

SECTOR STUDY ON AUTOMOBILES:
PROTECTION IN THE
CANADIAN AUTOMOBILE MARKET:
COSTS, BENEFITS AND
IMPLICATIONS FOR INDUSTRIAL
STRUCTURE AND ADJUSTMENT

LKC
HD
9710
.C22
H29
1986

IC

68065330

HD9710

ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT

RESTRICTED

Paris, drafted: 5th May, 1986

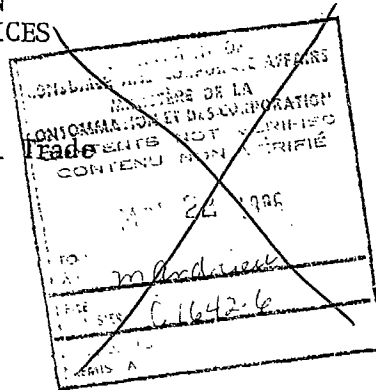
COMMITTEE OF EXPERTS ON
RESTRICTIVE BUSINESS PRACTICES

dist: 13th May 1986

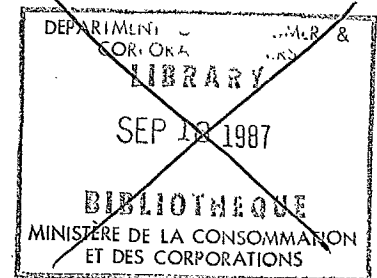
Working Party No 1 on
Competition and International

DAFFE/RBP/WP1/86.8

Scale L



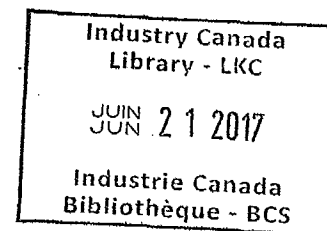
Or. Eng.



SECTOR STUDY ON AUTOMOBILES:
PROTECTION IN THE CANADIAN AUTOMOBILE MARKET:
COSTS, BENEFITS AND IMPLICATIONS FOR INDUSTRIAL STRUCTURE AND ADJUSTMENT

The attached study has been prepared by Tim Hazledine and Ian Wigington of the Department of Agricultural Economics of the University of British Columbia, Vancouver, Canada for the Canadian Bureau of Competition Policy, Ottawa. An earlier version of this study was circulated at the February meeting of Working Party No. 1. The views expressed in the report are those of the authors and do not necessarily represent the views of the Bureau of Competition Policy, the Department of Consumer and Corporate Affairs, or the Government of Canada.

This study is submitted to the Working Party for discussion at its next meeting on 24th June, 1986.



36374

The illegibility of certain pages is
due to the poor quality of the
originals available.

AGP. DOC/IMP.

Protection in the Canadian Automobile Market: Costs,
Benefits, and Implications for Industrial Structure and
Adjustment

by

Tim Hazledine and Ian Wigington
Dept. of Agricultural Economics
UBC, Vancouver BC V6T 1W5

April, 1986

Contents

1. Background	page 1
2. Present Policy Environment	page 4
3. Impact of Export Restraints (OECD Checklist)	page 7
4. Impact of other Policies	page 22
footnotes	page 28

ANNEX: A Model of Demand, Costs and Pricing in the Canadian
Automobile Market .

A.1 Introduction	page 31
A.2 Demand Elasticities	page 31
A.3 Costs	page 34
A.4 Pricing	page 36
A.5 The Model	page 41

References	page 52
------------	---------

This is a report for the Bureau of Competition Policy,
Consumer and Corporate Affairs, Ottawa. William J. Carroll
and Michel Andrieu are thanked for their encouragement and
advice, and participants at a seminar at the Bureau of
Competition policy for their comments.

The views expressed in this report are those of the authors,
and do not necessarily represent the views of the Bureau of
Competition Policy, the Department of Consumer and Corporate
Affairs, or the Government of Canada.

1. Background

1.1 The market

In a reasonably good year, Canadians buy one million new automobiles (excluding trucks and other commercial vehicles, with which this study is not concerned), which they add to a total stock of passenger cars of around eight to ten millions.[1] Because cars are relatively durable, with high substitutability between new and used models, and because, even in a rich country like Canada a new car is a major expenditure item for most households, the market is subject to quite severe cyclical swings, as Table 1 demonstrates. The most recent major recession suffered by the industry was from 1979 to 1982, when total sales dropped from one million to just over 700,000. Since then, demand has recovered with the overall improvement in business conditions, and 1985 turned out to be a very good year for the industry, with sales exceeding 1.1 million aided by price rebates, cheap financing, and discounting of options on North American-made cars and the release of some demand pent-up over the years of low sales and high interest rates.

Within the total sales figures are some quite large swings in market shares. Although North American-made vehicles retain their majority share of the market, they have been subjected to strong competition from imports. The 1979-82 collapse in the market was made even more unpleasant for the domestic (North American) industry by the dramatic increase over the period in the market share of Japanese imports, to a peak of 25% in 1982 (as Table 1 shows).

Since that time, however, Japanese exports have been restricted to about 18% of the Canadian market, and the most interesting new event has undoubtedly been the from-nowhere performance of the South Korean Hyundai (pronounced Hun-day), which, in its first year (1984) on the market sold 25,000 units, and in 1985 more than tripled this, to about 80,000 -- a seven percent market share -- becoming in the process the leading-selling import brand.

European imports, which have always had a presence in Canada, first from British cars, and then with the Volkswagon 'Beetle', now take a fairly steady five percent or so of the total market; much of this being relatively up-market sports sedans and luxury cars.

1.2 The industry

Canada has a substantial automotive industry, producing parts and assembling finished vehicles. Table 2 gives some data for 1983, which is the most recent year reported by Statistics Canada

TABLE 1

- 2 -

Year	Canadian Passenger Car Sales by Place of Origin (1)					Value/unit Passenger Cars Sold in Canada by Place of Origin (2)					Market Shares of Passenger Car Sold in Canada by Place of Ori			
	Total	North America	Japan	Over-seas	Korea	Total	North America	Japan	Over-seas	Korea (3)	North America	Japan	Europe	Korea
	(thousands of units)					(thousands of \$ Can.)					(percent)			
1970	640	497	70	143	0	3.37	3.61	2.50	2.57	0.0	78	11	11	0
1971	781	592	115	188	0	3.51	3.76	2.70	2.76	0.0	76	15	9	0
1972	859	654	120	205	0	3.69	3.91	3.00	3.01	0.0	76	14	10	0
1973	971	783	111	188	0	3.95	4.08	3.20	3.67	0.0	81	11	8	0
1974	943	797	88	146	0	4.26	4.34	3.44	4.46	0.0	85	9	6	0
1975	989	836	96	154	0	5.07	5.21	3.73	5.73	0.0	85	10	5	0
1976	946	793	102	153	0	5.54	5.70	4.08	5.90	0.0	84	11	5	0
1977	991	798	135	194	0	5.85	6.10	4.20	6.21	0.0	81	14	5	0
1978	989	816	113	173	0	6.45	6.60	5.07	7.16	0.0	83	11	6	0
1979	1003	864	80	139	0	7.32	7.36	6.39	8.04	0.0	86	8	6	0
1980	932	741	138	191	0	8.07	8.19	6.62	10.05	0.0	80	15	5	0
1981	904	647	208	257	0	9.15	9.33	7.82	12.42	0.0	72	23	5	0
1982	713	489	178	224	0	9.86	9.92	8.71	13.73	0.0	69	25	6	0
1983	843	625	177	218	0	10.72	10.72	9.57	15.64	0.0	74	21	5	0
1984	971	725	171	246	25	11.47	11.28	11.26	13.78	6.0	75	17	6	2
1985	1125	795	195	330	80	12.04	12.40	11.80	12.37	8.8	71	17	5	7

(1) New Motor Vehicle Sales, Stats. Can. 63-007 table 1
for Japan: 1970-72 estimated from import data from
Summary of External Trade, Stats. Can. 65-203.

(2) New Motor Vehicle Sales, Stats. Can. 63-007
[dollar sales (table 1)] / [unit sales (table 2)]
for Japan: 1970-72 calculation was
[units] * [unit value of imported passenger cars (non-N.A.)].

(3) estimate.

from the annual Census of Manufactures:

Table 2: Canadian motor vehicle and parts industries, 1983

	number of employees (\$m.)	value of shipments (\$m.)	value added
Motor Vehicles	47,639	15,591	3,046
Parts & Accessories	64,710	8,358	3,934

Sources: Statistics Canada publications 42-219 and 42-210.
Employment figures are for 'total activity';; shipments
and value added refer only to 'manufacturing activity'.

In 1983 there were 21 vehicle plants and 467 establishments in the parts and accessories sector. Apart from a small (fewer than 200 employees) Volvo assembly plant in Halifax, the finished-automobile sector of the industry is made up of subsidiaries of the four U.S. car companies, operating under the 'Autopact' as part of an integrated North American industry. Because of the substantial scale economies involved in car assembly, plants tend to specialize in the production of a particular model. Thus, for example, all Chrysler's new 'minivans' are assembled in Windsor, Ontario. In general, most of the motor vehicles made in Canada are exported to the United States, and most of the vehicles bought here are imported.

Currently, the balance of trade in automotive products between Canada and the U.S. is in substantial surplus in Canada's favour [2], although this has not always been the case. The reason for the present position is believed partly to be the fall in the value of the Canadian dollar relative to its US counterpart [3], which has made Canadian costs relatively attractive, but there is no doubt also an element of luck involved -- the success of the minivans, and the surprising resurgence in demand for 'full-sized' American cars; the production of these being disproportionately located north of the border.

Apart from small-scale producers of expensive 'replicars', there is no Canadian-owned auto company; nor does any foreign firm located in this country produce a vehicle peculiarly popular in, and/or designed for the Canadian market and Canadian conditions. In this sense, Canada does not have an indigenous automobile, and it is the largest industrial nation to be in this position. Of the smaller nations, Sweden and Australia both have their own auto industries, as do, amongst the smaller developing economies, South Korea and Yugoslavia.[4]

2. The Present Policy Environment

If there exists no Canadian automobile, there certainly is a unique Canadian automobile policy. This has been mainly concerned with the regulation of trade across Canada's borders, which is also the main focus of the present paper. As presently constituted, Canadian policy has five important elements:

(a) an 'autopact' under which new cars and the parts for their production cross the Canada/US border under the control of the manufacturers with no duty being levied in either direction. The agreement requires that a manufacturer produce in Canada finished autos at least equal in total value to those sold in Canada. As well, under a 'letter of intent', it is agreed that at least 60% by value of the parts in qualifying autos should be made in Canada. Manufacturers from other countries can qualify for trade under the autopact, for instance, Volvo currently operates in Canada under the terms of the pact.[5]

(b) a virtual prohibition on the import of used vehicles (excluding cars of the current model year).

(c) export restraints limiting Japanese-made cars to about 18% of the Canadian market. These are quite similar to the 'voluntary export restraints' (VERs) in place in the United States. It is left to the Japanese to allocate their total share of the market between makes.

(d) a tariff --9.9% in 1986 -- levied on most car imports not qualifying under the autopact, except

(e) duty-free status under the 'General Preferential Tariff' (GPT) to imports from developing countries, including Korea, up to January 1, 1987 when the GPT exemption will come to an end.

It is probably useful to briefly trace the historical evolution of this unique set of trade policies. They must be understood, on the one hand, in the context of Canada's particularly vulnerable position with respect to the much larger US economy, and, on the other, by the logic of the development in the world at large of the very important auto industry.

The original tariff of 35% was inherited from the horse-drawn carriage, in which category early imports of autos were included [6] In 1926 this was reduced to 20%, for cars costing less than \$1200 (27.5% for others). There was at that time an autopact of sorts - 'drawbacks' of tariffs for manufacturers attaining 50% Empire content in their output.

The Canadian industry was then caught up in the flood of

protectionism that was the world-wide response to the Great Depression of the 1930s. Tariffs on cars were raised, and the prohibition on the importation of used cars introduced. The reason for the latter may have been the pressure on the value of durable assets during the Depression, coupled with Canada's geographical accessibility (by road) to the United States market. Taking the rule of thumb that annual new car sales are about one tenth the total stock of cars, and noting that the Canadian market is about one tenth the size of the United States', we can see that the total stock of automobiles in North America is around one hundred times annual Canadian sales of new vehicles. Thus, given that used cars are good substitutes for new cars, a fall in the price of the former could induce a disastrous switch away from purchases of new vehicles, which cannot be sold in the long run for less than their cost of production. Prohibiting Canadians from crossing the border to draw on the large stocks of used vehicles there available would have greatly reduced the pressure on the Canadian auto-producing industry.

