

New Zealand After Nuclear War

THE BACKGROUND PAPERS

New Zealand Planning Council
PO Box 5066, Wellington

September 1987

BACKGROUND PAPER
1 (A) LIKELIHOOD OF NUCLEAR WAR,
1 (B) STUDY ASSUMPTIONS

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INITIAL DISRUPTIONS TO TRADE AND EMPLOYMENT IN NEW ZEALAND

by

Kevin Makin and Campbell Gillman

*This is one of a set of background papers prepared, in consultation with the Nuclear Impacts Study Team, from material provided by a wide range of contributors for a study of the impacts on New Zealand of a major nuclear war. Along with other sources the papers comprised the basis of the book **New Zealand After Nuclear War**, by Wren Green, Tony Cairns and Judith Wright, published by the New Zealand Planning Council, 1987. The assumptions that the study was based on are explained in Background Paper 1, note particularly the assumption that New Zealand is not a target, and the variable assumption involving an electromagnetic pulse (EMP - for an explanation, see Background Paper 5).*

BACKGROUND

This paper traces some of the effects that loss of trade with the Northern Hemisphere, due to nuclear war, might have on New Zealand, particularly on employment. Data relates to the present structure of New Zealand's economy (see Note 2), but the scale of structural change that seems likely to result from nuclear war, particularly if there was an electromagnetic pulse (EMP) effect on New Zealand, means that any interpretation of results has to be extremely cautious.

The limitations of the model requires certain assumptions to be made. Further work, under a second phase study, could refine this analysis. We assume that following Northern Hemisphere nuclear war:

- 1) There will be no more trade between New Zealand and the Northern Hemisphere (this assumption is specified by the study team, see Annex 1 for division of countries into hemispheres); trade with Southern Hemisphere countries would continue, but be much reduced because of fuel shortages.
- 2) Money continues to serve as a medium of exchange for domestic and international transactions.
- 3) Government survives and the rationing of essential supplies, such as liquid fuels, exists. We assume that on average, sectoral allocations of liquid fuels will be 50% of pre-war levels, with significant intersectoral variation.

However, if there was an EMP on New Zealand, trade with Southern Hemisphere countries would almost certainly be disrupted and probably Assumption 2 and possibly Assumption 3 would not hold.

The financial system, the energy sector, the transport and communication sectors, and the health sector are the subjects of separate investigations, and have not been considered in depth here.

METHOD

Starting with international trade, specifically imports, we determined for each of 64 product categories imported into New Zealand the ratio of imports from Northern Hemisphere sources to those from Southern Hemisphere sources. The ratios were determined using New Zealand international trade data for July 1976 - June 1977 (Note 2). (More recent data does not contain the level of detail of earlier data.) The 64 product categories are mainly those recognised at the two-digit level in the Standard International Trade Classification (SITC). This ratio was then applied to the value of New Zealand imports of each product between April 1976 and March 1977 according to each of the 128 sectors of New Zealand industry recognised in the New Zealand Standard Industrial Classification (NZSIC) and used in the Inter Industry Study (Note 1). This provided a rough picture of the relative dependence of different sectors on imports from Northern Hemisphere sources. Changes in economic policy by the present government will have set in motion changes in industrial structure and in pattern of imports. However, the nuclear war posited for the present study is assumed to take place "in the near future", so the exercise might help to reveal some of the more obvious adjustments which need to be made. The data produced a $(64 \times 2) \times 128$ matrix, which is now on computer file at New Zealand Planning Council (Note 3).

To organise all this data, only the largest of the 128 NZSIC sectors were considered, i.e. those with total output (1976-77) of over \$100m. This reduced the number of sectors under consideration to 65, but these still accounted for almost 90% of total output. These 65 sectors were then divided into the broader groupings listed in Table 1. (Annex 2 specifies the NZSIC sectors in each broad group.) The rationale for these broader groupings was the matching of major export producer and sector groupings which might be similarly affected by trade disruptions in general. Data for the individual sectors are readily retrievable, so other groupings can still be considered, and more detailed background papers could be prepared about any sectors or groupings.

