THE IMPACT OF ECONOMIC POLICIES ON THE MOTOR VEHICLE ASSEMBLY INDUSTRY OF NEW ZEALAND: AN EFFECTIVE PROTECTION ANALYSIS

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Philip James Maddren

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The New Zealand motor vehicle assembly and component industry has been insulated from overseas competition since 1907. Protection from completely built up overseas vehicles, in the form of import licensing and import tariffs has provided the local assembly industry with a margin of protection which the industry felt was necessary to assemble completely knocked down vehicle kits.

In 1983 the Government commissioned an Industry Development Plan of the motor vehicle industry, with the objective of maintaining the assembly and component industry while improving its efficiency. The plan resulted in the removal of import licensing, the reduction of tariffs and allowed for the importation of vehicle components.

The theory of effective and nominal protection and the optimal tariff theory were used in this dissertation to measure the efficiency of these policy changes.

Although the effective and nominal estimates have decreased since the Development Plan, they are all positive which would indicate that the current and past levels of protection have allowed the assemblers to earn revenues well above what would have been possible in a free trade environment.

The optimal tariff is derived from the reciprocal of the import supply elasticity for new vehicles. The elasticity estimation yielded a value of 10, which implies that an import tariff of 10 percent would maximize New Zealand's welfare. The current levels of import protection, however, are much higher than the derived optimal tariff.

KEYWORDS:* *completely built up vehicles, completely knocked down vehicles,

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ABBREVIATIONS

AGM = Annual General Meeting

cc. = Cubic Capacity of an Engine

C.B.U. = Completely Built Up Vehicle

CER = Closer Economic Relations

C.I.F. = Cost, Insurance and Freight

C.K.D. = Completely Knocked Down Vehicle

EPC = Effective Protection Coefficient

ERP = Effective Rate of Protection

F.O.B. = Free on Board (Value for Duty equivalent)

GDP = Gross Domestic Product

GM = General Motors (U.S.)

G.S.T. = Goods and Services Tax

IDC = Industry Development Commission

Jig = Vehicle Manufacturing Machinery specific to Make and Model of Car

J.I.T. = Just in Time or the Kanban System

M.I.T. = Massachusets Institute of Technology

MVMA = Motor Vehicle Manufacturers Association

NPC = Nominal Protection Coefficient

NRP = Nominal Rate of Protection

NZMC = New Zealand Motor Corporation (Honda)

OLS = Ordinary Least Squares

Pass. = Passenger Vehicles

Prod. = Production

VANZ = Vehicle Assemblers of New Zealand (Ford and Mazda Joint Venture)

V.F.D. = Value for Duty

¥ = Japanese Yen

CHAPTER I

INTRODUCTION

1.1 Statement of the Problem

"The motor vehicle assembly industry in New Zealand is a creation of Government protection. Without high tariff protection, it would almost certainly not exist in anything like its current form," (Caucus Committee, 1992a). The level of protection accorded the motor vehicle industry in the early 1980s was disproportionately high compared with other sectors of the New Zealand economy, (IDC, 1983). Protection was so high that domestic assembly of vehicles accounted for 97.8% of vehicle registrations in 1980/81 and 99.4% in 1981/82, with imports of vehicles accounting for 0.8 percent of the vehicle registrations over this period.

Concern over the resource efficiency and international competitiveness of the motor vehicle assembly and automotive component industry by the Government in the 1983 prompted an Industry Development Commission report, on "the present situation of New Zealand's motor vehicle industry, the potential for its development and the objectives for the motor vehicle industry," (IDC, 1983).

The result was a development plan which met the Government's objective of retaining the motor vehicle and automotive component manufacturing industries, while increasing the industry's efficiency with the "chill of international competition," (IDC, 1983).

The plan resulted in a gradual reduction in import tariffs, the removal of import licensing and allowed for the importation of vehicle components.

According to Hapimiraki (1992) of the Ministry of Commerce, assessing the relative efficiency of these policy changes on the New Zealand motor vehicle assembly industry is difficult, as the industry has proved most reluctant to supply useful information on costs and productivity, which has affected the ability of Officials to analyze in depth. The theory of nominal and effective protection and the optimal tariff theory will be used to address this problem of assessing the efficiency of the policy changes since the Industry Development Plan of 1984.

The nominal rate of protection (NRP), measures the percentage excess of the domestic price of a vehicle over the opportunity value of that vehicle. That is the price it can alternatively be obtained from foreign suppliers, free of duty. The higher the NRP, the greater the level of Government intervention and the less competition for the assemblers from overseas vehicles. Therefore the NRP value should have decreased substantially since the industry plan.

The effective rate of protection (ERP), compares domestic value added possible because of import protection, with value added in a free trade situation.[1] If domestic value added is larger than value added with free trade border prices (ERP > 0 percent) then domestic producers are receiving a greater return on their resources with intervention than with free trade.

The Industry Development Commission (1983), estimated the average ERP coefficient for the assembly industry at 544 percent in 1982. In other words, domestic value added from assembling vehicles, is approximately five times what would be possible with free trade. If the policy changes implemented by the plan have met the Government's objective of increasing the efficient use of resources, then the effective coefficients since the plan will have decreased considerably.

To determine whether the level of import protection for the assembly industry has maximized New Zealand's net welfare since the industry plan, the optimal tariff will be estimated. There is no optimal level of import protection that will maximize net welfare, if New Zealand is classified as a small country in the world market for Japanese vehicles. If however, New Zealand has any influence over the world price of Japanese vehicles, then an optimal level of import protection,

[1] Value Added is defined by Corden (1985), as the difference between the price of the final good and the cost of tradable inputs per unit of output.

greater than zero, exists and New Zealand is classified as a 'large country' in this market. To determine the optimal tariff, the import supply schedule is estimated for new Japanese vehicles. The result of this import supply estimation will also be used to adjust the NRP and ERP coefficients for New Zealand's market power.

Therefore, the objective of this research is to assess the efficiency of the policy changes directed at the New Zealand motor vehicle assembly industry, since 1984, by estimating the nominal and effective protection coefficients and the optimal level of import protection.

1.2 Structure of the Thesis

The thesis is structured in the following way:

Chapter II presents an overview of the New Zealand motor vehicle market, discussing the general characteristics and Government policies of this market.

Chapter III describes the recent development of the world automotive industry, and its recent performance, in relation to the domestic motor vehicle market.

Chapter IV outlines the analytical framework used to pursue the objective of this study. It presents the theory of nominal and effective rates of protection, and highlights some of the limitations of these protection measures. This is followed by a section on the theory and specification of the import supply model, to estimate the import supply schedule. The final section of Chapter IV discusses the optimal tariff theory.

Chapter V presents the empirical estimating procedure and the results of estimating the import supply function.

Chapter VI will focus on the results of the nominal and effective coefficients, adjusting for the supply estimation and reports the results of the optimal tariff calculation.

Chapter VII presents a summary and suggestion for future research.

CHAPTER II

AN OVERVIEW OF THE NEW ZEALAND MOTOR VEHICLE MARKET - GENERAL CHARACTERISTICS, AND GOVERNMENT POLICIES

2.1 Overview of the Domestic Motor Vehicle Market.

The purpose of Section 2.1 is to provide a general description of the New Zealand motor vehicle market. This includes a description of motor vehicle assembly and component operations in New Zealand, followed by a section on assembly and component industry employment. This is followed by a summary of vehicle sales in New Zealand since the industry development plan.

2.1.1 The Motor Vehicle Assembly Industry Since the Industry Plan.

The New Zealand motor vehicle assembly industry assembles imported completely knocked down kits (C.K.D. kits), consisting of a chasis, built up into a frame with engine and gearbox fully assembled and attached. These kits are supplemented by a range of components supplied by domestic and overseas component manufacturers.

Before the New Zealand Motor Vehicle Industry Development Plan was published in December 1984, there were ten car assembly companies in New Zealand. Table 2.1 contains each of these companies, their location and the number of employees in each assembly plant.

Since the 1984 Industry Development Plan, we have seen a move away from assembly, towards the importation of completely built up cars (C.B.U. cars). There are a number of factors responsible for this change in output and profitability of the New Zealand assemblers. These will be discussed in detail in Section 2.1.3.

Over the six years from 1985 to 1991, more than half of all assembly plants were closed, and the number of companies operating production facilities in the country fell from 10 to 6. The remaining assembly plants in 1994 are Ford/Mazda (VANZ or Vehicle Assemblers of

Table 2.1 Assembly Plants at the Time of the Plan: 1984

Company	Date Established	Plant Location	Date Plant Opened	Employment
Daihatsu NZ Ltd	1975	Te Awamutu	1986	100
Ford Motor Co. of NZ Ltd	1936	Lower Hutt Wiri	1936 1972	685 584
General Motors NZ Ltd	1926	Upper Hutt	1964	1200
Mazda Motors of NZ Ltd	1966	Sylvia Park	1980	140
Motor Holdings Ltd	1936	Otahuhu Waitara	1954 1975	253 126
NZ Motor Corporation	1928	Nelson Auckland	1965 1973	326 314
Nissan Datsun Holdings	1963	Wiri Otahuhu	1977 1978	386 155
South Pacific Suzuki Vehicle Assemblers Ltd	1983	Wanganui	1975	110
Todd Motors Ltd	1931	Porirua	1970	1092
Toyota NZ Ltd	1966	Thames Christchurch	1977 1977	450 310
			TOTAL	6231

Source: Witt, D.A. (1986) *The New Zealand Motor Car Industry After the Plan*. NZIER Research Paper 32.

New Zealand), Toyota (Thames), Toyota(Christchurch), Mitsubishi, Nissan and Honda. Only two of the surviving assembly lines are located in Auckland (Nissan, VANZ) and the other is located in Wellington (Mitsubishi). The other three plants are located in provincial cities: Christchurch (Toyota), Thames (Toyota) and Nelson (Honda). Hence there has been a steady erosion of metropolitan city assembly sites. Since 1965 all five Hutt Valley plants have closed, and only two of the seven plants, originally in Auckland, are still operational. However, three of the original five provincial city plants, have survived.

The component manufacturing industry operating since the industry plan, consist of those firms dependent on the assembly industry; producing seats, upholstery and interior trim items. The component firms exporting alloy wheels, wiring harnesses, glass and springs are not as dependent on the assembling industry, while the component manufacturers producing batteries and tyres rely primarily on the replacement market in New Zealand.

2.1.2 Assembly and Component Industry Employment Since the Plan.

Table 2.2 illustrates the change in employment in the assembly and component manufacturing industry, in 1981 before the industry plan and in 1991 and 1992 after the plan.

New Zealand's total labour force as at December 1992 was 1,487,100 (assuming 2 part-time positions are equivalent to 1 full-time job). Based on the employment figures in Table 2.2, the assembly industry accounts for 0.185% of the total labour force. New Zealand's labour force in the manufacturing sector as at December 1992 was 238,300. Assembly operations therefore account for 1.152% of those employed in the manufacturing sector.

Figure 2.1 below, also helps to put assembly industry employment into perspective. Assembly employment accounts for 5.9 percent of employment in the motor vehicle industry in New Zealand.

Table 2.2 Employment in the Assembly Industry.

Industry	**1981**	**1991**	**1992**
Assembly	7,578	3,322	2,745
Components	6,885	4,000	4,550
Total	14,463	7,332	7,295

Source: Gawith, A. and Webber, D. (1990) *The New Zealand Motor Vehicle Assembly Industry: The Economics of Industry Protection. Wellington,* Wellington: Infometrics Ltd, 26 February.

The effect on employment of a shutdown of New Zealand's assembly operations is difficult to predict. The experience with the General Motors closure in 1991, indicates that there would be residual employment for the assemblers in administration, sales and parts support of around 20%. Therefore approximately 2200 jobs would be lost if assembly of C.K.D. vehicles ceased in New Zealand.

The effect on the component industry of a complete shutdown of the New Zealand assembly

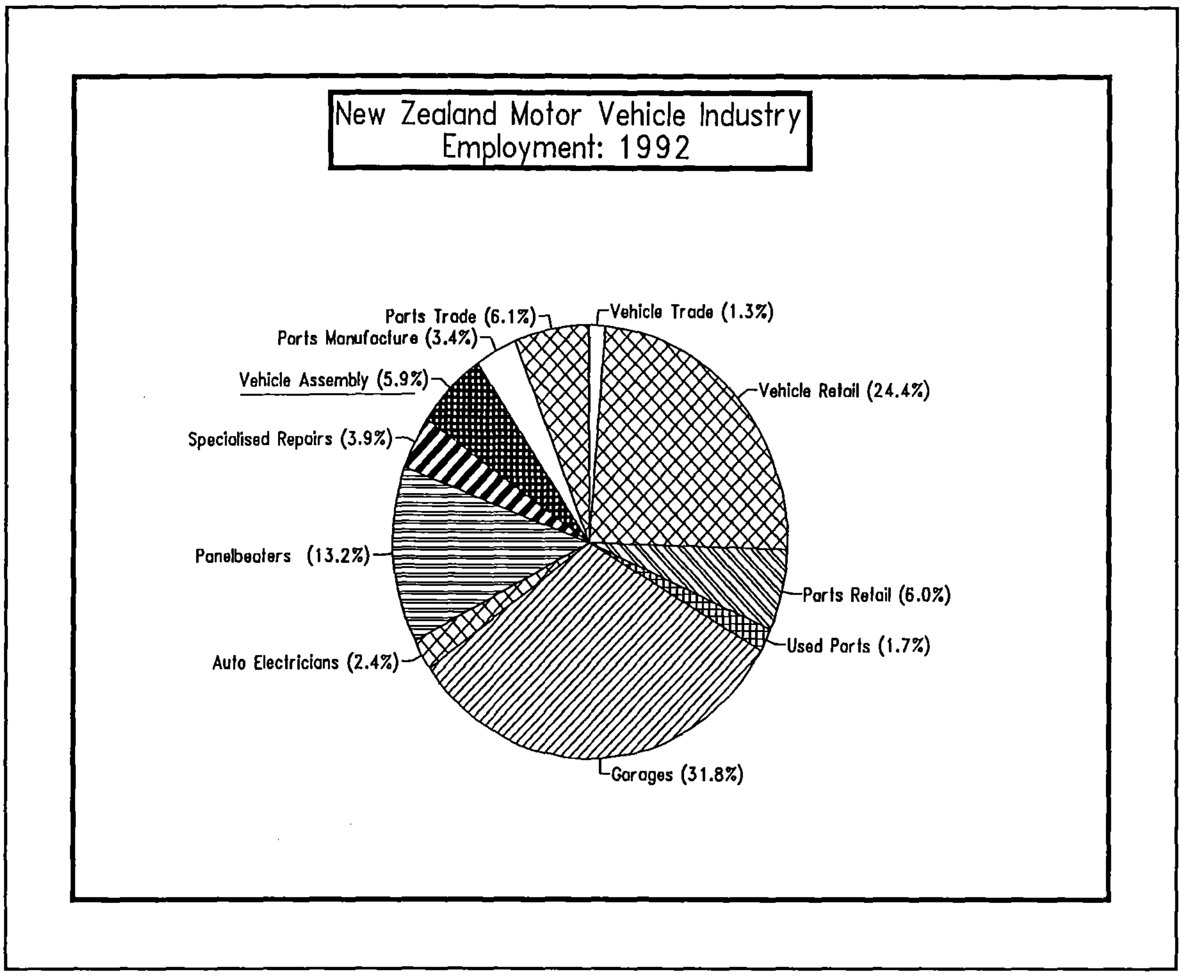

Figure 2.1
Source: Toyota New Zealand (1991) *Presentation to Treasury Officials*. Wellington: Toyota Head Office, May.

industry would also be significant. The Ministry of Commerce (1992c), estimated that there would be between 1900 and 2400 job losses in the component manufacturing sector if assembly in New Zealand were to cease, assuming those component manufacturers completely dependent on the New Zealand assembly industry, do not find an alternative market.

2.1.3 New Vehicle Sales Since the Industry Plan.

The sales of new vehicles (C.B.U. imports and assembled C.K.D.s) in New Zealand, fell from an average of approximately 77500 per year over the period 1986 to 1990, to 54370 in 1993. Sales of New Zealand assembled C.K.D.s have been affected most by this downturn. Production in 1993 is 50 percent lower than 1989, while imports of C.B.U.s are gradually increasing. Figure 2.2, contains the domestic sales figures for New Zealand assembled vehicles and new and used completely built up imported vehicles between 1986 and 1993.

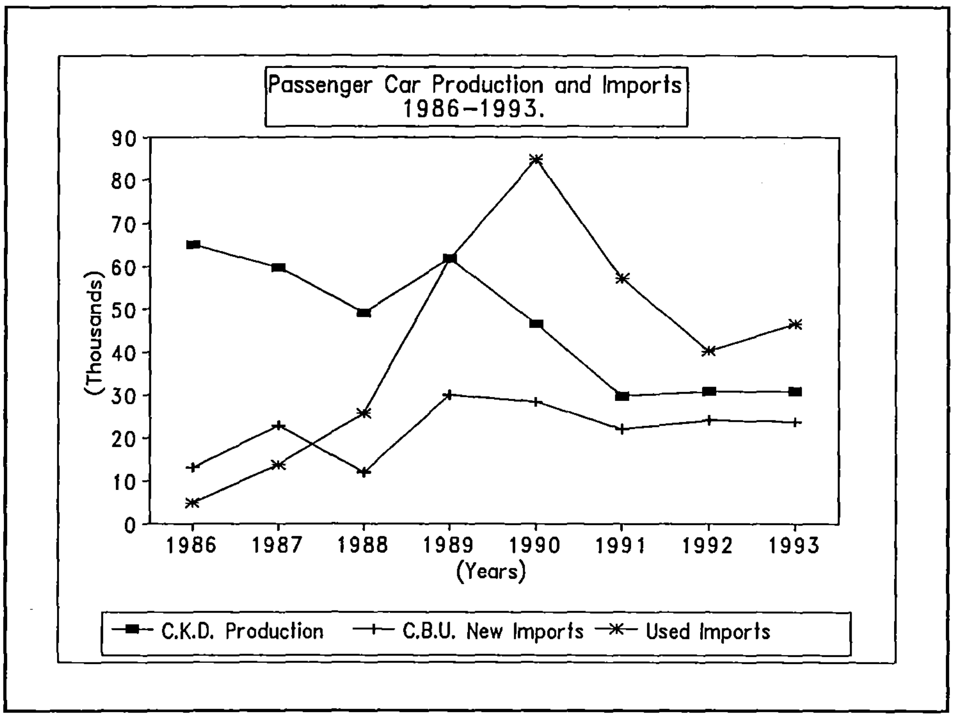

Figure 2.2 Source: Caucus Committee (1992d), updated by Kerr, P. of the Motor Vehicle Manufacturers Association, Wellington.

There are several factors responsible for the drop in new car sales. These include long-term shifts in demand patterns, changes in protection, the income/expenditure effects on households of a prolonged recession, and the increase in used Japanese imports.

a) *Long-term shifts in demand*

The new car market is very small by international standards. New Zealand's sales in 1991, accounted for 0.5% of the Asia/Pacific market, and 0.1% of the world market. The viability of the local assembly industry depends on the efficient assembly of models for which there is adequate local demand, (Infometrics, 1992). However, there are currently around 450 models available in New Zealand, of which only 95 are assembled locally, (New Zealand Car, 1993).

Changes in model preferences has had an effect on demand for locally assembled cars. For example, farmers have preferred to purchase twin-cab utility vehicles instead of sedans, while 4WD and mini-van units have also become very popular. The majority of these models are assembled overseas, having a negative effect on volumes of local assembled units.

b) *Changes in Protection*

A reduction in the level of protection accorded the vehicle assembly industry since the industry plan of 1984, has allowed the New Zealand consumer to purchase vehicles manufactured overseas. The ratio of New Zealand assembled vehicles, to new C.B.U. imports has fallen from 99.4:0.6 in 1982 to 57:43 in 1991. These policy changes which will be discussed in detail in the following section have had a negative impact on sales of domestically assembled vehicles.

c) *Recessionary Effects on Vehicle Sales.*

Sales of new and used vehicles decreased between 1989 and 1993, during New Zealand's recessionary period (Figure 2.2). The assembly industry argued that the introduction of used Japanese vehicles had a more significant effect on vehicle sales than the state of the economy.

Figure 2.3 contains the gross expenditure on new and used motor vehicles as a proportion of GDP. The expenditure on vehicles has decreased substantially between 1988 and 1992. Figure 2.3 also contains the aggregate expenditure on new and used vehicles as a percentage of GDP, between 1989 and 1992. The difference between these two curves would indicate the level of substitution from new to used vehicles during this period. However the difference has remained constant, which would indicate that the availability of used vehicles between 1989 and 1992 has not led to a major shift in expenditure away from new vehicles.

Figure 2.4 compares the percentage change in new car sales with the percentage change in new dwelling permits. Changes in the demand for housing permits give an indication of the state of the economy. The comparison indicates that recent expenditure trends on motor vehicles appear to be highly correlated with expenditure trends on new housing. The state of the economy may be having a significant effect on new car demand.

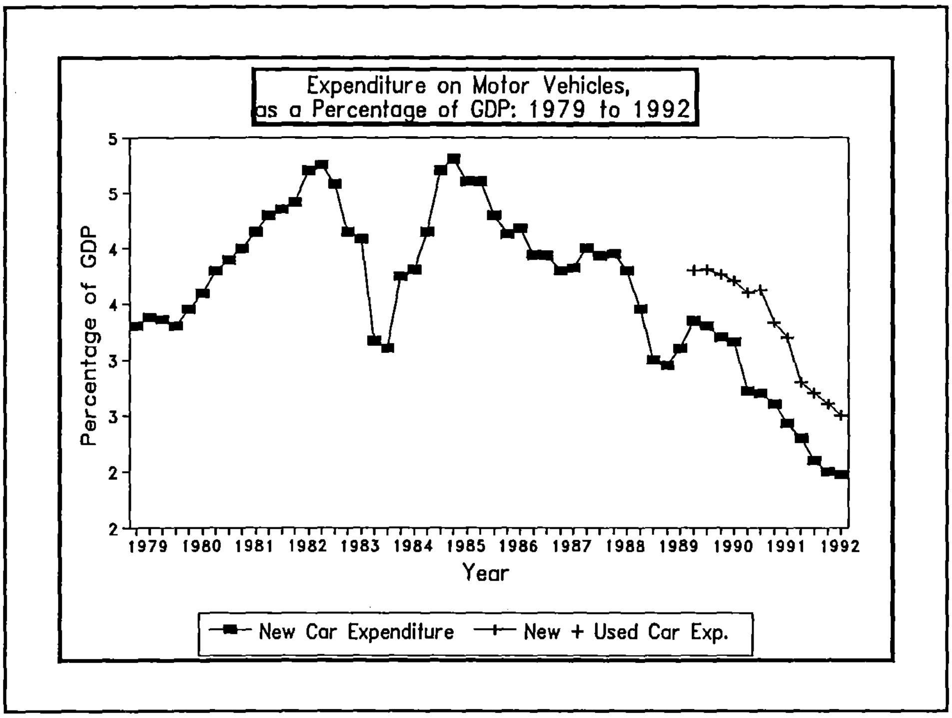

Figure 2.3 Source: The Treasury. *File on New Zealand's Motor Vehicle Industry, 1984-1994.* Wellington.

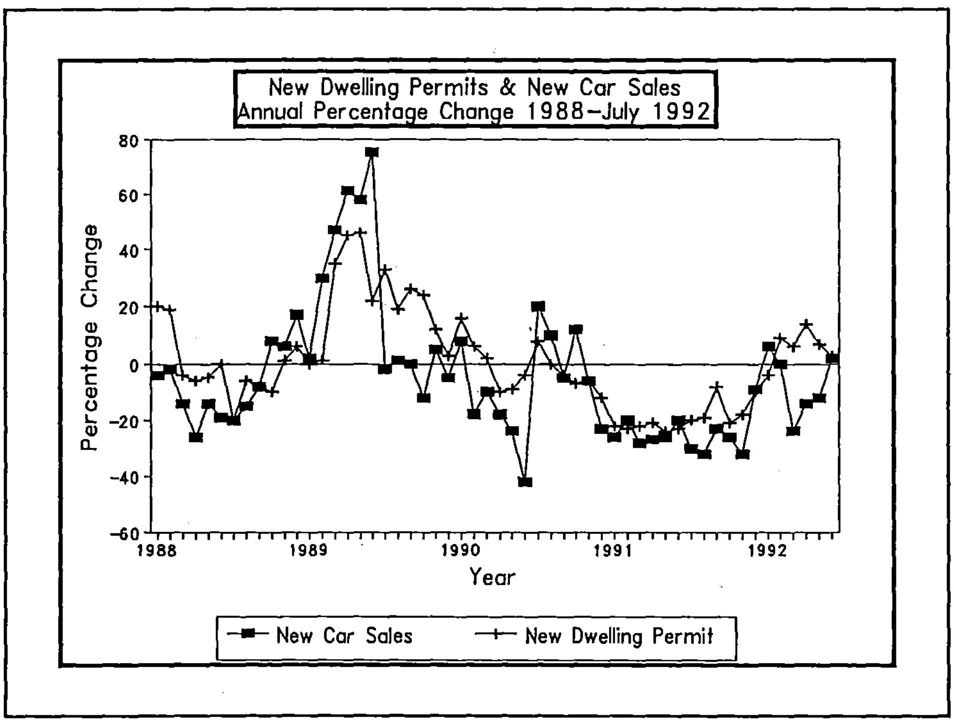

Figure 2.4 Source: The Treasury. *File on New Zealand's Motor Vehicle Industry, 1984-1994.* Wellington.

d) *Used Japanese Imports.*

The first major influx of used Japanese cars began in 1988, with changes to the rules governing vehicles imported by returning travellers. Travellers were allowed to import used vehicles privately, subject to import tariffs and licensing. Opportunity to import used cars on a wholesale basis, in conjunction with the removal of import licensing, and a reduction in the ad valorem tariff from 55 percent to 35 percent in 1989, led to a 240 percent increase in Japanese used imports in 1989. This was followed by a 137.5 percent increase in imports in 1990. Consequently, New Zealand became the largest importer in the world of Japanese second hand cars between 1989 and 1992. This was restricted by the fact that only right hand drive countries like New Zealand could benefit from this source of supply.

i) *The Shaken Test.*

Three years after the date of first registration in Japan, vehicles must undergo a vehicle safety check called a shaken test. After this initial test, further tests are required at two yearly intervals, until the ninth/tenth year when annual tests are required. The cost of the first shaken is approximately $1200 plus parts (and general taxes) while the cost of the second shaken is approximately $1640. Most cars pass the first test without additional work, but the five year and subsequent tests involve extra expense, as worn parts are discovered and replaced.

There is a schedule of mandatory parts replacements (eg. brake hoses, brake piston seals and master cylinder seals) that must be replaced at the time of the second shaken test. As a consequence, many Japanese motorists dispose of their vehicles before the second and third test, when their vehicles are between 5 and 7 years of age. Figure 2.5 contains the age distribution of used Japanese vehicles between October 1991 and September 1992. During this period 60.5% of Japanese used cars imported into New Zealand were aged between 6 and 8 years since first registration.

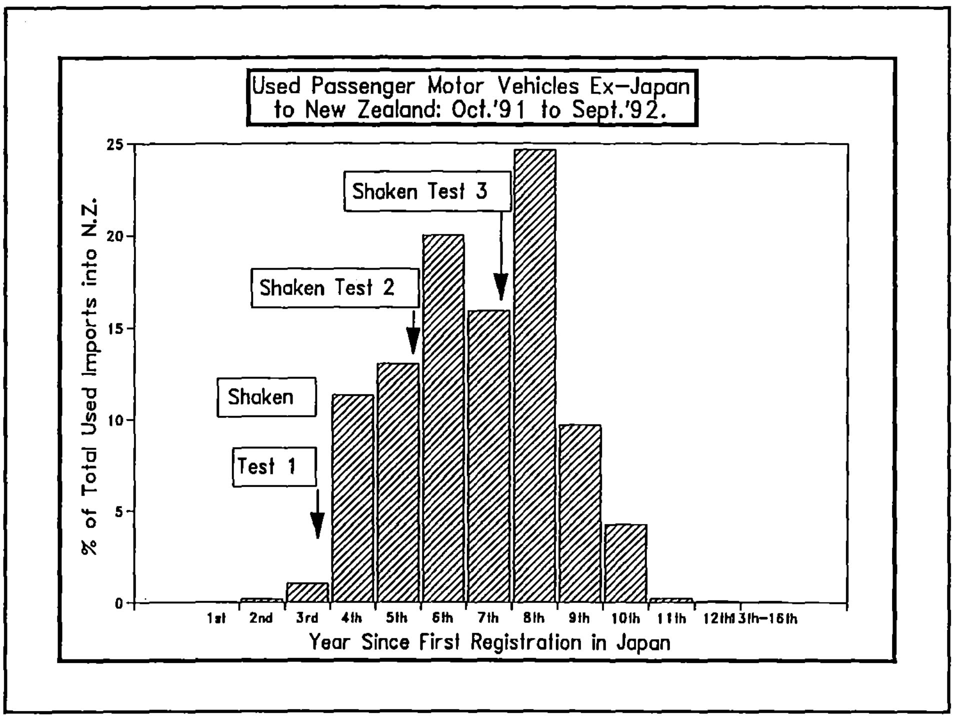

Figure 2.5

Source: Caucus Committee (1992d) *Motor Vehicles*. Wellington: Ministry of Commerce, 20 November.

ii) *The Key Issues on Used Japanese Imports.*

Substitution: Originally the assembly industry expressed concern over the detrimental effect of substitution between new cars and used imports. However, do the Japanese imports that are between 4 and 8 years of age really pose a threat to the new car market?

A simple way to estimate the substitution effect of used vehicles, is to calculate the percentage of used imports that may be classified as substitutes for new vehicles. If it is assumed that used vehicles between 0 and 3 years of age are close substitutes for new vehicles, then approximately 7.5 percent of used imports between 1989 and 1992 have posed a threat to the new car market, (Caucus Committee, 1992d).

Depreciation: The debate on the impact of used imports today, has moved away from the substitution argument, to focus on the depreciating effect of cheap Japanese used cars on the new car market. The depreciation figures in Appendix 1 represent the difference between the retail price of a new car and the trade in price of that model after three years of motoring.

Depreciation is estimated before and after the introduction of used Japanese vehicles. A significant difference between the before and after depreciation figures may indicate that cheaper used imports have had a depreciating effect on new vehicles. The figures in Appendix 1 would indicate that depreciation has increased by approximately 5% since the introduction of Japanese used vehicles.

Advantages of Used Car Imports: The importation of quality used cars has had benefits for the New Zealand economy, for road safety, and for the environment. The importation of quality used cars has reduced the age of the country's vehicle fleet, and the average age of vehicles on the road is still dropping. "With an average age of 9.4 the New Zealand fleet is now younger than Australia's (the Australian fleet age varies according to the method of calculation from 9.8 years up to 13.5 years. According to the last census data it is aging rather than getting younger)," (Caucus Committee, 1992b). This profits the country by way of safer, more modern technology and reduced pollution with less fuel consumption. Exhaust emissions are reduced because the imports are fitted with catalytic converters to meet Japan's higher environmental requirements.

Empirical estimates of the impact of used car imports on the level of demand for new cars, are not yet available. However, the above factors suggest that macro-economic conditions are the primary influence on new car demand levels, while the availability of used cars may have reduced new car demand by approximately 7.5 percent. The effect on actual assembly production would of course be somewhat less as the assemblers supply only 60 percent of new car sales.

2.2 A Historical Overview of the Government Policies Affecting the New Zealand Motor Vehicle Market.

It would be difficult to find a significant period of time over the last decade, where public policy towards the motor vehicle industry has not been an issue in politics. The motor vehicle industry was deemed important enough to require a separate industry review in 1983/84, and proceeding this report, separate tariff reviews.

2.2.1 The Motor Vehicle Industry Plan of 1984.

The Motor Vehicle Industry Plan announced on 12 December 1984, was the result of an inquiry by the Industries Development Commission. The Commission was to report on, the present situation of New Zealand's motor vehicle industry, the potential for its development, and the objectives for the motor vehicle industry, IDC (1983). The recommendation requested was, "a development plan for the motor vehicle industry which meets the Government's objectives of retaining the motor vehicle and automotive component manufacturing industries, improving its efficiency, and ensuring that future investment within the industry constitutes a more efficient use of resources from the national viewpoint, taking into account development in the international motor vehicle industry," (IDC, 1983).

The plan resulted in three significant changes in policy, affecting the industry:

1. dismantling the import licensing restrictions,
2. reducing tariffs,
3. allowing for the import of components.

These and subsequent changes in policy will be examined in the following section.

2.2.2 A Historical Overview of C.B.U. and C.K.D. Import Tariffs.

Motor vehicles first appeared in a tariff item in 1907. Duty for C.B.U.s was 20 percent, while local vehicle body builders were provided free entry of chassis and materials. In 1926 General Motors (U.S.) established its Petone mass assembly plant. American cars dominated the New Zealand vehicle market with 83 percent of sales in 1929. This prompted much criticism, as it threatened New Zealand's trading relationship with Britain. Thus in 1934, to encourage British trade and local assembly, the Coates' Tariff was introduced. This tariff regime allowed preferential treatment to British sourced cars and distinguished between C.B.U. and C.K.D. cars (Table 2.3).

Table 2.3 Coates' Tariff Schedule, 1934

	Tariff
Cars from Britain	
Assembled (C.B.U.)	15.00%
Unassembled (C.K.D.)	5.00%
Non-British Cars	
Assembled (C.B.U.)	60.00%
Unassembled (C.K.D.)	50.00%

Source: Witt, D.A. (1986) *The New Zealand Motor Car Industry After the Plan*. NZIER Research Paper 32.

The Minister of Finance, Hon. Coates, was also responsible for instituting the first 'determination,' which defined a C.K.D. car as, one where the chassis frame was assembled and the gear box, but no other parts were attached, (IDC, 1983).

The 1935 'determination' only restricted the degree of assembly that could be undertaken, and not the range of components. Therefore other elements and components could be imported as part of the C.K.D. pack. In 1939 the C.K.D. 'determination' was amended to exclude specific items from importation as part of the C.K.D. pack, and further restrict the degree of assembly that could be undertaken.

The exclusion of specific items prompted the development of the componentry industry, as assemblers were forced to source vehicle components locally. These items were called the mandatory deletion items, and will be discussed in greater detail in Section 2.2.4. In 1939 the mandatory deletion items included upholstery, materials and batteries.

A Board of Trade review of tariffs in 1956, resulted in a new set of tariffs introduced in 1961. In this review preferential tariffs were allocated to Australia, as well as Britain (Table 2.4).

Table 2.4

1961 Tariff Schedule.

	Tariff
Australian and British Preferential	
Assembled (C.B.U.)	20.00%
Unassembled (C.K.D.)	6.25%
Normal Tariffs on all other Countries	
Assembled (C.B.U.)	55.00%
Unassembled (C.K.D.)	45.00%

Source: Industries Development Commission (1983) *The New Zealand Motor Vehicle Industry Development Plan*. IDC Report No. 21, p 11.

a) *C.B.U. and C.K.D. Import Tariffs after the 1984 Plan.*

As mentioned above, one of the three main policy changes introduced in the Industry Plan, was to gradually reduce tariffs.

(i) *C.K.D. Tariffs.*

C.K.D. tariffs at the time of the plan (1984) were 6.25% for kits from Australia, and 45% for all Japanese kits. The changes announced in the plan were adhered to (Figure 2.6). While the plan greatly reduced the cost element of the C.K.D., with tariff reductions, it also reduced the preference to those assemblers sourcing their C.K.D.s from Australia.

