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This paper contains preliminary findings from research work still in
progress and should not be quoted without prior approval of the author.

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TRANSPORT COST AND TARIFF PROTECTION OF AUSTRALIAN AND CANADIAN MANUFACTURING: A COMPARATIVE STUDY

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In contrast with the large body of literature concerning the theoretical and empirical consideration of tariff protection, studies of international transport costs as a barrier to trade are comparatively rare. The body of literature which does exist in this respect deals almost exclusively with trade with the United States and is comprised in large part by the work of Waters (1970), and the more recent studies conducted by Yeats, either solely (1976,1977), or with collaborators (Finger and Yeats, 1976; Sampson and Yeats, 1977). Waters has dealt with transport costs and tariffs as an advantage serving to protect import-competing United States industries, while Yeats and his co-workers have been mainly concerned with aspects of these barriers from the opposite point of view: as trade barriers acting to disadvantage exporters to the United States.

This study uses an approach similar to that of Waters. Its aims are to provide estimates of the transport cost and tariff protection available to import-competing Australian producers and to compare it with estimates of transport cost and tariff barriers protecting similar Canadian manufacturing industries. In this respect, nominal and effective rates of tariff and transport cost protection[1] are derived for 85 similarly defined manufacturing industries in Australia and Canada using 1974 data for Canada, and for Australia, data drawn from the September quarter, 1974.[2,3] The findings indicate that while the structures of the respective tariff regimes display substantial similarities (i.e., industries which in Australia are relatively highly

protected, tend also to be highly protected in Canada) the means of all the
protection variables considered here are all significantly lower in Canada
than in Australia.

THE COMPARISON OF AUSTRALIAN AND CANADIAN MANUFACTURING INDUSTRIES

The comparison of the protective structures of Australia and Canada,
has been made because of the similarities in the two economies, particularly
the presence of:

(a) similar consumption patterns;

(b) similar geographic concentrations of industrial capacity,
     sparsely distributed populations, and the transport cost
     and communication problems associated with long internal
     distances;

(c) similar federal systems of government with consequent
     problems of achieving coordinated and consistent economic
     strategies; and

(d) similar histories of protectionism.

Tables 1, 2 and 3 compare some relevant characteristics of the Australian
and Canadian economies. Table 2 shows the similar distribution of gross pro-
duct in the two economies, with manufacturing sectors contributing about one-
quarter of the respective totals. Table 1 compares the trade performances of
the two countries' rural and mining sectors. These two sectors make a greater
contribution to total exports from Australia than their Canadian counterparts
(26.7 and 16.5 percent respectively in Australia, compared with 10.6 and 14.0
percent in Canada). Otherwise the sectoral data are similar in each country.

The export performance of the Australian manufacturing sector is markedly
worse than the Canadian by the criteria of Table 3, while the proportion of
imports comprising Australian supplies of manufactures is only half that of
Canada's. According to these data, the Australian manufacturing sector is much
less open to international trade than its Canadian counterpart. The proportion

TABLE 1

GROSS PRODUCT AT FACTOR COST 1973 (%)

	Australia (b)	Canada
Rural (a)	8.0	5.3
Mining (a)	3.8	4.2
Manufacturing (a)	23.8	23.1
Services (a)	64.6	67.1
Total (May not add owing to rounding)	100.0	100.0

Source: Australian Industries Assistance Commission, 1976a, p. 73.

Notes: See Table 3.

TABLE 2

TRADE PERFORMANCE OF RURAL MINING SECTORS (a):
AUSTRALIA AND CANADA, 1973 (b)

	Rural		Mining		Total = Rural + Mining + Manufacturing	
	Aust %	Can %	Aust %	Can %	Aust %	Can %
Exports/total exports (c)	26.7	10.6	16.5	14.0	100.0	100.0
Imports/total imports (d)	3.4	4.2	3.2	6.3	100.0	100.0
Exports/sector gross product (f)	53.7	46.2	69.5	75.1	45.2	70.6
Sector/gross product GDP (g)	8.0	5.3	3.8	4.3	35.4	32.8

Source: Australian Industries Assistance Commission, 1977, p. 96.

Notes: See Table 3.

TABLE 3

TRADE PERFORMANCE OF MANUFACTURING (a)
AUSTRALIA AND CANADA 1973 (b)

	Australia %	Canada %
Exports/total exports (c)	56.7	75.3
Exports/domestic production (i)	13.0	23.9
Exports/sector gross product (f)	38.4	75.3
Imports/total imports (d)	93.4	89.4
Intra-industry trade (j)	31.0	50.0
Sector gross product/GNP (g)	23.8	23.1
Imports/domestic supply (h)	13.1	26.1

Source: Australian Industries Assistance Commission, 1977, pp. 96-97.

Notes:

(a) Divisions of the International Standard Industrial Classification.

(b) Data for Australia are for 1972/73.

(c) Value of exports of the sector as a percentage of total exports of the sector as a percentage of total exports of goods from rural, mining and manufacturing sectors.

(d) Value of imports of goods produced by the sector as a percentage of total imports of goods produced by the rural, mining and manufacturing sectors.

(f) Value of exports expressed as a percentage of gross product at factor cost for the sector.

(g) Gross product at factor cost of the sector as a percentage of gross domestic product at factor cost.

(h) Value of imports as a percentage of domestic supply. Domestic supply is defined as the value of domestic production, plus imports, less exports.

(i) Value of exports as a percentage of domestic production.

(j) Intra-industry trade is defined as the ratio of matching exports and imports to the sum of exports and imports, expressed as a percentage.

of intra-industry trade is also lower in Australian manufacturing, and suggests a relative lack of specialization in the sector (Grubel, 1967).

One characteristic of the Canadian economy not shared by Australia is its proximity to the United States. The importance of the U.S. as a source of Canada's imports and as a market for Canadian exports is particularly important to the present study. In 1973 approximately 70 percent of Canada's foreign trade (both imports and exports) was conducted with the United States (Economic Council of Canada, 1975, 98). Canada's two most important manufacturing provinces, Ontario and Quebec, are within 24 hours by road of many major U.S. centres and therefore for a wide range of commodities, Canadian international transport costs may be expected to be relatively low when compared with those of Australia. Thus the comparison in this study is between the geographically isolated Australian manufacturing sector, which has developed behind high natural barriers of transport costs,[4] superimposed on the artificial barriers of tariffs and other measures of trade control, and Canadian industry, which may be considered to have developed primarily behind the artificial barrier of trade protection alone.

THE CONCORDANCE OF AUSTRALIAN AND CANADIAN MANUFACTURING ACTIVITIES

The estimates of Australian and Canadian tariffs and transport costs have been derived from data provided by the Australian Industries Assistance Commission (based on Australian Bureau of Statistics data) and Statistics Canada, respectively. The former were provided for 171 industries classified by the Australian Standard Industrial Classification, and the latter for 122 manufacturing industries comprising the L level of aggregation of the Canadian input-output table for 1974 (input-output industries 16-137). Thus, an essential part of this study entailed the reconciliation of the industry classifications used in each country.

The basic statistical classifications in Australia and Canada, the Australian Standard Industrial Classification (ASIC) and the Canadian Standard Industrial Classification (CSIC), respectively, are both based on the International Standard Industrial Classification of All Economic Activities (ISIC). The process of reconciliation involved the construction of an Australia-Canada Industrial Classification (ACIC) in such a way that a given ACIC industry in each country consists of a group of operating units engaged in the same activities. The task entailed matching 171 4-digit ASIC industries with 166 4-digit CSIC industries, and in turn, matching these with the Canadian Input-Output Industry Classification (CI-0). Fortunately, there is a readily available published concordance between this classification and CSIC (Statistics Canada, 1977, 35-36). Once the ASIC-CSIC concordance was constructed, it was then a fairly simple matter to use the published CSIC/CI-0 concordance to provide in turn an ACIC/CI-0 concordance.

The final concordance, which appears in Appendix 1 produced 85 industries which, for a given ACIC, comprise the same activities in each country. The concordance shown in Appendix 1 is considered to be extremely close, the only significant differences between the two manufacturing sectors being the lack of cotton ginning in Canada and the inclusion of iron ore pelletizing in the mining sector (CSIC 058) in that country. As a result, ASIC 2311 (cotton ginning) and ASIC 2911 (iron ore pelletizing) have been omitted from the analysis.

As far as can be ascertained the only other difference of note involves the rather interesting classification of baby carriage manufacturing to CSIC 393, sporting goods and toy industries in Canada, while the same activity in Australia is classified to ASIC 3225, transport equipment n.e.c. Unfortunately it was not possible to make suitable adjustments to the data, and this difference should be kept in mind. It is likely, however, that its impact on the empirical results will be negligible.

A DESCRIPTION OF TARIFF AND TRANSPORT COST DATA USED IN THIS STUDY

(i) Australia

The Australian nominal rates of protection which are examined in this study, and which have been used to calculate corresponding effective rates, include not only the effect of assistance provided by tariffs, but also by some forms of non-tariff barriers, such as manufacturing subsidies and import prohibitions. Where necessary, estimates of the effect of excise taxes have been deducted from the tariff rates of relevant items (mainly in the cases of alcoholic beverages and tobacco products) (Industries Assistance Commission, 1976b, 47). The rates do not take into account other important forms of assistance such as support value duties, government purchasing policies, local content plans, or quantitative import restrictions (Industries Assistance Commission, 1976b, 79). However, the time period chosen for this study, 1973/74, avoids the effect of most of the direct quantitative restrictions which, in the main, have been imposed since July, 1974.

As the most important component of protection during the study period was the tariff, rates of assistance will be referred to as nominal tariff rates, defined as the ad valorem equivalent of duties collected expressed as a percentage of the free-on-board (f.o.b.) value of imports (with the aforementioned adjustments). Nominal transport costs are defined as the ratio of the difference between the c.i.f. (cost, insurance, freight) and the f.o.b. values of imports to the f.o.b. value of imports:

[(c.i.f./f.o.b. value of imports) - 1]·100

The insurance and other changes which are included in the c.i.f. value of imports are considered to be unavoidable elements in the total cost of international transportation and as such are treated as transport charges.

It should be kept in mind that such import-weighted tariffs and transport costs understate the real level of protection, not only because of the exclusion of some forms of protection mentioned, but also because only imports which actually enter the country are included in the computation. Goods which are completely shut out by high tariffs and/or transport costs are, of course, excluded.

Effective rates of protection in the following analysis have been calculated in a manner consistent with the basic Australian Industries Assistance Commission formula.[5] The notation used in the Commission's formula has been changed here to make explicit the valuation bases (i.e., f.o.b. or c.i.f.) of the data used in the computations. In the cases of the tariff and the transport cost variables, c.i.f. values are distinguished from f.o.b. values by the use of a prime; e.g., t'_m = ad valorem tariff on materials valued c.i.f.; t_m = ad valorem tariff on materials valued f.o.b. The Commission's basic formulae are:

$$ERT_{cif} = \frac{P_{cif} \cdot t'_q - \left[P_{cif} \cdot (\frac{M_{cif}}{Q_{cif}}) \cdot t'_m \right]}{P_{cif} \left[1 - (\frac{M_{cif}}{Q_{cif}}) \right]} \qquad (1)$$

$$= \frac{t'_q - \left[(\frac{M_{cif}}{Q_{cif}}) \cdot t'_m \right]}{1 - (\frac{M_{cif}}{Q_{cif}})} \qquad (2)$$

where: ERT_{cif} = the effective rate of tariff protection;

P_{cif} = landed duty-free (c.i.f.) price of the imported product;

t'_q = duty on the finished product as a proportion of its landed duty-free (c.i.f.) price;

$(\dfrac{M_{cif}}{Q_{cif}})$ = landed duty free (c.i.f.) value of materials incorporated in the protected output, expressed as a proportion of the landed duty-free (c.i.f.) value of the imported finished product; and

t'_m = duty on importable materials expressed as a proportion of their landed duty-free (c.i.f.) prices.

It is assumed throughout that landed duty-free and c.i.f. values are identical. Because of certain landing charges there may be some differences, but they are likely to be small.