In any case, the law remains on the books today, with very few exemptions, amongst which is still the original 'grandfather clause' permitting Canadians who own an auto in the US which they personally purchased before 1931 to bring this into the country if they wish. [7] So far as I am aware, no other developed economy consumer good is similarly restricted in Canada.[8]

To return to the tariff on new cars, it provided a price 'umbrella' under which the US car companies built 'miniature replicas' of their Detroit plants, producing a full range of vehicles in and for the Canadian market. The consequent loss of scale economies, along with some other factors (such as higher steel costs), led to the

'general opinion of the industry that automobile manufacturing costs in Canada are roughly 15% higher than those in the U.S.' (Royal Commission, 1956, p. 75)

Although the 1930s' peak tariffs had been chipped away at (to 17.5% in 1965), they were still high enough to support cost differentials of this magnitude, and it was concern with the inefficiency of their protected industry that led Canadian policymakers to press for and achieve (in 1965) the rationalisation of the North American industry that was made possible by the provisions encoded in the Autopact and accompanying letters of intent. The current performance, from Canada's point of view, of the autopact, will be discussed below in section 4; here we will just note that it could be seen by some as an 'industrial policy', rather than as a 'free trade agreement', since it left control of the retailing of autos in the hands of the car companies, and does not permit

non-qualifying agents (such as private citizens or independent dealers) to import new cars duty-free from the United States.

The export restraints on Japanese cars were negotiated when the domestic market slumped in the early 1980s, as noted in section 1. They matched similar restrictions on Japanese exports to the United States. Although the formal export restraints expired last March 31, they have been replaced with an 'understanding' between the governments that

'The Japanese have agreed to avoid disruption of the Canadian market on the understanding that their exports be allowed to grow in a manner consistent with the total growth of the Canadian market. As a result of our understanding we expect that Japanese exports would be about 18% of the anticipated market for 1985.' [9]

The final policy development of note is the announcement in the last federal budget that the government would raise the General Preferential Tariff on imports of motor vehicles from developing countries (including Korea) as of 1987, to be equal to two thirds of the then prevailing tariff (or about 6%). [10]

The Canadian government is now preparing for negotiations with the United States on a proposal for bilateral free trade between the two countries, and also for the next round of the General Agreement on Tariffs and Trade (the GATT). It is most likely that all the auto industry policies surveyed here will come under intense scrutiny in the course of these negotiations.

3. Impact of the Japanese Export Restraints (the OECD checklist)

In this section we examine the impact of the restraints on Japanese automobile exports to Canada. We will use the OECD 'checklist', following the precedent of Willig and Dutz's (1985) analysis of the U.S. restraints (known there as VERs). The analysis relies on a mathematical model of the Canadian market. This model is fully documented in the Annex, but it is useful to note here its main features:

- the model is calibrated to replicate the actual 1985 data.
- three types of automobile are identified -- Japanese, domestic (North American), and Korean (Hyundai). For simplicity, European imports are included with domestic.
- Japanese cars are produced at lower cost than domestic, and Japan therefore is able to act as the price leader.
- the Japanese normally set price to achieve a target market share.
- domestic car makers set price at cost plus a markup embodying some monopoly rents.
- however, the imposition of restraints may have 'changed the rules of the oligopoly game', so that domestic prices have matched a proportion of the Japanese price increases needed to balance supply and demand at the lower-than-normal (about 18%) market share currently permitted to Japanese imports.
- Hyundai sets prices at cost plus a non-monopolistic markup, resulting in a price lower than that charged by either of the other supplying groups.

The main procedure followed is to ask the model how the 1985 situation would have differed had restraints not been in place. We will also examine how the results would differ had not Hyundai appeared on the Canadian scene when it did. Not all questions on the checklist are easily quantifiable, though, and other information is used when appropriate. The model itself, of course, incorporates a large amount of information, from primary research as well as from a literature search.

There are other important trade policies affecting the Canadian market, as noted in sections 1 and 2: the autopact, the prohibition on used car imports, and the differential tariff structure. The impact of these will be discussed in section 4.

(a) Conformity of restraints with international commitments

Although the allegedly voluntary nature of restraints diverts them from obvious conflict with the anti-protectionist regulations of the General Agreement on Tariffs and Trade (the GATT), to which Canada is a signatory, they could hardly be argued to be in the spirit of trade liberalization. Willig and Dutz note the 'uncertain status of VERS in general under national (US, in this case) and multinational (GATT) trade laws' (1985, p.4). This was an issue on which no agreement was reached during the last (Tokyo) Round of the GATT. The matter is very likely to be raised in the course of the negotiations for the next round of the GATT that begins in September, in the context of increasing concern with the use of non-tariff barriers to trade.

(b) Effect on domestic prices

Since the restraints have almost certainly reduced sales of Japanese cars in Canada, the price must have risen to clear the market. As a result, the price of domestic cars could also have increased, for either of two reasons -- (a) increasing costs as domestic output increases with consumers switching away from the Japanese products, or (b) oligopolistic price-follower behaviour as domestic and Japanese manufacturers and importers take advantage of the restraint and push up prices across the board. In the Annex, we argue that the evidence does not support reason (a), since there has been throughout the 1980s substantial excess capacity in the North American industry. On (b), it is not possible to be conclusive, as noted in the Annex, although there is quite impressive U.S. evidence that domestic car prices in that country rose by more when VERS were in place than can easily be explained by inflation, additional emission regulations, and other cost-increasing factors. Willig and Dutz, however, after citing this evidence, choose to work with the 'conservative' (in the sense of minimizing the effects of VERS) assumption that there was no domestic car price increase as a result of US VERS (p.6).

We have chosen to simulate the effect of removing Canadian restraints over a range of scenarios for the pricing behaviour of North American producers. Table 3 shows some results. Here column A gives the 'basecase' (actual 1985) situation, and the other columns predict what the market would look like without restraints. In scenario B, domestic (North American-produced) car prices are increased by 50 cents for every \$1 increase in the segment of the domestic industry's market is for their 'full-sized' models for which cross elasticities of demand with Japanese makes are apparently not very large.

Scenario C represents an intermediate position - 25 cents on domestic prices for every extra dollar on the import price - and D incorporates Willig and Dutz's conservative assumption that there is no domestic price response. In all of these scenarios, the total market price elasticity of demand is set at -1, and

Table 3: Scenarios of Impact of Export Restraints, with Hyundai

	----Scenarios----			
	A	B	C	D
(actual 1985)				
jobs/car		0.04	0.04	0.04
domestic markup, \$		1000	1000	1000
domestic price response		0.50	0.25	0
Japanese sales, units	105000	250000	243000	239000
Japanese price/car, \$	11800	10321	10694	10312
Japanese sales, \$m.	2301	2580	2599	2608
domestic price/car, \$	12400	11661	12123	12400
domestic sales, units	850000	889414	851053	828031
domestic sales, \$m.	10540	10371	10318	10268
Korean price/car, \$	8800	8800	8800	8900
Korean sales, units	80000	53472	64165	70513
Korean sales, \$m.	704	471	565	621
total sales, units	1125000	1192886	1158219	1137544
Japanese market share	0.173	0.210	0.210	0.210
domestic market share	0.756	0.746	0.735	0.728
Korean market share	0.071	0.045	0.055	0.062
average market price, \$	12040	11252	11639	11804
consumer costs of restraints, \$m.		913	457	199
producer rents from restraints, \$m.		589	234	22
jobs protected by restraints		-1577	-42	879
cost per job protected, \$				201165

own-price elasticities at -1.5, -3, and -5; for domestic, Japanese, and Korean cars, respectively. These numbers are intended to be an uncontroversial summary of the information generated by the quite large number of extant studies of demand in auto markets, as reported in the Annex.

We expect the price effects of restraints to be largest for scenario B. The more that domestic prices tend to follow import prices, the further the Japanese will need to go to get the increase in relative prices needed to discourage consumers enough to reduce their market share to the required level.

So it turns out. The actual Japanese car price of \$11,800 in 1985 would have been reduced to about \$10,300 without restraints under scenario B, and to \$10,700 and \$10,900 under C and D. The implied proportional increases in price due to restraints are thus about 14%, 10% and 8%. The corresponding increases in prices of North American-made cars are about 6%, 2%, and zero.

The scenario D figure can be compared with Willig and Dutz's findings, which use the same assumption about domestic pricing. They offer a range of price effects, with a lower bound of 10%. One possible explanation for the difference (not that the results should be exactly the same for the two economies) is the presence since 1984 of the phenomenally popular Hyundai in Canada. This low-priced entrant to the market can be expected to have exercised some natural restraint on Japanese market shares, (and on sales of domestic compact and subcompact cars) and thus reduced the net impact of the restraint.

Although inferring the impact of the presence of an entirely new brand in a market cannot be a very precise exercise, at least without a proper hedonic price analysis of demand, we have assumed (with some supporting argument -- see the Annex) that the Japanese target market share, absent both Hyundai and restraints, would have been 23% (the average of actual 1981-83 shares), whereas with Hyundai in the market it is only 21%. That is, the competitive pressure of Hyundai's presence forces the Japanese to give up two percentage points of the market. The overall impact of Hyundai is set out on Table 4. Here, column A is the actual-1985 basecase as on Table 3. First, we compare this with a situation in which restraints exist, but with no Hyundai (scenario AH). In this and the other scenarios shown, we have used the 'conservative' assumption of no domestic price response. This is partly to keep the set of comparisons manageably simple, and partly because it becomes rather tricky to predict changes in pricing behaviour in scenarios with two 'what if' conjectures incorporated simultaneously ('what if no-restraints and no-Hyundai?'), as is shown on the last column of Table 4.

Note, then, that prices of Japanese imports under the current policy regime (restraints in place) would be quite a lot higher were it not for the arrival of Hyundai on the market -- nearly \$12,600, or 6.5% higher in scenario AH than in the actual-1985

Table 4: Scenarios of Impact of Export Restraints, without Hyundai

	----Scenarios----			
	A	AH	D	DH
	(actual 1985)			
jobs/car		0.04	0.04	0.04
domestic markup, \$		1000	1000	1000
domestic price response		0	0	0
Japanese sales, units	195000	187000	239000	254000
Japanese price/car, \$	11800	12572	10912	10796
Japanese sales, \$m.	2301	2351	2608	2742
domestic price/car, \$	12400	12400	12400	12400
domestic sales, units	850000	893298	828031	849333
domestic sales, \$m.	10540	11077	10268	10532
Korean price/car, \$	8800	-	8800	-
Korean sales, units	80000	0	70513	0
Korean sales, \$m.	704	0	621	0
total sales, units	1125000	1080298	1137544	1103333
Japanese market share	0.173	0.173	0.210	0.230
domestic market share	0.756	0.827	0.728	0.770
Korean market share	0.071	0	0.062	0
average market price, \$	12040	12430	11864	12031
consumer costs of restraints, \$m.				436
producer rents from restraints, \$m.				44
jobs protected by restraints				1759
cost per job protected, \$				222749

basecase. Interestingly, Japanese sales are down by 8000 units -- nearly 4% -- despite the absence of Hyundai and the consequent strengthening of demand for the remaining suppliers. In part, of course, this is due to the price increase, but there is another factor at work -- anything that increases total auto sales, such as the introduction of a new make, increases the denominator of the Japanese market share ratio, and so allows them to sell more of their own cars (the numerator) without exceeding the restrained market share limit.

That is, the arrival of Hyundai has meant that the Japanese have been able to sell more cars under the restraint rule, but at a lower price, with a net slight decline in total revenues (from \$2.35 billion to \$2.3 billion).

Now look at the last two columns on Table 3, which compare the impact of eliminating the restraints, with (D) and without (DH) Hyundai. Scenario D is the same as on Table 3. In the absence of restraints, Japanese import prices would be about 1% lower without Hyundai than with it. This reflects the net effect of two opposing forces -- the market is less competitive without Hyundai, tending to increase prices, but the larger target market share -- 23% compared with 21% -- acts to reduce the price the Japanese choose to charge in Canada.

From the point of view of matching Canadian with U.S. results, however, the relevant comparison is between Scenarios AH and DH -- the market with and without restraints with no Hyundais being sold. The price difference is quite large -- about \$1600, implying import prices more than 16% higher with restraints than without. This is a number well within the range of U.S. estimates, and about twice as large as the with-Hyundai comparison of Scenarios A and D.

Thus, in summary, while it seems that Export Restraints have had a quite significant effect on the price of Japanese cars in the Canadian market, and possibly also on the price of North American cars, their impact has been noticeably softened by the sudden arrival of Hyundai as a major player in this market.

(c) Effect on Domestic Suppliers

The American car companies supplying the Canadian market may benefit from the restraints in two ways: (a) to the extent that they respond to the price increases on Japanese imports by raising their own selling prices, and (b) to the extent that any monopoly rents built into their profit margins without restraints are extended over a higher sales volume, if this is the result of the restriction in the Japanese market share.