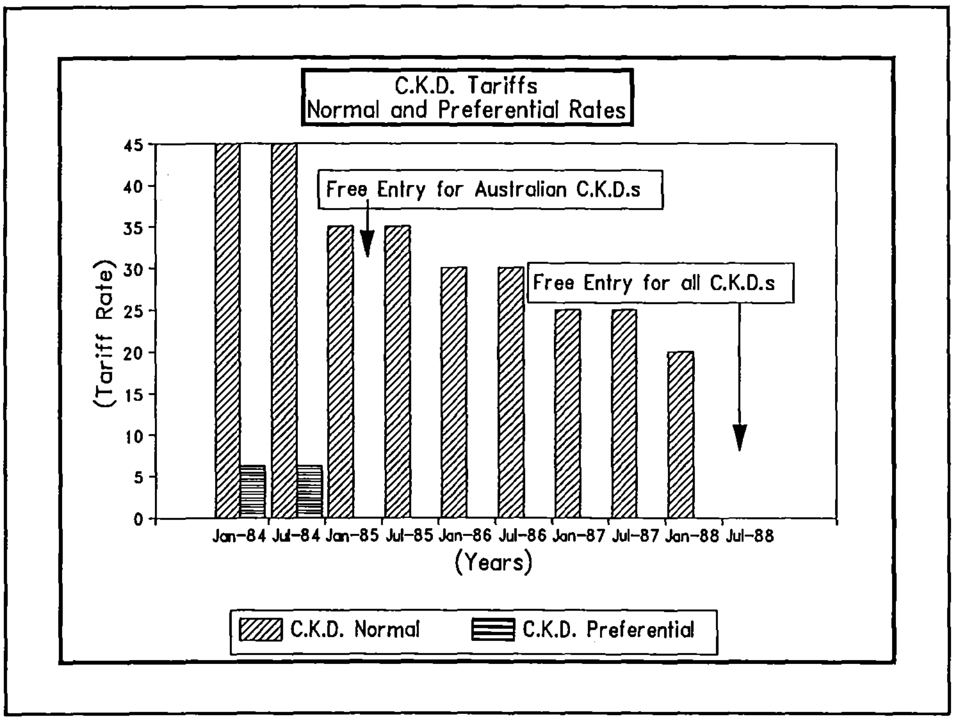

Figure 2.6

Source: Ministry of Customs New Zealand. *Official Information Request for Tariff Levels Since the Industry Plan, 1994.* Wellington: Head Office.

(ii) *C.B.U. Tariffs.*

The tariffs on C.B.U. imports, at the time of the plan (1984), were 20% for Australia and U.K.

sourced C.B.U.s and 55% for all other export sources (normal preference)[2]. The objective of C.B.U. tariffs before the plan, was to insulate the assembly operation from overseas competition, in the form of new C.B.U. imports.

The industry plan introduced a four year program of import licensing to get a feel for the appropriate market rate for a tariff on new C.B.U. vehicles. The tariff remained unchanged during this period. In 1987 a comprehensive tariff review of all industry announced a four year programme of tariff reductions for C.B.U. imports, from July 1988, to July 1992. These changes are outlined in Appendix 2, which contains the C.B.U. import tariff levels for this period.

In November 1990, the National spokesperson for trade and industry, Mr Philip Burdon confirmed the party policy on tariffs. "I have to make it clear that the Government does not intend to prop anybody up to the extent that they are fully insulated from the outside world. In that sense, a tariff does not guarantee `protection´ - it gives local producers a certain margin of advantage, while still allowing for overseas competition," (Kyd *et.al.*, 1991).

The motor vehicle industry is prepared for Government to reduce tariffs, so long as they have time to adjust, and the planned tariffs do not change (Kyd *et al.,* 1992). The New Zealand Components Manufacturers Federation (Inc) summed up the view of the vehicle and component manufacturers, "to the extent there is a concern over the cost to the consumer of maintaining preference for an added value industry, the solution is to be found in relatively small cuts on a regular basis over a longer time frame. If the aim is to destroy the industry, sharp decrements over a short time will achieve it, without significant benefit to the consumer," (Kyd *et.al.,* 1992).

The long-term tariff programme (post 1992) for the motor vehicle industry was determined in a 1992 tariff review. The central issue relating to tariff policy at this review, was, "to move them more into line with mainstream tariff policy," (Caucus Committee, 1992c). The review set the

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[2] Between 1984 and 1/1/90, total protection from C.B.U. vehicles was made up of import tariffs and import licensing. Section 2.2.3 outlines the import licensing on vehicle imports after the Industry Plan.

C.B.U. tariff to fall by 2.5% every 12 months starting from a tariff of 32.5% in July 1993, up until July 1996, when the tariff will be 25%. This allows industry time to plan ahead for the gradual falls in protection, particularly in the area of model changes which are planned two years in advance, and require considerable investment in new jigs.

The effect of the liberalization of protection on the efficiency of the assembly industry is difficult to quantify as the assembly industry is very sensitive to any requests for information on costings and productivity. However Table 2.5 and 2.6 show that faults per vehicle are reducing (for the Toyota Corolla), and that output of vehicles per person is on the rise, to some extent indicating efficiency gains.

Table 2.5

Comparison of Faults Per Vehicle (Toyota Corolla)

	New Zealand	**Australia**	**Japan**
1989	9.4	34.0	1.2
1991	1.5	8.0	0.7

Source: The Treasury. *File on New Zealand's Motor Vehicle Industry, 1984-1994.* Wellington.

Table 2.6

Aggregate Output Per Employee in New Zealand's Assembly Industry.

Year	**Output / Employee**
1987	14.1
1989	16.6

Source: Infometrics Ltd (1992) *The Motor Vehicle Assembly Industry: An Analysis of Employment and Viability Issues*. Wellington.

The future of the assembly industry under the decreasing tariff protection is uncertain. "Toyota (N.Z.) Ltd is the only company so far to state publicly that it could continue assembly operations in New Zealand at the 1996, 25 percent level of protection, but only given other favourable developments (specifically, much greater controls on used imports, and the development of new markets)," (Infometrics ,1992). The Government may be considering the assembly and component industry's future finite however, as they have commissioned reports on the employment effects of plant closures from Brookes and Quartermaine (1992) of Auckland University and Infometrics (1992).

2.2.3 An Historical Overview of C.K.D. and C.B.U. Import Licensing.

Import licensing strongly favouring assembly, begun during World War II. The amount of license available up to 1984 was dependent on balance of payments pressures and excess demand for vehicles.

a) *An Historical Overview of C.K.D. Import Licensing after the 1984 Plan.*

At the time of the 1984 industry plan, import licences were allocated on a replacement basis, depending on previous production. Assemblers were awarded a proportion of their previous years production. The plan abolished licensing on C.K.D. imports, as there was no domestic production of C.K.D. kits to protect from overseas competition.

b) *An Historical Overview of C.B.U. Import Licensing after the 1984 Plan.*

Changes to C.B.U. import licensing comprises a major element of the 1984 plan. Two distinct schemes were introduced, rationalisation, and tendering. Under this new scheme, 25 percent of the market was to be opened for imported C.B.U. cars by 1988 (Table 2.7).

(i) *Rationalisation*

As a result of the plan, assemblers were awarded C.B.U. import licences for a larger percentage (5%) of their domestic market, (previously 1.5%) as set out in Table 2.7. For example, an assembler who produced 2500 cars in 1984, would be entitled to import licences for 125 (5% of 1984 production) cars in 1985 under the rationalisation scheme.

The import licence would be charged at the lowest successful tender premium derived in the license tender rounds. The rationale behind this scheme was to link C.B.U. imports into production of C.K.D.s, as a form of protection of assembly, and to minimize problems arising out of short-run low volume productions.

Table 2.7

Import License Access as a Percentage of Domestic Production.

C.B.U. Licence	1985	1986	1987	1988
Tendered License	5.0%	10.0%	12.5%	17.5%
Rationalisation License	5.0%	5.0%	7.5%	7.5%
Total	10.0%	15.0%	20.0%	25.0%
Nominated Component License	**1985**	**1986**	**1987**	**1988**
Nominated Components	2.5%	5.0%	10.0%	15.0%

Source: Ministry of Customs. *Official Information Request for Tariff Level sSince the Industry Plan, 1994.* Wellington: Head Office.

Note: - Import Licensing begins in 1985 with 10 percent of domestic production available for importation.
- Import Licensing ends 1/1/89.

(ii) *Tendering*

The Government had planned to replace import licensing with tariffs, as the principle means of protection, by the 1st of January 1990. Hence the tendering scheme was introduced to determine a tariff level, that would be appropriate without import licensing. As more import licences were made available for tender, the premiums paid suggested what tariffs should be put in place once the import licensing was abolished.

Figure 2.7 illustrates why tendering for import licences was used to determine the level of the import tariff on C.B.U. vehicles. $S_{N.Z.}$ and $D_{N.Z.}$ represent aggregate supply and demand for vehicles in New Zealand. $P_{w(1+t)}$ represents the price of imported vehicles at the border after import tariffs, while the difference between Q3 and Q0 represents the supply of imports at this price. P_d represents the post-intervention price, with import tariffs and import licensing. The difference between P_d and $P_{w(1+t)}$ represents the dollar value allocation of import licenses, per imported vehicle, while Q2-Q1 represents the level of imports possible at P_d. Therefore, as long as P_d - $P_{w(1+t)}$ exceeds $P_{w(1+t)}$, import licensing is the binding import constraint for C.B.U. imports from Japan. This situation may have occurred prior to 1990, when C.B.U. imports were subject to tendered licenses and import tariffs.

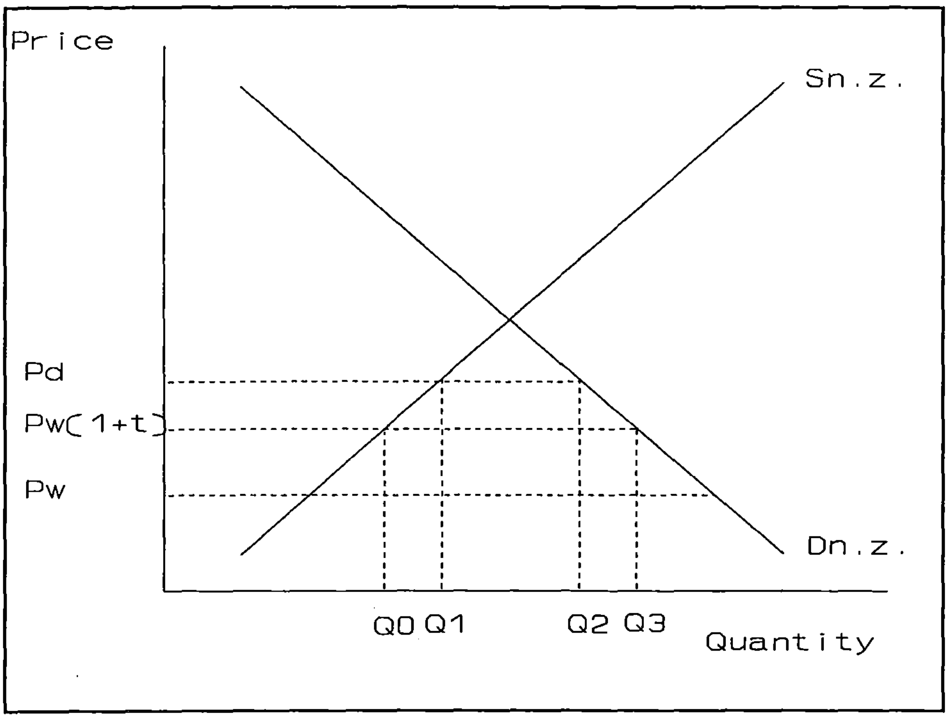

Figure 2.7 The Binding Import Restraint.

The C.B.U. licences were tendered every six months, with restrictions on the percentage of the assembly market to be allocated (Table 2.7 under the tendered licence heading). Both new and used cars could be imported with licences received by tendering.

Imported C.B.U.s were subject to the premium bid in the tender round, plus the import tariff, which was dependent on the source of the car. For example, the successful premiums bid on Round 20 in February of 1985, for units of $2,000 C.I.F., ranged between 27% ($542) and 60% ($1,200). The tariff on C.B.U.s at that time was 55%. Therefore, the total amount of protection on a C.B.U. import in 1985, ranged between, 82% and 115%. This is why most of these licences were used to satisfy the high price, high margin end of the market.

2.2.4 An Historical Overview of the C.K.D. Determination and Nominated Components Policy.

The `C.K.D. determination´ has changed little since its introduction by Coates in 1935. However, the list of `nominated components´ (mandatory deletions) is more comprehensive.

The C.K.D. Determination outlined in the 1984 plan, limits the state in which a C.K.D. kit may be imported, to a chassis built up into a frame, with engine and gearbox fully assembled and attached. "The body, may be built up into the form of a shell, with doors attached thereto. The shell may have a coat of grease, oil, red oxide, or similar protective coating. The shell may not be advanced in manufacture beyond the stage where the necessary welding processes have been performed," (Burdon, 1992).

As mentioned in section 2.2.2, the policy of nominated components, helped foster the component industry in New Zealand. The list of nominated components is in Appendix 3. The effect of this policy was to force local assemblers to use domestically-sourced components, or else pay a tariff, depending on where the componentry was sourced. Table 2.8 contains the tariffs for imported nominated components from Australia and all other countries, since the 1984 plan.

An import licence was also required to import vehicle components, between 1984 and 1989. The licence allocation was a percentage of the assemblers' purchases of overseas componentry in the previous six months. The percentage allocation is in Table 2.7 under nominated componentry.

Table 2.8 New Zealand Tariff Levels on Nominated Components.

Year	**All Coutries (Except Australia)**	**Australian Sourced Components (Closer Economic Relations (CER) Tariffs)**
1985	85.0%	30.0%
1986	85.0%	20.0%
1987	70.0%	20.0%
1988	55.0%	20.0%
1989	45.0%	0.0%
1990 *1	35.0%	0.0%
1991 *1	35.0%	0.0%
1992 *1	35.0%	0.0%
1993 *2	32.5%	0.0%
1994 *2	30.0%	0.0%
1995 *2	27.5%	0.0%
1996 *2	25.0%	0.0%

Source: Ministry of Customs. *Official Information Request.* Wellington: Head Office.
Note: *1 Changes took place on 1 January.
*2 Changes take place on 1 July.

The allocation of component licenses, was increased gradually after the plan, to allow the local component manufacturers to adjust to the increased competition. The new system provided the assemblers with a choice between imported components and the locally produced components. The mandatory deletion scheme operating before the plan, did not allow for any import competition. The aim of this policy was to gradually subject the component manufacturing sector to a degree of overseas competition.

A cost comparison between New Zealand-made components and Japanese-sourced equivalents, would give a good indication of the efficiency of our component sector, under the highly protective tariff regime of the 1980s. The comparison also indicates the cost to the consumer per component item, of protecting the component industry workforce.

Table 2.9 contains the differences between the cost of locally produced vehicle components and the cost of equivalent components if included in the C.K.D. kit. A negative percentage cost difference indicates that the component may be produced more efficiently in New Zealand. These figures indicate that domestic production of alloy wheels, wheelcaps and glass is more efficient than Japanese production (in June 1987). However, the New Zealand component industry's products were on average, 54 percent more expensive than their Japanese equivalents in June 1987.

Table 2.9

Corolla XL Sedan Component Cost Competitiveness, June 1987.

Component	% Cost Difference: Local Versus C.K.D. Pack
Glass	-6 %
Seats	73 %
Seat Belts	11 %
Wiring	84 %
Carpet	135 %
Wheelcaps	-61 %
Door Pannels	35 %
Meltsheets	62 %
Battery	25 %
Radiator	20 %
Exhaust	30 %
Armrest	127 %
Sunvisor	241 %
Package Tray	94 %
Springs	50 %
Alloy Wheels	-16 %
Tyres	21 %
Average	49 %

Source: The Treasury. *File on New Zealand's Motor Vehicle Industry*, 1984-1994. Wellington.

2.2.5 An Historical Overview of the Sales Tax Policy.

The 1974 oil price hike, resulted in a sales tax on motor cars that was determined by engine size. Cars with larger cc. ratings were taxed at a higher percentage (Table 2.10).

Table 2.10 Sales Tax Before the 1984 Plan.

Engine Size	Rate
0 - 1350 cc.	30.0%
1351 - 2000 cc.	37.5%
2001 - 2700 cc.	50.0%
over 2700 cc.	60.0%

Source: Witt, D.A. (1986) *The New Zealand Motor Car Industry After the Plan*. NZIER Research Paper 32.

To bring the sales tax in line with other related goods, and to reduce the inequities on large cars, a two-stepped sales tax was introduced by the plan. A rate of 30% was charged on the value for duty on those cars with an engine capacity of up to 3500cc., and 33% for cars with larger engines. The sales tax was subsequently phased out over a 6 year period after the plan (Appendix 2).

2.2.6 An Overview of Price Control and Hire Purchase Policy.

To further reduce the distortions in the market place, price controls and hire purchase restrictions were eliminated by the plan.

2.2.7 An Historical Overview of the Trans-Tasman Rationalization Policies.

The assembly industry is looking towards the Australian market to increase volumes. They believe they could assemble low volume niche models for Australia, while the Australians produce the large volume models for the Australasian market. The components industry also supports a rationalization policy with Australia, to allow them access to the Australian market.

However under CER, exports can only qualify for free trade if 50 percent of their content is locally produced. The local content of a vehicle refers to the proportion of the vehicle's value that is added domestically (including components, labour, overheads and finance). When tariffs were high, manufacturers were able to provide 50 percent local content, however the fall in protection has increased the overseas competition for component assemblers. Some of these companies have closed, as manufacturers have sourced from overseas. Perry Kerr (Personal communication, 1992), of the Motor Vehicle Manufacturers' Association estimates New Zealand currently averages up to 35 percent local content. Figures for the Toyota Corona in August of 1991, confirm this estimation (Figure 2.8).

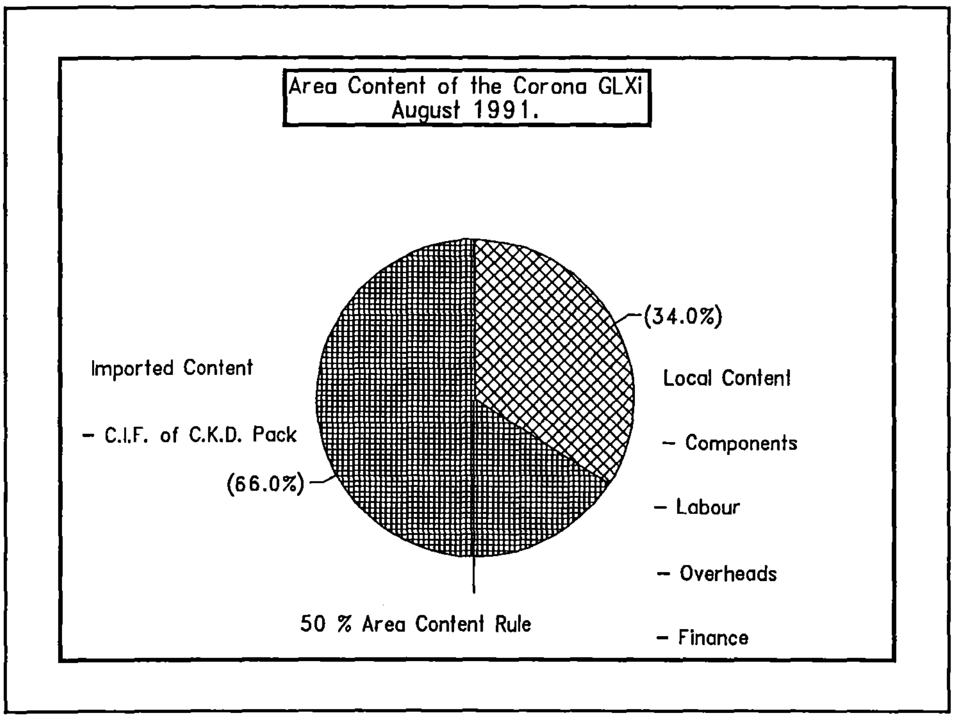

Figure 2.8

Source: Toyota New Zealand (1991) *Presentation to Treasury Officials.* Wellington: Toyota Head Office, May.

Increasing New Zealand's local content becomes increasingly difficult with competition from new Japanese C.B.U.s. Considerably more investment would be required in local car and component assembly to increase local content, and this is unlikely, with the future of the assembly industry so uncertain. The other condition New Zealand must meet before exporting to Australia, is a prohibitive tariff on used imports, (Kerr, P. (Personal communication), 1994).

The Motor Vehicle Manufacturers Association (M.V.M.A.) wrote to the Minister of Commerce on 24 June 1992, claiming that agreement had been reached with their Australian counterparts, to a package involving three elements:

(i) Harmonization of used vehicle import tariffs between Australia and New Zealand (N.Z. $16,000 duty on used imports).

(ii) A reduction of local content requirements from 50 percent to not less than 40%.

(iii) Restoration of export subsidies for C.B.U., C.K.D., and component exports from Australia to New Zealand (the 'Export Facilitation Scheme' which ceased 1/1/93), (Caucus Committee, 1992a).

However, a Secretary for Commerce visit to Australia, shortly afterwards indicated that there was "no consensus within the Australian industry on rationalization, and that some members of both the car and component industries in Australia are opposed to a lowering of the rule of origin," (Caucus Committee, 1992a).

Government is sceptical of the net benefits to New Zealand of a rationalization programme, particularly with the welfare loss from restricting used car imports, (Caucus Committee, 1992b).

2.2.8 Retail Price Movements with Tariff/Tax Reductions.

Figure 2.9 contains the index of real prices for new and used vehicles. In real terms, cars are now considerably cheaper than in the early 1980s. This is due in part to the changes in import tariff, import licensing and excise tax policy which have taken effect since the industry plan. Given the quality improvements in cars that have occurred, consumers are getting much cheaper motoring, and this is not at the expense of significantly higher depreciation rates, as mentioned in section 2.1 (d).

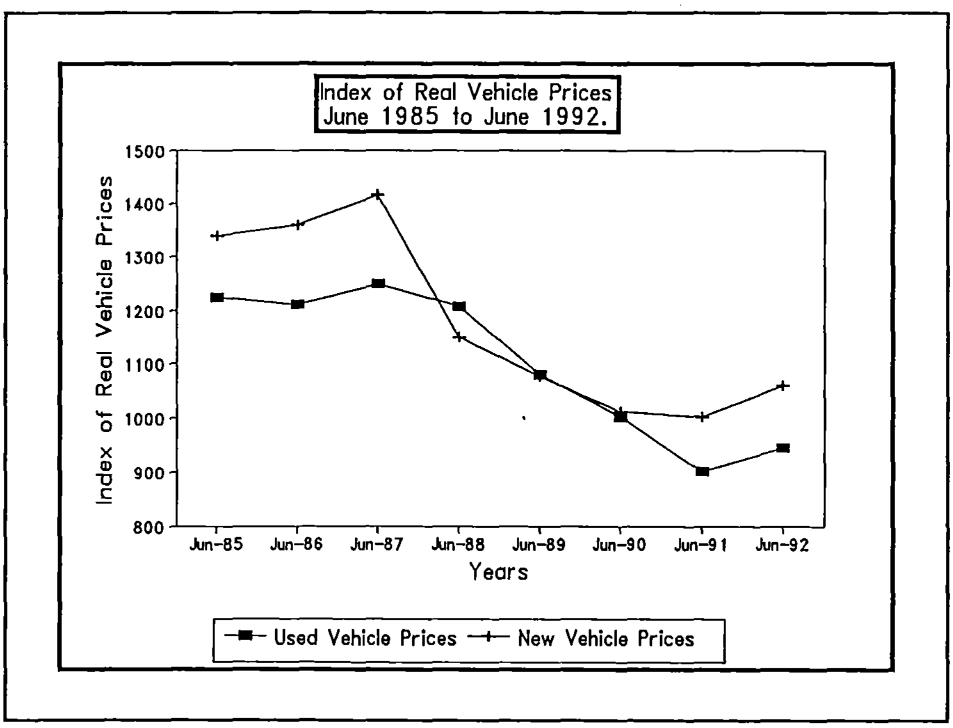

Figure 2.9 Source: New Zealand Department of Statistics (1994d) *INFOS Search of Real Vehicle Prices*: Wellington.

The influence of different tariff levels on the retail price of an average 1600cc C.B.U. import can be seen in Appendix 4, Table A4.1. This example shows that removing the 35% tariff would reduce the retail price of an average 1600cc. vehicle in 1990 by $6,800. One could not generalize from these figures. However, the 1500-2000cc. engine size bracket accounts for approximately 60 percent of our imports. It is interesting to note that although the percentage decline in the retail price (-21.87%) is less than the percentage decline in the tariff from 35% to 0%, the decline in the retail price of the car ($6,800) is greater than the dollar value of the 35% tariff ($4,915).

Having presented an overview of the domestic vehicle market and provided a review of the policies oriented towards this market. Attention will be turned next to the world automotive industry: the industry's development and performance.

CHAPTER III

AN OVERVIEW OF THE WORLD AUTOMOBILE INDUSTRY - THE INDUSTRY'S DEVELOPMENT, AND ITS PERFORMANCE

New Zealand's automobile market is by no means autonomous from the rest of the world. Therefore it is important to consider the recent development and performance of the overseas automobile industry.

The objective of this chapter is (a) to present an overview of the automobile industry's development and (b) to outline the performance of the world's major automobile manufacturers.

3.1 Development of the World Automobile Industry.

The spread of the car industry over the world can be broken into three major transformations. "Each transformation is related to a new innovation in either the product or production process (or both), and furthermore each stage is synonymous with a new region of the world becoming predominant in production, and thus shaping the world car industry," (Altshuler, 1984).

3.1.1 Stage One

Stage one was referred to as `Fordism,' after Henry Ford and his mass production of the Model T Ford between 1902 and the 1920s. He revolutionized automobile production, from the custom-built car involving short production runs and a high number of manufacturers, to a standardized product manufactured on a moving assembly line. He also introduced uniform vehicle components, which avoided the need to file or machine each part to fit.

3.1.2 Stage Two

The second transformation relates to the post-1945 period, through to the 1960s, when demand for motor cars had increased and shifted towards a more diversified range of products. European producers had developed separately, due to different travel patterns, road conditions and consumer tastes. When the European market opened up, they were able to offer a wide range of models, compared to the standardized American products. They also developed a wide range of new product technologies such as small transverse engines, and later front wheel drive and hatchback cars. The second stage was, therefore, characterised by product differentiation and an emphasis on product technology.

3.1.3 Stage Three

Development of the Japanese car industry in the late 1960s brought about the third transformation. The growth in Japanese production, characterised in Stage Three, (Figure 3.1). Like Ford's success, Japan's achievements as a car maker can be traced back to the following factory innovations.

a) *Flexible Production.*

Under Fordism, machines were assigned a particular task, which, due to long set-up times, could only be changed at considerable cost in terms of lost production. The Japanese use a production concept called jidoka. Toyota describes this as "using machines with intelligent function," (Markille, 1992). Rather than fill a plant with robots, Japanese car engineers build quality controls into their production system. Continuous improvement is another feature of the Toyota production method, so experimenting with the system has never ceased.

One of the biggest innovations came from Taiichi Ohno, Toyota's top engineer. He was inspired by his visits to American supermarkets in 1956, where he saw how customers could choose exactly what they wanted and in the quantities they needed. His idea was to let each production worker be the customer of the worker before him in the line and to take from the previous worker only what was needed to complete his job. It would then be up to the previous worker to replace what was taken. This technique pulled products through the production system as the final car specification demanded them.

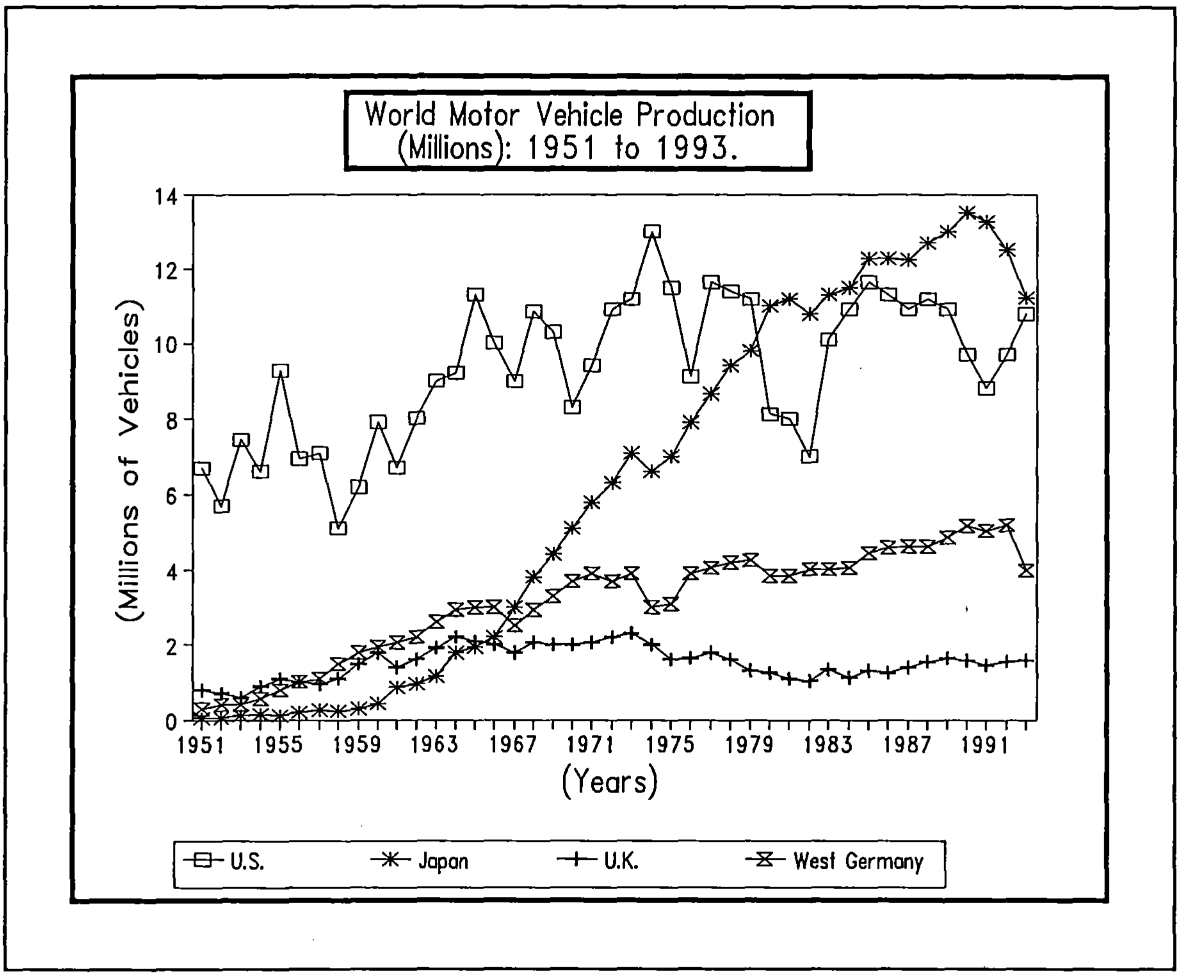

Figure 3.1

Source: Toyota (1994) and Law (1991)

The most recent modernization in Japanese car manufacturing is referred to as `holonic' production. This holistic approach stems from the idea that the whole is greater than the sum of its parts. A `holonic' production plant is capable of producing not only different versions of the same car on the one assembly line, but also completely different cars. The new Mazda plant in Japan is capable of producing every make and model of Mazda. Previously Mazda had separate plants for different models. Apart from lower fixed costs, it is also less painful to stop making a particular model if it fails to sell.

b) *Flexible Firms.*

(i) *Vertical Disintegration.*

The Japanese followed General Motor (U.S.) lead and broke the activities of their firms into profit centres, to the extent that each one was like an independent firm. These profit centres had to compete with outside firms, for the work of other subsidiaries. Those profit centres who could not compete were externalized. A range of activities were externalized in this way, from the manufacture of components and specialised processing, down to service activities such as canteens, cleaning, transport and computer facilities.

(ii) *Just-In-Time Systems (JIT)*

The JIT or `kanban´ system ensures component goods are supplied just as they are needed, reducing inventory costs and the capital required for warehouses. Originally the `kanban´ was a simple tag system through which new supplies could be ordered. Today the JIT system involves sophisticated communication systems between assemblers and suppliers that ensures that orders are transmitted and delivered as required.

However the JIT system involves more than just inventory control. It is also a system of quality control, since suppliers must guarantee the quality of the product, and pay heavily for any failures.

3.1.4 <u>The World Car Industry Since Stage Three</u>

a) *Lean Manufacturing and Lean Retailing.*

(i) *Lean Manufacturing.*

In 1986, a research team from the Massachusetts Institute of Technology (MIT) began a thorough study of the differences in car plants around the world. Their results showed that the Japanese "took less time to make a car with less defects than the American or European plants (Table 3.1). The main differences were due to the way the factories were organised." (Massachusetts Institute of Technology, 1989).

Table 3.1 How Three Continents Make Cars: 1989.

Average for Car Plants In:	**Japan**	**U.S.**	**Europe**
Performance			
Productivity (hours per car)	16.8	25.1	36.2
Quality (defects per 100 cars)	60.0	82.0	97.0
Layout			
Factory space (number of square feet per car per year)	5.7	0.8	7.8
Size of repair area (as a percentage of assembly space)	4.1	12.9	14.4
Stocks (for 8 sample parts)	0.2	0.9	2.0
Employees			
Workforce in teams (%)	69.3	17.3	0.6
Suggestions (per employee per year)	61.6	0.4	0.4
Number of job classifications	12.0	67.0	15.0
Training of new workers (hours)	380.0	46.0	173.0
Automation (% of process			
Welding	86.0	76.0	77.0
Painting	55.0	34.0	38.0
Assembly	2.0	1.0	3.0

Source: Massachusetts Institute of Technology (1989) *The Machine that Changed the World.* Cambridge: MIT Press.

The MIT's findings described the way the Japanese made their cars as 'lean manufacturing', (Massachusetts Institute of Technology, 1989). It also demonstrated that the technique could be easily copied. Nobuhiko Kawamoto, the President of Honda, said "his firm's American plant at Marysville, Ohio, can now produce cars better than those made in Japan," (Markille, 1992). The arrival of Japanese plants (transplant operations) in America and Europe has provided an example for other manufacturers to follow.

New Zealand's assembly plants have also capitalized on the Japanese 'lean manufacturing' techniques. This technology is also shared with other sectors of the New Zealand manufacturing sector. "In 1994 the Thames Plant (Toyota New Zealand Assembly Plant) will host not hundreds, but thousands of corporate visitors seeking assistance with improving their workplace teams," (Field, 1994).

(ii) *Lean Retailing.*

Another more recent 'lean' innovation is that of 'lean retailing', where the customer's order is transmitted from the showroom floor to the factory. The factory builds precisely what the domestic customer wants, and delivers it within days. Toyota knows that 30 percent of all its Corolla cars sold in Japan will be sold in white. However, it still builds to order. This removes the risk of stocks piling up requiring discounting to clear. It also avoids storage costs, which are at a premium, particularly in Japan. New Zealand vehicle assemblers will also make to order and deliver via their retail stores. "Toyota will assemble a specific vehicle to order and deliver within 5 to 7 days," (Kerr, (Personal communication), 1994).

b) *Vertical Disintegration.*

Automobile companies today are participating in transplant operations[3], joint ventures and takeovers.