The estimate of size of workforce for each broad group in Table 1 is approximate, arrived at by dividing the group's aggregate for "Compensation of Employees" (see Note 1 for definition) into the total for all groups, then multiplying that by 1.6 million (approximate total workforce - 1986). Broad adjustments were then made for differences in per capita rates of pay between different sectors. The estimates should be used only as very rough indicators of relative sizes of sector workforces.

Effects on export production were estimated by applying (to total 1976-77 exports) northern:southern ratios derived from actual markets for major categories of New Zealand exports (in 1985-86).

We have therefore considered three distinct sources of reduction to trade and employment:

- (i) the reduction in output in a sector resulting from loss of Northern Hemisphere export markets;

- (ii) the reduction in output resulting from unavailability of inputs previously sourced from the Northern Hemisphere;
- (iii) the reduction in output resulting from reduced domestic demand.

In considering preliminary effects, our approach has been to estimate the size of reduction for each sector. The overall reduction in output of a sector is then taken to be the bigger of either the demand side effects (i and iii) or the supply side effect (ii). So, for example, a sector may be forced to reduce output by 25% as a result of reduced availability of some imported input, but if demand for the product of that sector diminishes by, say 40%, as a result of lost export and domestic markets, then the latter effect overwhelms the former; the overall reduction in output will be by 40%.

Ideally, a more sophisticated, dynamic approach would be used, taking detailed account of intersectoral linkages in order to derive much more realistic values for multipliers, and recognising both "direct" effects on domestic demand, resulting from changes in consumer preferences, and "induced" or multiplier effects, resulting from the lower levels of output, employment and income in the economy as a whole. Time and money limited this exercise to the simplified approach just outlined.

An example may help to clarify our approach.

Suppose the economy comprises just two sectors, A and B.

Let initial value of output of A be	\$100
and of B	\$200

so total "initial" value of output is	\$300
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and numbers employed in A be	50#
and in B	70#

so total "initial" value of employment is	120#
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Considering A individually, suppose that 40% of initial output is for export to Northern Hemisphere markets, and that 25% of some essential input is from Northern Hemisphere sources. Then change in output of A due to type (i) effects is 40% and change due to type (ii) effects is taken to be 25%. The type (ii) effect is overwhelmed by the type (i) effect so the net effect on output of sector A is a reduction by 40% from \$100 to \$60. (It is assumed that there is no change in domestic demand for A or B.)

Turning to B, suppose that none of production is exported to Northern Hemisphere markets, but that as a result of disruptions to supplies of imports, output of B is reduced by 50%, then aggregate of types (i) and (ii) effects on B equate to 50% reduction from \$200 to \$100.

The "preliminary" total output in the economy, i.e. total output after preliminary disruptions, is therefore $\$60 + \$100 = \$160$; We have assumed a directly proportionate reduction in employment so that the total workforce after

preliminary disruptions is $(50-20) + (70-35) = 65\%$ or a 46% reduction in employment.

As a result of this "preliminary" reduction in output, employment and incomes, there will almost certainly be a reduction in domestic demand for the products of A and B. This effect will be *additional* to the "preliminary" effect of lost export markets on sector A, and may overwhelm, or be overwhelmed by, the supply side effect in sector B, but is *not* of course additional to the supply side effect. For the most part, we have excluded from consideration these "multiplier" effects - because they are induced by the "preliminary" effects which we have considered. We have, though, tried to take some account of "preliminary" effects on domestic demand. For example, we suggest that the loss of Northern Hemisphere markets for agricultural products would lead to an immediate reduction in domestic demand for chemical fertilisers, which is quite distinct from any subsequent reduction in demand for fertilisers resulting from the general economic downturn induced by preliminary effects.

In estimating type (ii) effects (those due to disrupted supplies of imported inputs), we have made some highly simplifying assumptions about the nature of production functions for various activities. The first of these is to assume that we can meaningfully talk about a *single* production function for a group of sectors. The second is that a reduction in supply of any particular input will result in a *proportionate* reduction in output.

