SPECIALIZATION AND COVERAGE RATIOS FOR THE MANUFACTURING INDUSTRIES OF CANADA

John S. Crysdale
Manufacturing, Construction and Energy Division

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ABSTRACT

Primary product specialization and coverage ratios are now being produced and published for Canadian manufacturing industries. This paper reviews concepts, outlines uses, summarizes 1994 data, details a number of methodological issues, examines sources of change over time and measures those sources by means of a shift/share decomposition. The paper also describes the algorithm that has been developed for detecting and treating confidential values. This algorithm includes the use of rounding and the application of ranges; such treatment maintains confidentiality while allowing specialization and coverage data to be released for each and every manufacturing industry. The Appendix comprises specialization and coverage ratios for 1994.

RÉSUMÉ

Les ratios de spécialisation et de couverture des produits principaux sont maintenant produits et publiés pour les industries manufacturières du Canada. Ce document du travail énonce les concepts et les utilisations possibles, résume les données de 1994, décrit en détail un certain nombre de questions d'ordre méthodologique, examine les sources de changements chronologiques et mesure ces derniers par décomposition changement/part. Le document décrit aussi l'algorithme qui a été développé pour repérer et traiter les valeurs confidentielles. Cet algorithme comporte l'utilisation de l'arrondissement et l'application de fourchettes. En traitant ainsi les données, il est possible de communiquer les renseignments sur la spécialisation et la couverture pour toutes les industries manufacturières, sans exception, toujours en conservant la confidentialité. L'annexe donne les ratios de spécialisation et de couverture de 1994.

KEY WORDS

Primary products, specialization ratio, coverage ratio, industry homogeneity, industrial classification, manufacturing industries.

John S. Crysdale
Tel: (613) 951-3589
Fax: (613) 951-9499
E-mail: crysdal@statcan.ca

1. INTRODUCTION

In 1995, Statistics Canada began publishing specialization and coverage ratios for Canadian manufacturing industries. These ratios measure the homogeneity and completeness of those industries.

Constructing these ratios requires (1) output commodity data and (2) a concordance that links commodities and industries. The output commodity data are collected at the establishment level by the Annual Survey of Manufactures (ASM). The concordance that links commodities and industries is produced by Standards Division. In both the data and the concordance, industries are classified according to the 1980 Standard Industrial Classification (SIC) and commodities are classified according to the Standard Classification of Goods (SCG). The SCG is an extension of the Harmonized Commodity Description and Coding System (HS).

1.1 Concepts and Definitions

(1) The **primary products** of a given SIC industry are the goods and/or services that result from the activities which define that industry. For example, in Canada, the Sweater Industry (SIC 2491) is defined in terms of the activity of making sweaters; sweaters are the primary product of that industry and can be said to be *primary* to that industry. An industry in which the primary products are services, rather than goods, is the Custom Coating of Metal Products Industry (SIC 3041); that industry is defined in terms of the activities of coating, galvanizing and electroplating metal and metal products.

(2) The **secondary products** of a given SIC industry are the goods and services that result from activities other than those which define that industry. Secondary products result from the practice of classifying entire establishments to a single industry even when not all constituent products are primary to that one industry. For example, in Canada, mittens, which are primary to the Glove Industry (SIC 2493), are secondary to the Sweater Industry and are included with Sweater Industry data when produced by Sweater Industry establishments.

(3) The **specialization ratio** (more formally, the *primary product* specialization ratio) measures the extent to which the establishments classified to an industry specialize in making the products primary to that industry.[1]

(4) The **coverage ratio** (more formally, the *primary product* coverage ratio) measures the extent to which the products primary to an industry are made by the establishments classified to that industry.[2]

To illustrate, consider the following simplified data for 1994 for Canadian SIC 2491 Sweater Industry:

Shipments by establishments in the Sweater Industry		
(P)	Primary products (sweaters)	$179 million
(S1)	Secondary products (such as mittens)	$ 17 million
(P+S1)	Total	$196 million
Shipments of products primary to the Sweater Industry		
(P)	By establishments in the Sweater Industry	$179 million
(S2)	By establishments in other manufacturing industries (such as Children's Clothing Industry (SIC 2451))	$ 13 million
(P+S2)	Total	$192 million

The specialization ratio for the Sweater Industry is 91%. This is P as a percentage of P+S1. It says that 91% of Sweater Industry shipments are sweaters: the industry is 91% specialized in its defining activities. The coverage ratio for the Sweater Industry is 93%. This is P as a percentage of P+S2. It indicates that 93% of sweaters shipped by the manufacturing industries come from the Sweater Industry: the industry covers 93% of its defining activities.

Several other points should be made. (1) These measures are generally called *ratios* and shown as percentages; some studies use the term *indices* rather than ratios. (2) The measures are often referred to collectively as *homogeneity ratios*. (3) The total P+S1 can be referred to as **establishment-based industry shipments**. (4) The total P+S2 can be referred to as **product-based industry shipments**.

These concepts can all be represented in a two-circle Venn diagram (Figure 1). Establishment-based shipments are represented by the circle P+S1; product-based shipments by the circle P+S2. Specialization and coverage ratios measure the correspondence between the two circles. Specialization is the intersecting area, P, as a proportion of P+S1; coverage is the intersecting area, P, as a proportion of P+S2. (For expository convenience, the particular circles shown here have a smaller overlap--hence a smaller amount of primary activity--than is normal for Canadian SIC industries.)

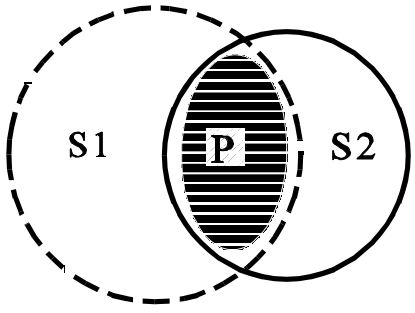

Figure 1: Venn Diagram

1.2 Uses for these Ratios

(1) These ratios can be used to measure the homogeneity and completeness of existing, establishment-based industries in terms of the products which define those industries. In other words, how do industries as groupings of entire establishments compare with industries as groupings of commodities? These ratios address that question and, as such, can be described as *quality indicators.*

(2) These ratios can be used to measure the homogeneity and completeness of proposed new industry classes. For example, when the 1980 Standard Industrial Classification was being developed, specialization and coverage ratios were calculated for each proposed class and compared to minimum targets. With the development of the North American Industrial Classification System (NAICS), specialization ratios have also been a consideration. (Coverage ratios were not formally used; they are viewed as being less relevant in this more process-oriented industrial classification. (See Section 4.6 for a discussion of process-oriented industries in the 1980 Standard Industrial Classification.))

(3) These ratios can be used to supplement concentration data. For example, if 4-firm concentration ratios are high for a given industry, is it the case that the market for the defining products of that industry is also highly concentrated (i.e., oligopolistic in structure)? Specialization and coverage ratios will show the degree to which 4-firm data include non-defining products and exclude defining products. Accordingly, if specialization is 100%, the 4-firm concentration figure can be interpreted as applying to defining products alone, and, if coverage is 100%, the 4-firm figure can be interpreted as covering all such products. Additional information may be necessary to further supplement the concentration data: in particular, the degree of competition provided by imported goods, by domestic substitutes, by the same products originating outside the manufacturing industries and by the potential for new entry. (See Khemani, 1980, for an example of specialization and coverage ratios used within a concentration context.)

(4) These ratios can be used to evaluate industrial coding generated by simple algorithms. For example, data relating to *exports by industry* might be generated by taking exports by product and attributing such exports to the industry to which the product is primary. In such cases, the lower the specialization ratio, the more the exports for a given industry would be overestimated, and the lower the coverage ratio, the more such exports would be underestimated.

(5) These ratios can be used to evaluate the need for *Commodity Sector Estimates*. (These involve selecting a group of commodities, summing the reported shipments of those commodities and calculating a set of other principal statistics by pro-rating input statistics.) If the selected group of commodities corresponds to the primary products of an SIC industry, and if specialization and coverage ratios are high, then the traditional establishment-based industry data should be fine.

