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TRADE PATTERN SCENARIOS INVESTIGATED BY SARUM

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ABSTRACT

New Zealand shares a number of economic ills with the rest of the Western world. Collectively the First World is suffering from a systems failure, as the international monetary and trading system is failing to provide a stable and adequate basis for continuing economic expansion. New Zealand must consider therefore its relationship to the international system and must balance the benefits of continued trade against the disadvantages of imported stagnation, inflation and unemployment. A major consideration is then the degree to which the New Zealand economy is coupled to the international system via trade.

The Systems Analysis Unit Model (SARUM) has been used to explore the implications to New Zealand of changing trade patterns. The principal effect is a shift of production between sectors, with natural products benefiting from trade increases and manufacturing expanding when trade is reduced. There is little difference in material standard of living between the several model experiments. Policy decisions on external trade must then be based on the relative importance of the various sectors, as well as on expectations of external developments. The discussion is expanded to include reference to other model experiments with SARUM, other modelling of the New Zealand economy, features of global structural change, and a personal statement of issues which must guide New Zealand economic and trade policies.

1. INTRODUCTION

This is the second report on computer model experiments carried out at the Victoria University Department of Information Science for the New Zealand Commission for the Future. These external reports have been preceded by ten internal reports and eleven internal technical documents which clarified key model features and explored preliminary model experiments. The introduction to the SARUM model given here has appeared in the first external report, "Energy price rise scenarios investigated by SARUM" (9).

The group which developed SARUM recognised two possible reactions within the model to a trade imbalance. The region concerned could be required to change its currency exchange rate with the external world and thus become more (or less) competitive on world markets; or could alter trade biases in order to discourage (or encourage) imports, and thus to move into a situation of balance in trade. The choice of the first mechanism in the model, of floating exchange rates, is designed to sustain trading activity and is consistent with the neo-classical economic concepts on which the model is based. Changes in trading policy, either globally or between specified regions, in all or specific sectors, can then be introduced exogenously by changes in the trade bias matrix. The model experiments reported here involve just such bias changes.

These model experiments demonstrate the trade-offs between various policy objectives as, for example, the creation or protection of an industrial sector in a developing country may have to be balanced against a short-term cut in living standards. Within New Zealand the model indicates that free trade will lead to growth of the agricultural sector, where there is a comparative advantage, and to decay of the manufacturing sector as purchases of cheaper imports increase. Trading policies need then to consider the preferred form of society and the degree of self-reliance to be sought.

The results of the several model experiments are qualitatively similar to those of previous model experiments using SARUM, and reference is made to work at the British Department of the Environment and the Australian Department of Science and the Environment. The conclusions for New Zealand are related briefly to some modelling work for the Planning Council, to Project on Economic Planning studies and to a paper to a CFF Decision Analysis Group. Questions of structural changes in the international community are largely ignored in the model structure. Reference to the continuing evolution in a number of key industries is taken from the report of the OECD Interfutures project. Since I am critical of the use of the SARUM model in that project, little reference will be made to Interfutures model experiments.

The following section presents those questions which I consider to be pre-eminent in any determination of future trading and economic policy for New Zealand. This personal selection of priority issues follows the appreciation that we are living through a final stage of the industrial revolution, that past patterns (of the 1950-1970 period) of rapid economic growth will not be repeated in the developed world and that the Western economic system is suffering from a deep, long-term crisis, not a short-term depression (with improvement expected always "next year")

nor even a down-turn phase of a Kondratief cycle. When the world is perceived from an evolutionary viewpoint it is obvious that humanity and human activities are now of plague proportions. Issues to be faced include then our relationship to nature and the ecosphere, limits to resources and to economic activity, and options open to a small country in the pursuit of peace (or avoidance of global war). Such fundamental considerations must guide our economic activity. The modelling presented indicates the feasibility of a self-reliance policy for New Zealand with no decrease in material standard of living following a cut-back in trade, and thus tells us that economic concerns need not dominate the discussion of a future path for New Zealand.

2. TOWARDS SCENARIOS

Since different viewpoints will colour the interpretation of the model experiments, and since the Commission for the Future is charged with investigating options for the future, a further consideration of the questions explored here must be set within a scenario exercise. Economic goals will then cease to dominate, but will follow the outline of a preferred evolution in each scenario, testing the feasibility of the various pictures of the future. An investigation of public opinion by the Commission for the Future (1), for example, identified a divergence of opinion on the need for economic growth, with many preferring emphasis on quality of life factors.

In order to set down a set (or sets) of aims and goals for the future evolution of New Zealand, we must first expand our horizons, in both time and space, and consider the present human condition as a life form upon a spaceship earth. When viewed from such a perspective the expansion of the human population across the earth in recent centuries, coupled with environmental changes and the extinction of other species, can be recognised to be of plague proportions. So first there is a need to define a relationship to the ecosphere and to the other life forms which share this earth with us. Consideration of future evolution then raises very fundamental philosophical questions, and the choice of a set of ethical statements defining relationships to other peoples, to other life forms and to the earth on which we live are basic to any scenario prescription. Coupled with this is the requirement to consider long-term changes which are ignored in most planning exercises, such as an increase in sea level should vast amounts of Antarctic ice slide into the ocean in perhaps 50 years, following rises in temperature due to the greenhouse effect caused by increases in the CO_2 level in the atmosphere; and such as the implications of desertification and the dropping of the water-table in many USA agricultural areas.

It is interesting to consider why planning bodies such as the Planning Council are now thought necessary, whereas a decade ago it was felt by government best to leave the market-place to control itself. Social conflict flared up in the late 1960s, being particularly marked in 1968, reflecting the failure of economic growth to treat social ills. At the same time environmental concern was growing and appreciation of physical as well as social limits to growth were increasingly expressed. Concern at official level was however muted until the next stage of the

evolution was reached.

Monetarists are constantly reminding us that prices are directly affected by the amount of money in circulation, and the velocity with which the monetary stock changes hands. The money supply must be appropriate to the degree of economic activity, and adequate to meet the demands of the market-place. If there is too little the economy may grind to a halt, too much and inflation results. Yet many, like Milton Friedman, appear to forget that this simple theory applies to the international market-place as well as to national economies. Since about 1967 the international economic system has been increasingly in disarray. As a reaction to the need for international liquidity, the IMF created "paper gold" or SDRs in 1968. The USA went off the gold standard in 1971 and increasing amounts of Eurodollars and petrodollars have circulated in an inflationary "house of mirrors" (2). The control of national banking systems is lacking in the international arena.