As prices and rates of duty are expressed in c.i.f. terms, the formula (1) implicitly takes account of transport costs. However, the present exercise aims at assessing the magnitudes of tariffs and transport cost separately. It therefore requires the estimation of f.o.b. values of all protection variables to enable the addition (and comparison) of the components of protection to be made on a common base.

$$ERP_{fob} = \frac{P_{fob}(t_q + f_q) - \left[P_{fob}(\dfrac{M_{fob}}{Q_{fob}})(t_m + f'_m)\right]}{P_{fob}\left[1 - (\dfrac{M_{fob}}{Q_{fob}})\right]} \qquad (3)$$

$$= \frac{(t_q + f_q) - \left[(\dfrac{M_{fob}}{Q_{fob}}) \cdot (t_m + f_m)\right]}{1 - (\dfrac{M_{fob}}{Q_{fob}})} \qquad (4)$$

where: ERP_{fob} = the (total) effective rate of protection);

P_{fob} = f.o.b. price of the imported product;

t_q = duty on the finished product as a proportion of its f.o.b. price;

f_q = transport cost of the finished product as a proportion of its f.o.b. price (i.e., (c.i.f./f.o.b. value of imports) - 1);

$[\frac{M_{fob}}{Q_{fob}}]$ = f.o.b. value of materials incorporated in the protected output expressed as a proportion of the f.o.b. value of the imported finished product;

t_m = duty on imported materials expressed as a proportion of their f.o.b. prices; and

f_m = transport cost on importable materials expressed as a proportion of their f.o.b. prices.

The components of the total effective protection in (4) are the f.o.b. based effective rate of tariff protection:

$$ERT = \frac{t_q - \left[(\frac{M_{fob}}{Q_{fob}}) \cdot t_m\right]}{1 - (\frac{M_{fob}}{Q_{fob}})} \qquad (5)$$

and the f.o.b.-based effective rate of transport cost protection:

$$ERF = \frac{f_q - \left[(\frac{M_{fob}}{Q_{fob}}) \cdot f_m\right]}{1 - (\frac{M_{fob}}{Q_{fob}})} \qquad (6)$$

The data from which the estimates of Australian protection have been derived are listed in Appendix 2.

(ii) Canada

The Canadian tariff rates used in this study are the _ad valorem_ equivalents of duties collected as a proportion of the value of imports at the factory gate.[6] To the extent that there are charges incurred in loading the goods onto the mode of transportation, free-on-board, these rates will be higher than f.o.b.-based tariffs. However, as nearly 70 percent of Canadian imports were from the United States,[7] there is the consequent likelihood that the greater proportion of imports were transported by either road or rail, and it would therefore appear likely that in aggregate, the difference between factory gate

and free on board tariffs is small. Consequently for the purpose of this exercise, these rates are considered to be equivalent to f.o.b. values. Like the Australian tariff data, the Canadian rates are net of the influence of subsidies and excise taxes.

The estimates of transport costs cover costs from the foreign factory door to the Canadian border. These have been derived from estimates for imported goods which have been valued either f.o.b. from plant, or from exit port. These respectively comprised 86.4 percent and 6.7 percent of the total value of Canadian imports in 1971. The remainder was valued c.i.f. (Statistics Canada, 1979c). No transport cost estimates were made for these goods. However, the overall coverage of the data from which the estimates have been made is large and may be reasonably considered to be representative. There is an additional caveat: the proportion of the total value of imports valued f.o.b. is larger for the United States than from overseas sources (95.4 and 87.5 percent, respectively). Thus, the measured proportion of imports from the U.S. contributing to the estimates will be greater than the true proportion, and this will almost certainly entail some underestimation of the transport cost barriers to Canadian imports. Like the tariff estimates, the resulting estimated transport costs for Canadian imports are expressed as a proportion of their value at the foreign factory gate, and for the reasons outlined earlier, these will again be considered as equivalent to f.o.b. values. The effective rates of tariff and transport cost protection using the nominal rates of protection just described have been calculated according to the formulae of (5) and (6), respectively. The precise computations undertaken for this study by Statistics Canada may be found in Appendix 3.

CHARACTERISTICS OF TRANSPORT COST AND TARIFF PROTECTION
OF AUSTRALIAN MANUFACTURING

The results of the computations described above and which are detailed
in Appendix 2 for the 85 ACIC groups comprising the Australian manufacturing
sector appear in Table 4, and a summary of these data in Table 5. As it
will be found in later analysis that there is a high rank and simple corre-
lation between nominal and effective transport costs, and nominal and
effective tariffs (see Table 6), the respective nominal and effective rates
of protection appearing in Table 4 are therefore discussed jointly.

(i) Nominal and Effective Transport Costs

An examination of Table 4 shows that both nominal and effective transport
costs tend to be relatively high, i.e. above the median, for the non-metallic
mineral group (ACIC 43-48), with the exception of stone products which have
a relatively low effective rate as a result of high nominal transport cost
for material inputs.[8] Both nominal and effective rates tend to be high for
the beverages group (ACIC 13-15), and for petroleum and coal products (ACIC 12),
which are characterized by low unit-values. Recalling that these are f.o.b.
values, which exclude all protection, alcoholic beverages, in addition to low
unit-values, often require special stowage to avoid damage (e.g. by heat
or breakage) and pillage. Petroleum and coal products (including bitumen
and other paving materials) also incur costly stowage by shipping companies.

TABLE 4
NOMINAL AND EFFECTIVE RATES OF PROTECTION (f.o.b.) :
EIGHTY-FIVE AUSTRALIAN MANUFACTURING INDUSTRIES

ACIC	Industry Description	(1)	(2)	(3)	(4)	(5)	(6)
1	Meat Products	6.2	0.9	7.2	14.4	0.1	14.5
2	Poultry Products	1.4	2.0	3.4	2.7	5.3	8.0
3	Milk Products	5.8	4.2	10.1	22.3	13.6	35.9
4	Fruit, veg. products	20.6	20.2	40.7	19.1	38.2	57.3
5	Flour, starch, cereal	21.2	4.8	26.0	32.1	8.6	40.7
6	Marg., oil, fats	20.6	15.7	36.3	42.2	20.9	63.2
7	Bread, cake, pastry	0.8	1.0	1.8	-8.9	-2.1	-10.9
8	Biscuits	23.0	16.0	39.0	23.8	23.9	47.7
9	Confect., cocoa	18.5	36.7	55.2	7.0	80.6	87.6
10	Fish products	6.2	5.3	11.5	-4.1	-2.4	-6.5
11	Animal products	12.0	5.6	17.6	2.2	8.9	11.1
12	Sugar, malt, other	20.4	4.5	24.9	56.5	18.2	74.7
13	Soft drink, etc.	55.5	32.7	88.2	88.6	100.9	189.4
14	Beer	56.5	48.5	105.0	93.7	84.6	178.5
15	Wine, alc. bev.	24.2	49.1	73.3	44.5	122.2	166.7
16	Tobacco	15.7	35.9	51.6	15.0	27.6	42.5*
17	Wool, scour. carb. tops	3.3	0.0	3.3	-8.6	-1.9	-10.5
18	Manmade for yarn fabric	10.1	24.0	34.1	7.2	41.8	49.0
19	Cotton yarn fabric	9.8	26.3	36.1	8.5	54.9	63.3
20	Wool yarn fabric	11.4	22.8	34.3	9.4	48.1	57.5
21	H'hold other text.	12.6	28.8	41.4	18.1	44.3	62.4
22	Textile floor covers	20.3	20.5	40.8	37.4	40.5	77.8
23	Felt and products	14.7	18.3	33.0	3.6	35.0	38.7
24	Canvas and products	12.9	32.7	45.6	19.4	73.4	92.9
25	Rope, cord, twine	12.9	19.2	32.1	-4.6	24.3	19.7
26	Hosiery	16.8	37.4	54.2	21.7	59.2	80.9
27	Knitted goods	13.5	40.2	53.7	19.7	92.1	111.7
28	Clothing, footwear	14.9	43.0	57.9	19.7	77.4	97.1
29	S'mill, wood prods.	28.9	13.8	42.7	25.2	16.1	41.4
30	Ply and boards	36.1	29.9	66.0	43.2	44.4	87.6
31	Furniture	19.0	25.2	44.3	12.4	28.1	40.5
32	Pulp paper board	24.5	12.5	37.0	20.5	17.8	38.3
33	Paper bags, containers	21.7	41.2	62.9	11.0	115.9	126.9
34	Paper, print. publish	16.7	18.2	35.0	7.6	29.8	37.3
35	Basic chemical	18.7	10.8	29.6	6.9	13.8	20.7
36	Chem. prod. ex agric.	14.5	22.9*	37.3	10.3*	29.0	39.4
37	Paints	16.3	30.2	46.5	12.5	44.5	57.0
38	Pharm vet prods.	5.8	27.5	33.3	3.5	34.7	38.2
39	Soap, detergents	15.6	22.0	37.6	9.3	25.3	34.6
40	Cosmetics, toiletry	13.6	33.0	46.6	9.9	42.2	52.1
41	Petroleum refining	9.9	4.4	14.3	-19.5	3.2	-16.3
42	Petrol., coal prods.	50.1	13.5	63.7	86.0	30.4	116.4
43	Glass and products	26.6	12.7	39.2	20.1	12.0	32.0
44	Clay products	38.1	23.2	61.4	43.3	32.0*	75.4
45	Cement	81.2	5.4	86.6	139.2	8.2	147.4
46	Concrete products	43.8	1.4	45.2	38.5	-2.1	36.4
47	Other nonmet. min. prods.	32.3	22.8	55.1	19.5	33.3	52.8
48	Stone products	29.0	21.9	51.0	7.8	25.8	33.6
49	Basic iron, steel	13.0	14.7	27.7	-12.9	20.9	8.0
50	Iron, steel cast forged	11.1	20.0	31.1	5.7	24.4	30.0
51	Steel pipes, tubes	15.3	19.6	34.9	-0.6	28.3	27.7
52	Smelting nonferrous metals	5.0	1.7	6.7	-19.0	2.8	-16.2
53	Alum. roll draw extrude	12.2	22.4	34.7	25.7	80.9	106.6
54	N'fer roll draw cast	5.8	14.1	19.9	-9.2	47.7	38.5
55	Fabric struct. steel	15.3	31.1	46.5	10.2	49.4	59.5
56	Arch metal preds	12.3	28.7	40.9	11.7	38.3	50.0
57	Boilers plates	18.9	25.0	43.9	22.2	37.6	59.8
58	Metal products	15.5	32.7	48.2	18.2	58.4	76.6
59	Cut, hand tools	7.0	15.0	21.9	2.8	14.9	17.7
60	Wire prods nuts & bolts	11.6	26.7	38.3	10.2	40.8	51.0
61	Other fab metal preds	12.4	35.3	47.8	17.6	62.5	80.1
62	Motor vehicles	7.0	28.9	35.8	2.1	41.9	44.0
63	Truck bus body	17.9	30.7	48.6	28.1	66.2	94.4
64	M.V.elect. parts	5.4	24.3	29.7	-4.0	29.7	25.8
65	Ship bld repair	5.2	34.7	39.9	-10.3	59.1	48.7
66	Boats other transp.	20.0	26.4	46.4	19.1	31.8	50.8
67	Loco stock repair	9.1	26.2	35.2	-12.8	46.9	34.1
68	Aircraft bld repair	5.8	11.6	17.5	7.2	19.7	26.9
69	Photo opt. sc. equip	7.7	13.3	21.1	0.9	10.7	11.6
70	TV, radio, electrical	10.0	29.7	39.7	5.7	31.7	37.4
71	H'hold appliances	15.5	31.3	46.9	17.2	47.4	64.6
72	Elect. tele wire	10.4	17.7	28.0	9.3	35.0	44.2
73	Batteries	10.0	31.9	41.9	5.8	43.8	49.6
74	Other electrical	9.6	23.0	32.7	7.4	23.8	31.3
75	Agric. mach equipment	12.6	21.4	34.0	6.1	22.2	28.3
76	Other industrial mach.	8.6	24.9	33.5	3.1	28.9	32.0
77	Leather tanning	9.5	13.1	22.7	12.3	26.8	39.1
78	Leather & subst. prods	19.5	29.9	49.3	28.5	46.6	75.1
79	Rubber tyres etc.	11.1	22.2	33.3	3.1	29.2	32.3
80	Other rubber prods	15.3	32.3	47.6	15.3	50.0	65.4
81	Plast rel. prods	15.2	23.0	38.1*	14.2	18.7	32.8
82	Jewelry, silver	3.1	20.6	23.7	-2.0	37.8	35.8
83	Brooms, brushes	14.4*	29.7	44.2	1.1	40.8	41.9
84	Signs adv. displays	20.8	31.4	52.2	21.8	47.2	69.0
85	Other manufacturing	9.4	26.9	36.3	-1.0	34.4	35.5

(1) Nominal Transport Cost (%)
(2) Nominal Tariff Rate (%)
(3) Total Nominal Protection
(4) Effective Transport Cost (%)
(5) Effective Tariff Rate (%)
(6) Total Effective Protection (%)

Notes: *Median. Data have been rounded.