1.3 What these Ratios do not Measure

(1) The primary product specialization ratio is *not* a measure of the degree to which establishments focus on one main product--even though the phrase *primary product* may suggest *most important product*. Rather, it is a measure of the degree to which establishments focus on a whole group of products, namely those designated as primary to the industry to which the establishment is classified. As a practical matter, although high *product* specialization and high *primary product* specialization do not necessarily go together, they do tend to do so.

(2) The primary product specialization ratio is *not* a measure of the similarity of any two establishments. One establishment may produce five products and another just two products (which may or may not coincide with any of the five produced by the first establishment) and both can have the same specialization ratio. In that example, both have the same percent of shipments accounted for by defining activities of the industry to which they are classified.

(3) These ratios are *not* measures of industrial concentration; however they can be used to supplement such measures. (See item 4 in Section 1.2.)

(4) These ratios are *not* measures of the usefulness of the commodity groupings. Some groupings may be meaningful to some users and not to others. High levels of specialization and coverage may be produced by groupings that are very broad: for example, ratios of one hundred percent can be generated by making all products primary to a single, large industry class.

2. SOME DATA HIGHLIGHTS

Table 1, below, displays specialization and coverage ratios at the all-manufacturing level for the period 1990 to 1994. It indicates that, for 1994, all-manufacturing specialization and coverage ratios are 92.5% and 92.9%. It also indicates that, between 1990 and 1994 there has been a 1.6 percentage point increase in specialization and a 1.5 percentage point increase in coverage. (See Section 3 for a discussion of the sources of these changes.)

Table 1:
Primary Product Specialization and Coverage Ratios, All-Manufacturing, 1990-1994

	1990	1991	1992	1993	1994
Specialization	90.9	91.3	92.0	92.6	92.5
Coverage	91.4	91.8	92.4	93.0	92.9

All-manufacturing ratios are shipments-weighted averages of the specialization and coverage ratios of the individual manufacturing industries. While the overall ratios exceed 90%, the ratios for some industries are lower and, for others, are as high as 100%. Table 2, below, shows the number of industries by specialization ratio value and by coverage ratio value. (Where the published data, shown in the Appendix, require broader ranges than those used in this table, they are included here with the range corresponding to the low end of the published range. In several cases, industries are combined; accordingly, while there are 236 4-digit SIC industries within manufacturing, there are only 233 published classes.)

Table 2:
Frequency of Ratio Values, 4-digit SIC Industries, 1994

Ratio Value	Number of Industries	
	Specialization	Coverage
90-100%	141	139
80-89	67	53
70-79	20	22
60-69	3	14
00-59	1	4
N/A	1	1
Total	233	233

3. SOURCES OF CHANGE OVER TIME

3.1 Specialization Ratios

Specialization ratios may change over time, both at the 4-digit SIC industry level and at more aggregated levels. Such aggregate changes can ultimately be attributed to different sorts and degrees of change in the specialization ratios of individual establishments. Table 3, *Sources of Change, Specialization Ratios, 1990-1994,* shows the results of this kind of shift/share decomposition.

Each establishment (and all its shipments) is classified to just one of the categories labelled "1" to "11" in the left column:

First, there is a set of categories related to the statistical framework. Category #1 covers establishments that started to operate within the manufacturing industries after 1990 (i.e., births or transfers from industries outside manufacturing) or had ceased to operate by 1994 (i.e., deaths or transfers to industries outside manufacturing). Category #2 covers establishments transferring from one industry to another within manufacturing. Category #3 covers establishments reporting commodity detail in one year but not the other. Category #4 covers establishments reporting commodity detail in neither year--by assumption, these are 100% specialized in each year.

Second, there is a set of categories relating to changes in product mix at the establishment-level. Category #5 covers establishments which experienced an increase in primary product specialization of ten percentage points or more between 1990 and 1994. Category #6 covers establishments increasing five points or more (but less than ten). Category #7 covers cases increasing one point or more (but less than five). Category #8 covers unchanged cases (less than one percentage point up or down). Category #9 covers cases decreasing one percentage point or more (but less than five). Category #10 covers decreases of five or more (but less than ten). Category #11 covers decreases of ten or more percentage points.

Columns three and four show the specialization ratio for each category (i.e., the primary product shipments of that category as a percentage of the manufacturing activity shipments for that same category). Columns five and six show the shipments share (i.e., the shipments of that category as a percentage of all-manufacturing shipments). The last column shows the contribution of each category to the overall change in specialization between 1990 and 1994.

These data indicate that, aside from the framework changes, the most significant source of change involves establishments with virtually unchanged specialization. This group had very high specialization in 1990 (97.8%) and maintained this into 1994 (98.1%). The contribution to the increase in all-manufacturing specialization is due to those high ratios combined with an increased share of shipments (50.7% in 1990, 56.6% in 1994). Of the 1.6 percentage point increase in overall specialization, the *unchanged* category accounts for 5.9 percentage points (some categories have negative and, therefore offsetting, contributions).

Table 3:
Sources of Change, Primary Product Specialization Ratios, 1990-1994

Establishment Type		Average Specialization Ratio of Constituent Establishments		Shipments Share of Constituent Establishments		1994 Ratio x Share/100 less 1990 Ratio x Share/100
		1990	1994	1990	1994	
Total		90.9	92.5	100.0	100.0	1.6
1	Began/ceased to operate within manufacturing	92.6	90.1	11.8	6.1	-5.4
2	Transferred within manufacturing	55.2	80.0	2.9	3.2	0.9
3	Commodity data one year only	94.9	93.0	4.8	4.9	0.1
4	Commodity data neither year	100.0	100.0	2.1	1.9	-0.2
5	Specialization up 10 percentage points or more	60.1	87.0	5.9	5.4	1.1
6	Specialization up 5 pts or more (and less than 10)	76.1	84.2	2.6	2.8	0.4
7	Specialization up 1 pt or more (and less than 5)	84.9	89.7	6.7	6.7	0.4
8	Specialization unchanged (less than 1 point up or down)	97.8	98.1	50.7	56.6	5.9
9	Specialization down 1 pt or more (and less than 5)	88.8	86.7	6.0	5.8	-0.3
10	Specialization down 5 pts or more (and less than 10)	86.3	80.3	2.1	2.1	-0.1
11	Specialization down 10 percentage points or more	84.7	58.5	4.4	4.5	-1.1

A more detailed empirical analysis, which could include an industry-by-industry assessment, is left for a potential future paper. The purpose of the very informal analysis presented here, and in the next section, is strictly to provide insight into the sorts of factors that affect these ratios and cause them to change over time.

3.2 Coverage Ratios

Coverage ratios may also change over time. Such changes can be attributed to different sorts and degrees of change in the coverage ratios of individual commodities. Table 4, *Sources of Change, Coverage Ratios, 1990-1994*, shows the results of this kind of shift/share decomposition.

Each commodity (at the reported level of detail) is classified to just one of the categories labelled "1" to "9" in the left column.

The first set of categories relates to the statistical framework. Category #1 covers commodities for which shipments were reported in 1994 but not 1990 (i.e., classes added to the classification or products new in production within manufacturing) or in 1990 but not 1994 (i.e., classes deleted from the classification or products no longer in production). Category #2 comprises SCG classes treated as primary wherever reported (see Section 4).

Changes to the commodity classification could also involve amendments to primary industry links. A separate category could have been established to isolate such changes (to correspond to the industry transfer category within the specialization table). As a practical matter, only three ongoing, detailed and reported classes changed primary industry between 1990 and 1994; these involved less than 0.1% of product-based shipments. Accordingly, these changes have not been treated separately, but have been assigned to Categories #3 through #9 as appropriate.