Willig and Dutz, for the U.S., do not, as noted, assume any increase in domestic auto prices, but they do calculate (p.7) the

1985 pre-tax profit margin to be \$US 1,840 per car, and use this as their measure of the benefit accruing to the domestic industry from selling another vehicle.

This procedure does not seem satisfactory, since the gross markup includes 'normal' returns to the capital assets tied up in automobile manufacturing. What is a net benefit is any monopoly rent earned by the industry as a result of its market power -- that is, any profit margin over and above the competitive opportunity cost of the inputs required to make a car.

It is difficult to assign a value to these rents. It could be argued that, since the North American industry was in desperate trouble in the early 1980s, with Chrysler almost going bankrupt, and the other firms reporting very low or even negative profits, that the restraints were imposed on a situation in which prices were not adequate to supply any above-normal returns. Then, if we made the Willig/Dutz assumption of no restraints-induced price increase, it would follow that the domestic industry received no benefits from the restrictions on Japanese imports.

However, the poor profitability situation at the start of this period almost certainly had a lot to do with the very low capacity utilisation rates observed then. In Canada, for example, the utilisation rate fell from a peak of 90.7% in 1977 to just 51.7% in 1982, at the trough of the recession (see Table 7, Annex). Thus, if, as has often been claimed, the price structure of the North American industry embodies monopoly rents left over from its palmy days before the Japanese import threat developed, any expansion of demand would generate surpluses for producers, which should be counted as net benefits to them.

These rents likely are not all captured by the shareholders of the auto companies. U.S. auto wages are reported to exceed by 60% the all manufacturing average. This figure seems rather high -- in Canada the excess is only 20% [11] -- but, in both countries, it is probably true that labour has captured some of the rents extracted from North American consumers by the domestic auto industry, and that it has not yet seen all of these eroded by the relatively modest wage settlements of the last few years.

For purposes of calculation, we will use a figure of \$1000 per car as a measure of monopoly rents earned on marginal increases or decreases in domestic car production. This is about 8% of the average 1985 selling price, and is presumed to be divided between capital and labour in some, unknown, proportion.

Table 3 has the results. Look first at the effects of restraints on the number of North American-made cars sold ('domestic sales, units'). Under scenario B, domestic sales are actually lower with restraints in place -- 850,000 versus 889,000. This is because the domestic producers under this scenario go for higher profit margins per unit rather than

increased sales, matching the Japanese price increase 50 cents to the dollar. With a 0.25 domestic price response (scenario C) there is hardly any net effect on sales - 850,000 compared with 851,000. It is only under the conservative no-price-response Scenario D, under which all the Japanese price increase goes into a widening of the relative price differential between imports and domestic autos, that sales would actually have been lower without the restraints, by about 22,000 units.

Not surprisingly, the difference is predicted to be larger in the absence of Hyundai. Scenarios AH and DH on Table 4 reveal that, due to the large difference between Japanese import prices without and with restraints, the difference in domestic sales is about 44,000 units. Given that the US market is about ten times larger than the Canadian, this figure is quite consistent with the 300,000 to 700,000 domestic sales that Willig and Dutz believe to have been due to the U.S. VRS (p.7).

The tables also show the producer rents that result from restraints. Even though sales would be higher under scenario B than the actual 1985 figure, rents were \$600million more in 1985, on account of the higher price per unit. The corresponding figure under the more modest price response assumed in scenario C is more than \$200million, while with scenario D, under which no price response occurs, domestic producers gain only \$22million from restraints. [12]

Absent Hyundai, the difference with and without restraints under scenario D pricing assumptions would be about \$44million, assuming monopoly rents of \$1000 per car.

Thus, we come up with a rather wide range of estimates of the producer benefits from restraints, with these depending largely on the assumption made about the domestic price response to import price increases. On the basis of the evidence documented in the Annex, we expect that there was some increase in domestic markups, such that a reasonable figure for the resulting producer rents would fall in the \$200-300million range that straddles scenario C.

However, it is important to point out that the portion of the rents that turns up in profits will be captured over the border, given that all the domestic auto companies are American owned. Even the rents built in to above-normal wage rates will predominantly be harvested in the U.S., given that that is where most non-imports sold in Canada are built. (Conversely, though, Canadian auto workers would have gained from the US VRS.) [13]

Canadian dealers, of both domestic and imported cars, will have benefited from any price increases (some of which they would capture in the form of lower trade-in allowances, and easier-to-sell options), but lost from lower volume due to lower sales. We will follow Willig and Dutz in not attempting to assess quantitatively the net effect on dealers' profitability.

(d) Employment Effects

Willig and Dutz report data showing that there are about 0.04 jobs per car in the U.S. motor vehicle industry, and another 0.05 jobs/car in the parts industry (p.8). Then they make various adjustments to arrive at a figure of 0.04 for the total (assembly and parts) incremental jobs per car. That is, the marginal jobs/car ratio is less than the average.

Given that most domestic cars sold in Canada are made in the United States, it is entirely appropriate to apply this number to our scenarios. Table 3 shows that the impact of export restraints on employment under our three scenarios ranges from a loss of nearly 1600 to a gain of nearly 900.[14] These are not very large numbers, and, in any case, would be largely diffused through the enormous U.S. economy. We will make no attempt to calculate the adjustment costs attributable to employment changes of this size.

Note that, if the autopact constraint was operating tightly, then an increase in imports from the U.S. (encouraged by the Canadian restraints) would have to be matched, by the automakers, by an increase in their domestic output in Canada, so that the Canadian restraints would in fact lead indirectly to additional Canadian jobs.

The restraints may result in some indirect Canadian job gains, to the extent that they played a role in the decision of Toyota and Hyundai to build plants in Canada. Toyota's planned plant in Cambridge, Ontario is expected to eventually assemble 50,000 cars each year, and employ 1000 workers. [15] Hyundai is to build in Quebec a plant with a planned capacity of 100,000 units, and employing 1,200. [16] Honda is also building an assembly plant in Canada. It is not possible to apportion the credit for these investment decisions between factors such as fear of continuing or future export restrictions, keenness to qualify under the autopact, and any of the other commercial and political factors that may have entered into them.

Note that it is possible that Japanese direct investment will actually reduce total Canadian employment, if (a) it displaces Canadian production of American autos, and (b) the proportion of value added in Canada is less for the Japanese cars.

(e) Effect on government revenues

Since the Japanese administer the export restraint, they capture the rents from it. In principle, the same price and thus market share of Japanese imports in Canada could be achieved by the imposition of special tariff. This would have raised large sums of money for the Canadian government -- nearly \$300million, under scenario B on Table 3.[17] However, such a tariff would be illegal under the GATT, unless it could be proven that the Japanese were dumping cars onto the Canadian market and that the dumped cars were causing material injury to domestic producers.

As the situation stands, however, the restraints probably do not have a substantial net impact on the public sector budget position. Reduced Japanese imports means less tariff revenue [18], but any increased local activity will yield business and income taxes.

(f) Effect on Consumers

Consumers suffer from export restraints because these raise the price of Japanese imports and, possibly, of domestic cars, too. We have calculated the costs to consumers of restraints as the sum of the additional money paid in higher prices, on average, by those consumers who actually bought a car in 1985 and the 'consumer surplus triangle' gain that would be earned by consumers induced to purchase a new automobile had prices been at their no-restraint levels.

The figures are shown on Table 3. Naturally, consumer costs are highest under scenario B, with its large increases in both import and domestic prices attributed to restraints. The numbers range from about \$900million to \$200million. If Hyundai were absent (Table 4), consumers would benefit to the amount of about \$440million from the elimination of restraints.

Under all scenarios, the restraints cost consumers much more than they benefit domestic producers, so that, from the point of view of the North American economy, they are a costly means of protecting the domestic industry. From the point of view of Canada alone, they are even more costly, since, as noted above, most of the producer gains are captured over the border.

Nor do these costs have an impressive payoff in domestic jobs generated: under scenario B employment is actually lower with restraints; the middle-of-the-road scenario C generates virtually no net employment, and even the conservative scenario D produces few

than 1000 new jobs, mostly in the U.S. and at a cost to Canadian consumers of well over \$200,000 each. (The cost per Canadian job created must be much, much more -- over \$1 million -- given the small share of the Canadian market for North American cars that is supplied by Canadian plants).

The \$200,000 figure is in line with the various U.S. estimates of the costs per job of VERS in that country. Willig and Dutz offer a range of estimates from about \$100,000 to more than \$200,000 per job (p. 11). Tarr and Morkre, in their study for the Federal Trade Commission put the figure somewhat higher than \$200,000 (1984, p. 10), and Crandall offers the often-quoted estimate of \$160,000 per job per year (1984, p. 16). All of these estimates are in \$US, of course.

Our consumer cost figures will be underestimates to the extent that dealers allowed some of the excess demand for Japanese cars created by restraints to be mopped up through lower trade-in prices, fewer discounts from the list price, narrower choice of models and options, and longer waiting times. We have not tried to measure these factors, but there is plenty of evidence of their existence. [19]

In the other direction, the fact that restraints are specified as a restriction on the total number of imports, regardless of price per car, encourages importers to shift market shares towards more expensive models. It can be shown that this element of flexibility in the system allows a small efficiency gain, some of which accrues to consumers as a class (though not all sub-groups will benefit -- in particular, lower income consumers who tend to purchase cars at the bottom end of the price scale will do relatively poorly by this feature of restraints).

(g) Impact on non-price factors

The upgrading of imports into higher-priced lines is the most widely remarked 'non-price' effect of restraints. It is non-price in the sense that no inflation in the price charged for individual models need occur, although the average price paid for all Japanese imports will increase. (This is not the same as the 'average price' shown on tables 3 and 4, which is an average taken across Japanese, domestic, and Korean cars, on the assumption that the model mix within each country's total supply is unchanged).

Some evidence on the extent of upgrading in Canada over the restraint period is shown on Table 5:

Table 5: Changes in Unit Values and Price, 1980-85

	% change domestic	unit value Japanese	% change CPI (autos)
1980-81	13.9	18.1	11.5
1981-82	6.3	11.6	4.7
1982-83	8.1	9.9	3.9
1983-84	5.2	17.7	4.1
1984-85	9.9	4.8	4.1

Sources: unit values calculated from Table 1; consumer price index for automobile purchase from Statistics Canada 62-010.

This table does show increases in unit values (which are affected by moves up-market) substantially larger than the increase in the CPI for automobile purchase, which is calculated holding the mix of models constant, and thus is consistent with the hypothesis that the restraints induced Japanese importers to shift supply to relatively high-priced models. It should be noted, though, that a continual drift upmarket has probably always been a feature of the North American auto market, interrupted perhaps by the sudden shifts in tastes towards smaller cars that followed the big OPEC price increases in 1973 and 1979.

Thus we see on table 5 that unit value increases of North American-made cars also outstripped the CPI, though by less than did the Japanese. It is also interesting to note the sharp decline in the rate of growth of Japanese cars' unit values in 1984-85. This could well reflect a moderating of price increases under the pressure of the surge of Hyundai imports.

(h) Impact on market structure and the competitive process

There are several factors to be considered here:

-- by essentially eliminating the important distraction of battling for market share, restraints may have aided Japanese and domestic car makers better deal with their oligopolistic interdependence, so as to coordinate on pricing at the expense of consumers and the competitive process. We have calculated the possible costs of this (and noted the pro-competitive influence of the arrival on the scene of Hyundai).

-- by encouraging direct investment in Canada by Japanese companies and Hyundai, either to get around the current restrictions or to forestall their future imposition, restraints may have helped increase the number of producers operating behind the tariff wall in Canada, and thus increased the degree of competition in the Canadian market.

-- Willig and Dutz point out that the Japanese Ministry of International Trade and Industry (MITI) originally allocated

quotas for exports to the U.S. under their VER scheme on the basis of existing market shares, thus favouring established suppliers and preventing smaller Japanese automakers from increasing their access to the U.S. market. This is, in effect, a barrier to entry, which would have had an anti-competitive effect on the degree of competition. We understand that the Canadian restraints have been administered in the same way.

--Willig and Dutz also claim an anti-competitive effect due to the restriction of Japanese market share having reduced the incentive for domestic manufacturers to counter the import threat by improving the attractiveness of their own products. Against this, though, it could be argued that the demonstration effect of Japanese plants setting up and operating in North America may eventually point the domestic industry towards bringing their own cost performance into line. In particular, the substantial wage premia won by the United Auto Workers over the decades of North American autarky may not survive competition with Japanese plants building and selling cars in North America with lower labour costs.

It is not possible to make a confident prediction of the net impact on competition and efficiency of the restraints. While their short-run effect is likely to be a reduction in the degree of competition in the Canadian market, we cannot rule out beneficial consequences from the long-term implications of Japanese (and Korean) direct investment in Canada.