Japanese transplants in North America and Europe enable the Japanese to assemble high-volume models offshore, to avoid tariffs and reduce resource costs (energy, labour, land). They retain low-volume, high value added production within Japan. The North American transplants have captured 30% of the U.S. market. The same trend is taking place in the component industry. Outside specialists are producing more parts for the car industry, while the car manufacturers are concentrating purely on assembly. In Japan, component suppliers already provide about 70 percent of the value of a complete car. In the U.S. that figure is approximately 50 percent. "Car makers own or have a stake in some of their suppliers companies, but many are independent companies and some are rapidly becoming global specialists for producing particular parts, like

[3] A transplant operation is an offshore vehicle manufacturing plant. For example, BMW of Germany, has established transplant operations in South Africa and North America.

Germany's Robert Bosch and France's Valeo in electronics, America's TRW in steering and Britain's GKN in bearings," (Munkins, 1993). New Zealand exports wiring looms to Japanese vehicle manufacturers.

There are many examples of joint ventures between vehicle manufacturers. General Motors (U.S.) owns Opel (Germany); Vauxall and Lotus (U.K.); Holden (Australia); 50 percent of SAAB and has links with Suzuki, Isuzu and Daewoo (Korea). Volvo owns the other 50 percent of SAAB, and plans a joint venture in the Netherlands with Mitsubishi.

Joint ventures in research and design are also commonplace today. Italy's Pininfarina designed and manufactured the Allante body for the Cadillac; Mazda designed Ford's Capri, Festiva, Laser and Escort and Porsche AG carried out the design work for the Mazda 929's V-6 engines, as well as Volkswagen's 4-cylinder engines.

Distribution joint ventures also take place around the world today. For example, G.M. distributes Isuzu vehicles in Europe, Canada and the U.S.; Renault vehicles in Brazil; SAAB-Scania AB vehicles in Canada and Brazil and Suzuki vehicles in the U.S. Toyota distributes both G.M. and Volkswagen vehicles in Japan.

"Cooperation between car manufacturers rather than competition is fast becoming the trend. The 12 major car producers have created a worldwide, oligopolistically cooperative market structure - not a cartel, with written market sharing agreements, and not a monopoly wherein one firm owns the means of production - but a seamless web of pecuniary and technological interdependencies that structurally binds the participants to a common fate," (Munkins, 1993).

3.2 The World Car Industry's Performance.

The 1980s was characterized by production growth in all the major car manufacturing countries, particularly in Japan and Europe (Figure 3.1). The turning point to this growth occurred in 1990, with the recession, and the saturation of car markets in developing countries, both taking their toll on car sales. Since 1990 production in the major manufacturing countries has fallen dramatically, except for production in America and the U.K in 1992/93. This growth in the U.S. and U.K. may be due in part to the establishment of Japanese transplants in these two countries, and also due to an increase in demand for recreational and commercial vehicles, particularly in America.

Tables A5.1, A5.2 and A5.3 (Appendix 5) present the production figures for the world's major car manufacturing companies from 1986 to 1993. Tables A5.4, A5.5 and A5.6 outline the performance (Sales $U.S. million and Net Income) of these companies between 1989 and 1993.

3.2.1 Japanese Performance.

Table A5.1 presents the production figures of Toyota, Nissan (1986-1993) and Mitsubishi (1988-1993). These figures include any production by their transplant operations overseas. The drop in manufacturing since 1990 is substantial for Toyota and Nissan. "In 1991 all Japanese firms except Mitsubishi saw profits retreat as sales fell 3.2%, the first fall since 1980," (Hapimiraki, 1992).

Although production of vehicles by Toyota and Nissan has reduced, sales figures (Tables A5.4-A5.6) have increased substantially, which would indicate production is shifting into lower volume, higher value added models.

3.2.2 U.S. Performance.

Between 1988 and 1992 production by the three major American car manufacturers GM, Ford and Chrysler was characterised by negative growth (Table A5.2). "In 1991 both Ford (U.S.$2.3 billion) and GM (U.S.$6 billion) made record losses," (Hapimiraki, 1992).

Unlike the Japanese however, 1992 and 1993 production by these three companies increased, particularly in vehicles other than passenger cars (commercial and recreational vehicles). By the second quarter in 1994, both GM and Ford had posted record profits, with "GM marking the first time in four years that the company has put together three consecutive profitable quarters," (Reuters, 1994a), while the second quarter profit recorded by Ford was "the biggest quarterly profit in its history," (Reuters, 1994b). Concentrating on production of recreational and commercial vehicles, where the competition from Japanese and other manufacturers is less, has been beneficial for the U.S. vehicle manufacturers.

3.2.3 European Performance.

Table A5.3 presents the production figures for Fiat, V.W. and Renault. Output from the Fiat company in Italy has fallen at an alarming rate since 1989 (production has dropped 48 percent between 1989 and 1993). Fiat's sales figures ($U.S. million) increased during those years until 1993, when sales declined by 30 percent on the previous year (Tables A5.4-A5.6).

The production figures for V.W. and Renault would indicate that the period 1989 to 1992 was not as difficult for these companies as it was for those discussed above. However, in 1993 compared with 1992, both sales (Tables A5.4-A5.6) and production (Table A5.3) fell substantially for these two European manufacturers.

Predictions for the European market in 1994/95 are positive, with "forecasters such as McGraw Hill, Germany's Marketing Systems, and the London-based Economist Intelligence Unit, predicting new car sales growth of between 6.4% and 8%," (Reuters, 1994c). Others see a less healthy performance. "There is still a recovery but not nearly as substantial as the preceding decline. `We're climbing out of the trough, but not as fast as we fell into it.´ says Charles Young, director of research at Landell Mills Commodities, London," (Reuters, 1994c).

The main point to note from Section 3.2, is that the sales and production patterns observed in Japan, the U.S. and parts of Europe, particularly in the early 1990s, are consistent with those experienced in New Zealand's motor vehicle market during this period. Domestic sales of new and second hand vehicles between 1989 and 1993 have decreased substantially (Figure 2.2), as have sales of Japanese, European and U.S. vehicles.

Having presented a chapter on the general characteristics and government policies of New Zealand's motor vehicle market and a chapter on the development and performance of the world automotive industry. The following section will outline the analytical framework used in this thesis.

CHAPTER IV

ANALYTICAL FRAMEWORK

The objective of this chapter is to present the analytical framework that will be used as a basis for determining the efficiency of the policy changes since the industry plan of 1984.

4.1 A Partial Equilibrium Analysis of Protection.

This section will present the partial equilibrium static analysis of import protection, that forms the basis of the nominal and effective protection coefficients discussed in the following section. It is implicitly assumed that assembly of vehicles in New Zealand is perfectly competitive and that there are no distortions in the input markets. The import supply elasticity for vehicles is perfectly elastic, assuming that New Zealand's trading in the world market for vehicles has no influence on the respective world price. Vehicles are assumed to be homogenous and are imported and produced domestically. In figure 4.1, the import supply is represented by the line **Sm** so that P_j^w is the free trade border price of vehicles. The domestic supply curve for import competing production is represented by **Sd**, while **Dd** represents the domestic demand curve for the product. **Dd** represents the demand for imports and domestic production combined. Free trade domestic production of vehicles is **Q0** and quantity demanded is **Q3**.

Import protection is imposed on the motor vehicle industry to protect domestic production. The *ad valorem* rate of protection is the difference between P_j^p and P_j^w . The increase in price raises domestic production to **Q1**, and reduces quantity demanded to **Q2**. The level of imports falls from **Q3-Q0** to **Q2-Q1**, while the value of imports falls by **Q0 Q1 E D** plus **Q2 Q3 F C**. Government revenue from protection is equivalent to the dollar value of the area **A B C D**.

A reduction in the level of import protection will have the opposite effect, the import supply schedule will shift downwards, imports of vehicles will increase, at the expense of domestic production.

The following effects of the import tariff can be distinguished.

(a) Production or Protection Effect: Domestic output increases from **Q0** to **Q1**.

(b) Consumption Effect: Consumption falls from **Q3** to **Q2**.

(c) Import or Balance of Payments Effect: Imports fall by the sum of the production and consumption effect.

(d) Redistribution effect: Since the price to domestic producers has risen at the expense of domestic consumers there is a redistribution of income. The consumer is subsidizing the output of the domestic product by $P_j^p - P_j^w$ per unit.

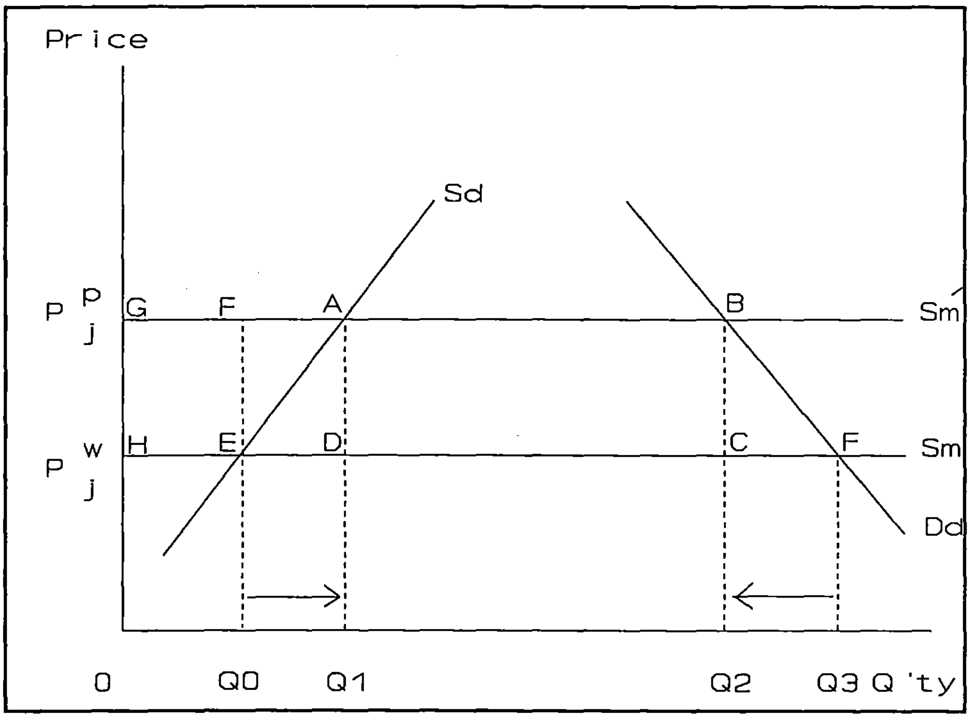

Figure 4.1 Partial Equilibrium Analysis of Import Protection

4.2 Nominal and Effective Coefficients of Protection.

This section presents the theory of nominal and effective protection.

4.2.1 The Nominal Rate of Protection.

The theory of nominal protection is based on the partial equilibrium framework above, assuming there are no distortions in the input market.

The central question in relation to the Government's trade policy, is what is the efficiency of the policy?

Prices contain two types of information; relative scarcity, or the value of a resource to the economy, and secondly, the relative incentives to produce, market and consume different commodities. Efficiency may be assessed using the nominal rate of protection, through price comparisons, by comparing the existing price structure with an alternative one that reflects efficient resource use. The alternative set of efficient prices, reflects the opportunity cost of commodities that are traded on the world market. These values when converted to domestic currency are termed `border prices.'

Government trade policy creates a divergence between the domestic price of the good and its opportunity cost. In simple terms, a procedure to determine the magnitude of the resulting price distortion, should consist of a comparison between the domestic post-intervention price of the good in question and the corresponding world (border) price. The magnitude of the price distortion can be algebraically determined as followed.

$$PD_j^p = P_j^p - P_j^w . E_t^r \tag{4.1}$$

where: PD_j^p = magnitude of the price distortion faced by domestic producers of good j.

P_j^p = domestic price of good j, received by domestic producers (this includes all taxes and subsidies).

P_j^w = world price of good j, in foreign currency terms.

E_t^r = exchange rate at time t (domestic currency units per unit of foreign currency).

When the magnitude of the price distortion is expressed in ad valorem terms, one obtains what is termed the nominal rate of protection (NRP). Balassa (1971), defined the NRP, as the percentage excess of the domestic price of the world market price, resulting from the application of protective measures. The NRP for producers is given by the following expression:

$$NRP_j^p = \frac{P_j^p - P_j^w.E_t^r}{P_j^w.E_t^r} * \frac{100}{1}$$

(4.2)

A similar measure may be used to quantify the distortions faced by consumers at the retail level (the NRP for producers is calculated at the ex-factory level). However, the analyst faces the problem of unknown wholesale and retail margins, that may under or overvalue the resulting NRP values. For this reason, the NRP calculations in this study use only ex-factory prices adjusted for distortions and transportation costs.

The NRP can assume a range of numerical values. If the NRP is larger than 0 percent [NRP * (100/1)], then domestic producers are receiving a higher price, after intervention, than they would without intervention. This is called `positive protection.' If the NRP < 0 percent, then the reverse structure of protection is in force. If NRP = 0 percent, then the structure of protection is neutral, where producers face domestic prices that are equal to border prices. Therefore the greater the divergence of the NRP from zero, the greater the effect of policy on altering price structures, and the incentives to produce a product domestically.

4.2.2 <u>The Effective Rate of Protection.</u>

The NRP is a useful tool to measure the price distortions to which producers react. However, the NRP measure fails to take account of distortions in input markets, faced by producers. That is input prices may also be affected by protection. One estimate of the net effect of distortions in the input and output market, that producers face, is the effective rate of protection (ERP). The effective rate of protection, provides an estimate of "the direction in which the structure of protection causes resources to be pulled as between activities producing traded goods. Domestic production will shift from low to high effective-protective-rate activities," (Strak, 1982).

Corden (1985), defined the effective rate of protection, as the percentage increase in value added per unit in an economic activity which is made possible by the tariff structure relative to the situation in the absence of tariffs, but with the same exchange rate. It depends not only on the tariff on the commodity produced by the activity but also on the input coefficients and the tariff on the inputs. As Johnston (1969) recognized, a tariff on a good used in a productive process is equivalent to a tax on the output of that process, and the consequent necessity of distinguishing sharply between the structure of tariff rates on commodities entering international trade (nominal tariff rates), and the structure of rates of protection accorded by the tariff structure to the specific processes or stages of production that make up the productive system (effective rates).

However, Sampson and Yeates (1976) have noted, in their Effective Protection study of Sweden's agricultural sector, that the estimation of effective protection using tariff data alone, would give an erroneous picture of the level of Swedish protection, as the measures would not pick up the distortions created by other forms of protection.

Others, to extend their application of the effective protection theory beyond input and output tariffs, include Valdes (1973); Motha and Plunket (1974); and Wipf (1971). They take into consideration (a) other trade distorting measures such as quantitative restrictions, variable levies, and export subsidies, and (b) indirect taxes, price support programs, transport costs, disequilibrium exchange rates and subsidies.

Producers' decisions, in relation to the effective rate of protection, are therefore based on what they receive for value added. Corden (1985) defined this value added per unit of output, as value added by primary factors, plus value added by non-traded inputs. In other words, it is the difference between the price of the final good and the cost of tradeable inputs per unit of output. "The intuitive defence is that protection for an activity producing a traded product represents not only protection for those primary factors intensive in that activity but also protection for those industries producing non-traded inputs in which that activity is intensive and thus, indirectly, protection for the primary factors intensive in these non-traded input industries. There appears, thus, to be a complete identity between primary factors and non-traded input industries," (Corden, 1966).

In calculating value added, depreciation must also be considered. The question is whether it should be treated as a traded or nontraded input. ERP studies, with access to detailed information on depreciation, use as their guideline the method of financing the capital investment, to determine whether depreciation be treated as a traded or nontraded input. If the funds tied up in the purchase of the capital asset are borrowed from or could be lent to international capital markets, the cost of providing the services from the capital asset - for example, equipment or buildings - should be considered a traded input cost. The cost of these capital services is made up of maintenance and repairs, depreciation, and the interest payment due on the loan. Depreciation is then a component of this overall cost and should be considered a traded input. On the other hand, if the investment funds used in the purchase of the capital asset displace or could finance alternative uses restricted to domestic capital markets, then the cost of providing the services should be considered nontraded, (Tsakok, 1990).

In this case, depreciation will be treated as a nontraded input, as access to any detail on capital depreciation was prohibited by the local assembly companies. It is therefore treated as part of the domestic resource cost of production to obtain value added.

As stated earlier, the ERP attempts to measure the level of protection given to a productive activity, by comparing the value added in domestic prices, obtainable by reason of the imposition of tariffs and other policy measures on the product and its inputs, with the value added in world or border prices. That is,

$$ERP = \frac{\text{Value Added at Domestic Prices - Value Added at World Prices}}{\text{Value Added at World Prices}}$$

$$ERP_j^{\,p} = \frac{V_j^{\,d} - V_j^{\,w}}{V_j^{\,w}} * \frac{100}{1} \qquad (4.3)$$

Where: V_j^d = value added per unit of good j, at domestic prices.

V_j^w = value added per unit of good j, at world market prices.

For the derivation of the ERP formula, refer to Appendix 6.

Due to the availability of world and domestic output and input price data for the New Zealand motor vehicle assembly industry, the expression that will be used to calculate the Effective Rates of Protection in this study, is derived from equations (A6.2) and (A6.9) in Appendix 6, and is set out below.

$$ERP_j^p = \frac{\left[P_j^w E_t^r[1+t_j^p] - \sum_{i=1}^{n} P_i^w E_t^r[1+t_i^p] A_{ij}\right] - \left[P_j^w E_t - \sum_{i=1}^{n} P_i^w E_t^r . A_{ij}\right]}{\left[P_j^w E_t - \sum_{i=1}^{n} P_i^w E_t^r . A_{ij}\right]} * \frac{100}{1} \tag{4.4}$$

Where t_j^p and t_i^p reflect the ad valorem tariff equivalent of the set of all trade policy distortions and P_j^p and P_i^p reflect the post-intervention prices.

$$t_j^p = \frac{P_j^p - P_j^w E_t^r}{P_j^w E_t^r}$$

$$t_i^p = \frac{P_i^p - P_i^w E_t^r}{P_i^w E_t^r}$$

$$P_j^p = P_j^w . E_t^r \, [1+t_j^p]$$

$$P_i^p = P_i^w . E_t^r \, [1+t_i^p]$$

The Effective Rate of Protection may also be expressed as the Effective Protection Coefficient (EPC).

$$EPC_j^p = \frac{V_j^d}{V_j^w} \tag{4.5}$$

$$EPC_j^p = \frac{\left[P_j^w E_t^r[1+t_j^p] - \sum_{i=1}^{n} P_i^w E_t^r[1+t_i^p] . A_{ij}\right]}{\left[P_j^w E_t^r - \sum_{i=1}^{n} P_i^w E_t^r . A_{ij}\right]} \tag{4.6}$$

Interpretation of the ERP and EPC is similar to the NRP. If the ERP is larger than zero percent [ERP * (100/1)] or the EPC larger than 1, then domestic producers are receiving a greater return on their resources, given Government intervention, than without it. They are enjoying positive protection. If ERP is less than zero percent, or the EPC less than 1, the reverse structure of protection is in force, where producers face higher prices with protection, than without it.

ERPs significantly greater than zero (EPCs significantly greater than 1) over a considerable period mean that substantial excess revenues are being earned, revenues well above the levels that would have prevailed under competitive conditions. These excess revenues in turn may imply that production need not be as efficient (not using the least-cost input mix) as a competitive activity would have to be to survive. If domestic producers had to face foreign competition, they would have to be more efficient to remain in production, (Tsakok, 1990).

If the EPC is less than zero, it means that either value added in domestic prices is negative, or value added in border prices is negative. If value added in domestic prices were negative, producers would not stay in business unless they were being subsidized by the Government to remain in an unprofitable business. If value added in border prices is negative then the economy is losing, "as the cost of the traded inputs exceeds the gross value of the output," (Tsakok, 1990).

4.3 Assumptions of the Effective Rate of Protection.

The ERP theory relies on a number of important assumptions. Strak (1982), has pointed out the main ones, from the theoretical literature on the Effective Rate of Protection.

These include: a) the input-output coefficients of production are assumed fixed; that is, after production, there is no change in the input-output relationships. Hence zero elasticity of substitution is assumed between material inputs and primary factors; b) the elasticities of supply of all imports are infinite; c) the elasticity of supply of factor inputs to the industry is less than infinite. These primary factors of production are also considered to be mobile nationally, but immobile internationally; d) all goods are considered to be traded before and after protection and exchange rate repercussions of the tariff policy are negligible; e) the rate of protection applied to an imported good is assumed to represent the difference between free trade and domestic prices of tradeable goods; f) there is no discrimination of tariffs between countries of origin; g) the appropriate government economic policy exists which will sustain full employment.

4.4 Limitations of the Analytical Framework.

The analytical framework described above, like any other, has some limitations. An obvious limitation is the assumption that firms have constant technical coefficients of production. This implies that producers do not react to changes in the relative price of inputs brought about by policy intervention. More specifically, they do not react to changes in relative input prices by economizing on the relatively more expensive inputs and utilizing more of the relatively less expensive inputs.

According to Corden (1966), calculations of effective rates of protection which use domestic input-output coefficients will overstate the effective rates if there is any substitution from primary inputs towards intermediate inputs, or vice versa, unless errors are offsetting.

Another limitation of the analytical framework, is that the ERP concept assumes that all firms involved in the production of the final product have the same technical coefficients. In practice, however, those coefficients might differ somewhat among firms. In that case, the analysis suffers from an aggregation problem, since intervention in output and input markets yield different effective rates, unless the ad valorem tariff equivalent on output happens to be the same as that for each of the intermediate inputs, (Corden, 1971).

The analytical framework described above assumes that there are no quality differences between domestic and foreign products. If this assumption is verified, the estimated tariff equivalents are not biased. However, if domestic production is of inferior quality, the estimation obtained is biased downward, and if domestic production is of superior quality, the estimate is biased upward, (Dardis and Learn, 1967).

The final limitation occurs when analysing the results of the effective protection coefficients. A disaggregated effective protection analysis of a single industry, such as this study, does not allow one to make conclusions of the resource pull between industries, resulting from differing levels of protection. An aggregate effective analysis of all industries, making use of the information in input-output tables will allow general conclusions of the resource pull effects to be made.

4.5 Limitations of the Small Country Assumption.

The simplicity of the NRP and ERP calculations lies in the small country assumption, which allows the practitioner to assume that a country's trading has no effect on the world market price of traded commodities. This assumption suggests that New Zealand's import supply elasticity for vehicles from Japan is close to or perfectly elastic.

Figure 4.2 illustrates the small country case. The import supply curve is **Sm** and the import demand is represented by **Dm**. The slope of **Sm**, indicates that a change in import demand will have no effect on the border price. Free trade equilibrium occurs at the point `**A**´ where vehicles enter at the duty free border price $P_j^w$. The imposition of import protection from the importers point of view shifts the import supply schedule up to $S_m'$ and the new equilibrium point is `**B.**´ The quantity of vehicles supplied from Japan falls from **Q1** to **Q0**.

To illustrate the effect of import protection on a large country the graphical exposition is modified in Figure 4.3 to incorporate an upward sloping supply curve. The import supply schedule is upward sloping from the importers viewpoint because a change in the quantity of imports demanded can be expected to change the import price. In this large country environment, the import price is determined by the interaction of the importers actions (including Government) and the actions of exporters (or import suppliers). In particular the exporters are prepared to supply few goods at a lower price because they are assumed to be operating on the upward sloping portion of their cost curves.

At equilibrium `C,´ the price is P' and the quantity supplied is Q1. Protection shifts the supply curve upwards to S_m' because from the exporters viewpoint, the importer is less willing to import built up cars (C.B.U. vehicles). It is not a parallel upward shift because the amount of protection increases as the price increases. The quantity imported falls to Q0 while the domestic price rises to P_j^p because of the increased scarcity on the domestic market. The world or border price falls to P_j^w because less is being purchased on the world market. The difference between P_j^p and P_j^w represents the total amount of import protection per unit of imports (NRP). The new equilibrium occurs at `A.´

In the large country case, the protection is paid partially by domestic consumers (through a rise in the price paid from P' to P_j^p) and foreign producers (through a fall in price received from P' to P_j^w). In the small country case, only the consumers bore the burden of the tariff.

The observed border price P_j^w is not the correct price to include in measuring the protection coefficient, because it is not the price domestic decision makers would have to face in the absence of intervention. Therefore the unobserved border price P' must be estimated to measure the nominal rate of protection, using Equation 4.7. The derivation of this unobserved price is presented in Appendix 8.

$$P' = P_j^w[\eta_{sm} - \eta_{dm}] \;/\; [\eta_{sm} - \eta_{dm}\frac{P_j^w}{P_j^p}] \tag{4.7}$$

where: η_{sm} = the import supply elasticity

η_{dm} = the import demand elasticity

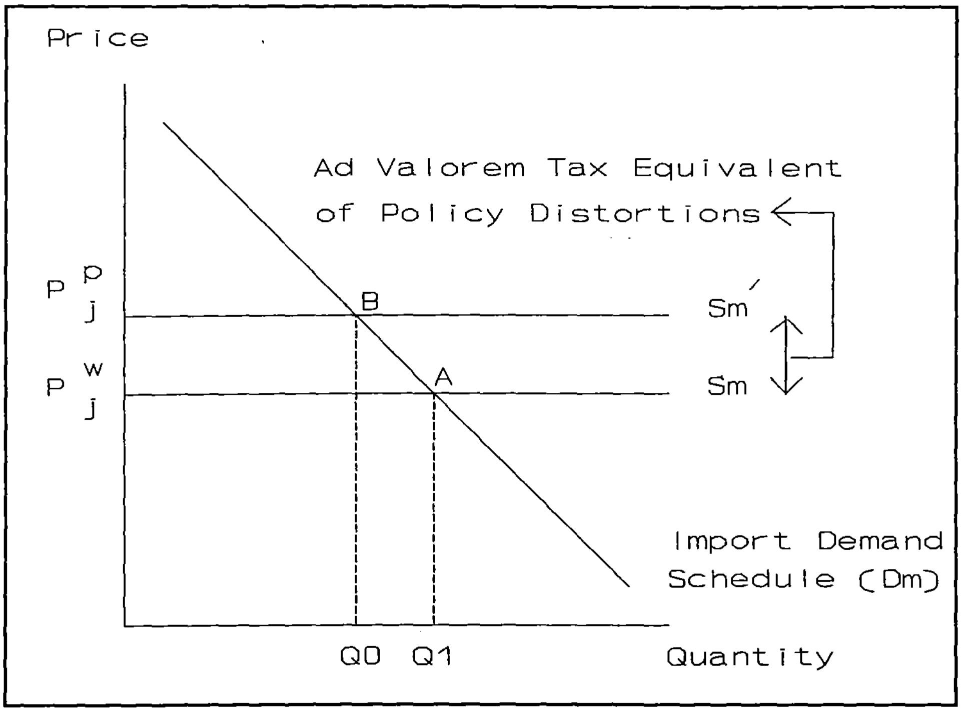

Figure 4.2 <u>The Imposition of Protection on a Small Country.</u>

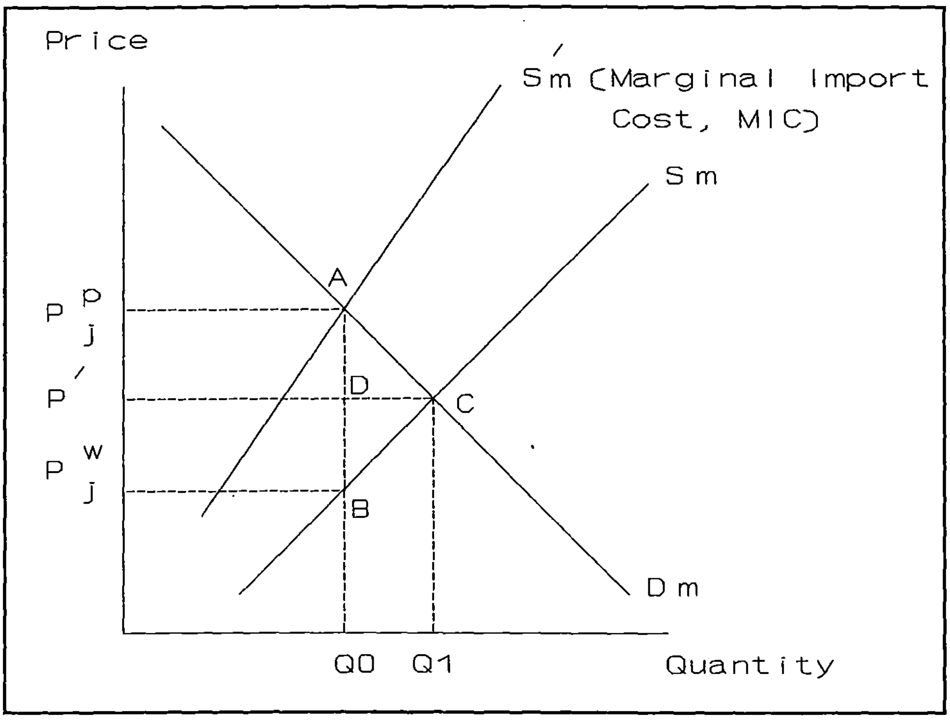

Figure 4.3 <u>The Imposition of Protection on a Large Country.</u>

The removal of the small country assumption, will, in turn alter the formula for the nominal rate of protection. The new expression for the nominal rate of protection becomes:

$$\text{Adjusted NRP}_j^{\,p} = \frac{P_j^{\,p} - \left[P_j^{\,w}[\eta_{sm} - \eta_{dm}] \,/\, [\eta_{sm} - \eta_{dm} \frac{P_j^{\,w}}{P_j^{\,p}}] \right] . E_t^{\,r}}{\left[P_j^{\,w}[\eta_{sm} - \eta_{dm}] \,/\, [\eta_{sm} - \eta_{dm} \frac{P_j^{\,w}}{P_j^{\,p}}] \right] . E_t^{\,r}} \qquad (4.8)$$

From the Adjusted NRP formula and Figure 4.3 it can be seen that using $P_j^{\,w}$, instead of P' for a particular commodity, would lead to an exaggeration of the level of protection, if New Zealand's trading in that commodity had any influence over the respective world price.

Calculation of the effective rate of protection, on the other hand, is more difficult if the country is not a price taker in the input markets. This is why most of the application of this theory has been undertaken in less-developed countries, and countries such as Canada, Australia and New Zealand, where it is possible to assume that import supply elasticities for most products are infinite or close to infinite. The problem can be broken into two elements; first non-infinite import supply elasticities for final goods, assuming infinite elasticities for their traded inputs; and secondly non-infinite elasticities for inputs, as well as final goods.

Measurement of the ERP under the first scenario, would require the calculation of price P′ for the final good (equation 4.9), as with the adjusted NRP formula above (equation 4.8).

$$\text{ERP}_j^{\,p} = \frac{\left[P_j' E_t^{\,r}[1 + t_j^{\,p}] - \sum_{i=1}^{n} P_i^{\,w} E_t^{\,r}[1 + t_i^{\,p}] A_{ij} \right] - \left[P_j' E_t - \sum_{i=1}^{n} P_i^{\,w} E_t^{\,r} . A_{ij} \right]}{\left[P_j' E_t - \sum_{i=1}^{n} P_i^{\,w} E_t^{\,r} . A_{ij} \right]} * \frac{100}{1} \qquad (4.9)$$

However the ERP coefficient becomes very difficult to calculate in the second case, where the traded input supply schedules are also not infinitely elastic. It would be necessary to calculate the import supply and demand elasticities for every input and output in the production process, to derive P′ values for both the final goods and the inputs (equation 4.10).

$$ERP_j^p = \frac{\left[P_j/E_t^r[1+t_j^p] - \sum_{i=1}^{n} P_i/E_t^r[1+t_i^p]A_{ij}\right] - \left[P_j/E_t - \sum_{i=1}^{n} P_i/E_t^r.A_{ij}\right]}{\left[P_j/E_t - \sum_{i=1}^{n} P_i/E_t^r.A_{ij}\right]} * \frac{100}{1} \tag{4.10}$$

The simplicity of the ERP formula (equation 4.4) lies in the fact that infinitely elastic supply curves allow the analyst to ignore any change in output due to Government intervention, and concentrate instead on value added, with and without intervention.

Therefore the choice of technique that may be used to analyze the level of protection, is dependent on the elasticities of the import supply schedules, with the ERP only being applied when one can justify the assumption of infinitely elastic traded input supply schedules.

4.6 Testing the Small Country Assumption.

To test the validity of the small country assumption, the import supply elasticity will be estimated for new C.B.U. vehicles from Japan. The following section presents the theoretical basis of supply functions. This is followed by the specification of the import supply function, to determine the supply elasticity for new vehicles from Japan.

4.6.1 Theoretical Basis of Supply Functions

Empirical studies of international trade flows have generally concentrated on the formulation and estimation of demand relationships for imports and exports (Houthakker and Magee, 1969; Taplin, 1973; Hickman and Lau, 1973). Supply relationships have typically been handled by assumption, the usual practice being to assume that the export and import supply price elasticities facing any individual country are infinite (Goldstein and Khan, 1976).

The majority of the literature available on estimating these import/export supply elasticities use a simultaneous equation approach, (Sarwar and Anderson, 1990; Goldstein and Khan, 1976; Muscatelli, Srinivasan and Vines, 1992). A simultaneous equation estimation will account for the effects of both changes in demand and supply behaviour or functions, on quantity and price.

However, a study by Rhomberg and Boissonneault (1964), estimated single equation export supply functions similar in specification to the import supply curves used in the simultaneous equation literature of Goldstein and Khan (1976).

Studies on agricultural supply elasticity estimations also form a useful guideline for the specification of supply functions (Tweeton and Quance ,1969; Meilke, 1977; Houck and Gallager, 1976). Learn and Cochrane (1961); Nerlove and Bachman (1960) provide information on the problems of obtaining estimates of supply elasticities. "One of the chief problems in the empirical application of economic theory is the problem of specifying the correct, or at least a useful relation between the constructs of the theory and the variables which actually may be observed," (Nerlove, 1961).

It is important to know whether changes in output occur as a result of a movement along a supply curve, or because of shifts in the supply curve. Shifts in supply result from changes in the values of any of the variables other than price and quantity. These variables that shift the supply curve are called `supply shifters.´

The two variables classified here as `supply shifters,´ are the price of inputs or factors and the prices of competing commodities.

(a) *Input Prices.*

An increase in the use of inputs may occur as a result of either an increase in the price of the product or a decrease in the price of inputs. A change in the price of an input is treated as the supply shifter. The prices of inputs may be treated relative to the output price, or as separate variables in the supply equation. Input prices relative to output prices are usually treated as price ratios, (Houck and Gallagher, 1976). The accuracy of an output/input price ratio in predicting the changes in supply depends on the proportion of that input used in the production process.

Analysts have found that using separate variables for the output and input prices, rather than a price ratio variable has improved the supply estimates, (Meilke, 1977).

(b) *Profitability of Competing Commodities.*

The supply curve for a given commodity will shift to the left if competing or alternative commodities become more profitable, and will shift to the right if competing commodities become less profitable. In an empirical analysis of supply, the prices of competing products are usually included as one of the explanatory variables, (Sarwar and Anderson, 1990; Muscatelli, Srinivasan and Vines, 1992; Learn and Cochrane, 1961).

The problem of multicollinearity among price series is such that one seldom attempts to include the prices of more than one or two major competing products and more than one or two major inputs in a supply function.

Structural change must also be considered, when specifying a supply function. Changes in technology over time, changes in the skills existing within an industry and the number and distribution of firms are important sources of structural change.

However, the standard regression model does not allow for structural change. A basic assumption of the regression model is that the parameters of the system remain constant and that the form of the supply relation does not change over time.

