WORKING PAPER

THE CLASSIFICATION OF THREE-DIGIT MANUFACTURING INDUSTRIES BASED ON TRADE DATA FROM 1962 to 1969

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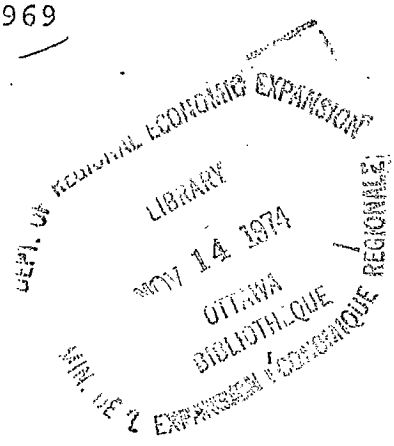

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1. Introduction

Aim of this work is to classify manufacturing industries according to those criteria which take account of the trends in shipments, exports, imports, and domestic sales. The series of data which were available to us (shipments, exports and imports) ran from the period 1962 to 1969 through for three-digit industries. From the beginning we have eliminated those industries which had a negative rate of growth in production during the period under consideration.

2. Criteria

We can divide the industries into two distinct groups. The first group is one in which the growth was due to a strong exterior demand (exports); the second group was due to a strong domestic demand. The second group can be divided into two sub groups; the first characterized by a positive import substitution (domestic sales growing more quickly than imports), the second characterized by a negative import substitution (imports growing more quickly than domestic sales). For an industry to be in the group "export lead growth", it is necessary as a first condition that exports grow more quickly than shipments and as a second condition that imports have a growth rate which is less rapid than shipments and thus the balance of trade is improving. (We can find, in the appendix an outline of this criteria). The second condition has been added in order to exclude certain industries which, in spite of a rapid growth in their exports compared to the shipments, saw imports growing at a rate greater than shipments and the trade balance deteriorating.

The group, "domestic market lead growth", is made up of the industries for which shipments have grown more quickly than exports as well as those which were rejected from the first group ("export lead growth") because they did not meet the

second condition. We can further divide this group into two sub groups as we have explained above. (The reader will find in the appendix a formulation of this criteria).

Classification

If we apply the criteria elaborated in the preceding paragraphs to three-digit manufacturing industries, we obtain a classification of industries in three groups: "export lead growth", "import substitution+" and "import substituting-". We can find in Table 1 the list of industries which pertain to each group. When we look at this table, we can see that the most important group in terms of numbers is made up of those industries which did not succeed in competing adequately with imports.

4. Selection of Industries

We can use these classification criteria to make a selection of industries. The industries chosen must ideally meet two imperatives; a marked rise in their sales to foreign market associated with a better ascendancy in the domestic market. The first criterion used consists of comparing the rate of growth of exports to that of shipments. We can show this ratio in the following fashion:

Criterion "Export Market":

$$\frac{\Delta X \text{ 62 to 69}}{X \text{ 69}} \quad \begin{matrix} > \\ < \end{matrix} \quad \frac{\Delta P \text{ 62 to 69}}{P \text{ 69}} \qquad 1$$

Where X = exports
P = shipments

When the value of the ratio is greater than 1, the industry is "desirable" because exports are going at a rate which is greater than shipments.

The second criteria consists of comparing the share of imports as percentage of domestic market in 1962 and in 1969. We can show this in the following manner:

Criterion "Export Market":

$$\frac{M}{P + M - X}_{62} \quad \begin{matrix} > \\ < \end{matrix} \quad \frac{M}{P + M - X}_{69} \quad 1$$

where M = imports

When the value of this ratio is greater than 1, this will indicate that imports have a smaller part of the domestic market at the finish of the period than at the beginning.

We can make a selection of industries from the summation of the values of these two criteria. (See Table 2 Column 1 to 4). Nevertheless one can have a very high value for the summation when one of the values for one of the criteria is very high and the other one is relatively weak. As well, as the average for the criterion "Export Market" is greater than the average for the criterion "Domestic Market" in the ratio of 2.23 to 1, the former will have a greater influence on the summation of the latter.