The second set of categories shown in Table 4 relates to the change in the industry mix at the commodity-level. Category #3 comprises commodities for which coverage increased by ten percentage points or more between 1990 and 1994. Category #4 comprises commodities for which coverage increased by five points or more (but less than ten). Category #5 comprises commodities increasing one point or more (but less than five). Category #6 comprises unchanged commodities (less than one percentage point up or down). Category #7 comprises decreases of one percentage point or more (but less than five). Category #8 covers decreases of five or more (but less than ten). Category #9 comprises decreases of ten or more percentage points.

Columns three and four show the coverage ratio for each category (i.e., the shipments of that category originating in the primary industry as a percentage of the total shipments for that same category). Columns five and six show the shipments share (i.e., the shipments of that category as a percentage of the shipments of all categories). The last column shows the contribution of each category to the overall change in coverage between 1990 and 1994.

Table 4:
Sources of Change, Primary Product Coverage Ratios, 1990-1994

Commodity Type		Average Coverage Ratio of Constituent Commodities		Shipments Share of Constituent Commodities		1994 Ratio x Share/100 less 1990 Ratio x Share/100
		1990	1994	1990	1994	
Total		91.4	92.9	100.0	100.0	1.5
1	Began/ceased to be reported within manufacturing	88.4	89.5	5.1	5.5	0.4
2	Treated as primary wherever reported	100.0	100.0	7.3	6.0	-1.3
3	Coverage up 10 percentage points or more	54.3	83.8	7.6	8.1	2.6
4	Coverage up 5 pts or more (and less than 10)	79.2	86.0	4.0	4.0	0.3
5	Coverage up 1 pt or more (and less than 5)	90.2	92.7	8.4	7.5	-0.6
6	Coverage unchanged (less than 1 point up or down)	97.7	97.9	52.7	56.9	4.2
7	Coverage down 1 pt or more (and less than 5)	91.1	88.3	6.6	6.0	-0.8
8	Coverage down 5 pts or more (and less than 10)	91.5	82.2	2.9	2.3	-0.8
9	Coverage down 10 percentage points or more	85.0	51.8	5.4	3.7	-2.7

These results correspond very closely to those of the specialization decomposition. The data indicate that, aside from the framework changes, the most significant source of change involves commodities with virtually unchanged coverage. This group had very high coverage in 1990 (97.7%) and this was maintained into 1994 (97.9%). (This means that almost all shipments of the constituent commodities originated from the primary industry.) The contribution to the increase in all-manufacturing coverage is due to those high ratios combined with an increased share of shipments (52.7% in 1990, 56.9% in 1994). Of the 1.5 percentage point increase in overall coverage, the *unchanged* category accounts for 4.2 percentage points.

4. METHODOLOGICAL ISSUES

4.1 Incorporating Establishment-Level Adjustment Items

When developing these ratios, an early question was whether the ratios should be based only on commodity shipments or whether they should also incorporate the establishment-level adjustment items included in the principal statistic *value of shipments of goods of own manufacture.*

In 1992 (the most recent year at the time the methodology was being developed), at the all-manufacturing level, those adjustment items, taken in total, accounted for 6% of manufacturing activity shipments. The adjustments (presented here in descending order of absolute magnitude) relate to:

(1) Short-form establishments not reporting commodity detail (such establishments accounted for 115% of adjustments (some adjustments were negative), were present in 189 of the 212 industries publishable in 1992 and in 7 of those industries accounted for more than 20% of shipments);

(2) Shipping charges, sales taxes, discounts and returns not excluded from the values reported for individual products (these accounted for -18% of adjustments; such charges were present in 202 of 212 industries and in 9 of those industries accounted for, in absolute terms, 5% or more of shipments);

(3) Progress payments received for work completed but not written off to sales (such payments accounted for 3% of adjustments, were reported in 18 of 212 industries and in 2 industries accounted for more than 5% of shipments);

(4) Reporting based on production rather than shipments (this accounted for -.02% of adjustments, occurred in 49 of 212 industries and in no industry accounted for, in absolute terms, as much as 1% of shipments).

It was decided that all these adjustment items should all be incorporated into the ratios and into the calculation of product-based shipments. This means that: (1) the measures will reflect all the activity incorporated in the principal statistic; (2) there will be no closely related shipments aggregate to cause confusion; (3) because *value of shipments of goods of own manufacture* (also referred to as *manufacturing activity shipments*) is released for all industries (through grouping if necessary), the denominator of the specialization ratio is immediately releasable in all cases.

The second question was whether these items should be treated as representing defining activities. The options were either to make the adjustments primary to the industry in which they are reported or to pro-rate them over any reported commodity detail.

In deciding to treat adjustment items as primary where reported, the focus was on short-form establishments not reporting commodity detail. As already noted, this is the largest adjustment and accounts for 115% of all adjustments and 7% of manufacturing activity shipments.

Treating short-form revenue as primary to whatever industry by which it was reported amounts to assuming complete specialization. To assess whether this would be reasonable, data were examined for short-form establishments located in the province of Quebec; such establishments are asked to report the top four commodities shipped. For that group, specialization was found to be 94%. Assuming this applies to short-form establishments generally, it seems reasonable to treat all other short-form shipments (i.e., those without commodity detail) as primary where reported.

The other adjustment items, which together account for -1% of manufacturing activity shipments, are also treated as primary to the industry where reported.

Pro-rating (short-forms at the industry level, the other adjustments at the establishment level) would have produced a somewhat lower result--specialization and coverage ratios would have been calculated as being 91.2% and 91.7% (down from 92.0% and 92.4%). Such a strategy would not be as simple and would have made confidentiality assessment more difficult.

Whenever the treatment of adjustment items makes a significant difference to an industry's ratios, those ratios are suppressed. The difference is considered *significant* if the adopted approach (namely, making adjustment items primary wherever reported) causes the calculated ratios to differ by ten percentage points or more from ratios calculated by pro-rating adjustment items or from ratios calculated by excluding adjustment items. (Comparison is made against both these other treatments.) These suppressions are shown as three dots--the standard Statistics Canada symbol for "figures not appropriate or not applicable".

4.2 Too-Aggregated Commodity Coding

Commodities classified according to the SCG accounted for 91% of manufacturing activity shipments in 1992. This commodity shipments comprised, 89% reported at suitably detailed levels of the classification, 10% reported at a too-aggregated level and 0.2% uncoded. The issue involves how to treat the too-aggregated and uncoded cases.

The *uncoded cases* can be disposed of quickly: the amount involved is treated as being primary to the industry to which the reporting establishment is classified.

The *too-aggregated cases* require more explanation. A *too-aggregated* level of commodity detail is defined to be one for which the commodity-to-industry concordance relates the commodity to more than one 4-digit SIC industry.

Here is an example:

SCG 8708.70.2	Hubcaps (Primary to SIC 3255 and to SIC 3256)
SCG 8708.70.21	Hubcaps, of metal (Primary to SIC 3255 Motor Vehicle Wheel & Brake Industry)
SCG 8708.70.22	Hubcaps, of plastic (Primary to SIC 3256 Plastic Parts & Accessories for Motor Vehicles Industry)

In this case, SCG 8708.70.2 is too aggregated: the two more detailed SCG classes are primary to different industries. How to treat such cases? If an establishment reports just *hubcaps* (the too-aggregated class), the problem becomes one of trying to decide whether these are likely to be metal or plastic. What is done here is to look at the SIC industry of the reporting establishment. (1) If the reporting establishment is classified to SIC 3255 Motor Vehicle Wheel & Brake Industry, *hubcaps* are treated as being metal and are primary to SIC 3255. (2) If the reporting establishment is classified to SIC 3256 Plastic Parts & Accessories for Motor Vehicles Industry, *hubcaps* are treated as being plastic and are primary to SIC 3256. (3) If the commodity is reported by an establishment classified to a third industry, say SIC 3259 Other Motor Vehicle Accessories, Parts and Assemblies Industries, the commodity is treated as being primary to SIC 3255 since SIC 3255 accounts for the largest share of *hubcaps*. (There is a slightly more complex sequence if the detailed commodities are primary to different 3-digit industries or to different major groups--the sequence involves looking at the 3- and 2-digit coding of the establishment before resorting to assignment based on largest share.)