For example, suppose that sector A uses some input *n*, and that 50% of its supplies of *n* are imported, and that 75% of these imports are from northern hemisphere sources. We therefore take the value of the type (ii) effect on sector A to be $0.5 \times 0.75 = 0.375$ or 37.5% of "initial" value of output. This obviously takes no account of the possibility of substituting Southern Hemisphere or domestic supplies of *n* for the lost Northern Hemisphere supplies. Conversely, neither does it take account of the possibility that the northern hemisphere supplies of *n* are totally non-substitutable. The data that we have used allocate actual imports to SITC categories (see Note 2), but at the 64-digit level of SITC there could be considerable heterogeneity of inputs within a particular category. Thus a particular sector may import inputs in SITC category 86 (scientific instruments etc.) from both northern and southern sources, but the *specific* instruments imported from the north may be totally unsubstitutable by increasing imports from the south. A digital thermometer, for example, is not an effective substitute for an X-ray machine.

So for any particular sector which uses some imported input from a northern hemisphere source, the type (ii) effect could range from zero, in the case of perfect substitutability, to 100%, in the case where some specific product from a northern hemisphere source is totally unsubstitutable. It has been suggested, for example, that, in the short term at least, ball bearings may be totally unsubstitutable - there are no doubt numerous other examples.

Our response to the high degree of uncertainty which these data problems bring to the exercise has been to assign only values of 0, 25, 50 and 75 (and, theoretically, 100) to the percentage reduction of output and employment suggested for each group of sectors. We feel it would be misleading to suggest that any more exactness could be achieved without a much bigger and more detailed study.

RESULTS

A major effect of nuclear war would be massive reduction in employment and output resulting from a lack of imports. The resulting shortage of one particular commodity, i.e. liquid fuels, can be used as an indicator to examine the impact of nuclear war on each sector. At present New Zealand is capable of around 50% self-sufficiency in liquid fuels (see Background Paper 6, Impacts on Energy Systems in New Zealand), but this will fall year by year as some domestic supplies of fuels are depleted. Since the war is assumed to take place "in the near future", we have assumed industry would receive 50% of its pre-war share of liquid fuels. Immediately, many forms of transport would be at a premium, and, under any conceivable rationing system, most high-bulk/low-value commodities would have low priority, so effects of rationing for sectors producing such items could well be a reduction in output of more than 50%. Some indications of New Zealand's dependence on specific imported commodities is given in Table 2 (Annex 3).

THE SECTORS - PRELIMINARY IMPACTS (NO EMP)

Agriculture

The agriculture sector exports around 66% of output, of which over 90% is to Northern Hemisphere markets. Loss of those markets and greatly increased production costs as a result of reduced availability of fuels, chemical fertilisers, and pharmaceuticals, would rapidly reduce output and employment in large-scale, monocultural agriculture. There would be growth of small-scale production, but we exclude this from consideration under *preliminary* effects, so we assume a reduction in output and employment of 75%.

Forestry

Forestry in New Zealand is dominated by extensive production forests; once again a shortage of transport fuel would be likely to reduce output significantly, certainly by more than the 30% reduction in output which would result from lost export markets. We assume a preliminary reduction in output and employment of 50%.

Pulp, paper, etc

These industries, too, generally produce high bulk/low value items. Currently over 40% of output is exported. We assume that all export markets would be lost - not only the Northern Hemisphere markets but also the currently important Australian market; the products are unlikely to be given priority on strictly rationed trans-Tasman transport. Because of lost scale-economies, the industry may eventually shut down completely, but we assume a preliminary reduction of 75% of output and employment.

Basic metal industries

The major export from this group is aluminium of which the majority is sold to Japan. The effect on the iron and steel industry would depend largely upon the extent of liquid fuel rationing and the effect of changing domestic demand. There would probably be reduced domestic demand for basic metals, at least until industrial users had assessed their needs. We assume a preliminary reduction in

output for the group as a whole of 50%.

Hotels, camps and other lodgings

This group "exports" 20% of output, i.e. sells services to overseas residents. There might be an increased demand for services resulting from immigration and domestic population movements, but the overall direction of movement could be out of the cities - which is where a lot of the hotels are located. We assume a preliminary reduction of output of 25%, principally as a result of economy-wide fuel shortages and reduced discretionary travel.