(i) Adjustment impacts

The points made in (h) above apply here. While the restraints may have given the domestic industry some temporary relief from the pressure to learn how to build and sell small cars able to compete with imports, it is not likely that the added incentive for the Japanese to come in and do the job themselves, by building plants in North America, will make life more comfortable for North American automakers and their union in the long run.

Willig and Dutz claim (p.15) that VERS stifle dynamic adjustment to a more viable market structure, but also that the 'breathing space is only short-lived'. But if the domestic industry knows too that the breathing space is temporary, it is not clear why they will not push ahead at once with the necessary long-term adjustments. It is also debatable that they would have been able to easily finance on capital markets the enormous investments required without the relief to their very poor cash-flow situation of the early 1980s that the restraints (along with the general recovery in demand) gave them. Thus, export restraints may have helped the domestic industry move towards a more viable long-term position. An extreme scenario is that they saved Chrysler, and even perhaps Ford, from bankruptcy, with its consequent sizeable adjustment problems.

(j) Effect on investment

We have noted, without providing any hard supporting evidence, the possibility that restraints may have been a factor in the recent decisions of several Asian car-makers (Toyota, Honda, Hyundai), to build manufacturing plants in Canada.

In this context, Willig and Dutz note (p.16) that replacing Japanese imports with 'Japanese' cars made in North America is not necessarily a good thing if the latter are produced at higher cost than imports could be bought for. They do, however, admit the possible beneficial demonstration effect on domestic producers.

To this qualification we add three points: (a) in economies with underemployed resources, especially labour, import replacement, even at higher cost, can still be socially beneficial; (b) import replacement, by reducing the amount of exports required to balance trade payments, should improve a nation's terms of trade -- reducing in real terms the price it pays for all its imports; (c) there is a 'second-best' argument for restraints, noted by Krugman (1984). To the extent that autoworkers earn monopoly rents, domestic production costs are above the social opportunity cost of the inputs, so that price is too high, resulting in socially sub-optimal output. Thus the restraints on Japanese exports to North America, by increasing the demand for the domestic product, could have improved, on balance, the allocation of resources.

(k) Effect on other sectors of the economy

The Canadian automobile manufacturing and parts industry contributes about 2% of the country's Gross National Product. [20] A major policy affecting this industry could have significant indirect effects on other industries, especially the important automotive suppliers such as the steel, plastic and textile industries.

(l) Effect on other countries

Export restraints negotiated between Canada and Japan are hardly likely to be complained about by other countries, since they offer other suppliers (such as Hyundai and Volkswagen) an excellent opportunity to increase their market share. As for the effect on Japan itself, this depends on the tradeoff between lower sales and higher markups per unit. Our model does not tell us how this tradeoff nets out, since it does not include any information on the profit margins earned on Japanese imports. At least one economist who has analysed the U.S. VERs believes that

the Japanese have, on balance, benefited from them, and are quite happy to have them continue. [21]

(m) Public and private foreign reactions

Willig and Dutz (p.18) refer to a 'demonstration effect' that followed the U.S.-Japan voluntary export restraints, in which they include the Canadian restraints (although these were actually imposed at about the same time), along with a number of agreements reached by Japan with various European governments. We have no information to suggest that the Canadian situation has had an independent effect on other countries' policies. No doubt the experience that Canada, the U.S., and other economies have had with 'voluntary' trade restrictions will add complexity and interest to the forthcoming reopening of the General Agreement on Tariffs and Trade.

4. The Impact of other Canadian Automobile Industry Policies

In this section we will examine the performance of the other major policies identified in section 2. We will look first at the Canada-U.S. autopact, and the associated impact on the market for new North American-made cars; then at the prohibition on imports of used vehicles; and, finally, at the tariff structure applied to imports from countries not qualifying under the autopact.

4.1 The autopact and the market for new cars

In his survey of the autopact, Moroz wrote that its longevity:

'does not reflect its on-going usefulness, but rather the inability of the two signatories to reach a mutually better arrangement.' (1983, p.1)

Be this as it may, the last two years, at least, have been very profitable for Canadian participation in the pact. In 1984 Canada's trade surplus with the U.S. on automotive products was nearly \$6 billion, on exports of about \$30 billion. [22] Although some of this was no doubt due to the luck of being a major supplier to the North American market of the resurgently popular 'full size' cars and the new 'minivans', the surplus probably also reflects underlying fundamentals of relative production costs between the two economies.

It has been reported that Canadian wage rates are such that, at current exchange rates, a Canadian auto assembler earns \$7.50/hour less than a U.S. worker. This translates into about \$1,000/car (assuming 140 hours per car). [23] Even with exchange rate parity there would still be a \$2.50 Canadian wage cost advantage.

The outcome is that the production-to-sales ratio safeguards built-in to the autopact are currently inactive -- the American car companies are choosing to make more vehicles in Canada than the pact requires of them. This situation may be of particular interest in the context of the forthcoming negotiations on bilateral free trade.

What would be the implications for Canadian consumers of true free trade across the Canada/U.S. border? It appears to have always been the case that the U.S. auto manufacturers used their control over their retail dealers on both sides of the border to set different prices in the two countries. Before the autopact, when Canada produced all or most of its own cars, in relatively small plants, this was easily justified by the cost differential. But it is interesting that the dual price

structure has survived the post-autopact rationalisation of the industry. We regressed the annual percentage change in the Canadian consumer price index for automobile purchase (DCPIA) first on the annual percentage change in the U.S. wholesale or factory price index (DUSWPA), and then on the Canadian factory price (DCWPA), using annual data for the 1971-85 period. The results were:

$$\begin{array}{llll} (1) & \text{DCPIA} & = & 2.18 + 0.714\text{DUSWPA} & R^2 = 0.45 \\ & & & (1.5) & (3.3) \\ (2) & \text{DCPIA} & = & 1.44 + 0.844\text{DCWPA} & R^2 = 0.95 \\ & & & (4.1) & (16.7) \end{array}$$

(t-statistics in brackets)

The statistical fit of these equations was able to be improved somewhat by adding variables for exchange rate changes and changes in the unit values of Japanese imports, but their major implication was not affected; namely, that Canadian retail prices for automobiles are much more closely related statistically to Canadian factory prices than to U.S. factory prices.

The reason that this is interesting, of course, is that most (more than 80%) of the North American cars bought in Canada are made in the United States, so that their prices at retail might be expected to follow wholesale prices in that country, not the prices of vehicles coming out of Canadian plants and being mostly exported into the U.S. market. It seems that the industry sets Canadian prices more on the basis of 'fairness' than on the actual costs of the cars we buy, using our productivity at producing vehicles for the U.S. market as the norm for what Canadians are asked to pay.

If this interpretation is correct, we would expect that new domestic cars would currently be cheaper in Canada than in the United States, given that our costs are now lower, as noted above.

Such is indeed the case. The first column of Table 6 gives retail prices in Canada and the United States for three popular North American models, as well as for two Japanese and one German make, in \$Canadian.[25] Prices are in all cases markedly lower in Canada, despite the 10% manufacturers' sales tax applied here but not in the United States.

Table 6: New and Used Passenger Car Prices
Canada and U.S., 1980-1984, 1986
in Canadian Dollars

Model		1986*	1984+ (n)	1983 (n)	1982 (n)	1981 (n)	1980 (n)
K-car	Can.	8051	7631 (7)	6520 (12)	5557 (17)	5193 (10)	-
	U.S.	10187	7826 (13)	6798 (9)	5036 (8)	4382 (11)	-
Chevette/ Acadian	Can.	6295	5547 (7)	5556 (5)	4845 (4)	3730 (10)	3139 (34)
	U.S.	7790	6279 (4)	5110 (6)	4122 (8)	2822 (13)	2281 (12)
Mustang	Can.	8837	11670 (2)	8928 (10)	6497 (8)	5683 (13)	4876 (13)
	U.S.	9919	11647 (8)	11629 (12)	7655 (8)	5675 (9)	4671 (15)
Corolla	Can.	8798	8523 (6)	7588 (6)	7224 (9)	6194 (12)	5589 (5)
	U.S.	9946	9830 (7)	7452 (7)	6494 (13)	5904 (12)	4892 (11)
Accord	Can.	12165	10106 (11)	8790 (12)	7168 (16)	6358 (11)	5299 (8)
	U.S.	15800	11727 (12)	9982 (13)	8647 (16)	7001 (12)	6100 (12)
Rabbit total:	Can.	8950	11420 (16)	8697 (5)	7524 (7)	6014 (10)	5379 (14)
	U.S.	9481	9761 (13)	8139 (7)	5662 (9)	5034 (10)	4219 (13)
cv.:	Can.	-	12618 (10)	-	10495 (2)	8375 (2)	8831 (2)
	U.S.	-	15111 (1)	-	-	9653 (1)	8273 (1)
non-cv.:	Can.	-	8785 (6)	-	6350 (5)	5423 (8)	4804 (12)
	U.S.	-	9315 (12)	-	-	4521 (9)	3882 (12)

- 24 -

where cv. = convertible

* base prices

Canada: Financial Post Magazine, Nov. 1 1985.

U.S.: personal communication with Seattle
car dealers.

+ average used car prices (model years 1980-1984)

from classified advertisements August through
October 1985.

Canada: Vancouver Sun Saturday editions.

U.S.: Seattle Post-Intelligencer Saturday editions,
Seattle Daily Times Sunday editions (August).

(n) = number of observations

It might be asked why American consumers do not turn up in Canada en masse and arbitrage away the price differential, given the low rate of duty payable on new cars imported to the U.S. (about 2.5%). A reason sometimes offered is the more stringent emission control equipment required on cars driven in the United States, and there are reports of some low-volume models which are sold in Canada equipped to U.S. standards being bought here by Americans and then imported into the United States. [26]

However, other cars can be 'retro-fitted' with U.S. standard equipment and the major block to large-scale arbitraging appears to be simply that the U.S. auto companies virtually forbid, it, taking advantage of their control of retail dealerships and franchises, to protect U.S. dealers. Devices such as an "emission label" not available on vehicles sold in Canada help the auto companies enforce this balkanization of the North American market (to the present advantage of Canadian consumers, since arbitraging would presumably result in the Canadian price being increased to the U.S. level, rather than vice versa). [27]

In general, exclusive dealerships are likely to reduce competition between makes, and set up a barrier to entry to new makes, by requiring an entrant to build a network of dealers from scratch, rather than being able to persuade existing dealers to add the new model to their inventory.

However, a determined manufacturer with an attractive product can still enter successfully, as Hyundai has demonstrated. It is reported that three hundred candidates applied for the forty-nine Hyundai dealerships set up in 1983, each with \$200,000-\$500,000 in initial investment. [28]

Thus, introducing genuine free trade in new automobiles between Canada and the United States -- that is, allowing individuals and dealers to buy across the border -- would not lead to disruption of the Canadian market, given the present structure of prices and costs. (Such a policy might, however, harm the consumer interest, if it induced the auto companies to give up their special Canadian formula and set prices at parity!)

4.2 The prohibition on used car imports.

Unless there are shortages, the prices of late-model used cars obviously cannot get far out of line with new car prices. Thus we should expect that the Canada/U.S. new car price differential would show up too in used car prices. To test this, we collected data on asking prices for the six popular models shown on table 6 from Seattle and Vancouver newspapers. Our samples were not very large, so some randomness is to be expected, but it appears to be true that used car prices tend to be lower in Canada, although the differential is not as large as for new prices, and disappears altogether for some older models.

Thus, relaxing the fifty-year old prohibition on imports of used cars would not lead to a flood of second-hand American vehicles ruining our new-car trade and forcing everyone who owns a car to write-down its asset value. There would be some arbitraging, no doubt, but no large movements. Correspondingly, the benefits from allowing used car imports would not be enormous. But it would make our automobile market 'thicker', and thus more competitive, especially in border areas, and it would be useful to buyers searching for rare (and/or rust-free) models.

4.3 The tariff structure

Finally, we look briefly at the implications of the tariff structure that now applies to non-autopact vehicles. Under the agreement signed at the last round of the GATT, Canada has been reducing the tariff it imposes on most Japanese and European imports, from 12.1% in 1983 down to 9.2% in 1987. In the meantime, Hyundai takes advantage of Korea's developing nation status, and enters at the 'general preferential tariff', currently set at zero, though due to be raised to about 6% on January 1, 1987.

Does this tariff structure benefit Canadian consumers? To answer this we need to know who pays the tariff. European imports, to which we have not paid much attention in this study, tend to be relatively up-market, expensive cars, and probably are priced on a cost-plus basis, with the tariff added on to the price. In this case, the Canadian consumer bears the incidence of the tariff (and the Canadian taxpayer benefits from it).

