses probability tables to assign patents from a technology group (IPC) to an industry or sector (IOM or SOU). Instead of reading each patent and determining a single IOM-SOU combination, it assigns part of the patent to each possible IOM-SOU combination. For example, see Table 1, where 12 patents are assigned to different IOM-SOU combinations. The use of probability tables means that the counts in each IOM (or SOU) need not be whole numbers. If the OTC tables indicate that half of the patents historically filed in this technology were from one IOM and half were from another IOM, then the next patent in this technology will be essentially split into each possible assignment, half to one IOM and half to the other. In contrast, our test assigned each patent to at most three possible sectors, and almost always to only one “most probable” sector. As a result, we expect the OTC results to be more diffuse across IOM-SOU categories, with more “partial patent counts” (*i.e.* non-whole number sums) in a larger number of categories. Essentially, the hand-counts present a discrete projection of patents onto the two-dimensional industrial surface, while the OTC presents a more continuous projection.

The result is a time-consuming and imperfect test of the concordance, but it is the only real alternative method of assigning patents to IOM and SOU (and therefore, the only real test) of the OTC. Statistics summarising results of the hand-counted test and OTC are presented in Table 2, with separate presentation made for the totals by industry of manufacture, totals by sector of use, and entire matrix of values. Four statistics are presented for each summary: correlations to show the similarity of the counts by each method; chi-square statistics to test for a statistical difference between the output series; and Spearman rank/Kendall tau statistics to test for ordering of the sectors and relative importance of each IOM-SOU combination.

Statistics in Table 2 show the same pattern for both US and European patents: high correlation, high chi-square statistics and moderately high rank similarity. The correlation statistic indicates how similar the series of output by the OTC and hand-counts are, while the chi-square statistic tests how likely it is that the two series came from the same statistical process or underlying distribution. The combination of statistics presented in Table 2 confirms that the results are very similar (correlations exceed 0.93 in almost all cases), but that there are differences significant enough to strongly suggest that the hand-count and OTC procedures generate statistically distinguishable output. Finally, any differences between the processes are not sufficient to dramatically reorder the sectors in terms of importance, as the Spearman and Kendall statistics indicate.

To test the robustness of these statistics, we calculated the same statistics for a subset of all output, those IOM-SOU combinations which warranted more than one full patent from the OTC. We felt that such a test would auger heavily against our primary test results above for two reasons. First, it should eliminate high correlations due to the high frequency of zeroes in the output, by omitting that output from consideration. Second, it should also eliminate high chi-square statistics due to low patent counts spread across the entire IOM-SOU spectrum by the OTC. While hand-counts are limited to integer values in each IOM-SOU cell (except in rare cases where a hand-count examiner split the patent between possible IOM or SOU categories), the OTC always splits each patent across all possible IOM-SOU categories, resulting in a more diffuse output pattern. Omitting the low counts in many cells should eliminate statistical chi-square differences between the OTC and hand-count process without necessarily lowering the correlation between

their output. However, to our satisfaction, correlations and chi-square statistics both remained high, indicating that our tests are robust.

Table 2. **Statistics for comparison of hand-counting and OTC**

	US patents	EPO patents
<b><i>IOM totals = 66 elements</i></b>		
Correlation	0.94	0.96
Chi-square statistic	1 988.90***	3 738.82***
Spearman rho	0.73	0.69
Kendall tau	0.57	0.57
<b><i>SOU totals = 126 elements</i></b>		
Correlation	0.94	0.94
Chi-square statistic	5 946.44***	2 332 051***
Spearman rho	0.70	0.59
Kendall tau	0.55	0.47
<b><i>Entire matrix (66 IOM by 126 SOU) = 15 876 elements</i></b>		
Correlation	0.84	0.87
Chi-square statistic	3 025.12***	15 982.24***
Spearman rho	0.47	0.51
Kendall tau	0.49	0.49

\*\*\* = significant at the 1% level, indicating statistically significant difference between the results of the hand-count and the OECD Technology Concordance.

As a research team, we view these results to be highly affirming of our work, presenting evidence that the OTC works as well as hand-counts, yet due to the probabilistic nature of the OTC, it creates output more diffuse across the IOM-SOU matrix than hand-counts do. This difference, in combination with the higher accuracy afforded by a mechanised process based on scientific definitions and no typographical errors introduced by hand, produces an efficient, high-precision efficient process for assigning patents to industries of manufacture and sectors of use.

## Conclusion

This paper introduces a variation of the Yale Technology Concordance for use by researchers acquainted with ISIC definitions. The OTC processes patent data provided by the user into a matrix of patent counts sorted by probably industry of manufacture and sector of use. The paper presents a sample implementation of the process, and tests the results for accuracy, with a striking conclusion – that the OTC saves an enormous amount of time for investigators interested in patent counts by sector, with minimal (if any) loss in accuracy compared to hand tabulation, and offers a slightly more diffuse (and therefore probably more realistic) spread of patents across industries.

It is clear that the OTC is a useful tool for the analysis of patent data. Not only are the results compatible with other economic definitions, they also allow researchers to identify key sectors from the demand (SOU) and supply (IOM) perspectives as well as inventive interactions between sectors. Tests show that output is similar to, although not identical to, output generated by a careful and time-consuming individual reading of patent titles. In short, the OTC permits researchers to extract a useful piece of information with which patent data are already endowed, a piece which is prohibitively expensive to obtain in the absence of the OTC. Use of this process should open the way to new explorations of patent trends and help to inform policy debates on industrial, national and international levels.

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- World Intellectual Property Office, "Definitions of International Patent Classification System", <http://www.wipo.org/classifications/en/index.html>

*Appendix A***IPC CATEGORIES (ABBREVIATED)**

A01	Agriculture, hunting and fishing
A21	Baking
A22	Butchering
A23	Foodstuffs, n.e.c.
A24	Tobacco products
A41	Wearing apparel
A42	Headwear
A43	Footwear
A44	Haberdashery and jewellery
B01	Physical and chemical separation
B02	Crushing and disintegrating
B03	Magnetic separation and washing
B04	Centrifugal machines
B05	Spraying and atomising
B30	Presses
B60	Vehicles
C01	Inorganic chemistry
C02	Treating of water and sewage
C03	Glass, mineral and slag wool
C04	Cement and ceramic
C21	Iron metallurgy
D01	Natural and artificial threads
D02	Yarns, ropes and warping
D03	Weaving
D21	Making paper and cellulose
E01	Construction of roads, bridges
E02	Hydraulic engineering
E05	Locks, keys, safes
E21	Mining
F01	Engines and pumps
F02	Combustion engines
F15	Fluid-pressure actuation
F21	Lighting
F28	Heat exchange
F42	Ammunition and blasting
G01	Measuring and testing
G06	Computing, calculating
G21	Nuclear physics
H01	Basic electric elements
H02	Generation of electricity
H04	Electric communication

*Appendix B*

**SAMPLE PROBABILITIES ASSIGNING IPCS TO IOM-SOU COMBINATIONS**

The text below is excerpted from the probability tables for the Revised Yale Technology Concordance, and lists the IPC, IOM (in SIC-based sectors), SOU (in SIC-based sectors) and probability that a patent in this IPC will be part of this IOM-SOU combination.

"A01B", 239, 3241, 1.686341E-03  
"A01B", 1599, 3111, 1.686341E-03  
"A01B", 1631, 3799, 1.686341E-03  
"A01B", 3023, 4210, 1.686341E-03  
"A01B", 3063, 151, 1.686341E-03  
"A01B", 3063, 221, 3.372681E-03  
"A01B", 3111, 139, 5.733558E-02  
"A01B", 3111, 141, 2.529511E-02  
...  
"A01F", 3111, 139, 1.790281E-02  
"A01F", 3111, 141, 1.534527E-02  
"A01F", 3111, 171, 2.557545E-03  
"A01F", 3111, 210, 1.278772E-02  
...  
"A01K", 3931, 321, 1.076716E-02  
"A01K", 3931, 330, 5.38358E-03  
"A01K", 3931, 339, 2.69179E-03  
"A01K", 3931, 3931, 5.38358E-03

The entire table lists roughly 70 000 probability values for use in the concordance.

*Appendix C***CANADIAN SIC-E (1980)-BASED SECTOR DEFINITIONS**

0111 Dairy Farms	0616 Uranium Mines
0112 Cattle Farms	0617 Iron Mines
0114 Poultry & Egg Farms	0619 Other Metal Mines
0115 Sheep & Goat Farms	0621 Asbestos Mines
0119 Livestock Combination Farms	0622 Peat Industry
0121 Honey & Apiary Product Farms	0623 Gypsum Mines
0122 Horse & Other Equine Farms	0624 Potash Mines
0123 Furs & Skins	0625 Salt Mines
0129 Other Animal Specialty Farms nec	0629 Other Non Metal Mines Exc Coal
0131 Wheat Farms	0631 Bituminous Coal Mines
0132 Small Grain Farms Exc Wheat	0632 Subbituminous Coal mines
0133 Oilseed Farms Exc Corn	0633 Lignite Mines
0134 Grain Corn Farms	0711 Conventional Oil & Natural Gas
0135 Forage	0712 Non Conventional Crude Oil
0136 Dry Field Pea & Bean Farms	0811 Granite Quarries
0137 Tobacco Farms	0812 Limestone Quarries
0138 Potato Farms	0813 Marble Quarries
0139 Other Field Crops Farms	0814 Sandstone Quarries
0141 Field Crop Combination Farms	0815 Shale Quarries
0151 Fruit Farms	0821 Sand & Gravel Pits
0152 Other Vegetable Farms	0911 Contract Drilling
0161 Mushrooms	0919 Services Incidental to Oil & Gas
0162 Greenhouse Products	0921 Contract Drilling Exc Oil & Gas
0163 Nursery Products	0929 Services Incidental to mining
0169 Other Horticultural Specialties	1011 Meat & Meat Products Exc Poultry
0171 Livestock	1012 Poultry Products Industry
0211 Veterinary Services	1021 Fish Products Industry
0212 Farm Animal Breeding Serv Exc Poultry	1031 Canned & Preserved Fruit & Veg
0213 Poultry Services	1032 Frozen Fruit & Vegetable Industry
0219 Services Incidental to Livestock	1041 Fluid Milk Industry
0221 Soil Prep Planting & Cultivating Services	1049 Other Dairy Products Industries
0222 Crop Dusting & Spraying Services	1051 Cereal Grain Flour Industry
0223 Harvesting	1052 Prepared Flour Mixes & Cereal Foods
0229 Services Incidental to Agric Crops	1053 Feed Industry
0231 Agric Management & Consulting Services	1061 Vegetable Oil Mills Exc Corn Oil
0239 Other Services Incidental to Agric	1071 Biscuit Industry
0311 Salt Water Fishing Industry	1072 Bread & Other Bakery Products
0312 Inland Fishing Industry	1081 Cane & Beet Sugar Industry
0321 Services Incidental to Fishing	1082 Chewing Gum Industry
0331 Furs & Skins	1083 Sugar & Chocolate Confectionery
0339 Other Trapping	1091 Tea & Coffee Industry
0411 Logging Industry Exc Contract Logging	1092 Dry Pasta Products Industry
0412 Contract Logging Industry	1099 Other food Products Industries nec
0511 Forestry Services Industry	1111 Soft Drink Industry
0611 Gold Mines	1121 Distillery Products Industry
0612 Copper & Copper Zinc Mines	1131 Brewery Products Industry
0613 Nickel Copper Mines	1141 Wine Industry
0614 Silver Lead Zinc Mines	1211 Leaf Tobacco Industry
0615 Molybdenum Mines	1221 Tobacco Products Industry