One way to overcome this problem is to restrict the period of analysis to years in which it is believed the structure is reasonably constant. Another technique is to use substitute variables for nonmeasurable structural variables. For example education may be used as a proxy for managerial skill.

4.6.2 Specification of the Import Supply Function for New Motor Vehicles from Japan.

The following section will specify the import supply function, used in this study to test the `small country assumption´ that the import supply function for new Japanese vehicles to New Zealand, is perfectly or close to perfectly elastic.

The supply of imports is specified in the form below:

$$M_{jt} = f(P_{jt}, P_{wt}, W_{it}, IS_{it}, NRP_t)$$

(4.11)

where: the quantity of new vehicles supplied from Japan to New Zealand is a function of the own price that these vehicles are supplied to New Zealand, the price that Japanese firms supply these vehicles to the rest of the world, the manufacturing wage rate in Japan, Japan's wholesale price of iron/steel and New Zealand's nominal rate of protection.

where:

M_{jt} = the quantity of new vehicles supplied from Japan to New Zealand over time.

P_{jt} = The price at which these vehicles are supplied to New Zealand.

P_{wt} = The price at which Japan supplies these vehicles to the rest of the world.

W_{it} = The manufacturing wage rate in Japan.

IS_{it} = Japan's wholesale iron/steel index.

NRP_t = New Zealand's NRP rate.

The explanatory variable P_{wt} represents the opportunity cost of supplying vehicles to the rest of the world relative to the New Zealand market. If P_{wt} increases relative to P_{jt}, one would expect the Japanese manufacturer to supply more vehicles to this market than to the New Zealand market. This would shift New Zealand's import supply schedule to the left.

The two input cost variables, the manufacturing wage rate, (W_t) and the iron/steel index (IS_t), reflect the shifts in supply due to changes in significant input costs in the manufacturing of Japanese vehicles. An increase in these variables, other things being equal, shifts the cost curves of each of the vehicle manufacturing firm, and hence the supply curve shifts to the left; a decrease in these cost variables has an opposite effect.

The nominal rate of protection (NRP) variable represents the total amount of protection (tariff and import licensing) from new Japanese vehicle imports into New Zealand. An increase in the NRP will shift the supply curve upwards because the higher the border taxes into New Zealand, the less the Japanese firms will be able to export to New Zealand. A decrease in the NRP will have an opposite effect.

Technology, the number of firms and the skills involved in producing Japanese vehicles are assumed fixed over the time period. It is also assumed that New Zealand import demand for Japanese vehicles is constant over time.

a) Functional Form

The import supply equation can be expressed in logarithmic form as:

$$\log M_{jt} = \alpha_{0j} + \alpha_{1j}\log P_{jt} + \alpha_{2j}\log P_{wt} + \alpha_{3j}\log W_{lt} + \alpha_{4j}\log IS_{lt} + \alpha_{5j}\log NRP_t + u_t \tag{4.12}$$

The variable u_t is assumed to be random, and is assumed to satisfy the Gaussian assumptions (ie. 'white noise', distributed normally and independently with a mean of zero and a constant variance, $u_t \sim NID(0,\sigma_u^2)$). As the function is specified in terms of logarithms, the parameter α_{1j} is the own price elasticity of import supply. The sign is expected to be $\alpha_{1j} > 0$. A rise in the price that can be charged by Japanese exporters for vehicles, will increase the willingness of Japanese manufacturers to export to New Zealand.

The sign of α_{2j} is expected to be negative, as this coefficient represents the opportunity cost of trading with New Zealand. As the world price increases relative to the price of the New Zealand markets, more will be supplied to the world market at the expense of New Zealand.

The sign of α_{3j} and α_{4j} are also expected to be negative, as an increase in these input costs will shift the supply curve to the left.

The sign of the final coefficient α_{5j} is expected to be negative, as an increase in the level of protection will shift the import supply schedule up for a small country and to the left for a large country. This in-turn reduces the quantity supplied to New Zealand from Japan (at the higher border price) while increasing the supply of domestically assembled vehicles.

Equation 4.9 is in log-log form to allow the supply elasticity to be determined directly from the slope coefficient.

4.7 Calculating the Optimal Level of Import Protection.

Johnson (1958), defined the `optimal level of import protection´ for a particular commodity, as the reciprocal of the respective import supply elasticity (equation 4.13).

$$t_{optimal} = \frac{1}{\eta_{sm}} \tag{4.13}$$

The optimal level of protection occurs at the point where the net welfare of a country, of import protection, is maximized. This occurs at the point where the sum of the domestic producer and consumer surplus and the Government revenue is maximized.

Figure 4.4 will illustrate how import protection can lead to a net welfare gain. Domestic supply of vehicles is represented by Sd, while Dd represents domestic demand for both imported and domestically assembled vehicles. The schedule, Sd+m represents the aggregate supply curve for domestic and imported vehicles and Sd+m(tariff) represents the post intervention aggregate supply curve. At equilibrium `i´, the price is P', the unobserved free trade border price and the domestic supply of vehicles is Q0. Excess demand for vehicles or the quantity of vehicles imported, is the difference between Q3 and Q0.

Import protection in the form of a tariff shifts the aggregate import supply curve upwards to Sd+Sm(Tariff). Domestic production increases from Q0 to Q1 while excess demand falls from Q3-Q0 to Q2-Q1. As mentioned in Section 4.5, the consumer (through a rise in price from P' to P_j^p) and foreign producer (through a fall in price received from P' to P_j^w) pay for the import protection in the large country case.

The net effect of import protection for the whole country is the sum of: (a) the welfare gain to domestic producers (increase in producer surplus) of $P' P_j^p$ c b, (b) the net welfare gain to consumers (negative) of $P' P_j^p$ h i (decrease in consumer surplus) and (c) the increase in

Government revenue of **e f h c.** The country gains from protection when the increase in producer surplus of the domestic producers and the increase in Government protection revenue, outweighs the decrease in consumer surplus. This occurs at the point where the level of protection is equal to the reciprocal of the import supply elasticity.

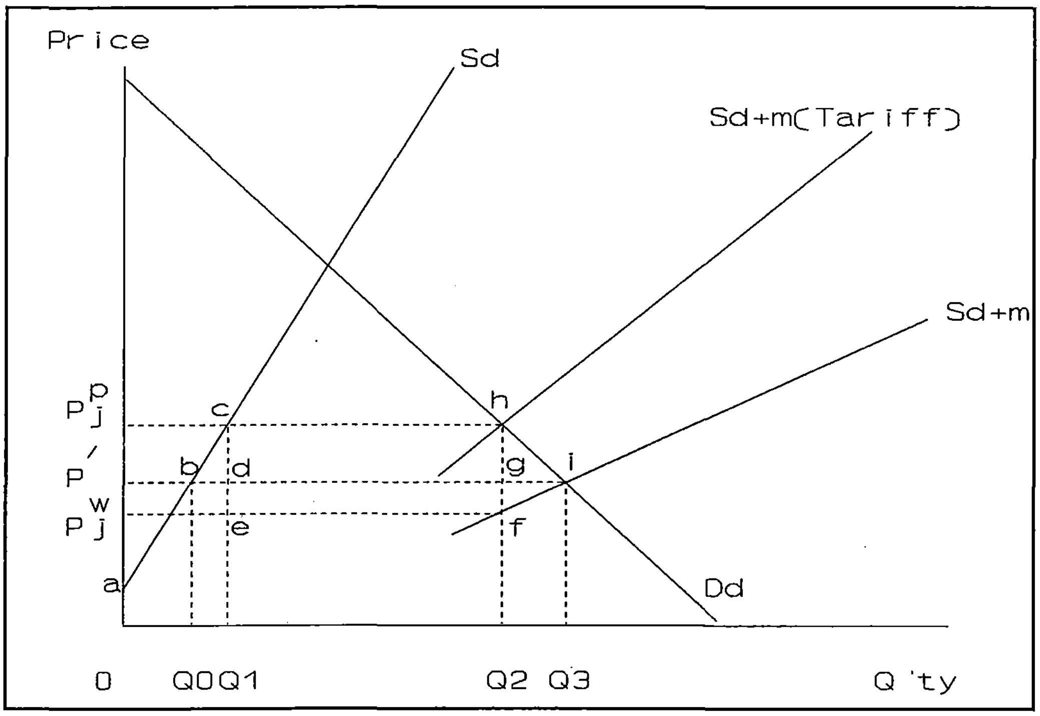

Figure 4.4 <u>The Optimal Tariff for a Large Country.</u>

CHAPTER V

TESTING THE SMALL COUNTRY ASSUMPTION

The objectives of this chapter are: (a) to present the data used to test the small country assumption (b) to discuss the results of the test.

5.1 Data Used to Test the Small Country Assumption.

This section will present the data used in the estimation of the import supply elasticity. The data was available, for the period 1978 to 1993 on an annual basis. The sample period being determined by data availability and to cover the change in policy before and after the 1984 Motor Vehicle Industry Plan. The import supply elasticities will be estimated for 1000-1500cc. and 1500-3000cc. vehicles.

Data on the quantity supplied (M_{jt}) and average price (P_{jt}) of new vehicles by tariff code from Japan to New Zealand, was obtained from a search of the INFOS database by the New Zealand Department of Statistics (1994c). The data are presented in total value (value for duty), volume form. The average price is calculated by dividing the volume into the total value. The average price was then converted from New Zealand Dollars to Japanese Yen using the Yen/$N.Z. exchange rate and deflated into real terms using the Japanese wholesale price index (Tables A18.1, A18.2: Appendix 18).

The data used to compute the world price for this period, was sourced from Nagayama (1982-1994). The variable P_{wt} is a weighted average of the price at which vehicles are supplied to Japan's major export markets.[1] These markets include Hong Kong, Singapore, Norway, Sweden, Denmark, Netherlands, Belgium, France, Germany, Switzerland and Australia.

[1] This aggregate variable excludes the U.S., Canada and the U.K., who have their own Japanese transplant operations, manufacturing high volume low value added vehicles, while importing low volume high value added vehicles direct from Japan.

Unfortunately the Japanese Statistics Department use different tariff codes from the New Zealand Statistics Department. The two Japanese engine capacity codes, 1000-2000cc. and 2000-3000cc., are assumed to be close enough to the New Zealand codes of 1000-1500cc. and 1500-3000cc., respectively, without seriously biasing the results. Accordingly, it is implicitly assumed in choosing the series that the price of a 1000-2000cc. car moves together with the price of a 1000-1500cc. car, likewise for the larger cars it is implicitly assumed that the price of a 2000-3000cc. car moves together with the price of a 1500-3000cc. car. The world price data in real (adjusted by Japan's wholesale price index) and nominal terms are presented in Appendix 18, Tables A18.3 and A18.4.

The IMF (1982-1994) International Financial Statistics volumes contained the index of manufacturing wages (W_t) for Japan. This index was converted to real terms using the Japanese consumer price index (Table A18.5).

The wholesale iron/steel index (IS_t) for Japan was obtained from Nagayama (1982-1994). The index was adjusted for inflation by the Japanese wholesale price index (Table A18.6).

The NRP between 1985 and 1993 is the sum of the tariff duty and import license tender amount. The NRP between 1978 and 1984 is assumed constant, in the absence of other information. The NRP value for this period represents the tariff duty for this period of 55%, plus the import license amount tendered in 1985 of 32%. The NRP coefficient used in this study is higher than the NRP published in Syntec Economic Services (1984). The NRP quoted by Syntec includes preferential tariffs for Australia and the U.K. while the NRP used in this study is specific to Japan only. These NRP values are detailed in Table A18.7 of Appendix 18.

5.2 <u>Results of Testing the Small Country Assumption.</u>

The import supply elasticity was estimated for the 1500-3000cc. and 1000-1500cc. C.B.U. imports from Japan into New Zealand. The results of these estimations will be discussed in the next section and are detailed in Appendix 20.

5.2.1 Results of the '1500-3000cc.' Import Supply Function Estimations.

(i) Equation 4.12 was estimated using ordinary least squares.

$$\log M_{jt} = \alpha_{0j} + \alpha_{1j}\log P_{jt} + \alpha_{2j}\log P_{wt} + \alpha_{3j}\log W_{lt} + \alpha_{4j}\log IS_{lt} + \alpha_{5j}\log NRP_t + u_t \qquad (4.12)$$

The results of this estimation are partially reproduced below

Quantity Dependent Estimation for 1500-3000cc. Vehicles

$$\ln M_{jt} = -96.369 + \underset{(2.403)}{9.8882\ln P_{jt}} - \underset{(-0.2207)}{0.2760\ln P_{wt}} - \underset{(-0.0134)}{0.0381 n W_t}$$

$$- \underset{(-2.169)}{5.5941\ln IS_t} - \underset{(-3.010)}{1.1456\ln NRP_t}$$

Sample: 1978-1993	R^2 = 0.9489		
DW	= 2.3249	d_L = 0.615	d_U = 2.157
F^{stat}	= 37.18	F^{crit} (5,11)	= 3.20
Jarque Bera	= 0.8340	sig. level (5%)	= 5.99
Breusch Pagan	= 10.201	sig. level (5%)	= 11.07

Given the associated critical t-values, of $t^{crit}_{0.05}$ = 2.228 and $t^{crit}_{0.05}$ = 1.812, the coefficients P_{jt}, IS_t and NRP_t are statistically significantly different from zero at the 10 percent level of significance.

The estimated import supply elasticity (α_{1j} coefficient), is approximately 10. The influence of this elasticity on the estimated protection coefficients will be discussed in the following Chapter.

The other two significant parameter estimates are the input price elasticity for iron and steel of -5.6 and the nominal protection elasticity of -1.2. Therefore it is estimated that if the price of steel rises by 10 percent then the shipment supply of cars from Japan to New Zealand will fall by 56 percent. This result would indicate that an increase in the price of steel in Japan will result in a significant shift of New Zealand's import supply curve to the left. The nominal protection elasticity, estimates that if New Zealand's nominal rate of protection were to increase by 10 percent, the supply of vehicles from Japan to New Zealand will fall by 12 percent, while a reduction in the nominal protection will have the opposite effect. The cuts in protection resulting from the industry plan have led to an increase in C.B.U. imports from Japan, as was discussed in section 2.1, supporting the result of the nominal protection elasticity.

The diagnostic tests discussed in detail in Appendix 19, would indicate that the model provided adequate representation of the sample data. According to the Jarque-Bera test, the null hypothesis in favour of normality was not rejected at the 5% level. The Durbin Watson test statistic for autocorrelation fell between d_u and 4-d_u, indicating no autocorrelation. The Breusch-Pagan test statistic showed that the null hypothesis of no heteroscedasticity was not rejected at the 5% level.

There is a degree of collinearity between each of the variables, as the F^{stat} of the auxiliary regression exceeds the F^{crit} at the 5% level for each of the variables, rejecting the null hypothesis of no collinearity between independent variables (refer to Appendix 20, Equation A20.1). However the auxiliary regressions R^2 values between each of the independent variables (Equation 20.1) did not exceed the coefficient of determination, which would indicate the level of multicollinearity is not serious under the guidelines established by Kennedy (1992) in Appendix 19.

The signs of the estimated coefficients were all as expected *a priori.*

(ii) The import supply function was re-estimated in price dependent form below.

<u>Price Dependent Estimation for 1500-3000cc Vehicles</u>

$$\ln \mathbf{P}_{jt} = \underset{}{11.478} + \underset{(2.403)}{0.03702 \ln \mathbf{M}_{jt}} + \underset{(1.725)}{0.11614 \ln \mathbf{P}_{wt}} - \underset{(-2.684)}{0.35611 \ln \mathbf{W}_t}$$

$$+ \underset{(3.343)}{0.4396 \ln \mathbf{IS}_t} + \underset{(2.348)}{0.0606 \ln \mathbf{NRP}_t}$$

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993		R^2 = 0.9653	
DW	= 1.5810	d_L = 0.615	d_U = 2.157
F^{stat}	= 55.623	F^{crit} (5,11)	= 3.2
Jarque Bera	= 2.3540	sig. level (5%)	= 5.99
Breusch Pagan	= 1.358	sig. level (5%)	= 11.07

The diagnostic tests of Appendix 19, accepted the null hypothesis in favour of no serious multicollinearity, normality in the residuals and accepted the null hypothesis of no heteroscedasticity. However, the Durbin Watson test rejected the null hypothesis of no positive or negative autocorrelation. Therefore the model was re-estimated using a Cochrane-Orcutt type procedure of order one, which assumes that the disturbance term is linearly related to the disturbance term in the previous period. The Durbin-h-Statistic was then computed, indicating the autocorrelation had been remedied. Partial results of this re-estimation are reproduced below.

Cochrane-Orcutt Re-Estimation of Price Dependent Function

$$\ln P_{jt} = \underset{}{11.573} + \underset{(3.090)}{0.028466\ln M_{jt}} + \underset{(3.042)}{0.15638\ln P_{wt}} - \underset{(-2.988)}{0.26919nW_t}$$

$$+ \underset{(2.161)}{0.25004\ln IS_t} + \underset{(1.333)}{0.02526\ln NRP_t}$$

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993 $R^2 = 0.9708$
DW-h-Statistic = 1.5479 sig. level (5%) -1.96 < DW-h >1.96

The results of this estimation indicates that quantity supplied, the world price, the NRP and the iron/steel coefficients all have a positive influence on the price that vehicles are supplied to New Zealand. While Japanese wage rate has a negative influence on the dependent variable at the 5% level of significance. All estimated coefficients, except the NRP coefficient are statistically significantly different from zero at the 5% level.[2]

The original quantity dependent static model, equation 4.12, was also estimated in autoregressive form (Appendix 20, A20.4), with the dependent variable M_{jt} lagged by one period. This was followed by an estimation of equation 4.12 in a distributed lag form, with both price variables, P_{jt} and P_{wt} lagged by one period (A20.5). Finally equation 4.12 was estimated in autoregressive distributed lag form with the dependent variable and the two price variables lagged by one period

[2] Serially correlation usually results in a pattern of observations that allows a better fit than the non-serially correlated coefficients, resulting in t-statistics being over-estimated, Stuenmund, *et al.* (1987). This may be the reason for the nominal rate of protection coefficient becoming insignificant.

(A20.6).

These estimations were to ensure that the original restricted model 4.12 was not too specific to characterise the sample data adequately. In other words the supply response of the Japanese manufacturers to the independent variables of the model, may have occurred over a longer time-period than the static model would suggest.

The model became more insignificant as the number of lagged variables increased. The level of multicollinearity between the current and lagged price variables was very high, requiring a Koyck transformation to alleviate this problem. However, this was beyond the time available for this study.

Therefore the import supply elasticity for 1500-3000cc. vehicles, is taken from the original static model. Although a short-run estimate, the model appears to be the most adequate of the supply functions, for the data set.

Although the elasticity estimated for 1500-3000cc. vehicles, of approximately 10 is relatively elastic, it is contrary to what has been assumed of New Zealand (IDC, 1983 and Rose, 1971) when estimating effective coefficients for the motor vehicle assembly industry in the past.

5.2.2 Results of the `1000-1500cc.' Import Supply Function Estimations.

The results of estimating equation 4.12 for 1000-1500cc. vehicles are partially set out below (for more detail refer to Appendix 20, A20.7).

Quantity Dependent Estimation for 1000-1500cc. Vehicles

$$\ln \mathbf{M}_{jt} = 7.6249 + \underset{(0.5797)}{0.869\ln \mathbf{P}_{jt}} - \underset{(-0.3983)}{1.004\ln \mathbf{P}_{wt}} - \underset{(-0.9664)}{4.65\ln \mathbf{W}_t}$$

$$- \underset{(-1.094)}{5.824\ln \mathbf{IS}_t} - \underset{(-1.182)}{0.930\ln \mathbf{NRP}_t}$$

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993 R^2 = 0.6842

DW = 1.9681 d_L = 0.615 d_U = 2.157

F^{stat}	= 4.334	F^{crit} (5,11)	= 3.20
Jarque Bera	= 4.5628	sig. level (5%)	= 5.99
Breusch Pagan	= 2.260	sig. level (5%)	= 11.07

The estimated coefficients of equation 4.12 for the 1000-1500cc. vehicles were not statistically significantly greater than zero at the at the 10% level. The presence of autocorrelation resulted in a re-estimation of equation 4.12 using the Cochrane-Orcutt procedure of order one (refer to the results below). Although the null hypothesis of no autocorrelation between past and present error terms is not rejected, the coefficients still remain insignificant at the 10% level.

Cochrane-Orcutt Re-Estimation of Price Dependent Function

$$\ln \mathbf{M}_{jt} = 7.3719 + \underset{(0.7271)}{0.8629\ln \mathbf{P}_{jt}} - \underset{(-0.4888)}{0.97582\ln \mathbf{P}_{wt}} - \underset{(-1.215)}{4.64\ln \mathbf{W}_t}$$

$$- \underset{(1.370)}{5.7939\ln \mathbf{IS}_t} - \underset{(-1.474)}{0.920\ln \mathbf{NRP}_t}$$

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993 R^2 = 0.6843
DW-h-Statistic = -0.29131 sig. level (5%) = -1.96 < DW-h > 1.96

The results of estimating the supply function in price dependent rather than quantity dependent form for 1000-1500cc. vehicles are presented below.

Price Dependent Estimation for 1000-1500cc Vehicles

$$\ln \mathbf{P}_{jt} = 14.941 + \underset{(0.5797)}{0.0374\ln \mathbf{M}_{jt}} - \underset{(0.05866)}{0.30894\ln \mathbf{P}_{wt}} - \underset{(0.1216)}{0.12684 1n\mathbf{W}_t}$$

$$- \underset{(-0.3163)}{0.36779\ln \mathbf{IS}_t} - \underset{(-0.16781)}{0.02921\ln \mathbf{NRP}_t}$$

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993		R^2 = 0.0575	
DW	= 1.8587	d_L = 0.615	d_U = 2.157
F^{stat}	= 0.122	F^{crit} (5,11)	= 3.20
Jarque Bera	= 0.0820	sig. level (5%)	= 5.99
Breusch Pagan	= 7.32	sig. level (5%)	= 11.07 (5 d.f.)

Once again the explanatory variables are not statistically significantly different from zero at the 10% level.

No adjustment to the 1000-1500cc. protection coefficients will be made, as the import supply coefficient was not statistically significantly different from zero at the 10% level of significance. It will be assumed that the import supply elasticity for the 1000-1500cc. vehicles is infinitely elastic.

Assuming the input supply elasticity for 1000-1500cc. vehicles is infinitely elastic, may also be justified on the grounds that 1000-1500cc. vehicles account for approximately 20 percent of the New Zealand vehicle market, while the 1500-3000cc. vehicles account for approximately 65 percent of the New Zealand market. The fact that New Zealand imports over three times as many 1500-3000cc. vehicles than 1000-1500cc. vehicles from Japan may account for the greater degree of market power in the larger vehicle market (ie. an import supply elasticity of 10 for the larger vehicles rather than an infinite elasticity).

CHAPTER VI

ESTIMATING THE PROTECTION COEFFICIENTS.

The objectives of this chapter are to: (a) outline the empirical procedures utlilzed when estimating the protection coefficients; and (b) to present the results of these estimations.

6.1 Geographic Location at which Price Distortions are Estimated.

The first two steps generally taken in studies of the effective rate of protection are; to define the industry to be examined and to choose a location at which domestic and world prices will be compared.

6.1.1 Industry Definition.

The industry of interest for this study is defined as the set of car-assembly companies in New Zealand. The estimates of price distortion refer to the Toyota Plant's assembly of the Corolla and Corona and Mazda's assembly of their 323 and 626. These four vehicles are produced locally from C.K.D. kits and imported completely built-up.

A separate effective rate of protection will be calculated for the 1000-1500cc. Corolla/323, and the 1500-3000cc. Corona/626, as both the Toyota and Mazda vehicles have similar assembly and ex-factory costs and because the available C.K.D. and C.B.U. data is averaged for the Port of Auckland. This port is utilized by these two companies.

6.1.2 Industry Point of Valuation.

In general, when selecting a point to evaluate the magnitude of price distortions, some adjustments must be made to the input and output prices, to ensure a proper comparison between domestic and the corresponding border prices.

From this perspective, the selection of the assembly plant as the point of valuation, requires an adjustment to the V.F.D. (value for duty) of each imported vehicle and component, for insurance/freight, customs and wharfage charges, cartage from the port to the assembly plant and any tariff and import licence duty.

Excise duty will be left out of the adjustment process, as it is not a form of protection for the domestic vehicle assembly industry. The excise tax was introduced during the 1974 oil shock, with the objective of taxing motor vehicles with large engines (over 3500cc.) and was gradually phased out over a six year period after the plan.

6.2 Technical Coefficients of Production (A_{ij}).

The technical coefficient of production represents the total quantity of the tradeable input `i´ used in the production of good `j.´ Given the definition of value added, adopted in this study (Section 4.1: Chapter 4), only the technical coefficients of tradeable inputs are considered.[1] The two tradeable inputs involved in New Zealand car assembly, are the C.K.D. kit and the nominated components.

One C.K.D. kit is required to produce one vehicle, therefore the technical coefficient of this input is equal to 1. The nominated component cost is also aggregated into the total cost per vehicle, due to the number of inputs involved in the assembly process. Hence the technical coefficient of this input is also equal to 1.

6.3 Domestic and World Output and Input Prices ($P_j^p, P_j^w, P_i^p, P_i^w$).

There will be two different NRP and ERP calculations, for the two classes of vehicles. The first calculation [NRP (a), ERP (a)] assumes that the domestic output and input (post-intervention)

[1] Corden (1971), defined a tradable input as one which can be exported or imported.

prices are the local ex-factory prices of the assembled vehicles, and components.[2]

This technique measures the implicit protection that cannot be quantified by assuming that the domestic output and input prices equal the world prices plus distortions. Policies such as the Mandatory Deletions Policy, where the assemblers are forced to use domestically-produced vehicle components to increase their local area content, rather than cheaper imported components, may be factored into the model. The opportunity cost of these policies is quantified in the equivalent tariff rates (t_j^p, t_i^p).

The second method of calculating the protection coefficients, [NRP (b), ERP (b)] is the more conventional method. This method assumes that the domestic input and output (post-intervention) prices are equal to the world prices plus any policy distortions. From Figure 6.1 overleaf, the Nominal Rate of Protection calculated in this manner, is the percentage difference between P_j^p and P_j^w .

Effective protection calculated using the second method, is the percentage difference between value added at domestic prices (Figure 6.1) and value added at world prices, (Figure 6.2) where value added in domestic prices in Figure 6.1 equals:

$$VA_j^d = P_j^p - \sum_{i=1}^{n} P_i^p . A_{ij}$$

and value added in world prices (from Figure 6.2) equals:

$$VA_j^w = P_j^w - \sum_{i=1}^{n} P_i^w . A_{ij}$$

[2] This technique is consistent with that used by Tsakok (1990); when policy distortions are difficult to quantify.

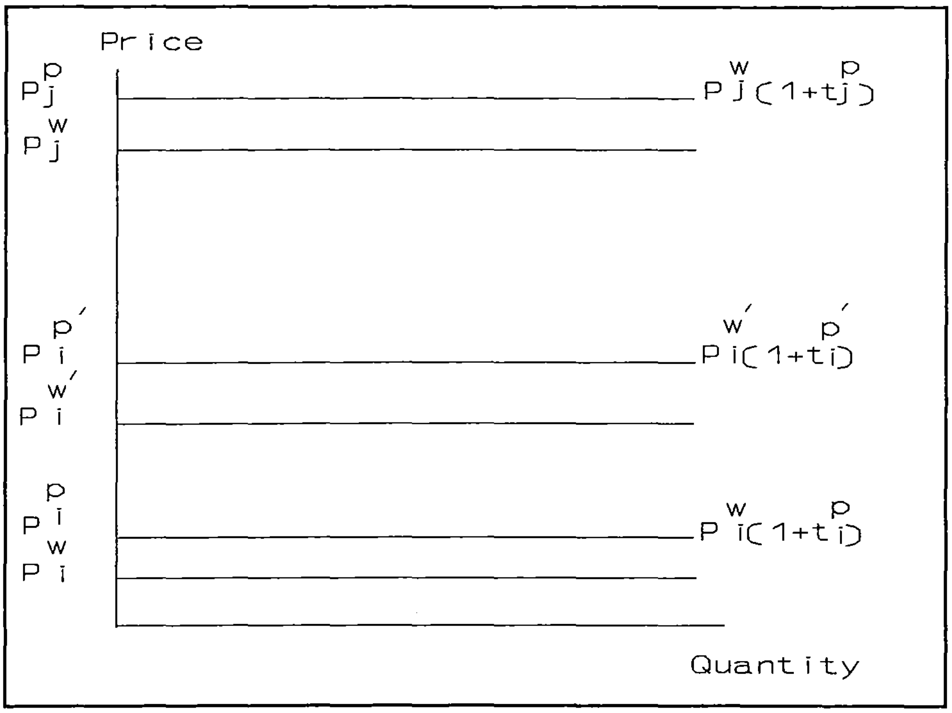

Figure 6.1. Domestic Value Added (ERP (b)).

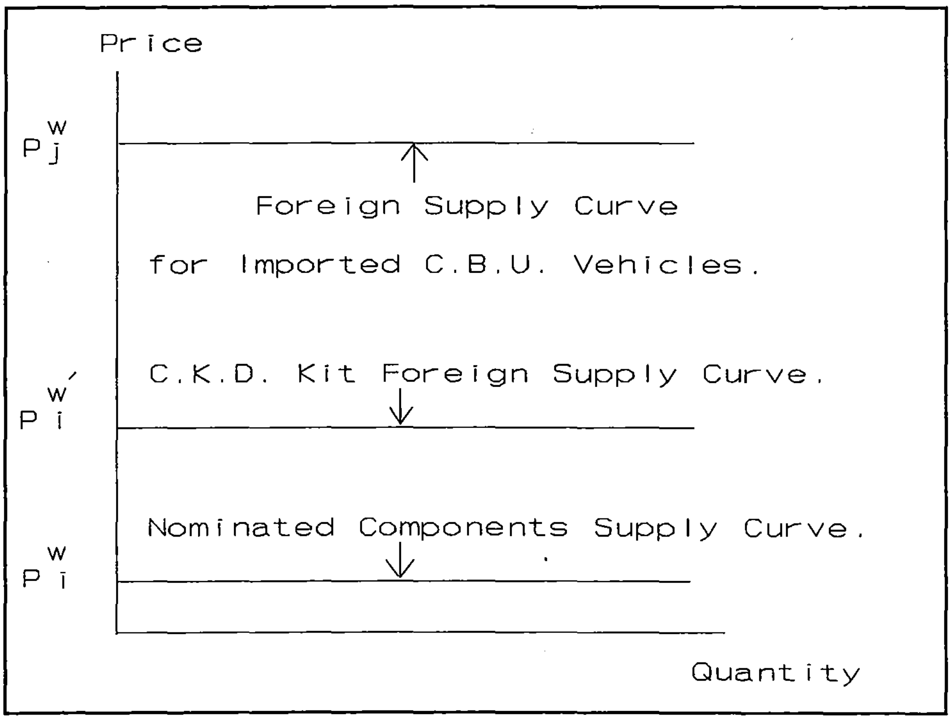

Figure 6.2 Value Added at World Prices (ERP (b)).

6.3.1 Domestic Output Prices (P_j^p).

(a) *Domestic Output Prices used to calculate NRP (a) and ERP (a).*

The domestic output price used to derive NRP (a) and ERP (a), is assumed to equal the domestic ex-factory price, which includes policy distortions. This is calculated by first averaging the retail prices of the Corolla/323 and the Corona/626 vehicles (refer Appendix 9).

These average retail prices are then adjusted downwards for GST, the dealer margin, and excise tax, to determine the local ex-factory price (refer Appendix 10). This calculation will overvalue the domestic ex-factory price of these vehicles, if there is any wholesale margin between the factory and the showroom floor of the retail dealer. The calculation, also fails to account for any transportation costs from the factory to the retail level and any change in the dealer-margin over time. The above technique, however, is used by New Zealand Customs to check for fraudulent undervaluation of V.F.D. values.

(b) *Domestic Output Prices used to calculate NRP (b) and ERP (b).*

The domestic output price used in deriving NRP (b) and ERP (b) is assumed to equal the world ex-factory price plus any policy distortions and transport costs. Appendix 11 contains the average $N.Z. V.F.D. and C.I.F. values of completely built-up new Japanese vehicles into the Port of Auckland.

These prices are derived from New Zealand Department of Statistics (1994b) and The Treasury (1987).[3] The data is in New Zealand dollars, converted from Japanese Yen using the Yen/$N.Z. exchange rate, at the time the import entry is lodged with the Customs department. The exchange rate used for the conversion is set by Customs on a fortnightly basis.

Unfortunately these statistics are not vehicle make/model specific. Rather, they are aggregated into volume and value, by New Zealand port of entry. The sensitive nature of data on specific

[3] The Treasury's file on the motor vehicle industry contained production figures for Toyota and Mazda vehicles for 1987, (The Treasury, 1987).

vehicles imported completely built-up, prevented Customs from releasing this information, under the Official Informations Act, when requested.

Toyota and Mazda vehicles are imported into the Port of Auckland, hence the average C.I.F. data for Auckland forms the best proxy available for the imported value of a completely built vehicle of the above make. The cc. ratings allow one to be more specific about the model of the imported vehicle. However, as most other makes and models of vehicles from Japan, are imported into the Port of Auckland, particularly vehicles of a higher specification, the average C.B.U. statistics (refer Appendix 11) used as a proxy to compare with low specification locally assembled Mazda and Toyota vehicles, may be biased upwards.

The prices found in Appendix 11, are adjusted for import tariffs, port and customs charges, import licensing,[4] and insurance and freight (assume C.I.F. - V.F.D. equals the door to door insurance and freight), to determine the domestic post-intervention prices.

6.3.2 World Output Prices (P_j^w).

The world output prices are those prices from Appendix 11, adjusted for port and customs charges, insurance and freight (C.I.F. plus prices). They represent the price at which completely built up vehicles would enter New Zealand free of protection.

6.3.3 Domestic and World Prices of Tradeable Inputs (P_i^p,P_i^w).

As mentioned in section 6.2, the tradeable inputs used in the assembly of passenger vehicles are the C.K.D. kit and the nominated components. The procedure to calculate the prices of these two inputs is set out below.

a) *C.K.D. Kit Prices.*

The C.K.D. kit prices are supplied by New Zealand Department of Statistics (1994a) and The

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[4] The import license tender amount is the weighted average of the total successful tenders for C.B.U. vehicles, calculated on the C.I.F. value of the car, from the New Zealand Gazette (1984-1989). These calculations are presented in Table A10.1 and A10.3 of the Appendix.

Treasury (1987). These are in value, volume form by New Zealand port of entry, and are broken down into engine capacity by their tariff codes (Appendix 12).

The Port of Auckland receives C.K.D. kits from Japan for, Toyota, VANZ (Mazda/Ford) and Nissan. The average C.I.F. price of a C.K.D. kit at the Port of Auckland, is therefore an average of these three companies' C.K.D. kits, by engine capacity. However, the majority of these kits are for Toyota and VANZ. The ex-factory world (border) prices of these kits are adjusted for port and customs charges and transport to the assembly plant.

Imports of C.K.D. kits were subject to import tariffs until July 1988. Therefore, an adjustment must be made accordingly, to the domestic price (C.I.F. + (V.F.D. * [1 + Tariff])) to determine the domestic post-intervention price of the C.K.D. kit.

b) *Component Prices.*

As mentioned in section 6.2, the component price is aggregated to represent the total cost of the nominated components, per vehicle.