The crisis in the Western economic system is not yet over; the basic problems have yet to be solved. Unemployment (which had been growing in the West since the end of World War II) and inflation are remaining at very high levels. This is a systems failure, and the cause of the New Zealand economic decline is principally to be found in the international system. The increases in energy prices and the flow of capital to OPEC have exacerbated the situation, but are *not* the root cause of our economic ills.

In times of economic decline a familiar pattern appears with:

- a search for simplistic solutions to a poorly understood situation,
- a turning towards "father-figure" politicians (the fascist model) to guide an ignorant public,
- alienation and increasing violence among the unemployed who see little hope for advancement,
- growing stratification of society,
- a lack of sympathy for the unemployed (dole bludgers), and
- the use of scapegoats to turn attention away from the failures of the system.

The next stage, historically, is often the onset of large-scale conflict. What should be the New Zealand response to this possibility? The literature is full of hand-wringing at the considerable global arms budgets, and of calls for universal disarmament. How can we help to move towards peace, with what concrete steps? As a small nation, New Zealand is irrelevant to the arms race. We could however unite with other South Pacific nations to form a nuclear-free zone and to push the major powers from our corner of the globe; and work with others on an extension of similar zones throughout the world. At least such moves may remove some of the sources of tension, and will move many peoples away from participation in war.

How long can the present depression, with its widespread stagflation phenomenon, be expected to last? It is noticeable that claims of recovery "later this year" or "next year" have been replaced by "in two or three years" in political statements. Haywood's modelling (3) indicates a continuing decline until at least 1985, and his most probable scenario indicates considerable unemployment throughout the decade. Three interpretations of the economic situation were possible in the mid and late seventies:

- that the economic down-turn was due to mismanagement of a basically sound system, and recovery would come soon,

- that the economic system was entering the down-turn phase of a long-term Kondratief cycle, and would recover naturally over a decade or so, and

- that the Western world is moving into the last phase of the industrial revolution and into some "post-industrial" form.

The first possibility can now be recognised to be not valid. Yet most modelling is predicated on the experiences of the largely successful period since World War II, and does not reflect any fundamental change in the economic situation.

Coupled with the faltering of the economic system is the question of the means of distribution of income. The evolution of an increasing service sector has been a positive feature of modern society (4), providing improved welfare and an improved satisfaction of many human needs. Yet the proportion of income collected by the state and redistributed to this sector has become too large. A solution is not obvious; certainly to simply cut back on government activities (as in many Western countries today) only removes important services and increases unemployment. A solution does not then lie in the dismantling of a successful evolution of society, which has been made possible by the improvements in productivity and organisation. It may be that a fundamental review of our entire economic system is required. And any suggestion that we need to question the fundamental organisation of our society leads us back to those basic questions of goals, of ethics and of philosophical attitudes.

The modelling then is only one part of a futures analysis, with the main role of testing the feasibility of the various alternative paths suggested in a scenario exercise. The SARUM experiments illustrate the trade-offs amongst different trading policies, and suggest that a policy of less trade and greater self-reliance, in order to decrease dependency on the outside world and to develop a more complete society, is a realistic option.

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3. Introduction to SARUM

The Commission for the Future has been directed to have regard for prospective trends, policies and events in New Zealand and overseas which could have important consequences for the country's future. The lessons of history indicate the folly of any attempt to discuss the future in isolation from the rest of the world, for many internal

developments are determined by external events.

The Commission has a number of research projects aimed at modelling aspects of the future of New Zealand. Similar scenario studies have been carried out in the past in other countries, and a comparison of projections with the actual experience has shown the danger of attempting to describe the future evolution of any country in isolation from the rest of the world. The global modelling work being carried out with the model SARUM (Systems Analysis Research Unit Model) is intended to provide background information for the national analysis, and to identify global trends which cannot be ignored in any formulation of possible New Zealand future scenarios.

SARUM has been chosen for this purpose by the Commission for the Future following an investigation of a number of available models. The model is a dynamic simulation model of the global economy based on neo-classical economic principles. It is composed of a number of world regions and economic sectors within each region. In the current work New Zealand and Australia are treated as separate regions. Other regions are: North America, Japan, EEC Europe, European and Asian COMECON, other Europe and Asia Minor, Latin America and Caribbean, South Asia, East and South-East Asia and Oceania, China, West Asia and North Africa, and other Africa. Economic sectors currently within each region deal with energy, minerals, manufactures, machinery, construction, fertilizer, water, land development, food, services, natural products. SARUM models tradeable energy and the energy sector does not include New Zealand hydro-electricity, for example.

Some aspects of the model will be briefly described. These involve productivity, distribution of trade, currency exchange rates and cartel price-rise modelling.

Economic growth is defined external to the model by the prescription of changes in productivity. A continuation of recently observed trends implies a slower productivity growth rate in New Zealand than in most other regions. In the reference run the performance of New Zealand as measured by, for example, changes in exchange rate relative to a global currency is poor. This behaviour is not derived but is a consequence of the choice of input into the reference run, i.e. a continuation of the recent past.

In the model each region satisfies demand for a commodity by buying from all regions. The proportion of demand met by each region is a function of selling price, volume of production and a trade bias. All the factors affecting trade such as distance, politics and tariff barriers are summarised by the trade bias matrix and policy changes can be modelled by variations of the trade bias. Thus a policy of self-reliance in energy, or restriction of imports, is modelled by an increase in the energy import trade bias over an appropriate range of time.

In one formulation of the model exchange rates are kept fixed and imbalances of payment are allowed to accumulate. In the version used here currencies are constantly adjusted in reaction to trade imbalances - and such surplusses or deficits are thereby kept small. Although any one balance of trade, being a relatively small difference between the

two quantities, imports and exports, has very little meaning, the accumulative effect of a number of imbalances as shown in the evolving exchange rate (which must always vary in such a way as to attempt to bring trade into balance) gives a measure of the success of the trading effort and the relative health of the economy.

Within each region and in each sector goods that are produced are bought at a local price, placed in stock, and then sold to consuming sectors in all regions. A cartel, price-fixing action is modelled by multiplication of the selling price, from stock, by a cartel factor, in all regions. The OPEC cartel actions of 1973 and 1979-80 are included in all runs considered here.

4. Model Experiments

With a complicated model such as SARUM, two approaches to model experiments are possible. OECD Interfutures (5) interposed an analysis external to the model. Thus, for example, both trade biases and productivity growth rates were changed when setting up model experiments to provide numerical input to a "breakdown" scenario. The conclusion, that lower economic growth rates follow cut-backs in trade, was then input to the model experiment and not a consequence of interactions within the model.