1511 Tire & Tube Industry	2612 Upholstered Household Furniture
1521 Rubber Hose & Belting Industry	2619 Other Household Furniture
1599 Other Rubber Products Industries	2691 Bed Spring & Mattress Industry
1611 Foamed & Expanded Plastic Prod	2692 Hotel & Restaurant Furniture
1621 Plastic Pipe & Pipe Fittings	2699 Other furniture & Fixture
1631 Plastic Film & Sheeting Industry	2711 Pulp Industry
1691 Plastic Bag Industry	2712 Newsprint Industry
1699 Other Plastic Products Industries	2713 Paperboard Industry
1711 Leather Tanneries	2714 Building Board Industry
1712 Footwear Industry	2719 Other Paper Industries
1713 Luggage	2721 Asphalt Roofing Industry
1719 Other Leather & Allied Products	2731 Folding Carton & Set up Box
1811 Man Made Fibre & Filament Yarn	2732 Corrugated Box Industry
1821 Wool Yarn & Woven Cloth	2733 Paper Bag Industry
1829 Other Spun Yarn & Woven Cloth	2791 Coated & Treated Paper Industry
1831 Broad Knitted Fabric Industry	2792 Stationery Paper Products Industry
1911 Narrow Fabric Industry	2793 Paper Consumer Products Industry
1921 Carpet	2799 Other Converted Paper Products
1931 Canvas & Related Products	2811 Business Forms Printing Industry
1992 Contract Textile Dyeing & Finishing	2819 Other Commercial Printing
1993 Household Products of Textile Materials	2821 Platemaking
1994 Hygiene Products of Textile Materials	2831 Book Publishing Industry
1995 Tire Cold Fabric Industry	2839 Other Publishing Industries
1999 Other Textile Products Industries	2841 Newspapers
2241 Women's Coat & Jacket Industry	2849 Other Combined Publishing & Printing
2431 Men's & Boys' Coat Industry	2911 Ferro Alloy Industry
2432 Men's & Boys' Suit & Jacket	2912 Steel Foundries
2433 Men's & Boys' Pants Industry	2919 Other Primary Steel Industries
2434 men's & Boys' Shirt & Underwear	2921 Steel Pile & Tube Industry
2435 Men's Boys' Clothing Contractors	2941 Iron Foundries
2441 Women's Coat & Jacket Industry	2951 Primary Production of Aluminium
2442 women's Sportswear Industry	2959 Other Non Ferrous Smelting & Refining
2443 Women's Dress Industry	2961 Aluminium Rolling
2444 Women's Blouse & Shirt Industry	2971 Copper Rolling
2445 Women's Clothing Contractors	2999 Other Metal Rolling
2451 Children's Clothing Industry	3011 Power boiler & Heat Exchanger
2491 Sweater Industry	3021 Metal Tanks (Heavy Gauge)
2492 Occupational Clothing Industry	3022 Plate work Industry
2493 Glove Industry	3023 Pre eng Metal Bldgs Exc Portable
2494 Hosiery Industry	3029 Other Fabricated Structural Metal
2495 Food Goods Industry	3031 Metal door & Windows Industry
2496 Foundation Garment Industry	3032 Prefabricated Portable Metal Bldg
2499 Other Clothing & Apparel	3039 Ornamental & Architect Metal
2511 Single & Shake Industry	3041 Custom Coating of Metal Products
2512 Sawmill & Planning Mill Products	3042 Metal Closure & Container
2521 Hardwood Veneer & Plywood	3049 Other Stamped & Pressed Metal
2522 Softwood Veneer & Plywood	3051 Upholstery & Coil Spring Industry
2541 Prefabricated Wooden Building	3052 Wire & Wire Rope Industry
2542 Kitchen Cabinet & Bathroom Vanity	3053 Industrial Fastener Industry
2543 Wooden Door & Window Industry	3059 Other Wire Products Industries
2549 Other Millwork Industries	3061 Basic Hardware Industry
2561 Wooden Box & Pallet Industry	3062 Metal Dies
2581 Coffin & Casket Industry	3063 Hand Tool & Implement Industry
2591 Wood Preservation Industry	3069 Other Hardware & Cutlery
2592 Particle board Industry	3071 Heating Equipment Industry
2593 Wafer Board Industry	3081 Machine Shop Industry
2599 Other Wood Industries nec	3091 Metal Plumbing Fixtures & Fittings
2611 Wooden Household Furniture	3092 Metal Valve Industry



3099 Other Metal Fabricating Industries	3592 Asbestos Products Industry
3111 Agricultural Implement Industry	3593 Gypsum Products Industry
3121 Commercial Refrigeration Equipment	3594 Non Metallic Mineral Insulating Material
3191 Compressor	3599 Other Non Metallic Mineral Products nec
3192 Construction Mining & Handling	3611 Petroleum Products Exc lub Oil
3193 Sawmill & Woodworking Machinery Industry	3612 Lubricating Oil & Grease Industry
3194 Turbine & Power Transmission Equipment	3699 Other Petroleum & Coal Products
3199 Other Machinery & Equipment	3711 Industrial Inorganic Chemical nec
3211 Aircraft & Aircraft Parts Industry	3712 Industrial Organic Chemical nec
3231 Motor Vehicle Industry	3721 Chemical Fertilizers Industry
3241 Truck & Bus Body Industry	3722 Mixed Fertilizer Industry
3242 Commercial Trailer Industry	3729 Other Agricultural Chemical
3243 Non Commercial Trailer Industry	3731 Plastic & Synthetic Resin Industry
3244 Mobile Home Industry	3741 Pharmaceutical & Medicine
3251 Motor Vehicle Engine & Engine Parts	3751 Paint & Varnish Industry
3252 Electronic Parts & Components	3761 Soap & Cleaning Compounds
3253 Motor Vehicle Stamping Industry	3771 Toilet Preparation Industry
3254 Motor Vehicle Steering & Suspension	3791 Printing Ink Industry
3255 Motor Vehicle Wheel & Brake	3792 Adhesives Industry
3256 Motor Vehicle Plastic Parts	3799 Other Chemical Products
3257 Motor Vehicle Fabric Accessories	3911 Indicating & Recording Instruments
3259 Other Motor Vehicle Accessories & Parts	3912 Other Instruments & Related Products
3261 Railroad rolling Stock Industry	3913 Clock & Watch Industry
3262 Railroad Rolling Stock Industry	3914 Ophthalmic Goods Industry
3271 Shipbuilding & Repair Industry	3921 Jewelry & Silverware Industry
3281 Boatbuilding & Repair Industry	3922 Precious Metal Secondary Refining
3299 Other Transportation Equipment	3931 Sporting Goods Industry
3311 Small Electrical Appliances	3932 Toys & Games Industry
3321 Major Appliances (Electric & Non Electric)	3971 Sign & Display Industry
3331 Lighting Fixture Industry	3991 Broom
3332 Electric Lamp & Shade Industry	3992 Button
3333 Electric Lamp (Bulb & Tube)	3993 Floor Tile
3341 Record Players	3994 Musical Instrument & Sound Recording
3351 Telecommunication Equipment	3999 Other Manufactured Products Inds
3352 Electronic Parts & Components	4011 Single Family Housing
3359 Other Electronic Equipment	4012 Apartment & Other Multiple Housing
3361 Electronic Computers & Peripheral Equipment	4013 Residential Renovation
3362 Electronic Business Machines	4021 Mfg & Light Industrial Building
3369 Other Office	4022 Commercial Building
3371 Electrical Transformer Industry	4023 Institutional Building
3372 Electrical Switchgear & Protective Equipment	4111 Power Plants Exc Hydroelectric
3379 Other Electrical Industrial Equipment	4112 Energy Related Structures Exc Pipelines
3381 Communications & Energy Wire & Cable	4113 Gas & Oil Pipelines
3391 Battery Industry	4119 Other Industrial Construction
3392 Non Current Carrying Wiring Devices	4121 Highways
3399 Other Electrical Products nec	4122 Waterworks & Sewage Systems
3511 Clay Products Ind (From Domestic Clay)	4123 Hydro Power Plants Exc Trans Lines
3512 Clay Products Ind (From Imported Clay)	4124 Power & Telecomm Transmission Lines
3521 Hydraulic Cement Industry	4129 Other Heavy Construction
3541 Concrete Pipe Industry	4211 Wrecking & Demolition
3542 Structural Concrete Products	4212 Water Well Drilling
3549 Other Concrete Products Industries	4213 Septic System Installation
3551 Ready Mix Concrete Industry	4214 Excavating & Grading
3561 Primary Glass & Containers	4215 Equipment Rental (With Operator)
3562 Glass Products Exc Containers Ind	4216 Asphalt Paving
3571 Abrasives Industry	4217 Fencing Installation
3581 Lime Industry	4219 Other Site Work
3591 Refractories Industry	4221 Piledriving work

4222 Form Work	4555 Marine Shipping Agencies
4223 Steel Reinforcing	4559 Other Services Incidental to Water Transport
4224 Concrete Pouring & Finishing	4561 General Freight Trucking Industry
4225 Precast Concrete Installation	4562 Used Goods Moving & Storage
4226 Rough & Framing Carpentry	4563 Bulk Liquids Trucking Industry
4227 Structural Steel Erection	4564 Dry Bulk Materials Trucking
4231 Masonry Work	4565 Forest Products Trucking Industry
4232 Siding Work	4569 Other Truck Transport Industries
4233 Glass & Glazing Work	4571 Urban Transit Systems Industry
4234 Insulation Work	4572 Interurban & Rural Transit Systems
4235 Roof Shingling	4573 School Bus Operations Industry
4236 Sheet Metal & Built Up Roofing	4574 Charter & Sightseeing Bus Services
4239 Other Exterior Close in Work	4575 Limousine Service to Airports & Stations
4241 Plumbing	4581 Taxicab Industry
4242 Dry Heating & Gas Piping Work	4589 Transportation Industries nec
4243 Wet Heating & Air Conditioning	4591 Highway
4244 Sheet Metal & Other Duct Work	4592 Freight Forwarding Industry
4251 Process Piping Work	4599 Other Serv Incidental to Transp
4252 Automatic Sprinkler System Installation	4611 Natural Gas Pipeline Transport
4253 Commercial Refrigeration Work	4612 Crude Oil Pipeline Transport
4254 Environmental Control Work	4619 Other Pipeline Transport
4256 Thermal Insulation Work	4711 Grain elevator Industry
4259 Other Mechanical Specialty Work	4791 Refrigerated Warehousing
4261 Electrical Work	4799 Other Storage & Warehousing nec
4271 Plastering & Stucco Work	4811 Radio Broadcasting Industry
4272 Drywall Work	4812 Television Broadcasting Industry
4273 Acoustical Work	4813 Combined Radio & TV Broadcasting
4274 Finish Carpentry	4814 Cable Television Industry
4275 Painting & Decorating Work	4821 Telecommunication Carriers
4276 Terrazzo & Tile Work	4839 Other Telecommunication
4277 Hardwood Flooring & Carpeting	4841 Postal Service Industry
4278 Resilient Flooring & Carpet Work	4842 Courier Service Industry
4279 Other Interior & Finishing Work	4911 Electric Power System Industry
4291 Elevator & Escalator Installation	4921 Gas Distribution Sstems Industry
4292 Ornamental & Misc Fab Metal Installation	4931 Water Systems Industry
4293 Residential Swimming Pool Installation	4999 Other Utility Industries nec
4299 Other Services to Const nec	5000 Wholesale Trade
4411 Project Management	5011 Livestock
4491 Land Developers	5012 Grain
4499 Other Services to Const nec	5019 Other Farm Products
4511 Scheduled Air Transport Industry	5111 Petroleum Products
4512 Non Scheduled Air Transport	5211 Confectionery
4513 Non Scheduled Air Transport	5212 Frozen Foods (Packaged)
4521 Airport Operations Industry	5213 Dairy Products
4522 Aircraft Rental Industry	5214 Poultry & Eggs
4523 Aircraft Servicing Industry	5215 Fish & Seafood
4529 Other Services Incidental to Air Transport	5216 Fresh Fruit & Vegetables
4531 Railway Transport Industry	5217 Meat & Meat Products
4532 Services Incidental to Railway Transport	5219 Other Foods
4541 Freight & Passenger Water Transp	5221 Non alcoholic Beverages
4542 Ferry Industry	5231 Drugs
4543 Marine Towing Industry	5232 Toilet Soaps & Preparations
4544 Ship Chartering Industry	5239 Sundries & Other Drug & Toilet Preparation
	Wholesale
4549 Other Water Transport Industries	5241 Tobacco Products
4551 Marine Cargo Handling Industry	5311 Men's
4552 Harbor & Port Operation	5312 Women's
4553 Marine Salvage Industry	5313 Women's
4554 Piloting Service	5314 Footwear