Sources: See text.

Low nominal and effective rates tend to be grouped in transport equipment (ACIC 62-68) and machinery and equipment (ACIC 69-76). Exceptions in the former group are truck and bus bodies (ACIC 63) and boats and other transport equipment (ACIC 66). The outputs of both these industries tend to be relatively bulky. The only exception from the latter group is household appliances (ACIC 17), for which there is no obvious explanation. Other low nominal and effective rates are for jewellery (ACIC 82), wool processing (ACIC 17) and bakery products (ACIC 7). Most of these industries are characterized by high unit values. The low rates for bakery products probably reflect the "mix" of imports of commodities classified within this industry classification (e.g. high quality tinned and frozen cakes, puddings, pastries). Fresh bread, which is classified to this industry, is, of course, virtually precluded from importation by its perishability. As is newspaper publishing, this industry is protected from imports by its proximity to the market.

(ii) Nominal and Effective Tariffs

High nominal and effective rates are characteristic of beverages (ACIC 13-15), which are usually subject to high duties mainly as a revenue raising device, and of industries producing relatively highly fabricated products, e.g. ACIC 27, 28, 40, 55-85. Within ACIC 55-85, 23 of the 31 industries have nominal rates above the median, while 21 have effective rates above it.

Low rates are characteristic of food industries with the exceptions of confectionery (ACIC 19), and fruit and vegetable products (ACIC 4). The high rate for ACIC 4 is mainly a product of high tariffs imposed on imports of frozen vegetables, primarily from New Zealand. Industries producing goods at

relatively low levels of fabrication, which rely mainly on inputs which are
relatively abundant in Australia, e.g. wool processing (ACIC 17) and basic
metal products (ACIC 49-54), or which have high levels of natural protection,
e.g. cement (ACIC 45) and concrete products (ACIC 46), also tend to be
characterized by low levels of nominal and effective tariff protection.
Within the basic metals group, however, two industries are characterized by
nominal tariffs below the median: aluminum rolling, drawing and extruding
(ACIC 53), and non-ferrous metals, rolling, drawing and casting (ACIC 54) have
effective rates significantly above the median, mainly as a result of very
low tariffs on material inputs.[9]

(iii) Total Nominal and Effective Protection

High nominal rates of protection are characteristic of the non-metallic
mineral products industries (ACIC 43-48), mainly as a consequence of the high
transport component of total protection. The corresponding effective rates,
while generally above the median, tend to be lower than the corresponding
nominal rates, primarily because of relatively high transport costs for raw
materials. Nominal and effective rates for the industries comprising beverages
(ACIC 13-16) and the clothing and footwear group (ACIC 26-28) are significantly
above the respective medians.

Of the 12 food group industries, 9 are below the median nominal rate
of protection (ACIC 1-3, 5 7, 10-12); for effective rates the same is true
for only 7 industries. In the cases of margarine (ACIC 6) and sugar (ACIC 12),
transport contributes by far the greater proportion of the total effective
rate, while in fruit and vegetable products (ACIC 4) and confectionery (ACIC 9),
the tariff component is the most important element of total effective
protection. Low rates of protection are also characteristic of basic chemicals

(ACIC 35-41, except 37), basic metal products (ACIC 49-54, except 53) and
the machinery and equipment group (ACIC 69-76, except 71-73).

(iv) A Summary of the Protective Structure

Of the 85 manufacturing industries, 26 shelter behind nominal transport
costs which are higher than the corresponding nominal tariff.[10] In terms
of employment, over 358,000 persons, or nearly 27 percent of the manufacturing
industry workforce in Australia during 1973/74, were primarily protected by
transport costs rather than the tariff. The main areas of production protected
in this manner are the food and beverage group (ACIC 1-15) where 12 of 15
industries are mainly protected by transport costs, while the same is true of
all industries in the non-metallic mineral products group (ACIC 43-47). In
effective rate terms, 12 industries accounting for nearly 15 percent of the
workforce, are mainly protected by transport costs. Again, these industries
are concentrated in the food and beverage and non-metallic mineral products
groups.

A summary of the data of Table 4 may be found in Table 5. From this
table it may be seen firstly that the transport cost protection comprises a
very significant portion of the average total protection available to the
Australian manufacturing sector. Of the total weighted average nominal protection
available to manufacturing (32.39 percent), over 40 percent may be attributed
to transport costs, while of the weighted average effective protection (39.05
percent), nearly one-quarter may be attributed to protection afforded by
transport cost. All the measures of central tendency (median, unweighted
mean and weighted mean) show the effective transport cost as being less than

TABLE 5

SUMMARY - NOMINAL AND EFFECTIVE TRANSPORT COSTS AND TARIFFS FOR 85

AUSTRALIAN MANUFACTURING INDUSTRIES 1973/74

	Nominal Transport %	Nominal Tariff %	Total Nominal Protection %	Effective Transport %	Effective Tariff %	Total Effective Tariff %
Lowest Value	0.81	0	1.82	-19.52	-2.40	-16.30
Highest Value	81.16	49.10	105.01	139.17	122.20	189.44
Range	80.35	49.10	103.19	158.69	124.60	205.74
Median	14.42	22.88	38.13	10.34	32.05	42.53
Unweighted Mean	16.85	22.13	38.99	16.12	36.49	52.62
Standard Deviation	12.90	11.37	17.99	24.41	25.49	39.14
Coefficient of Variation	0.77	0.51	0.46	1.51	0.70	0.74
Weighted Mean	13.60	18.79	32.39	9.66	29.39	39.05
Skewness	2.47	-0.11	0.68	2.47	1.10	1.28

the corresponding nominal rate. This suggests that for Australian manu-
facturing the transport cost burden on inputs is greater than the protection
provided by transport costs to the final products of import-competing
industries,[11] and this is borne out in Table 7, which summarizes the structure
of tariffs and transport costs on the inputs of the Australian manufacturing
sector. All measures of central tendency reflect higher transport costs for
materials than for final products, though the difference is not great.

The opposite is true of tariffs. For both nominal and effective
measures the range of the transport cost variable is greater than for tariffs,
as are the respective dispersions (standard deviations and coefficients of
variation). The measure of skewness indicates that for all but the nominal
tariff variable, more than half the rates are below the unweighted mean.
Histograms showing the frequency distributions of the respective variables
are shown in Figure 1, and the rank (Spearman) correlation (r_s) and Pearson
correlation (R) coefficients of the respective protection variables appear
in Table 6.

Perhaps the most striking feature of Table 6 is the high rank and
simple correlation between nominal and the corresponding effective rates of
transport, tariff and total protection (r_s^{14} = .772, R^{14} = .891, r_s^{25} = .869,
R^{25} = .852, r_s^{36} = .813, R^{36} = .869). Following Waters (1970), from this
"...it appears that the much more easily obtained nominal rates might do a
satisfactory job of indicating the pattern of protection among industries"
(Waters, 1970, p. 1015).

The table provides no statistical support for the existence of an in-
verse relationship between transport cost and tariff protection as
is commonly expected (Yeats, 1977, 468) (r_s^{12} = .204, R^{12} = .095,
r_s^{45} = .251, R^{45} = .230).[12] Indeed, at the 5 percent level of

FIGURE 1: DISTRIBUTION OF PROTECTION: EIGHTY-FIVE INDUSTRIES
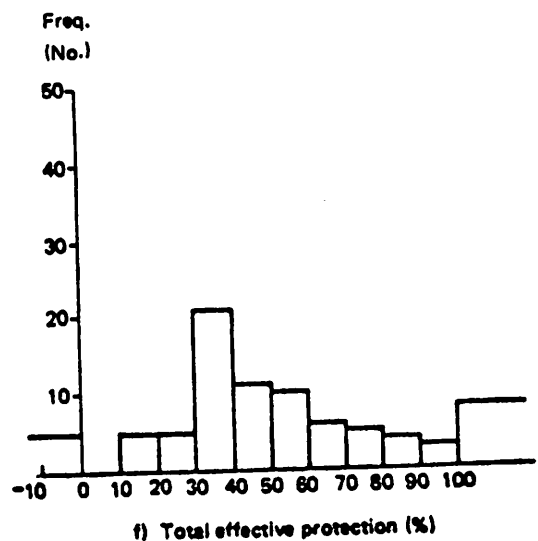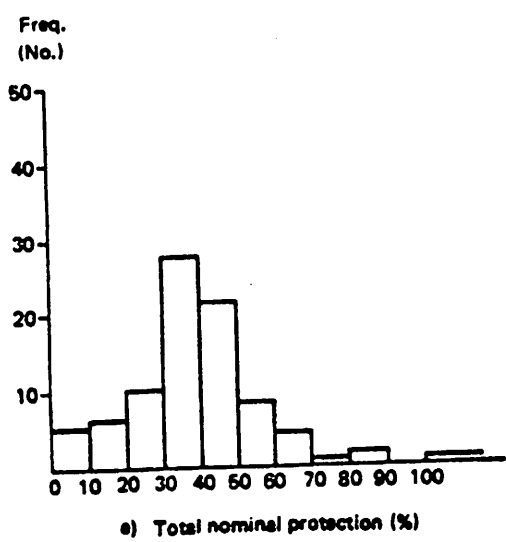COMPRISING THE AUSTRALIAN MANUFACTURING SECTOR

a) Nominal transport (%)

b) Effective transport (%)

c) Nominal tariff (%)

d) Effective tariff (%)

e) Total nominal protection (%)