We choose here to vary one parameter at a time, and use the model to explore the implications of different future trends or policy choices. The model then suggests that changes in trade patterns lead to increases or decreases in the standard of life in the different regions, and changes in the growth of different economic sectors. This is a more usual use of the model (6, 7) and one which provides the maximum guidance from the model. Once the model experiments are completed, it is of course necessary to consider the validity of the model feedback mechanisms and the importance of factors not included in the modelling; to balance the positive and negative aspects of policy changes and to relate the results to broader societal goals.

Three model experiments are reported here:

- base, the reference run (including the energy cartel actions of the 1970s, but with the cartel multiplier constant thereafter),
- more trade, in which all trade biases are reduced steadily from 1980 by 10% per annum, a rate similar to those experienced in the past (8), and as input into model experiments by other experimenters (6, 7),
- less trade, with an increase of 10% per annum from 1990, similarly a rate of change explored by other users of SARUM.

Care has been taken to provide neutral names for the model experiments. It is usual to describe the experiments in such a way as to bias the analysis (or to describe in advance the bias which is to be imposed on the analysis of the model output). Thus a move to less trade has been

interpreted as a move to self-reliance (6), a good thing, and as breakdown in trade (5) and a move to protectionism (7), both having negative implications. The use of one model experiment to describe very different scenarios can be seen in OECD Interfutures (5), where the same modelling described developments of both a moderate growth scenario (where failure to achieve high economic growth leads to problems) and a new growth scenario (in which changes in values and adaptations in life-styles reduce demands for economic growth). A final consideration of the message, or messages, of the computer model experiments is then properly placed within a scenario description. The move to energy self-sufficiency indicated by previous modelling with SARUM (9) may, for example, be pursued by large-scale projects or alternatively by a mixture of small-scale projects and efforts at more efficient energy use, the choice reflecting different pictures of a preferred society and the power relationships within the society.

The choice of parameters in these model experiments follows the OECD Interfutures "medium growth" runs (i.e. lower than their "high growth" experiments), with adaptations due to some changes in regions, in particular the definition of Australia and New Zealand as separate regions (10, 11). The productivity growth rates of around 1.5% per annum for New Zealand are close to the guidelines for the coming decade of the Planning Council (12) but significantly higher than the 0.6% of the Project on Economic Planning (13). Haywood (3) has calculated that the output per person employed must increase at about 1% for the decade of the 80s in order to maintain the 1979-80 employment position, and his model suggests that higher growth rates are feasible.

With the inclusion of the OPEC cartel actions of the 1970s the trading position of New Zealand, and of several other regions (9) is weakened, and there is a continuing devaluation of the NZ dollar until a recovery (helped of course by price decreases of New Zealand products in the world market due to that devaluation) begins in the 1990s. It should be noted that changes in international transport costs are not included in the base run, for transport costs are included in the trade bias factors which are kept constant in that experiment. Increases in transport costs will, in this model, force increases in trade biases and move the trade position towards that described in the "less trade" experiment.

Many of the results of the model experiments are rather obvious consequences of the changes in trade patterns. In figures 1 and 2 New Zealand exports of food and imports of machinery are shown. The changes in propensity to trade also affect the proportion of needs supplied from local sources. As shown in figures 3 and 4 cut-backs in trade imply a dependency on local sources, a move towards self-reliance, while with increased trade a greater proportion of goods used in New Zealand is provided by imports.

On an international scale the changes in trading patterns lead to rather small changes in material consumption. There is a tendency for more powerful regions to benefit from increased trade, as Japan (figure 5), and for developing regions to suffer, as South Asia (figure 6). Such behaviour has been noted before in experiments with SARUM: Mula, MacRae and Parker (7), for example, noted that "Any community formation between developed and developing countries of Asia produces a