To handle this we can weigh the criterion "Domestic Market" by a factor W = 2.23. We would therefore give an equal weight to the two criteria. (See Table 2, column 5 and 6). The reader will be able to find in Table 3, a list of the ten "first" industries according to the value of the summation of the two criteria of selection. When we look at the last table, we can see that only one of the ten industries chosen by Mr. D. Boulter (See note to Table 2) is among the first ten industries.

TABLE 1

Classification of Industries According to Trade Criterias for the Period 1962-1969

1) Export led growth industries	2) Domestic market led growth industries	
	a) Import Substitution+ *	b) Import Substitution- **
S.I.C.	S.I.C.	S.I.C.
221	328	125 172 337
372	103	145 175 339
183	258	163 212 351
272	298	214 215 355
153	354	256 219 357
264	385	273 239 359
223	216	291 242 369
268	292	296 252 373
343	229	345 261 377
131	356	352 266 379
365	302	375 274 393
323	135	378 286 397
197	295	101 297
128	376	169 303
341	287	174 304
141	133	231 305
371	201	259 306
311	311	301 307
354	251	374 309
347	131	381 315
379	316	383 318
393	179	399 321
151	382	105 325
129	139	112 326
324	336	123 327
335	332	147 331
143	352	161 334
111		
271		

* the positive sign means that an industry has succeeded in replacing imports by domestic production

** the negative sign means that an industry has not succeeded in replacing imports by domestic production and that these imports took a larger part of the domestic market at the end of the period (1969).

Source: Statistics Canada, special tabulations

TABLE 2

Industry Selection Criteria Based on 1962-1969 data
(with ranks)

S.I.C.	Export Mkt. criteria 1	Domestic Mkt. criteria 2	Summation (col.1+2) 3	Rank 4	Summation weighted[c] (col.1+2w) 5	Rank 6	Col. 1 weighted by exports in % 7	Rank 8	Col. 2 weighted by consumption % 9	Rank 10	Summation (col.7+9) 11	Rank 12
101	1.14	0.72	1.86	(82)	2.74	(85)	1.27	(67)	1.00	(41)	2.27	(76)
103	-0.29	3.25	2.96	(45)	6.95	(11)	-0.29	(97)	3.44	(4)	3.15	(46)
105	1.08	0.84	1.92	(81)	2.95	(77)	1.10	(74)	1.10	(33)	2.21	(78)
111	1.15	1.17	2.32	(67)	3.75	(59)	1.38	(63)	1.22	(24)	2.60	(66)
112	2.69	0.90	3.59	(28)	4.69	(35)	2.79	(30)	1.03	(38)	3.82	(30)
123*	1.60	0.55	2.15	(73)	2.82	(82)	1.63	(57)	0.63	(71)	2.26	(77)
125	0.80	0.15	0.95	(98)	1.13	(105)	0.80	(84)	0.15	(83)	0.95	(98)
128	3.16	1.22	4.38	(20)	5.88	(18)	3.19	(24)	1.25	(21)	4.44	(25)
129	1.66	1.00	2.66	(59)	3.89	(56)	1.66	(56)	1.12	(31)	2.78	(62)
131	3.77	1.07	4.84	(15)	6.15	(15)	3.80	(20)	1.13	(30)	4.93	(18)
133	1.21	1.11	2.32	(67)	3.68	(62)	1.21	(69)	1.15	(29)	2.36	(73)
135	-0.44	1.25	0.81	(102)	2.34	(93)	-0.45	(99)	1.29	(20)	0.84	(100)
139	1.14	1.05	2.19	(70)	3.48	(67)	1.17	(71)	1.22	(24)	2.39	(70)
141	2.91	2.00	4.91	(14)	7.37	(10)	2.91	(29)	2.14	(9)	5.05	(17)
143*	1.18	0.98	2.16	(72)	3.36	(71)	1.37	(64)	1.01	(40)	2.38	(71)
145	0.10	0.75	0.85	(101)	1.77	(99)	0.10	(93)	0.81	(55)	0.91	(99)
147	4.92	0.80	5.72	(9)	6.70	(12)	4.92	(9)	0.81	(55)	5.73	(11)
151	1.69	1.19	2.88	(48)	4.34	(43)	1.78	(52)	1.22	(24)	3.00	(52)
153	5.59	0.81	6.40	(8)	7.39	(9)	5.61	(7)	0.87	(51)	6.48	(10)
161	11.0	0.61	11.61	(2)	12.36	(3)	11.01	(1)	0.62	(72)	11.63	(2)
163	0.51	0.41	0.92	(99)	1.42	(103)	0.52	(89)	0.44	(79)	0.96	(97)
169	1.38	0.63	2.01	(79)	2.78	(84)	1.40	(61)	0.67	(68)	2.07	(81)
172	-0.55	0.55	0.00	(107)	0.67	(106)	-0.56	(100)	0.56	(75)	0.00	(104)