Milk, beer

These sectors export about 10% of output. The beer industry imports a significant proportion of "non-metallic minerals" from Northern Hemisphere sources but we assume substitutes could be found for these. We assume that the overwhelming effect on overall output and employment in both sectors would be from liquid fuel rationing. This might be an incentive to reorganise production into smaller, local units, but this would not be a "preliminary" effect. We assume that fuel supplies to milk processing would be cut by 25% and to beer by 50%, resulting in a proportionate reduction in output in each sector.

Food not elsewhere considered (n.e.c.)

Imports constitute almost 40% of the value of "output" of this sector. Exports to Southern Hemisphere countries are negligible. We assume that food imports will cease completely in the short term, but that this sector will be fully occupied solving new food-distribution problems, and receive priority under fuel rationing, so there will be no net effect on output or employment.

Textiles, clothing

These sectors export around 12% of output at present - we assume all this trade will be lost in the short term. They are big importers of textiles and yarns, of which around 90% currently comes from the Northern Hemisphere. Although domestic wool may eventually be substituted for some of these imports, we assume a preliminary reduction in output and employment of 75%; consumers are likely to conserve and recycle old clothes and other textile products in anticipation of reduced disposable income, and the industries are unlikely to be given priority for fuel supplies.

Solid wood products

Sawmilling, joinery and prefabricated buildings have very low dependence on imports, but the furniture industry imports fabrics from the Northern Hemisphere. We assume that overall the products of this group will be in high demand as a result of population movements and that there will be no immediate effect on output and employment.

Printing and publishing

The printing industry is a significant importer of paper from Northern Hemisphere sources, but we assume that substitutes could be found for these imports. Exports account for 17% of value of output. Some export sales would no doubt be disrupted.

and despite a premium on communications, domestic demand is likely to fall too, so we assume an *immediate* effect on output and employment of 25%.

Chemicals n.e.c.

Export sales account for 22% of value of output, but any reduction in these sales is likely to be overwhelmed by the effect of reduced supplies of imports. Imports constitute 25% of value of output of this sector, and 75% of imports are from Northern Hemisphere sources. The biggest single import by value is "plastic materials, etc" of which 84% is from Northern Hemisphere sources. Disruptions to import supplies could thus result in big reductions in output.

A specialist study of this sector is recommended. We assume a preliminary reduction in output of 50%.

Chemical fertilisers

Imports account for 65% of value of output; 40% of imports are from Northern Hemisphere sources. Loss of Northern Hemisphere sources of supply could thus reduce overall output and employment by over 25%, at least in the short term. However, the reduction in demand for fertilisers arising from reduced agricultural production and lost exports (currently over 50% of production) is likely to be overwhelming. We assume a preliminary reduction in output of 75%.

Manufacturing

Exports account for about 10% of value of output of the sectors in this group. However, the group depends heavily on imported plastics, iron and steel, non-ferrous metals (although only 25% of these come from Northern Hemisphere sources), electrical and other machinery, transport equipment and scientific instruments. In most cases, 75-85% of these imports are currently from Northern Hemisphere sources. Specialist studies would be needed to estimate the sectors' dependence on Northern Hemisphere imports and the substitutability of those imports. In the meantime, we estimate a preliminary reduction in overall output of 50%. (The reduction in output is likely to be concentrated in the radio and television and vehicle assembly industries.)

Building and construction

Exports account for only 5% of value of output of these sectors. Rapid economic restructuring may well increase demand for building and construction, and we assume that some priority would be given to the group in fuel rationing. We assume preliminary reduction of employment and output of 25%.

Services

Several of the service sectors - finance, health, transport and communications - are the subjects of separate studies. We assume that the finance and business group will experience a reduction in output of 75% - related primarily to the overall reduction in international trade. We assume output of the transport group will fall by 50% as a result of fuel rationing. We assume no preliminary effect on

output in health, education and other government services.* Schools and government offices in rural areas could become nuclei for groups of migrants from the cities, while some of their existing organisational networks might survive and take on new value in a much more dispersed society which has considerably less access to public or private transport.

We assume a reduction in employment and output in "personal and domestic services" of 75% - most of these services are likely to be seen as non-essential by consumers.

PRELIMINARY IMPACTS (IF AN EMP)

Because of the extreme uncertainty of the disruptive effects an EMP could have on the national electrical grid and other electrical/electronic equipment, the overall effects of such a disruption on New Zealand's economic environment are equally hard to gauge. But even with all this uncertainty some likely effects do seem relatively clear.