f) Total effective protection (%)
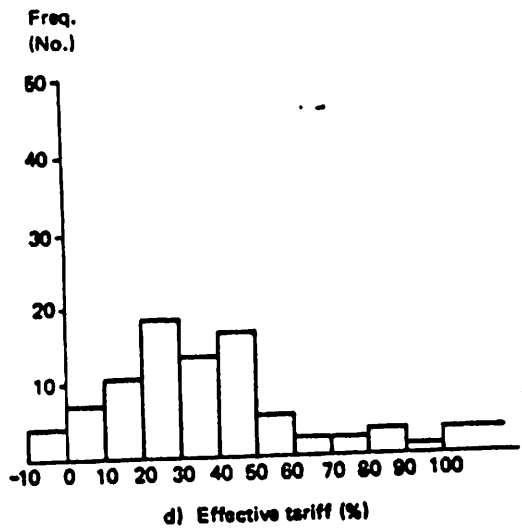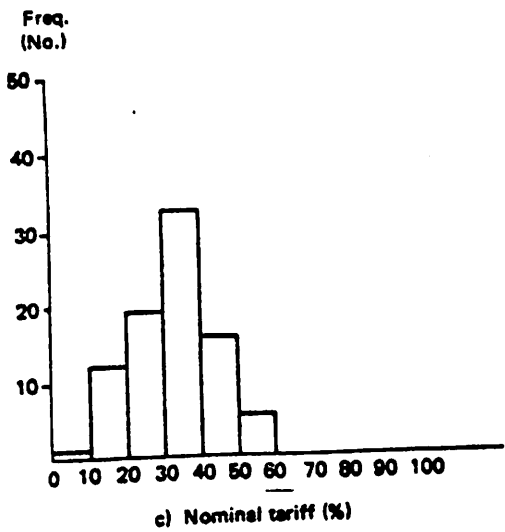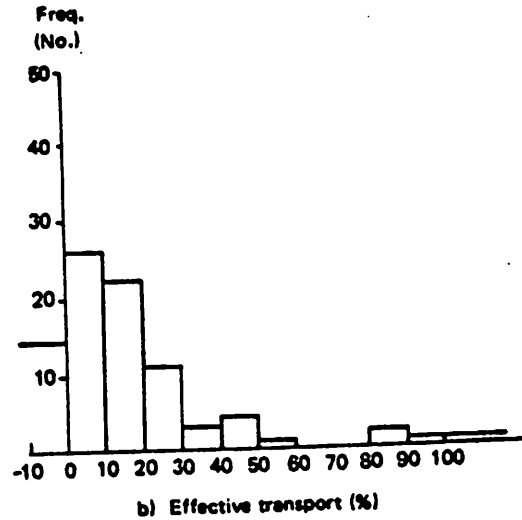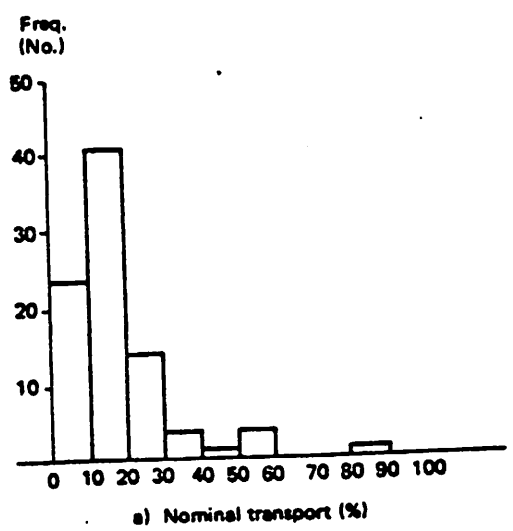
TABLE 6

MATRIX OF RANK (SIMPLE) CORRELATION COEFFICIENTS OF PROTECTION CHARACTERISTICS FOR 85 AUSTRALIAN MANUFACTURING INDUSTRIES 1973/74

	(1)	(2)	(3)	(4)	(5)	(6)
1. Nominal Transport	1.000	.204 (.095)	.734 (.777)	.772 (.891)	.178 (.162)	.582 (.661)
2. Nominal Tariff		1.000	.735 (.700)	.211 (.113)	.869 (.852)	.660 (.625)
3. Total Nominal Protection			1.000	.637 (.710)	.640 (.655)	.813 (.869)
4. Effective Transport				1.000	.251 (.230)	.743 (.774)
5. Effective Tariff					1.000	.772 (.795)
6. Total Effective Tariff						1.000

Significance levels: r_s - 1 percent = .282
- 5 percent = .214
R - 1 percent = .275
- 5 percent = .211

TABLE 7

TRANSPORT COSTS AND TARIFFS FOR INPUTS OF 85 AUSTRALIAN MANUFACTURING INDUSTRIES, 1973/74

	Transport Costs %	Tariffs %
Unweighted Mean	19.39	12.08
Standard Deviation	12.19	8.42
Coefficient of Variation	.13	.20
Weighted Mean	16.51	10.97
Skewness	2.10	.75

Source: See Appendix Table

significance, there is a positive relationship between effective transport costs and tariffs. It may be thought that part of the process of determining levels of tariff protection through Australian Tariff Board/Industries Assistance procedures may be an attempt to offset low transport cost protection by high tariff protection. Thus, over a period it is possible that if an industry has little natural protection, it is given man-made protection instead. Such a hypothesis is not supported by these (albeit weak) results. However, the coefficients of variation ($V = \frac{\sigma}{\bar{x}}$) of Table 3 show that the relative dispersion of total protection (both nominal and effective) is less than the transport cost component (and in the case of nominal rates, the tariff component as well). Therefore it would appear that there is some tendency for the total protective barrier to be more "uniform" than its components.

CHARACTERISTICS OF TRANSPORT COST AND TARIFF PROTECTION OF CANADIAN MANUFACTURING

The results of the computations outlined in Appendix 3 for the 85 ACIC groups comprising the Canadian manufacturing sector appear in Table 8, and a summary of these data in Table 9. Again, as there is a high rank and simple correlation between the corresponding nominal and effective rates of protection (see Table 11), the corresponding nominal and effective rates will be discussed jointly.

(i) Nominal and Effective Transport Costs

While it will later be shown that there is no significant correlation between Australian and Canadian transport cost protection,[13] nevertheless there are broad areas of consistency between the two sets of data. Nominal and

TABLE 8

NOMINAL AND EFFECTIVE RATES OF PROTECTION (f.o.b.): EIGHTY-FIVE CANADIAN MANUFACTURING INDUSTRIES

ACIC	Industry Description	(1)	(2)	(3)	(4)	(5)	(6)
1	Meat products	6.0	2.6	8.6	24.3	5.8	30.1
2	Poultry products	1.3	11.8	13.1	-46.1	34.5	-11.6
3	Milk products	4.6	12.1	16.7	17.2	8.1	25.3
4	Fruit, veg. products	5.9	9.3	15.2	5.7	19.7	25.4
5	Flour, starch, cereal	3.3	2.8	6.1	16.3	11.8	28.1
6	Marg., oil, fats	7.6	3.3	10.9	39.4	20.0	59.4
7	Bread, cake, pastry	5.3	7.6	12.9	8.4	14.7	23.1
8	Biscuits	0.9	4.9	5.8	-6.2	5.2	-1.0
9	Confect., cocoa	8.1	10.9	19.0	17.2	28.4	45.6
10	Fish products	10.7·	7.7	18.4	32.4	22.1	54.5
11	Animal products	16.7	6.5	23.2	81.8	36.9	118.7
12	Sugar, malt, other	7.9	3.9	11.8	24.9	8.2	33.1
13	Soft drink, etc.	1.1	4.8	5.9	-5.4	2.4	-3.0
14	Beer	11.6	25.0	36.6	26.5	60.9	87.4
15	Wine, alc. bev.	3.7	85.1	88.8	8.6	444.4	453.0
16	Tobacco	0.6·	56.3	56.9	0.5	106.9	107.4
17	Wool, scour. carb. tops	6.6	12.3	18.9	13.6	32.3	45.9
18	Manmade fbr year fabric	5.1	16.2	21.3	9.4	34.4	43.8
19	Cotton yarn fabric	5.3	18.6	23.9	10.2	42.2	52.4
20	Wool yarn fabric	3.0	14.0	17.0	3.0	31.3	34.3
21	H'hold other text.	3.5	11.9	15.4	4.1	13.4	17.5
22	Textile floor covers	7.7	25.9	33.6	28.5	107.9	136.4
23	Felt and products	2.8	16.9	19.7	-7.4	43.6	36.2
24	Canvas and products	2.3	11.2	13.5	-0.8	8.9	8.1
25	Rope, cord, twine	8.8	6.8	15.6	15.3	8.5	23.8
26	Hosiery	3.7	22.7	26.4	1.7	44.9	46.6
27	Knitted goods	3.2	25.9	29.1	1.7	61.6	63.3
28	Clothing, footwear	4.6	20.9	25.5	9.2	39.9	49.1
29	S'mill, wood prods.	2.8	3.4	6.2	4.2	7.2	11.4
30	Ply and boards	1.8	10.5*	12.3	1.7	25.7	27.4
31	Furniture	4.0	14.8	18.8	6.8	24.7	31.5
32	Pulp paper board	1.9	6.4	8.3	1.4	12.9	14.3
33	Paper bags, containers	4.0*	14.9	18.9	7.1	27.1	34.2
34	Paper, print. publish	2.2	7.2	9.4	2.7	7.5	10.2
35	Basic chemical	10.1	4.7	14.8	16.5	9.9	26.4
36	Chem. prod. ex agric.	4.4	10.0	14.4	2.2	20.8	23.4
37	Paints	1.8	19.7	21.5	-6.2	55.6	49.4
38	Pharm vet prods	1.1	7.3	8.4	-0.5	11.7	11.2
39	Soap, detergents	5.3	11.6	16.9	6.6	24.1	30.7
40	Cosmetics, toiletry	1.6	13.0	14.6	0.6	22.8	23.4
41	Petroleum refining	6.9	0.8	7.7	-25.0	4.2	-20.8
42	Petrol., coal prods	6.3	10.8	17.1	6.1	19.2	25.3
43	Glass and products	4.1	11.9	16.0	2.4	17.4	19.8
44	Clay products	5.1	9.4	14.5	3.8	15.3	19.1
45	Cement	9.6	0.5	10.1	15.9	-0.2	15.7
46	Concrete products	3.1	3.5	6.6	-5.7	6.1	0.4
47	Other nonmet. min. prods.	4.1	8.9	13.0	0.2	15.8	16.0
48	Stone products	5.9	10.0	15.9	-6.6	19.4	12.8
49	Basic iron, steel	8.9	7.9	16.8	10.0	21.2	31.2
50	Iron, steel cast forged	2.8	8.0	10.8	-2.3	15.3	13.0
51	Steel pipes, tubes	8.0	9.7	17.7	12.6	18.6	31.2
52	Smelting nonferrous metals	4.7	1.2	5.9	3.0	4.2	7.2
53	Alum. roll draw extrude	2.7	5.5	8.2	0.0	14.4	14.4
54	N'fer roll draw cast	2.6	5.2	7.8	-17.4	20.9	3.5
55	Fabric struct. steel	4.8	11.3	16.1	1.2	16.6	17.8
56	Arch metal prods	4.0	16.8	20.8	5.9	39.0	44.9
57	Boilers plates	4.2	10.0	14.2	2.5	15.0	17.5
58	Metal products	2.9	12.0	14.9*	0.2	20.1	20.3
59	Cut, hand tools	5.0	11.1	16.1	5.5	17.3	22.8
60	Wire prods nuts & bolts	5.6	9.7	15.3	-0.6	15.1	14.5
61	Other fab metal prods	4.1	8.6	12.7	1.7	13.0	14.7
62	Motor vehicles	1.8	1.8	3.6	0.1	-0.9	-0.8
63	Truck bus body	1.4	12.4	13.8	-3.5	23.9	20.4
64	M.V. elect. parts	2.8	1.5	4.3	1.7	-2.7	-1.0
65	Ship b'd repair	6.3	18.8·	25.1	9.6	44.2	53.8
66	Boats other transp.	2.8	8.8	11.6	4.5	19.2	23.7*
67	Loco stock repair	3.2	10.5	13.7	2.2	15.3	15.5
68	Aircraft bld repair	2.7	0.5	3.2	3.3*	-0.9	2.4
69	Photo opt. sc. equip	5.1	7.2	12.3	9.2	11.7	20.9
70	TV, radio, electrical	2.5	12.5	15.0	3.2	17.2	20.4
71	H'hold appliances	6.8	12.9	19.7	17.2	29.8	47.0
72	Elect. tele wire	3.2	14.0	17.2	8.1	48.1	56.2
73	Batteries	1.0	7.9	8.9	-5.7	9.8	4.1
74	Other electrical	1.6	11.8	13.4	0.4	19.5*	19.9
75	Agric. mach equipment	3.8	1.2	5.0	2.1	-4.3	-2.2
76	Other industrial mach.	3.9	7.6	11.5	5.2	10.0	15.2
77	Leather tanning	0.5	7.0	7.5	-4.0	21.3	17.3
78	Leather & subst. prods	6.5	15.9	22.4	16.8	29.4	46.2
79	Rubber tyres etc.	2.8	12.7	15.5	1.6	25.4	27.0
80	Other rubber prods	1.8	12.5	14.3	-0.9	20.5	19.6
81	Plast rel prods	3.6	13.2	16.8	4.7	27.0	31.7
82	Jewelry, silver	2.3	7.4	9.7	5.2	27.4	32.6
83	Brooms, brushes	4.5	19.2	23.7	7.4	39.3	46.7
84	Signs adv. displays	0.1	43.1	43.2	-1.7	88.0	86.3
85	Other manufacturing	4.5	13.3	17.8	7.6	23.6	31.2