If, instead of the treatment described above, the too-aggregated classes had just been made primary where reported, all-manufacturing ratios would been 93.2 and 93.6 (compared to 92.0 and 92.4 as now published). That option would have affected 173 industries (26 of which by 5 or more percentage points).

4.3 Coding of Custom and Repair Work

These items are often referred to as *manufacturing services* and are covered by a set of pseudo-commodity codes. Such items accounted for 3% of manufacturing activity shipments in 1992. Recent work by Standards Division has related the existing custom and repair classes to specific industries. Some classes have been related to one industry (these accounted for 26% of custom and repair work in 1992), some to two or more industries (20%). Aggregates such as *all custom work* have been related to no specific industry (55%).

In calculating specialization and coverage ratios, custom and repair classes are treated just like other commodities. Where they have been related to a single industry, they are treated as primary to that industry. Where they have been related to several industries, treatment is the same as that described in Section 4.2 for too-aggregated commodities. Where custom and repair codes have been related to no specific industry, they are treated as primary where found.

If, instead of the treatment just described, the 20% of classes related to two or more industries had simply been made primary where reported, the all-manufacturing ratios would been unchanged (since those classes were always primary to the industries in which they were reported). Finally, if all custom and repair work (not just the 20%) were made primary where reported, the ratios would have become 92.0% and 92.4% (the slight increase is lost in the rounding). The first of these options would have affected no industries; the second would have affected 14 industries (2 of which by 5 or more percentage points).

4.4 Non-Manufacturing Activity

Establishment-based shipments, the denominator of the specialization ratio, do not include any activity of any establishment classified to non-manufacturing industries (regardless whether that activity is primary to manufacturing or primary elsewhere). Establishment-based shipments can, however, include activity primary to non-manufacturing industries where such activity is reported by establishments classified to manufacturing (for example, products primary to Sand and Gravel Pits (SIC 0821) reported by establishments classified to the Ready-Mix Concrete Industry (SIC 3551)). The exclusion from establishment-based shipments of establishments classified to non-manufacturing industries is not a methodological issue but, rather, reflects the extent of coverage by the Annual Survey of Manufactures. The inclusion of the non-manufacturing activity reflects the decision that establishment-based shipments should coincide with the principal statistic *value of shipments of goods of own manufacture.*

Like establishment-based shipments, product-based shipments, the denominator of the coverage ratio, do not include any activity of establishments classified to non-manufacturing industries. Unlike establishment-based shipments, product-based shipments do *not* include activity primary to non-manufacturing industries even where such activity is reported by establishments classified to manufacturing. Again, the exclusion of non-manufacturing establishments is not a methodological

issue but rather reflects the extent of coverage by the Annual Survey of Manufactures. As for the latter exclusion, users interested in determining the value of shipments primary outside manufacturing at the all-manufacturing level can do so by subtracting product-based shipments from establishment-based shipments.

4.5 Calculating Major Group and All-Manufacturing Ratios

The ratios are calculated at the 4-digit level of the SIC. Where presented at more aggregate levels, they are shipments-weighted averages of the 4-digit SIC ratios.

The alternative for producing major group and all-manufacturing ratios, is to perform the primary product calculations at those levels--treating as primary to that major group or to all-manufacturing all products which are primary to any 4-digit industry within the major group or within manufacturing. This approach would lead to increased values for both specialization and coverage wherever activities secondary to a given 4-digit industry are primary to another 4-digit industry within the same major group or within manufacturing. Under this approach, the all-manufacturing specialization ratio would differ from 100% by just the amount of non-manufacturing activity undertaken by manufacturing establishments; all-manufacturing coverage would become 100% (because of the exclusion of all non-manufacturing establishments and of all non-manufacturing activity, see section 4.4).

The former approach was chosen because it reflects the basic focus on 4-digit SIC industries--the aggregates just summarize the 4-digit ratios--and because more aggregate ratios (particularly all-manufacturing figures) would become almost meaningless if the latter approach were adopted.

4.6 Process-Oriented Industries

Some industries are defined in terms of the activity of making goods according to a particular process rather than simply in terms of the activity of making goods.

For example:

(1) SIC 2712 Newsprint Industry and SIC 2799 Other Converted Paper Products Industries, n.e.c. are defined in terms of whether the production process is vertically integrated. Cut newsprint produced by an integrated process, starting with wood chips, is primary to SIC 2712. Cut newsprint produced by cutting up a large roll of newsprint is primary to SIC 2799.

(2) SIC 2819 Other Commercial Printing Industries and SIC 2849 Other Combined Publishing and Printing Industries are defined in terms of whether the production process is horizontally integrated (i.e., involves joint production). Advertising flyers produced by

establishments engaged solely in printing are considered to be primary to SIC 2819. Advertising flyers produced in establishments engaged in any publishing activity at all are primary to SIC 2849.

One difficulty posed by process-oriented industries is that the corresponding specialization and coverage ratios are not as simple to understand. For example, the Newsprint Industry coverage ratio does not measure the degree to which all newsprint originates from the Newsprint Industry, but rather, the degree to which all *vertically-integrated* newsprint originates from the Newsprint Industry. Similarly, the Newsprint Industry specialization ratio does not measure the degree to which that industry's shipments consist of newsprint, but rather the degree to which those shipments consist of *vertically-integrated* newsprint.[3]

Another difficulty is calculation. This arises because the commodity classification, upon which the calculation of specialization and coverage ratios is based, does not differentiate between the various processes differentiated by the industrial classification. For example, it does not distinguish between newsprint produced in a vertically-integrated process and newsprint produced in a converting operation. Nor, does it distinguish between advertising flyers produced in a horizontally-integrated process and advertising flyers produced in a non-integrated process.

In order to reflect process considerations in calculated ratios, output commodity data must be supplemented by other information.

One source of supplementary information is other commodity data reported by the subject establishment. For example, if vertical integration is a consideration, the establishment's input commodities can be examined (i.e., if wood chips are an input for a given establishment, then the cut newsprint produced by that establishment is part of a vertically integrated process). One difficulty with this establishment-level approach is that within one industry a given SCG commodity may be treated as both primary and secondary. This is intuitively awkward--although it is just the result of differentiation within the industry classification but not within the commodity classification.

Another source of supplementary information is the industrial classification of the subject establishment. This can be used in conjunction with a *too-aggregated* treatment (see Section 4.2) of the commodities of process-oriented industries. For example, cut newsprint, is treated as primary to both SIC 2712 and SIC 2799; if reported by an establishment classified to SIC 2712 it is considered to reflect an integrated process; if reported in SIC 2799 it is considered to reflect converting activity; and if reported elsewhere it is considered to reflect one or the other depending on the precise classification of the reporting establishment. Similar treatment is given to advertising flyers and to a number of other commodities in the Paper and Allied Products Industries and in the Printing, Publishing and Allied Industries.

5. ASSESSING CONFIDENTIALITY

Before publishing these ratios, Statistics Canada has had to ensure that doing so would not divulge information relating to any identifiable business. For any given cell, this requirement can be implemented by verifying that the cell comprises information from at least three companies and that it is not dominated by one or two companies. The requirement can also be implemented by verifying that the cell *as published* does not allow an outside user to estimate information for any given company to within a predetermined degree of accuracy--ranges, for example, can be used to mask the underlying information.

Confidentiality assessment for specialization and coverage data focuses on the five totals from which the specialization and coverage ratios are constructed: namely P, S1, S2, P+S1 and P+S2 (these are the designations used in the Sweater Industry example of the Section 1).

P+S1, the principal statistic *manufacturing activity shipments*, is publishable in all cases. (It is made publishable, as part of the regular publication process, by giving it precedence in developing the industry confidentiality pattern and, if necessary, by combining industries or by obtaining permission from respondents to publish values they dominate. The strategy of combining industries explains why the 236 manufacturing industries of the 1980 SIC became the 212 industries for which data were published in 1992. (In 1994, the number of publishable industries is 233.))