1. The monetary system of today would collapse due to lost electronic/magnetic data.
2. Communication would be significantly affected due to the damaging effects on telephone/radio/television and computer systems..
3. There would be significant effects on industry and domestic life due to National Grid failure, and other damaged electrical/electronic equipment.

The economic effects of an EMP are largely dependant on:

1. The initial effects of an EMP on the electrical grid and on communications and electrical and electronic equipment.
2. The extent to which New Zealand could repair or provide substitutes for equipment damaged by the above initial effects.
3. How quickly this repair/substitution could be made.

These would in turn, determine the degree to which people would migrate from cities and the nature of the associated economic structure that would arise.

This change in economic structure would, of course, continually evolve, as progress continued on the repairs/substitution that followed the initial EMP effects.

The economic change would also be largely dependent on government's role in such an event, and in particular the effectiveness of liquid fuel rationing for "survival" industries, and of strategic electricity rationing via generators, and of Civil Defence communication via newsprint.

*Editor's note: While the Nuclear Impacts Study did not investigate impacts on the education sector, see Background Paper 10 for a detailed analysis of the impacts of nuclear war on health and the health care system in New Zealand.

In the event of an EMP, a range of effects are possible. In a "best-case" scenario, cities would be sustainable until electrical power and communications could be restored (this would involve food rationing and alternative sewage disposal for a period), but there would still be a significant effect due to the loss of electronic data, and the collapse of the existing monetary system.

In a "worst-case" scenario, cities would not be sustainable for the length of time needed to restore grid power and communication. There would be a major flux of people out from the cities (land ownership would become a major issue) and New Zealand's economic structure as it stands would undergo a complete transformation, resulting in a structure based much more on primary resources and self-sufficiency.

Small-scale, highly labour-intensive industries are likely to develop as they are more dependent on local resources and not so dependent on electricity and external communication and coordination. Industries such as milk and beer, textiles and clothing and solid wood products are examples of these. Some strategic industries would survive at some level of output; liquid fuel and electricity rations would, we assume, be provided for the chemicals, paper and basic metals industries, and for health services and limited transport and communication.

AFTERWORD

The estimates made in this paper of preliminary disruptions to trade and employment resulting from Northern Hemisphere nuclear war are very rough, but may at least serve as a basis for further discussion. It would be easy to conclude that the effects of Northern Hemisphere nuclear war would be so wide ranging that no worthwhile estimate of the consequences for New Zealand could be made, but to conclude this would, we believe, be to simply shy away from thinking about the unthinkable. In this consideration of preliminary economic effects, we have taken no account of possible *ecological* effects on New Zealand - so our conclusions may be subject to major qualifications. Certainly, life for many if not most of the population would be radically different - it is not at all clear that the cities would remain viable, for example. And we have estimated that output in the formal economy would initially be reduced by almost 50%, and employment by slightly less. These preliminary disruptions would be significantly bigger if New Zealand were affected by an EMP. We believe that it is sensible and prudent for some effort to be put into developing plans to make it easier for the New Zealand economy to adapt to the huge changes which would result from such as war. These plans would need to include a rationing system for strategic supplies, particularly transport fuel.

Although the international trade data on which we have based our estimates are 10 years old, and major changes will have occurred with respect to some specific commodities and sectors, it is unlikely that the broad patterns of trade will have changed very greatly. This leads us to speculate that the pattern of New Zealand's imports, which are still often largely sourced from the Northern Hemisphere, may be still largely determined by historical influences - by custom and habit. There may be gains to be made from investigating alternative sources - it may not be in the interest of any individual importer to finance such investigations, nevertheless the results of the investigations may be a public good. In addition, their relevance to New Zealand's survival in the event of Northern Hemisphere nuclear war provides added justification for research into some conservation, recycling and other appropriate technologies. Similarly, while it may be

unrealistic to expect *individual* producers to make major changes to their production technologies in order to be better prepared for the possibility of Northern Hemisphere nuclear war, there may be a case for publicly-funded research.

Serious consideration should be given to establishing or increasing stocks of strategic materials.