174	1.11	0.45	1.56	(92)	2.11	(97)	1.12	(73)	0.48	(78)	1.60	(94)
175	2.24	0.94	3.18	(38)	4.33	(44)	2.24	(40)	0.94	(45)	3.18	(44)
179	2.03	1.06	3.09	(42)	4.39	(41)	2.03	(47)	1.08	(35)	3.11	(47)
183	6.66	1.10	7.76	(7)	9.11	(7)	6.79	(4)	1.19	(27)	7.98	(6)
197	3.31	1.20	4.51	(18)	5.98	(16)	3.33	(23)	1.23	(23)	4.56	(23)
201	0.42	1.10	1.52	(94)	2.87	(80)	0.43	(90)	1.24	(22)	1.67	(92)
211	2.57	1.10	3.67	(27)	5.02	(29)	2.59	(32)	1.11	(32)	3.70	(33)
212	2.59	0.64	3.23	(35)	4.01	(52)	2.59	(32)	0.64	(70)	3.23	(42)
214[a]	2.11	0.91	3.02	(43)	4.13	(50)	2.11	(43)	0.92	(47)	3.03	(50)
215	-3.57	0.26	-3.31	(108)	-2.99	(107)	-3.57	(101)	0.26	(82)	-3.31	(105)
216*	1.71	1.51	3.22	(36)	5.07	(26)	1.71	(54)	1.56	(14)	3.27	(40)
219	4.63	0.91	5.54	(10)	6.65	(13)	4.64	(12)	0.92	(47)	5.56	(12)
223	4.68	8.00	12.68	(1)	22.52	(1)	4.68	(11)	8.06	(1)	12.74	(1)
229	1.50	1.41	2.91	(47)	4.64	(37)	1.50	(59)	1.51	(16)	3.01	(51)
231	1.67	0.60	2.27	(68)	3.00	(76)	1.67	(55)	0.61	(73)	2.28	(75)
239	2.05	0.69	2.74	(54)	3.58	(65)	2.06	(44)	0.74	(62)	2.80	(60)
242	4.12	0.69	4.81	(16)	5.65	(20)	4.28	(15)	0.89	(49)	5.17	(14)
251	0.98	1.09	2.07	(75)	3.41	(68)	1.66	(56)	1.22	(24)	2.88	(58)
252	1.02	0.67	1.69	(89)	2.51	(90)	1.11	(74)	0.71	(65)	1.82	(89)
254	2.56	0.63	3.19	(37)	3.96	(54)	2.58	(33)	0.67	(68)	3.25	(41)
256	0.40	0.50	0.90	(100)	1.51	(102)	0.40	(91)	0.51	(77)	0.91	(99)
258	0.18	2.22	2.40	(65)	5.13	(24)	0.18	(92)	2.23	(6)	2.41	(69)
259	1.33	0.70	2.03	(77)	2.89	(79)	1.34	(65)	0.72	(64)	2.06	(82)
261[b]	2.30	0.85	3.15	(40)	4.19	(47)	2.31	(39)	0.92	(47)	3.28	(42)
264	5.22	2.96	8.18	(4)	11.82	(4)	5.24	(8)	3.01	(5)	8.25	(5)
266	2.40	0.72	3.12	(41)	4.00	(53)	2.41	(35)	0.76	(60)	3.17	(45)
268*	4.46	0.26	4.72	(17)	5.04	(28)	4.48	(13)	0.26	(82)	4.74	(21)
271	1.09	1.02	2.11	(74)	3.36	(71)	2.91	(29)	1.20	(26)	4.11	(27)