The focus thus switches to the four other totals: P, S1, S2, P+S2. These are all aggregations of commodity data. For example, in the Sweater Industry, P comprises the different sweater codes for which data were reported by establishments in that industry.

As part of the regular publication process, all commodity/industry data are flagged as to whether they are to be suppressed for confidentiality reasons or whether they can be published. The flags are stored in machine-readable form in what is referred to as the *pattern file*.

To assess specialization and coverage ratios, the constituent commodities of the four totals for each industry are matched against the pattern file and the flag is brought in. The values of all commodities which are identified as having been suppressed are then pooled. Each pool is then assessed using the confidentiality rules for industry statistics.

Given that P+S1 will already have been published when this confidentiality assessment is performed, and given that all five values are inter-related, it may be necessary to suppress P+S2 in order to prevent residual disclosure. Such suppression is necessary if one of the P, S1 or S2 totals is confidential and another of those three totals has already been published or is otherwise known to users. For example, suppose: P is $70 (publishable), S1 is $25 (confidential), S2 is $20 (already published), P+S1 is $95 (already published) and P+S2 is $90. If P+S2 is released and S2 has already been published, P will fall out and can be subtracted from P+S1 to yield S1.

Zero-values for any of the five components are considered as known to users; very low values are also considered known in some cases.

At this stage, for 1992 (the most recent year at the time this methodology was being developed), all 5 totals were publishable for 144 of 212 industries. Attention shifts to the 68 other industries.

For some of those 68 industries, very small confidential values were preventing the release of homogeneity ratios. In such cases, the values were checked to see whether sufficient distortion would be introduced by rounding the ratios to the nearest whole percentage. In other words, if the specialization ratio is 69.6%, it would be shown as 70%. Rounding permitted release of 37 more industries. (At this stage, the whole percentage point was adopted as the basic unit of presentation for these ratios.) No rounding was done to product-based shipments; if such shipments had been suppressed by this stage (which was the case in 10 cases) they stayed suppressed.

The remaining 31 industries were then tested to see whether sufficient distortion would be introduced by presenting their ratios using a predetermined set of 10-point ranges (i.e., 50-59%, 60-69%, 70-79%, 80-89%, 90-100%). This permitted release of 22 more industries. Adding a set of 20-point ranges (i.e., 40-59%, 60-79%, 80-100%) allowed release of another 8 industries. A set of 30-point ranges (i.e., 40-69%, 70-100%) was added and was used for 1 industry. If, for any given industry, one ratio could be released using a range of one length and the other ratio required a range of greater length, the greater-length range would be used for both ratios.

Trying to determine whether applying a range (including rounding to a whole percent) offers sufficient distortion leads to an appreciation of how inter-related the five totals are. Consider these examples:

(1) Suppose that P is confidential. If the ratios are shown as ranges, a high and low estimate of P can be made by multiplying P+S1 by the upper and lower bounds of the range used for the specialization ratio. The end points of this range must be examined to ensure that they do not allow too close an estimate of the confidential component. P can also be estimated by multiplying P+S2 by the upper and lower bounds of the range used for the coverage ratio. The end points of that range must also be examined.

(2) Suppose P+S2 is confidential. If the ratios are shown as ranges, a high and low estimate of P+S2 can be made by multiplying P+S1 by the upper and lower bounds of the specialization ratio and dividing by the lower and upper bounds of the coverage ratio. The resulting end points must also be examined.

In order to ensure that these data could be released in conjunction with data at the 2-digit and all-manufacturing levels, the final step was to check for residual disclosure between levels. This affected 8 4-digit industries.

In the end, for 1992, taking into account vertical suppression and cases deemed inappropriate (too sensitive to assumptions relating to adjustment items; see section 4.1), specialization and coverage ratios rounded to the nearest whole percent were released for all 22 major groups and for the all-manufacturing level; P+S1 and P+S2 were also released for all major groups and for the all-manufacturing level. For the 4-digit industries, P+S1 was released in all cases, P+S2 in 197 cases, and some information about specialization and coverage in all cases. In 175 cases, specialization and coverage ratios were rounded to the nearest whole percentage, in 26 cases a 10-point range was used, in 8 cases a 20-point range, in 1 case a 30-point range and in 2 cases the ratios were deemed inappropriate.

6. CONCLUSIONS

This paper has reviewed the concepts of primary product specialization and coverage, has summarized the 1994 data, looked at sources of change over time (within the framework of a shift/share decomposition), detailed a number of methodological issues, and described the specially-developed confidentiality algorithm. That algorithm, which involves the use of rounding and the application of ranges, allows specialization and coverage information to be released for each and every manufacturing industry.

ACKNOWLEDGMENTS

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NOTES

[1,2] Khemani, 37.

[3] For ease of exposition, groundwood printing paper, also primary to SIC 2712 Newsprint Industry, has been ignored.

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APPENDIX

The following pages show primary product specialization and coverage ratios for 1994. These are taken from Statistics Canada (1997).

MANUFACTURING INDUSTRIES OF CANADA, 1994
PRIMARY PRODUCT SPECIALIZATION AND COVERAGE RATIOS

SIC	INDUSTRY	PRIMARY PRODUCT SPECIALIZATION RATIO %	PRIMARY PRODUCT COVERAGE RATIO %	VALUE OF SHIPMENTS OF GOODS OF OWN MANUFACTURE $'000,000	PRODUCT-BASED SHIPMENTS $'000,000
00	TOTAL, ALL MANUFACTURING, 1980 SIC	92	93	352,834.7	351,266.0
10	FOOD INDUSTRIES	92	92	42,809.5	42,687.0
1011	MEAT & MEAT PRODUCTS (EXC POULTRY)	96	99	9,530.4	9,208.8
1012	POULTRY PRODUCTS INDUSTRY	98	87	2,572.4	2,899.1
1021	FISH PRODUCTS INDUSTRY	100	99	2,900.2	2,919.3
1031	CANNED & PRESERVED FRUIT & VEG. IND	87	83	2,416.5	2,538.6
1032	FROZEN FRUIT & VEGETABLE INDUSTRY	83	91	1,102.4	1,005.8
1041	FLUID MILK INDUSTRY	86	95	3,395.2	3,075.1
1049	OTHER DAIRY PRODUCTS INDUSTRIES	80-89	80-89	4,017.7	3,893.1
1051	CEREAL GRAIN FLOUR INDUSTRY	90	98	838.0	767.2
1052	PREPARED FLOUR MIXES & CEREAL FOODS	89	82	867.6	945.2
1053	FEED INDUSTRY	100	99	3,170.0	3,199.5
1061	VEGETABLE OIL MILLS (EXC CORN OIL)	70	99	1,412.6	997.5
1071	BISCUIT INDUSTRY	99	98	639.7	641.7
1072	BREAD & OTHER BAKERY PRODUCTS IND.	98	98	2,172.2	2,189.6
1081	CANE & BEET SUGAR INDUSTRY	100	100	629.0	628.2
1082	CHEWING GUM INDUSTRY	70-79	90-100	341.1	X
1083	SUGAR & CHOCOLATE CONFECTIONS IND.	100	87	1,206.9	1,391.8
1091	TEA & COFFEE INDUSTRY	89	94	817.9	774.7
1092	DRY PASTA PRODUCTS INDUSTRY	90-100	70-79	250.9	316.4
1093	POTATO CHIP, PRETZEL & POPCORN IND.	100	93	849.4	911.6
1094	MALT & MALT FLOUR INDUSTRY	100	100	216.8	X
1099	OTHER FOOD PRODUCTS INDUSTRIES NEC	84	74	3,462.3	3,901.0
11	BEVERAGE INDUSTRIES	99	100	6,713.2	6,658.8
1111	SOFT DRINK INDUSTRY	97	100	2,298.6	2,243.1
1121	DISTILLERY PRODUCTS INDUSTRY	100	99	854.7	858.9
1131	BREWERY PRODUCTS INDUSTRY	100	100	3,257.3	3,248.3
1141	WINE INDUSTRY	90-100	90-100	302.6	308.4
12	TOBACCO PRODUCTS INDUSTRIES	98	100	2,471.5	2,432.0
1211	LEAF TOBACCO INDUSTRY	90-100	90-100	381.4	X
1221	TOBACCO PRODUCTS INDUSTRY	90-100	90-100	2,090.0	X
15	RUBBER PRODUCTS INDUSTRIES	90	92	3,412.1	3,323.7
1511	TIRE & TUBE INDUSTRY	90-100	90-100	1,549.3	X
1521	RUBBER HOSE & BELTING INDUSTRY	80-89	90-100	330.0	X
1599	OTHER RUBBER PRODUCTS INDUSTRIES	88	84	1,532.8	1,591.1
16	PLASTIC PRODUCTS INDUSTRIES	91	90	7,102.2	7,179.2
1611	FOAMED & EXPANDED PLASTIC PRODUCTS	94	91	584.8	603.5
1621	PLASTIC PIPE & PIPE FITTINGS IND.	94	97	587.9	573.5
1631	PLASTIC FILM & SHEETING INDUSTRY	79	88	949.0	851.9
1691	PLASTIC BAG INDUSTRY	90	88	875.1	885.4
1699	OTHER PLASTIC PRODUCTS INDS. NEC	93	90	4,105.5	4,264.9