5319 Other Apparel  
 5321 Piece Goods  
 5329 Notions & Other Dry Goods  
 5411 Electrical Household Appliances  
 5412 Electronic Household Appliances  
 5421 Household Furniture  
 5431 China  
 5432 Floor Coverings  
 5433 Linens  
 5439 Other Household Furnishings  
 5511 Automobiles  
 5512 Trucks & Buses  
 5519 Other Motor Vehicles & Trailers  
 5521 Tires & Tubes  
 5529 Other Motor Vehicle Parts & Accessories  
 Wholesale  
 5611 Iron & Steel Primary Forms  
 5612 Other Iron & Steel Products  
 5613 Non Ferrous Metal & Metal Prod Wholesale  
 5619 Combination Metal & Metal Prod Wholesale  
 5621 Hardware  
 5622 Plumbing  
 5631 Lumber  
 5632 Paint  
 5639 Other Building Materials  
 5711 Farm Machinery  
 5721 Const & Forestry Mach Equip Wholesale  
 5722 Mining Mach Equip & Supplies  
 5731 Industrial Mach Equip & Supplies  
 5741 Elect Wiring Supplies & Const Materials  
 Wholesale  
 5742 Electrical Generators  
 5743 Electronic Mach & Equip Exc Computing  
 5744 Computer Mach  
 5749 Other Electrical Mach  
 5791 Office & Store Mach Equip & Supplies  
 5792 Service Mach Equip & Supplies  
 5793 Profess Mach Equip & Supplies  
 5799 Other mach Equip & Supplies nec Wholesale  
 5911 Automobile Wrecking  
 5919 Other Waste Materials  
 5921 Newsprint  
 5922 Stationery & Office supplies  
 5929 Other Paper & Paper Products  
 5931 Agricultural Feeds  
 5932 Seeds & Seed Processing  
 5939 Agric Chem & Other Farm Supplies  
 5941 Toys  
 5942 Amusement & Sporting Goods  
 5951 Photo Equip & Supplies  
 5952 Musical Instruments & Accessories  
 5961 Jewelry & Watches  
 5971 Industrial & Household Chemicals  
 5981 General Merchandise  
 5991 Books  
 5992 Second Hand Goods  
 5993 Forest Products  
 5999 Other Products nec  
 6011 Supermarkets  
 6012 Grocery Stores Exc Supermarkets  
 6013 Bakery Products Stores  
 6014 Candy & Nut Stores  
 6015 Fruit & Vegetable Stores  
 6016 Meat Markets  
 6019 Other Food (Specialty) Stores  
 6021 Liquor Stores  
 6022 Wine Stores  
 6023 Beer Stores  
 6031 Pharmacies  
 6032 Patent Medicine & Toiletries Stores  
 6111 Shoe Stores  
 6121 Men's Clothing Stores  
 6131 Women's Clothing Stores  
 6141 Children's Clothing Stores  
 6142 Fur Store  
 6149 Other Clothing Stores  
 6151 Fabric & Yarn Stores  
 6211 Hsld Furn Stores With Appliances  
 6212 Hsld Furn Stores Without Appliances  
 6213 Furniture Refining & Repair Shops  
 6221 Appliance Stores  
 6222 Television  
 6223 Appliance Repair Shops  
 6231 Floor Covering Stores  
 6232 Drapery Stores  
 6239 Other Household Furnishings Stores  
 6311 Automobile (New) Dealers  
 6312 Automobile (Used) Dealers  
 6321 Motor Home & Travel Trailer Dealers  
 6322 Boats  
 6323 Motorcycle & Snowmobile Dealers  
 6329 Other Recreational Vehicle Dealers  
 6331 Gasoline Service Stations  
 6341 Home & Auto Supply Stores  
 6342 Tire Stores  
 6351 Garages (General Repairs)  
 6352 Paint & Body Repair shops  
 6353 Muffler Replacement Shops  
 6354 Motor Vehicle Glass Replacement Shops  
 6355 Motor Veh Transm Rep & Replacement Shops  
 6359 Other Motor Vehicle Repair Shops  
 6391 Car Washes  
 6399 Other Motor Vehicle Services nec  
 6411 Department Stores  
 6412 General Stores  
 6413 Other General Merchandise Stores  
 6511 Book & Stationery Stores  
 6521 Florist Shops  
 6522 Lawn & Garden Centers  
 6531 Hardware Stores  
 6532 Paint  
 6541 Sporting Goods Stores  
 6542 Bicycle Shops  
 6551 Musical Instrument Stores  
 6552 Record & Tape Stores  
 6561 Jewelry Stores  
 6562 Watch & Jewelry Repair Shops  
 6571 Camera & Photographic Supply Stores  
 6581 Toy & Hobby Stores  
 6582 Gift

6591 Second-hand Merchandise Stores	7742 Media Representatives
6592 Opticians' Shops	7743 Outdoor Display & Billboard Advertising
6593 Art Galleries & Artists' Supply Stores	7749 Other Advertising Services
6594 Luggage & Leather Goods Stores	7751 Offices of Architects
6595 Monuments & Tombstone Dealers	7752 Offices of Engineers
6596 Pet Stores	7759 Other Scientific & Technical Services
6597 Coin & Stamp Dealers	7761 Offices of Lawyers & Notaries
6598 Mobile Home Dealers	7771 Management Consulting Services
6599 Other Retail Stores nec	7779 Other Business Services nec
6911 Vending Machine Operators	7791 Security & Investigation Services
6921 Direct Sellers	7792 Credit Bureau Services
7011 Central Bank	7793 Collection Agencies
7021 Chartered Banks	7794 Customs Brokers
7029 Other Banking Type Intermediaries	7795 Telephone Answering Services
7031 Trust Companies	7796 Duplicating Services
7041 Deposit Accepting Mortgage Co Exc Co op	7799 Other Business Services nec
7052 Central Credit Unions	8111 Defense Services (Federal)
7099 Other Deposit Accepting Intermediaries	8121 Courts of Law (Federal)
7111 Consumer Loan Companies	8122 Correctional Services (Federal)
7121 Sales Finance Companies	8123 Police Services (Federal)
7122 Credit Card Companies	8125 Regulatory Services (Federal)
7123 Factoring Companies	8129 Other Protective Services
7124 Financial Leasing Companies	8131 Labor & Employment Services
7125 Venture Capital Companies	8132 Immigration Services (Federal)
7129 Other Business Financing Companies	8139 Other Labor (Federal)
7211 Investment (Mutual) Funds	8141 Foreign Affairs (Federal)
7212 Retirement Savings Funds	8142 International Assistance (Federal)
7213 Segregated Funds	8151 Executive & Legislative Administration (Federal)
7214 Investment Companies	8152 Finance & Economic Administration (Federal)
7215 Holding Companies	8153 Taxation Administration (Federal)
7221 Mortgage Investment Companies	8154 Intergovernmental Affairs Administration (Federal)
7222 Real Estate Investment Trusts	8159 Other General Administrative Services (Federal)
7229 Other Mortgage Companies	8161 Health Administration (Federal)
7291 Trusteed Pension Funds	8162 Social Service Administration
7292 Estate	8163 Education Administration
7299 Other Investment Intermediaries	8164 Recreation & Culture Administration (Federal)
7311 Life Insurers	8171 Transp & Communication Administration (Federal)
7321 Deposit Insurers	8172 Resource Conservation & Ind Dev Administration (Federal)
	8173 Environment Administration
7331 Health Insurers	8174 Housing & Administration
7339 Other Property & Casualty Insurers	8175 Regional Planning & Development Administration
7341 Stock Exchanges	8176 Research Administration
7411 Investment Dealers	8221 Courts of Law (Provincial)
7412 Stock Brokers	8222 Correctional Services (Provincial)
7413 Commodity Brokers	8223 Police Services (Provincial)
7421 Mortgage Brokers	8224 Firefighting Services (Provincial)
7432 Commodity Exchanges	8225 Regulatory Services (Provincial)
7499 Other Financial Intermediaries nec	8229 Other Protective Services
7511 Oper of Residential Bldgs & Dwellings	8231 Labor & Employment Services
7512 Operators of Non Residential Bldgs	8251 Executive & Legislative Administration (Provincial)
7599 Other Real Estate Operators	8252 Finance & Economic Administration (Provincial)
7611 Insurance & Real Estate Agencies	8253 Taxation Administration
7711 Employment Agencies	8254 Intergovernmental Affairs Administration (Provincial)
7712 Personnel Suppliers	8259 Other General Administration Services (Provincial)
	8261 Health Administration
7720 Computer & Related Services	8262 Social Service Administration
7721 Computer Services	8263 Education Administration
7722 Computer Equip Maintenance & Repair	8264 Recreating & Culture Administration (Provincial)
7731 Offices of Chartered & Certified Accountants	8271 Transportation & Communication Admin (Provincial)
7739 Other Accounting & Bookkeeping Services	
7741 Advertising Agencies	

8272 Resource Conservation & Ind Dev Administration (Provincial)	8641 Child Day Care & Nursery School Services
8273 Environment Administration	8642 Child Welfare Services
8274 Housing Administration	8643 Family Planning Services
8275 Regional Planning & Development Admin	8644 Sheltered Workshops
8276 Research Administration	8645 Home Maker Services
8321 Courts of Law (Local)	8646 Meal Services (Non Commercial)
8322 Correctional Services (Local)	8647 Social Rehabilitation Services
8323 Police Services (Local)	8648 Crisis Intervention
8325 Regulatory Services (Local)	8649 Other Non-Institutional Social Services
8329 Other Protective Services (Local)	8651 Offices of Physicians
8351 Executive & Legislative Administration (Local)	8652 Offices of Phys & Surgeons
8352 Finance & Economic Administration (Local)	8653 Offices of Dentists
8353 Taxation Administration	8654 Offices of Dentists
8354 Intergovernmental Affairs Administration (Local)	8661 Offices of Chiropractors & Osteopaths
8359 Other General Administrative Services (Local)	8662 Offices of Nurses
8361 Health Administration (Local)	8663 Offices of Nurses
8362 Social Service Administration	8664 Offices of Nutritionists
8363 Education Administration	8665 Offices of Physio
8364 Recreation & Culture Administration (Local)	8666 Offices of Optometrists
8371 Transportation Administration	8667 Offices of Podiatrists & Chiropodists
8372 Resource Conservation & Ind Dev Administration (Local)	8668 Offices of Denturists
8373 Environment Administration	8669 Offices of Other Health Practitioners
8374 Housing Administration (Local)	8671 Offices of Psychologists
8375 Regional Planning & Development Admin (Local)	8672 Offices of Social Workers
8411 Intl & Other Extra territorial Agencies	8679 Offices of Other Social Serv Practitioners
8511 Elementary & Secondary Education	8681 Medical Laboratories
8521 Post Secondary Non university Education	8682 Radiological Laboratories
8531 University Education	8683 Combined Medical & Radiological Labs
8541 Library Services	8684 Public Health Laboratories
8551 Museums & Archives	8685 Blood Bank Laboratories
8594 Social Serv Planning & Advocacy Agencies	8689 Other Health Laboratories
8599 Other Educational Services	8691 Health & Public Safety Prom Associations
8611 General Hospitals	8692 Health Care Standards Agencies
8612 Rehabilitation Hospitals	8693 Health Care Research Agencies
8613 Extended Care Hospitals	8694 Social Planning & Advocacy Agencies
8614 Mental (Psychiatric) Hospitals	8699 Other Health & Social Service Associations
8615 Addiction Hospitals	9111 Hotels & Motor Hotels
8616 Nursing Stations & Outpost Hospitals	9112 Motels
8617 Children's (Pediatric) Hospitals	9113 Tourist Courts & Cabins
8619 Other specialty Hospitals	9114 Guest Houses & Tourist Homes
8621 Homes for Personal & Nursing Care	9121 Lodging Houses & Residential Clubs
8622 Homes Physically Handicapped or Disabled	9131 Camping Grounds & Travel Trailer Parks
8623 Homes for Mentally Retarded	9141 Outfitters ( Hunting & Fishing camps)
8624 Homes Mentally Handicapped or Disabled	9149 Other Recreation & Vacation Camps
8625 Homes for Emotionally Disturbed Children	9211 Restaurants
8626 Homes for Alcohol	9212 Rest Unlicensed (Including Drive Ins)
8627 Homes for Children in Need of Protection	9213 Take out Food Services
8628 Homes for Single Mothers	9214 Caterers
8629 Other Instit Health & Social Serv	9221 Taverns
8631 Ambulance Services	9611 Motion Picture & Video Production
8632 Addiction & Alcoholism Treatment Clinics	9612 Motion Picture & Video Distribution
8633 Health Rehabilitation Clinics	9613 Motion Pict Labs & Video Prod Facilities
8634 Home Care Serv (Including Home Nursing)	9614 Sound Recording Services
8635 Health Clinics	9619 Other Motion Pict Audio & Video Services
8639 Other Non Institutional Health Services	9621 Regular Motion Picture Theaters