FIGURE 1: VALUE OF FOOD EXPORTS FROM NEW ZEALAND, IN GLOBAL CURRENCY

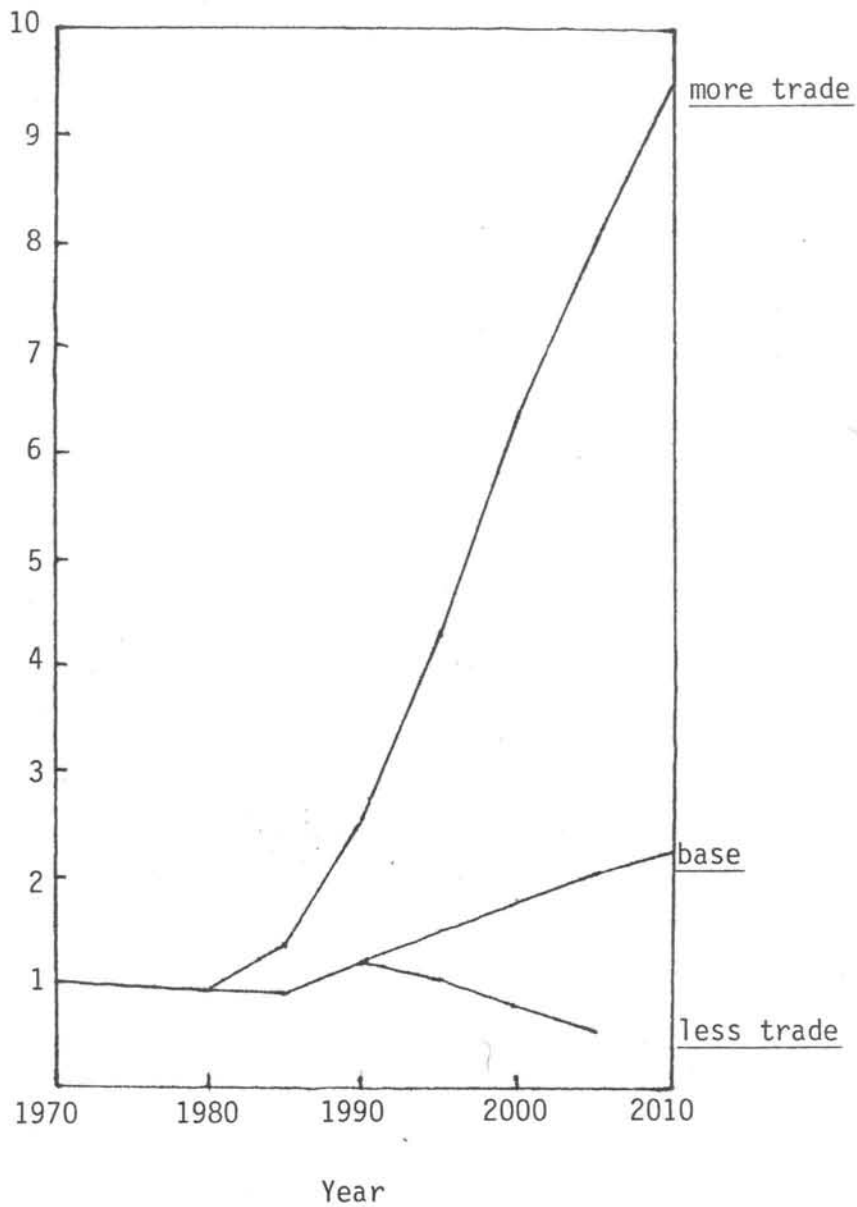


FIGURE 2: VALUE OF MACHINERY IMPORTS INTO NEW ZEALAND, IN GLOBAL CURRENCY

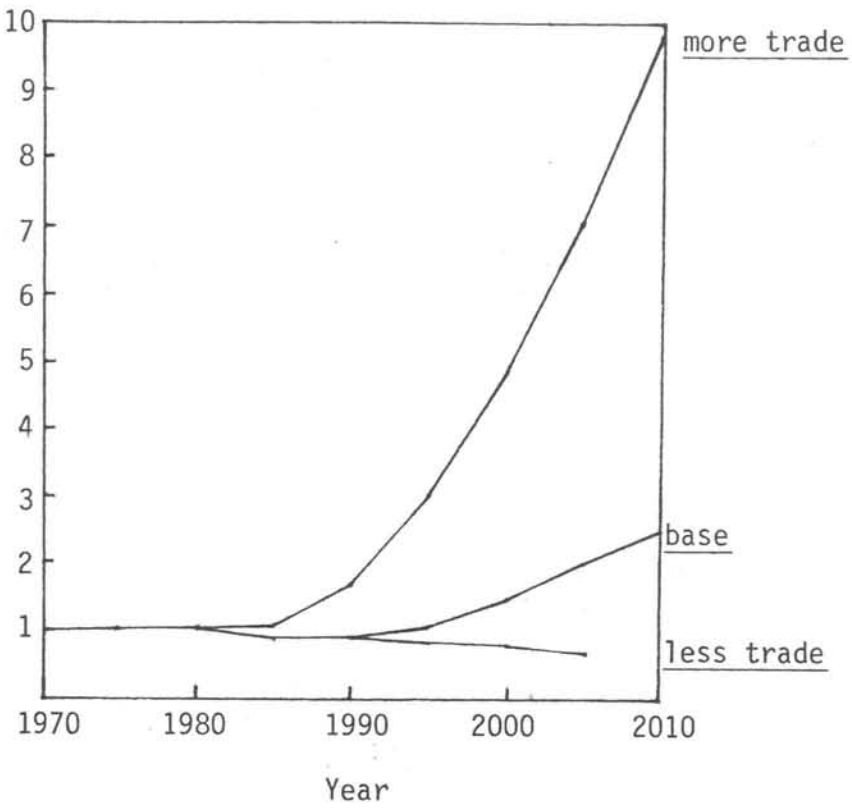


FIGURE 3: PROPORTION OF FOOD CONSUMPTION IN NEW ZEALAND PROVIDED FROM LOCAL PRODUCTION