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17	LEATHER & ALLIED PRODUCTS INDS.	98	98	1,006.3	1,009.8
1711	LEATHER TANNERIES	98	100	180.0	177.0
1712	FOOTWEAR INDUSTRY	99	100	677.3	671.8
1713	LUGGAGE, PURSE & HANDBAG INDUSTRY	97	91	70.4	74.4
1719	OTHER LEATHER & ALLIED PRODUCT INDS	90-100	80-89	78.6	86.5
18	PRIMARY TEXTILE INDUSTRIES	96	95	3,072.7	3,118.5
1811	MAN-MADE FIBRE & FILAMENT YARN IND.	98	96	1,069.8	1,091.5
1821	WOOL YARN & WOVEN CLOTH INDUSTRY	90-100	90-100	297.0	282.9
1829	OTHER SPUN YARN & WOVEN CLOTH INDS.	95	91	1,162.8	1,214.8
1831	BROAD KNITTED FABRIC INDUSTRY	95	97	543.1	529.2
19	TEXTILE PRODUCTS INDUSTRIES	92	90	3,170.1	3,234.2
1911	NATURAL FIBRES & FELT PRODUCTS IND.	93	65	263.0	376.3
1921	CARPET, MAT & RUG INDUSTRY	100	100	873.7	X
1931	CANVAS & RELATED PRODUCTS INDUSTRY	89	96	144.9	135.3
1991	NARROW FABRIC INDUSTRY	99	92	126.0	X
1992	CONTRACT TEXTILE DYEING & FINISHING	90-100	90-100	272.1	X
1993	HOUSEHOLD PRODS OF TEXTILE MATERIAL	93	93	617.8	616.8
1994	HYGIENE PRODS. OF TEXTILE MATERIAL	75	79	276.6	264.0
1998	OTHER TEXTILE PROD (INCL TIRE CORD)	84	89	596.1	564.3
24	CLOTHING INDUSTRIES	86	85	6,147.0	6,171.3
2431	MEN'S & BOYS' COAT INDUSTRY	64	55	160.3	188.5
2432	MEN'S & BOYS' SUIT & JACKET IND.	84	87	553.0	533.2
2433	MEN'S & BOYS' PANTS INDUSTRY	81	80	536.9	539.4
2434	MEN'S & BOYS' SHIRT & UNDERWEAR IND	83	92	598.9	536.6
2435	MEN'S & BOYS' CLOTHING CONTRACTORS	100	100	169.3	169.3
2441	WOMEN'S COAT & JACKET INDUSTRY	67	80	202.6	169.1
2442	WOMEN'S SPORTSWEAR INDUSTRY	81	86	1,229.7	1,157.7
2443	WOMEN'S DRESS INDUSTRY	92	90	313.2	322.4
2444	WOMEN'S BLOUSE & SHIRT INDUSTRY	81	36	88.8	200.3
2445	WOMEN'S CLOTHING CONTRACTORS	100	100	324.6	324.6
2451	CHILDREN'S CLOTHING INDUSTRY	90	82	440.8	482.8
2491	SWEATER INDUSTRY	91	93	195.7	191.6
2492	OCCUPATIONAL CLOTHING INDUSTRY	74	70	179.7	190.8
2493	GLOVE INDUSTRY	95	93	46.9	48.0
2494	HOSIERY INDUSTRY	97	96	339.6	342.1
2495	FUR GOODS INDUSTRY	90-100	90-100	87.5	87.4
2496	FOUNDATION GARMENT INDUSTRY	85	99	188.4	161.8
2499	OTHER CLOTHING & APPAREL INDS. NEC	92	86	491.2	525.8
25	WOOD INDUSTRIES	96	97	22,906.7	22,647.5
2511	SHINGLE & SHAKE INDUSTRY	98	92	254.4	270.2
2512	SAWMILL & PLANING MILL PRODUCTS	98	99	15,075.9	15,005.4
2521	HARDWOOD VENEER & PLYWOOD IND.	98	94	493.1	517.7

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2522	SOFTWOOD VENEER & PLYWOOD IND.	80-89	90-100	989.8	882.6
2541	PREFABRICATED WOODEN BUILDINGS IND.	90	92	338.0	328.8
2542	KITCHEN CABINETS, BATHROOM VANITIES	96	95	937.1	951.6
2543	WOODEN DOOR & WINDOW INDUSTRY	84	95	1,173.0	1,044.5
2549	OTHER MILLWORK INDUSTRIES	93	90	1,127.6	1,171.2
2561	WOODEN BOX & PALLET INDUSTRY	96	97	273.3	270.3
2581	COFFIN & CASKET INDUSTRY	100	100	58.7	58.8
2591	WOOD PRESERVATION INDUSTRY	92	90	391.8	401.9
2592	PARTICLE BOARD INDUSTRY	94	100	549.2	X
2593	WAFER BOARD INDUSTRY	90-100	90-100	945.7	X
2599	OTHER WOOD INDUSTRIES NEC	84	89	299.1	282.2
26	FURNITURE & FIXTURE INDUSTRIES	91	90	4,522.8	4,544.0
2611	WOODEN HOUSEHOLD FURNITURE INDUSTRY	93	96	1,060.8	1,035.5
2612	UPHOLSTERED HOUSEHOLD FURNITURE	94	91	497.3	516.1
2619	OTHER HOUSEHOLD FURNITURE INDUSTRY	84	78	159.3	171.9
2641	METAL OFFICE FURNITURE INDUSTRY	88	94	622.2	584.6
2649	OTHER OFFICE FURNITURE INDUSTRIES	92	84	461.1	501.4
2691	BED SPRING & MATTRESS INDUSTRY	92	100	417.9	387.0
2692	HOTEL & RESTAURANT FURNITURE IND.	89	89	836.4	836.0
2699	OTHER FURNITURE & FIXTURE INDS. NEC	88	81	467.7	511.4
27	PAPER & ALLIED PRODUCTS INDUSTRIES	90	89	25,647.8	25,671.9
2711	PULP INDUSTRY	93	88	6,514.2	6,894.2
2712	NEWSPRINT INDUSTRY	86	97	7,534.7	6,677.0
2713	PAPERBOARD INDUSTRY	72	89	1,927.1	1,562.3
2714	BUILDING BOARD INDUSTRY	88	91	204.8	197.3
2719	OTHER PAPER INDUSTRIES	94	74	3,367.8	4,302.1
2721	ASPHALT ROOFING INDUSTRY	94	94	381.2	378.5
2731	FOLDING CARTON & SET-UP BOX IND.	97	99	1,099.1	1,072.8
2732	CORRUGATED BOX INDUSTRY	95	100	1,863.4	1,775.9
2733	PAPER BAG INDUSTRY	76	72	238.1	250.9
2791	COATED & TREATED PAPER INDUSTRY	94	87	813.3	884.2
2792	STATIONERY PAPER PRODUCTS INDUSTRY	87	80	416.5	454.5
2793	PAPER CONSUMER PRODUCTS INDUSTRY	100	98	493.8	499.5
2799	OTHER CONVERTED PAPER PRODUCTS NEC	83	91	793.7	722.7
28	PRINTING, PUBLISHING & ALLIED INDS.	96	96	13,495.6	13,424.6
2811	BUSINESS FORMS PRINTING INDUSTRY	93	93	950.1	947.8
2819	OTHER COMMERCIAL PRINTING INDS.	95	98	5,666.6	5,539.8
2821	PLATEMAKING, TYPESETTING & BINDERY	95	91	1,088.0	1,138.9
2831	BOOK PUBLISHING INDUSTRY	100	96	1,088.5	1,123.1
2839	OTHER PUBLISHING INDUSTRIES	98	100	1,752.7	1,720.4
2841	NEWSPAPERS, MAGAZINES & PERIODICALS	98	98	2,789.3	2,777.2
2849	OTHER COMBINED PUBLISHING, PRINTING	67	61	160.5	177.5
29	PRIMARY METAL INDUSTRIES	91	94	23,441.8	22,662.8