9622 Outdoor Motion Picture Theatres  
9629 Other Motion Picture Exhibition  
9631 Entertainment Prod Companies & Artists  
9639 Other Theatrical & Staged Entertainment Services  
9641 Professional Sports Clubs  
9642 Prof Athletes & Promoters on Own Account  
9643 Horse Race Tracks  
9644 Other Race Tracks  
9651 Golf Courses  
9652 Curling Clubs  
9653 Skiing Facilities  
9654 Boat Rentals & Marinas  
9659 Other Sports & Recreation Clubs  
9661 Gambling Operations  
9691 Bowling Alleys & Billiard Parlors  
9692 Amusement Park  
9693 Dance Halls  
9694 Coin Operated Amusements Services  
9695 Roller Skating Facilities  
9696 Botanical & Zoological Gardens  
9699 Other Amuse & Recreational Serv  
9711 Barber Shops  
9712 Beauty Shops  
9713 Combination Barber & Beauty Shops  
9721 Power Laundries  
9722 Distributors or Agents for Dry Cleaners  
9723 Self Serve Laundries and  
9724 Valet Services  
9725 Linen supply  
9726 Carpet Cleaning  
9729 Other Laundry & Dry Cleaning Services  
9731 Funeral Homes  
9732 Cemeteries & Crematoria  
9741 Private Households  
9791 Shoe Repair  
9792 Fur Cleaning Repair & Storage  
9799 Other Personal & Household Services nec  
9811 Religious Organizations  
9821 Business Associations  
9831 Prof Health & Soc Serv Membership Associations  
9839 Other Professional Membership Associations  
9841 Labor Organizations  
9851 Political Organizations  
9861 Civic & Fraternal Organizations  
9911 Industrial Mach & Equip Rental & Leasing  
9912 Audiovisual Equipment Rental & Leasing  
9913 Office Furniture & Mach Rental & Leasing  
9919 Other Mach & Equip Rental & Leasing  
9921 Auto & Truck Rental & Leasing  
9931 Photographers  
9941 Electric Motor Repair  
9942 Welding  
9949 Other Repair Services nec  
9951 Disinfecting & Exterminating Services  
9952 Window Cleaning Services  
9953 Janitorial Services  
9959 Other Services to Buildings & Dwellings  
9961 Ticket & Travel Agencies  
9962 Tour Wholesalers & Operators  
9991 Parking Lots & Parking Garages  
9999 Other Services nec

## Appendix D

## FINAL SECTORS AS DEFINED BY ISIC (REVISION 3) GROUPINGS

Each sector in the final results is denoted as a *major section total*, *section total*, *subsection total* or single sector by font. Each has a sector number (left column), and the ISIC code for that sector or total (immediately preceding the sector name).

1	<b><u>A - Agriculture, hunting and forestry</u></b>
2	<b>01 - Agriculture, hunting and related service activities</b>
3	011 - Growing of crops; market gardening; horticulture
4	0111 - Growing of cereals and other crops n.e.c.
5	0112 - Growing of vegetables, horticultural specialties and nursery products
6	0113 - Growing of fruit, nuts, beverage and spice crops
7	<b>02 - Forestry, logging and related service activities</b>
8	<b><u>B - Fishing</u></b>
9	<b>05 - Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing</b>
10	<b><u>C - Mining and quarrying</u></b>
11	<b>10 - Mining of coal and lignite; extraction of peat</b>
12	<b>11 - Extraction of crude petroleum and nat. gas; services incidental to oil and gas extraction excluding surveying</b>
13	<b>12 - Mining of uranium and thorium ores</b>
14	<b>13 - Mining of metal ores</b>
15	<b>14 - Other mining and quarrying</b>
16	<b><u>D - Manufacturing</u></b>
17	<b>15 - Manufacture of food products and beverages</b>
18	<b>16 - Manufacture of tobacco products</b>
19	<b>17 - Manufacture of textiles</b>
20	<b>18 - Manufacture of wearing apparel; dressing and dyeing of fur</b>
21	<b>19 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear</b>
22	<b>20 - Manufacture of wood and products of wood and cork, except furniture; manuf. of articles of straw, plaiting</b>
23	<b>21 - Manufacture of paper and paper products</b>
24	<b>22 - Publishing, printing and reproduction of recorded media</b>
25	<b>23 - Manufacture of coke, refined petroleum products and nuclear fuel</b>
26	<b>24 - Manufacture of chemicals and chemical products</b>
27	241 - Manufacture of basic chemicals
28	242 - Manufacture of other chemical products
29	2421 - Manufacture of pesticides and other agro-chemical products
30	2422 - Manufacture of paints, varnishes and similar coatings, printing ink and mastics
31	2423 - Manufacture of pharmaceuticals, medicinal chemicals and botanical products
32	2424 - Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, toilet prep.
33	2429 - Manufacture of other chemical products n.e.c.

- 34                    243 - *Manufacture of man-made fibres*
- 35                    **25 - *Manufacture of rubber and plastics products***
- 36                    **26 - *Manufacture of other non-metallic mineral products***
- 37                    **27 - *Manufacture of basic metals***
- 38                    271 - *Manufacture of basic iron and steel*
- 39                    272 - *Manufacture of basic precious and non-ferrous metals*
- 40                    273 - *Casting of metals*
- 41                    2731 - *Casting of iron and steel*
- 42                    2732 - *Casting of non-ferrous metals*
- 43                    **28 - *Manufacture of fabricated metal products, except machinery and equipment***
- 44                    **29 - *Manufacture of machinery and equipment n.e.c.***
- 45                    **30 - *Manufacture of office, accounting and computing machinery***
- 46                    **31 - *Manufacture of electrical machinery and apparatus n.e.c.***
- 47                    3130 - *Manufacture of insulated wire and cable*
- 48                    **32 - *Manufacture of radio, television and communication equipment and apparatus***
- 49                    321 - *Manufacture of electronic valves and tubes and other electronic components*
- 50                    322 - *Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy*
- 51                    323 - *Manufacture of television and radio receivers, sound or video recording/reproducing apparatus*
- 52                    **33 - *Manufacture of medical, precision and optical instruments, watches and clocks***
- 53                    331 - *Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments*
- 54                    3311 - *Manufacture of medical and surgical equipment and orthopaedic appliances*
- 55                    3312 - *Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment*
- 56                    3313 - *Manufacture of industrial process control equipment*
- 57                    332 - *Manufacture of optical instruments and photographic equipment*
- 58                    333 - *Manufacture of watches and clocks*
- 59                    **34 - *Manufacture of motor vehicles, trailers and semi-trailers***
- 60                    **35 - *Manufacture of other transport equipment***
- 61                    351 - *Building and repairing of ships and boats*
- 62                    352 - *Manufacture of railway and tramway locomotives and rolling stock*
- 63                    353 - *Manufacture of aircraft and spacecraft*
- 64                    359 - *Manufacture of transport equipment n.e.c.*
- 65                    **36 - *Manufacture of furniture; manufacturing n.e.c.***
- 66                    **37 - *Recycling***
- 67                    **E - *Electricity, gas and water supply***
- 68                    40 - *Electricity, gas, steam and hot water supply*
- 69                    41 - *Collection, purification and distribution of water*
- 70                    **F - *Construction***
- 71                    45 - *Construction*
- 72                    **G - *Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods***
- 73                    50 - *Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel*
- 74                    51 - *Wholesale trade and commission trade, except of motor vehicles and motorcycles*
- 75                    515 - *Wholesale of machinery, equipment and supplies*
- 76                    52 - *Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods*
- 77                    **H - *Hotels and restaurants***



78	<i>55 - Hotels and restaurants</i>
79	<b><u>I - Transport, storage and communications</u></b>
80	<i>60 - Land transport; transport via pipelines</i>
81	<i>61 - Water transport</i>
82	<i>62 - Air transport</i>
83	<i>63 - Supporting and auxiliary transport activities; activities of travel agencies</i>
84	<i>64 - Post and telecommunications</i>
85	<i>641 - Post and courier activities</i>
86	<i>642 - Telecommunications</i>
87	<b><u>J - Financial intermediation</u></b>
88	<i>65 - Financial intermediation, except insurance and pension funding</i>
89	<i>66 - Insurance and pension funding, except compulsory social security</i>
90	<i>67 - Activities auxiliary to financial intermediation</i>
91	<b><u>K - Real estate, renting and business activities</u></b>
92	<i>70 - Real estate activities</i>
93	<i>71 - Renting of machinery and equipment without operator and of personal and household goods</i>
94	<i>7123 - Renting of office machinery and equipment (including computers)</i>
95	<i>72 - Computer and related activities</i>
96	<i>721 - Hardware consultancy</i>
97	<i>722 - Software consultancy and supply</i>
98	<i>723 - Data processing</i>
99	<i>724 - Data base activities</i>
100	<i>725 - Maintenance and repair of office, accounting and computing machinery</i>
101	<i>729 - Other computer related activities</i>
102	<i>73 - Research and development</i>
103	<i>74 - Other business activities</i>
104	<i>741 - Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy</i>
105	<i>742 - Architectural, engineering and other technical activities</i>
106	<i>743 - Advertising</i>
107	<i>749 - Business activities n.e.c.</i>
108	<b><u>L - Public administration and defense; compulsory social security</u></b>
109	<i>75 - Public administration and defense; compulsory social security</i>
110	<b><u>M - Education</u></b>
111	<i>80 - Education</i>
112	<i>801 - Primary education</i>
113	<i>802 - Secondary education</i>
114	<i>803 - Higher education</i>
115	<i>809 - Adult and other education</i>
116	<b><u>N - Health and social work</u></b>
117	<i>85 - Health and social work</i>
118	<b><u>O - Other community, social and personal service activities</u></b>
119	<i>90 - Sewage and refuse disposal, sanitation and similar activities</i>
120	<i>91 - Activities of membership organizations n.e.c.</i>
121	<i>92 - Recreational, cultural and sporting activities</i>
122	<i>93 - Other service activities</i>
123	<b><u>P - Private households with employed persons</u></b>
124	<i>95 - Private households with employed persons</i>
125	<b><u>Q - Extra-territorial organizations and bodies</u></b>
126	<i>99 - Extra-territorial organizations and bodies</i>

## Appendix E

## CONCORDANCE BETWEEN SIC AND ISIC SECTORS

This list records which SIC categories are recorded in the final sector ISIC-based definitions. Included is information on which SICs are ***included in the project***, ***entirely included according to the Statistics Canada definitions***, and ***partially included according to the Statistics Canada definitions***, all distinguished by font.