272	5.94	1.87	7.81	(6)	10.11	(6)	5.95	(5)	1.90	(11)	7.85	(7)
273	0.96	0.58	1.54	(93)	2.25	(95)	0.96	(79)	0.66	(69)	1.62	(93)
274*	2.02	0.85	2.87	(49)	3.91	(55)	2.04	(46)	0.93	(46)	2.97	(54)
286	2.43	0.85	3.28	(34)	4.32	(45)	2.47	(34)	1.12	(31)	3.59	(37)
287	2.16	1.15	3.31	(33)	4.72	(34)	2.16	(42)	1.17	(28)	3.33	(39)
291	0.98	0.66	1.64	(91)	2.45	(91)	1.20	(70)	0.84	(54)	2.04	(83)
292	1.23	1.42	2.65	(60)	4.39	(41)	1.25	(68)	1.52	(15)	2.77	(63)
294	3.77	0.53	4.30	(22)	4.95	(31)	4.04	(17)	0.55	(76)	4.59	(22)
295	0.98	1.24	2.22	(69)	3.74	(60)	2.39	(37)	-		-	
296*	0.64	0.63	1.27	(96)	2.04	(98)	0.68	(86)	0.66	(69)	1.34	(95)
297	1.41	0.40	2.81	(84)	2.30	(94)	1.53	(58)	0.42	(80)	1.95	(85)
298*	0.86	2.09	2.95	(46)	5.52	(21)	0.87	(82)	2.17	(7)	3.04	(49)
301*	1.02	0.64	1.66	(90)	2.44	(92)	1.04	(76)	0.66	(69)	1.70	(91)
302	3.71	1.28	4.99	(13)	6.56	(14)	3.76	(21)	1.40	(18)	5.16	(15)
303	2.32	0.84	3.16	(39)	4.19	(47)	2.32	(38)	0.89	(49)	3.21	(43)
304*	1.72	0.96	2.68	(58)	3.86	(57)	1.74	(53)	1.15	(29)	2.89	(57)
305	2.86	0.66	3.52	(30)	4.33	(44)	2.96	(27)	0.73	(63)	3.69	(34)
306	1.18	0.99	2.17	(71)	3.38	(69)	1.20	(70)	1.06	(36)	2.26	(77)
307	1.39	0.95	2.34	(66)	3.50	(66)	1.39	(62)	0.98	(43)	2.37	(2)
309	2.06	0.94	3.00	(44)	4.15	(48)	2.17	(41)	1.04	(37)	3.21	(43)
311	0.96	1.10	2.06	(76)	3.41	(68)	1.12	(73)	1.21	(25)	2.33	(74)
315*	1.94	0.93	2.87	(49)	4.01	(52)	2.41	(35)	1.34	(19)	3.75	(32)
316*	2.15	1.07	3.22	(36)	4.53	(38)	2.17	(41)	1.10	(33)	3.27	(40)
318*	1.05	0.70	1.75	(86)	2.61	(88)	1.10	(75)	0.78	(58)	1.88	(86)
321	1.60	0.93	2.53	(62)	3.67	(63)	2.17	(41)	1.08	(35)	3.25	(41)
323	3.58	0.33	3.91	(24)	4.31	(46)	9.95	(2)	0.58	(74)	10.53	(3)
324*	1.27	1.56	2.83	(52)	4.74	(33)	1.34	(65)	1.61	(13)	2.95	(55)
325*	3.31	0.60	3.91	(24)	4.64	(37)	5.75	(6)	0.88	(50)	6.63	(8)