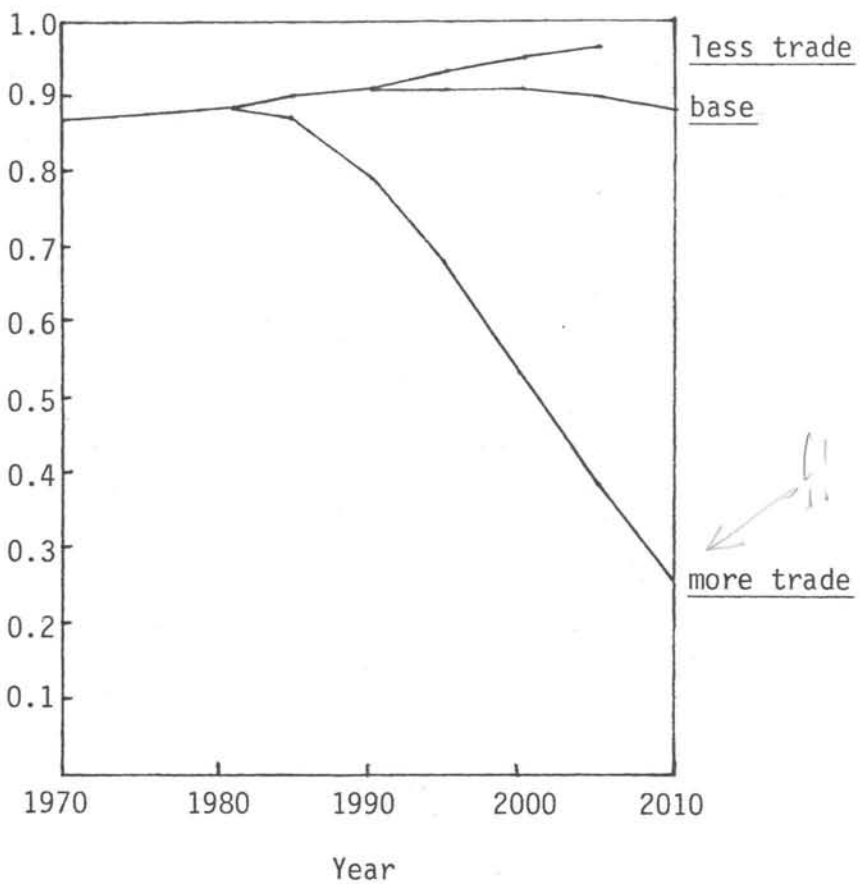


FIGURE 4: PROPORTION OF MACHINERY IN NEW ZEALAND PROVIDED FROM LOCAL PRODUCTION

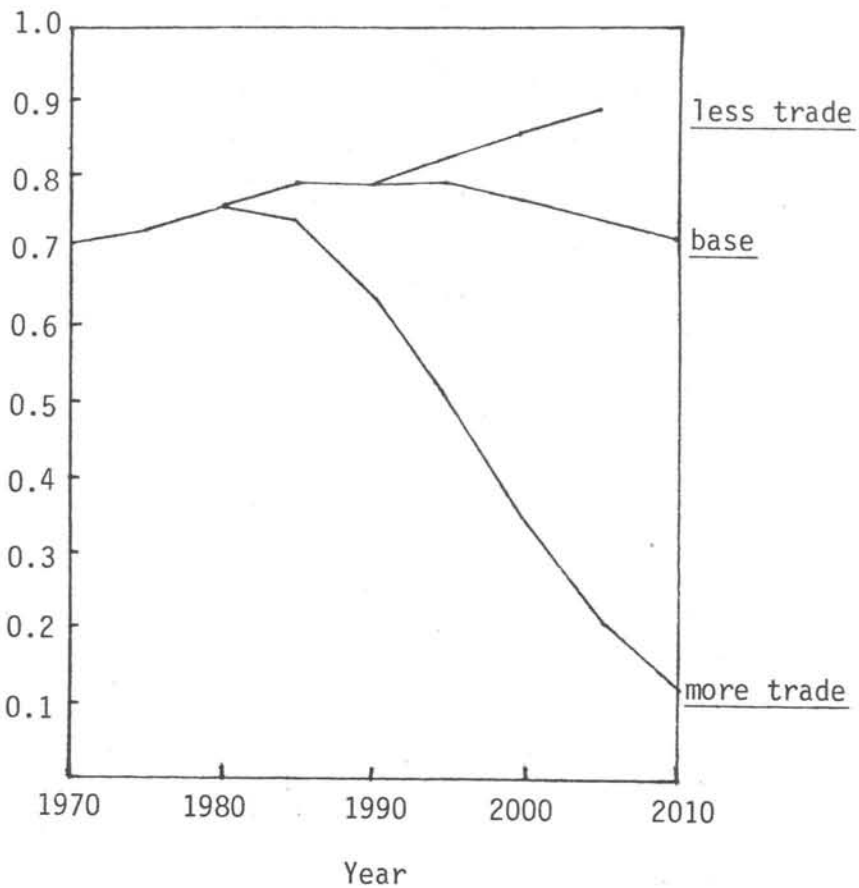


FIGURE 5: INDEX OF NET CONSUMPTION PER CAPITA AT CONSTANT GLOBAL PRICES IN JAPAN

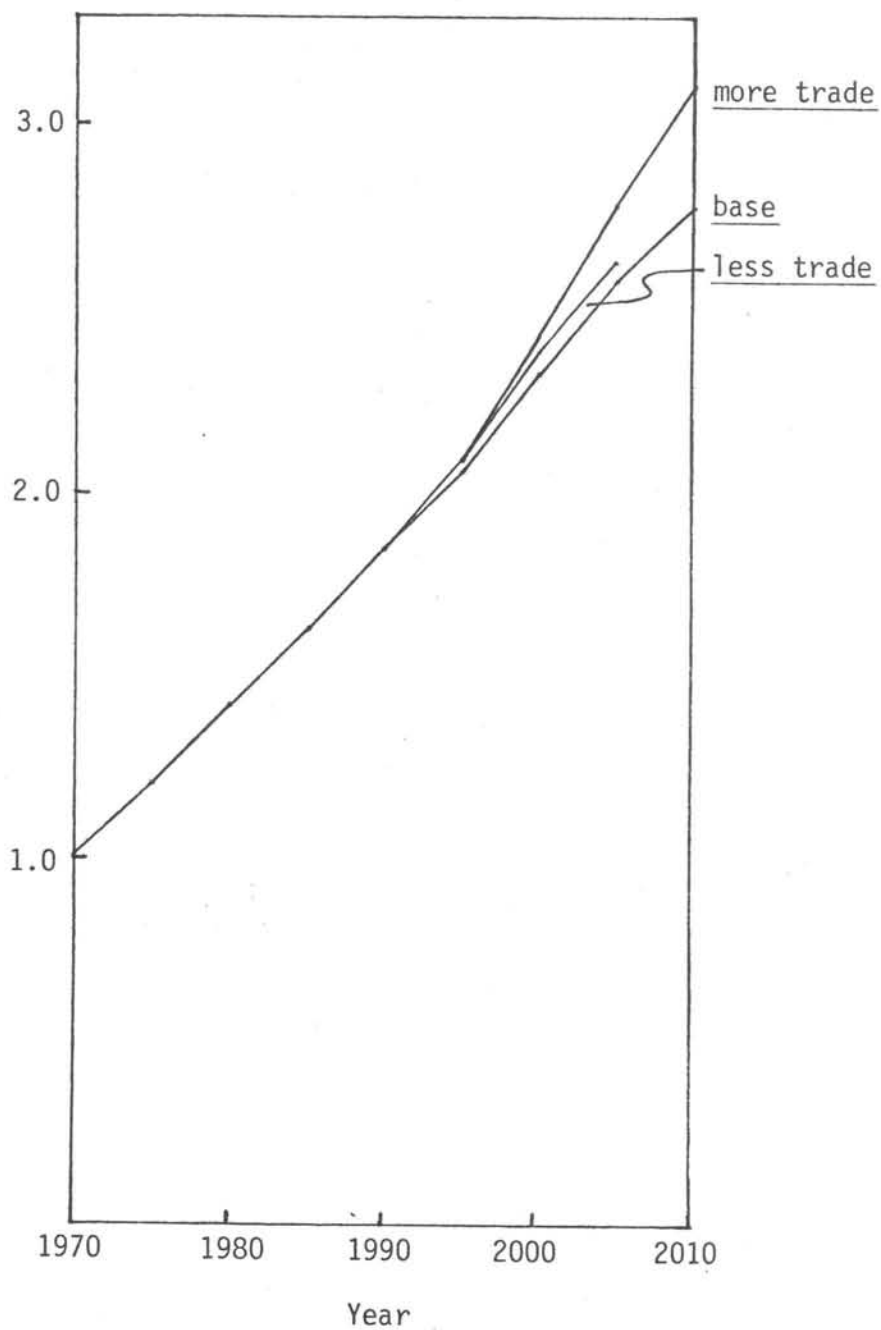
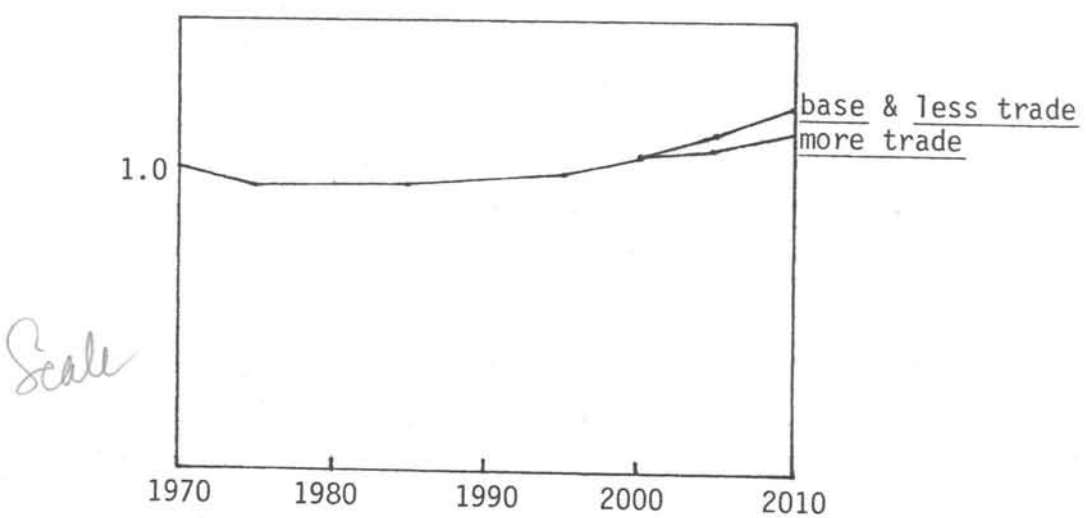