Sector	Name	<b><i>Included in project, in Statistics Canada, partially in Statistics Canada</i></b>
1	A - Agriculture, hunting and forestry	<b><i>0111-0199, 0212-0229, 0239, 0331-0339, 0400-0599, same</i></b>
2	01 - Agriculture, hunting and service	<b><i>0111-0199, 0212-0229, 0239, 0331-0339, same</i></b>
3	011 - Growing of crops	<b><i>0130-0169, same</i></b>
4	0111 - Growing of cereals	<b><i>0130-0149, 0130-0141, 0151, 0162, 0169</i></b>
5	0112 - Growing of vegetables	<b><i>0152-0169, 0152, 0161, 0163, 0151, 0159, 0162, 0169, 0171, 0229</i></b>
6	0113 - Growing of fruit, nuts	<b><i>0151, 0156, 0151, 0159, 0162, 0169, 0171, 1141</i></b>
7	02 - Forestry, logging and related	<b><i>0400-0599, 0412, 0511, 0169, 0229, 0411, 4513, 4565, 7599</i></b>
8	B - Fishing	<b><i>0310-0329, same</i></b>
9	05 - Fishing, fish hatcheries	<b><i>0310-0329, 0310-0329</i></b>
10	C - Mining and quarrying	<b><i>0600-0999, same</i></b>
11	10 - Mining of coal and lignite	<b><i>0622, 0631-0639, 0622, 0631-0639, 0711, 0929, 3699, 3699</i></b>
12	11 - Extraction of crude petroleum	<b><i>0700-0799, 0911-0919, 0712, 0911, 0919, 0711</i></b>
13	12 - Mining of uranium and thorium	<b><i>0616, 0616</i></b>
14	13 - Mining of metal ores	<b><i>0600-0615, 0617-0619, 0611-0615, 0619, 0616-0617</i></b>
15	14 - Other mining and quarrying	<b><i>0621, 0623-0629, 0800-0899, 0921, 0621, 0623-0629, 0800-0899, 0617, 3511, 3512, 3591</i></b>
16	D - Manufacturing	<b><i>1000-3999, 5521-5529, 5900-5919, 9613, 9942, same</i></b>
17	15 - Manufacture of food products	<b><i>1000-1199, 1000-1199 except 1011, 1099, 1141, 3999, 6013, 6014, 9213</i></b>
18	16 - Manufacture of tobacco	<b><i>1200-1299, 1211, 1221</i></b>
19	17 - Manufacture of textiles	<b><i>1821-1999, 1829, 1831, 1931, 1991, 1995, 1011, 1811, 1821, 1911, 1921, 1992-1999, 2431-2499, 2799, 3257, 3931, 3993, 3999</i></b>
20	18 - Manufacture of wearing apparel	<b><i>2200-2499, 2435, 2445, 2495, 1992, 1994, 1999, 2431-2434, 2441-2444, 2451, 2491-2499, 3999, 6121, 6131, 6142, 7799, 9799</i></b>
21	19 - Tanning and dressing of leather	<b><i>1700-1799, 1711, 1712, 1713, 1599, 1691, 1719</i></b>
22	20 - Manufacture of wood products	<b><i>2500-2599, 2500-2599, 2714, 0411, 1719, 1921, 2699, 3799, 3971, 3999</i></b>
23	21 - Manufacture of paper products	<b><i>2700-2719, 2730-2799, 2700-2719, 2731, 2732, 2792, 2793, 2492, 2733, 2791, 2799, 2819, 3999</i></b>
24	22 - Publishing, printing and media	<b><i>2800-2899, 3970-3979, 2831, 2841, 2811, 2839, 2849, 2819, 2821, 3971, 3994, 3999, 9613</i></b>
25	23 - Manufacture of coke, petroleum	<b><i>3600-3699, 3611, 3612, 2919, 2959, 3699, 3711, 3712</i></b>
26	24 - Chemicals, chemical products	<b><i>3700-3799, same</i></b>

<b>Sector</b>	<b>Name</b>	<b><i>Included in project, in Statistics Canada, partially in Statistics Canada</i></b>
27	241 - Manufacture of basic chems	<b><u>3700-3719, 3730-3739</u></b> , <b>3721, 3722, 3731, 3711, 3712, 3799</b>
28	242 - Other chemical products	<b><u>3721-3729, 3741-3799</u></b> , same
29	2421 - Manufacture of pesticides	<b><u>3720-3729, 3729</u></b> , 3799
30	2422 - Manufacture of paints, ink	<b><u>3750-3759, 3791-3792</u></b> , <b>3751, 3791</b> , 3792, 3799, 3999
31	2423 - Pharmaceuticals, medicinal	<b><u>3740-3749, 3741</u></b> , 1994, 3712, 3799, 3912, 3922
32	2424 - Soap and detergents	<b><u>3760-3771, 3771</u></b> , 1994, 2791, 3712, 3761, 3799
33	2429 - Other chemical products	<b><u>3799</u></b> , 1099, 2791, 3199, 3711, 3712, 3792, 3799, 3912, 3932, 3994, 3999
34	243 - Man-made fibres	<b><u>1811</u></b> , 1811, 1999
35	25 - Rubber and plastics products	<b><u>1500-1699, 5521, 1511, 1521, 1621, 1631, 1611</u></b> , 1599, 1691, 1699, 1719, 1821, 1993, 1999, 2431-2451, 2493, 2499, 3256, 3331, 3332, 3931, 3971, 3993, 3999, 5521
36	26 - Other non-metallic mineral	<b><u>2720-2729, 3500-3599, 3561, 3562, 3521, 3581, 3541, 3542, 3549, 3551, 2721, 3571, 3592, 3593, 3594, 3599</u></b> , 1811, 2492, 2493, 3259, 3332, 3399, 3511, 3512, 3591, 3699, 3799, 3999
37	27 - Basic metals	<b><u>2911-2999</u></b> , same
38	271 - Basic iron and steel	<b><u>2911, 2919, 2920-2929, 2911, 2921</u></b> , 2919, 2941, 3052, 3099
39	272 - Precious, non-ferrous metals	<b><u>2960-2999, 3922, 2951</u></b> , 2959, 2961, 2971, 2999, 3059, 3099, 3922
40	273 - Casting of metals	<b><u>2912, 2941-2959</u></b> , same
41	2731 - Casting of iron and steel	<b><u>2912, 2940-2949, 2912</u></b> , 2941
42	2732 - Casting non-ferrous metals	2961, 2971, 2999
43	28 - Fabricated metal products	<b><u>3000-3069, 3023, 3029, 3031, 3032, 3041, 3042, 3051, 3053</u></b> , 1719, 2699, 2733, 2799, 2941, 2961, 2971, 2999, 3011, 3021, 3022, 3039, 3049, 3052, 3059, 3061, 3062, 3063, 3069, 3071, 3081, 3091, 3092, 3099, 3111, 3192, 3194, 3211, 3254, 3259, 3261, 3761, 3921, 3931, 3971, 3992, 3999, 4243, 5731, 9942, 9949
44	29 - Machinery and equipment n.e.c.	<b><u>3070-3199, 3300-3329, 3359, 3121, 3191, 3193, 3311, 3321</u></b> , 1599, 2581, 2999, 3011, 3021, 3022, 3049, 3062, 3063, 3069, 3071, 3081, 3091, 3092, 3099, 3111, 3192, 3194, 3199, 3211, 3241, 3251, 3254, 3259, 3261, 3299, 3359, 3362, 3369, 3379, 3799, 3911, 3912, 3999, 5529, 5711, 5721, 5722, 5731, 5791, 5792, 5799, 5971, 9949
45	30 - Office and computing mach	<b><u>3360-3369</u></b> , 3049, 3199, 3361, 3362, 3369
46	31 - Electrical mach. and apparatus	<b><u>3381-3399</u></b> , same
47	3130 - Insulated wire and cable	<b><u>3381-3389</u></b> , 3381, 3399
48	32 - Radio, television equipment	<b><u>3340-3352, 9613</u></b> , same
49	321 - Electronic valves and tubes	<b><u>3352</u></b> , 3352, 3372, 3379
50	322 - Television and radio lines	<b><u>3351</u></b> , 3351, 3359, 5743
51	323 - Television and radio receivers	<b><u>3340-3349, 9613, 3341</u></b> , 3351, 3352, 3359, 3362, 3912, 5743
52	33 - Medical, precision instruments	<b><u>3911-3914</u></b> , same
53	331 - Med. appliances, instruments	<b><u>3911-3912</u></b> , same
54	3311 - Medical, surgical equipment	2692, 3369, 3912, 3999, 5793, 6111
55	3312 - Instruments for measuring	<b><u>3911-3912</u></b> , 3063, 3099, 3199, 3359, 3911, 3912, 3999, 5793, 9949
56	321 - Indus. process control equip	3359, 3361, 3911, 3912, 5743, 5792
57	332 - Optical instruments	<b><u>3914, 3914</u></b> , 3199, 3381, 3912, 3999, 5792, 5793
58	333 - Watches and clocks	<b><u>3913, 3913</u></b> , 3911, 3921
59	34 - Motor vehicles, trailers	<b><u>3230-3259, 5529, 3231, 3242, 3243, 3244, 3253, 3255</u></b> , 1699 3081, 3192, 3199, 3241, 3251, 3252, 3254, 3256, 3257, 3259, 3261, 3299, 5529, 9942
60	35 - Other transport equipment	<b><u>3210-3219, 3261-3299, 9942</u></b> , same
61	351 - Building of ships and boats	<b><u>3270-3289, 3281</u></b> , 1599, 1699, 3021, 3022, 3039, 3271, 5919

<b>Sector</b>	<b>Name</b>	<b>Included in project, in Statistics Canada, partially in Statistics Canada</b>
62	352 - Railway and tramway	<u>3260-3269</u> , 3260-3269, 3071, 3192, 3261
63	353 - Aircraft and spacecraft	<u>3210-3219</u> , 3211, 3352, 3359
64	359 - Transport equipment n.e.c.	2692, 3059, 3111, 3199, 3299, 3931, 3999, 9949
65	36 - Furniture; manufacturing n.e.c.	<u>2600-2699</u> , <u>3921</u> , <u>3930-3939</u> , <u>3990-3999</u> , <u>9942</u> , <u>2542</u> , <u>2611</u> , <u>2612</u> , <u>2619</u> , <u>2641</u> , <u>2649</u> , <u>2691</u> , <u>3991</u> , 1599, 1699, 1719, 1999, 2581, 2692, 2699, 2799, 3049, 3059, 3061, 3199, 3257, 3259, 3799, 3921, 3931, 3932, 3971, 3992, 3993, 3994, 3999, 9949, 9999
66	37 - Recycling	<u>5900-5919</u> , 1599, 1699, 1811, 1911, 2999, 5919
67	E - Electricity, gas and water supply	<u>4900-4999</u> , same
68	40 - Electricity, gas, steam	<u>4900-4929</u> , 3699, 4911, 4921, 4999
69	41 - Collection, purification of water	<u>4930-4939</u> , 4931
70	F - Construction	<u>4010-4499</u> , same
71	45 - Construction	<u>4010-4499</u> , same except 4243, 4299, 4499, 0221, 0929, 3271, 4532, 4591, 4921, 9959
72	G - Wholesale and retail trade	<u>5000-5519</u> , <u>5600-5899</u> , <u>5920-6999</u> , <u>9790-9799</u> , <u>9941</u> , <u>9949</u> , same
73	50 - Sale of motor vehicles	<u>5100-5199</u> , <u>5500-5519</u> , <u>6300-6321</u> , <u>6323-6341</u> , <u>6351-6399</u> , <u>9941</u> 5511, 5512, 5519, 6311, 6312, 6321, 6323, 6331, 6341, 6351, 6352, 6353, 6354, 6355, 6359, 6391, 6399, 5521, 5529, 5911, 6329, 6342, 9654, 9941
74	51 - Wholesale trade	<u>5000-5499</u> , <u>5600-5899</u> , <u>5920-5999</u> , <u>9790-9799</u> , <u>9949</u> , same
75	515 - Wholesale of machinery	<u>5700-5799</u> , <u>5922</u> , <u>5742</u> , 5529, 5700-5799, 5922, 5942, 5971, 5999
76	52 - Retail trade, except vehicles	<u>6000-6299</u> , <u>6322</u> , <u>6342</u> , <u>6400-6999</u> , <u>9790-9799</u> , <u>9949</u> , same except 5111, 5631, 5639, 5744, 5791, 6013, 6014, 6111, 6121, 6131, 6142, 6329, 6342, 6571, 6593, 6599, 9724, 9792, 9949, 9999
77	H - Hotels and restaurants	<u>9100-9141</u> , <u>9200-9299</u> , same
78	55 - Hotels and restaurants	<u>9100-9141</u> , <u>9200-9299</u> , same except 4532, 8111, 9149, 9213, 9861
79	I - Transport, storage and comm.	<u>4500-4899</u> , <u>9960-9991</u> , same
80	60 - Land transport	<u>4531</u> , <u>4561-4591</u> , <u>4600-4699</u> , <u>4531</u> , <u>4563</u> , <u>4569</u> , <u>4571</u> , <u>4573</u> , <u>4574</u> , <u>4575</u> , <u>4612</u> , <u>4619</u> , 4532, 4561, 4562, 4564, 4565, 4572, 4581, 4589, 4611, 4841, 9699
81	61 - Water transport	<u>4540-4549</u> , <u>4541</u> , <u>4542</u> , <u>4544</u> , <u>4549</u> , 4543
82	62 - Air transport	<u>4500-4519</u> , 4511, 4512, 4513, 4599
83	63 - Supporting transport activities	<u>4520-4529</u> , <u>4532</u> , <u>4550-4559</u> , <u>4592</u> , <u>4700-4799</u> , <u>7794</u> , <u>9960-9991</u> , <u>4551</u> , <u>4553</u> , <u>4554</u> , <u>4555</u> , <u>4559</u> , <u>4592</u> , <u>4711</u> , <u>4791</u> , <u>4799</u> , <u>5552</u> , <u>7794</u> , <u>9961</u> , <u>9962</u> , 4521, 4523, 4529, 4532, 4543, 4561, 4562, 4572, 4581, 4591, 4599, 4611, 7771, 7799, 9654, 9792, 9799, 9991
84	64 - Post and telecommunications	<u>4800-4899</u> , same
85	641 - Post and courier activities	<u>4841-4842</u> , <u>4842</u> , 4511, 4512, 4589, 4841
86	642 - Telecommunications	<u>4800-4839</u> , <u>7795</u> , <u>4814</u> , <u>4821</u> , 4811, 4812, 4813, 4839, 7795
87	J - Financial intermediation	<u>7000-7499</u> , same
88	65 - Financial intermediation	<u>7000-7299</u> , <u>7490-7499</u> , same except 7099, 7211, 7215, 7299, 7499
89	66 - Insurance and pension funding	<u>7300-7399</u> , <u>7213</u> , <u>7311</u> , <u>7212</u> , <u>7291</u> , <u>7321</u> , <u>7339</u> , 7299, 7331, 9799
90	67 - Auxiliary to financial intermed.	<u>7400-7439</u> , same except 7499, 7099, 7211, 7611, 7799, 9999
91	K - Real estate, renting and business	<u>231</u> , <u>7500-7599</u> , <u>8693</u> , <u>9900-9929</u> , <u>9931</u> , same
92	70 - Real estate activities	<u>7500-7699</u> , <u>4491</u> , <u>7511</u> , <u>7512</u> , 7599, 7611
93	71 - Renting of machinery	<u>9900-9929</u> , same
94	7123 - Renting of office machinery	<u>9913</u> , 7721, 9913
95	72 - Computer and related activities	<u>7720-7729</u> , <u>8693</u> , same
96	721 - Hardware consultancy	7721