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2912	STEEL FOUNDRIES	90-100	90-100	249.8	262.3
2918	FERRO-ALLOYS & OTHER PRIMARY STEEL	98	95	9,447.5	9,731.1
2921	STEEL PIPE & TUBE INDUSTRY	99	99	2,018.0	2,028.1
2941	IRON FOUNDRIES	98	97	1,065.2	1,072.9
2951	PRIMARY PRODUCTION OF ALUMINUM	80-89	90-100	4,166.9	X
2959	OTHER NON-FERROUS SMELTING,REFINING	74	94	2,800.2	2,218.7
2961	ALUMINUM ROLLING, CASTING,EXTRUDING	92	80	2,180.6	2,513.5
2971	COPPER ROLLING, CASTING & EXTRUDING	98	95	542.8	558.7
2999	OTHER METAL ROLLING, CASTING ETC.	80-89	90-100	970.8	X
30	FABRICATED METAL PRODUCT INDUSTRIES	83	89	17,814.5	16,619.0
3011	POWER BOILER & HEAT EXCHANGER IND.	99	98	986.2	996.5
3021	METAL TANKS (HEAVY GAUGE) INDUSTRY	83	88	426.8	400.0
3022	PLATE WORK INDUSTRY	85	71	186.7	223.4
3023	PRE-ENG. METAL BLDGS (EXC PORTABLE)	90	78	230.9	268.5
3029	OTHER FABRICATED STRUCTURAL METAL	90	94	1,043.1	1,005.0
3031	METAL DOOR & WINDOW INDUSTRY	87	87	1,018.0	1,017.0
3032	PREFAB. PORTABLE METAL BUILDING IND	89	80	93.5	103.6
3039	OTHER ARCHITECTURAL METAL PRODUCTS	80	85	639.4	603.9
3041	CUSTOM COATING OF METAL PRODUCTS	70-79	90-100	1,115.5	X
3042	METAL CLOSURE & CONTAINER INDUSTRY	84	98	1,373.6	1,169.0
3049	OTHER STAMPED & PRESSED METAL PRODS	90	86	2,186.9	2,275.1
3051	UPHOLSTERY & COIL SPRING INDUSTRY	70-100	70-100	34.9	35.0
3052	WIRE & WIRE ROPE INDUSTRY	81	83	652.8	636.7
3053	INDUSTRIAL FASTENER INDUSTRY	99	92	626.7	676.5
3059	OTHER WIRE PRODUCTS INDUSTRIES	77	70	573.2	629.6
3061	BASIC HARDWARE INDUSTRY	91	87	478.6	498.2
3062	METAL DIES, MOULDS & PATTERNS IND.	97	95	1,330.2	1,361.3
3063	HAND TOOL & IMPLEMENT INDUSTRY	70-100	40-69	106.5	158.7
3069	OTHER HARDWARE & CUTLERY INDUSTRIES	87	78	281.9	315.9
3071	HEATING EQUIPMENT INDUSTRY	72	86	599.2	502.8
3081	MACHINE SHOP INDUSTRY	...	...	1,845.8	...
3091	METAL PLUMBING FIXTURES & FITTINGS	71	98	232.8	167.5
3092	METAL VALVE INDUSTRY	93	77	348.7	419.6
3099	OTHER METAL FABRICATING INDS, NEC	83	82	1,402.7	1,403.4
31	MACHINERY INDUSTRIES	91	87	12,374.7	12,865.2
3111	AGRICULTURAL IMPLEMENT INDUSTRY	85	97	1,637.4	1,434.7
3121	COMMERCIAL REFRIGERATION EQUIPMENT	93	77	384.7	463.5
3191	COMPRESSORS PUMPS & INDUSTRIAL FANS	90	93	940.0	917.0
3192	CONSTRUCTION & MINING MACHINERY	92	83	3,267.6	3,623.2
3193	SAWMILL & WOODWORKING MACHINERY	94	95	401.6	399.0
3194	TURBINE & POWER TRANSMISSION EQUIP.	89	90	1,265.9	1,242.5
3199	OTHER MACHINERY & EQUIPMENT, NEC	93	87	4,477.5	4,785.3
32	TRANSPORTATION EQUIPMENT INDUSTRIES	94	95	76,132.1	75,312.3
3211	AIRCRAFT & AIRCRAFT PARTS INDUSTRY	99	99	5,743.5	5,735.6
3231	MOTOR VEHICLE INDUSTRY	100	100	44,557.9	44,488.3