The US has held stocks of strategic minerals since 1950, the time of the Korean war. The US Government holds stocks of 94 minerals, valued at US \$12,000 million in 1982. (Congress authorised additional spending of US \$157 million to increase stocks in 1983/84). The aim is to hold sufficient stocks to supply industry for up to 3 years. The French, in 1975, established a policy of holding a reserve of two years' supply of chrome, copper, lead, tungsten and other minerals. The British government, in 1983, set aside over \$35 million to build stocks of manganese, chrome, vanadium, cobalt, nickel and tungsten.

It may be feasible to diversify some of New Zealand's gold reserves into other precious metals, such as platinum, if these are likely to be of strategic significance for New Zealand industry.

The investigations proposed here may well be worth doing independently of the possibility of Northern Hemisphere nuclear war; they may be justified even if the possibility of war is thought to be so remote as to be not worth considering. There are other good reasons for seeking to diversify New Zealand's sources of supply of strategic materials and its technological base.

NOTES

- 1) 1976-1977 Inter Industry Study of the New Zealand Economy, Department of Statistics.
- 2) New Zealand Country Analyses of External Trade, July 1976 - June 1977.
- 3) A specific example of the information actually contained in a cell of the matrix may be useful. Suppose the total value of SITC division 7 (coffee, tea, coca, etc) imports into NZ in 1976-77 is \$10,000,000. Now suppose that of these total imports, \$7,000,000 worth came from Northern Hemisphere sources, and \$3,000,000 worth came from Southern Hemisphere sources. The ratio for this import is then 7:3. Now suppose the actual value of cocoa imports in terms of 1976-77 input into the New Zealand biscuit industry (Inter Industry Classification 22) is \$1,000,000. We have assumed that the ratio for total imports can be applied to this actual value; that of the biscuit industry's actual \$1,000,000 worth of division 7 imports, \$700,000 worth came from northern sources, and \$300,000 worth from the south. This may well be very different from reality; the biscuit industry may in fact import a much greater proportion of its SITC division 7 imports from southern sources than the average for all importers, while some other industry imports a correspondingly lesser proportion from southern sources. But the form in which the data were available, and the timetable for the exercise, made this simplifying approach necessary. Also, most of the results reported here do not depend on these *estimated* north:south import ratios for specific sectors but on the *actual* ratios for the particular SITC commodity.

ANNEX 1: Southern Hemisphere countries

American Samoa
Angola
Argentina
Australia
Botswana
Brazil
Chile
Cook Islands
Ecuador
Fiji
Falkland Islands
French Polynesia
Gabon
Indonesia
Kenya
Kiribati
Malawi
Mauritius
Mozambique
Nauru
New Caledonia
Niue
Norfolk Island

Papua New Guinea
Peru
Reunion
Seychelles
Western Samoa
Solomon Islands
South Africa
Swaziland
Tanzania
Tonga
Tuvalu
Uruguay
Vanuatu
Wallis & Futuna Islands
Zaire
Zambia
Zimbabwe

ANNEX 2 : Correspondence between Sector Groups in Table 1 and NZSIC

SECTOR GROUPS	NZSIC SECTORS (NUMBERS IN BRACKETS)
Agriculture	Agriculture & Livestock Production (1), Other farming n.e.c. (3), Agricultural Services (4), Meat Freezing & Preserving (10), Abattoirs & Slaughterhouses (12), Butter, Cheese & Milk Production (13), Fruit & Vegetable Preserving (16), Wool scouring (30), Woolen Milling (31).
Forestry	Forestry & Logging (6).
Pulp, Paper etc	Pulp, Paper & Paperboard (49), Cartons, Paperbags and Sacks (50).
Basic Metal Inds	Basic Metal Industries (75).
Hotels, Camps etc	Hotels, Camps & Other Lodgings (104).
Milk, Beer	Milk Processing Stations (14), Malting, Brewing Beer & Stout (27).
Food n.e.c.	Food Preps n.e.c. (24).
Textiles, Clothing	Hosiery and other Knitting Mills (34), Spinning and Weaving Mills (35) Wearing Apparel excl. footwear (37).
Solid Wood Products	Sawmills (42), Joinery & Prefab Building (45), Furniture, Blinds etc (47).
Printing & Publishing	Printing & Publishing (52), Job & General Printing (53).
Chemicals n.e.c.	Chemical Products n.e.c. (55).
Chemical Fertilisers	Chemical Fertilisers (56).
Manufacturing	Plastic Products n.e.c. (66), Metal Products n.e.c. (81), Household Durables and Ranges (82), Electrical Apparatus & Repairs (83), Radio and TV etc equipment (84), Motor Vehicle Assembly (86).
Building & Construction	Sheetmetal Products (76), Wireworking & Nailmaking (77), Residential Buildings (98), Non-residential Buildings (99), Construction other than Buildings (100), Ancillary Building & Construction (101).
Financial & Business	Financial Institutions & Services (113), Insurance (114), Real Estate (115), Owner Occupied Real Estate (116), Business Services (117).