<b>Sector</b>	<b>Name</b>	<b><i>Included in project, in Statistics Canada, partially in Statistics Canada</i></b>
97	722 - Software consultancy	<u>7721</u>
98	723 - Data processing	<u>7721</u>
99	724 - Data base activities	<u>7721, 7799</u>
100	725 - Maintenance of office mach.	<u>7722, 7722, 5791</u>
101	729 - Other computer activities	
102	73 - Research and development	<u>7759, 8693, 239, 8693, 7759, 7799, 8599, 8694, 9999</u>
103	74 - Other business activities	<u>231, 7700-7719, 7730-7799, 9931, same</u>
104	741 - Legal, accounting, consultancy	<u>231, 7730-7739, 7761-7771, 7730-7739, 231, 7215, 7741, 7749, 7761, 7771, 7799, 8599, 8671, 9999</u>
105	742 - Architectural, engineering	<u>7751-7752, 4411, 7751, 7752, 229, 929, 4513, 7759, 7799</u>
106	743 - Advertising	<u>7740-7749, 7742, 7743, 4513, 7741, 7749</u>
107	749 - Business activities n.e.c.	<u>7700-7719, 7790-7793, 7796-7799, 9931, 7711, 7712, 7791-7793, 9952, 9953, 9931, 7796, 2821, 4299, 4499, 4513, 4523, 6571, 6599, 7749, 7795, 7799, 9639, 9799, 9949, 9951, 9959, 9999</u>
108	L - Public administration	<u>8100-8399, 8692, same</u>
109	75 - Public administration	<u>8100-8399, 8692, same except 109, 321, 7331, 7761, 7799, 8111, 8151, 8251, 8364, 8411, 8692, 9661, 9999</u>
110	M - Education	<u>0211, 8500-8549, 8590-8599, 8600-8691, 8694, same</u>
111	80 - Education	<u>0211, 8500-8549, 8590-8599, 8600-8691, 8694, same</u>
112	801 - Primary education	<u>8511</u>
113	802 - Secondary education	<u>8511</u>
114	803 - Higher education	<u>8520-8539, 8531, 8111, 8521</u>
115	809 - Adult and other education	<u>8599, 4513, 4529, 8521, 8599</u>
116	N - Health and social work	<u>0211, 8600-8691, 8694, same</u>
117	85 - Health and social work	<u>0211, 8600-8691, 8694, same except 4513, 7759, 8599, 8624, 8639, 8671, 8691, 8694, 9799</u>
118	O - Other community, social activ.	<u>8550-8559, 8699, 9149, 9600-9612, 9614-9739, 9800-9899, 9950-9959, 9999, same</u>
119	90 - Sewage and refuse disposal	<u>9950-9959, 4521, 4564, 4591, 4599, 4999, 9959, 9999</u>
120	91 - Membership organizations	<u>8699, 9800-9899, same except 8691, 8692, 8694, 9811, 9821, 9861, 9999</u>
121	92 - Recreational, cultural, sporting	<u>8550-8559, 9149, 9600-9612, 9614-9699, same except 4513, 4811-4813, 4839, 6593, 7799, 8151, 8251, 8264, 8364, 8541, 8639, 9149, 9613, 9639, 9654, 9661, 9699, 9799, 9811, 9821, 9919, 9999</u>
122	93 - Other service activities	<u>9700-9739, 9999, same except 9699, 9724, 9732, 9792, 9799, 9919, 9991, 9999</u>
123	P - Private households	<u>9740-9749, same</u>
124	95 - Private households	<u>9740-9749, 9741</u>
125	Q - Extra-territorial organizations	<u>8400-8499, same</u>
126	99 - Extra-territorial organizations	<u>8400-8499, 8411</u>

## Appendix F

**SUMMARISED RESULTS OF CONCORDANCE FOR EPO PATENTS 1998-99**

This appendix summarises the results of the OTC run for EPO patent applications published in 1998 and 1999, simply presenting row and column totals to indicate the relative importance of each industry of manufacture (IOMs in rows) and sector of use (SOUs in columns).

<b>Sector</b>		<b>Total by IOM</b>		<b>Total by SOU</b>	
<b>1</b>	<b><i>A - Agriculture, hunting and forestry</i></b>	<b><u>10</u></b>	<b><u>0.04</u></b>	<b><u>338</u></b>	<b><u>1.36</u></b>
<b>2</b>	<b><i>01 - Agriculture, hunting and related</i></b>	<b><u>10</u></b>	<b><u>0.04</u></b>	<b><u>309</u></b>	<b><u>1.24</u></b>
<b>3</b>	<b><i>011 - Growing of crops; market gardening</i></b>	<b><u>1</u></b>	<b><u>0.00</u></b>	<b><u>162</u></b>	<b><u>0.65</u></b>
4	0111 - Growing of cereals and other crops	0	0.00	137	0.55
5	0112 - Growing of vegetables, horticultural	1	0.00	23	0.09
6	0113 - Growing of fruit, nuts, beverage	0	0.00	2	0.01
7	<i>02 - Forestry, logging and related service</i>	<i>0</i>	<i>0.0</i>		<i>29</i>
<b>8</b>	<b><i>B - Fishing</i></b>	<b><u>0</u></b>	<b><u>0.00</u></b>	<b><u>29</u></b>	<b><u>0.12</u></b>
9	<i>05 - Fishing, operation of fish hatcheries</i>	<i>0</i>	<i>0.00</i>	<i>29</i>	<i>0.12</i>
<b>10</b>	<b><i>C - Mining and quarrying</i></b>	<b><u>6</u></b>	<b><u>0.02</u></b>	<b><u>254</u></b>	<b><u>1.02</u></b>
11	<i>10 - Mining of coal and lignite</i>	<i>3</i>	<i>0.01</i>	<i>6</i>	<i>0.02</i>
12	<i>11 - Extraction of crude petroleum, nat gas</i>	<i>2</i>	<i>0.01</i>	<i>194</i>	<i>0.78</i>
13	<i>12 - Mining of uranium and thorium ores</i>	<i>0</i>	<i>0.00</i>	<i>2</i>	<i>0.01</i>
14	<i>13 - Mining of metal ores</i>	<i>1</i>	<i>0.00</i>	<i>31</i>	<i>0.12</i>
15	<i>14 - Other mining and quarrying</i>	<i>0</i>	<i>0.00</i>	<i>9</i>	<i>0.04</i>
<b>16</b>	<b><i>D - Manufacturing</i></b>	<b><u>24915</u></b>	<b><u>99.94</u></b>	<b><u>17092</u></b>	<b><u>68.56</u></b>
17	<i>15 - Manufacture of food products</i>	<i>133</i>	<i>0.53</i>	<i>469</i>	<i>1.88</i>
18	<i>16 - Manufacture of tobacco products</i>	<i>8</i>	<i>0.03</i>	<i>34</i>	<i>0.13</i>
19	<i>17 - Manufacture of textiles</i>	<i>158</i>	<i>0.63</i>	<i>223</i>	<i>0.89</i>
20	<i>18 - Manufacture of wearing apparel</i>	<i>29</i>	<i>0.12</i>	<i>66</i>	<i>0.26</i>
21	<i>19 - Tanning and dressing of leather</i>	<i>42</i>	<i>0.17</i>	<i>59</i>	<i>0.24</i>
22	<i>20 - Manufacture of wood products</i>	<i>53</i>	<i>0.21</i>	<i>89</i>	<i>0.36</i>
23	<i>21 - Manufacture of paper products</i>	<i>187</i>	<i>0.75</i>	<i>304</i>	<i>1.22</i>
24	<i>22 - Publishing, printing and reproduction</i>	<i>89</i>	<i>0.36</i>	<i>439</i>	<i>1.76</i>
25	<i>23 - Manufacture of coke, refined petroleum</i>	<i>56</i>	<i>0.22</i>	<i>157</i>	<i>0.63</i>
<b>26</b>	<b><i>24 - Manufacture of chemical products</i></b>	<b><u>4 929</u></b>	<b><u>19.77</u></b>	<b><u>2 851</u></b>	<b><u>11.43</u></b>
27	<i>241 - Manufacture of basic chemicals</i>	<i>2 103</i>	<i>8.44</i>	<i>887</i>	<i>3.56</i>
28	<i>242 - Manufacture of other chemical</i>	<i>2 825</i>	<i>11.33</i>	<i>1 880</i>	<i>7.54</i>
29	<i>2421 - Manufacture of pesticides</i>	<i>89</i>	<i>0.36</i>	<i>142</i>	<i>0.57</i>
30	<i>2422 - Manufacture of paints</i>	<i>248</i>	<i>1.00</i>	<i>153</i>	<i>0.61</i>
31	<i>2423 - Manufacture of pharmaceuticals</i>	<i>1 498</i>	<i>6.01</i>	<i>1 104</i>	<i>4.43</i>
32	<i>2424 - Manufacture of soap and</i>	<i>199</i>	<i>0.80</i>	<i>175</i>	<i>0.70</i>