326	2.02	0.71	2.73	(55)	3.60	(64)	2.05	(45)	0.74	(62)	2.79	(61)
327	-0.22	0.63	0.41	(105)	1.18	(104)	-0.22	(96)	0.67	(68)	0.45	(103)
328*	0.98	7.14	8.12	(5)	16.9	(2)	1.00	(77)	7.38	(2)	8.38	(4)
331	-0.38	0.86	0.48	(104)	1.53	(101)	-0.38	(98)	0.90	(48)	0.52	(102)
332	2.54	1.03	3.57	(29)	4.83	(32)	2.58	(33)	1.11	(32)	3.69	(34)
334	3.78	0.57	4.35	(21)	5.05	(27)	3.90	(18)	0.61	(73)	4.51	(24)
335*	1.26	1.44	2.70	(57)	4.47	(40)	1.46	(60)	1.69	(12)	3.15	(46)
336*	2.33	1.05	3.38	(32)	4.67	(36)	2.47	(34)	1.17	(28)	3.64	(35)
337	4.80	0.40	5.20	(11)	5.69	(19)	4.82	(10)	0.41	(81)	5.23	(13)
338	1.92	0.65	2.57	(61)	3.37	(70)	1.96	(48)	0.69	(66)	2.65	(64)
339*	2.20	0.68	2.88	(48)	3.71	(61)	2.24	(40)	0.73	(63)	2.97	(54)
341	2.95	0.64	3.59	(28)	4.37	(42)	2.97	(26)	0.66	(69)	3.63	(36)
343	4.12	0.79	4.91	(14)	5.88	(18)	4.12	(16)	0.79	(57)	4.91	(19)
345	0.67	0.66	1.33	(95)	2.14	(96)	0.67	(87)	0.67	(68)	1.34	(95)
347	2.40	4.00	6.40	(8)	11.32	(5)	2.40	(36)	4.18	(3)	6.58	(9)
351	3.36	0.85	4.21	(23)	5.25	(23)	3.37	(22)	0.87	(51)	4.24	(26)
352	0.81	1.01	1.82	(83)	3.06	(75)	0.81	(83)	1.02	(39)	1.83	(88)
354	0.55	2.00	2.50	(63)	5.01	(30)	0.55	(88)	2.02	(10)	2.57	(67)
355	4.30	0.74	5.04	(12)	5.95	(17)	4.31	(14)	0.75	(61)	5.06	(16)
356	2.37	1.41	3.78	(26)	5.51	(22)	2.39	(37)	1.50	(7)	3.89	(28)
357	1.08	0.71	1.79	(85)	2.66	(87)	1.12	(73)	0.72	(64)	1.84	(87)
359	0.75	0.95	1.70	(88)	2.86	(81)	0.75	(85)	0.95	(44)	1.70	(91)
365	3.69	0.70	4.39	(19)	5.25	(23)	3.88	(19)	0.98	(43)	4.86	(20)
369	-6.62	0.77	-5.85	(109)	-4.91	(108)	-6.63	(102)	0.77	(59)	-5.86	(106)
371*	2.85	0.74	3.59	(28)	4.50	(39)	3.04	(25)	0.75	(61)	3.79	(31)
372	8.75	0.01	8.76	(3)	8.77	(8)	9.63	(3)	-		-	
373	-0.15	0.80	0.65	(103)	1.63	(100)	-0.15	(94)	0.85	(53)	0.70	(101)

374	1.11	0.91	2.02	(78)	3.13	(74)	1.13	(72)	0.99	(42)	2.12	(79)
375	0.91	0.81	1.72	(87)	2.71	(86)	0.91	(80)	0.86	(52)	1.77	(90)
376	-0.19	1.22	1.03	(97)	2.53	(89)	-0.19	(95)	1.29	(20)	1.10	(96)
377	2.03	0.78	2.81	(53)	3.76	(58)	2.03	(47)	0.80	(56)	2.83	(59)
378	0.81	0.94	1.75	(86)	2.90	(78)	0.98	(78)	1.13	(30)	2.11	(80)
379	1.92	0.79	2.71	(56)	3.68	(62)	1.96	(48)	0.87	(51)	2.83	(59)
381*	1.64	0.68	2.32	(67)	3.15	(73)	1.82	(51)	0.79	(57)	2.61	(65)
382	2.74	1.06	3.80	(25)	5.10	(25)	2.75	(31)	1.09	(34)	3.84	(29)
383	1.32	0.67	1.99	(80)	2.81	(83)	1.32	(66)	0.68	(67)	2.00	(84)
385*	0.88	1.96	2.84	(51)	5.25	(23)	0.90	(81)	2.15	(8)	3.05	(48)
393	1.90	0.96	2.86	(50)	4.04	(51)	1.93	(49)	1.00	(41)	2.93	(56)
397*	2.92	0.55	3.47	(31)	4.14	(49)	2.92	(28)	0.56	(75)	3.48	(38)
399	1.80	0.67	2.47	(64)	3.29	(72)	1.83	(50)	0.71	(65)	2.54	(68)