FIGURE 6: INDEX OF NET CONSUMPTION PER CAPITA AT CONSTANT GLOBAL PRICES IN SOUTH ASIA



deterioration in the standard of living of the poorest countries of the non-community regions of South Asia and Africa other than WANA" (West Asia and North Africa, a region which includes many OPEC members). Little change is experienced in some other developing regions (East and South-East Asia, Africa). Europe (as Japan) profits somewhat from increased trade while North America suffers a slight relative decline. Consumption in New Zealand is not much affected by the changes in trade patterns, the tendency being for an improvement in consumption with reduced trade (figure 7).

Exchange rate movements illustrate more strongly the gains and losses following changes in global trading patterns. The Japanese currency is much stronger with increased trade and weakened by trade cuts (figure 8), with the opposite trends observed for South Asia (figure 9). This type of behaviour has been observed many times historically. More powerful and advanced nations tend to profit from free trade, while a degree of protectionism is needed to allow new industries to flourish in less developed regions. Each group favours the policy which is of benefit to themselves. Thus today governments and organisations in the developed world call for moves towards more free trade while developing countries in the non-aligned movement plan an increase in self-reliance, with the Lima target, for example, setting a goal of 25% of the world's industry in the developing world by the year 2000. Within New Zealand, as internationally, the chosen future path will reflect the relative power of the actors involved, for different policy choices are required for the benefit of different sectors.

The situation for New Zealand is not clear-cut, with some gains in exchange rate following from both increased and reduced trade (figure 10). Again this illustrates a well-understood situation; that in many aspects of trade New Zealand is mid-way between developed and developing nations.

The shift in sectoral activities and items traded is more marked, with a tendency to stress comparative advantage in a situation of increased trade, and to develop self-sufficiency in all sectors with reduced trade. Thus output in food is increased as trade barriers are reduced (figure 11) while output of machinery is depressed (figure 12).

SARUM models employment rather crudely but does give an indication of the associated trends in work-force numbers. The total work force grows at about 1% per annum between 1970 and 2005, somewhat less than the 1.5% of some Planning Council forecasts (12) and the slightly higher demand for employment forecast by the present author (4). Limiting trade increases the work force by 4% in 2005, while increased trade reduces the work force by 4% over the base run value. The changes in the distribution of the work force are given in table 1. The shift from the manufacturing sectors to the natural product sectors, where New Zealand has a comparative advantage, with increased trade is evident. The limited changes amongst the sectors from year zero (1970) illustrates the conservative nature of the modelling, which shows no evolution to any different ("post-industrial") form of society.

The terms of trade for New Zealand are improved by a global move towards more trade. Overseas buyers are prepared to pay more for an increased