Sector		Total by IOM		Total by SOU	
33	2429 - Manufacture of other chemical	791	3.17	307	1.23
34	243 - Manufacture of man-made fibres	0	0.00	83	0.33
35	25 - Manufacture of rubber and plastics	714	2.86	747	3.00
36	26 - Manufacture of other non-metallic	271	1.09	247	0.99
<b>37</b>	<b>27 - Manufacture of basic metals</b>	<b>146</b>	<b>0.59</b>	<b>257</b>	<b>1.03</b>
38	271 - Manufacture of basic iron and steel	94	0.38	137	0.55
39	272 - Manufacture of basic precious metals	41	0.16	74	0.30
40	273 - Casting of metals	11	0.05	46	0.19
41	2731 - Casting of iron and steel	11	0.05	46	0.19
42	2732 - Casting of non-ferrous metals	0	0.00	0	0.00
43	28 - Manufacture of fabricated metal	837	3.36	466	1.87
44	29 - Manufacture of machinery	6 472	25.96	3 697	14.83
45	30 - Manufacture of office machinery	1 305	5.24	1 449	5.81
<b>46</b>	<b>31 - Manufacture of electrical machinery</b>	<b>90</b>	<b>0.36</b>	<b>76</b>	<b>0.30</b>
47	3130 - Manufacture of insulated wire, cable	90	0.36	76	0.30
<b>48</b>	<b>32 - Manufacture of radio, television</b>	<b>2 049</b>	<b>8.22</b>	<b>1 665</b>	<b>6.68</b>
49	321 - Manufacture of electronic valves	1 279	5.13	553	2.22
50	322 - Manufacture of television, radio lines	409	1.64	530	2.13
51	323 - Manufacture of television, radio recvr	361	1.45	582	2.33
<b>52</b>	<b>33 - Manufacture of medical instruments</b>	<b>2 173</b>	<b>8.72</b>	<b>723</b>	<b>2.90</b>
53	331 - Manufacture of medical	2 075	8.32	666	2.67
54	3311 - Manufacture of medical and surgical	0	0.00	0	0.00
55	3312 - Manufacture of instruments	2 075	8.32	666	2.67
56	3313 - Manufacture of industrial process	0	0.00	0	0.00
57	332 - Manufacture of optical instruments	75	0.30	39	0.16
58	333 - Manufacture of watches and clocks	24	0.10	18	0.07
59	34 - Manufacture of motor vehicles	1 144	4.59	1 596	6.40
<b>60</b>	<b>35 - Manufacture of other transport equip</b>	<b>186</b>	<b>0.75</b>	<b>288</b>	<b>1.16</b>
61	351 - Building and repairing of ships	32	0.13	48	0.19
62	352 - Manufacture of railway	82	0.33	106	0.43
63	353 - Manufacture of aircraft	72	0.29	133	0.53
64	359 - Manufacture of transport equipment	0	0.00	0	0.00
65	36 - Manufacture of furniture; man. n.e.c.	2 483	9.96	447	1.79
66	37 - Recycling	0	0.00	1	0.00
<b>67</b>	<b><u>E - Electricity, gas and water supply v</u></b>			<b><u>499</u></b>	<b><u>2.00</u></b>
68	40 - Electricity, gas, steam, hot water			0	0.00
69	41 - Collection, purification of water			0	0.00
<b>70</b>	<b><u>F - Construction</u></b>			<b><u>1 129</u></b>	<b><u>4.53</u></b>
71	45 - Construction			1 129	4.53
<b>72</b>	<b><u>G - Wholesale and retail trade</u></b>			<b><u>361</u></b>	<b><u>1.45</u></b>
73	50 - Sale, maintenance and repair of			50	0.20
<b>74</b>	<b>51 - Wholesale trade</b>			<b>61</b>	<b>0.25</b>
75	515 - Wholesale of machinery			61	0.25
76	52 - Retail trade			180	0.72

Sector		Total by IOM	Total by SOU
<b><u>77</u></b>	<b><u>H - Hotels and restaurants</u></b>		<b><u>96</u></b> <b><u>0.38</u></b>
78	55 - Hotels and restaurants	96	0.38
<b><u>79</u></b>	<b><u>I - Transport, storage and communications</u></b>	<b><u>532</u></b>	<b><u>2.13</u></b>
80	60 - Land transport; transport via pipelines	145	0.58
81	61 - Water transport	14	0.06
82	62 - Air transport	26	0.11
83	63 - Supporting and auxiliary transport	52	0.21
<b><u>84</u></b>	<b><u>64 - Post and telecommunications</u></b>	<b><u>288</u></b>	<b><u>1.16</u></b>
85	641 - Post and courier activities	15	0.06
86	642 - Telecommunications	274	1.10
<b><u>87</u></b>	<b><u>J - Financial intermediation</u></b>	<b><u>38</u></b>	<b><u>0.15</u></b>
88	65 - Financial intermediation	37	0.15
89	66 - Insurance and pension funding	0	0.00
90	67 - Activities auxiliary to financial	0	0.00
<b><u>91</u></b>	<b><u>K - Real estate renting and business activ.</u></b>	<b><u>545</u></b>	<b><u>2.18</u></b>
92	70 - Real estate activities	7	0.03
93	71 - Renting of machinery and equipment	0	0.00
94	7123 - Renting of office machinery	0	0.00
<b><u>95</u></b>	<b><u>72 - Computer and related activities</u></b>	<b><u>0</u></b>	<b><u>0.00</u></b>
96	721 - Hardware consultancy	0	0.00
97	722 - Software consultancy and supply	0	0.00
98	723 - Data processing	0	0.00
99	724 - Data base activities	0	0.00
100	725 - Maintenance of office machinery	0	0.00
101	729 - Other computer related activities	0	0.00
102	73 - Research and development	230	0.92
<b><u>103</u></b>	<b><u>74 - Other business activities</u></b>	<b><u>283</u></b>	<b><u>1.14</u></b>
104	741 - Legal, accounting, consultancy	2	0.01
105	742 - Architectural, engineering	50	0.20
106	743 - Advertising	20	0.08
107	749 - Business activities n.e.c.	211	0.85
<b><u>108</u></b>	<b><u>L - Public administration and defense</u></b>	<b><u>163</u></b>	<b><u>0.65</u></b>
109	75 - Public administration and defense	163	0.65
<b><u>110</u></b>	<b><u>M - Education</u></b>	<b><u>13</u></b>	<b><u>0.05</u></b>
<b><u>111</u></b>	<b><u>80 - Education</u></b>	<b><u>6</u></b>	<b><u>0.03</u></b>
112	801 - Primary education	0	0.00
113	802 - Secondary education	0	0.00
114	803 - Higher education	5	0.02
115	809 - Adult and other education	1	0.01
<b><u>116</u></b>	<b><u>N - Health and social work</u></b>	<b><u>2 322</u></b>	<b><u>9.32</u></b>
117	85 - Health and social work	2 322	9.32



Sector	Total by IOM		Total by SOU	
<b><u>118</u></b>	<b><u>Q - Other community activities</u></b>		<b><u>1 506</u></b>	<b><u>6.04</u></b>
119	90 - Sewage and refuse disposal		17	0.07
120	91 - Activities of membership orgs		1	0.00
121	92 - Recreational, cultural and sporting		104	0.42
122	93 - Other service activities		1 384	5.55
<b><u>123</u></b>	<b><u>P - Private households</u></b>		<b><u>14</u></b>	<b><u>0.05</u></b>
124	95 - Private households		14	0.05
<b><u>125</u></b>	<b><u>Q - Extra-territorial organizations</u></b>		<b><u>0</u></b>	<b><u>0.00</u></b>
126	99 - Extra-territorial organizations		0	0.00
<b>Totals</b>	<b>24 931</b>	<b>100.00</b>	<b>24 931</b>	<b>100.00</b>

## Appendix G

## SUMMARY RESULTS FOR SIX NATIONS, 1998

The table below presents row (IOM) and column (SOU) totals for six of the major applicant nations in the EPO data set, tracing patents by the nation of applicant for 1998. Full matrices of interactions can be found on the electronic media accompanying this report. The sector numbers refer to those found in Appendices D-F. Notice that the columns do not add to the total, since subtotals are included.

1998 Sector	Germany (DE)		Denmark (DK)		France (FR)		United Kingdom (UK)		Italy (IT)		Netherlands (NL)	
	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU
1	3	179	0	15	2	83	2	52	0	45	1	64
2	3	159	0	14	2	74	2	48	0	40	1	58
3	1	92	0	7	0	40	0	23	0	22	0	28
4	0	77	0	7	0	32	0	19	0	18	0	22
5	1	14	0	1	0	7	0	4	0	4	0	5
6	0	1	0	0	0	1	0	0	0	0	0	1
7	0	20	0	1	0	9	0	4	0	5	0	6
8	0	11	0	1	0	8	0	6	0	4	0	8
9	0	11	0	1	0	8	0	6	0	4	0	8
10	2	137	0	3	1	70	1	44	0	20	1	29
11	1	4	0	0	1	1	0	1	0	1	1	1
12	1	96	0	2	1	57	0	36	0	14	0	24
13	0	1	0	0	0	0	0	0	0	0	0	0
14	0	22	0	1	0	6	0	4	0	3	0	2
15	0	6	0	0	0	2	0	1	0	1	0	1
16	13 875	9 639	417	248	4 932	3 210	2 932	1 870	2 363	1 617	2 446	1 642
17	43	231	6	22	21	88	27	84	12	66	45	123
18	6	20	0	0	1	4	2	7	1	8	0	1
19	89	156	2	3	32	34	17	23	19	33	11	16
20	17	36	0	1	11	12	5	6	7	18	0	2
21	17	25	0	0	17	23	3	4	20	29	4	5
22	41	74	2	3	14	20	8	9	9	17	6	7
23	97	229	4	4	38	32	32	35	22	31	19	21
24	35	174	1	3	14	33	10	27	8	23	9	27
25	18	68	1	4	11	41	6	15	3	11	8	18
26	2 250	1 411	127	81	842	491	727	427	257	170	445	254
27	1 081	521	47	19	328	159	253	107	129	56	170	74
28	1 169	845	80	61	514	319	474	312	128	106	275	173

1998 Sector	Germany (DE)		Denmark (DK)		France (FR)		United Kingdom (UK)		Italy (IT)		Netherlands (NL)	
	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU
29	35	68	2	4	13	25	13	20	6	11	4	9
30	125	91	2	1	28	20	21	15	6	6	24	14
31	526	432	61	47	309	187	302	196	66	62	134	92
32	100	93	2	2	23	25	51	40	7	9	41	32
33	382	161	13	6	140	62	87	41	42	19	72	26
34	0	45	0	1	0	12	0	8	0	8	0	6
35	441	436	16	12	171	114	96	74	97	78	72	67
36	167	144	4	3	69	69	34	28	30	36	22	18
37	100	182	3	2	35	48	17	26	15	38	8	10
38	70	101	2	1	23	25	13	13	11	24	6	5
39	21	49	0	0	9	14	3	7	2	7	2	3
40	9	33	0	1	3	9	1	5	2	7	1	2
41	9	33	0	1	3	9	1	5	2	7	1	2
42	0	0	0	0	0	0	0	0	0	0	0	0
43	722	335	19	6	230	94	110	57	145	60	77	32
44	4 175	2 281	111	48	1 312	737	760	398	847	426	652	363
45	378	407	5	6	159	187	111	118	58	70	148	169
46	42	40	1	1	27	18	9	7	6	6	7	7
47	42	40	1	1	27	18	9	7	6	6	7	7
48	774	632	11	7	356	281	173	139	97	74	302	249
49	511	248	8	3	226	95	98	37	74	35	172	60
50	181	228	2	3	96	121	52	61	13	19	60	77
51	82	157	1	1	34	65	24	41	10	20	70	112
52	974	357	40	10	363	133	268	90	142	50	163	57
53	938	333	39	9	344	122	260	85	129	43	157	54
54	0	0	0	0	0	0	0	0	0	0	0	0
55	938	333	39	9	344	122	260	85	129	43	157	54
56	0	0	0	0	0	0	0	0	0	0	0	0
57	25	16	1	1	16	9	6	4	11	6	4	3
58	11	8	0	0	3	2	2	1	2	1	1	1
59	1 119	1 461	9	13	287	391	109	147	139	192	44	66
60	143	215	2	2	65	88	21	33	21	31	9	16
61	12	25	1	1	6	7	3	6	7	8	4	5
62	81	105	1	1	17	23	8	10	10	13	2	4
63	50	85	0	1	43	58	10	17	5	10	3	7
64	0	0	0	0	0	0	0	0	0	0	0	0
65	1 310	270	38	9	524	97	265	53	259	75	254	37
66	0	1	0	0	0	0	0	0	0	0	0	0
67		336		12		119		66		50		52
68		0		0		0		0		0		0
69		0		0		0		0		0		0
70		949		30		301		155		171		119
71		949		30		301		155		171		119

1998 Sector	Germany (DE)		Denmark (DK)		France (FR)		United Kingdom (UK)		Italy (IT)		Netherlands (NL)	
	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU
72		224		7		84		53		54		40
73		38		1		11		7		6		3
74		35		1		13		9		7		7
75		35		1		13		9		7		7
76		110		4		46		27		30		22
77		68		2		29		16		22		16
78		68		2		29		16		22		16
79		291		7		131		74		44		64
80		109		3		40		23		21		15
81		6		0		3		2		2		2
82		16		0		8		3		1		2
83		38		1		13		9		7		6
84		119		2		65		36		11		39
85		7		0		3		3		2		1
86		112		1		62		33		9		38
87		15		0		5		4		4		4
88		15		0		5		4		4		3
89		0		0		0		0		0		0
90		0		0		0		0		0		0
91		218		6		80		64		30		48
92		4		0		3		1		2		1
93		0		0		0		0		0		0
94		0		0		0		0		0		0
95		0		0		0		0		0		0
96		0		0		0		0		0		0
97		0		0		0		0		0		0
98		0		0		0		0		0		0
99		0		0		0		0		0		0
100		0		0		0		0		0		0
101		0		0		0		0		0		0
102		121		4		46		38		13		22
103		84		2		27		23		13		23
104		1		0		0		0		0		0
105		25		1		10		8		3		5
106		10		0		6		4		3		3
107		49		0		10		11		7		14
108		110		1		46		18		16		12
109		110		1		46		18		16		12
110		6		0		2		2		1		1
111		3		0		1		1		1		1
112		0		0		0		0		0		0
113		0		0		0		0		0		0
114		2		0		1		1		0		0

1998 Sector	Germany (DE)		Denmark (DK)		France (FR)		United Kingdom (UK)		Italy (IT)		Netherlands (NL)	
	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU	IOM	SOU
115		1		0		0		0		0		0
116		922		71		435		352		142		179
117		922		71		435		352		142		179
118		767		15		331		157		143		170
119		13		0		3		3		4		2
122		704		12		299		141		119		161
123		9		0		3		2		2		2
124		9		0		3		2		2		2
125		0		0		0		0		0		0
126		0		0		0		0		0		0
Total	13 881	13 881	418	418	4 935	4 935	2 935	2 935	2 364	2 364	2 448	2 448

*Appendix H***SAMPLE OF FULL RESULTS OF CONCORDANCE FOR EPO PATENTS 1998-99**

This appendix presents a portion of the full results of the IOM-SOU matrix (full size is 126 rows by 126 columns). Shown here is the chemical sector, industries 26 through 33, of which sectors 26 and 28 are subtotals.