* Industries selected by D. Boulter in: "A Preliminary Ranking of Industry Performance in the Manufacturing Sector in Canada".

a and b: Rates of growth have been calculated for the period 1962-1968.

c: Column 2 in weighted by a factor "w" = 2.23

Source: Statistics Canada, special tabulations

The following industries are not included in the list because of either a lack of data or a negative growth of production in the period 1962-1969: 124, 193, 213, 218, 221, 308, 348, 353, 384, 395.

TABLE 3

First ten industries selected by summation of export and domestic market criterias

(See Table 2, Column 3 and 4)

S.I.C.	Name	Summation	Rank
223	Cotton and jute bag industry	12.68	1
161	Rubber footwear manufacturers	11.61	2
372	Manufacturers of mixed fertilizers	8.76	3
264	Office furniture industry	8.18	4
328*	Boat building and repair	8.12	5
272	Asphalt roofing manufacturers	7.81	6
183	Cotton yarn and cloth mills	7.76	7
153	Tobacco product manufacturers	6.40	8
147	Wineries	5.72	9
129	Linoleum and coated fabrics industry	5.54	10

* Industries selected by D. Boulter in: "A Preliminary Ranking of Industry Performance in the Manufacturing Sector in Canada".

Source: Statistics Canada, special tabulations

5. Possibilities of the Introduction of Weighting

One can find a great deal of weakness in the approach elaborated in the preceding section, notably the fact that the criteria do not let us take into account the size of industries. Therefore, according to these criteria, one prefers the small industry enjoying a strong growth in relative value at the expense of a very large industry with a relative growth which is much less, even though it surpasses the other in absolute value. To address ourselves to this deficiency, we wish to weigh each of the criteria by a factor that took into account the relative size of each industry.

The criterion, "Export Market" was weighted by a factor which consisted of the size of exports of each industry in comparison to total manufacturing exports. The criterion "Domestic Market" was weighted by a factor which took into consideration the size of domestic consumption (including imports) going to each industry in comparison to total consumption. (See Table 2, Column 7-12). If we compare the new summation obtained by the weighting of each of these factors, the results differ very little from the summation of the criteria in the non-weighted state.

We can make a number of criticisms on the value of this study which is no more than an outline for a more serious study of the question. Instead of considering the summation of certain criteria, a summation which can be meaningless, it would be preferable to consider each criterion separately and to choose the one which was considered as being the most important. One could as well compare the performance of each industry vis-à-vis the foreign market or the domestic market.

APPENDIX

Criterias used for industry classification

I - "Export led growth"

$$\Delta X/X > \Delta P/P$$

Subject to i) $\Delta P/P > \Delta M/M$

ii) $\Delta (X-M)/X-M > 0$

II - "Domestic market led growth"

$$\Delta X/X < \Delta P/P$$

plus the industries where $\Delta X/X > \Delta P/P$

but $\Delta P/P \quad \Delta M/M$ or $\Delta (X-M)/X-M < 0$

If $\left(M/P+M-X\right)_{62} > \left(M/P+M-X\right)_{69}$ -
they are "Import substituting positive" *

If $\left(M/P+M-X\right)_{62} > \left(M/P+M-X\right)_{69}$
they are "Import substituting negative" *

* see the footnote on Table 1