(1) Nominal Transport Cost (%)
(2) Nominal Tariff Rate (%)
(3) Total Nominal Protection (%)
(4) Effective Transport Cost (%)
(5) Effective Tariff Rate (%)
(6) Total Effective Protection (%)

Notes : * Median
Data have been rounded

Sources: See text

effective transport costs for the food group (ACIC 1-12) tend to be above

the respective medians. Exceptions are poultry (ACIC 2) and biscuits (ACIC 8),

for which both nominal and effective rates are below the median, while for

flour (ACIC 5), only the nominal rate is lower. In the case of poultry,

broadly, the same influences affect the cost of providing the transportation

service for these products as affect the cost of providing the service for

meat products (ACIC 1). Both product groups require refrigerated transport

facilities, with the problems inherent in handling such cargoes. The reason

for the relatively low rate may lie in the relative bulkiness of the commodities

classified within the two product groups. The stowage factor[14] for meat

products lies between 60 (frozen boneless beef) and 110 cubic feet per tonne

(carcases, bone-in meats), while for poultry products it lies between 60 and

70 cubic feet per tonne (Leeming, 1968). Depending on the product mix, the

greater stowage space required for meat products could well explain their

higher transport cost compared with poultry products.[15]

With the exception of concrete products (ACIC 46), and like their

Australian counterparts, relatively high nominal rates are characteristic

of the Canadian non-metallic mineral products group (ACIC 43-48). Effective

rates for the group are however, below the median in the cases of glass (ACIC 43),

concrete products (ACIC 46), other non-metallic mineral products (ACIC 47),

and stone products (ACIC 48). This is a consequence of significantly higher

transport costs for these bulky, low unit-value materials, than for final

products.[16] While effective rates also tend to be less than the corresponding

nominal rates for the same Australian industries, the overall level of

transport costs for them is much higher and in Australia this generally

results in these effective rates being still above the median. In common with

their Australian counterparts, beer (ACIC 14) and petroleum products (ACIC 42) in Canada are also protected by relatively high nominal and effective transport costs, for reasons similar to those described earlier.

Lower than median nominal and effective rates characterize the Canadian transport equipment (ACIC 62-68) and machinery and equipment (ACIC 69-76) groups, as they do in Australia. From the former, shipbuilding and repair (ACIC 65) is an exception in the case of both nominal and effective rates, while the effective rate for boatbuilding and other transport equipment (ACIC 66) is also relatively high, as it is for the Australian industry. From the latter group, the exception of household appliances (ACIC 71) to lower than median transport cost protection is also a characteristic shared with the Australian group.

(ii) Nominal and Effective Tariffs

High levels of protection (after netting out excise taxes) are provided under the Canadian tariff to the revenue raising beer, wine and tobacco industries (ACIC 14, 15 and 16 respectively) as they are in Australia. Knitted goods (ACIC 27) and clothing and footwear (ACIC 28) are also very highly protected in both countries, as is much of the remainder of the textiles and clothing groups (ACIC 17-28). Exceptions in Canada within this group are nominal and effective rates for rope, etc. (ACIC 25) and the effective rates for household and other textiles (ACIC 21), and canvas products (ACIC 24). Higher than median rates are also characteristic of the machinery and equipment group (ACIC 69-74), and other manufacturing (ACIC 77-85). Exceptions within the latter are

photographic and scientific equipment (ACIC 69), which may be due to concessional entry of some goods under the "not of a class or kind produced in Canada" provisions of the Canadian tariff (the equivalent of Australia's by-law entry). This industry in Australia also has protection below the median.

Low nominal rates are characteristic of the food group (ACIC 1-12), exceptions being poultry (ACIC 2), milk (ACIC 3) and confectionery products (ACIC 9). Effective rates for this group tend to be above the median as a result of very low tariffs on material inputs and relatively high materials/output ratios.[17] Unlike Australia, the Canadian passenger car industry (ACIC 62 and 64) has rates of tariff protection below the median. This is almost certainly the result of the United States-Canada Auto Agreement.[18] The Canadian aircraft industry (ACIC 68) also has low levels of tariff protection, and like its Australian counterpart, this is probably at least the partial result of government purchasing policies. It has not been possible to take non-tariff barriers such as this into account in the present study.

(iii) Total Nominal and Effective Protection

Higher than median rates of total protection are characteristic of the textiles and clothing group of industries (ACIC 17-28, except 24) and other manufacturing (ACIC 77-85, except 77 and 80). Within the former, hosiery (ACIC 26), knitted goods (ACIC 27) and clothing and footwear (ACIC 28) are all very highly protected as are the corresponding Australian industries. Beverages and tobacco (ACIC 14-16) are also highly protected in both countries.

As in Australia, the food group (ACIC 1-12) in Canada tends to have nominal rates of protection below the median. Exceptions are poultry (ACIC 2), milk (ACIC 3) and confectionery products (ACIC 9). Effective rates however are generally below the median, and this pattern of protection is also broadly

consistent with the protective structure of the Australian group. In contrast

to Australia, in Canada the non-metallic mineral products group tends to

be characterized by total protection below the median. While transport

cost protection for these industries tends to be higher than the median, when

combined with their relatively low tariff protection, the result is relatively

low total protection.

(iv) A Summary of the Protective Structure

In Canada, of 85 manufacturing industries, 16 are protected by nominal

transport costs which are higher than the corresponding tariffs.[19] These

industries employ nearly 360,000 persons--just over 20 percent of the Canadian

manufacturing industry workforce in 1974. Included in this total however,

are the 99,000 employed in passenger motor vehicles and parts (ACIC 62 and 64)

which, as mentioned earlier, are also (and primarily) protected under the

U.S.-Canada Auto Agreement. Thirteen industries are protected by effective

rates of transport cost protection which are higher than corresponding effective

tariff rates.[20] As in Australia, in Canada the industries primarily protected

by transport costs are concentrated in the food group. Within the non-metallic

minerals product group, only cement (ACIC 45) is protected by transport costs

higher than the corresponding tariff.

A summary of the data just discussed may be found in Table 9. From the

table it may be seen that while the average level of total protection (median,

unweighted mean, weighted mean) available to Canadian industry is less than

half that available to Australian manufacturing, transport costs are still a

significant component of the protective structure in Canada, comprising nearly

35 percent of the total weighted nominal barrier to trade, and about 20 percent

of the total weighted effective rate of protection.

TABLE 9

SUMMARY - NOMINAL AND EFFECTIVE TRANSPORT COSTS AND TARIFFS FOR
85 CANADIAN MANUFACTURING INDUSTRIES, 1974

	Nominal Transport	Nominal Tariff %	Total Nominal Protection %	Effective Transport %	Effective Tariff %	Total Effective Tariff %
Lowest Value	0.08	0.49	3.18	-46.11	-4.28	-20.76
Highest Value	16.74	85.12	88.83	81.84	444.38	452.96
Range	16.66	84.63	85.65	127.95	448.66	473.72
Median	3.95	10.46	14.95	3.28	19.46	23.68
Unweighted Mean (Omitting ACIC 14-16)	4.40 (4.36)	12.09 (10.51)	16.49 (14.87)	5.68 (5.45)	28.45 (22.03)	34.13 (27.48)
Standard Deviation (Omitting ACIC 14-16)	2.81 (2.71)	11.58 (6.67)	11.57 (6.82)	14.04 (14.09)	49.98 (18.01)	52.88 (24.24)
Coefficient of Variation (Omitting ACIC 14-16)	0.64 (0.62)	0.96 (0.63)	0.70) (0.46)	2.47 (2.59)	1.76 (0.82)	1.55 (0.88.)
Weighted Mean	4.38	8.16	12.54	4.24	16.94	21.18
Skewness (Omitting ACIC 14-16)	1.47 (1.52)	3.92 (1.66)	3.63 (1.09.)	1.53 (1.58)	7.12 (2.11)	6.19 (1.83)

There is no strong evidence from Table 9 to suggest that the burden
of transport costs on Canadian manufacturing inputs outweighs the protection
they provide to final products, as they do in Australia. While both the
median and weighted mean effective transport costs are slightly lower than
the corresponding nominal rates, the same is not true of the unweighted
means. Table 10 summarizes the structure of tariffs and transport costs on
the inputs of the Canadian manufacturing sector. From that table the nominal
transport cost on materials is slightly below the rate in final products
(4.3 percent and 4.4 percent respectively). The difference however is well
within the standard errors of the estimates. On balance, it must be concluded
that the protection which transport costs afford the final products of import-
competing Canadian industries is approximately the same as the transport
cost burden on material inputs. That the effective rate of transport cost
protection is positive is a result of an average materials/output ratio
which is less than unity.[21]

For tariff protection however, all the measures of central tendency
reflect the so-called "cascade" effect (i.e. tariffs which vary directly
with the stage of product fabrication) typical of developed country tariff
structures. Average effective rates are all substantially higher than the
corresponding nominal rates. Indeed, the unweighted and weighted means of
the tariff on inputs from Table 10 are about half of those protecting final
products (unweighted: 5.2 and 12.1 percent respectively; weighted: 4.1 and
8.2 percent, respectively). The range of both nominal and effective tariffs
is much greater than the corresponding transport cost protection, as are the
respective dispersions. The measures of skewness are all positive and in the
cases of the tariff variables, high. This is primarily the result of high
(mainly) revenue rates for alcoholic beverages and tobacco (ACIC 14-16). If

TABLE 10

TRANSPORT COSTS AND TARIFFS FOR INPUTS OF 85 CANADIAN
MANUFACTURING INDUSTRIES, 1974

	Transport Costs %	Tariffs %
Unweighted Mean	4.35	5.18
Standard Deviation	2.81	3.75
Coefficient of Variation	0.64	0.72
Weighted Mean	4.45	4.08
Skewness	2.01	0.52

Source: See Appendix 5.

TABLE 11

MATRIX OF RANK (SIMPLE) CORRELATION COEFFICIENTS OF PROTECTION
CHARACTERISTICS FOR 85 CANADIAN MANUFACTURING INDUSTRIES, 1974 .

	(1)	(2)	(3)	(4)	(5)	(6)
1. Nominal Freight	1.000	-0.039 (-.124)	0.366 (.118)	0.747 (.742)	0.058 (-.015)	0.387 (.183)
2. Nominal Tariff		1.000	0.870 (.971)	0.076 (.001)	.845 (.896)	0.665 (.847)
3. Total Nominal Protection			1.000	0.386 (.180)	0.835 (.893)	0.835 (.892)
4. Effective Freight				1.000	0.175 (.072)	0.621 (.333)
5. Effective Tariff					1.000	0.807 (.964)
6. Total Effective Protection						1.000