(i) *Domestic Component Prices.*

The component price used in the calculation of ERP (a) is the local component price (ex-factory). The reason is that the Mandatory Deletions Policy prohibits the importation of any nominated component within the C.K.D. kit. This forces the domestic assemblers either to source locally-produced components or to pay high tariffs and import licences on imported components.

The Treasury's (1984-1994) files on the motor vehicle industry contain the cost of the local materials used in the domestic assembly of Toyota and Mazda vehicles for June 1987. This amount represents the total value of the domestic-nominated components, per vehicle (listed in Appendix 3). These figures have been adjusted using an index of component prices compiled by McKenzie (1994) of the Department of Statistics (refer Appendix 13).

(ii) *World Component Prices.*

The world price of the nominated component bundle, reflects the total price of those components if included in the C.K.D. kit. The component bundle prices were sourced from New Zealand Department of Statistics (1994b). The world price of those components is adjusted for tariff duty and import licence duty,[5] when representing the domestic post-intervention component price in the calculation of ERP (b).

6.4 Indicative Measures of Price Distortions.

Two measures of price distortions have been calculated in this study; the Nominal Rate of Protection (NRP) and the Effective Rate of Protection (ERP).

The first of these measures is used to quantify the distortion in the price of the final product. The procedure to calculate the NRP for the New Zealand motor vehicle market, is set out below:

6.4.1 Calculating NRP (a).

Step 1. Calculate the average domestic price, ex-factory (Appendix 10).

Step 2. Calculate the adjusted border price (C.I.F. plus price).

Step 3. Calculate the NRP (percentage difference between the domestic price and the border price) and the NPC (domestic price / border price). The nominal coefficients calculated in this manner reflects the total implicit or equivalent protection.[6]

6.4.2 Calculate NRP (b).

Step 1. Calculate the average domestic price, equal to the world price plus distortions.

Step 2. Calculate the adjusted border price (C.I.F. plus price).

Step 3. Calculate the NRP and the NPC.

The nominal coefficient calculated using the above technique reflects the total amount of explicit protection (total tariff and licensing duty on the free-trade border price).

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[5] The weighted average of the successful tenders for those nominated components that required import licenses. Refer to Tables A14.2 and A14.4 in Appendix 14 for these calculations.

[6] Note: All NRP calculations are G.S.T. exclusive.

6.4.3 Adjusting the NRP Coefficients for Non-Infinitely Elastic Import Supply Schedules.

To adjust the NRP coefficients for an import supply elasticity that is not perfectly elastic, one must calculate P', the unobserved border price (refer to equation 4.7, in Chapter 4). This price will be estimated for 1500-3000cc. vehicles only, as the 1000-1500cc. import supply estimation, was not significant and is therefore assumed to be perfectly elastic (Section 5.2). The import supply elasticity for this class of vehicle (1500-3000cc.) was estimated as approximately 9.9 in Chapter 5.

The estimation also requires the domestic demand elasticities for vehicles. Gawith and Webber (1990), calculated demand elasticities for small (less than 1600cc.) and large (greater than 1600cc.) new vehicles for the period 1975 to 1989.

They estimated price elasticities of demand of -1.3 for small cars and -0.5 for large cars. In other words, purchasers of small cars tend to be more sensitive to price changes than buyers of larger cars. Business purchases are more common in this latter category.[7] The higher the proportion of business buyers in the larger car category, the less sensitive demand is likely to be to price because of large fleet discounts and tax incentives to companies purchasing vehicles.

The two other variables required to calculate P', are the free trade border price and the post-intervention price of these vehicles. These were obtained from Step 2 and Step 3 of Tables A15.9 - A15.10 of Appendix 15.

The steps to calculate the two ERP coefficients are set out below:

6.4.4 Calculate ERP (a).

(i) *Estimate Value Added at Domestic Prices.*

Step 1. Calculate the average domestic price, ex-factory (Appendix 10).

Step 2. Estimate the input costs.

[7] Studies in the US and Australian car industries (refer EDC (1987) p.29) suggest that the price elasticity of demand in the US is between 1.2 and 1.5, while in Australia it is less than 1.0 for all cars; for those sold to business the price elasticity is very low.

(a) Calculate the C.K.D. cost plus tariff duty, insurance, freight, customs and wharfage charges.

(b) Calculate the domestic component cost.

Step 3. Estimate value added at domestic prices (the difference between the price of the final good and the cost of tradeable inputs per unit of output).[8]

(ii) *Estimate Value Added at World Prices.*

Step 1. Calculate the ex-factory price at free-trade world prices, adjusted for freight, customs and wharfage.

Step 2. Estimate the input costs at free-trade world prices.

(a) Calculate the C.K.D. cost at free-trade world prices, plus freight.

(b) Add the cost of the nominated components, if included in the C.K.D. pack.

Step 4. Calculate value added at free-trade world prices.

(iii) *Calculate the ERP (percentage excess of domestic over world value added), and the EPC (domestic / world value added) coefficients.*[9]

6.4.5 Calculate ERP (b).

(i) *Estimate Value Added at Domestic Prices.*

Step 1. Estimate the ex-factory price in domestic prices (the world ex-factory price plus tariff duty, import licensing, transport charges and customs/wharfage.

Step 2. Estimate the input costs.

(a) Calculate the C.K.D. Cost plus tariff duty, insurance, freight, customs and wharfage charges.

(b) Calculate the component cost if included in the C.K.D. kit plus the tariff duty and import licence duty on those nominated components requiring licences.

Step 3. Estimate value added in domestic prices.

(ii) *Estimate Value Added at World Prices.*

Step 1. Calculate the ex-factory price in free-trade world prices, adjusted for freight, customs and

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[8] In this dissertation, nontradable inputs are treated in the same way as the primary factors of production. Therefore, the value added per unit of output consists of value added by primary factors plus value added by nontradable inputs. This procedure is consistent with Corden's method, (Corden, 1966).

[9] Note: All ERP calculations are G.S.T. exclusive.

wharfage.

Step 2. Estimate the input costs at free-trade world prices.

(a) Calculate the C.K.D. cost at free-trade world prices, plus freight.

(b) Add the cost of the nominated components, if included in the

C.K.D. pack.

Step 4. Calculate value added at free-trade world prices.

(iii) *Calculate the ERP, and the EPC coefficients.*

The results derived from the above steps will be presented and analyzed in section 6.5.2.

6.4.6 Adjusting the ERP Coefficients for Non-Infinitely Elastic Import Supply Schedules.

Adjusting the effective rate of protection for non-infinitely elastic import supply elasticities is more difficult (Section 4.5, equation 4.9). The effective rates may be adjusted using the unobserved border price P′, if one assumes that the import supply curves of the tradable inputs are perfectly elastic, as import supply and demand elasticities have not been estimated for the tradable inputs to calculate unobserved border prices for these inputs.

On the other hand one may wish to calculate these elasticities for the tradable inputs, adjusting the border prices to obtain P′ for the input prices as well as the output prices. These unobserved input and output border prices would then be substituted for the free trade input and output border prices in the ERP calculation. This would adjust the effective rate for an elasticity that was not close to perfectly elastic (section 4.3, equation 4.10).

This is an area that could be explored further, but is beyond the scope of this thesis.

6.5 **Aggregated View of the Price Distortions.**

This section presents the results of the estimated NRP and ERP coefficients.

6.5.1 Nominal Protection Coefficients.

Table 6.1 and Table 6.2 contain the nominal protection coefficients for the 1500-3000cc.

Corona/626, imported and assembled in Auckland. A disaggregated picture of the empirical steps involved in computing the unadjusted NRP coefficients, is presented in Appendix 15.

The original NRP coefficients (column 6) presented in the Table 6.1 and Table 6.2 were calculated under the assumption that New Zealand is a price taker in the world market for Japanese vehicles. The adjusted nominal rate (column 5) is estimated using the unobserved border price, which is calculated by substituting the estimated elasticities and the domestic and border prices into equation 4.8 of Chapter 4.

Table 6.1 Calculating the NRP (a) and Adjusted NRP (a) Coefficients for 1500-3000cc. Vehicles

Date	Domestic Price	World Price	P′	Adjusted NRP (a)	Original NRP (a)
Jul-Dec'87	18862.12	12075.00	12287.81	53.50%	56.21%
Jan-Jun'88	16792.59	13101.00	13241.10	26.82%	28.18%
Jul-Dec'88	18044.50	13444.00	13611.02	32.57%	34.22%
Jan-Jun'89	17357.86	14484.00	14600.35	18.88%	19.84%
Jul-Dec'89	18486.20	13846.00	14015.33	31.89%	33.51%
Jan-Jun'90	18486.20	13112.00	13298.07	39.01%	40.99%
Jul-Dec'90	20291.37	13410.00	13632.52	48.85%	51.32%
Jan-Jun'91	21067.44	14711.00	14927.78	41.13%	42.63%
Jul-Dec'91	21347.47	16393.00	16578.19	28.77%	30.22%
Jan-Jun'92	23415.68	17339.00	17558.32	33.36%	35.05%
Jul-Dec'92	25522.56	19049.00	19284.43	32.35%	33.98%
Jan-Jun'93	26389.31	19500.00	19748.14	33.63%	35.33%
Jul-Dec'93	27736.11	21498.00	21733.27	27.62%	29.02%

Note: NRP (a) is calculated with P_j^p equal to the New Zealand Ex-Factory Price Adjusted for policy distortions.

Table 6.2 Calculating the NRP (b) and Adjusted NRP (b) Coefficients for 1500-3000cc. Vehicles

Date	Domestic Price	World Price	P′	Adjusted NRP	Original NRP
Jul-Dec'87	22065.27	12075.00	12344.00	78.75%	82.74%
Jan-Jun'88	23612.57	13101.00	13387.86	76.37%	80.24%
Jul-Dec'88	23648.54	13444.00	13729.14	72.25%	75.90%
Jan-Jun'89	20243.70	14484.00	14685.10	37.85%	39.77%
Jul-Dec'89	18786.40	13846.00	14023.50	33.96%	35.68%
Jan-Jun'90	17287.65	13112.00	13266.23	30.31%	31.85%
Jul-Dec'90	17681.20	13410.00	13567.75	30.32%	31.85%
Jan-Jun'91	19528.35	14711.00	14887.77	31.17%	32.75%
Jul-Dec'91	21764.55	16393.00	16590.07	31.19%	32.77%
Jan-Jun'92	23055.25	17339.00	17548.42	31.38%	32.97%
Jul-Dec'92	25399.45	19049.00	19281.03	31.73%	33.33%
Jan-Jun'93	25995.00	19500.00	19737.36	31.71%	33.31%
Jul-Dec'93	28179.70	21498.00	21746.18	29.59%	31.08%

Note: NRP (b) is calculated with P_j^p equal to the world price plus any policy distortions.

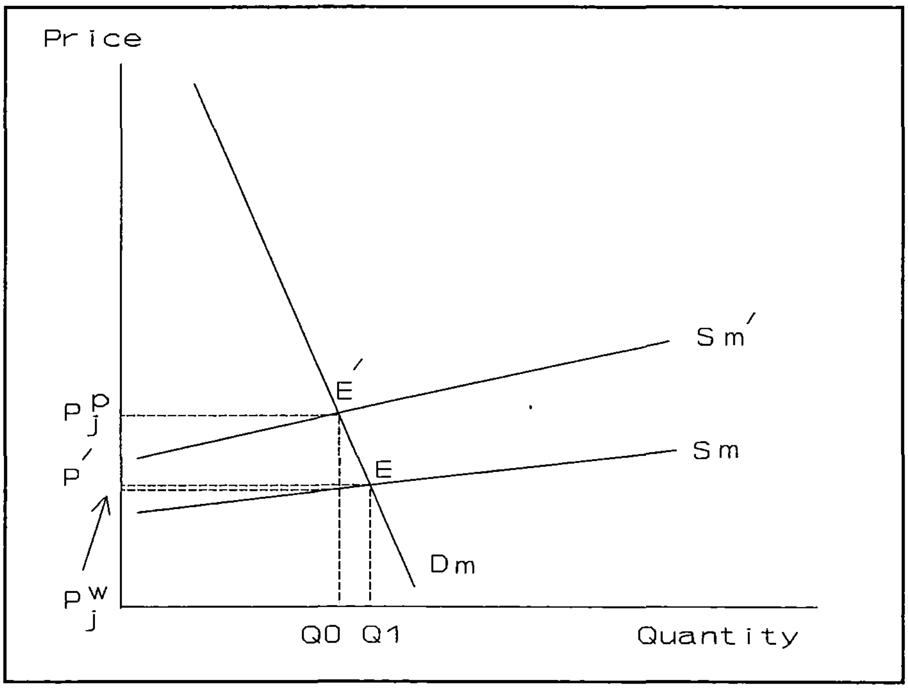

Figure 6.3 Calculating the Unobserved Border Price.

Figure 6.3 above, contains the import supply (Sm) and demand (Dm) schedules for 1500-3000cc. vehicles, drawn approximately to scale with their respective elasticities ($\eta_{sm} = 9.9$, $\eta_{dm} = -0.5$). The supply curve shifts up from S_m to S_m' by the level of per unit import protection, shifting the equilibrium from E to E'. The difference between the unobserved border price and the free trade border price represents the bias resulting from the small country assumption or the difference between the original and adjusted protection coefficients.

The difference between the original and adjusted NRP values in Table 6.1 and 6.2 is very little because the import supply elasticity is elastic and the demand elasticity is relatively inelastic.

a) *Analysis of the Nominal Protection Coefficients for the 1500-3000cc. Corona/626.*

The first point to note from the results in Table 6.1 and Table 6.2, is that all the NRP values are over 0 percent. This means that domestic producers are receiving a greater return on their resources than they would without protection. However, this return is decreasing, as the protection from C.B.U. vehicles is being phased out.

The second point to note from the NRP figures in Table 6.1 and Table 6.2, for the Corona/626, refers to the difference between NRP (a) and the NRP (b). As the explicit protection or the total licensing and tariff duties on imported C.B.U. vehicles (as indicated in the NRP (b) values) has decreased, the difference between the domestic ex-factory price and the free trade world price, as indicated in the NRP (a) figures, has also fallen. If perfect competition existed in the vehicle market, these two coefficients (NRP (a) and NRP (b)) would be equal. However, between July 1987 and July 1991, the two coefficients are significantly different.

Between July 1987 and January 1990 the assemblers were heavily protected from C.B.U. imports, (refer NRP (b)) and demand for vehicles was high. This kept the assemblers volumes up, which is reflected in the low NRP (a) values.

Between January 1990 and July 1991, the NRP (a) coefficients were larger than the NRP (b) coefficients. The recessionary effects substantially reduced the demand for New Zealand assembled vehicles (Figure 2.2), resulting in lower volumes and less economies of scale. These effects are passed on to the consumer in the form of higher fixed costs per vehicle, and are reflected in the higher NRP (a) coefficients during this period.

The difference between the two coefficients, reflects the margin that is possible between the domestic ex-factory price and the equivalent world price plus any distortions. This difference is possible because of the Japanese vehicle manufacturers' complete control over the distribution and pricing of vehicles within New Zealand.

However, as the competition from other imported C.B.U. vehicles has increased (eg. Peugeot, Hyundai), the assemblers have managed to reduce the assembly cost of their vehicles in line with the total cost of a C.B.U. import plus tariff distortions. This is reflected in the similar values for the two coefficients after July 1991.

Another factor contributing to the reduction in assembly costs, is the substitution away from domestic sourcing of the nominated components, to sourcing these components from the cheapest supplier (Post-1990). This substitution is discussed in greater detail in Section 6.5.2.

The NRP figures for the Corona/626 in Table 6.1, would indicate that, as the Government has increased the competitive environment by reducing C.B.U. protection, the assemblers have managed to increase their efficiency through a combination of cheaper sourcing of components and more efficient production techniques, as the ex-factory cost of these vehicles has moved closer to the free trade border prices. This is in line with the Government's policy, set in 1984 by the Motor Vehicle Industry Plan, of maintaining the assembly industry, while increasing its efficiency by altering the competitive environment.

With a 2.5 percent drop in the C.B.U. tariff every year till 1996, the sustainability of the assembly industry depends on whether they can lower their NRP (a) coefficients any further.

b) *Analysis of the Nominal Protection Coefficients for the 1000-1500cc. Corolla/323.*

Once again the Nominal Rates of Protection are all over zero percent in Column 2 and 3 of Table 6.3. This would indicate that the protective environment has allowed the assemblers to earn a greater return on their resources assembling the Corona/323, than they would without protection.

Table 6.3 NRP and NPC Values for the 1000-1500cc. Corolla/323

Year	NRP (a) δ	NRP (b) λ	NPC (a)	NPC (b)
Jul-Dec'87	54.59%	83.75%	1.55	1.84
Jan-Jun'88	116.64%	77.90%	2.17	1.78
Jul-Dec'88	123.53%	74.09%	2.24	1.74
Jan-Jun'89	69.35%	39.31%	1.69	1.39
Jul-Dec'89	78.86%	35.17%	1.79	1.35
Jan-Jun'90	56.42%	32.07%	1.56	1.32
Jul-Dec'90	69.60%	31.90%	1.70	1.32
Jan-Jun'91	65.73%	31.53%	1.66	1.32
Jul-Dec'91	11.92%	32.53%	1.12	1.33
Jan-Jun'92	63.73%	33.25%	1.64	1.33
Jul-Dec'92	72.87%	33.63%	1.73	1.34
Jan-Jun'93	63.09%	33.22%	1.63	1.33
Jul-Dec'93	64.27%	30.66%	1.64	1.31

Note: δ NRP (a) is calculated with P_j^p equal to the New Zealand Ex-Factory Price adjusted for policy distortions.

λ NRP (b) is calculated with P_j^p equal to the world price plus any policy distortions.

Although the NRP (a) coefficients over the time period have decreased with the reduction in C.B.U. protection, most are significantly greater than the NRP (b) coefficients. To insulate the assembly of these smaller-engined vehicles from C.B.U. imports, would require import tariffs of between 60 and 70%.

The gap between the two coefficients is substantial. It is obvious from these results that the assembly of smaller vehicles requires greater economies of scale than the larger vehicles, to compete against equivalent completely built up imports. It would appear, that production of the

1500 to 3000cc. Corolla/626 at current output levels, is just allowing the assemblers to break even, while production of the 1000 to 1500cc. Corolla/323 requires 30-40 percent extra tariff protection to remain viable (at current output levels).

6.5.2 Effective Protection Coefficients.

From the point of view of the overall economy, vehicle assembly is a value subtracting operation. The assemblers are unable to add value at world prices, requiring substantially more in terms of domestic resources to assemble a vehicle, (Caucus Committee Report, 1992a).

a) *ERP (a).*

Tables 6.4 and 6.5 contain the effective protection coefficients, derived when domestic value added is calculated, using the New Zealand ex-factory prices, plus distortions. A disaggregated picture of the steps involved in these calculations is presented in Appendix 16.

i) *Analysis of ERP (a) Coefficients for the 1500-3000cc. Corona/626.*

The effective rates of protection for the Corona/626, are all well over 0 percent (EPC > 1), (Table 6.4). These results would suggest that, substantial excess revenues are being earned, revenues well above those that would have prevailed under competitive conditions. These excess revenues in turn may imply that production need not be as efficient as a competitive industry would have to be to survive, (Tsakok, 1990).

The gap between value added at world and domestic prices has not decreased with the reduction in protection over the analysis period. The ex-factory price of the Corona/626 has been reduced in line with the equivalent C.B.U. import prices plus distortions (difference between NRP (a) and NRP (b)). This reduction, however, has not been at the expense of lower returns to the assemblers' factors of production (lower value added at domestic prices). This would indicate some form of efficiency gain, as a result of the increased competition.

Table 6.4

Value Added at World and Domestic Prices, and the Resulting Protection Coefficients, for the Corona and 626.

(P_j^p and P_i^p equal the New Zealand Ex-Factory Price)

Year	Value Added at Domestic Prices (A)	Value Added at World Prices (B)	EPC (a) (A/B)	ERP (a) [(A-B)/B]
Jul-Dec'87	6134.01	2821.43	2.17	117.41%
Jan-Jun'88	2257.37	2070.71	1.09	9.01%
Jul-Dec'88	4956.90	2204.49	2.25	124.86%
Jan-Jun'89	3985.49	3032.61	1.31	31.42%
Jul-Dec'89	5115.70	2523.46	2.03	102.73%
Jan-Jun'90	5497.11	2240.74	2.45	145.33%
Jul-Dec'90	6275.74	1555.09	4.04	303.56%
Jan-Jun'91	5267.75	1270.24	4.15	314.71%
Jul-Dec'91	6289.70	3732.20	1.69	68.53%
Jan-Jun'92	5288.79	1764.96	3.00	199.66%
Jul-Dec'92	5327.42	1594.50	3.34	234.11%
Jan-Jun'93	5246.04	1322.34	3.97	296.72%
Jul-Dec'93	5225.66	2206.09	2.37	136.87%

ii) *Analysis of ERP (a) Coefficients for the 1000-1500cc. Corolla/323.*

Once again, the difference between value added at domestic and world prices, as reflected in the ERP and EPC coefficients, is substantial between 1987 and 1994 (Table 6.5).

The interesting point to note from these coefficients, is the negative or very low value added at world prices. In the case where negative value added exists at world prices, the sum of the C.K.D. kit and the nominated components cost at free trade prices outweighs the duty free cost of the equivalent completely built up vehicle. In one case the C.K.D. kit alone was a mere $900 cheaper than the equivalent C.B.U. vehicle (Appendix Table A16.3.).[10]

[10] The Industry Development Commission (1983), calculated 15 different ERP coefficients for the assembly of different vehicles in 1982. Of these ERPs, two were negative.

Would these levels of value added at world prices allow the assemblers to operate in a free trade environment? Obviously the assemblers would not operate with negative value added, assembling Corolla/323 vehicles in a free trade situation.

Table 6.5

Value Added at World and Domestic Prices, and the Resulting Protection Coefficients, for the Corolla and 323.

(P_j^p and P_i^p equal the New Zealand Ex-Factory Price)

Year	Value Added at Domestic Prices (A)	Value Added at World Prices (B)	EPC (a) (A/B)	ERP (a) [(A-B)/B]
Jul-Dec'87	2828.03	946.89	2.99	198.67%
Jan-Jun'88	3511.07	-1047.40	-3.35	-435.22%
Jul-Dec'88	5424.17	-802.23	-6.76	-776.14%
Jan-Jun'89	4716.65	795.59	5.93	492.85%
Jul-Dec'89	4085.04	-611.43	-6.68	-768.11%
Jan-Jun'90	4390.39	898.18	4.89	388.81%
Jul-Dec'90	5431.28	921.64	5.89	489.30%
Jan-Jun'91	4675.90	270.26	17.30	1630.12%
Jul-Dec'91	4190.46	4541.91	0.92	-7.74%
Jan-Jun'92	4119.89	-553.75	-7.44	-844.00%
Jul-Dec'92	3852.97	-1656.82	11.59	-332.55%
Jan-Jun'93	5794.00	140.84	41.14	4013.93%
Jul-Dec'93	5982.06	-26.27	-227.72	-22874.27%

b) *ERP (b).*

Tables 6.6 and 6.7 contain the effective protection coefficients calculated under the assumption that domestic value added is the difference between world output and world tradeable input prices. A disaggregated picture of the steps involved in calculating the following coefficients, is presented in Appendix 17.

i) *Analysis of ERP (b) Coefficients for the 1500-3000cc.Corona/626.*

As with the ERP (a) calculations for the Corona/626, the ERP (b) coefficients are well over zero percent (Table 6.6, Column 5). Value added at world prices is the same for both ERP(a) and ERP (b). The difference between ERP (a) and (b), lies in the estimated value added in domestic prices. The difference is due to the fact that domestic output and input prices are assumed to equal world free trade prices plus protection. As mentioned above, these prices should in theory, equal the domestic ex-factory prices. However, due to the mandatory deletions policy, the rationalization policy with Australia and the control over the distribution of vehicles in New Zealand by the Japanese manufacturers, these input and output prices differ from their domestic equivalents. This problem is discussed in detail below.

The ERP (b) coefficients are larger than the ERP (a) coefficients, for the Corona/626. This is due to the fact that the domestic component cost (used in calculating value added at domestic prices for ERP (a)) is greater than the world component cost plus tariff and licensing.

The other factor contributing to the difference in the two ERP coefficients is the world output prices of the Corona/626. The world output price plus distortions, during the import licensing years (1987 and 1988), is greater than the domestic ex-factory price (Appendix Table A16.5 and A17.5). From 1989 onwards however, the ex-factory price is approximately the same as the world price plus distortions.

Table 6.6

Value Added at World and Domestic Prices, and the Resulting Protection Coefficients, for the Corona and 626.

(P_j^p and P_i^p equals the World Ex-Factory Price Plus Policy Distortions)

Year	Value Added at Domestic Prices (A)	Value Added at World Prices (B)	EPC (a) (A/B)	ERP (a) [(A-B)/B]
Jul-Dec'87	9580.90	2821.43	3.40	239.58%
Jan-Jun'88	9722.07	2070.71	4.70	369.50%
Jul-Dec'88	11209.80	2204.49	5.08	408.50%
Jan-Jun'89	7892.58	3032.61	2.60	160.26%
Jul-Dec'89	6504.67	2523.46	2.58	157.77%
Jan-Jun'90	5644.90	2240.74	2.52	151.92%
Jul-Dec'90	5039.17	1555.09	3.24	224.04%
Jan-Jun'91	5190.12	1270.24	4.09	308.59%
Jul-Dec'91	8230.57	3732.20	2.21	120.53%
Jan-Jun'92	6551.25	1764.96	3.71	271.18%
Jul-Dec'92	6946.58	1594.50	4.36	335.66%
Jan-Jun'93	6814.18	1322.34	5.15	415.31%
Jul-Dec'93	7799.07	2206.09	3.54	253.52%

Which of the two ERP calculations is the more accurate for the Corona/626, will depend on the level of substitution between domestic and overseas nominated components during the time period. The ERP calculations contain the two extreme scenarios. ERP (a) uses only domestic component prices, while ERP (b) uses overseas component prices plus policy distortions.

In 1990 assemblers began sourcing nominated components from the cheapest supplier, whether that be overseas or domestic. Some domestic components are cheaper than overseas, such as wiring looms and glass. New Zealand exports wiring looms to the Japanese manufacturers. However, components such as car stereos are imported.

The emphasis has gone off increasing the local content of domestically assembled vehicles, for three reasons. The Government has gradually opened up the borders to C.B.U. vehicles, increasing the competition for the assemblers. The level of protection accorded the component industry from overseas competition has fallen (tariff reductions for components are the same as C.B.U. tariffs). Thirdly, the assemblers have realized the difficulties in gaining access to the Australian market, unless vehicles are virtually completely built up in New Zealand (the 50% Area Content Rule is impossible to meet, assembling C.K.D. kits).

Without access to detailed input statistics on the vehicle assembly industry, this substitution away from domestically sourced components is impossible to factor into the ERP calculations.

ERP (a) uses domestic component prices in the calculation of domestic value added. Being unable to factor this substitution into the calculation, results in an undervaluation of domestic value added. This biases the ERP (a) coefficient downwards. The more substitution to cheaper overseas components, the greater the domestic value added.

The second ERP calculation (ERP (b)) assumes the domestic price of the component bundle is equal to the world price plus any protection distortions. The component bundle price used in calculating ERP (b) becomes a more accurate indication of the component cost for the Corolla/626, as the substitution becomes greater and the assemblers behave in a more perfectly competitive manner (the closer ERP is to 1994). However, during the early years of the analysis, the assemblers were sourcing domestically, hence the early ERP (b) results will overstate the difference between domestic and world value added for the Corolla/626.

ii) *Analysis of ERP (b) Coefficients for the 1000-1500cc. Corolla/323.*

Once again the difference between value added at domestic and world prices is significant (Table 6.7). Value added at world free trade prices is the same as the world value added used in the ERP (a) coefficients, calculated in Section 6.1.1, for the Corolla/323. However, value added in domestic prices is less in the ERP (b) calculation than in ERP (a). The difference is due to the fact that the world price of the Corolla/323 plus any import protection is significantly less than the equivalent domestic price (Appendix A16.1-16.4 and A17.1-A17.4). This price differential is reflected in the difference between NRP (a) and NRP (b) in Table 6.1 and Table 6.2.

When deciding which of the two ERP coefficients is the more accurate for the 1000-1500cc. vehicles one must bear in mind the substitution effect mentioned in section 6.5.2 b) (i) above.

Table 6.7

Value Added at World and Domestic Prices, and the Resulting Protection Coefficients, for the Corolla and 323.

(P_j^p and P_i^p equals the World Ex-Factory Price Plus Policy Distortions)

Year	**Value Added at Domestic Prices** (A)	**Value Added at World Prices** (B)	**EPC (b)** (A/B)	**ERP (b)** [(A-B)/B]
Jul-Dec'87	5679.76	946.89	6.00	499.83%
Jan-Jun'88	1708.62	-1047.40	-1.63	-263.13%
Jul-Dec'88	2851.62	-802.23	-3.55	-455.56%
Jan-Jun'89	3185.51	795.59	4.00	300.40%
Jul-Dec'89	1442.43	-611.43	-2.36	-335.91%
Jan-Jun'90	3266.14	898.18	3.64	263.64%
Jul-Dec'90	3168.66	921.64	3.44	243.81%
Jan-Jun'91	2617.95	270.26	9.69	868.68%
Jul-Dec'91	8600.58	4541.91	1.89	89.36%
Jan-Jun'92	2241.14	-553.75	-4.05	-504.72%
Jul-Dec'92	1121.94	-1656.82	-0.68	-167.72%
Jan-Jun'93	3612.21	140.84	25.65	2464.76%
Jul-Dec'93	3236.34	-26.27	-123.20	-12419.54%

6.6 **The Optimal Tariff for New Vehicles from Japan.**

The optimal tariff is the reciprocal of the elasticity of import supply (equation 6.1). If the import supply curve is perfectly elastic (the small country scenario), the optimal tariff is zero.

$$t_{optimal} = \frac{1}{\eta_{m_s}} \qquad (6.1)$$

As the estimated import supply curve for 1500-3000cc. vehicles (η_{ms} = 9.9) is not perfectly elastic, the optimal tariff is calculated for imports of this class of vehicle.

Therefore a tariff on imports of new 1500-3000cc. vehicles from Japan of 10.1% [(1/9.9)*100] would maximize the net welfare of New Zealand, assuming the estimated import supply elasticity of 9.9.

CHAPTER VII

SUMMARY AND SUGGESTIONS FOR FURTHER RESEARCH

7.1 Summary

This study attempts to assess the relative efficiency of the New Zealand Government's gradual liberalization of the motor vehicle market since the Industry Development Plan of 1984. These policy changes were presented in Section 2.2.

The objective of the 1984 Industry Plan was to maintain the motor vehicle and component manufacturing industry while improving its efficiency and ensuring that future investment within the industry constitutes a more efficient use of resources from the national viewpoint.

However, the set of policy changes implemented in 1984 still heavily subsidises the vehicle assembly industry, at the expense of the New Zealand consumer. The nominal rates of protection indicating that the ex-factory cost of a New Zealand assembled vehicle is up to 65 percent more expensive than an equivalent C.B.U. Japanese manufactured vehicle of a higher specification.

The average effective rate of protection estimated at the time of the Industry Development Plan in 1982 was 544%, (Industry Development Commission, 1983). Although the effective coefficients for the larger vehicles (1500-3000cc.) have decreased from 544% to an average of 200% since the industry plan, they still remain high. The effective coefficients for the larger vehicles ranged from 100% up to 400%, between 1987 and 1994.

Production of the smaller vehicles (1000-1500cc.) results in negative rates of effective protection. A negative ERP occurs in circumstances when the sum of the vehicle component cost at the border, outweighs the border cost of a completely built up vehicle. These negative ERPs indicate activities that have a negative contribution to the economy and should be ceased as soon as possible, (IDC, 1983).

The effective rates for the two classes of vehicles were estimated under the assumption that New Zealand is a small country on the world market for Japanese new vehicles. Testing this small country assumption resulted in an estimated import supply elasticity of approximately 10 for large 1500-3000cc. vehicles, ex-Japan. This elasticity was factored into the nominal rate of protection, by estimating the unobserved border price for the 1500-3000cc. vehicles. The difference between the original and adjusted NRP coefficients of no more than 2% would indicate that the bias resulting from assuming New Zealand is a `Small Country´ in the world market for these vehicles, is not significant.

The import supply elasticity is however, different from what has been assumed of New Zealand's import supply schedule in past studies estimating protection coefficients for the vehicle industry. Both the Industry Development Commission, (1983) and Rose, (1971), assumed the import supply elasticity to be perfectly elastic.

Although the estimated import supply model for large vehicles provides an adequate representation of the sample data, one must consider the high level of multicollinearity between explanatory variables and the very small sample size when considering the accuracy of the estimation. The high level of collinearity will increase the significance of the model and decrease the ability of the estimator to separate out the influence of each explanatory variables on the dependent variable. While a larger sample size, would reduce the variance of the estimators, increasing the significance of the model.

The optimal tariff calculated from the elasticity of import supply is approximately 10 percent. Compared with the current level of import protection from Japanese completely built up vehicles (30 percent), the optimal tariff is significantly less than past and present levels of import protection. This means that the net welfare resulting from import protection since the plan has not been maximized. The nation is subsidizing the vehicle assembly by an extra 20% per vehicle (largely via higher consumer prices), while the level of producer surplus and Government revenue is higher than the optimal tariff theory would suggest.

The current level of protection will meet the first of the 1984 Industry Plan's objectives, of sustaining the assembly and component industry, while a decrease in the level of protection since 1984 has reduced the nominal and effective coefficients indicating some form of efficiency gains.

However, the results of this study would indicate that current levels of protection do not provide an environment for the efficient use of resources from the national viewpoint.

7.2 Suggestions for Further Research

It is difficult to make general conclusions about the resource pull effects between industries as a result of protection, using a disaggregated effective protection analysis of a single manufacturing sector. Therefore, similar studies in other sectors of the economy would enable the practitioner to gauge the level of resource pull likely from one sector to another, as a result of differing levels of protection.

The import supply schedule may be re-estimated using quarterly or semi-annual data. This would increase the sample size substantially, decreasing the variance of the estimators. However, the data required for this estimation would need to be sourced from the Japanese Statistical Bureau, as all their current publications in New Zealand contain annual data only.

It would also be possible to estimate the elasticity of import supply for C.K.D. kits and other nominated components to adjust the effective protection coefficients accordingly. New Zealand currently accounts for between 5 and 10% of the Japanese C.K.D. market, therefore the import supply elasticity for C.K.D. kits may be less than perfectly elastic.

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APPENDIX.

APPENDIX LIST

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APPENDIX I.

Table A1.1

Trade Up Gap Before and After Japanese Used Imports.

Vehicle Type	Price	Depreciation	Difference
Toyota Corolla 4 Door Sedan:			
March 1992 New Price	$26,100	Trade Up Gap:	
Value of 1989 Model	$16,500	36 %	Difference
April 1987 New Price	$26,250	Trade Up Gap:	-1 %
Value of 1984 New Price	$16,500	37 %	
Ford Telstar 2.0 GL:			
March 1992 New Price	$30,495	Trade Up Gap:	
Value of 1989 Model	$17,000	44 %	Difference
April 1987 New Price	$29,830	Tade Up Gap:	4 %
Value of 1984 Model	$17,750	40 %	
Honda Civic LX 4 Door Saloon:			
March 1992 New Price	$26,850	Trade Up Gap:	
Value of 1989 Model	$15,000	44 %	Difference
April 1987 New Price	$23,950	Trade Up Gap:	4%
Value of 1984 Model	$14,300	40 %	

Source: Kyd, W., Campion, C. and Hancock, H. (1992) *Executive Summary of Automobile Enquiry Carried Out by Government Caucus Sub-Committee on Matters of Concern to the Automotive Industry.* Wellington: Caucus Sub-Committee.