But the situation may be rather different for Japanese cars. In the Annex we argue that Japanese pricing strategies are very much 'market oriented' -- that is, designed to achieve certain market share goals. This means that they may absorb all or a large portion of any tariff, rather than pass it on and lose market share. If so, then two policy recommendations follow:

(a) it is certainly not in Canada's interest to reduce the tariff imposed on Japanese imports, since this provides revenue for the government at little or no cost to the consumer in higher prices. In essence, the situation is that Japan is a low cost supplier, and earns rents from its position by selling into the North American market with its higher price structure. Our tariff is simply an instrument for capturing some of those rents in Canada. Indeed;

(b) in theory, it would probably be advantageous to increase the tariff by a substantial amount (until the tradeoffs with domestic allocative efficiency outweighed the rents captured). But this is impossible under GATT rules, and rightly so. However, a less obtrusive alternative is to allow a low-cost close substitute into the Canadian market duty-free, and so force the Japanese to price down to meet the competition. This, of course, is just the role currently being played by the Hyundai.

That is, our reasoning (supported by the simulation results reported in section 3) leads to the conclusion that it is not only the people who buy Hyundais, but import owners at large, who have benefited from its low price.

Of course, Hyundai's price advantage will likely eventually be eroded as Korean wages increase with economic growth (and probably as a result of their production in North America, too). But there should soon be another generation of low-cost automobiles appearing on the market (from Taiwan, for example?).

Footnotes

1. Blomqvist and Haessel (1978, p. 487 n. 26) took 'the total number of cars in Canada to be about 8 million', a figure which has probably increased since they wrote. A common industry rule of thumb is that the existing stock of automobiles is around ten times normal average new sales (United Nations, 1983, p.7).
2. The net trade surplus in automobiles and parts was \$5.8 billion in 1984 (Toronto Star, March 16, 1985, p.D1). In the ten month period up to the end of October, 1985, the surplus was still comfortably positive, though about \$1 billion below the figure for the same period in 1984 (Globe and Mail, January 23, 1986).
3. The Canadian dollar traded at around par with the \$US for most of the 1970s, but currently buys only about 71 U.S. cents.
4. In Australia, General Motors builds the indigenous 'Holden' for the local market. The possibility and desirability of building what some have called the 'Beaver' (the Canadian Car) was examined by the leading architect of the Autopact, Simon Reisman, in his 1978 report on the industry.
5. Toyota are building a plant in Cambridge, Ontario, with an expected eventual capacity of 50,000 small cars a year. Although production from this plant is likely to be less than total Toyota sales in Canada (currently around 55,000 annually), the company apparently hopes to put itself in a position to qualify under the autopact by the very simple device of operating the plant 'independently' of its importing arm. Toyota are definitely aiming at 50% domestic content for parts, which would earn it duty-free access to the U.S. market, under that country's rules. See articles in the Globe and Mail, December 13, 1985, p.B9, and the Financial Post, December 21, 1985, p.18. A good history and analysis of the autopact is given by Moroz (1983).
6. See Royal Commission, (1956).
7. This exemption is in fact made superfluous by the provision in the customs code for importing cars at least fifteen years old as 'antiques or collectors' items'. The other main exemptions are for immigrants and Canadian residents who have lived somewhere else for a year, or who have been absent for at least six months and have owned the vehicle for at least six months.
8. The United States in effect prohibits the importation of all but old (pre-1968), or very valuable cars (worth the expensive conversion job required) through its stringent emission control regulations. But the US domestic used car market is so huge that this limitation on imports is not likely to have a significant effect on market performance.

9. Press release by The Honourable Sinclair Stevens and the Honourable James Kelleher, July 3, 1985.

10. Hyundai claims that dutyfree access is worth about \$300 a car (Financial Post, December 28, 1985, p.18).

11. For the U.S., the source is Crandall (1984); for Canada, we calculated the differential from Statistics Canada Census of Manufacturers data.

12. Equal to the change in sales (22000) times the assumed per unit monopoly rent of \$1000. It is easy to recalculate these figures using another number for monopoly rents.

13. In 1983, the Canadian industry produced 851,426 passenger cars, of which only 102,544 were for sale in Canada (Statistics Canada, 42-219, 1983). Employment in the Canadian industry (including parts manufacturing) fell from 105,000 in 1979 to 84,000 in 1980. It has since recovered to 114,000 in 1985 (all figures for July, and from Statistics Canada 72-002, various issues).

14. The table shows the change in jobs going from the actual 1985 (ie, with restraints in place) situation to the hypothetical no-restraint scenario. It is useful to document the imbalance in types of cars traded between Canada and the United States under the autopact:

Table: Canada/U.S. trade in cars (incl. minivans)

	units imported	units exported
less than 100 cu. ft.	98,340	86
100-110 cu. feet	172,959	151,950
110-120 cu. feet	167,503	309,910
more than 120 cu. ft	52,994	167,885
station wagons	79,222	319,917

(for ten months to end-October, 1985. Source: Statistics Canada, #65-004, Table 3)

These figures reflect Canada's concentration on the production of larger cars and minivans (which are included as 'station wagons').

15. Globe and Mail, December 13, 1985, p. B9

16. Financial post, November 23, 1985.

17. Calculated as the difference in price between A and B (about \$1,500 per car) multiplied by actual 1985 units sales (about 195,000).

18. At around \$750/car in 1985, a reduction in imports of 50,000 cars would reduce tariff revenues by \$37,500,000.

19. For example, the Globe and Mail reported delivery times for Japanese cars of up to four months, as well as the drying up of discounting and option giveaways (Jan. 25, 1985).

20. In 1983, total value added in the motor vehicles (SIC 3231) and part and accessories (SIC3250) industries was about \$8billion, whilst Canadian GNP in that year was \$390billion.

21. See Crandall (1984, p.16) . If the Japanese markup was about \$2000/car before VERs, and \$3000/car after, the higher profits per car sold would easily compensate for the loss of profits on the cars not sold because of the restraints. However, the distribution of these profit across the Japanese automakers is very uneven because of the way the restraints have been applied. In particular, it would appear that established suppliers have been favoured at the expense of smaller Japanese automakers.

22. Toronto Star, May 11, 1985. The autopact surplus would have been even higher without VERs, since these will have encouraged additional imports of compact and sub-compact models made in the United States.

23. ibid.

24. However, the autopact is nowhere near as important to the Americans as it is to us. Huncker's large book on the U.S. auto industry does not include the words 'Canada' and 'autopact' in its index.

25. Actually, the Volkswagen Rabbit is now made in the U.S., and so may qualify as a domestic make.

26. Corvette, Cadillac and Mercedes were three such models named in a Globe and Mail story (July 23, 1984).

27. See 'Ford bars truck sale to Alaskan', Vancouver Sun, February 25, 1986.

28. Financial Post, December 28, 1985, p.18.

ANNEX

A.1 Introduction

The purpose of this Annex is to document the model used to generate our predictions of the impact of the VERs, with and without Hyundai. In section A.2 we report a literature review which leads to the values chosen for elasticities of demand in the model. Section A.3 deals with the assumptions made about cost conditions in the auto industry, and section A.4 makes use of this and other information to formulate a hypothesis about pricing practices in this oligopolistic industry. Finally, section A.5 sets out the mathematical equations of the model, and explains the source of the actual-1985 data used to calibrate the 'base case' solution against which no-VER scenarios are compared.

A.2: Demand Elasticities

Trade policies such as tariffs and quotas affect the prices of automobiles, which, along with tastes and incomes, determine consumer demand. In order to predict the impact of changes in these policies we need information on the relationships between prices and demand. This information is usefully summarized by means of elasticities, measuring the percentage response in the quantity demand of a commodity that is induced by a one percent change in the price of that or another commodity.

There have been quite a large number of estimates published of demand elasticities in the North American car market, mostly focusing on the U.S. segment of this market. Having several sources of estimates is not, of course, an unmixed blessing. As Hunker notes:

'In general, the estimates of elasticities produced by various studies are difficult to compare or evaluate because they are based on quite different data sets and variable definitions. The range of uncertainty associated with these estimates of elasticities is quite large.' (1983, p.109)

The matter is further complicated by the slow, but cumulatively radical, change in the tastes of North American car buyers that has taken place over the past two decades. Whereas the automobile markets of the rest of the world and North America were once virtually distinct, due to the latter's taste for very large cars, the bridgehead established in the 1960s by the Volkswagen 'Beetle', and widened over the next decade with the impact of OPEC and the increasing availability of attractively priced Japanese cars, has now broadened to the extent that, to many consumers, it is the European or Japanese product that is 'normal', and the so-called 'standard-sized' American automobile

that looks out of place.

The complication is that the effects of this massive change in consumer attitudes cannot yet be regarded as complete. Given the durability of automobiles, it takes many years for a change in buying patterns for new cars to fully affect the stock of used vehicles (which we have noted to be around ten times annual new sales), and so filter through to all the economic and demographic groups who enter the auto market at different price levels. In particular, the lifetime purchasing habits of car buyers are likely to be strongly influenced by the vehicles they first own or drive regularly, and these tend to be the cheapest cars, at the tail end of the age distribution.

Therefore, the surge in demand for Japanese cars that occurred in the early 1980s may be the forerunner of an even larger permanent shift in market shares towards smaller cars, as these vehicles work their way through the age distribution. The expected arrival, towards the end of the 1980s, of attractively specified and priced small cars from the North American producers may, in the short run, put a dent in Japanese sales, but, over the longer term, is likely to help sales of all suppliers in this segment of the market, by further legitimising in the eyes of the North American consumer the integration of their purchases into the pattern of the rest of the world. The highest of the without-VER scenarios considered by Willig and Dutz for the U.S. incorporates an International Trade Commission estimate that the Japanese market share would have increased from 21 percent in 1980 to 28 percent in 1984 (1985, p.5).

Thus the results of comparative statics exercises such as this (and other) studies cannot safely be extrapolated very far into the future, since we do not attempt to model the long-run trends that are slowly changing the market.

Given this caveat, however, there is a good deal of information in the literature on how to specify demand elasticities over the short to medium term. We will look in turn at elasticities for the total market, for Japanese cars, for domestic (North American-made) cars, and for the Korean Hyundai. The level of disaggregation -- into just three sources of supply -- is justified partly on the grounds of simplicity, partly because of similarities within, and differences between these sources of supply with respect to the characteristics of the product, and partly because of the evidence, to be presented below in section A.4, that this is the appropriate level at which to study the industry's pricing behaviour.

(1) Total market elasticities

The total market price elasticity measures the effect on the total number of cars sold of an equal percentage change in the prices of all makes and models. There is a clear consensus that the most reasonable value to use for this elasticity is -1. As

Huncker puts it:

'Studies have generally estimated the price elasticities of demand for new cars as a whole to be in the neighborhood of -1.' (1983, p.109)

The studies that we have surveyed which use or recommend this figure include Crandall (1984, p.16), Tarr and Morkre (1984, p.62, using an estimate by Toder), and Gomez-Ibanez et al. (1983, p.212. They justify it as an industry 'rule of thumb'.) A survey in Australian Economic Papers (June 1984, p.50) of six econometric studies found a median market price elasticity of about -0.7. Given that measurement and other errors are likely to bias econometric estimates towards zero, this finding should probably be considered quite consistent with the use in models of the -1.0 figure that has generally been favoured.

Although none of the studies cited above were directly concerned with the Canadian market alone, it is reasonable to assume that consumer incomes and tastes are sufficiently similar here and in the United States to justify using -1 as the total market elasticity in the present study.

(2) Price elasticity for Japanese cars

We need estimates of own-price elasticities -- the effect on the demand for a particular make or group of makes if its price changes while the prices of other makes remain unchanged. For individual segments of the market there is less information and unanimity than for the total market.

For Japanese cars, Tarr and Morkre again use Toder's estimate. This has the relative Japanese/domestic market share elasticity with respect to a change in relative prices set at -2, which implies an own-price elasticity for Japanese autos a little smaller than -2 (given actual market shares). Willig and Dutz (1985, pp19-20), however, prefer a figure of -3 (which is also in line with the estimate used by Gomez-Ibanez et al.), and Huncker settles on a range of -2.5 to -3.5 (1983, p.109).

With Japanese market shares around 20% of the market, and a total-market elasticity of -1, a figure of -3 seems quite reasonable, and we will use it here. It is also fairly consistent with a 1978 Canadian econometric estimate that the price elasticity for all 'small cars' is -2.3 (Blomqvist and Haessel, 1978).

(3) Price elasticity for domestic cars

We will follow recent U.S. studies (Huncker, Gomez-Ibanez) in lumping together European and North American-made cars, into one category, called 'domestic'. The reason for doing this is simply

analytical convenience, the cost of which, in loss of accuracy, is likely to be low, because (a) the share of European cars in the Canadian market is now only about 5 or 6 percent; (b) many European imports are from up-market marques such as Jaguar, BMW, Mercedes, and Volvo (the last-named being assembled in Canada, in any case), which probably remain closer substitutes for North American luxury cars than for imports from other sources; and, (c), the leading European importer is Volkswagen, who now have a large plant in the United States, and so can reasonably be categorised as a North American producer.