FIGURE 7: INDEX OF NET CONSUMPTION PER CAPITA AT CONSTANT GLOBAL PRICES IN NEW ZEALAND

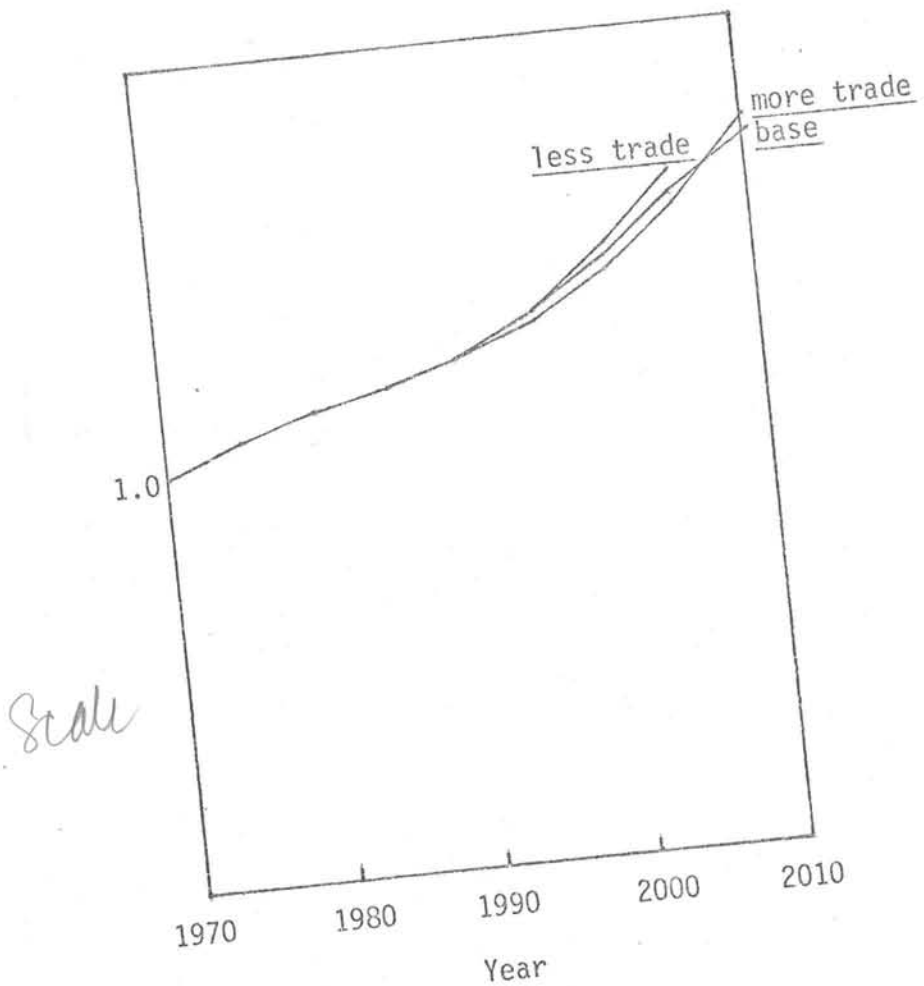


FIGURE 8: EXCHANGE RATE FOR JAPAN

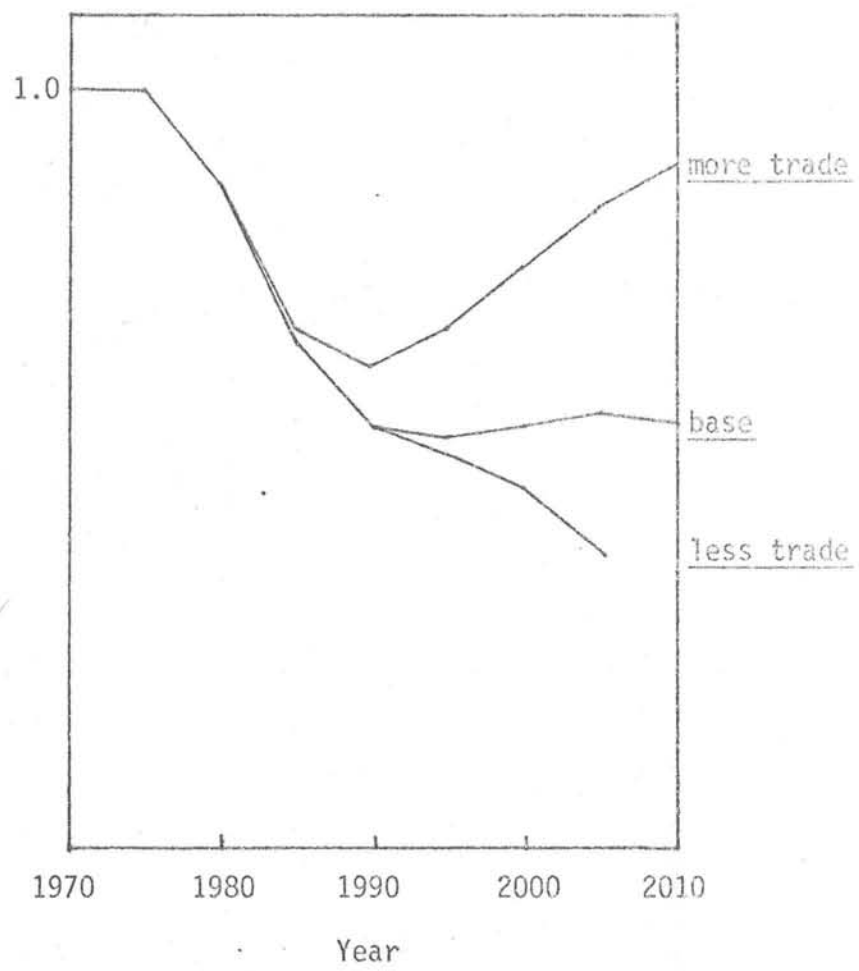


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FIGURE 9: EXCHANGE RATE FOR SOUTH ASIA

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FIGURE 10: EXCHANGE RATE FOR NEW ZEALAND