NB: The trade up gap represents the depreciation after three years of motoring, and is estimated by the difference between the retail price of a new vehicle and retail price of the same vehicle after three years of motoring. The trade up gaps are compared before and after the influx of used Japanese vehicles, to determine whether used imports have had a depreciating effect on new cars.

The new vehicle industry, however, contended that the above figures were incorrect by being based on how much the dealer would sell the car for (retail price) rather than how much the dealer is prepared to pay for it (trade value). If trade in values are used the outcome changes to Table A1.2 overleaf.

Table A1.2

Trade Up Gap Before and After Japanese Used Imports.

Vehicle Type	Price	Depreciation	Difference
Toyota Corolla 4 Door Sedan:			
March 1992 New Price	$26,100	Trade Up Gap:	
Trade Value of 1989 Model	$12,000	54 %	Difference
April 1987 New Price	$26,250	Trade Up Gap:	6 %
Trade Value of 1984 Model	$13,700	48 %	
Ford Telstar 2.0 GL:			
March 1992 New Price	$30,495	Trade Up Gap:	
Trade Value of 1989 Model	$13,600	55 %	Difference
April 1987 New Price	$29,830	Tade Up Gap:	4 %
Trade Value of 1984 Model	$14,700	51 %	
Honda Civic LX 4 Door Saloon:			
March 1992 New Price	$26,850	Trade Up Gap:	
Trade Value of 1989 Model	$12,000	55 %	Difference
April 1987 New Price	$23,950	Trade Up Gap:	15 %
Trade Value of 1984 Model	$14,300	40 %	

Source: Kyd, W., Campion, C. and Hancock, H. (1992) *Executive Summary of Automotive Enquiry Carried out by Government Caucus Sub-Committee on Matters of Concern to the Automotive Industry*. Wellington: Caucus Sub-Committee.

APPENDIX II.

Table A2.1

Tariff and Tax Levels on C.B.U. and C.K.D. Imports.

Date	C.B.U. - Aust.	C.B.U. - U.K.	C.B.U. - Other	C.K.D.	Excise Tax	G.S.T.
Jan-85	20.0%	20.0%	55.0%	35.0%	30.0%	
Jul-85	20.0%	20.0%	55.0%	35.0%	30.0%	
Jan-86	20.0%	20.0%	55.0%	30.0%	30.0%	
Jul-86	20.0%	20.0%	55.0%	30.0%	30.0%	
Jan-87	20.0%	20.0%	55.0%	25.0%	25.0%	10.0%
Jul-87	20.0%	20.0%	55.0%	25.0%	20.0%	10.0%
Jan-88	20.0%	20.0%	55.0%	20.0%	20.0%	10.0%
Jul-88	15.0%	20.0%	50.0%	0.0%	15.0%	10.0%
Jan-89	10.0%	20.0%	45.0%	0.0%	15.0%	10.0%
Jul-89	5.0%	20.0%	40.0%	0.0%	7.5%	12.5%
Jan-90	0.0%	20.0%	35.0%	0.0%	7.5%	12.5%
Jul-90	0.0%	20.0%	35.0%	0.0%	0.0% ψ	12.5%
Jan-91	0.0%	20.0%	35.0%	0.0%	0.0%	12.5%
Jul-91	0.0%	20.0%	35.0%	0.0%	0.0%	12.5%
Jan-92	0.0%	20.0%	35.0%	0.0%	0.0%	12.5%
Jul-92	0.0%	20.0%	35.0%	0.0%	0.0%	12.5%
Jan-93	0.0%	20.0%	35.0%	0.0%	0.0%	12.5%
Jul-93	0.0%	20.0%	32.5%	0.0%	0.0%	12.5%
Jan-94	0.0%	20.0%	32.5%	0.0%	0.0%	12.5%
Jul-94	0.0%	20.0%	30.0%	0.0%	0.0%	12.5%
Jan-95	0.0%	20.0%	30.0%	0.0%	0.0%	12.5%
Jul-95	0.0%	20.0%	27.5%	0.0%	0.0%	
Jun-96	0.0%	20.0%	27.5%	0.0%	0.0%	
Jul-96	0.0%	20.0%	25.0%	0.0%	0.0%	

ψ The goods became free of Excise Duty on 24/7/90.
Source: Ministry of Customs. *Official Information Request for Tariff Levels Since the Industry Plan, 1994.* Wellington: Head Office.

APPENDIX III.

The undermentioned goods, if imported to be used in the assembly, completion or manufacture of motor vehicles, must be entered in accordance with their appropriate Tariff item.

- arm rests
- battery cables and earth straps
- brake hoses and cables
- coiled suspension springs
- driveshafts
- electric batteries (accumulators)
- exhaust systems (comprising piping and mufflers)
- exterior rear vision mirrors
- floor coverings - cut, fabricated or molded to shape
- glass, curved or flat
- head restraints
- horns
- hub caps, hub centres, full wheel covers, wheel trim bands and discs, and wheel trim rimbellishers
- ignition coils
- interior trim components of hardboard, cardboard or similar materials, leather and plastic sheetings
- melt sheets cut to shape
- pneumatic rubber tyres and inner tubes of rubber
- radiator assemblies including pressure caps
- seat belts
- seat frame and spring frame assemblies (including seat reclining mechanisms)
- seat springs
- spark plugs

- sun visors and covers including arms and fixing brackets
- upholsterers' materials (such as flock, wadding, batting, fluting, linters, padding, foams) cut, molded or fabricated to shape
- upholstery textiles, fabrics, leathers or plastic sheetings, cut molded or fabricated to shape
- wireless broadcast receiving sets suited or designed for use in motor vehicles
- wiring looms, or harnesses
- wheels of magnesium, aluminium alloys, chrome or decorative steel wheels, whether one piece construction or composite.

APPENDIX IV.

Table A4.1

The Impact of a Tariff Reduction on New Car Prices: 1990.

Costings	**35.0%**	**32.5%**	**30.0%**	**27.5%**	**25.0%**	**0.0%**
V.F.D.	14043	14043	14043	14043	14043	14043
Tariff	35.0% 4915	32.5% 4564	30.0% 4213	27.5% 3862	25.0% 3511	0.0% 0
Freight Insurance	1530 154	1530 154	1530 154	1530 154	1530 154	1530 154
Administration	1060	1060	1060	1060	1060	1060
Marketing	530	530	530	530	530	530
Preparation / Delivery	239	239	239	239	239	239
Landed Cost	22471	22120	21769	21418	21067	17556
Importer / Dealer Margin	23% 5168	23% 5088	23% 5007	23% 4926	23% 4845	23% 4038
Retail Price	27639	27208	26776	26344	25912	21594
G.S.T. @12.5%	3455	3401	3347	3293	3239	2699
Retail Price	31094	30609	30123	29637	29156	24293
Retail Price Change from 35% Tariff	N/A	-1.59	-3.12	-4.69	-6.24	-21.87
Value of Tariff as a % of Retail Price	4915 15.8%	4564 14.9%	4213 14.0%	3862 13.0%	3511 12.0%	0 0.0%

Source: V.F.D. based on 1989 trade statistics from New Zealand Department of Statistics (1994a) *Report on C.B.U. and C.K.D. Volume Value, by Port of Entry*. Wellington. Costings based on Infometrics data for 1990, in Infometrics Ltd (1992) *The Motor Vehicle Assembly Industry: An Analysis of Employment and Viability Issues*. August.

APPENDIX V.

Table A5.1

Production by the World's Major Automakers.

Country	Make	Year	Total Vehicles	% Change	Passenger Cars	% Change
Japan	Toyota	1986	3,660,167	N/A	2,684,024	N/A
		1987	3,638,279	-0.6%	2,708,069	0.9%
		1988	3,968,697	9.1%	2,982,922	10.2%
		1989	3,975,902	0.2%	3,055,101	2.4%
		1990	4,212,373	5.9%	3,345,885	9.5%
		1991	4,085,081	-3.0%	3,180,054	-5.0%
		1992	3,931,341	-3.8%	3,171,311	-0.3%
		1993	3,561,750	-9.1%	2,882,698	-9.1%
	Nissan	1986	2,242,995	N/A	1,769,484	N/A
		1987	2,226,313	-0.7%	1,803,924	2.0%
		1988	2,164,218	-2.8%	1,730,948	-4.1%
		1989	2,372,526	9.6%	1,972,508	14.0%
		1990	2,417,010	1.9%	2,020,523	2.4%
		1991	2,330,943	-3.6%	1,946,173	-3.7%
		1992	2,117,664	-9.3%	1,750,829	-10.0%
		1993	1,811,591	-14.5%	1,524,541	-12.9%
	Mitsub-ishi	1988	1,261,409	N/A	639,890	N/A
		1989	1,249,510	-0.9%	708,418	10.7%
		1990	1,332,938	6.7%	833,265	17.6%
		1991	1,405,647	5.5%	914,178	9.7%
		1992	1,395,875	-0.7%	939,590	2.7%
		1993	1,362,447	-2.4%	944,247	0.5%

Source: Toyota (1991-1994) *The Automobile Industry: Toyota and Japan*. Tokyo: Toyota Motor Corporation, International Public Affairs Division.

Table A5.2

Production by the World's Major Automakers.

Country	Make	Year	Total Vehicles	% Change	Passenger Cars	% Change
U.S.A.	G.M.	1986	5,834,648	N/A	4,316,143	N/A
		1987	5,129,244	-12.1%	3,603,074	-16.5%
		1988	5,162,544	0.7%	3,501,124	-2.8%
		1989	4,848,556	-6.1%	3,213,752	-8.2%
		1990	4,120,237	-14.5%	2,652,988	-17.5%
		1991	3,721,617	-9.7%	2,496,076	-5.9%
		1992	3,825,588	2.8%	2,468,869	-1.1%
		1993	4,328,270	13.1%	2,542,455	3.0%
	Ford	1986	3,145,889	N/A	1,764,235	N/A
		1987	3,312,409	5.3%	1,830,376	3.8%
		1988	3,324,360	0.4%	1,805,741	-1.4%
		1989	3,174,176	-4.5%	1,677,081	-7.2%
		1990	2,762,441	-12.9%	1,377,351	-17.9%
		1991	2,428,942	-12.1%	1,172,384	-14.9%
		1992	2,829,990	16.5%	1,333,578	13.7%
		1993	3,220,461	13.9%	1,489,699	11.7%
	Chrysler	1986	1,691,232	N/A	1,347,083	N/A
		1987	1,664,260	-1.6%	1,109,421	-17.6%
		1988	1,727,960	3.8%	1,072,845	-3.3%
		1989	1,575,416	-8.8%	915,899	-14.6%
		1990	1,252,968	-20.5%	726,466	-20.7%
		1991	1,073,850	-14.3%	510,147	-29.8%
		1992	1,283,369	19.5%	522,656	2.5%
		1993	1,427,402	11.2%	494,453	-5.4%

Source: Toyota (1991-1994) *The Automobile Industry: Toyota and Japan*. Tokyo: Toyota Motor Corporation, International Public Affairs Division.

Table A5.3

Production by the World's Major Automakers.

Country	Make	Year	Total Vehicle	% Change	Passenger Cars	% Change
Europe	Fiat: Italy	1986	1,594,327	N/A	1,426,776	N/A
		1987	1,836,270	15.2%	1,676,134	17.5%
		1988	2,035,407	10.9%	1,868,790	11.5%
		1989	2,148,040	5.5%	1,968,094	5.3%
		1990	2,049,270	-4.6%	1,870,736	-4.9%
		1991	1,796,956	-12.3%	1,618,365	-13.5%
		1992	1,609,912	-10.4%	1,465,258	-9.5%
		1993	1,119,255	-30.5%	1,005,472	-31.4%
	V.W.: Germany	1986	1,862,174	N/A	1,774,364	N/A
		1987	1,891,014	1.6%	1,810,454	2.0%
		1988	1,879,748	-0.6%	1,798,497	-0.7%
		1989	1,963,110	4.4%	1,885,234	4.8%
		1990	2,019,722	2.9%	1,930,194	2.4%
		1991	2,026,404	0.3%	1,912,916	-0.9%
		1992	2,149,690	6.0%	2,041,570	6.7%
		1993	1,581,080	-26.5%	1,504,001	-26.3%
	Renault: France	1986	1,574,964	N/A	1,305,191	N/A
		1987	1,652,769	4.9%	1,375,696	5.4%
		1988	1,680,636	1.7%	1,384,959	0.7%
		1989	1,771,177	5.4%	1,446,669	4.5%
		1990	1,616,104	-8.8%	1,316,930	-9.0%
		1991	1,630,109	0.9%	1,351,647	2.6%
		1992	1,812,277	11.2%	1,504,111	11.3%
		1993	1,486,595	-18.0%	1,264,628	-15.9%

Source: Toyota (1991-1994) *The Automobile Industry: Toyota and Japan*. Tokyo: Toyota Motor Corporation, International Public Affairs Division.

Table A5.4

Selected World Automakers, Results.
(Unit:$U.S. million)

Country / Location	Make	1989 Results		1990 Results	
		Sales	Net Income	Sales	Net Income
Japan	Toyota	55,701	2,404	60,084	2,884
	Nissan	36,451	868	35,729	734
U.S.A.	G.M.	126,932	4,224	124,705	1,986
	Ford	96,146	3,835	97,650	860
	Chrysler	34,922	359	30,620	68
Europe	Daimler -Benz	40,634	3,622	52,918	1,114
	Fiat	37,912	2,409	47,075	N/A.
	V.W.	34,762	552	42,125	672
	Renault	27,350	1,549	30,044	220
	Peugeot	23,973	1,614	29,379	1,700

Source: Toyota (1989-94) *The Automotive Industry: Toyota and Japan*. Tokyo: Toyota Motor Division, International Public Affairs Division.

Table A5.5

Selected World Automakers, Results.
(Unit:$U.S. million)

Country / Location	Make	1991 Results		1992 Results	
		Sales	Net Income	Sales	Net Income
Japan	Toyota	71,414	3,126	81,307	1,903
	Nissan	42,304	346	48,255	762
U.S.A.	G.M.	123,056	4,453	132,242	-23,498
	Ford	88,286	2,258	100,132	-7,385
	Chrysler	29,370	795	36,897	723
Europe	Daimler -Benz	57,039	N/A.	63,072	896
	Fiat	46,613	513	48,643	447
	V.W.	45,978	671	54,686	94
	Renault	29,422	546	33,898	1,011
	Peugeot	28,388	N/A.	29,361	637

Source: Toyota (1989-94) *The Automotive Industry: Toyota and Japan*. Tokyo: Toyota Motor Division, International Public Affairs Division.

Table A5.6

Selected World Automakers, Results.

(Unit:$U.S. million)

Country / Location	Make	1993 Results	
		Sales	Net Income
Japan	Toyota	95,428	1,649
	Nissan	53,428	483
U.S.A.	G.M.	138,219	2,466
	Ford	108,521	2,529
	Chrysler	43,600	-2,551
Europe	Daimler -Benz	59,094	-1,089
	Fiat	34,123	-1,589
	V.W.	46,323	-1,173
	Renault	29,981	189
	Peugeot	25,675	N/A.

Source: Toyota (1989-94) *The Automotive Industry: Toyota and Japan*. Tokyo: Toyota Motor Division, International Public Affairs Division.

APPENDIX VI.

The Algebra of Effective Protection.

$$ERP_j^{P}=\frac{V_j^{d}-V_j^{w}}{V_j^{w}} \tag{A6.1}$$

Where: V_j^d= value added per unit of good j at domestic prices.

and, V_j^w= value added per unit of good j at world market prices.

Value Added at World Market Prices.

Value added per unit of output "j" at world market (border) prices is defined below.

$$V_j^{w}=P_j^{w}E_t^{r}-\sum_{i=1}^{n} P_i^{w}E_t^{r}.A_{ij} \tag{A6.2}$$

where: P_i^w is the world market (border) price of tradable input "i" used in the production of good "j".

E_t^r is the exchange rate

A_{ij} is the fixed input - output technical coefficient in physical units.

Expression (A6.2) has led to difficulties with empirical measurements, therefore an adjustment may be made to allow for the use of output price data, and the value of tradeable inputs used per unit of the final product.

$$V_j^{w}=P_j^{w}E_t^{r}\left[1-\sum_{i=1}^{n} a_{ij}^{*}\right] \tag{A6.3}$$

This equation follows from (A6.2) given that,

$$A_{ij}=\frac{X_{ij}}{Q_j} \tag{A6.4}$$

and

$$a_{ij}^* = A_{ij} \cdot \frac{P_i^w E_t^r}{P_j^w E_t^r} \quad (A6.5)$$

Where: X_{ij} = total quantity of the tradeable input "i" used in the production of good "j".

and Q_j = total output of good j.

Expression (A6.2) on the other hand required data on output and input prices, and information about the technical coefficients of production in physical units.

Value Added Per Unit of Output Under Domestic Prices

When Government intervenes in the economy it distorts both the output and input prices. This distortion faced by producers was represented by t_j^p or the Nominal Rate of Protection.

We can also introduce a similar measure for the distortion in the price of tradeable inputs.

$$t_i^p = \frac{P_i^p - P_i^w E_t^r}{P_i^w E_t^r} \quad (A6.6)$$

where: P_i^p is the price of the tradeable input "i" in the domestic market.

and P_i^w is the price of the tradeable input "i" in the world market.

Expressions (A6.6) and (4.3) can be rewritten for post-intervention prices P_i^p and P_j^p .

$$P_i^p = P_i^w E_t^r \, [1 + t_i^p] \quad (A6.7)$$

$$P_j^p = P_j^w E_t^r \, [1 + t_j^p] \quad (A6.8)$$

Therefore, value added per unit of output of good "j" at domestic post-intervention prices is:

$$V_j^d = P_j^w E_t^r [1+t_j^p] - \sum_{i=1}^{n} P_i^w E_t^r [1+t_i^p].A_{ij} \tag{A6.9}$$

However for empirical applications, it is easier to work with an expression that defines the relationship between intermediate inputs and output in value terms, instead of physical terms.

Hence:

$$a_{ij} = A_{ij} \cdot \frac{P_i^w E_t^r [1+t_i^p]}{P_j^w E_t^r [1+t_j^p]} \tag{A6.10}$$

where: a_{ij} = share of input "i" in the cost of one unit of product "j", at post intervention prices.

Solve (A6.10) for A_{ij} .

$$a_{ij}.P_j^w E_t^r [1+t_j^p] = A_{ij}.P_i^w E_t^r [1+t_i^p]$$

$$A_{ij} = a_{ij} \cdot \frac{P_j^w E_t^r [1+t_j^p]}{P_i^w E_t^r [1+t_i^p]} \tag{A6.11}$$

Sub A_{ij} from (A6.11) into (A6.9).

$$V_j^d = P_j^w E_t^r [1+t_j^p] - \left[\sum_{i=1}^{n} P_i^w E_t^r [1+t_i^p].a_{ij} \left[\frac{P_j^w E_t^r [1+t_j^p]}{P_i^w E_t^r [1+t_i^p]} \right] \right] \tag{A6.12}$$

Cancel $P_i^w E_t^r [1+t_i^p]$'s

$$V_j^d = P_j^w E_t^r [1+t_j^p] - \sum_{i=1}^{n} a_{ij} [P_j^w E_t^r [1+t_j^p]] \tag{A6.13}$$

Remove the like term $P_j^{w}E_t^{r}[1+t_j^{p}]$.

$$V_j^{d}=\left[P_j^{w}E_t^{r}[1+t_j^{p}]\right].\left[1-\sum_{i=1}^{n}a_{ij}\right] \qquad \text{(A6.14)}$$

Finally to derive the Effective Protection expression, we must sub expressions (A6.3) and (A6.14) together with (A6.5) a^{*}_{ij} and (A6.10) a_{ij} into (A6.1).

$$ERP_j^{p}=\frac{V_j^{d}-V_j^{w}}{V_j^{w}} \qquad \text{(A6.1)}$$

$$ERP_j^{p}=\frac{\left[P_j^{w}E_t^{r}(1+t_j^{p})\right].\left[1-\sum_{i=1}^{n}a_{ij}\right]-\left[P_j^{w}E_t^{r}(1-\sum_{i=1}^{n}a_{ij}^{*})\right]}{\left[P_j^{w}E_t^{r}(1-\sum_{i=1}^{n}a_{ij}^{*})\right]} \qquad \text{(A6.15)}$$

$$=\frac{\left[P_j^{w}E_t^{r}(1+t_j^{p})\right]-\left[P_j^{w}E_t^{r}(1+t_j^{p}).\sum_{i=1}^{n}a_{ij}\right]-\left[P_j^{w}E_t^{r}(1-\sum_{i=1}^{n}a_{ij}^{*})\right]}{\left[P_j^{w}E_t^{r}(1-\sum_{i=1}^{n}a_{ij}^{*})\right]} \qquad \text{(A6.16)}$$

Remove the like term $P_j^{w}E_t^{r}$

$$=\frac{P_j^{w}E_t^{r}\left[(1+t_j^{p})-\left[(1+t_j^{p}).\sum_{i=1}^{n}a_{ij}\right]-(1-\sum_{i=1}^{n}a_{ij}^{*})\right]}{\left[P_j^{w}E_t^{r}\,(1-\sum_{i=1}^{n}a_{ij}^{*})\right]} \qquad \text{(A6.17)}$$

Sub in a_{ij}.

Since $\sum_{i=1}^{n}A_{ij}.\frac{P_i^{w}E_t^{r}}{P_j^{w}E_t^{r}}=\sum_{i=1}^{n}a_{ij}^{*}$

$$= \frac{P_j^{\,w}E_t^{\,r}\left[(1+t_j^{\,p}) - \left[(1+t_j^{\,p}).\sum_{i=1}^{n} A_{ij}.\frac{P_i^{\,w}E_t^{\,r}(1+t_i^{\,p})}{P_j^{\,w}E_t^{\,r}(1+t_j^{\,p})}\right] - (1-\sum_{i=1}^{n} a_{ij}^{*})\right]}{\left[P_j^{\,w}E_t^{\,r}(1-\sum_{i=1}^{n} a_{ij}^{*})\right]} \tag{A6.18}$$

$$= \frac{P_j^{\,w}E_t^{\,r}\left[(1+t_j^{\,p}) - \left[(1+t_j^{\,p}).\sum_{i=1}^{n} a_{ij}^{*}.\frac{(1+t_i^{\,p})}{(1+t_j^{\,p})}\right] - [1-\sum_{i=1}^{n} a_{ij}^{*}]\right]}{\left[P_j^{\,w}E_t^{\,r}(1-\sum_{i=1}^{n} a_{ij}^{*})\right]} \tag{A6.19}$$

$$= \frac{P_j^{\,w}E_t^{\,r}\left[(1+t_j^{\,p}) - \sum_{i=1}^{n} a_{ij}^{*}(1+t_i^{\,p}) - (1-\sum_{i=1}^{n} a_{ij}^{*})\right]}{\left[P_j^{\,w}E_t^{\,r}(1-\sum_{i=1}^{n} a_{ij}^{*})\right]} \tag{A6.20}$$

$$= \frac{P_j^{\,w}E_t^{\,r}\left[1+t_j^{\,p}-\sum_{i=1}^{n} a_{ij}^{*} - \sum_{i=1}^{n} a_{ij}^{*}t_i^{\,p} - 1 + \sum_{i=1}^{n} a_{ij}^{*}\right]}{\left[P_j^{\,w}E_t^{\,r}(1-\sum_{i=1}^{n} a_{ij}^{*})\right]} \tag{A6.21}$$

$$= \frac{P_j^{\,w}E_t^{\,r}\left[t_j^{\,p}-\sum_{i=1}^{n} a_{ij}^{*}\, t_i^{\,p}\right]}{\left[P_j^{\,w}E_t^{\,r}(1-\sum_{i=1}^{n} a_{ij}^{*})\right]} \tag{A6.22}$$

Cancel the $[P_j^{\,w}E_t^{\,r}]$'s

$$ERP_j^{\,p} = \frac{t_j^{\,p} - \sum_{i=1}^{n} a_{ij}^{*}\, t_i^{\,p}}{1 - \sum_{i=1}^{n} a_{ij}^{*}} \tag{A6.23}$$

The numerator of (A6.23) represents the net price distortions to which producers react. All output and input price distortions, are captured by the formula through the t_j^p and t_i^p terms.

In order to apply the ERP formula empirically, one requires the free trade coefficients a^*_{ij}, not the coefficients corresponding to the distorted situation (a_{ij}). The expression for the coefficient is below, and is derived in Appendix 7.

$$a_{ij}^* = a_{ij} \cdot \frac{(1+t_j^p)}{(1+t_i^p)}$$

Where a_{ij} is the value of the tradeable input i used per unit of output j at post-intervention prices.

APPENDIX VII.

$$a_{ij} = A_{ij} . \frac{P_i^{\,w} E_t^{\,r} (1 + t_i^{\,p})}{P_j^{\,w} E_t^{\,r} (1 + t_j^{\,p})}$$

(A6.10)

$$a_{ij}^{*} = A_{ij} \, . \, \frac{P_i^{\,w} . E_t^{\,r}}{P_j^{\,w} . E_t^{\,r}}$$

(A6.5)

Solve for a^{*}_{ij}

Rearrange (A6.5)

$$A_{ij} = a_{ij}^{*} . \frac{P_j^{\,w} E_t^{\,r}}{P_i^{\,w} E_t^{\,r}}$$

Sub into (A2.10)

$$a_{ij} = a_{ij}^{*} . \frac{P_j^{\,w} E_t^{\,r}}{P_i^{\,w} E_t^{\,r}} . \frac{P_i^{\,w} E_t^{\,r} (1 + t_i^{\,p})}{P_j^{\,w} E_t^{\,r} (1 + t_j^{\,p})}$$

$$a_{ij} = a_{ij}^{*} \, \frac{(1 + t_i^{\,p})}{(1 + t_j^{\,p})}$$

(A7.1)

Rearrange.

$$a_{ij}^{*} = a_{ij} . \frac{(1 + t_j^{\,p})}{(1 + t_i^{\,p})}$$

(A7.2)

APPENDIX VIII.

Derivation of Free Trade Border Price (P')

for a Country that Affects the World Price.

The case of an import tariff of

$$\frac{P_j^p - P_j^w}{P_j^w}$$

The elasticity of import supply is defined as:

$$\eta_{sm} = \frac{\Delta Q_{sm}}{\Delta P_{sm}} x \frac{P_{sm}}{Q_{sm}} \tag{A8.1}$$

Rearrange:

$$\eta_{sm} \cdot \frac{\Delta P_{sm}}{P_{sm}} . Q_{sm} = \Delta Q_{sm} \tag{A8.2}$$

Rearrange:

$$\eta_{sm} = \left[\frac{\Delta Q_{sm}}{Q_{sm}}\right] \Big/ \left[\frac{\Delta P_{sm}}{P_{sm}}\right] \tag{A8.3}$$

A movement from P_j^w to P' in diagram 4.2 leads to:

$$\eta_{sm} = \left[\frac{Q_1 - Q_o}{Q_o}\right] \Big/ \left[\frac{P' - P_j^w}{P_j^w}\right] \tag{A8.4}$$

This can be rewritten as,

$$\left[\frac{Q_1-Q_o}{Q_o}\right]=\left[\frac{P'-P_j^{w}}{P_j^{w}}\right].\eta_{sm}$$

(A8.5)

Similarly on the demand side:

$$\eta_{dm}=\left[\frac{\Delta Q_{dm}}{Q_{dm}}\right]\Big/\left[\frac{\Delta P_m}{P_m}\right]$$

(A8.6)

Therefore

$$\eta_{dm}=\left[\frac{Q_1-Q_o}{Q_o}\right]\Big/\left[\frac{P'-P_j^{p}}{P_j^{p}}\right]$$

(A8.7)

hence

$$\left[\frac{Q_1-Q_o}{Q_o}\right]=\left[\frac{P'-P_j^{p}}{P_j^{p}}\right].\eta_{dm}$$

(A8.8)

Since (A4.5) and (A4.8) are in the form of $\frac{Q_1-Q_o}{Q_o}$, then set (A4.5) and (A4.8) equal to each other, and solve for P'.

$$\frac{P'-P_j^{w}}{P_j^{w}}.\eta_{sm}=\frac{P'-P_j^{p}}{P_j^{p}}.\eta_{dm}$$

(A8.9)

Rearranging

$$\frac{P'}{P_j^{w}}.\eta_{sm}-\frac{P_j^{w}}{P_j^{w}}.\eta_{sm}=\frac{P'}{P_j^{p}}.\eta_{dm}-\frac{P_j^{p}}{P_j^{p}}.\eta_{dm}$$

(A8.10)

Cancel $\frac{P_j^w}{P_j^w}$ and $\frac{P_j^p}{P_j^p}$

$$\frac{P'}{P_j^w}\cdot\eta_{sm}-\eta_{sm}=\frac{P'}{P_j^p}\cdot\eta_{dm}-\eta_{dm} \tag{A8.11}$$

$$\frac{P'}{P_j^w}\cdot\eta_{sm}-\frac{P'}{P_j^p}\cdot\eta_{dm}=\eta_{sm}-\eta_{dm} \tag{A8.12}$$

Multiply through by P_j^w, and factor out P′

$$P_j^w\left[\frac{P'}{P_j^w}\cdot\eta_{sm}-\frac{P'}{P_j^p}\cdot\eta_{dm}\right]=\left[\eta_{sm}-\eta_{dm}\right]\cdot P_j^w \tag{A8.13}$$

$$P'\cdot\eta_{sm}-P'\cdot\frac{P_j^w}{P_j^p}\cdot\eta_{dm}=\left[\eta_{sm}-\eta_{dm}\right]\cdot P_j^w \tag{A8.14}$$

factor out P′ from LHS

$$P'\left[\eta_{sm}-\frac{P_j^w}{P_j^p}\cdot\eta_{dm}\right]=P_j^w\left[\eta_{sm}-\eta_{dm}\right] \tag{A8.15}$$

The equation to estimate the unobserved border price is:

$$P'=P_j^w\left[\eta_{sm}-\eta_{dm}\right]\Big/\left[\eta_{sm}-\eta_{dm}\frac{P_j^w}{P_j^p}\right] \tag{A8.16}$$

APPENDIX IX.

Table A9.1

Calculating the Average Retail Price of the 323 LX and the Corolla XL, 1000-1500cc.

Year	Vehicle Type	Retail Price	Average Retail Price.
Jul-Dec'87	323 LX 3Dr	19995.00	20495.00
	Corolla XL 3Dr	19495.00	
	Corolla XL Sedan	21995.00	
Jan-Jun'88	323 LX 3Dr	19390.00	19460.00
	Corolla XL 3Dr	18995.00	
	Corolla XL Sedan	19995.00	
Jul-Dec'88	323 LX 3Dr	19800.00	19996.67
	Corolla XL 3Dr	19595.00	
	Corolla XL Sedan	20595.00	
Jan-Jun'89	323 LX 3Dr	18895.00	19295.00
	Corolla XL 3Dr	18995.00	
	Corolla XL Sedan	19995.00	
Jul-Dec'89	323 LX 3Dr	19325.00	19838.33
	Corolla XL 3Dr	19595.00	
	Corolla XL Sedan	20595.00	
Jan-Jun'90	323 LX 3Dr	19795.00	19995.00
	Corolla XL 3Dr	19595.00	
	Corolla XL Sedan	20595.00	
Jul-Dec'90	323 LX 3Dr	18495.00	19561.67
	Corolla XL 3Dr	19695.00	
	Corolla XL Sedan	20495.00	
Jan-Jun'91	323 LX 3Dr	19495.00	20298.33
	Corolla XL 3Dr	20300.00	
	Corolla XL Sedan	21100.00	
Jul-Dec'91	323 LX 3Dr	20595.00	20781.67
	Corolla XL 3Dr	20500.00	
	Corolla XL Sedan	21250.00	

Source: *New Zealand Car* (1987-1993) What They Cost. Auckland: Graham Billings Ltd.

Note: The Average Retail Price is calculated by averaging the three retail prices of the two vehicles for each year.

Table A9.2

Calculating the Average Retail Price of the 323 LX and the CorollaXL, 1000-1500cc.

Year	Vehicle Type	Retail Price	Average Retail Price.
Jan-Jun'92	323 LX 3Dr	22200.00	22266.67
	Corolla XL 3Dr	21900.00	
	Corolla XL Sedan	22700.00	
Jul-Dec'92	323 LX 3Dr	22800.00	23533.33
	Corolla XL 3Dr	23500.00	
	Corolla XL Sedan	24300.00	
Jan-Jun'93	323 LX 3Dr	23450.00	26750.00
	Corolla XL 3Dr	27800.00	
	Corolla XL Sedan	29000.00	
Jul-Dec'93	323 LX 3Dr	24850.00	28300.00
	Corolla XL 3Dr	29500.00	
	Corolla XL Sedan	30550.00	

Source: *New Zealand Car* (1987-1993) What They Cost. Auckland: Graham Billings Ltd.

Table A9.3

Calculating the Average Retail Price of the 626 LX and the Corona XL, 1500-3000cc.

Year	Vehicle Type	Retail Price	Average Retail Price.
Jul-Dec'87	626 LX	26995.00	27661.67
	Corona XL Sedan	26495.00	
	Corona XL Lift	29495.00	
Jan-Jun'88	626 LX	24590.00	24626.67
	Corona XL Sedan	24295.00	
	Corona XL Lift	24995.00	
Jul-Dec'88	626 LX	24590.00	25360.00
	Corona XL Sedan	24995.00	
	Corona XL Lift	26495.00	
Jan-Jun'89	626 LX	23295.00	24395.00
	Corona XL Sedan	24595.00	
	Corona XL Lift	25295.00	
Jul-Dec'89	626 LX	23825.00	24838.33
	Corona XL Sedan	24995.00	
	Corona XL Lift	25695.00	
Jan-Jun'90	626 LX	23825.00	24838.33
	Corona XL Sedan	24995.00	
	Corona XL Lift	25695.00	
Jul-Dec'90	626 LX	25595.00	25361.67
	Corona XL Sedan	25295.00	
	Corona XL Lift	25195.00	
Jan-Jun'91	626 LX	25995.00	26331.67
	Corona XL Sedan	26100.00	
	Corona XL Lift	26900.00	
Jul-Dec'91	626 LX	27045.00	26681.67
	Corona XL Sedan	26100.00	
	Corona XL Lift	26900.00	

Source: *New Zealand Car* (1987-1993) What They Cost. Auckland: Graham Billings Ltd.

Table A9.4

Calculating the Average Retail Price of the 626 LX and the Corona XL, 1500-3000cc.

Year	**Vehicle Type**	**Retail Price**	**Average Retail Price.**
Jan-Jun'92	626 LX	29000.00	29266.67
	Corona XL Sedan	28800.00	
	Corona XL Lift	30000.00	
Jul-Dec'92	626 LX	30200.00	31900.00
	Corona XL Sedan	32500.00	
	Corona XL Lift	33000.00	
Jan-Jun'93	626 LX	31450.00	32983.33
	Corona XL Sedan	33000.00	
	Corona XL Lift	34500.00	
Jul-Dec'93	626 LX	32400.00	34666.67
	Corona XL Sedan	34800.00	
	Corona XL Lift	36800.00	

Source: *New Zealand Car* (1987-1993) What They Cost. Auckland: Graham Billings Ltd.

APPENDIX X.

Appendix 10 estimates the ex-factory prices of the two classes of vehicle, by adjusting the retail prices of these vehicles downwards for GST, the dealer margin, and excise tax to determine the local ex-factory cost.