However, we do not have a ready-made elasticity estimate to apply to this sector of the market (Huncker breaks it down into four segments -- small/large and basic/luxury). Given that domestic cars take about 75% of the Canadian market, the figure chosen cannot be much bigger than the -1 estimate used for the total market elasticity. In this study we set the own-price elasticity for domestic cars at -1.5. Again, this is fairly consistent with Blomqvist and Haessel's Canadian econometric estimates -- they find a 'large car' price elasticity of -1.25.

(4) Price elasticity for Hyundai

Given the phenomenal changes observed in the share of Canadian market taken by the Korean Hyundai -- from zero in 1983 to about 2% in 1984 to 7% in 1985 -- it would be premature to expect to find a secure estimate of the price elasticity of demand for this make. However, its elasticity is likely to be higher than those of other segments of the market (with much larger market shares) -- in particular, our category of all Japanese cars. We will use a figure of -5.

A.3 Costs

We need information on two dimensions of the cost structures of manufacturers of cars sold in the Canadian market. First, we need to know about the relative levels of United States and Japanese production costs, in order to plausibly specify pricing behaviour in the automobile market. And, second, we need estimates of how unit costs change with changes in output, in order to allow for any changes in the cost structure, and thus in prices, that might accompany changes in market shares due to tariff changes or lifting of VERs. In this section we deal with each of these dimensions in turn.

(a) Relative Japan/U.S. cost levels

There is widespread recognition that the Japanese companies produce small and compact cars more cheaply than the United States plants which are the main suppliers to the Canadian market, under the autopact, of domestically made vehicles in this class.

There is not a perfect consensus on the magnitude of the cost differential. Crandall uses the range \$1300-\$2500/car (1984, p.11); Huncker uses a Dept of Transportation estimate of \$1250-\$2000 (1983, p.26); the U.S. ITC puts it at \$1500-\$2000 (1985, p.12); Gomez-Ibanez and Harrison (1982) prefer a somewhat lower range -- \$800-\$1000.

We are not concerned here with making an independent assessment of the cost differential, or even with analysing the reasons for differing estimates (which sometimes reflect differences in the year chosen for comparison). What we can do is claim that the Japanese are clearly the low-cost supplier in the North American market (possibly excepting smaller sellers such as Lada or Hyundai), with a differential that almost certainly is a sizeable proportion (say, around 10%) of the average retail price of the cars.

It may be of interest to break down the differential into its major components. The USITC (1985, p.12) report a study which gave the Japanese productivity advantage for a sub-compact car as \$1640, to which should be added the Japan/U.S. wage differential, worth \$550, and from which is subtracted shipping costs of \$480/car, to get a net landed-in-the-US-market cost advantage of \$1710. They note as well that, although Hondas have apparently been about \$500 more expensive to build in Ohio than in Japan, the US-built product is still more than \$1000 cheaper than the domestic competition.

(b) Changes in costs with output

Do unit costs/car increase or decrease as output increases? Studies based on 'competitive' assumptions tend to draw supply curves upward-sloping, implying increasing marginal costs. For example, Toder uses a supply elasticity of 10, implying a gently upward-sloping marginal cost curve.

However, the empirical evidence points strongly to the conclusion that the industry operates under conditions of increasing or, at least, non-decreasing returns to scale. Huncker, who tries a range of supply elasticities, admits that assuming a perfectly elastic supply curve 'most closely corresponds with historic industry pricing patterns' (1983, p.136).

In econometric work on the U.S. industry, both Friedlander et al. (1983, p.14), and Chang (1983) get results implying approximate long run constant returns to scale. Crandall uses, without explanation (1984, p.16), an employment-output elasticity of 0.7, which implies increasing returns to scale, given that the elasticity of the other major input -- materials -- is likely to be close to one. Willig and Dutz (1985, p.8) cite a Congressional Budget Office study with an incremental job/car ratio of 0.04, which compares with an average ratio of 0.09, and thus implies quite strongly declining marginal costs (some but not all of the difference is because the large number includes some workers making trucks and parts).

Thus it seems quite safe to conclude that any price increase of domestic autos associated with an increase in sales due to demand-switching effect of the VERs on Japanese imports was not due to increases in marginal costs. As one further piece of evidence, note, with Willig and Dutz (p.21, n9) the extremely low capacity utilisation rates in the U.S. industry at the time that the VERs came into effect (65% in 1980, 67.8% in 1981, 54.6% in 1982; compared with 82.9% in 1979 and 86.8% in 1984).

As for the Japanese, one report claimed that their auto industry had 2million units of excess capacity last year (Toronto Star, February 22, 1985). There were apparently some differences in the situations of individual firms, with Honda having the least spare capacity (also, with its U.S. plant, being quite happy with the VERs), and Toyota the most, but, with Japanese exports to Canada representing about 2 percent of the annual production (which normally exceeds 10 million vehicles), it is quite safe to assume that any plausible increase in sales to this country could be supplied without forcing up Japanese marginal costs.

A.4 Pricing

Changes in trade policies work through changes in market prices to alter sales and market shares. It is therefore crucial for the purposes of our study that we formulate an empirically well-grounded model of industry pricing behaviour.

We will follow the practice of U.S. studies and make the attractive (from the point of view of analytical tractability) assumption that the Japanese and North American industries can each be considered as single units from the point of view of their pricing practices. Although we do not (and nor has anyone else, so far as we are aware) attempt to rigorously defend this assumption with, for example, a successful econometric study of pricing behaviour, it is plausible on two grounds: (a) the differences within the Japanese and the North American auto industries, with respect to product specification, costs, and 'corporate culture', seem fairly clearly to be rather smaller than the differences between the two groups; (b) our literature search, which included academic journals and print journalism, satisfied us that economists who have studied this market, and members of the industry, find it valid and useful to talk in terms of 'the Japanese' and 'Detroit', when discussing the implications for pricing of trade policies and other developments.

As noted in section A.2, we have, for convenience, lumped-in European imports with the domestic industry. However, we cannot usefully bury the Korean Hyundai in some other segment, since, as is documented below, its role in the Canadian market has been both important and quite different from either of the North American or Japanese 'players'.

We proceed by looking in turn at the pricing practices of the Japanese, the domestic industry, and Hyundai.

(a) Japanese pricing in the North American auto market

Although with only around 20% of the market in the United States and in Canada, the Japanese are in a strong market position in both countries. This is for two reasons: first, they offer products -- well-made and well-equipped compact and sub-compact cars -- which are increasingly popular with North American consumers (as noted in section A.2), and, second, they are able to produce these automobiles significantly more cheaply than can the North American car companies (section A.3).

These factors make it plausible that Japan is now the price leader in the North American market -- that it can choose the industry price structure that best suits its interests, because it has the power to discipline any Detroit-led disruption of prices by undercutting domestic car prices. Although, as we shall

note below, there are political constraints on the freedom of the Japanese to lead the market, the idea that they are now the dominant force in setting prices is supported by a number of U.S. experts, including Gomez-Ibanez et al., and Huncker, who writes that

'the assumption of Japanese price leadership reflects the developing realities of the U.S. market.' (1983, p.120)

The political constraint is the threat of restraining action by North American governments should the Japanese proceed too aggressively to undercut domestic prices and erode the domestic share of the market. The VERs are, of course, vivid examples of such political intervention, spurred when events outside Japan's control (the second oil-price hike followed by the massive recession of the early 1980s) combined to push Japanese sales to well above 20% of a shrinking total market.

Thus we will assume in our model that prices of Japanese imports are set to yield a target market share, given elasticities of demand and the likely response of the domestic industry.

How large is the target? Under the present VER regime, it is set at about 18% of the Canadian market (although the actual market share has been closer to 17%). Without VERs, the target would be, we assume here, set at 21% -- that is, at a little less than the average market share achieved over the 1981-83 period, before the VERs began to bite in earnest (higher without Hyundai -- see section A.5). Such a market share would not be likely to provoke reimposition of restraints in today's more buoyant auto market (with total sales up by more than 50% from 1982 to 1985 -- see Table 1 in the main text of this paper). Indeed, the assumption of pre-VER market shares may be rather conservative, given the signs of a continuing structural shift of consumer tastes towards the Japanese product. Willig and Dutz use the U.S. evidence of trends in demand to forecast a post-VER Japanese market share of as much as 28% -- well above the pre-VER peak of around 21% in that market (1985, p.5).

Reinforcing the Japanese wariness of provoking political intervention may be the 'live-and-let-live' dimension to their business culture -- a distaste for forcing the competition out of business completely. Such may be behind, at least in part, the restraint of the Japanese car makers in entering the highly vulnerable (because high-cost) British market (see Ashworth et al., 1982).

A testable implication of our model of Japanese behaviour is that prices of their cars in North American should vary in response to factors in the North American market, rather than because of domestic Japanese events, such as changes in costs. In support of this are two bodies of evidence:

-- the very large differences in prices between Japanese cars sold in Japan and in North America. Business Week put the US/Japan price differential at 45%. A thorough DRI study cited in the USITC report (1985, p.37) found that, based on costs of production and distribution, Japanese import prices in the U.S. could have been reduced by 20 to 43 percent, depending on model. The Globe and Mail (July 23, 1984) reported that average profit margins per Japanese car sold in Japan (where competition is fierce, unconstrained by any need to prop up high-cost producers) were only \$85-125, compared with around \$2000 per car in the U.S. Differentials of this magnitude make it implausible that prices are based on the same criteria (ie, costs of production) in both markets.

-- the second piece of evidence is that Japanese prices in North America do not appear fully to reflect changes in the yen/\$ exchange rate, as they would were they based on Japanese costs (which are measured in Japanese currency, of course). Interviewed in October of 1985 after the 10% increase in the \$Cdn value of the yen since September, a Honda of Canada spokesman predicted that prices would not rise by the same amount since 'price is always decided by the market situation, not the exchange rate' (Globe and Mail, October 2, 1985).

As a direct test, we regressed the annual percentage change in the unit value of Japanese cars sold in Canada (DUVJ) against the percentage change in the \$/yen exchange rate, lagged one year (LDEXCH). (The lagged value worked better than the current year variable.) The result, for 1971-85, was:

$$\begin{array}{ll} \text{DUVJ} = 9.60 + 0.33\text{LDEXCH} & R^2 = 0.37 \\ (5.8) \quad (2.7) & (\text{t-statistics in brackets}) \end{array}$$

The regression reveals that exchange rate changes do have some impact on prices paid in the Canadian market, but with a coefficient well below one.

Against this is the evidence of Willig and Dutz, who show what is apparently a quite close relationship between the U.S. prices of Japanese automobiles and an 'open market benchmark' which includes costs and exchange rates, over the pre-VER period (1985, p.31). Not having had the opportunity to replicate these results for the Canadian market, we will maintain the hypothesis that the large Japan/ North America price differentials are the result of the Japanese companies applying quite different pricing strategies in the two markets.

(b) Domestic pricing behaviour

Given that the North American manufacturers are still not very proficient at building small cars (as evidenced by the cost differential and consumer perceptions of superior Japanese and European quality), it is unlikely that the price structure set by the Japanese in the absence of restraints would allow the

domestic industry much discretion to set price above that needed to barely cover costs (or less -- cf. a Globe and Mail report that 'Ford loses money on every Lynx and Escort it sells' (October 1, 1985)). The only qualification is the peculiarity in the Canada-US price structure noted in section 4 of the body of this paper.

However, the story might be quite different under the VER regime. By in essence eliminating the usual market dispute over market shares, the restraints may have radically changed the rules of the oligopoly game played by the Japanese and the domestic industry, permitting them to escape from the zero-sum battle for each others' customers to the more lucrative (positive-sum) pasttime of matching each other's price increases. As Willig and Dutz put it:

'the common knowledge of the VER may encourage all the oligopoly rivals to strategically raise their prices in a parallel fashion.' (1985, p.4)

In spite of this insight, though, Willig and Dutz prefer to work with the conservative assumption that the VER-induced increases in the price of imports did not carry through to prices of domestic autos. In so doing, they were very likely being too cautious. Crandall looks at three independent measures of the effect on domestic prices -- an econometric model, a 'hedonic' price index, and direct analysis of consumer prices -- all of which point to substantial changes in the VER period (1984, p.15). He chooses to work with a figure of \$400 for the increase in US-made price/car, induced by a \$1000/car increase in import prices.

We expect that domestic prices have followed Japanese prices in Canada, too (to the joint advantage of all the suppliers, of course), but offer a range of price responses (from zero to 50%) in the scenarios reported in the main body of this paper.

(c) Hyundai

The pricing strategy of the Korean Hyundai appears to have been quite different from Japanese practices. As a new entrant to the Canadian market, which they view as something of a testing ground for their potentially much more important leap into the U.S. market, Hyundai appears to have proceeded by setting up a good distribution network, pricing their product close to cost, and sitting back and seeing how many customers choose to turn up (no-one appears to have predicted the remarkably rapid response of Canadian consumers to the availability of Hyundais).