Personal & Domestic

Health

Education

Other Government

Wholesale & Retail Trade

Cafes & Restaurants

Energy n.e.c.

Transport

Communication

Personal & Domestic Services (128).

Health Services (122).

Education Services (121).

Public Administration (119), Social & Community Services (124), Recreation & Cultural Services (125).

Wholesale & Retail Trade (102).

Cafes & Restaurants (103).

Coal Mining & Natural Gas Production (8), Petroleum & Coal Products (61), Electric Light & Power (95).

Rail Transport (105), Passenger Road Transport (106), Road Freight Transport (107), Services to Land Transport (108), Water Transport (109), Air Transport (110), Storage, Freight & Travel Agents (111), Repair of Motor Vehicles (126).

Communication (112).

TABLE 1: ESTIMATED PRELIMINARY EFFECTS ON OUTPUT AND EMPLOYMENT IN MAJOR SECTORS

SECTORS	A OUTPUT (1) (\$MNS)	B COLUMN A AS % OF TOTAL OUTPUT	C ESTIMATED EMPLOYED (2) (1000S)	D COLUMN C AS % OF TOTAL EMPLOYED	E VALUE OF EXPORTS (3) (\$MNS)	F EXPORTS AS % OF OUTPUT (Est % of A)	G ESTIMATED % REDUCTION IN OUTPUT (4)	H COLUMN A REVISED DUE TO REDUCTION IN COLUMN G (\$MNS)	I COLUMN C REVISED DUE TO REDUCTION IN COLUMN G (1000S)
Agriculture	5115	17.4	288	18	3373	66	75	1279	72
Forestry	219	0.75	16	1	66	30	50	110	8
Pulp, Paper etc	514	1.8	16	1	221	43	75	128	4
Hotels, camp etc	371	1.26	16	1	73	20	25	278	12
Milk	104	0.35	4	0.25	10	10	25	78	3
Beer	119	0.41	4	0.25	12	10	50	60	2
Food n.e.c.	199	0.68	8	0.5	25	13	0	199	8
Textiles, clothing	490	1.67	32	2	57	12	75	122	8
Basic Metals Inds.	434	1.5	24	1.5	134	31	50	217	12
Solid Wood products	424	1.4	24	1.5	33	8	0	424	24
Printing & Publishing	307	1.1	24	1.5	51	17	25	230	18
Chemicals n.e.c.	236	0.8	8	0.5	52	22	50	118	4
Chemical fertilisers	149	0.51	8	0.5	76	51	75	37	2
Manufacturing	1711	5.8	80	5	176	10	50	856	40
Building & Construction	3152	10.7	112	7	147	5	25	2364	84
Transport	1969	6.7	112	7	780	40	50	985	56
Communications	377	1.3	5	3	61	16	0	377	5
Financial and Business	2742	9.3	112	7	304	11	75	685	28
Personal and Domestic	130	0.4	8	0.5	64	3	75	32	2
Health	695	2.3	80	5	13	2	0	695	80
Education	585	2.0	112	7	7	1	0	585	112
Other Government	1270	4.3	128	8	59	5	0	1270	128
Wholesale & Retail Trade	3524	12.0	224	14	685	19	50	1762	112
Cafes & Restaurants	436	1.4	16	1	55	13	50	218	8
Energy n.e.c.	1072	3.7	24	1.5	179	17	50	536	12
Other	3025	10	80	5	-	-	50	1513	40
TOTALS	29369	100	1565	100	-	-	-	15158 (5)	884 (6)

(1) Output = "Grand total" from Table 1 (Inter Industry Study, 1976-77).