Table A10.1
Estimating the Average Ex-Factory Price for the 1000-1500cc Toyota Corolla and Mazda 323: Jun 1987 to Dec 1993.

Steps	Jul-Dec87	Jan-Jun88	Jul-Dec88	Jan-Jun89
Average Retail Price (Tables A5.1 and A5.2)	20495.00	19460.00	19996.67	19295.00
Less G.S.T.	1863.18	1769.10	1818.49	1754.09
Retail Price Less G.S.T.	18631.82	17690.90	18178.18	17540.91
Less Dealer Discount of 11.1% δ	1861.50	1767.50	1816.18	1752.51
Ex-Factory Price with Excise Tax	16770.32	15923.40	16362.00	15788.40
Less Excise Tax	2795.05	2653.90	2134.17	2059.36
Ex-Factory Price Less Excise Tax	13975.27	13269.50	14227.83	13729.04

δ Source: The Treasury. *File on New Zealand's Motor Vehicle Industry, 1984-1994.* Wellington.

Table A10.2

Steps	Jul-Dec89	Jan-Jun90	Jul-Dec90	Jan-Jun91
Average Retail Price (Tables A5.1 and A5.2)	19838.33	19995.00	19561.67	20298.33
Less G.S.T.	2204.26	2221.67	2173.52	2255.37
Retail Price Less G.S.T.	17634.07	17773.33	17388.15	18042.96
Less Dealer Discount of 11.1%	1761.82	1775.73	1737.25	1802.67
Ex-Factory Price with Excise Tax	15872.25	15997.60	15650.90	16240.29
Less Excise Tax	1107.37	1116.11	-	-
Ex-Factory Price Less Excise Tax	14764.88	14881.49	15650.90	16240.29

Table A10.3

Estimating the Average Ex-Factory Price for the 1000-1500cc Toyota Corolla and Mazda 323: Jun 1987 to Dec 1993.

Steps	Jul-Dec91	Jan-Jun92	Jul-Dec92	Jan-Jun93
Average Retail Price (Tables A5.1 and A5.2)	20781.67	22266.67	23533.33	26750.00
Less G.S.T.	2309.07	2474.07	2614.81	2972.22
Retail Price Less G.S.T.	18472.60	19792.60	20918.52	23777.78
Less Dealer Discount of 11.1%	1845.60	1977.48	2089.97	2375.64
Ex-Factory Price with Excise Tax	16627.00	17815.12	18828.55	21402.14
Less Excise Tax	-	-	-	-
Ex-Factory Price Less Excise Tax	16627.00	17815.12	18828.55	21402.14

Table A10.4

Steps	Jul-Dec93
Average Retail Price (Tables A5.1 and A5.2)	28300.00
Less G.S.T.	3144.44
Retail Price Less G.S.T.	25155.56
Less Dealer Discount of 11.1%	2513.29
Ex-Factory Price with Excise Tax	22642.27
Less Excise Tax	-
Ex-Factory Price less Excise Tax	22642.27

Table A10.5

Estimating the Average Ex-Factory Price for the 1500-3000cc Toyota Corona and Mazda 626: Jun 1987 to Dec 1993.

Steps	Jul-Dec87	Jan-Jun88	Jul-Dec88	Jan-Jun89
Average Retail Price (Tables A5.3 and A5.4)	27661.67	24626.67	25360.00	24395.00
Less G.S.T.	2514.69	2238.78	2305.46	2217.73
Retail Price Less G.S.T.	25146.97	22387.88	23054.55	22177.27
Less Dealer Discount of 11.1%	2512.44	2236.78	2303.38	2215.73
Ex-Factory Price with Excise Tax	22634.54	20151.11	20751.17	19961.54
Less Excise Tax	3772.42	3358.52	2706.67	2603.68
Ex-Factory Price Less Excise Tax	18862.12	16792.59	18044.50	17357.86

Table A10.6

Steps	Jul-Dec89	Jan-Jun90	Jul-Dec90	Jan-Jun91
Average Retail Price (Tables A5.3 and A5.4)	24838.33	24838.33	25361.67	26331.67
Less G.S.T.	2759.82	2759.82	2817.96	2925.74
Retail Price Less G.S.T.	22078.52	22078.52	22543.71	23405.93
Less Dealer Discount of 11.1%	2205.86	2205.86	2252.34	2338.49
Ex-Factory Price with Excise Tax	19872.66	19872.66	20291.37	21067.44
Less Excise Tax	1386.46	1386.46	-	-
Ex-Factory Price Less Excise Tax	18486.20	18486.20	20291.37	21067.44

Table A10.7

Estimating the Average Ex-Factory Price for the 1500-3000cc Toyota Corona and Mazda 626: Jun 1987 to Dec 1993.

Steps	Jul-Dec91	Jan-Jun92	Jul-Dec92	Jan-Jun93
Average Retail Price (Tables A5.3 and A5.4)	26681.67	29266.67	31900.00	32983.33
Less G.S.T.	2964.63	3251.85	3544.44	3664.82
Retail Price Less G.S.T.	23717.04	26014.82	28355.56	29318.52
Less Dealer Discount of 11.1%	2369.57	2599.14	2833.00	2929.21
Ex-Factory Price with Excise Tax	21347.47	23415.68	25522.56	26389.31
Less Excise Tax	-	-	-	-
Ex-Factory Price Less Excise Tax	21347.47	23415.68	25522.56	26389.31

Table A10.8

Steps	Jul-Dec93
Average Retail Price (Tables A5.3 and A5.4)	34666.67
Less G.S.T.	3851.85
Retail Price Less G.S.T.	30814.82
Less Dealer Discount of 11.1%	3078.71
Ex-Factory Price with Excise Tax	27736.11
Less Excise Tax	-
Ex-Factory Price less Excise Tax	27736.11

APPENDIX XI.

Appendix 11 contains the quantity of completely built up vehicles imported into the Port of Auckland between January 1988 and December 1993, plus their respective average value for duty and average cost, insurance and freight. Statistics on C.I.F. and V.F.D. for the period July 1987 to December 1987 were sourced from The Treasury's file on the New Zealand Motor Vehicle Industry.

Table A11.1

Average V.F.D. and C.I.F. for New C.B.U. Cars from Japan: July 1987 to December 1987.

Tariff Code/Port of Entry	V.F.D. ($N.Z.)	C.I.F. ($N.Z.)
1500-3000cc. Auckland	10425	11975
1000-1500cc. Auckland	7942	8940

Source: The Treasury. *File on New Zealand's Motor Vehicle Industry, 1984-1994.* Wellington.

Table A11.2

Average V.F.D. and C.I.F. for New C.B.U. 1000-1500cc. Cars from Japan.

Year	Quantity	V.F.D. ($N.Z.)	C.I.F. ($N.Z.)	Average V.F.D. ($N.Z.)	Average C.I.F. ($N.Z)
Jan-Jun'88	109	547943	656725	5027	6025
Jul-Dec'88	130	684652	814443	5267	6265
Jan-Jun'89	1176	7935903	9357721	6746	7957
Jul-Dec'89	1320	9084860	10699084	6883	8105
Jan-Jun'90	2180	17758704	20303946	8146	9314
Jul-Dec'90	929	7283736	8386813	7840	9028
Jan-Jun'91	1019	8411698	9781463	8255	9599
Jul-Dec'91	402	5459689	6068576	13091	14606
Jan-Jun'92	767	7272138	8115847	9481	10581
Jul-Dec'92	287	2757415	3039776	9608	10592
Jan-Jun'93	869	10079721	11143384	11599	12823
Jul-Dec'93	861	10402364	11609924	12082	13484

Source: New Zealand Department of Statistics (1994a) *Report on C.B.U. and C.K.D. Volume Value, by Port of Entry.* Wellington.

Table A11.3

Average V.F.D. and C.I.F. for New C.B.U. 1500-3000cc. Cars from Japan.

Year	Quantity	V.F.D. ($N.Z.)	C.I.F. ($N.Z.)	Average V.F.D. ($N.Z.)	Average C.I.F. ($N.Z)
Jan-Jun'88	460	5267460	5980460	11451	13001
Jul-Dec'88	511	6011821	6818573	11765	13344
Jan-Jun'89	1863	23223919	26704722	12466	14334
Jul-Dec'89	2124	25436502	29090765	11976	13696
Jan-Jun'90	3439	39063350	44404492	11359	12912
Jul-Dec'90	2289	26626167	30238228	11632	13210
Jan-Jun'91	2685	34961499	39123555	13021	14571
Jul-Dec'91	2068	30261741	33383212	14633	16143
Jan-Jun'92	2203	34090586	37536984	15475	17039
Jul-Dec'92	1536	26552042	28798393	17287	18749
Jan-Jun'93	1962	34728107	37670956	17700	19200
Jul-Dec'93	2402	47165006	50916293	19636	21198

Source: New Zealand Department of Statistics (1994a) *Report on C.B.U. and C.K.D. Volume Value, by Port of Entry*. Wellington.

APPENDIX XII.

Appendix 12 contains the quantity and average C.I.F. and V.F.D. for C.K.D. kits imported through the Port of Auckland, for the period January 1988 to December 1993. The Treasury's file on the New Zealand Motor Vehicle Industry contained the average V.F.D. and C.I.F. of C.K.D. kits for the period July 1987 to December 1987.

Table A12.1

Average V.F.D. and C.I.F. for C.K.D. kits from Japan, by Port: July 1987 to December 1987.

Tariff Code/Port of Entry	**V.F.D. ($N.Z.)**	**C.I.F. ($N.Z.)**
1000-1500cc. Auckland	5738	6318
1500-3000cc. Auckland	6584	7260

Source: The Treasury. *File on New Zealand's Motor Vehicle Industry, 1984-1994*. Wellington.

Table A12.2

Average V.F.D. and C.I.F. for 1000-1500cc. C.K.D. Kits Ex-Japan.

Year	**Quantity**	**V.F.D. ($N.Z.)**	**C.I.F. ($N.Z.)**	**Average V.F.D. ($N.Z.)**	**Average C.I.F. ($N.Z)**
Jan-Jun'88	5659	27163200	30442950	4800	5380
Jul-Dec'88	4615	22064315	24752385	4781	5364
Jan-Jun'89	5857	28175574	31577443	4811	5391
Jul-Dec'89	4141	25460722	28277974	6148	6829
Jan-Jun'90	2740	16140257	17710901	5891	6464
Jul-Dec'90	2603	14601470	15917470	5610	6115
Jan-Jun'91	2621	17284586	18897269	6595	7210
Jul-Dec'91	2140	15468679	16809572	7228	7855
Jan-Jun'92	1830	14965277	16070727	8178	8782
Jul-Dec'92	1140	10373506	11084237	9100	9723
Jan-Jun'93	1260	11625698	12535368	9227	9949
Jul-Dec'93	1730	16935565	18240923	9789	10544

Source: New Zealand Department of Statistics (1994a) *Report on C.B.U. and C.K.D. Volume Value, by Port of Entry*. Wellington.

Table A12.3

Average V.F.D. and C.I.F. for 1500-3000cc. C.K.D. Kits Ex-Japan

Year	Quantity	V.F.D. ($N.Z.)	C.I.F. ($N.Z.)	Average V.F.D. ($N.Z.)	Average C.I.F. ($N.Z)
Jan-Jun'88	5679	47379897	51219305	8343	9019
Jul-Dec'88	6470	55266740	59627975	8542	9216
Jan-Jun'89	11862	102164267	110341981	8628	9302
Jul-Dec'89	12390	103755848	112022660	8374	9041
Jan-Jun'90	10083	77802164	85371508	7716	8467
Jul-Dec'90	8922	76951623	83919996	8625	9406
Jan-Jun'91	6004	60338045	65488404	10050	10908
Jul-Dec'91	5937	54230151	58871867	9134	9916
Jan-Jun'92	7421	86942555	93629973	11716	12617
Jul-Dec'92	8800	117226899	125852805	13321	14302
Jan-Jun'93	10199	140323151	150857267	13759	14791
Jul-Dec'93	9670	140277536	151253567	14507	15642

Source: New Zealand Department of Statistics (1994a) *Report on C.B.U. and C.K.D. Volume Value, by Port of Entry*. Wellington.

APPENDIX XIII.

Table A13.1

Index of Vehicle Component Prices.

Year	Index	% Change From Dec-1987
Dec-87	938	0.00%
Mar-88	940	
Jun-88	942	0.43%
Sep-88	943	
Dec-88	944	0.64%
Mar-89	941	
Jun-89	975	3.94%
Sep-89	977	
Dec-89	1000	6.61%
Mar-90	972	
Jun-90	970	3.41%
Sep-90	963	
Dec-90	957	2.03%
Mar-91	962	
Jun-91	998	6.40%
Sep-91	980	
Dec-91	978	4.26%
Mar-92	1001	
Jun-92	999	6.50%
Sep-92	1008	
Dec-92	1007	7.36%
Mar-93	1009	
Jun-93	1015	8.21%
Sep-93	1014	
Dec-93	1018	8.53%

Source: McKenzie, H. (1994) *CPI Index of Vehicle Components*. Wellington: New Zealand Department of Statistics.

Note: The index has 26 items and covers the following commodities: seat belts, seats, tyres, dies, glass and windscreens, batteries, sprints, exhausts and wheels (G.S.T Exclusive).

APPENDIX XIV.

Appendix 14 contains the calculations of the average tender premiums for C.B.U. vehicles and Nominated Components for 1987 and 1988

Table A14.1

Calculating the Average Tender Premium for C.B.U. Vehicle Imports, for 1987.

License Units: $2,000 C.I.F.

Total Units Won	**Total Premium (Total of Bids * Premiums)**
19,919	13,828,382

Source: *New Zealand Gazette* (1987) Wellington: Government Printers. 19: 3591-3592.

Weighted Average of Total Premium with respect to the Total C.I.F.:

Total Premium: 13,828,382

Total C.I.F. : 39,838,000

Weighted Average: $694.23 (weighted average of the successful tender bids).

Weighted Average per C.I.F. Units: 34.71% (weighted average of the successful tender bids, per unit of $2000 C.I.F.).

Table A14.2

Calculating the Average Tender Premiums for those Nominated Components Requiring Import Licenses: 1987.

License Units: $2000 C.I.F.

Goods	**Weighted Average of Successful Bid**
Battery Cables and Earth Strap	$102 per $2000 C.I.F.
Mufflers and Exhaust Systems	$63.88
Storage Batteries	$112.89
Spark Plugs	$605.73
Ignition Coils	$742.40
Seatbelts and Parts thereof	$2.00
Sunvisors and Covers	$2.02
Radiators including Pressure Caps	$27.12
Tyres	$26.50
Include Seat Springs, Coiled Suspension Springs, Horns, Wiring Looms and Harnesses, Brake Cables, Driveshafts, Hubcaps, Interior Trim, Meltsheets, Upholstery Materials and Seats	$466.29

Source: *New Zealand Gazette* (1987) Wellington: Government Printers. 19: 3591-3592.

Weighted Average of Total Premium with respect to the Total C.I.F.:

Total Premium: $ 2,654.30

Total C.I.F.: $20,000.00

Weighted Average: 13.27% (total weighted average of the successful tender bids per license units for those nominated components requiring import licenses, per $2,000 C.I.F.)

Table A14.3

Calculating the Average Tender Premium for C.B.U. Vehicle Imports, for 1988.

License Units: $2,000 C.I.F.

Total Units Won	**Total Premium (Total of Bids * Premiums)**
17,870	11,309,248

Source: *New Zealand Gazette* (1988) Wellington: Government Printers. 20: 398-400.

Weighted Average of Total Premium with respect to the Total C.I.F.:

Total Premium: 11,309,248

Total C.I.F. : 35,740,000

Weighted Average: $632.86 (weighted average of the successful tender bids.

Weighted Average per C.I.F. Units: 31.64% (weighted average of the successful tender bids per C.I.F. units)

Table A14.4

Calculating the Average Tender Premiums for those Nominated Components Requiring Import Licenses: 1988.

License Units: $2000 C.I.F.

Goods	**Weighted Average of Successful Bid**
Arm Rests and Door Pulls	$1.00 per $2000 C.I.F.
Battery Cables and Earth Strap	$5.29
Mufflers and Exhaust Systems	$18.83
Storage Batteries	$59.98
Spark Plugs	$509.72
Ignition Coils	$311.64
Seatbelts and Parts thereof	$1.24
Sunvisors and Covers	$1.99
Radiators including Pressure Caps	$11.89
Tyres	$529.97
Include Seat Springs, Coiled Suspension Springs, Horns, Wiring Looms and Harnesses, Brake Cables, Driveshafts, Hubcaps, Interior Trim, Meltsheets, Upholstery Materials and Seats	$164.60

Source: New Zealand Gazette (1988) Wellington: Government Printers. 20: 2435 - 2450.

Weighted Average of Total Premium with respect to the Total C.I.F.:

Total Premium: $1,616.15

Total C.I.F.: $22,000.00

Weighted Average: 7.35% (total weighted average of the successful tender bids per license units for those nominated components requiring import licenses, per $2,000 C.I.F.)

APPENDIX XV.

Appendix 15 contains the nominal rates of protection for the 1000-1500cc. and 1500-3000cc. vehicles. NRP (a) is estimated assuming the post-intervention price equal to New Zealand's domestic price, while NRP (b) is estimated assuming the post-intervention output price is equal to the free trade border price adjusted for import protection. The steps involved in these estimations are presented in Section 6.4.1 and 6.4.2 of Chapter 6.

Table A15.1

Disaggregated Picture of the Calculated NRPs for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec87	Jan-Jun88	Jul-Dec88
Step 1. Average Ex-Factory Price in New Zealand for the 323/Corolla (Appendix 6)	13975.27	13269.50	14227.83
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 323/Corolla	8940.00 100.00	6025.00 100.00	6265.00 100.00
Free Trade Border Price	9040.00	6125.00	6365.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	9040.00	6125.00	6365.00
Equivalent Value for Duty	7942.00	5027.00	5267.00
Import Tariff	4368.10	2764.85	2633.50
(i) V.F.D. + Import Tariff	12310.10	7791.85	7900.50
World Price C.I.F. less Port and Customs Charges	8940.00	6025.00	6265.00
(ii) Import License	3103.07	1906.31	1982.25
(iii) Insurance and Freight	1098.00	1098.00	1098.00
(iv) Port Charges	100.00	100.00	100.00
(i) + (ii) + (iii) + (iv)	16611.17	10896.16	11080.75
Equivalent World Price plus Policy Distortions	16611.17	10896.16	11080.75
Step 4. **Calculate the NRP(a):** **(% difference between Step 1 and 2)**	**54.59%**	**116.64%**	**123.53%**
Step 5. **Calculate the NRP(b)** **(% difference between Step 3 and Step 2)**	**83.75%**	**77.90%**	**74.09%**

Table A15.2

Disaggregated Picture of the Calculated NRPs
for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jan-Jun89	Jul-Dec89	Jan-Jun90
Step 1. Average Ex-Factory Price in New Zealand for the 323/Corolla (Appendix 6)	13729.04	14764.88	14881.49
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 323/Corolla	7957.00 150.00	8105.00 150.00	9314.00 200.00
Free Trade Border Price	8107.00	8255.00	9514.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	8107.00	8255.00	9514.00
Equivalent Value for Duty	6748.00	6883.00	8146.00
Import Tariff	3036.60	2753.20	2851.10
(i) V.F.D. + Import Tariff	9784.60	9636.20	10997.10
World Price C.I.F. less Port and Customs Charges	7957.00	8105.00	9314.00
(ii) Import License on C.I.F. Value	-	-	-
(iii) Insurance and Freight	1359.00	1372.00	1368.00
(iv) Port Charges	150.00	150.00	200.00
(i) + (ii) + (iii) + (iv)	11293.60	11158.20	12565.10
Equivalent World Price plus Policy Distortions	11293.60	11158.20	12565.10
Step 4. **Calculate the NRP (a)**	**69.35%**	**78.86%**	**56.42%**
Step 5. **Calculate the NRP (b)**	**39.31%**	**35.17%**	**32.07%**

Table A15.3

Disaggregated Picture of the Calculated NRPs
for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec90	Jan-Jun91	Jul-Dec91
Step 1. Average Ex-Factory Price in New Zealand for the 323/Corolla (Appendix 6)	15650.90	16240.29	16627.00
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 323/Corolla	9028.00 200.00	9599.00 200.00	14606.00 250.00
Free Trade Border Price	9228.00	9799.00	14856.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	9228.00	9799.00	14856.00
Equivalent Value for Duty	7840.00	8255.00	13091.00
Import Tariff	2744.00	2889.25	4581.85
(i) V.F.D. + Import Tariff	10574.00	11144.25	17672.85
World Price C.I.F. less Port and Customs Charges	9028.00	9599.00	14606.00
(ii) Import License on C.I.F. Value	-	-	-
(iii) Insurance and Freight	1388.00	1544.00	1765.00
(iv) Port Charges	200.00	200.00	250.00
(i) + (ii) + (iii) + (iv)	12172.00	12888.25	19687.85
Equivalent World Price plus Policy Distortions	12172.00	12888.25	19687.85
Step 4. **Calculate the NRP (a)**	**69.60%**	**65.73%**	**11.92%**
Step 5. **Calculate the NRP (b)**	**31.90%**	**31.53%**	**32.53%**

Table A15.4

Disaggregated Picture of the Calculated NRPs
for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jan-Jun92	Jul-Dec92	Jan-Jun93
Step 1. Average Ex-Factory Price in New Zealand for the 323/Corolla (Appendix 6)	17815.12	18828.55	21402.14
Step 2.Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 323/Corolla	10581.00 300.00	10592.00 300.00	12823.00 300.00
Free Trade Border Price	10881.00	10892.00	13123.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	10881.00	10892.00	13123.00
Equivalent Value for Duty	9481.00	9608.00	11599.00
Import Tariff	3318.35	3362.80	4059.65
(i) V.F.D. + Import Tariff	12799.35	12970.80	15658.65
World Price C.I.F. less Port and Customs Charges	10581.00	10592.00	12823.00
(ii) Import License on C.I.F. Value	-	-	-
(iii) Insurance and Freight	1400.00	1284.00	1524.00
(iv) Port Charges	300.00	300.00	300.00
(i) + (ii) + (iii) + (iv)	14499.35	14554.80	17482.65
Equivalent World Price plus Policy Distortions	14499.35	14554.80	17482.65
Step 4. **Calculate the NRP (a)**	**63.73%**	**72.87%**	**63.09%**
Step 5. **Calculate the NRP (b)**	**33.25%**	**33.63%**	**33.22%**

Table A15.5

Disaggregated Picture of the Calculated NRPs
for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec93
Step 1. Average Ex-Factory Price in New Zealand for the 323/Corolla (Appendix 6)	22642.27
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 323/Corolla	13484.00 300.00
Free Trade Border Price	13784.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	13784.00
Equivalent Value for Duty	12082.00
Import Tariff	3926.65
(i) V.F.D. + Import Tariff	16008.65
World Price C.I.F. less Port and Customs Charges	13484.00
(ii) Import License on C.I.F. Value	-
(iii) Insurance and Freight	1702.00
(iv) Port Charges	300.00
(i) + (ii) + (iii) + (iv)	18010.65
Equivalent World Price plus Policy Distortions	18010.65
Step 4. **Calculate the NRP (a)**	**64.27%**
Step 5. **Calculate the NRP (b)**	**30.66%**

Table A15.6

Disaggregated Picture of the Calculated NRPs
for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec87	Jan-Jun88	Jul-Dec88
Step 1. Average Ex-Factory Price in New Zealand for the 626/Corona (Appendix 6)	18862.12	16792.59	18044.50
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 626/Corona	11975.00 100.00	13001.00 100.00	13344.00 100.00
Free Trade Border Price	12075.00	13101.00	13444.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	12075.00	13101.00	13444.00
Equivalent Value for Duty	10425.00	11451.00	11765.00
Import Tariff	5733.75	6298.05	5882.50
(i) V.F.D. + Import Tariff	16158.75	17749.05	17647.50
World Price C.I.F. less Port and Customs Charges	11975.00	13001.00	13344.00
(ii) Import License on C.I.F. Value	4156.52	4113.52	4222.04
(iii) Insurance and Freight	1650.00	1650.00	1679.00
(iv) Port Charges	100.00	100.00	100.00
(i) + (ii) + (iii) + (iv)	22065.27	23612.57	23648.54
Equivalent World Price plus Policy Distortions	22065.27	23612.57	23648.54
Step 4. **Calculate the NRP (a)**	**56.21%**	**28.18%**	**34.22%**
Step 5. **Calculate the NRP (b)**	**82.74%**	**80.23%**	**75.90%**

Table A15.7

Disaggregated Picture of the Calculated NRPs
for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jan-Jun89	Jul-Dec89	Jan-Jun90
Step 1. Average Ex-Factory Price in New Zealand for the 626/Corona (Appendix 6)	17357.86	18486.20	18486.20
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 626/Corona	14334.00 150.00	13696.00 150.00	12912.00 200.00
Free Trade Border Price	14484.00	13846.00	13112.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	14484.00	13846.00	13112.00
Equivalent Value for Duty	12466.00	11976.00	11359.00
Import Tariff	5609.70	4790.40	3975.65
(i) V.F.D. + Import Tariff	18075.70	16766.40	15334.65
World Price C.I.F. less Port and Customs Charges	14344.00	13696.00	12912.00
(ii) Import License on C.I.F. Value	-	-	-
(iii) Insurance and Freight	2018.00	1870.00	1753.00
(iv) Port Charges	150.00	150.00	200.00
(i) + (ii) + (iii) + (iv)	20243.70	18786.40	17287.65
Equivalent World Price plus Policy Distortions	20243.70	18786.40	17287.65
Step 4. **Calculate the NRP (a)**	**19.84%**	**33.51%**	**40.99%**
Step 5. **Calculate the NRP (b)**	**39.77%**	**35.68%**	**31.85%**

Table A15.8

Disaggregated Picture of the Calculated NRPs
for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec90	Jan-Jun91	Jul-Dec91
Step 1. Average Ex-Factory Price in New Zealand for the 626/Corona (Appendix 6)	20291.37	21067.44	21347.47
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 626/Corona	13210.00 200.00	14571.00 200.00	16143.00 250.00
Free Trade Border Price	13410.00	14711.00	16393.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	13410.00	14711.00	16393.00
Equivalent Value for Duty	11632.00	13021.00	14633.00
Import Tariff	4071.20	4557.35	5121.55
(i) V.F.D. + Import Tariff	15703.20	17578.35	19754.55
World Price C.I.F. less Port and Customs Charges	13210.00	14771.00	16393.00
(ii) Import License on C.I.F. Value	-	-	-
(iii) Insurance and Freight	1778.00	1750.00	1760.00
(iv) Port Charges	200.00	200.00	250.00
(i) + (ii) + (iii) + (iv)	17681.20	19528.35	21764.55
Equivalent World Price plus Policy Distortions	17681.20	19528.35	21764.55
Step 4. **Calculate the NRP (a)**	**51.32%**	**42.63%**	**30.22%**
Step 5. **Calculate the NRP (b)**	**31.85%**	**32.21%**	**32.77%**

Table A15.9

Disaggregated Picture of the Calculated NRPs
for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jan-Jun92	Jul-Dec92	Jan-Jun93
Step 1. Average Ex-Factory Price in New Zealand for the 626/Corona (Appendix 6)	23415.68	25522.56	26389.31
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 626/Corona	17039.00 300.00	18749.00 300.00	19200.00 300.00
Free Trade Border Price	17339.00	19049.00	19500.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	17339.00	19049.00	19500.00
Equivalent Value for Duty	15475.00	17287.00	17700.00
Import Tariff	5416.25	6050.45	6195.00
(i) V.F.D. + Import Tariff	20891.25	23337.45	23895.00
World Price C.I.F. less Port and Customs Charges	17039.00	18749.00	19200.00
(ii) Import License on C.I.F. Value	-	-	-
(iii) Insurance and Freight	1864.00	1762.00	1800.00
(iv) Port Charges	300.00	300.00	300.00
(i) + (ii) + (iii) + (iv)	23055.25	25399.45	25995.00
Equivalent World Price plus Policy Distortions	23055.25	25399.45	25995.00
Step 4. **Calculate the NRP (a)**	**35.05%**	**33.98%**	**35.33%**
Step 5. **Calculate the NRP (b)**	**32.97%**	**33.34%**	**33.31%**

Table A15.10

Disaggregated Picture of the Calculated NRPs
for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec93
Step 1. Average Ex-Factory Price in New Zealand for the 626/Corona (Appendix 6)	27736.11
Step 2. Estimate the C.I.F. Price, Plus Port Charges and Customs Charges for the 323/Corolla	21198.00 300.00
Free Trade Border Price	21498.00
Step 3. Adjust the World Price for Policy Distortions (Step 2)	21498.00
Equivalent Value for Duty	19636.00
Import Tariff	6381.70
V.F.D. + Import Tariff	26017.70
World Price C.I.F. less Port and Customs Charges	21198.00
(ii) Import License on C.I.F. Value	-
(iii) Insurance and Freight	1862.00
(iv) Port Charges	300.00
(i) + (ii) + (iii) + (iv)	28179.70
Equivalent World Price plus Policy Distortions	28179.70
Step 4. **Calculate the NRP (a) δ**	**29.02%**
Step 5. **Calculate the NRP (b) λ**	**31.08%**

Note: δ NRP (a) is calculated with P_j^p equal to the New Zealand Ex-Factory Price adjusted for policy distortions.

While λ NRP (b) is calculated with P_j^p equal to the world price plus any policy distortions.

APPENDIX XVI.

Appendix 16 contains a disaggregated presentation of the calculations involved in estimating the effective coefficients for the 1000-1500cc. and 1500-3000cc. vehicles, following the steps outlined in Section 6.4.4 of Chapter 6. The effective coefficients presented below were calculated assuming the post-intervention prices are equal to the domestic, ex-factory prices.

Table A16.1
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	**Jul-Dec 1987**	**Jan-Jun 1988**	**Jul-Dec 1988**	**Jan-Jun 1989**
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	13975.27	13269.50	14227.83	13729.04
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 5738.00 1434.50 580.00 90.40	 4800.00 960.00 580.00 100.00	 4781.00 - 583.00 100.00	 4811.00 - 580.00 150.00
C.K.D. Cost at the Factory	7842.90	6440.00	5464.00	5541.00
(b) Component Cost	3304.34	3318.43	3339.66	3471.39
Step 3. Estimating Domestic Value Added	2828.03	3511.07	5424.17	4716.65
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 8940.00 100.00	 6025.00 100.00	 6265.00 100.00	 7957.00 150.00
Ex-Factory Price at World Prices	9040.00	6125.00	6365.00	8107.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 6317.50 90.40	 5380.00 100.00	 5364.00 100.00	 5391.00 150.00
Total C.K.D. to the Factory	6407.90	5480.00	5464.00	5541.00
(b) Component Cost if included in the CKD pack	1685.21	1692.40	1703.23	1770.41
Step 6. Value Added at World Prices	946.89	-1047.40	-802.23	795.59
ERP (a):	198.67%	-435.22%	-776.14%	492.85%
EPC (a):	2.99	-3.35	-6.76	5.93

Table A16.2

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	**Jul-Dec 1989**	**Jan-Jun 1990**	**Jul-Dec 1990**	**Jan-Jun 1991**
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	14764.88	14881.49	15650.90	16240.29
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 6148.00 - 681.00 150.00	 5891.00 - 573.00 200.00	 5610.00 - 505.00 200.00	 6595.00 - 615.00 200.00
C.K.D. Cost at the Factory	6979.00	6664.00	6315.00	7410.00
(b) Component Cost	3700.84	3827.10	3904.62	4154.38
Step 3. Estimating Domestic Value Added	4085.04	4390.39	5431.28	4675.90
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 8105.00 150.00	 9314.00 200.00	 9028.00 200.00	 9599.00 200.00
Ex-Factory Price at World Prices	8255.00	9514.00	9228.00	9799.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 6829.00 150.00	 6464.00 200.00	 6115.00 200.00	 7210.00 200.00
Total C.K.D. to the Factory	6979.00	6664.00	6315.00	7410.00
(b) Component Cost if included in the CKD pack	1887.43	1951.82	1991.36	2118.74
Step 6. Value Added at World Prices	-611.43	898.18	921.64	270.26
ERP (a):	-768.11%	388.81%	489.30%	1630.12
EPC (a):	-6.68	4.89	5.89	17.30

Table A16.3

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec 1991	Jan-Jun 1992	Jul-Dec 1992	Jan-Dec 1993
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	16627.00	17815.12	18828.55	21402.14
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	7228.00 - 627.00 250.00	8178.00 - 604.00 300.00	9100.00 - 623.00 300.00	9227.00 - 722.00 300.00
C.K.D. Cost at the Factory	8105.00	9082.00	10023.00	10249.00
(b) Component Cost	4331.54	4613.23	4952.58	5359.14
Step 3. Estimating Domestic Value Added	4190.46	4119.89	3852.97	5794.00
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	14606.00 250.00	10581.00 300.00	10592.00 300.00	12823.00 300.00
Ex-Factory Price at World Prices	14856.00	10881.00	10892.00	13123.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	7855.00 250.00	8782.00 300.00	9723.00 300.00	9949.00 300.00
Total C.K.D. to the Factory	8105.00	9082.00	10023.00	10249.00
(b) Component Cost if included in the CKD pack	2209.09	2352.75	2525.82	2733.16
Step 6. Value Added at World Prices	4541.91	-553.75	-1656.82	140.84
ERP (a):	-7.74%	-844.00%	-332.55%	4013.93%
EPC (a):	0.92	-7.44	11.59	41.14

Table A16.4

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec 1993
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	22642.27
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 9789.00 - 755.00 300.00
C.K.D. Cost at the Factory	10844.00
(b) Component Cost	5816.21
Step 3. Estimating Domestic Value Added	5982.06
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 13484.00 300.00
Ex-Factory Price at World Prices	13784.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 10544.00 300.00
Total C.K.D. to the Factory	10844.00
(b) Component Cost if included in the CKD pack	2966.27
Step 6. Value Added at World Prices	-26.27
ERP (a):	-22874.27
EPC (a):	-227.72

Table A16.5

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec 1987	Jan-Jun 1988	Jul-Dec 1988	Jan-Jun 1989
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	18862.12	16792.59	18044.50	17357.86
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	6584.00 1646.00 676.00 90.40	8343.00 1668.60 676.00 100.00	8542.00 - 674.00 100.00	8628.00 - 674.00 150.00
C.K.D. Cost at the Factory	8996.40	10787.60	9316.00	9452.00
(b) Component Cost	3731.71	3747.62	3771.60	3920.37
Step 3. Estimating Domestic Value Added	6134.01	2257.37	4956.90	3985.49
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	11975.00 100.00	13001.00 100.00	13344.00 100.00	14334.00 150.00
Ex-Factory Price at World Prices	12075.00	13101.00	13444.00	14484.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	7260.00 90.40	9019.00 100.00	9216.00 100.00	9302.00 150.00
Total C.K.D. to the Factory	7350.40	9119.00	9316.00	9452.00
(b) Component Cost if included in CKD pack	1903.17	1911.29	1923.51	1999.39
Step 6. Value Added at World Prices	2821.43	2070.71	2204.49	3032.61
ERP (a):	117.41%	9.01%	124.86%	31.42%
EPC (a):	2.17	1.09	2.25	1.31

Table A16.6

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec 1989	Jan-Jun 1990	Jul-Dec 1990	Jan-Jun 1991
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	18486.20	18486.20	20291.37	21067.44
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 8374.00 - 667.00 150.00	 7716.00 - 751.00 200.00	 8625.00 - 781.00 200.00	10050.00 - 858.00 200.00
C.K.D. Cost at the Factory	9191.00	8667.00	9606.00	11108.00
(b) Component Cost	4179.50	4322.08	4409.63	4691.69
Step 3. Estimating Domestic Value Added	5115.70	5497.11	6275.74	5267.75
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	13696.00 150.00	12912.00 200.00	13210.00 200.00	14571.00 200.00
Ex-Factory Price at World Prices	13846.00	13122.00	13410.00	14771.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	9041.00 150.00	8467.00 200.00	9406.00 200.00	10908.00 200.00
Total C.K.D. to the Factory	9191.00	8667.00	9606.00	11108.00
(b) Component Cost if included in CKD pack	2131.54	2204.26	2248.91	2392.76
Step 6. Value Added at World Prices	2523.46	2240.74	1555.09	1270.24
ERP (a):	102.73%	145.33%	303.56%	314.71%
EPC (a):	2.03	2.45	4.04	4.15

Table A16.7

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec 1991	Jan-Jun 1992	Jul-Dec 1992	Jan-Jun 1993
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	21347.47	23415.68	25522.56	26389.31
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	9134.00 - 782.00 250.00	11716.00 - 901.00 300.00	13321.00 - 981.00 300.00	13759.00 - 1032.00 300.00
C.K.D. Cost at the Factory	10166.00	12917.00	14602.00	15091.00
(b) Component Cost	4891.77	5209.89	5593.13	6052.27
Step 3. Estimating Domestic Value Added	6289.70	5288.79	5327.42	5246.04
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s V.F.D. + Customs/Wharfage	16143.00 250.00	17039.00 300.00	18749.00 300.00	19200.00 300.00
Ex-Factory Price at World Prices	16393.00	17339.00	19049.00	19500.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	9916.00 250.00	12617.00 300.00	14302.00 300.00	14791.00 300.00
Total C.K.D. to the Factory	10166.00	12917.00	14602.00	15091.00
(b) Component Cost if included in CKD pack	2494.80	2657.04	2852.50	3086.66
Step 6. Value Added at World Prices	3732.20	1764.96	1594.50	1322.34
ERP (a):	68.53%	199.66%	234.11%	296.72%
EPC (a):	1.69	3.00	3.34	3.97

Table A16.8

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	**Jul-Dec 1993**
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Refer Appendix 6)	27736.11
Step2. Estimating the Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 14507.00 - 1135.00 300.00
C.K.D. Cost at the Factory	15942.00
(b) Component Cost	6568.45
Step 3. Estimating Domestic Value Added	5225.66
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 21198.00 300.00
Ex-Factory Price at World Prices	21498.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 15642.00 300.00
Total C.K.D. to the Factory	15942.00
(b) Component Cost if included in CKD pack	3349.91
Step 6. Value Added at World Prices	2206.09
ERP (a):	136.87%
EPC (a):	2.37

APPENDIX XVII.