MANUFACTURING INDUSTRIES OF CANADA, 1994
PRIMARY PRODUCT SPECIALIZATION AND COVERAGE RATIOS

SIC	INDUSTRY	PRIMARY PRODUCT SPECIALIZATION RATIO %	PRIMARY PRODUCT COVERAGE RATIO %	VALUE OF SHIPMENTS OF GOODS OF OWN MANUFACTURE $'000,000	PRODUCT-BASED SHIPMENTS $'000,000
3241	TRUCK & BUS BODY INDUSTRY	90	62	518.5	747.0
3242	COMMERCIAL TRAILER INDUSTRY	95	93	471.6	482.9
3243	NON-COMMERCIAL TRAILER INDUSTRY	90-100	90-100	349.1	356.9
3244	MOBILE HOME INDUSTRY	80-100	80-100	227.5	232.9
3251	MOTOR VEHICLE ENGINE & PARTS IND.	100	97	2,878.6	2,974.5
3252	MOTOR VEHICLE WIRING ASSEMBLIES	35	97	1,108.3	397.7
3253	MOTOR VEHICLE STAMPINGS INDUSTRY	84	83	3,294.9	3,327.5
3254	MOTOR VEHICLE STEERING & SUSPENSION	90-100	90-100	1,441.7	1,451.2
3255	MOTOR VEHICLE WHEEL & BRAKE IND.	96	83	1,333.9	1,547.7
3256	MOTOR VEHICLE PLASTIC PARTS IND.	89	66	1,726.6	2,344.1
3257	MOTOR VEHICLE FABRIC ACCESSORIES	80-89	60-69	2,019.3	2,629.1
3259	OTHER MOTOR VEHICLE ACCESS. & PARTS	70	96	6,192.4	4,483.0
3261	RAILROAD ROLLING STOCK INDUSTRY	70-79	90-100	1,990.7	X
3271	SHIPBUILDING & REPAIR INDUSTRY	99	98	976.3	984.5
3281	BOATBUILDING & REPAIR INDUSTRY	87	98	303.7	271.1
3299	OTHER TRANSPORTATION EQUIPMENT INDS	80-100	60-79	997.6	X
33	ELECTRICAL & ELECTRONIC PRODUCTS	94	91	23,862.3	24,664.1
3311	SMALL ELECTRICAL APPLIANCE INDUSTRY	86	96	416.5	371.8
3321	MAJOR APPLIANCES (ELEC. & NON-ELEC)	90-100	80-89	946.3	1,073.6
3331	LIGHTING FIXTURE INDUSTRY	92	93	446.8	442.1
3332	ELECTRIC LAMP & SHADE INDUSTRY	90	71	67.7	86.0
3333	ELECTRIC LAMP (BULB & TUBE) IND.	100	79	153.0	X
3341	RECORD PLAYERS,RADIO & TV RECEIVERS	70-79	90-100	391.1	308.8
3351	TELECOMMUNICATION EQUIPMENT IND.	95	97	4,457.6	4,331.9
3352	ELECTRONIC PARTS & COMPONENTS IND.	98	96	3,894.0	3,980.1
3359	OTHER ELECTRONIC EQUIPMENT INDS.	89	89	2,618.7	2,625.4
3361	ELECTRONIC COMPUTERS & PERIPHERALS	99	97	5,106.7	5,219.1
3362	ELECTRONIC BUSINESS MACHINES IND.	80-100	80-100	285.1	X
3369	OTHER OFFICE & BUSINESS MACHINES	90-100	70-79	104.4	140.7
3371	ELECTRICAL TRANSFORMER INDUSTRY	80-100	80-100	607.4	636.4
3372	ELEC. SWITCHGEAR, PROTECTIVE EQUIP.	90-100	60-69	810.1	1,110.7
3379	OTHER ELECTRICAL INDUSTRIAL EQUIP.	90	68	808.9	1,062.1
3381	COMMUNICATIONS, ENERGY WIRE & CABLE	90-100	90-100	1,804.0	1,755.7
3391	BATTERY INDUSTRY	100	69	213.7	X
3392	NON-CURRENT CARRYING WIRING DEVICES	81	67	172.3	209.9
3399	OTHER ELECTRICAL PRODUCTS INDS. NEC	81	85	558.4	531.8
35	NON-METALLIC MINERAL PRODUCTS INDS.	94	94	6,698.4	6,721.2
3511	CLAY PRODUCTS (FROM DOMESTIC CLAY)	100	89	102.3	115.0
3512	CLAY PRODUCTS (FROM IMPORTED CLAY)	80-100	80-100	81.1	78.5
3521	CEMENT INDUSTRY	90-100	90-100	895.4	909.6
3541	CONCRETE PIPE INDUSTRY	85	85	186.8	186.9
3542	STRUCTURAL CONCRETE PRODUCTS IND.	91	88	221.8	229.4
3549	OTHER CONCRETE PRODUCTS INDUSTRIES	92	88	447.5	464.2
3551	READY-MIX CONCRETE INDUSTRY	94	100	1,636.3	1,552.8
3561	PRIMARY GLASS & CONTAINERS INDUSTRY	93	97	669.8	642.6
3562	GLASS PRODUCTS (EXCEPT CONTAINERS)	96	85	702.2	797.2
3571	ABRASIVES INDUSTRY	80-89	70-79	261.6	296.7

MANUFACTURING INDUSTRIES OF CANADA, 1994
PRIMARY PRODUCT SPECIALIZATION AND COVERAGE RATIOS

SIC	INDUSTRY	PRIMARY PRODUCT SPECIALIZATION RATIO %	PRIMARY PRODUCT COVERAGE RATIO %	VALUE OF SHIPMENTS OF GOODS OF OWN MANUFACTURE $'000,000	PRODUCT-BASED SHIPMENTS $'000,000
3581	LIME INDUSTRY	87	100	179.7	155.8
3591	REFRACTORIES INDUSTRY	91	97	207.1	193.9
3592	ASBESTOS PRODUCTS INDUSTRY	80-89	90-100	28.2	25.6
3593	GYPSUM PRODUCTS INDUSTRY	90-100	90-100	414.2	418.8
3594	NON-METAL. MINERAL INSULATING MAT'L	100	100	397.2	397.2
3599	OTHER NON-METAL. MINERAL PRODS. NEC	91	95	267.2	257.2
36	REFINED PETROLEUM & COAL PRODUCTS	97	96	17,535.5	17,683.1
3611	PETROLEUM PROD (EXC LUB OIL,GREASE)	98	99	16,586.1	16,346.1
3612	LUBRICATING OIL & GREASE INDUSTRY	80-100	60-79	608.7	825.1
3699	OTHER PETROLEUM & COAL PRODUCTS	89	59	340.7	511.9
37	CHEMICAL & CHEMICAL PRODUCTS INDS.	90	90	25,598.0	25,574.5
3711	INDUSTRIAL INORGANIC CHEMICALS NEC	95	89	2,673.7	2,839.3
3712	INDUSTRIAL ORGANIC CHEMICALS NEC	88	94	5,172.3	4,806.3
3721	CHEMICAL FERTILIZERS INDUSTRY	70-100	70-100	1,062.8	961.4
3722	MIXED FERTILIZER INDUSTRY	80-89	60-69	484.5	621.6
3729	OTHER AGRICULTURAL CHEMICAL INDS.	99	97	331.6	336.7
3731	PLASTIC & SYNTHETIC RESIN INDUSTRY	91	94	4,364.3	4,249.3
3741	PHARMACEUTICAL & MEDICINE INDUSTRY	97	99	4,451.3	4,381.7
3751	PAINT & VARNISH INDUSTRY	92	92	1,610.0	1,614.2
3761	SOAP & CLEANING COMPOUNDS INDUSTRY	73	95	1,585.6	1,214.1
3771	TOILET PREPARATIONS INDUSTRY	80-100	60-79	965.1	1,199.2
3791	PRINTING INK INDUSTRY	100	99	320.4	321.1
3792	ADHESIVES INDUSTRY	76	71	348.0	371.2
3799	OTHER CHEMICAL PRODUCTS INDS. NEC	90	75	2,228.4	2,658.6
39	OTHER MANUFACTURING INDUSTRIES	93	91	6,899.8	7,061.1
3911	INDICATING & RECORDING INSTRUMENTS	93	78	1,116.7	1,328.2
3912	OTHER INSTRUMENTS, RELATED PRODUCTS	98	94	1,046.5	1,086.5
3913	CLOCK & WATCH INDUSTRY	80-100	60-79	39.3	46.5
3914	OPHTHALMIC GOODS INDUSTRY	100	95	277.5	X
3920	JEWELLERY & PRECIOUS METAL INDS.	94	98	551.2	529.4
3931	SPORTING GOODS INDUSTRY	93	96	1,032.3	999.9
3932	TOYS & GAMES INDUSTRY	87	88	231.7	229.5
3971	SIGN & DISPLAY INDUSTRY	89	94	617.1	579.1
3991	BROOM, BRUSH & MOP INDUSTRY	90-100	90-100	102.6	100.7
3992	BUTTON, BUCKLES & CLOTHES FASTENERS	100	94	87.7	X
3993	FLOOR TILE, LINOLEUM, COATED FABRIC	90-100	80-89	342.5	357.4
3994	MUSICAL INSTRUMENT, SOUND RECORDING	100	92	428.8	464.4
3999	OTHER MANUFACTURED PRODUCTS NEC	88	95	1,025.6	952.9

BUSINESS AND TRADE STATISTICS FIELD
RESEARCH PAPERS

No.	Title/Author
1/IND01	Specialization and Coverage Ratios for the Manufacturing Industries of Canada **John S. Crysdale**
2/SBS01	Finding Funds for Small Business: Results of the 1994 National Survey on the Financing of Small Business **Greg Peterson**

For more information or to obtain copies of papers, contact:

Roger N. Purdue, Senior Advisor
Business and Trade Statistics Field
13th Floor, Jean Talon Building
Statistics Canada
Ottawa, Ontario K1A 0T6

Tel: (613) 951-3425
Fax: (613) 951-0411
E-mail: purdrge@statcan.ca