Evidence in support of this includes: (1) the low selling price (Canadian Consumer (October 1985, p.15) reports that the Hyundai Pony sold in 1985 for about \$600 less than the least expensive Japanese imports); (2) evidence that Hyundai sets its export price below the domestic Korean price (United Nations,

1983, p.135) -- in sharp contrast to the Japanese; and, (3), a statement by the President of Hyundai's Canadian operation that sales in this market have yet to prove very profitable.

In all, Hyundai appears to be quite anxious to avoid provoking its competitors to respond to its success -- their announcement of a plan to build a plant in Quebec should forestall domestic Canadian pressure to imposed VER-type restraints, and they are at pains to disclaim any capacity or desire to challenge Japan's supremacy in the small-car market (see an interview with President Park of Hyundai in the Financial Post, December 28, 1985).

We will model Hyundai as a passive participant in the market, setting a cost-based price that does not alter with changes in the prices of Japanese or domestic cars.

A.5 The Model

In this section we set out the mathematical model used to generate the simulations reported in tables 3 and 4 of the main body of the paper. First, we demonstrate how the demand functions are calibrated, then combine these with the pricing equations, and then explain how the scenarios without Hyundai were set up.

(1) Calibrating the demand functions

We assume that demand for each segment of the market is linear in own prices and in the differences between own prices and the prices of substitutes. This gives

$$(1) Q_D = a_D + b_{DD}P_D + b_{DJ}(P_D - P_J) + b_{DK}(P_D - P_K)$$

$$(2) Q_J = a_J + b_{JJ}P_J + b_{JD}(P_J - P_D) + b_{JK}(P_J - P_K)$$

$$(3) Q_K = a_K + b_{KK}P_K + b_{KD}(P_K - P_D) + b_{KJ}(P_K - P_J)$$

where Q is quantity demanded, P is price, and the subscripts D , J , and K refer to domestic, Japanese and Korean automobiles. These equations will be calibrated to fit actual 1985 data and the values for total-market and own-price elasticities that were determined in A.2 above. We have three equations in twelve unknown parameters, which means that we must find nine more restrictions to place on the data.

Suppose all prices are changed by the same proportional amount, dP/P :

$$(4) dP_D/P_D = dP_J/P_J = dP_K/P_K = dP/P$$

Given the actual average prices of cars from each source of supply (see section A.6), an equal proportional change in each market segment is approximately equivalent to changes satisfying:

$$(5) dP_D = dP_J = dP; \quad dP_K = 0.7dP$$

-- domestic and Japanese prices are close to the total-market average, whereas Hyundai sells for about 70% of the average price

charged for automobiles in the Canadian market. Then changes in the number of units sold will satisfy (substituting into equations (1), (2) and (3)):

$$(6) \quad dQ_D = b_D dP_D + 0.3b_{DK} dP = dP_D (b_D + 0.3b_{DK})$$

$$(7) \quad dQ_J = dP_J (b_J + 0.3b_{JK})$$

$$(8) \quad dQ_K = b_K dP_K - 0.3b_{KD} dP - 0.3b_{KJ} dP \\ = dP_K (b_K - 0.43b_{KD} - 0.43b_{KJ})$$

Assuming that an equal proportional change in all prices will leave market shares undisturbed, we have:

$$(9) \quad \frac{dQ_D}{dP_D} \cdot \frac{P_D}{Q_D} = e$$

$$(10) \quad \frac{dQ_J}{dP_J} \cdot \frac{P_J}{Q_J} = e$$

$$(11) \quad \frac{dQ_K}{dP_K} \cdot \frac{P_K}{Q_K} = e$$

Substitute (6)-(8) into (9)-(11):

$$(12) \quad (b_D + 0.3b_{DK}) \cdot P_D / Q_D = e$$

$$(13) \quad (b_J + 0.3b_{JK}) \cdot P_J / Q_J = e$$

$$(14) \quad (b_K - 0.43b_{KD} - 0.43b_{KJ}) \cdot P_K / Q_K = e$$

Define the cross-price elasticity of demand:

$$(15) e_{ij} = (dQ_i/dP_j) \cdot P_j/Q_i = -b_{ij}(P_j/Q_i)$$

The Hotelling-Jureen condition is:

$$(16) e_{ij} = (P_j Q_j)/(P_i Q_i) \cdot e_{ji}$$

Substituting, we get:

$$(17) e_{ij} = -b_{ij}(P_j/Q_i) = -(P_j Q_j)/(P_i Q_i) \cdot b_{ji} \cdot (P_i/Q_j)$$

or, $b_{ij} = b_{ji}$

That is,

$$(18) b_{DJ} = b_{JD}$$

$$(19) b_{DK} = b_{KD}$$

$$(20) b_{JK} = b_{KJ}$$

Finally, we have the own-price elasticities of demand for each source of supply:

$$(21) e_D = (b_D + b_{DJ} + b_{DK}) \cdot P_D / Q_D$$

$$(22) e_J = (b_J + b_{JD} + b_{JK}) \cdot P_J / Q_J$$

$$(23) e_K = (b_K + b_{KD} + b_{KJ}) \cdot P_K / Q_K$$

WHERE

$$\text{where } e_i = (dQ_i / dP_i) \cdot P_i / Q_i$$

Given 1985 data on the Q_i and P_i , and given estimates of total market and own-price elasticities, we can solve for the unknown parameters.

(2) The Model

Central to our model of the effects of VERS on the Canadian auto market are the pricing hypotheses developed in section A.4 above. A very useful feature of these is that the model that they imply can be solved recursively (ie, without need for simultaneous equation algorithms). We begin with target Japanese sales, set by the VER or, in the absence of this, by the Japanese themselves (in fact it is market share, not sales in units that is exogenous, and the solution is iterated to achieve the target market share). Given this, and the parameters of the demand function, equation (2) can be solved for P_J , the price of Japanese imports, under both with- and without-VER conditions.

We have the hypothesis that the price of North American or domestic autos equals their costs (plus some standard markup) in the absence of VERS, but may increase by some proportion of the increase in the Japanese price when VERS are imposed. That is:

$$(24) P_D = \bar{P}_D + \alpha_D (P_J - \bar{P}_J)$$

where the bar superscript denotes that the variable is at the value it would take in the absence of VERS. Equation (24) can be rearranged to give the domestic price without VERS:

$$(25) \bar{P}_D = P_D - \alpha_D (P_J - \bar{P}_J)$$

Domestic price is then plugged in to the domestic demand function, equation (1). The exogenous Korean price can be substituted into its demand function, (3), and we then have values for prices and sales of all segments of the market.

The costs and benefits of VERs are calculated as follows: Consumer costs (in \$millions) equal the increase in the average market price (calculated as the value of automobiles sold divided by the number of units sold) times the total number of units sold in 1985, plus the 'consumer surplus triangle' lost from the VER-induced restriction of total demand:

$$(26) \text{ Consumer Costs} = ((P_{av} - \bar{P}_{av}) \cdot Q + 0.5(P_{av} - \bar{P}_{av}) \cdot (\bar{Q} - Q)) / 1000000$$

where P_{av} is average price, and Q is the total number of units sold.

The rents earned by domestic producers as a result of VERs are the sum of any difference in the price charged times number of units sold, and the existing rents per unit (built-in to profit margins and the wage structure) times the change in the number of domestic cars sold as a result of the VERs:

$$(27) \text{ Producer Rents} = ((P_D - \bar{P}_D) \cdot Q_D + m(Q_D - \bar{Q}_D)) / 1000000$$

The number of jobs protected (which may be negative), is simply the change in domestic output times the incremental jobs/car coefficient (taken to be 0.04, following Willig and Dutz):

$$(28) \text{ Jobs protected} = 0.04(Q_D - \bar{Q}_D)$$

Finally, the social cost per job protected is the difference between consumer costs and producer gains divided by the number of jobs saved:

$$(29) \text{ Costs/job} = ((26) - (27)) / (28)$$

which is, of course, only defined when the number of jobs

protected is positive.

(3) The situation without Hyundai

There is, of course, no certain way of estimating what the Canadian market would look like now in the absence of Hyundai. We proceeded by solving equation (3) (the Hyundai demand function) for the value of Hyundai price that would have reduced its sales to zero, assuming actual 1985 prices for domestic and Japanese cars. This price turns out to be about \$10,600 -- somewhat less than the average prices of the other makes in the market, which is consistent with the relatively 'down-market' position taken by Hyundai at present. We then substituted this price into the domestic and Japanese demand functions (1) and (2), to get estimates of what these would be, absent Hyundai.

The new functions imply that Hyundai's 80,000 unit sales in 1985 would be distributed about 24,000 to the domestic industry and 21,000 to Japanese suppliers. The remainder -- 35,000 cars -- would be lost altogether (that is, total automobile sales in 1985 would have been 35,000 lower in the absence of Hyundai). From this we inferred that the Japanese target market share in the absence of VERs would be about two percentage points higher -- 23% rather than 21% -- without Hyundai.

(4) Calibration of the Base Case

The model was calibrated to fit, as its base case, the actual 1985 data. Sales in units are reported in the press for each month around the middle of the next month. This meant that the model was built with only estimates of the final twelve-month figures for 1985, but these have in fact turned out to be very close to what actually happened. The only noticeable difference between the numbers used here and the reported data is that sales of the independent Japanese car companies were in fact a little under 190,000 units in total, rather than the 195,000 unit number used here.

Average prices of domestic and Japanese cars were calculated from the mid-year (July) average value per unit sold at retail, published in Statistics Canada #63-007. Average price of Hyundais was imputed from newspaper stories on the prices charged and the numbers sold of the various Hyundai models.

Other parameters, including (incremental) jobs/car, the domestic markup, and the domestic price response, were discussed in earlier sections of this Annex.

TABLE 7

Year	CPI Canada 1971=100 (1)	Industry Selling Price Canada Total Cars 1971=100 (2)	Input-Output Implicit Input Price Index Canada 1971=100 (3)	Hourly Earnings per Worker Canada (4) 1971=100	Foreign Exchange (5) (\$ Can.) \$U.S. Jap.Yen	Annual Avg. Utilization Rate Canada Trans. Equip.
	All Items	Auto Purchase				
1970	97.2	96.1	97.6	98.3	4.02	1.0440 .00292
1971	100.0	100.0	100.0	100.0	4.28	1.0098 .00291
1972	104.8	102.0	101.7	100.7	4.61	0.9905 .00327
1973	112.7	102.4	100.7	106.3	5.01	1.0001 .00370
1974	125.0	109.6	106.8	115.0	5.65	0.9780 .00335
1975	138.5	116.8	114.2	129.8	6.32	1.0173 .00343
1976	148.9	123.4	117.4	139.8	6.70	0.9861 .00333
1977	160.8	131.7	126.4	153.4	7.38	1.0635 .00398
1978	175.2	143.4	136.6	172.1	7.91	1.1402 .00548
1979	191.2	160.7	153.1	185.8	8.86	1.1715 .00538
1980	210.6	179.5	171.7	209.3	10.18	1.1690 .00518
1981	236.9	200.1	192.4	238.4	10.71	1.1990 .00545
1982	262.5	209.5	199.4	252.0	11.69	1.2341 .00497
1983	277.6	217.7	206.0	258.4	13.23	1.2324 .00519
1984	289.7	226.7	212.9	-	13.93	1.2948 .00540
1985	299.4	235.9	220.8	-	14.45	1.3542 .00561

(1) All Items: Bank of Canada Review, 1985 figure is June.
 Auto Purchase: Consumer Prices and Price Indexes
 Stats. Can. 62-010 1972-85, and Prices and Price Indexes
 Stats. Can. 62-002 1971.

(2) Industry Selling Price Indexes: Manufacturing
 Stats. Can. 62-543, 1985 figure is July.

(3) 1972-85: unpublished Stats. Can. data.
 1970-71: Real Domestic Product by Industry 1961-1971
 Stats. Can. 61-516.

(4) 1982-85: Employment, Earnings and Hours, Stats. Can. 72-002.
 1970-81: Motor Vehicle Manufacturers, Annual Census of
 Manufacturers, Stats. Can. 42-209 table 1.
 Calculation: [workers wages] / [thousands of manhours]
 spliced into 1982-85 series.

(5) Bank of Canada Review, 1985 figure is July.

(6) Stats. Can. 31-003, 1st. qtr. 1985, table 3
 figure is 1st. & 2nd. qtr.