Appendix 17 contains the effective coefficients for the two classes of vehicle, calculated under the assumption that the post intervention prices equal the free trade border prices adjusted for import protection. The effective rate of protection is the percentage difference between value added at domestic prices (Step 3) and value added at free trade border prices (Step 6).

Table A17.1

Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	**Jul-Dec 1987**	**Jan-Jun 1988**	**Jul-Dec 1988**	**Jan-Jun 1989**
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step3, Appendix11)	16611.17	10896.16	11080.75	11293.60
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 5738.00 1434.50 580.00 90.40	 4800.00 960.00 580.00 100.00	 4781.00 - 583.00 100.00	 4811.00 - 580.00 150.00
C.K.D. Cost at the Factory	7842.90	6440.00	5464.00	5541.00
(b) Component Cost + Import Tariff + Import License	1685.21 1179.65 223.65	1692.40 930.82 124.32	1703.23 936.78 125.12	1770.41 796.69 -
Component Cost at the Factory	3088.51	2747.54	2765.13	2567.10
Step 3. Estimating Domestic Value Added	5679.76	1708.62	2851.62	3185.51
World Value Added Step4. World Price adjusted: C.B.U.s C.I.F. + Customs/Wharfage	 8940.00 100.00	 6025.00 100.00	 6265.00 100.00	 7957.00 150.00
Ex-Factory Price at World Prices	9040.00	6125.00	6365.00	8107.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 6317.50 90.40	 5380.00 100.00	 5364.00 100.00	 5391.00 150.00
Total C.K.D. Cost	6407.90	5480.00	5464.00	5541.00
(b) Component Cost if included in the CKD pack	1685.21	1692.40	1703.23	1770.41
Step 6. Value Added at World Prices	946.89	-1047.40	-802.23	795.59
ERP (b):	499.83%	-263.13%	-455.56%	300.40%
EPC (b):	6.00	-1.63	-3.55	4.00

Table A17.2
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec 1989	Jan-Jun 1990	Jul-Dec 1990	Jan-Jun 1991
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step 3 Appendix11)	11158.20	12565.10	12172.00	12888.25
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	6148.00 - 681.00 150.00	5891.00 - 573.00 200.00	5610.00 - 505.00 200.00	6595.00 - 615.00 200.00
C.K.D. Cost at the Factory	6979.00	6664.00	6315.00	7410.00
(b) Component Cost + Import Tariff + Import License	1887.43 849.34 -	1951.82 683.14 -	1991.36 696.98 -	2118.74 741.56 -
Component Cost at the Factory	2736.77	2634.96	2688.34	2860.30
Step 3. Estimating Domestic Value Added	1442.43	3266.14	3168.66	2617.95
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	8105.00 150.00	9314.00 200.00	9028.00 200.00	9599.00 200.00
Ex-Factory Price at World Prices	8255.00	9514.00	9228.00	9799.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	6829.00 150.00	6464.00 200.00	6115.00 200.00	7210.00 200.00
Total C.K.D. Cost	6979.00	6664.00	6315.00	7410.00
(b) Component Cost if included in the CKD pack	1887.43	1951.82	1991.36	2118.74
Step 6. Value Added at World Prices	-611.43	898.18	921.64	270.26
ERP (b):	-335.91%	263.64%	243.81%	868.68%
EPC (b):	-2.36	3.64	3.44	9.69

Table A17.3
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec 1991	Jan-Jun 1992	Jul-Dec 1992	Jan-Dec 1993
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step 3 Appendix11)	19687.85	14499.35	14554.80	17482.65
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 7228.00 - 627.00 250.00	 8178.00 - 604.00 300.00	 9100.00 - 623.00 300.00	 9227.00 - 722.00 300.00
C.K.D. Cost at the Factory	8105.00	9082.00	10023.00	10249.00
(b) Component Cost + Import Tariff + Import License	2209.09 773.18 -	2352.75 823.46 -	2525.82 884.04 -	2733.16 888.28 -
Component Cost at the Factory	2982.27	3176.21	3409.86	3621.44
Step 3. Estimating Domestic Value Added	8600.58	2241.14	1121.94	3612.21
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 14606.00 250.00	 10581.00 300.00	 10592.00 300.00	 12823.00 300.00
Ex-Factory Price at World Prices	14856.00	10881.00	10892.00	13123.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 7855.00 250.00	 8782.00 300.00	 9723.00 300.00	 9949.00 300.00
Total C.K.D. Cost	8105.00	9082.00	10023.00	10249.00
(b) Component Cost if included in the CKD pack	2209.09	2352.75	2525.82	2733.16
Step 6. Value Added at World Prices	4541.91	-553.75	-1656.82	140.84
ERP (b):	89.36%	-504.72	-167.72%	2464.76%
EPC (b):	1.89	-4.05	-0.68	25.65

Table A17.4
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1000-1500cc. Toyota Corolla and Mazda 323.

Steps	Jul-Dec 1993
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step 3 Appendix11)	18010.65
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 9789.00 - 755.00 300.00
C.K.D. Cost at the Factory	10844.00
(b) Component Cost + Import Tariff + Import License	2966.27 964.04 -
Component Cost at the Factory	3930.31
Step 3. Estimating Domestic Value Added	3236.34
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 13484.00 300.00
Ex-Factory Price at World Prices	13784.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 10544.00 300.00
Total C.K.D. Cost	10844.00
(b) Component Cost if included in the CKD pack	2966.27
Step 6. Value Added at World Prices	-26.27
ERP (b):	-12419.54
EPC (b):	-123.20

Table A17.5
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec 1987	Jan-Jun 1988	Jul-Dec 1988	Jan-Jun 1989
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step 3 Appendix11)	22065.27	23612.57	23648.54	20243.70
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 6584.00 1646.00 676.00 90.40	 8343.00 1668.60 676.00 100.00	 8542.00 - 674.00 100.00	 8628.00 - 674.00 150.00
C.K.D. Cost at the Factory	8996.40	10787.60	9316.00	9452.00
(b) Component Cost + Import Tariff + Import License	1903.17 1332.22 252.58	1911.29 1051.21 140.40	1923.51 1057.93 141.30	1999.39 899.73 -
Component Cost at the Factory	3487.97	3102.90	3122.74	2899.12
Step 3. Estimating Domestic Value Added	9580.90	9722.07	11209.80	7892.58
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 11975.00 100.00	 13001.00 100.00	 13344.00 100.00	 14334.00 150.00
Ex-Factory Price at World Prices	12075.00	13101.00	13444.00	14484.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 7260.00 90.40	 9019.00 100.00	 9216.00 100.00	 9302.00 150.00
Total C.K.D. Cost	7350.40	9119.00	9316.00	9452.00
(b) Component Cost if included in the CKD pack	1903.17	1911.29	1923.51	1999.39
Step 6. Value Added at World Prices	2821.43	2070.71	2204.49	3032.61
ERP (b):	239.58%	369.50%	408.50%	160.26%
EPC (b):	3.40	4.70	5.08	2.60

Table A17.6
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec 1989	Jan-Jun 1990	Jul-Dec 1990	Jan-Jun 1991
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step 3 Appendix11)	18786.40	17287.65	17681.20	19528.35
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	8374.00 - 667.00 150.00	7716.00 - 751.00 200.00	8625.00 - 781.00 200.00	10050.00 - 858.00 200.00
C.K.D. Cost at the Factory	9191.00	8667.00	9606.00	11108.00
(b) Component Cost + Import Tariff + Import License	2131.54 959.19 -	2204.26 771.49 -	2248.91 787.12 -	2392.76 837.47 -
Component Cost at the Factory	3090.73	2975.75	3036.03	3230.23
Step 3. Estimating Domestic Value Added	6504.67	5644.90	5039.17	5190.12
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	13696.00 150.00	12912.00 200.00	13210.00 200.00	14571.00 200.00
Ex-Factory Price at World Prices	13846.00	13122.00	13410.00	14771.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	9041.00 150.00	8467.00 200.00	9406.00 200.00	10908.00 200.00
Total C.K.D. Cost	9191.00	8667.00	9606.00	11108.00
(b) Component Cost if included in the CKD pack	2131.54	2204.26	2248.91	2392.76
Step 6. Value Added at World Prices	2523.46	2240.74	1555.09	1270.24
ERP (b):	157.77%	151.92%	224.04%	308.59%
EPC (b):	2.58	2.52	3.24	4.09

Table A17.7
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec 1991	Jan-Jun 1992	Jul-Dec 1992	Jan-Jun 1993
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step 3 Appendix11)	21764.55	23055.25	25399.45	25995.00
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 9134.00 - 782.00 250.00	 11716.00 - 901.00 300.00	 13321.00 - 981.00 300.00	 13759.00 - 1032.00 300.00
C.K.D. Cost at the Factory	10166.00	12917.00	14602.00	15091.00
(b) Component Cost + Import Tariff + Import License	2494.80 873.18 -	2657.04 929.96 -	2852.50 998.38 -	3086.66 1003.17 -
Component Cost at the Factory	3367.98	3587.00	3850.88	4089.82
Step 3. Estimating Domestic Value Added	8230.57	6551.25	6946.58	6814.18
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s V.F.D. + Customs/Wharfage	 16143.00 250.00	 17039.00 300.00	 18749.00 300.00	 19200.00 300.00
Ex-Factory Price at World Prices	16393.00	17339.00	19049.00	19500.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 9916.00 250.00	 12617.00 300.00	 14302.00 300.00	 14791.00 300.00
Total C.K.D. Cost	10166.00	12917.00	14602.00	15091.00
(b) Component Cost if included in the CKD pack	2494.80	2657.04	2852.50	3086.66
Step 6. Value Added at World Prices	3732.20	1764.96	1594.50	1322.34
ERP (b):	120.53%	271.18%	335.66%	415.31%
EPC (b):	2.21	3.71	4.36	5.15

Table A17.8
Disaggregated Picture of the Calculated Effective Rates of Protection for the 1500-3000cc. Toyota Corona and Mazda 626.

Steps	Jul-Dec 1993
Domestic Value Added Step1. Estimating Ex-Factory Cost $NZ: (Step 3 Appendix11)	28179.70
Step2. Input Costs: (a) C.K.D. V.F.D. + Import Tariff + Insurance/Freight + Customs/Wharfage	 14507.00 - 1135.00 300.00
C.K.D. Cost at the Factory	15942.00
(b) Component Cost + Import Tariff + Import License	3349.91 1088.72 -
Component Cost at the Factory	4438.63
Step 3. Estimating Domestic Value Added	7799.07
World Value Added Step4. Ex-Factory World Price adjusted for freight etc: C.B.U.s C.I.F. + Customs/Wharfage	 21198.00 300.00
Ex-Factory Price at World Prices	21498.00
Step 5. Estimating the Input Costs at World Prices: (a) C.K.D.s C.I.F. + Customs/Wharfage	 15642.00 300.00
Total C.K.D. Cost	15942.00
(b) Component Cost if included in the CKD pack	3349.91
Step 6. Value Added at World Prices	2206.09
ERP (b):	253.52%
EPC (b):	3.54

APPENDIX XVIII.

Table A18.1

Quantity and Real/Nominal Price of New Vehicles: Ex-Japan to New Zealand 1000-1500cc. 1978-1993.

(Base Year 1990)

Year	Quantity	Average Price (Yen)	PPI: Base Year 1990	Real Average Price (Yen)
1978	517	642722.34	87.8	732030.00
1979	485	834523.86	94.1	886847.88
1980	399	680328.49	110.8	614014.88
1981	407	815986.22	112.4	725966.39
1982	391	1109441.00	114.4	969791.09
1983	748	1010199.41	111.9	901159.15
1984	225	902625.62	111.6	808804.32
1985	416	867632.24	110.3	800214.19
1986	139	673622.17	100.2	676327.48
1987	770	656664.98	96.5	677847.72
1988	1067	705618.79	95.5	738867.84
1989	3928	771745.21	98.0	787495.11
1990	3973	771523.26	100.0	771523.26
1991	1857	828972.52	100.2	827317.88
1992	1581	812743.49	98.7	823448.32
1993	2114	780425.55	95.0	821933.18

Source: New Zealand Department of Statistics (1994c) *INFOS Search on new C.B.U. Vehicles from Japan into New Zealand.* Wellington.

Table A18.2

Quantity and Real/Nominal Price of New Vehicles: Ex-Japan to New Zealand 1500-3000cc. 1978-1993.

(Base Year 1990)

Year	Quantity	Average Price (Yen)	PPI: Base Year 1990	Real Av. Price (Yen)
1978	363	921512.83	87.8	1049559.03
1979	226	998194.57	94.1	1060780.63
1980	574	1035723.66	100.8	1027503.63
1981	1131	1114136.57	103.4	1077501.52
1982	982	1221200.483	114.4	1067482.94
1983	1024	1262140.10	111.9	1127917.87
1984	879	1241609.19	111.6	1112553.04
1985	2302	1311717.03	110.3	1189226.68
1986	1392	1201136.54	100.2	1198739.06
1987	2219	1198887.76	96.5	1242370.74
1988	2303	1203129.68	95.5	1259821.65
1989	5913	1250959.73	98.0	1276489.52
1990	8087	1278795.71	100.0	1278795.71
1991	6136	1285374.83	100.2	1282809.21
1992	5343	1265649.35	98.7	1282319.50
1993	6171	1257455.60	98.1	1281809.99

Source: New Zealand Department of Statistics (1994c) *INFOS Search on new C.B.U. Vehicles from Japan into New Zealand.* Wellington.

Table A18.3

Real/Nominal Price of New Vehicles: Ex-Japan to Other Countries
1000-2000cc. 1978-1993.

(Base Year 1990)

Year	Av. Price (Yen)	PPI: Base Year 1990	Real Average Price (Yen)
1978	487694.87	87.8	555461.12
1979	619594.01	94.1	658442.10
1980	682411.30	110.8	615894.68
1981	683860.95	112.4	608417.22
1982	736852.24	114.4	644101.61
1983	776583.10	111.9	693997.40
1984	764116.43	111.6	684692.14
1985	757759.24	110.3	686998.40
1986	770621.20	100.2	769083.04
1987	854215.61	96.5	885197.53
1988	869743.15	95.5	910725.82
1989	874149.35	98.0	891989.13
1990	976395.03	100.0	976395.03
1991	969155.56	100.2	967221.12
1992	1053151.30	98.7	1067022.59
1993	1009755.37	95.0	1062900.39

Source: Nagayama (1982-1994) *Japan: Statistical Yearbook*. Tokyo: Statistics Bureau, Prime Ministers Office.

Table A18.4

Real/Nominal Price of New Vehicles: Ex-Japan to Other Countries 2000-3000cc. 1978-1993.

(Base Year 1990)

Year	Av. Price (Yen)	PPI: Base Year 1990	Real Av. Price (Yen)
1978	1016066.62	87.8	1157251.28
1979	1075552.54	94.1	1142988.88
1980	1254620.25	110.8	1132328.75
1981	1207982.91	112.4	1074717.89
1982	1342380.23	114.4	1173409.30
1983	1595269.94	111.9	1425621.04
1984	1453088.66	111.6	1302050.77
1985	1463164.46	110.3	1326531.70
1986	1382051.36	100.2	1379292.77
1987	1418048.62	96.5	1469480.43
1988	1414166.81	95.5	1480802.95
1989	1465615.73	98.0	1495526.26
1990	1652995.63	100.0	1652995.63
1991	1695865.97	100.2	1692481.01
1992	1826078.07	98.7	1850129.75
1993	1795786.81	95.0	1890301.90

Source: Nagayama (1982-1994) *Japan: Statistical Yearbook.* Tokyo: Statistics Bureau, Prime Ministers Office.

Note: Average Price of Vehicles, Ex-Japan to other countries is a weighted average of vehicle prices to Hong Kong, Singapore, Malaysia, Norway, Sweeden, Denmark, Netherlands, Belgium, France, Germany, Switzerland and Australia. These countries represent a significant proportion of the world market for new Japanese vehicles. The U.K., U.S. and Canada were not included in the calculation as they have their own Japanese transplant operations, manufacturing high volume low value added vehicles while importing low volume high value added vehicles.

Table A18.5

Real/Nominal Manufacturing Wage Index for Japan.

(Base Year 1990)

Year	Wage Index	CPI Index	Real Wage Index
1978	107.25	77.40	138.56
1979	101.59	79.65	127.55
1980	98.58	81.60	120.81
1981	102.80	85.85	119.74
1982	102.75	88.13	116.60
1983	103.83	90.03	115.33
1984	102.83	91.83	111.98
1985	101.25	93.48	108.32
1986	107.13	93.93	114.05
1987	103.28	94.83	108.91
1988	98.43	95.25	103.33
1989	97.43	96.73	100.72
1990	98.68	100.00	98.68
1991	99.35	103.28	96.20
1992	108.73	105.05	103.50
1993	114.40	106.35	107.57

Source: International Monetary Fund (1982-1994) *International Financial Statistics Yearbook.* Washington D.C.: Publications Services, I.M.F.

Table A18.6

Real/Nominal Wholesale Iron/Steel Index for Japan.

(Base Year 1990)

Year	Iron/Steel Index	CPI Index	Real Iron/Steel Index
1978	92.14	87.8	104.94
1979	95.24	94.1	101.21
1980	99.26	110.8	89.58
1981	100.25	112.4	89.19
1982	101.55	114.4	88.77
1983	101.63	111.9	90.82
1984	101.50	111.6	90.95
1985	100.58	110.3	91.18
1986	96.30	100.2	96.11
1987	93.88	96.5	97.28
1988	94.88	95.5	99.35
1989	96.78	98.0	98.75
1990	99.75	100.0	99.75
1991	101.05	100.2	100.85
1992	99.93	98.7	101.24
1993	98.90	95.0	104.11

Source: Nagayama, S. (1982/83-1994) *Japan: Statistical Yearbook.* Tokyo: Statistics Bureau, Prime Ministers Office.

Table A18.7

Nominal Rate of Protection Value for C.B.U. Imports.

Year	Nominal Rate of Protection
1978	87.00%
1979	87.00%
1980	87.00%
1981	87.00%
1982	87.00%
1983	87.00%
1984	87.00%
1985	86.98%
1986	62.96%
1987	83.25%
1988	77.03%
1989	37.48%
1990	31.92%
1991	32.26%
1992	33.30%
1993	32.07%

APPENDIX XIX

Diagnostic Tests.

The import supply functions of Appendix 20 were estimated using OLS. The following tests were used to determine the statistical adequacy of these models.

a) **Coefficient of Determination.**

The coefficient of determination (R^2) indicates how well the estimated model fits the sample data. The value of R^2 lies between 0 and 1 and the higher the R^2 the higher the goodness of fit of the model.

b) **Normality.**

Normality indicates that the residual error term in the regression is normally distributed. If the distribution of the residuals of the estimated model are not normal, the derived coefficients are not efficient and the test statistics (F and t-tests) may be biased. The Jarque-Bera test is used in this study to test for normality.

It utilises the result that skewness (SK) and excess kurtosis (EK) both equal zero in a normally distributed variable. The test statistic for the null hypothesis H_o: SK = EK = 0 is JB = 1/6(T-K)(SK^2+0.25*EK^2), distributed asymptotically, where K is the number of regressors and T is the number of sample observations.

c) **Auto-Correlation.**

The Durbin-Watson test is used to test for auto-correlation. Auto-correlation is detected by comparing the Durbin-Watson test statistic, with a critical upper (d_U) and lower value (d_L). If the test statistic lies between 0 and d_U, or 4-d_U and 4, we reject the null hypothesis that there is no positive or negative autocorrelation. If the test statistic lies between d_U and 4-d_U we accept the null hypothesis.

This method cannot be used for dynamic models with lagged dependent variables. The Durbin-h-Statistic is used in these cases. If the Durbin-h-Statistic lies between -1.96 and 1.96 we accept the null hypothesis that there is no positive or negative autocorrelation at the 5% level.

d) **Heteroscedasticity.**

The Breusch-Pagan test is used to test for heteroscedasticity. The statistic is distributed asymptotically as a chi-square with the number of degrees of freedom equal to the number of variables thought to affect the error term.

e) **Multicollinearity.**

The auxiliary regression of each explanatory variable on the other variables is used to measure the extent of the multicollinearity present in the model. An F-statistic is calculated using equation A16.1 to test for the existence of multicollinearity in each variable.

$$F_i = \frac{R^2_{x_i.x_2x_3...x_k} \;/\; (k-2)}{1 - R_{x_i.x_2x_3...x_k} \;/\; (N-k+1)} \qquad \text{(A19.1)}$$

where: N equals the sample size, k is the number of explanatory variables including the intercept term and $R_{x_i.x_2x_3...x_k}$ is the

coefficient of determination in the regression of variable X_i on the remaining X variables. If F^{stat} exceeds the F^{crit} value at the 5% level we reject the null hypothesis that there is no multicollinearity in the model.

A guideline as to what level of collinearity between variables constitutes a serious problem, was established by Kennedy, 1992. He states that "one should not worry about multicollinearity if the R^2 from the regression exceeds the R^2 of any independent variable regressed on the other independent variables."

f) **Theory Consistency.**

The estimated model must be consistent with *a priori* expectations of the theory. The models estimated coefficients should reflect theory predicted signs, (eg. positive own price coefficients of supply).

APPENDIX XX.

Import Supply Function

1500-3000cc.

Equation A20.1

OLS Quantity Dependent Form.

$$\ln M_{jt} = -96.369 + 9.8882\ln P_{jt} - 0.2760\ln P_{wt} - 0.0381 nW_t - 5.5941\ln IS_t - 1.1456\ln NRP_t$$

(-2.169) (-3.010) (2.403) (-0.2207) (-0.0134)

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample:	1978-1993	R^2 = 0.9489	
DW	= 2.3249	d_L = 0.615	d_U = 2.157
F^{stat}	= 37.18	F^{crit} (5,11)	= 3.20
Jarque Bera	= 0.8340	sig. level (5%)	= 5.99
Breusch Pagan	= 10.201	sig. level (5%)	= 11.07

Auxiliary Regressions, to detect the level of multicollinearity.

R^2 of $\ln P_{jt}$ on other independent variables	= 0.9453	F^{stat} = 38.83
R^2 of $\ln P_{wt}$ on other independent variables	= 0.8778	F^{stat} = 16.16
R^2 of $\ln W_t$ on other independent variables	= 0.9210	F^{stat} = 26.23
R^2 of $\ln IS_t$ on other independent variables	= 0.7332	F^{stat} = 6.18
R^2 of $\ln NRP_t$ on other independent variables	= 0.7914	F^{stat} = 8.54

F^{crit} (5% level) = 3.36

Equation A20.2

Price Dependent, OLS Estimation.

$\ln P_{jt} = 11.478 + 0.03702 \ln M_{jt} + 0.11614 \ln P_{wt} - 0.35611 nW_t + 0.4396 \ln IS_t + 0.060 \ln NRP_t$

(2.403) (1.725) (-2.684) (3.343) (2.348)

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993		$R^2 = 0.9653$	
DW	= 1.5810	$d_L = 0.615$	$d_U = 2.157$
F^{stat}	= 55.623	F^{crit} (5,11)	= 3.20
Jarque Bera	= 2.3540	sig. level (5%)	= 5.99
Breusch Pagan	= 1.358	sig. level (5%)	= 11.07

Auxiliary Regressions, to detect the level of multicollinearity.

R^2 of $\ln P_{jt}$ on other independent variables	= 0.9194	F^{stat} = 25.66
R^2 of $\ln P_{wt}$ on other independent variables	= 0.8423	F^{stat} = 12.02
R^2 of $\ln W_t$ on other independent variables	= 0.8641	F^{stat} = 14.3
R^2 of $\ln IS_t$ on other independent variables	= 0.6158	F^{stat} = 3.6
R^2 of $\ln NRP_t$ on other independent variables	= 0.8302	F^{stat} = 11.0

F^{crit} (5% level) = 3.36

Equation A20.3

Price Dependent Model to Adjust for Autocorrelation.

$\ln P_{jt} = 11.573 + 0.02846 \ln M_{jt} + 0.15638 \ln P_{wt} - 0.26919 nW_t + 0.250 \ln IS_t + 0.0252 \ln NRP_t$

(3.090) (3.042) (-2.988) (2.161) (1.333)

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993		$R^2 = 0.9708$
DW-h-Statistic	= 1.5479	sig. level (5%) -1.96 < DW-h >1.96
Breusch Pagan	= 1.433	sig. level (5%) 11.07

Equation A20.4

Lagged Dependent Form.

$\ln M_{jt} = -81.9 - 0.135\ln M_{jt-1} + 9.569\ln P_{jt} + 0.2901\ln P_{wt} - 1.913nW_t$

(-1.858) (2.592) (0.2498) (-0.6978)

$- 7.316\ln IS_t - 1.217\ln NRP_t$

(-2.938) (-3.546)

t^{crit}: sig. level (5%) = 2.262 sig. level (10%) = 1.860

Sample:	1978-1993	R^2	= 0.9630
F^{stat}	= 39.093	F^{crit} (6,10)	= 3.22
DW-h-Statistic	=-0.9384	sig. level (5%)	= -1.96<DW-h>1.96
Jarque Bera	= 0.2594	sig. level (5%)	= 5.99
Breusch Pagan	= 11.566	sig. level (5%)	= 12.59 (6 D.F.)

Auxiliary Regressions, to detect the level of multicollinearity.

R^2 of $\ln M_{jt-1}$ on other independent variables	= 0.7954	F^{stat} = 6.22
R^2 of $\ln P_{jt}$ on other independent variables	= 0.9454	F^{stat} = 27.7
R^2 of $\ln P_{wt}$ on other independent variables	= 0.8862	F^{stat} = 12.46
R^2 of $\ln W_t$ on other independent variables	= 0.931	F^{stat} = 21.8
R^2 of $\ln IS_t$ on other independent variables	= 0.770	F^{stat} = 5.40
R^2 of $\ln NRP_t$ on other independent variables	= 0.794	F^{stat} = 6.17

F^{crit} (5% level) = 3.33

Equation A20.5

Dynamic Model with both Price Variables Lagged One Period.

$$\ln M_{jt} = -85.413 + 9.6270 \ln P_{jt} + 0.5470 \ln P_{jt-1} - 0.0447 \ln P_{wt}$$

(1.956) (0.1102) (0.0367)

$$- 0.09888 \ln P_{wt-1} - 1.39351 nW_t - 7.9117 \ln IS_t - 1.1221 \ln NRP_t$$

(0.0659) (-0.4949) (-2.844) (-2.792)

t^{crit}: sig. level (5%) = 2.306 sig. level (10%) = 1.860

Sample: 1978-1993		R^2	= 0.9632
DW	= 2.635	d_L = 0.398	d_U = 2.624
F^{stat}	= 26.181	F^{crit} (7,9)	= 3.22
Jarque Bera	= 0.3858	sig. level (5%)	= 5.99
Breusch Pagan	= 11.479	sig. level (5%)	= 14.06 (7 D.F.)

Auxiliary Regressions, to detect the level of multicollinearity.

R^2 of $\ln P_{jt}$ on other independent variables	= 0.9610	F^{stat} = 28.8
R^2 of $\ln P_{jt-1}$ on other independent variables	= 0.9630	F^{stat} = 30.4
R^2 of $\ln P_{wt}$ on other independent variables	= 0.9147	F^{stat} = 12.5
R^2 of $\ln P_{wt-1}$ on other independent variables	= 0.906	F^{stat} = 11.3
R^2 of $\ln W_t$ on other independent variables	= 0.890	F^{stat} = 9.4
R^2 of $\ln IS_t$ on other independent variables	= 0.7631	F^{stat} = 3.8
R^2 of $\ln NRP_t$ on other independent variables	= 0.8298	F^{stat} = 5.7

F^{crit} (5% level) = 3.29

Equation A20.6

Autoregressive-Distributed Lag Model (AD(L)).

$$\ln M_{jt} = -78.125 + 0.16726 \ln M_{jt-1} + 11.559 \ln P_{jt} - 1.8518 \ln P_{jt-1} - 0.89614 \ln P_{wt}$$

(0.5688) (1.866) (-0.2759) (-0.4181)

$$+ 0.36583 \ln P_{wt-1} - 0.69055 \ln W_t - 7.8824 \ln IS_t - 1.1172 \ln NRP_t$$

(0.2058) (-0.2151) (-2.693) (-2.641)

t^{crit}: sig. level (5%) = 2.365 sig. level (10%) = 1.895

Sample:	1978-1993	R^2	= 0.9651
F^{stat}	= 20.735	F^{crit} (8,8)	= 3.44
DW-h-Statistic	=-0.6187	sig. level (5%)	= -1.96<DW-h>1.96
Jarque Bera	= 0.3334	sig. level (5%)	= 5.99
Breusch Pagan	= 12.413	sig. level (5%)	= 15.51 (8 D.F.)

Auxiliary Regressions, to detect the level of multicollinearity.

R^2 of $\ln M_{jt-1}$ on other independent variables	= 0.936	F^{stat} = 12.6
R^2 of $\ln P_{jt}$ on other independent variables	= 0.972	F^{stat} = 30.65
R^2 of $\ln P_{jt-1}$ on other independent variables	= 0.978	F^{stat} = 38.64
R^2 of $\ln P_{wt}$ on other independent variables	= 0.956	F^{stat} = 18.75
R^2 of $\ln P_{wt-1}$ on other independent variables	= 0.926	F^{stat} = 10.72
R^2 of $\ln W_t$ on other independent variables	= 0.9067	F^{stat} = 8.33
R^2 of $\ln IS_t$ on other independent variables	= 0.763	F^{stat} = 2.763
R^2 of $\ln NRP_t$ on other independent variables	= 0.829	F^{stat} = 4.182

F^{crit} (5% level) = 3.44

1000-1500cc.

Equation A20.7

OLS Quantity Dependent Form.

$$\ln M_{jt} = 7.6249 + 0.869\ln P_{jt} - 1.004\ln P_{wt} - 4.65\ln W_t - 5.824\ln IS_t - 0.930\ln NRP_t$$

(0.5797) (-0.3983) (-0.9664) (-1.094) (-1.182)

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993		R^2	= 0.6842
DW	= 1.9681	d_L = 0.615	d_U = 2.157
F^{stat}	= 4.334	F^{crit} (5,11)	= 3.20
Jarque Bera	= 4.5628	sig. level (5%)	= 5.99
Breusch Pagan	= 2.260	sig. level (5%)	= 11.07

Auxiliary Regressions, to detect the level of multicollinearity.

R^2 of $\ln P_{jt}$ on other independent variables	= 0.025	F^{stat} = 0.06
R^2 of $\ln P_{wt}$ on other independent variables	= 0.89	F^{stat} = 19.74
R^2 of $\ln W_t$ on other independent variables	= 0.86	F^{stat} = 14.1
R^2 of $\ln IS_t$ on other independent variables	= 0.68	F^{stat} = 4.97
R^2 of $\ln NRP_t$ on other independent variables	= 0.75	F^{stat} = 7.01

F^{crit} (5% level) = 3.36

Equation A20.8

Quantity Dependent Model Adjusted for Autocorrelation.

$$\ln M_{jt} = 7.3719 + 0.8629\ln P_{jt} - 0.97582\ln P_{wt} - 4.64\ln W_t - 5.7939\ln IS_t - 0.920\ln NRP_t$$

(0.7271) (-0.4888) (-1.215) (1.370) (-1.474)

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993 R^2 = 0.6843

DW-h-Statistic = -0.29131 sig. level (5%) = -1.96 < DW-h > 1.96

Equation A20.9

Price Dependent, OLS Estimation.

$\ln P_{jt} = 14.941 + 0.0374 \ln M_{jt} - 0.30894 \ln P_{wt} - 0.12684 \ln W_t - 0.36779 \ln IS_t - 0.02921 \ln NRP_t$

(0.5797) (0.05866) (0.1216) (-0.3163) (-0.16781)

t^{crit}: sig. level (5%) = 2.228 sig. level (10%) = 1.812

Sample: 1978-1993		$R^2 = 0.0575$	
DW	= 1.8587	$d_L = 0.615$	$d_U = 2.157$
F^{stat}	= 0.122	F^{crit} (5,11)	= 3.20
Jarque Bera	= 0.0820	sig. level (5%)	= 5.99
Breusch Pagan	= 7.32	sig. level (5%)	= 11.07 (5 d.f.)

Auxiliary Regressions, to detect the level of multicollinearity.

R^2 of $\ln P_{jt}$ on other independent variables	= 0.673	F^{stat} = 4.64
R^2 of $\ln P_{wt}$ on other independent variables	= 0.89	F^{stat} = 20.09
R^2 of $\ln W_t$ on other independent variables	= 0.87	F^{stat} = 15.7
R^2 of $\ln IS_t$ on other independent variables	= 0.718	F^{stat} = 5.75
R^2 of $\ln NRP_t$ on other independent variables	= 0.786	F^{stat} = 8.27

F^{crit} (5% level) = 3.36