Significance levels: r_s - 1 percent = .282
- 5 percent = .214

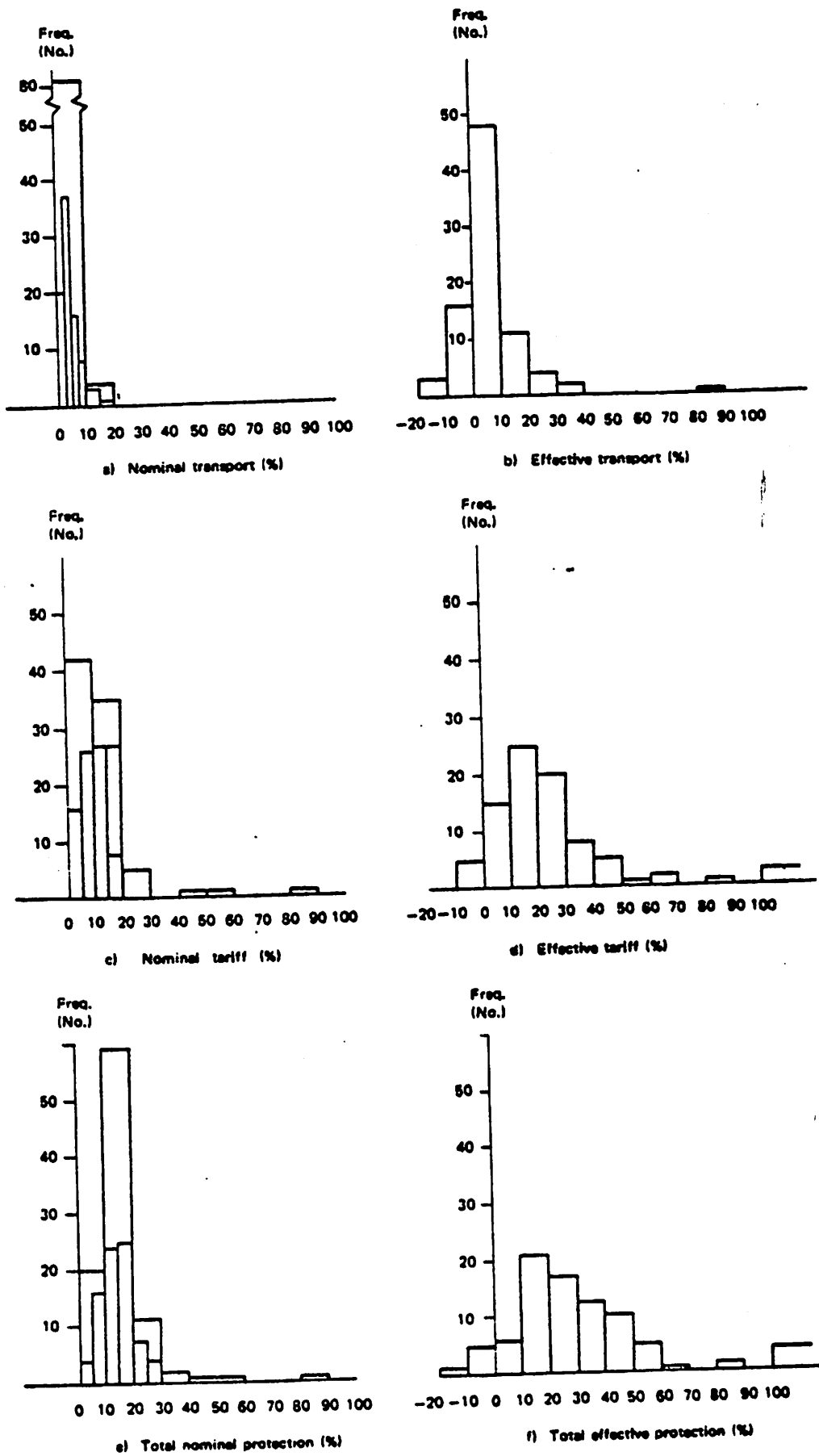R - 1 percent = .275
- 5 percent = .211

these industries are omitted from the calculations, the dispersions and skews of the distributions of tariff and total protection (both nominal and effective) fall significantly.

Histograms showing the frequency distributions of the respective variables are shown in Figure 2. For the purpose of comparison with Australia, the class intervals are the same as those of Figure 1 (intervals of 10 percentage points), and a comparison of the two figures clearly shows the much greater dispersion of rates in Australia, and particularly of nominal rates. Indeed, in Canada the modal class for nominal transport costs (0-10 percent) contains 81 of the 85 rates. Thus, to provide more information concerning their dispersion, the class intervals have been further divided in this and in the histograms for nominal tariffs and nominal transport costs.

Table 11 contains the matrix of rank (Spearman) and Pearson correlation coefficients of the protection variables. As in the case of Australia, for Canada there is a high rank and simple correlation between the respective nominal and effective rates (r_s^{14} = .747, R^{14} = .742, r_s^{25} = .845, R^{25} = .896, r_s^{36} = .835, R^{36} = .892). These findings are consistent with findings by Wilkinson and Norrie (1975) of high correlations between nominal rates of protection and various measures of effective rates in Canada, using mainly 1966 data. From the table there is no significant relationship between nominal transport costs and tariffs (r_s^{12} = -0.039, R^{12} = -0.124), or the corresponding effective rates (r_s^{45} = 0.175, R^{45} = .072).[22]

From this there would appear to be no significant tendency for tariffs and transport costs to vary inversely, though as in Australia, the coefficient of variation of total nominal and effective protection for the 85 Canadian

FIGURE 2: DISTRIBUTION OF PROTECTION: EIGHTY-FIVE INDUSTRIES COMPRISING THE CANADIAN MANUFACTURING SECTOR

a) Nominal transport (%)

b) Effective transport (%)

c) Nominal tariff (%)

d) Effective tariff (%)

e) Total nominal protection (%)

f) Total effective protection (%)

industries is lower than for their respective transport cost and tariff components.[23] On balance it appears that the total protective barrier is more uniform than its components in Canada, as it is in Australia.

A COMPARISON OF THE PROTECTIVE STRUCTURES OF AUSTRALIA AND CANADA

Summary Table 12 shows that for all the protection variables there is a significantly lower mean for the 85 industries in Canada than in Australia. If alcoholic beverages and tobacco (ACIC 14-16) are omitted (in Canada the very high effective tariff on wine and other alcoholic beverages--in excess of 400 percent--alone contributes over 5 percent to the mean of the 85 industries) from the computation, the difference between the nominal and effective tariff variables for the two countries becomes greater. As a consequence the differences between the respective means of the total protection variables also increase. Though as mentioned earlier there is reason to believe that nominal Canadian transport costs are understated, the difference between the means of the respective nominal rates is nevertheless extremely significant. The difference between effective transport costs, while also highly statistically significant, is not so great. This is to be expected as any understatement will affect both outputs and materials and so tend to be cancelled out in the effective rate calculation. The dispersions of rates around the respective means also tend to be significantly less in Canada than in Australia. The exception is the nominal tariff, and if ACIC 14 to 16 are omitted, the F-statistic implies significantly different variances for all variables.

In summary, the data of Table 12 suggest that for a given variable, the protective structure is more uniform (i.e. tends to vary less) in Canada than in Australia, and that the average level of protection available to

TABLE 12

SUMMARY STATISTICS, COMPARISONS OF AUSTRALIAN AND CANADIAN PROTECTION
FOR 85 COMPARABLE MANUFACTURING INDUSTRIES

	Means (Unweighted)		Standard Deviations		Wilcoxon Matched Pairs Signed-Ranks Test (Difference in means) Z	Variance Ratio F
	Aust.	Canada	Aust.	Canada		
Nominal Transport Cost (Omitting ACIC 14-16)	16.85 (16.30)	4.40 (4.36)	12.90 (12.33)	2.81 (2.71)	7.69 (7.53)	21.07 (20.70)
Nominal Tariff (Omitting ACIC 14-16)	22.13 (21.31)	12.09 (10.51)	11.37 (10.65)	11.58 (6.67)	6.44 (6.94)	1.03 (2.54)
Total Nominal Protection (Omitting ACIC 14-16)	38.99 (37.61)	16.49 (14.87)	17.99 (16.23)	11.57 (6.82)	7.55 (7.55)	2.42 (5.66)
Effective Transport Cost (Omitting ACIC 14-16)	16.12 (14.85)	5.68 (5.45)	24.41 (23.07)	14.04 (14.09)	4.11 (3.81)	3.02 (2.68)
Effective Tariff (Omitting ACIC 14-16)	36.49 (34.97)	28.45 (22.03)	25.49 (23.47)	49.48 (18.01)	4.36 (4.81)	3.84 (1.69)
Total Effective Protection (Omitting ACIC 14-16)	52.62 (49.82)	34.13 (27.48)	39.14 (34.97)	52.88 (24.24)	4.76 (5.18)	1.82 (2.08)

Significance Levels: differences in means $Z = 2.57$ (1 percent)
                     variance ratio $F = 1.63$ (1 percent)

Canadian industries is significantly lower. The latter should come as no surprise. In 1970, Australian tariffs on industrial products were two to three times the world average and, more specifically, were higher than those of Japan and any of the Western European and North American countries with which Australia is usually compared. Only New Zealand tariffs were higher. Despite a 25 percent tariff reduction imposed by the government in July, 1973, Australian manufacturing industry still had higher tariff protection in 1975 than the manufacturing industries of Japan, the European Economic Community, Sweden, Canada and the United States (Industries Assistance Commission, 1978, 78). Comparing the geographic isolation of Australia with the proximity of the United States and its importance to Canadian trade, it would have been most surprising if international transport costs had not been significantly lower for Canada.

Despite differences in means and variances, the relative tariff structures of the two countries do display substantial similarities: those industries in Australia which are relatively highly protected also tend to be relatively highly protected in Canada. Table 13 contains the matrix of correlation coefficients of the corresponding protection variables in each country. The table shows highly significant rank and simple correlations between nominal and effective tariffs in each country (r_s^{22} = .602, R^{22} = .544, r_s^{55} = .419, R^{55} = .440). The omissions of ACIC 14-16 makes little difference to the correlation coefficients of the sets of variables.

There are no significant relationships between the nominal and effective transport cost variables in the two countries. There is no reason to expect that there should be. The measured transport costs depend on both the

TABLE 13

MATRIX OF RANK (SIMPLE) CORRELATION COEFFICIENTS OF PROTECTION CHARACTERISTICS: AUSTRALIA (1973/74) AND CANADA (1974)

		(1)	(2)	(3)	(4)	(5)	(6)
1. Nominal Transport Cost	- Aust. - Canada	.077 (.176)					
2. Nominal Tariff	- Aust. - Canada		.602 (.544)				
3. Total Nominal Protection	- Aust. - Canada			.341 (.361)			
4. Effective Transport Cost	- Aust. - Canada				.034 (.166)		
5. Effective Tariff	- Aust. - Canada					.419 (.440)	
6. Total Effective Protection	- Aust. - Canada						.248 (.358)

Significance Levels: r_s - 1 percent = .282

R - 1 percent = .275
   - 5 percent = .211

characteristics of the mix of imported commodities classified to a particular
industry, and the source of the imports. In the case of Canada, international
transportation may involve extremely short distances from the United States
factory gate to Canadian border. Indeed, for Canada the international transport
costs of a given commodity may be less than the cost of its internal trans-
portation and this will tend to provide a stimulus to international trade.

The evidence in this paper suggests that the two components of total
protection examined here--tariffs and transport costs--differ significantly
in both countries. Not only is the mean of each protection variables significantly
lower in Canada than in Australia, but the relative contribution of transport
costs to the total protective barrier in Canada is also substantially lower.
In Australia nominal transport costs contribute over 40 percent of the total
nominal (unweighted) trade barrier; in Canada just over one-quarter. In
effective rate terms, transport costs provide over 30 percent of the total
(unweighted) barrier in Australia; in Canada just under 17 percent.

Clearly, Australian manufacturing has developed behind higher average
natural and man-made barriers to trade than has the manufacturing sector in
Canada. As well, the balance of evidence suggests that international
transport costs, especially in Australia, but also in Canada despite its
proximity to the United States, constitute an advantage to import-competing
industries.

FOOTNOTES

[1] It is assumed here that the reader is familiar with the theory of effective protection, and with the problems which may arise in its measurement. For a discussion of the major issues, see Grubel (1971).

[2] The time period chosen is a product of the Australian transport cost data available to the study, and of the need to avoid the nontariff barriers (which are not analyzed here) which have been imposed by Australia mainly since the end of that period.

[3] It would obviously be desirable to use import data drawn from a full year as is the Canadian data, as seasonal influences may cause variations in the commodity composition and origin of trade. Nevertheless, data for 3 months comprise a large sample, and as they have been highly aggregated for the present purpose, they may be reasonably expected to give an accurate indication of the structure of Australian imports.

[4] A discussion of the relationship between geographical distance and transport costs may be found in Conlon (1979). See also Geraci and Prewo (1977).

[5] The formula and its derivation has been outlined by the Australian Tariff Board (1967, 32-36), the predecessor of the Commission.

[6] Import duties are those appearing in the input-output table row 596 (commodity indirect taxes) under the column "imports" in final demand.