TABLE 2

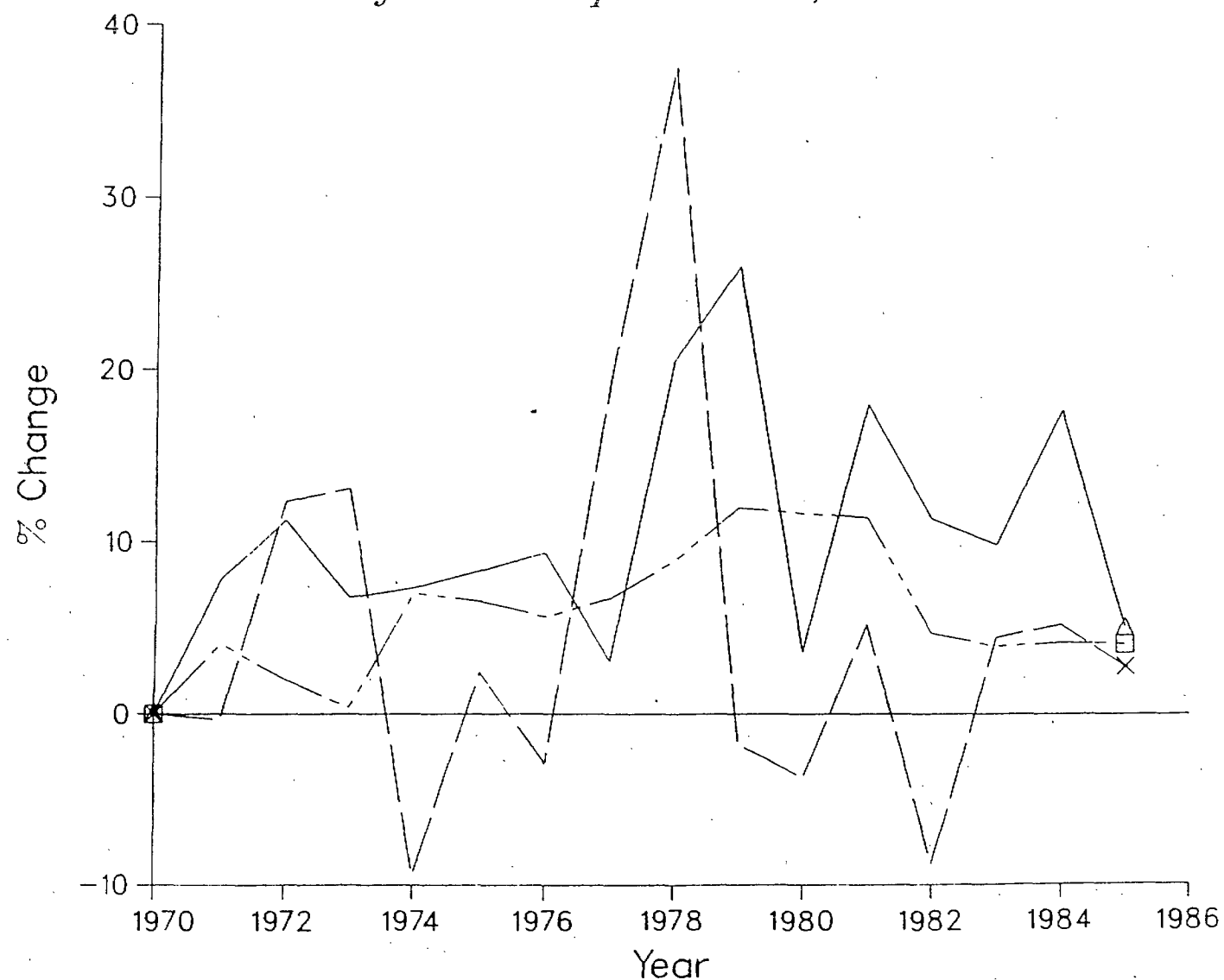
Year	Industry Selling Price (1) Automobiles 1971=100				% Change in Industry Selling Price (2)			
	Canada		U.S.		Canada		U.S.	
	Total	Small Cars	Stand. Cars	Total	Total	Small Cars	Stand. Cars	Total
1970	97.6	97.6	97.6	90.3	-	-	-	-
1971	100.0	100.0	100.0	100.0	2.46	2.46	2.46	10.74
1972	101.7	101.2	101.9	103.0	1.70	1.20	1.90	3.00
1973	100.7	101.6	100.5	103.2	-0.98	0.40	-1.37	0.19
1974	106.8	113.3	103.8	108.1	6.06	11.52	3.28	4.75
1975	114.2	121.5	111.1	118.6	6.93	7.24	7.03	9.71
1976	117.4	124.1	114.3	125.0	2.80	2.14	2.88	5.40
1977	126.4	132.0	123.5	133.0	7.67	6.37	8.05	6.40
1978	136.6	139.7	134.1	144.0	8.07	5.83	8.58	8.27
1979	153.1	157.2	149.8	155.6	12.08	12.53	11.71	8.06
1980	171.7	180.9	165.0	167.0	12.15	15.08	10.15	7.33
1981	192.4	197.1	186.9	183.6	12.06	8.96	13.27	9.94
1982	199.4	196.0	197.6	191.9	3.64	-0.56	5.72	4.52
1983	206.0	199.0	207.0	194.5	3.31	1.53	4.76	1.35
1984	212.9	201.2	216.4	197.6	3.35	1.11	4.54	1.59
1985	220.8	204.0	225.6	204.9	3.71	1.39	4.25	3.69

(1) Canada: Industry Selling Price Indexes: Manufacturing
Stats. Can. 62-543, 1985 are July figures.
U.S.: Producer Prices and Price Indexes, U.S. Dept. of
Labor, Bureau of Labor Stats., June figures.

(2) Calculated from (1) as follows:

$$\{[x - \text{lag}(x)] / [\text{lag}(x)]\} * 100$$

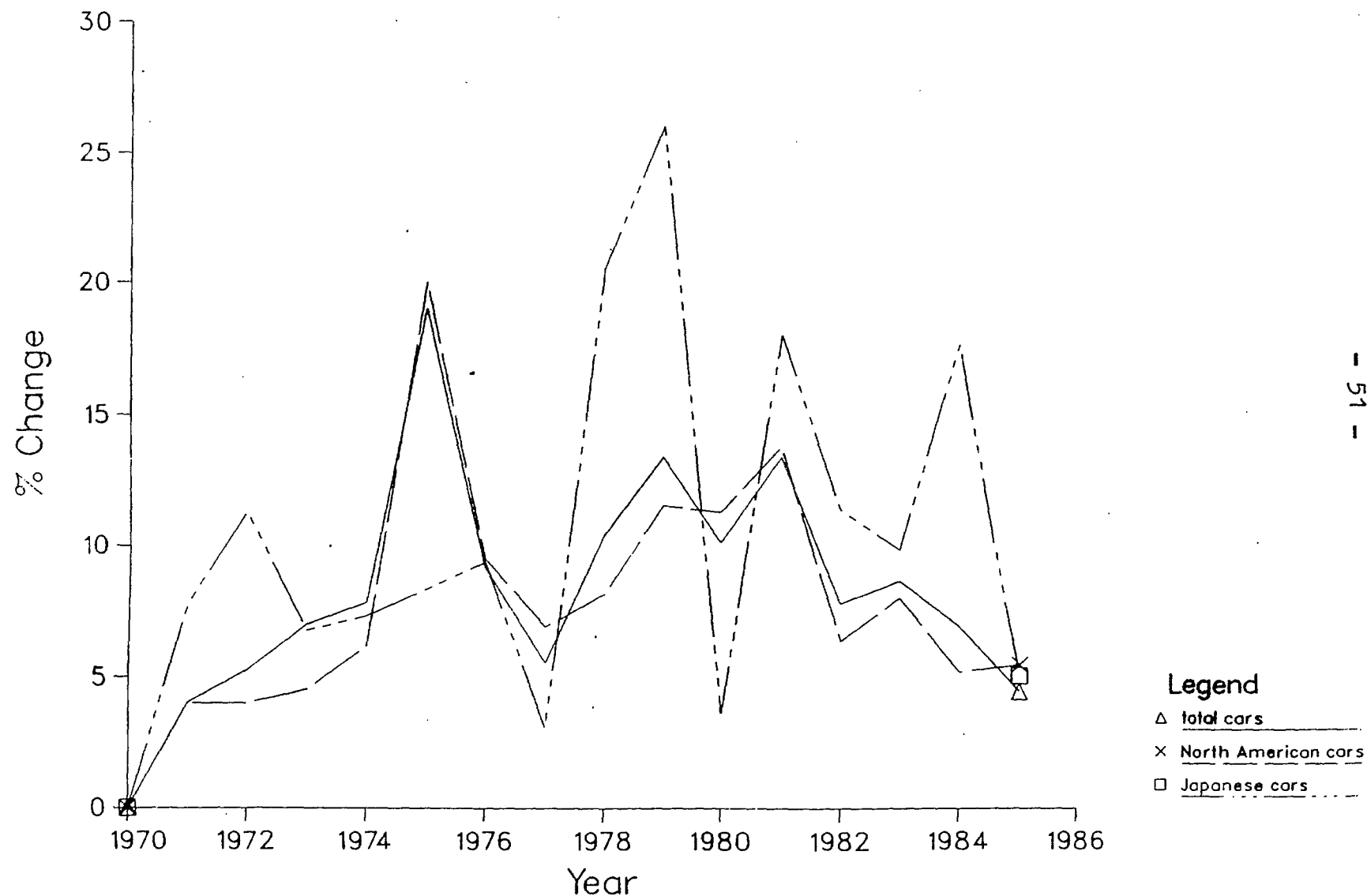
*Change in unit value of Japanese cars sold
in Canada, Japanese yen, and Canadian
CPI for auto purchase, 1970-1985.*



Legend

- △ Japanese cars
- × Japanese yen
- CPI autos

*change in unit value of
passenger cars sold in
Canada 1970-1985*



References

- Ashworth, M.H., J.A. Kay and T.A.E. Sharpe (1982), Differentials between Car Prices in the United Kingdom and Belgium, Institute for Fiscal Studies, Report Series No.2, London.
- Blomqvist, Ake G. and Walter Haessel (1978), 'Small cars, large cars, and the price of gasoline', Canadian Journal of Economics, August.
- Chang, Julius C. (1983), 'An Econometric Model of the Short-run Demand for Workers and Hours in the U.S. Auto Industry', Journal of Econometrics, 22.
- Connidis, L.A. (1983), 'The Effective Rate of Protection for Motor Vehicle Manufacturing in Canada', Canadian Journal of Economics, February.
- Crandall, Robert W. (1984), 'Import Quotas and the Automobile Industry: The Costs of Protectionism', The Brookings Review, Summer.
- Federal Task Force (1983), An Automotive Strategy for Canada, Ottawa, May.
- Friedlander, A.F., C. Winston and U. Wang (1983), 'Costs, Technology, and Productivity in the U.S. Automobile Industry', Bell Journal of Economics, 14(1).
- Gomez-Ibanez, J., and David Harrison, 'Imports and the Future of the U.S. Automobile Industry', American Economic Review, May.
- Gomez-Ibanez, J., R. Leone and S. O'Connell (1983), 'Restraining Auto Imports: Does Anyone Win?', Journal of Policy Analysis and Management, 2(2).
- Huncker, J.A. (1983), Structural Change in the U.S. Automobile Industry, Lexington Books, Lexington MA.
- International Trade Commission (1985), A Review of Recent Developments in the U.S. Automobile Industry Including an Assessment of the Japanese Voluntary Restraint Agreements, USITC publication, Washington, D.C.
- Krugman, Paul R. (1984), 'The U.S. Response to Foreign Industrial Targeting', Brookings Papers, 1.
- Moroz, Andrew R. (1983), 'Canada-United States Automotive Trade and Trade Policy Issues', Centre for the Study of International Economic Relations, University of Western

Ontario, Working Paper No. 8330C.

Organisation for Economic Co-operation and Development (1985),
Costs and Benefits of Protection, Paris.

Reisman, S. (1978), 'The Canadian Automotive Industry --
Performance and Proposals for Progress', Dept of Supply
and Services, Ottawa.

Royal Commission on Canada's Economic Prospects (1956), The
Canadian Automotive Industry, September.

Tarr, David G. and Morris E. Morkre (1984), 'Aggregate Costs to
the United States of Tariffs and Quotas on Imports', Federal
Trade Commission, Bureau of Economics Staff Report, December.

Toder, E.J., with N.S. Cardell (1978), 'Effects of Trade Barriers
on the U.S. Automobile Market', in The Impact of
International Trade and Investment on Employment, U.S. Dept
of Labour.

United Nations (1983), Transnational Corporations in the
International Auto Industry, ST/CTC/38, U.N. Publications,
New York.

Willig, Robert D. and Mark A. Dutz (1985), 'U.S. -- Japanese
VER: A Case Study from a Competition Policy Perspective',
Report to OECD Working Party No 1 on Competition and
International Trade, Paris, October.

Wilton, D.A. (1976), An Econometric Analysis of the Canada-
United States Automotive Agreement: The First Seven Years,
Economic Council of Canada; Ottawa.