<b>IOM</b>	<b>SOU=&gt;26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>	<b>32</b>	<b>33</b>
<b>26</b>	<b>2 445</b>	<b>693</b>	<b>1 739</b>	<b>138</b>	<b>143</b>	<b>1 059</b>	<b>149</b>	<b>250</b>
<b>27</b>	<b>1 596</b>	541	<b>1 046</b>	130	63	696	44	112
<b>28</b>	<b>849</b>	<b>152</b>	<b>692</b>	<b>7</b>	<b>80</b>	<b>363</b>	<b>104</b>	<b>138</b>
<b>29</b>	<b>7</b>	0	<b>6</b>	5	0	0	1	0
<b>30</b>	<b>77</b>	4	<b>72</b>	0	70	1	0	1
<b>31</b>	<b>376</b>	12	<b>364</b>	1	1	353	4	5
<b>32</b>	<b>100</b>	1	<b>99</b>	0	0	2	91	5
<b>33</b>	<b>290</b>	135	<b>151</b>	1	9	7	9	126

## Appendix I

**R&D EXPENDITURES PER PATENT  
FOR SELECTED EPO APPLICANT NATIONS IN 1998**

This table presents research and development expenditures per patent, assuming a two-year lag between R&D and an application (*i.e.* 1998 values are for 1996 R&D and 1998 patent applications), and counting patents by the nationality of the applicant.

		Germany (DE)	France (FR)	Italy (IT)
16	D - Manufacturing	3.664	19.973	37.261
17	15 - Manufacture of food products and beverages	8.080	85.477	108.230
18	16 - Manufacture of tobacco products	7.828	214.494	11.531
19	17 - Manufacture of textiles	3.198	15.789	11.558
20	18 - Manufacture of wearing apparel	2.554	12.999	1.973
21	19 - Tanning and dressing of leather; luggage	0.758	3.969	7.355
22	20 - Manufacture of wood and of wood products	1.324	5.803	13.745
23	21 - Manufacture of paper and paper products	1.388	8.919	4.702
24	22 - Publishing, printing and reproduction	1.414	1.680	4.077
25	23 - Manufacture of coke, refined petroleum	7.488	129.892	166.545
26	24 - Manufacture of chemicals	4.415	24.773	58.569
27	241 - Manufacture of basic chemicals	4.015	13.301	31.905
31	2423 - Manufacture of pharmaceuticals	5.725	44.527	135.938
35	25 - Manufacture of rubber and plastics products	1.912	16.628	21.074
36	26 - Manufacture of other non-metallic mineral	3.140	20.276	11.645
37	27 - Manufacture of basic metals	5.296	53.843	73.840
38	271 - Manufacture of basic iron and steel	4.666	50.956	75.847
39	272 - Manufacture of precious and non-ferrous	7.635	62.115	63.016
43	28 - Manufacture of fabricated metal products	1.096	5.997	16.318
44	29 - Manufacture of machinery n.e.c.	1.447	3.974	6.861
45	30 - Manufacture of office, computing machinery	4.378	17.970	73.129
46	31 - Manufacture of electrical machinery n.e.c.	62.994	141.153	843.372
47	3130 - Manufacture of insulated wire and cable	138.427	478.116	3294.631
48	32 - Manufacture of television, communication	16.006	73.299	674.797
49	321 - Manufacture of electronic valves and tubes	3.246	15.082	60.037
52	33 - Manufacture of precision instruments	3.112	29.247	14.388
59	34 - Manufacture of motor vehicles, trailers	10.975	46.372	106.754
60	35 - Manufacture of other transport equipment	36.922	245.047	564.991
61	351 - Building and repairing of ships and boats	11.125	24.305	159.218
62	352 - Manufacture of railway and locomotives	7.710	30.358	120.304
63	353 - Manufacture of aircraft and spacecraft	90.831	359.428	2016.934
65	36 - Manufacture n.e.c.	0.216	1.250	1.675
66	37 - Recycling	n.a.	n.a.	n.a.
	Total	3.861	22.771	43.345

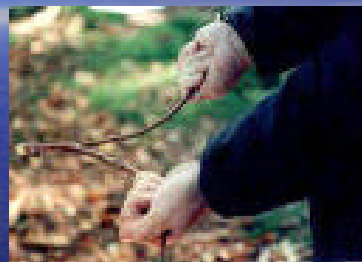
\* Expenditures are measured in millions (hundreds of millions in Italy) of nominal national currency units.

Defining  
(and Divining)  
Industries:  
The Construction and Use of  
Patent Concordances

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## Divining

- To locate (underground water of minerals) with a divining rod; douse.
- To know by inspiration, intuition, or reflection.
- To guess.



Definition according to dictionary.com



## Outline of Presentation

- Definitional issues
- Need for a solution
- Possible solutions
- OECD Technology Concordance
- Tests and Limitations
- Future directions

## Definitional issues

- IPC as technology classes
  - 700 4-digit classes plus subclasses
  - augmentation of national systems
    - e.g. USPC system
- SIC, ISIC as industrial classes
  - 900 distinct SIC 4-digit sectors
  - wide data availability

## Need for a solution

Critical for policy and planning regarding:

- impact on invention
  - inventive productivity (R&D, employees)
  - Kortum and Lerner's surge explanation
- impact of invention
  - output growth
  - prices
  - trade volumes and values
  - spillovers

## Possible solutions

- Redefine / reaggregate economic variables
- Assign each patent SIC/ISIC code
  - Canadian precedent 1972-1995
  - industry of manufacture (IOM)
  - sector of use (SOU)
- Develop definitional concordances
  - MERIT            - IPC to ISIC Rev.2
  - Yale              - IPC to SIC-E
  - Wellesley       - USPC to SIC-E
  - OECD            - IPC to ISIC Rev.3

## OECD Technology Concordance

- uses 300,000 patents assigned IPCs along with IOM and SOU under 1980 SIC-E definitions
- calculated  $\Pr(\text{patent with IOM, SOU} \mid \text{IPC})$  for each combination
- frequency distribution of patents by IPC is sufficient to create frequency distribution across (IOM,SOU) matrix
- translation of SIC-E to ISIC (Rev. 3)

## Example of concordance process

- consider 10 patents in IPC A01B
- consider concordance probability table:
  - $\Pr(\text{IOM}=1, \text{SOU}=1 \mid \text{A01B}) = 0.75$
  - $\Pr(\text{IOM}=1, \text{SOU}=2 \mid \text{A01B}) = 0.10$
  - $\Pr(\text{IOM}=2, \text{SOU}=1 \mid \text{A01B}) = 0.15$
  - $\Pr(\text{IOM}=2, \text{SOU}=2 \mid \text{A01B}) = 0$



## Result of example concordance

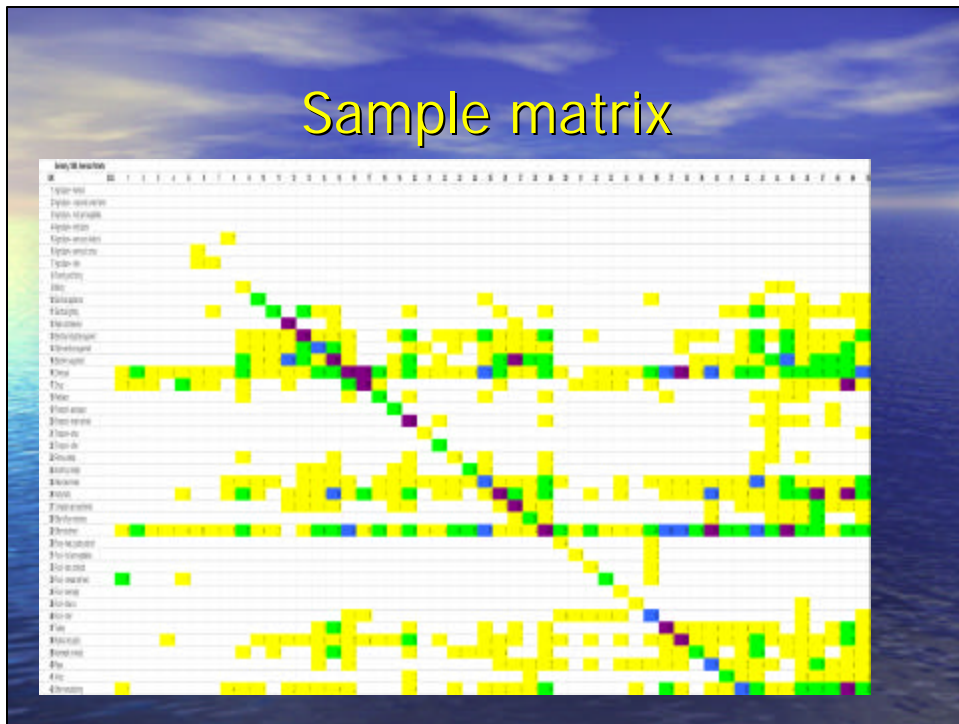
	SOU1	SOU2	total
IOM1	7.5	1.0	8.5
IOM2	1.5	0	1.5
total	9.0	1.0	10.0

- add onto this matrix patents from other IPCs with own distinct probability distributions

## Sample Data

- 10951 patents granted to Americans applying in Germany in 1995
  - 1% had agricultural use, 5% transport use, 11% health use
  - 17% created by chemical sector, 5% created by computers/office equipment
  - of patents for use in food processing, 18% were created by chemical/drug sectors

## Sample matrix



## Concorded data available

- see [www.wellesley.edu/Economics/johnson](http://www.wellesley.edu/Economics/johnson)
- roughly 10,000 matrices
  - 25 years and 40 nations with applicants
- by state for U.S. for 1975-1999
- U.S. nationally for 1790-1999

## Sample application

R&D Expenditures per patent (1996 \$M)

	IT	FR	DE
Apparel	1.18	2.60	1.69
Printing	2.45	0.34	0.93
Iron/Steel	45.5	10.2	3.08

## Tests and Limitations

- Robustness tests completed
- Limitations
  - across nations
  - across time
    - introduction of new IPCs
  - probabilistic, not discrete counts
  - assignation by examiner
    - creator is not describing own research activity
    - user is not identified, simply projected
  - no tertiary sector SOUs



## Future Directions

- Limited, without change in:
  - recording of IOM, SOU with IPC on patent
  - redefinition of economic variables
- National Science Foundation grant
  - to compile international dataset

## Conclusion

Two tests of “divining” process

- Have we found “water” (patents by industry)?
  - Yes, at least according to robustness tests
- Will it be a reliable process to find future “water”?
  - Less certain, requires continued testing