[7] During 1973, of total Canadian imports of U.S. $21.3 billion, U.S. $14.8 billion were from the United States (Economic Council of Canada, 1975, 98).

[8] The input data (tariff and transport costs on inputs and materials/output ratios) from which the effective rates of Table 4 are derived may be found in Appendix 4.

[9] See Appendix 4.

[10] ACIC 1-6, 8, 10-14, 17, 29, 30, 32, 35, 41-48, 52.

[11] The average effective rate of transport cost protection is positive owing to average materials/output ratios which are less than unity.

[12] In the case of tariffs and transport costs on inputs, there is weak evidence in support of an inverse relationship. Pearson and Spearman correlation coefficients are both negative, but at low levels of significance ($R = -.114$, $r_s = -.0716$).

[13]Indeed, there is no reason to expect that there should be.

[14]A measure of the bulkiness of cargoes in relation to their weight.

[15]This is true of the ratio for the corresponding Australian industries as well; see Table 4.

[16]Tariffs and transport costs for materials and material/output ratios may be found in Appendix 5.

[17]See Appendix 5.

[18]An evaluation of the agreement may be found in Beigie (1970).

[19]ACIC 1, 5, 6, 10-12, 25, 34, 41, 45, 49, 52, 62, 64, 68, 75.

[20]ACIC 1, 3-5, 10-12, 45, 62, 64, 68, 75.

[21]See Appendix 5.

[22]In the case of tariffs and transport costs on inputs, there is evidence suggesting an inverse relationship. Pearson and Spearman correlation coefficients are both negative at greater than the 10 percent level of significance (R = -.2267 (.018), r_s = .1500(.086) - significance levels in parentheses).

[23]When ACIC 14-16 are omitted however, this is not true of the effective rates of protection.

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APPENDIX 1

CONCORDANCE OF STATISTICAL CLASSIFICATIONS: AUSTRALIAN
AND CANADIAN MANUFACTURING INDUSTRIES (ACIC) 1973-74.

Australian Standard Industrial Classification (ASIC)
Canadian Standard Industrial Classification (CSIC)
Canadian Input-Output Industry Classification (CI-O)

ACIC	Industry Description	ASIC	CSIC	CI-O
1	Meat products	2111,2113, 2114	1011	016
2	Poultry products	2112	1012	017
3	Milk products	2120	1040	018
4	Fruit, veg. products	2131-32	1031,1032	020
5	Flour,starch,cereals	2151-53	1050	022
6	Marg.,oils,fats	2140	1083	027
7	Bread,cakes,pastry	2161-62	1072	024
8	Biscuits	2163	1071	023
9	Confect.,cocoa	2181	1081	025
10	Fish products	2182	1020	019
11	Animal feeds	2183	1060	021
12	Sugar,malt,etc.	2184,2193	1082,1089	026,028
13	Soft drink,etc.	2191	1091	029
14	Beer	2192	1093	031
15	Wine, alc.bev.	2194-95	1092,1094	030,032
16	Tobacco	2210	1510,1530	033,034
17	Wool,sc.carb.tops	2312-13	1831	046
18	Man made fbr.yn.	2314-15	1831-32	045
19	Cotton yn.fab.	2316	1810,1899	043,047
20	Wool yn.fab.	2317-18	1820	044
21	W'hold oth.text.	2319,2321-23, 2335	1820,1893-94 1899	049,052 053
22	Text.fl.covers	2331	1860	051
23	Felt & prods.	2332	1852	050
24	Canvas & prods.	2333	1872	053
25	Rope,cord,twine	2334	1840	048
26	Hosiery	2411	2310	036
27	Knitted goods	2412-13	2391-92	037
28	Clothing,footwear	2421-29 2431-32	1874,1740, 1750,2431, 2441,2450, 2460,2482, 2491-92,2499	035,042 041,058
29	S'mill,wood prod.	2511-12, 2514-16	2511,2513, 2541-43,2560 2580,2591-93 2199	059,061- 064
30	Ply & boards	2513	2520	060
31	Furniture	2521-22,3122	2544,2611, 2619,2640 2660	065-067
32	Pulp,paper,board	2611	2710	069
33	Paper bag, con.	2612-14	1871,2731-33 054,071
34	Paper,print,publ.	2615,2621-25	2740,2860, 2870,2880, 2890	072-074
35	Basic chemicals	2711-13	3721-63	123,129
36	Ch.prod.exc.agr.	2721,2724, 2727-28	3791,3799	130
37	Paints	2722	3750	124
38	Pharm.vet.prod.	2723	3740	125
39	Soap,detergents	2725	3760	127
40	Cosmet.t'letry	2726	3770	126
41	Petroleum ref.	2750	3651-52	121
42	Petrol.coal pr.	2760	2720,3690	070,122
43	Glass & prod.	2811	3561-62	119
44	Clay prod.	2821-23	3511-12,3891 115-16
45	Cement	2831	3530	111
46	Concrete goods	2833-34	3541-42, 3540-50	113-14

47	Other nonmet.min	2835,2841, 2843	3570,3580 3599	112,118, 120
48	Stone prod.	2842	3530	117
49	Basic iron steel	2912	2910	075
50	Iron steel cast forge	2913	2940	077
51	Steel pipe tubes	2914	2920	076
52	Smelt.nfer.met.	2921-23	2950	078,079
53	Alum.Rl.dr.ext.	2927	2960	080
54	N.fer.r.dr.cast	2828-29,2931	2970,2980	081,082
55	Fab.str.steel	3111	3020	084
56	Arch.met.prod.	3112-13	3031,3039	085
57	Boilers,plates	3114	3010	083
58	Metal prod.	3121,3123, 3134,3136	3041-42	086
59	Cut, hand tools	3131	3060	088
60	Wire prod.N.bolt	3132-33	3050	087
61	Other fab.met.prod.	3135,3137	3080,3090	090,091
62	Motor vehicles	3211	3230	097
63	Truck bus.body	3212	3241-43	098
64	M.v.elect. parts	3213-14	3250	099
65	Ship build rep.	3221	3270	101
66	Boat other trans.	3222,3225	3280,3290	102
67	Loco stock rep	3223	3260	100
68	Airc. build.rep.	3224	3210	096
69	Ph.opt.sc.equip.	3311-12,3441	3911-14	131
70	TV,radio elect.	3321	3340,3350	105-06
71	H'hold appliance	3322-23	3310,3320, 3370	089, 103-04
72	Elect. tele wire	3324	3380	109
73	Batteries	3325	3391	108
74	Other elect.	3326	2680,3330, 3360,3399	107,110
75	Ag.mach.equip.	3331	3110	092
76	Other ind.mech.	3332-39	3150,3160, 3180	093-95
77	Leather tan.	3411	1720	039
78	Leather & sub.pr.	3412	1792,1799	042
79	Rubber,tyre, etc.	3421	1623	036
80	Other rubber prod.	3422	1629	037
81	Plast.rel.prod	3431-34	1650,3730, 3993	038,124 135
82	Jewellery,silver	3442	3920	132
83	Brooms, brushes	3443	3991	133
84	Signs,adv.disp.	3444	3970	136
85	Other manuf.	3445-47	3931-32,3992 3994-99	134,137

APPENDIX 2: DERIVATION OF AUSTRALIAN PROTECTION VARIABLES

The available data from which the estimates of Table 4 have been derived and their bases of valuation are as follows:

t'_{qj} = nominal tariff on output of the jth industry classified by ASIC, 1973/74 (c.i.f.);

t'_{mj} = nominal tariff on tradeable inputs of the jth industry classified by ASIC, 1973/74 (c.i.f.); and

VA_j^{ldp} = value-added of the jth industry classified by ASIC, 1973/74 .

Assuming that local producers "price up to the tariff", value-added is effectively valued on a landed duty-paid basis (l.d.p.), i.e., includes both tariff and transport cost protection.

f'_{qj} = f.o.b./c.i.f. value of final good imports classified to the jth ASIC industry (Sept. Qr), 1974

f'_{mj} = f.o.b./c.i.f. value of tradeable materials classified to the jth ASIC industry (Sept. Qr), 1974.

All of these data have been converted to an f.o.b. base to enable the computation of comparable effective rates in the form of (5) and (6). The relationships between the available data, and the data necessary for the computation of the nominal and effective rates of this study are as follows. For convenience, the respective valuation bases (f.o.b., c.i.f. and l.d.p.) have been retained, and the variables are defined in the same manner as those in text.

Materials

$$M_j^{fob}(1 + f_{mj}) = M_j^{cif} \tag{1a}$$

$$M_j^{fob}(1 + f_{mj} + t_{mj}) = M_j^{ldp} \tag{2a}$$

$$M_j^{fob} = M_j^{cif}(1 + f_{mj})^{-1} \tag{3a}$$

$$= M_j^{ldp}(1 + f_{mj} + t_{mj})^{-1} \tag{4a}$$

Output

$$Q_j^{fob}(1 + f_{qj}) = Q_j^{cif} \tag{5a}$$

$$Q_j^{fob}(1 + f_{qj} + t_{qj}) = Q_j^{ldp} \tag{6a}$$

$$Q_j^{fob} = Q_j^{cif}(1 + f_{qj})^{-1} \tag{7a}$$

$$= Q_j^{ldp}(1 + f_{qj} + t_{qj})^{-1} \tag{8a}$$

Materials/Output

$$\frac{M_j^{cif}}{Q_j^{cif}} = \frac{M_j^{fob}(1 + f_{mj})}{Q_j^{fob}(1 + f_{qj})} \tag{9a}$$

$$\frac{M_j^{ldp}}{Q_j^{ldp}} = \frac{M_j^{fob}(1 + f_{mj} + t_{mj})}{Q_j^{fob}(1 + f_{qj} + t_{qj})} \tag{10a}$$

$$\frac{M_j^{fob}}{Q_j^{fob}} = \frac{M_j^{cif}(1 + f_{mj})^{-1}}{Q_j^{cif}(1 + f_{qj})^{-1}} \tag{11a}$$

$$= \frac{M_j^{ldp}(1 + f_{mj} + t_{mj})^{-1}}{Q_j^{ldp}(1 + f_{qj} + t_{qj})^{-1}} \tag{12a}$$

Value Added

$$VA_j^{fob} = Q_j^{fob} - M_j^{fob} \tag{13a}$$

$$VA_j^{cif} = Q_j^{cif} - M_j^{cif} \tag{14a}$$

$$VA_j^{ldp} = Q_j^{ldp} - M_j^{ldp} \tag{15a}$$

In addition to the available tariff and transport cost data mentioned earlier, we have the values of the relationships expressed in (9a) and (15a). Thus, to express (15a) in terms of the given data of (9a), we may divide (15a) by Q_j^{ldp}.