(2) Rough estimate based on "Compensation of employees" - Table 1 (Inter Industry Study, 1976-77).

(3) Data from Table 13 (Inter Industry Study, 1976-77).

(4) Refer to text for estimated % reduction caused by preliminary effects; estimates are of amount by which output and employment are reduced.

(5) Estimated preliminary effect on total output is a reduction of 48%.

(6) Estimated preliminary effect on total employment is a reduction of 44%.

TABLE 2: SOURCE OF MAJOR IMPORTS INTO NEW ZEALAND
1976-77

MAJOR IMPORTS (SITC no.)	VOLUME OF MAJOR IMPORTS (\$mns)	% OF IMPORTS FROM NORTHERN HEMISPHERE	% OF IMPORTS INPUT INTO INDUSTRY (BALANCE TO CONSUMERS)	MAJOR INDUSTRIAL USERS - (NZSIC nos, SEE ANNEX 1) (PERCENTAGES IN BRACKETS INDICATE USE BY THAT SECTOR)
Transport Equipment (73)	405	87	60	81, 86 (50%), 102, 107, 109, 119, 126
Non-Electrical Machinery (71)	361	89	20	1, 10, 13, 34, 35, 49, 75, 79, 81, 82, 95, 101, 102, 107, 109, 119, 126
Petroleum, Crude & Partly Refined (331)	306	95	100	61 (100%)
Transport Services (93)	253	96	40	49, 102, 107, 109 (10%), 110 (10%), 119
Textile Yarn, Fabric, Products (65)	249	90	60	1, 10, 31, 34 (10%), 35, 37 (25%), 47, 66, 86, 101, 102, 103, 104, 115, 116, 122, 125, 126
Iron & Steel (67)	235	74	95	1, 47, 75 (30%), 76 (10%), 77 (10%), 79 (10%), 81, 82, 83, 98, 100, 101, 102, 110, 116
Travel Services (92)	226	96	20	8, 10, 55, 75, 81, 102, 103, 104, 110, 117, 119, 124, 125
Electrical Machinery (72)	201	86	40	1, 75, 79, 81, 82, 83, 84 (20%), 95, 100, 101, 112, 119, 126
Petroleum Products (332)	184	41	70	1, 4, 6, 8, 10, 13, 49, 61, 75, 79, 95, 98, 100, 101, 102, 103, 104, 105, 106, 107, 109, 110 (20%), 117, 119, 122, 126
Chemical Elements & Compounds (51)	151	60	100	10, 13, 16, 24, 27, 49 (10%), 55 (15%), 56, 75 (40%), 79, 83, 102, 104, 119, 122
Manufactures of Metal (69)	121	75	70	1, 3, 10, 13, 14, 27, 42, 49, 56, 75, 79, 81, 82, 86, 95, 98, 99, 100, 101, 102, 104, 107, 115, 116, 117, 119, 125, 126
Misc. Manufactured Articles N.E.C. (89)	112	82	25	34, 37, 66, 98, 101, 102, 117, 119, 121, 125
Crude Fertilisers & Minerals (27)	93	26	100	24, 56 (85%), 100
Services N.E.C. (96)	87	96	100	1, 8, 102 (50%), 103, 104, 110, 114, 117, 119, 122, 124 (15%), 125

TABLE 2 : CONTINUED

Plastic Materials etc (58)	79	84	100	3, 10, 47, 55 (35%), 66 (40%), 98, 99, 100, 102, 116
Scientific Instruments etc (86)	78	86	45	8, 79, 81, 100, 101, 102, 117, 122 (15%), 125, 128
Non-Ferrous Metals (68)	70	25	100	45, 75 (30%), 76, 77, 79 (15%), 81, 82, 83 (20%), 84 101 (10%)
Medicinal & Pharmacy Products (54)	61	70		901 (30%), 122 (50%)
Coal & Oil Exploration (91)	59	96		708 (10%), 100 (65%)
			
	3484			