$$\left[\frac{VA_i^{ldp}}{Q_j^{ldp}}\right] = 1 - \left[\frac{M_i^{ldp}}{Q_j^{ldp}}\right] \tag{16a}$$

$$= 1 - \left[\frac{M_i^{cif}(1 + f_{mi} + t_{mi})(1 + f_{mi})^{-1}}{Q_j^{cif}(1 + f_{qj} + t_{qj})(1 + f_{qj})^{-1}}\right] \tag{17a}$$

$$= 1 - \left[\frac{M_i^{cif}(1 + f_{mi} + t_{mi})(1 + f_{qi})}{Q_j^{cif}(1 + f_{qj} + t_{qj})(1 + f_{mj})}\right] \tag{18a}$$

$$Q_j^{ldp} = \frac{VA_i^{ldp}}{1 - \left[\dfrac{M_i^{cif}(1 + f_{mi} + t_{mi})(1 + f_{qi})}{Q_j^{cif}(1 + f_{qj} + t_{qj})(1 + f_{mj})}\right]} \tag{19a}$$

and

$$M_j^{ldp} = Q_j^{ldp} - VA_j^{ldp} \tag{20a}$$

From (19a) and (20a), and the given data, VA_j^{ldp}, we may obtain the corresponding c.i.f. values. Recalling (14a):

$$VA_j^{cif} = Q_j^{cif} - M_j^{cif}$$

$$= \left[\frac{Q_j^{ldp}(1 + f_{qi})}{(1+f_{qj}+t_{qj})}\right] - \left[\frac{M_i^{ldp}(1 + f_{mi})}{(1+f_{mj}+t_{mj})}\right] \tag{21a}$$

$$Q_j^{cif} = \frac{VA_i^{cif}}{1 - \left[\dfrac{M_i^{cif}}{Q_j^{cif}}\right]} \tag{22a}$$

$$M_j^{cif} = Q_j^{cif} \cdot \frac{M_i^{cif}}{Q_j^{cif}} \tag{23a}$$

In turn we may use (21a), (22a) and (23a) to obtain the f.o.b. values of value added, the values of outputs, and materials. Recalling (13a):

$$VA_j^{fob} = Q_j^{fob} - M_j^{fob}$$

$$= \left[\frac{Q_j^{cif}}{(1+f_{qj})}\right] - \left[\frac{M_j^{cif}}{(1+f_{mj})}\right] \qquad (24a)$$

from (7a)

$$Q_j^{fob} = \frac{Q_j^{cif}}{(1+f_{qj})}$$

and from (3a)

$$M_j^{fob} = \frac{M_j^{cif}}{(1+f_{mj})}$$

APPENDIX 3: DERIVATION OF CANADIAN PROTECTION VARIABLES

The Canadian tariff and transport cost protection variables were derived in the following manner. First, the Canadian Input-Output Use (input) and Make (output) matrices were revalued on an f.o.b. basis, net of tariff and transport cost protection. The Use matrix was converted by dividing each of its elements by one plus the sum of the corresponding tariff and transport cost rates.

$$M_{ij}^{fob} = M_{ij}^{ldp}(1 + t_{mi} + f_{mi})^{-1} \qquad \text{(ia)}$$

where: M_{ij}^{fob} = the f.o.b. value of the ith commodity used by the jth industry;

M_{ij}^{ldp} = the value of the ith commodity used by the jth industry under protection;

t_{mi} = ad valorem tariff imposed on the ith commodity input based on imports, valued f.o.b.; and

f_{mi} = cost to transport the ith commodity input to the Canadian border as a proportion of the f.o.b. value of imports.

Similarly, from the Make matrix:

$$Q_{ij}^{fob} = Q_{ij}^{ldp}(1 + t_{qi} + f_{qi})^{-1} \qquad \text{(iia)}$$

where: Q_{ij}^{fob} = the f.o.b. values of the ith commodity produced by the jth industry;

Q_{ij}^{ldp} = the value of the ith commodity produced by the jth industry under total protection;

t_{qi} = ad valorem tariff imposed on the ith final commodity based on imports, valued f.o.b.; and

f_{qi} = cost to transport the ith final commodity to the Canadian border as a proportion of the value of imports, f.o.b.

Here, as in the Australian case, it is assumed that domestic protected goods are priced at free trade prices plus tariffs and transport costs. The calculations performed by Statistics Canada for this exercise were as follows:

$$Q_j^{fob} = \sum_{i=1}^{k} \left[Q_{ij}^{ldp}(1 + t_{qi} + f_{qi})^{-1} \right] \qquad (1a)$$

$$\frac{M_j^{fob}}{Q_j^{fob}} = \frac{\sum_{i=1}^{m} \left[M_{ij}^{ldp}(1 + t_{mi} + f_{mi})^{-1} \right]}{\sum_{i=1}^{k} \left[Q_{ij}^{ldp} \cdot (1 + t_{fi} + f_{fi})^{-1} \right]} \qquad (2a)$$

$$t_{mj} = \frac{\sum_{i=1}^{n} \left[t_{mi}(M_{ij}^{ldp}(1 + t_{mi} + f_{mi})^{-1}) \right]}{\sum_{i=1}^{m} \left[M_{ij}^{ldp}(1 + t_{mi} + f_{mi})^{-1} \right]} \qquad (3a)$$

$$f_{mj} = \frac{\sum_{i=1}^{r} \left[f_{mi}(M_{ij}^{ldp}(1 + t_{mi} + f_{mi})^{-1}) \right]}{\sum_{i=1}^{m} \left[M_{ij}^{ldp}(1 + t_{mi} + f_{mi})^{-1} \right]} \qquad (4a)$$

$$t_{qi} = \frac{\sum_{i=1}^{n} \left[t_{qi}(Q_{ij}^{ldp}(1 + t_{qi} + f_{qi})^{-1}) \right]}{\sum_{i=1}^{m} \left[Q_{ij}^{ldp}(1 + t_{qi} + f_{qi})^{-1} \right]} \qquad (5a)$$

$$f_{qi} = \frac{\sum_{i=1}^{r} \left[f_{qi}(Q_{ij}^{ldp}(1 + t_{qi} + f_{qi})^{-1}) \right]}{\sum_{i=1}^{m} \left[Q_{ij}^{ldp}(1 + t_{qi} + f_{qi})^{-1} \right]} \qquad (6a)$$

where: k = set of all goods produced in the Canadian economy;

m = set of all goods produced in the Canadian economy as well as those services which make up the difference between their producer and purchaser prices;

n = set of goods and services that contain non-zero observations for tariffs; and

r = set of goods and services that contain non-zero observations for transport costs.

The calculated effective rates of protection are:

(i) tariff protection

$$
ERT_j = \frac{t_{qi} - \left[(\frac{M_i}{Q_j}) \cdot t_{mi} \right]}{1 - \left[\frac{M_i}{Q_j} \right]} \tag{7a}
$$

(ii) transport cost protection

$$
ERF_j = \frac{f_{qi} - \left[(\frac{M_i}{Q_j}) \cdot f_{mi} \right]}{1 - \left[\frac{M_i}{Q_j} \right]} \tag{8a}
$$

(iii) total protection

$$
ERP_j = \frac{(t_{qi} + f_{qi}) - \left[(\frac{M_i}{Q_j}) \cdot (t_{mi} + f_{mi}) \right]}{1 - \left[\frac{M_i}{Q_j} \right]} \tag{9a}
$$

APPENDIX 4
PROTECTION ON INPUTS: EIGHTY FIVE AUSTRALIAN MANUFACTURING INDUSTRIES, 1973/74

ACIC	(1)	(2)	(3)	ACIC	(1)	(2)	(3)
1	3.6	1.2	.755	44	25.1	1.0	.284
2	1.0	1.0	.763	45	17.6	2.4	.477
3	1.9	2.0	.810	46	49.8	5.3	.468
4	21.7	5.5	.550	47	53.6	5.5	.376
5	15.1	2.7	.642	48	80.2	12.6	.294
6	10.7	13.3	.686	49	44.1	7.2	.455
7	18.5	6.7	.353	50	19.6	13.2	.390
8	22.0	6.1	.444	51	31.9	10.6	.490
9	26.4	6.3	.590	52	30.2	0.6	.488
10	14.3	11.4	.557	53	7.3	1.1	.732
11	18.1	3.5	.617	54	9.5	5.7	.800
12	8.4	0.0	.751	55	19.8	15.6	.539
13	33.9	12.0	.604	56	12.7	20.0	.528
14	20.3	13.2	.507	57	16.0	13.9	.533
15	14.5	14.3	.677	58	13.6	13.6	.575
16	17.0	49.1	.386	59	16.1	15.1	.313
17	10.3	1.1	.631	60	12.9	14.2	.527
18	12.6	9.0	.543	61	8.6	15.2	.574
19	10.6	7.7	.605	62	9.2	22.9	.686
20	12.9	5.1	.587	63	14.0	17.1	.724
21	10.5	23.0	.725	64	16.1	18.1	.466
22	12.5	11.2	.685	65	18.9	13.1	.531
23	25.2	2.5	.513	66	20.8	21.3	.509
24	9.9	14.3	.688	67	20.2	15.6	.662
25	43.9	10.1	.361	68	4.4	3.1	.487
26	12.5	18.0	.530	69	16.4	16.7	.442
27	10.5	15.5	.677	70	14.7	27.5	.480
28	11.5	19.2	.591	71	14.5	21.6	.622
29	33.2	11.1	.460	72	11.0	7.8	.636
30	28.2	14.1	.478	73	14.0	20.5	.511
31	25.5	22.4	.505	74	11.6	22.3	.531
32	29.0	6.5	.473	75	20.3	20.5	.459
33	26.3	8.9	.698	76	13.9	21.0	.504
34	27.7	4.4	.454	77	8.0	5.4	.639
35	27.5	8.5	.574	78	12.5	16.9	.563
36	19.4	15.5	.456	79	20.0	14.4	.472
37	18.9	20.2	.587	80	15.3	13.8	.490
38	9.1	17.4	.417	81	16.3	27.8	.472
39	22.4	18.4	.482	82	6.0	10.6	.632
40	18.8	20.2	.421	83	32.6	14.6	.423
41	19.5	4.8	.754	84	19.6	13.2	.464
42	29.7	3.9	.637	85	20.7	16.6	.478
43	43.1	14.3	.283				

(1) Transport Costs Importable Inputs
(2) Tariffs Importable Inputs
(3) Materials/Output Ratio

Sources: See Text.

APPENDIX 5
PROTECTION ON INPUTS: EIGHTY FIVE CANADIAN
MANUFACTURING INDUSTRIES, 1974

ACIC	(1)	(2)	(3)	ACIC	(1)	(2)	(3)
1	3.3	2.1	.870	44	6.5	3.1	.483
2	13.6	5.9	.795	45	3.7	1.0	.518
3	1.9	12.9	.823	46	10.5	1.2	.540
4	6.0	5.9	.759	47	6.9	3.9	.576
5	1.1	1.3	.853	48	17.2	1.4	.526
6	1.8	0.2	.846	49	8.3	1.1	.661
7	3.3	2.9	.606	50	7.3	1.5	.528
8	5.2	4.6	.618	51	6.5	6.6	.747
9	4.8	4.6	.735	52	5.0	0.5	.812
10	2.7	2.5	.731	53	3.5	2.8	.769
11	5.9	1.4	.857	54	7.6	1.3	.800
12	4.1	2.9	.814	55	8.4	4.0	.501
13	4.8	6.1	.638	56	3.1	6.0	.674
14	2.9	4.2	.633	57	5.5	6.0	.558
15	2.7	8.8	.825	58	4.4	7.6	.647
16	0.7	21.2	.591	59	4.6	5.0	.501
17	4.0	4.9	.731	60	9.8	6.1	.598
18	3.1	8.1	.691	61	6.1	5.1	.555
19	3.2	8.7	.707	62	2.3	2.5	.790
20	3.0	3.4	.623	63	3.5	7.5	.701
21	3.2	11.0	.609	64	3.6	4.5	.585
22	3.5	9.5	.833	65	4.6	5.4	.655
23	7.0	5.8	.706	66	2.1	4.5	.707
24	4.0	12.4	.647	67	4.8	7.9	.650
25	4.2	5.6	.581	68	2.1	2.0	.483
26	4.8	10.3	.643	69	2.8	4.7	.637
27	3.8	11.4	.710	70	1.8	8.4	.539
28	2.4	11.4	.668	71	1.4	4.2	.661
29	2.1	1.4	.647	72	1.8	4.8	.787
30	1.9	3.1	.674	73	5.6	6.5	.595
31	2.4	9.0	.628	74	2.5	6.4	.585
32	2.3	1.3	.560	75	5.0	5.9	.594
33	2.6	9.5	.694	76	3.5	6.0	.590
34	1.7	7.0	.503	77	2.3	1.3	.717
35	7.0	2.1	.674	78	1.3	9.0	.664
36	5.4	5.0	.683	79	3.4	5.1	.627
37	4.9	5.9	.724	80	3.9	6.5	.578
38	2.2	4.3	.591	81	3.1	6.4	.666
39	4.7	6.2	.699	82	1.4	1.3	.769
40	2.4	6.3	.593	83	2.9	8.0	.643
41	12.1	0.2	.861	84	1.5	6.8	.554
42	6.4	5.8	.629	85	2.5	6.7	.610
43	6.1	5.4	.457				

(1) Transport Costs Importable Inputs
(2) Tariffs Importable Inputs
(3) Materials/Output Ratio

Sources: See Text

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