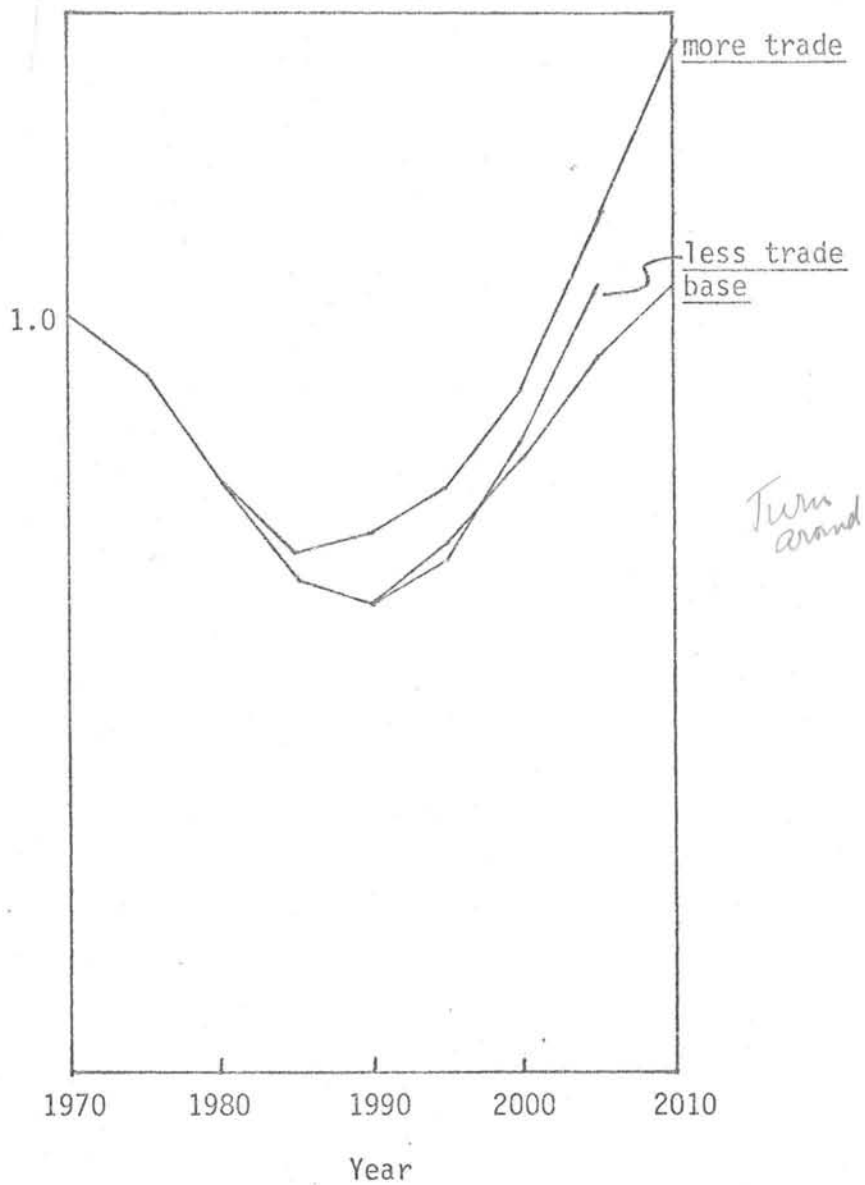


FIGURE 11: OUTPUT IN PHYSICAL UNITS OF FOOD IN NEW ZEALAND

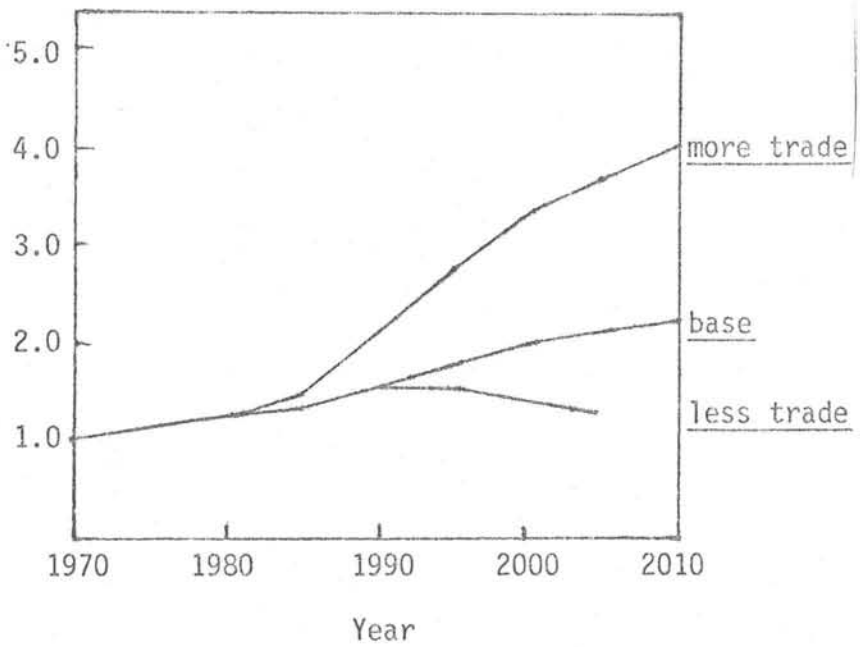


FIGURE 12: OUTPUT IN PHYSICAL UNITS OF MACHINERY IN NEW ZEALAND

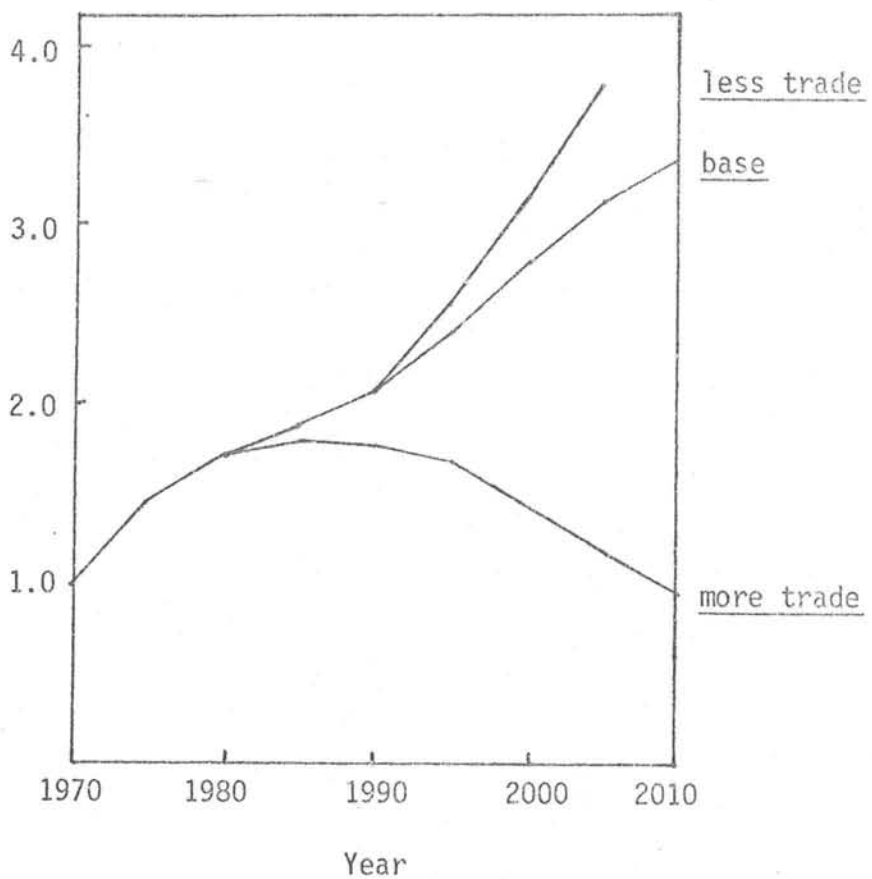


TABLE 1: SECTORAL DISTRIBUTION OF NEW ZEALAND WORK FORCE

	1970	2005 less trade	2005 base	2005 more trade
manufacturing sectors	20.8	23.9	22.6	19.6
service sector	71.3	71.0	71.1	71.3
natural products sectors	7.8	5.2	6.3	9.2

volume of food (figure 13). Internal food prices also follow the same trends. Changes in the prices of other natural products are however little affected by the changes in trade policy. Imports of machinery and other manufactured products are slightly more expensive with increased trade, but as New Zealand produced goods are reduced in price, the cost to the New Zealand consumer, PEFR, is little changed (figure 14).

5. OTHER TRADE POLICY EXPERIMENTS WITH SARUM

(a) Response to energy cartel action

With each price increase, energy becomes an increasingly important element of world trade. Experiments with SARUM (9) have shown the considerable vulnerability of several regions, notably Japan and Europe, to further OPEC cartel action. New Zealand is similarly adversely affected. The increased cost of energy is found to force currency devaluation, and consequently the price in local currency is increased still further. A second feedback mechanism in the model suggests an additional price increase due to adjustments within the energy industry following a cartel action. A policy of self-reliance in energy has been shown to protect New Zealand from many of the adverse effects of both the recent and forecast energy price rises.

(b) Application of SARUM to problems of interest to developing countries

Parker and Raftery of the UK Department of the Environment have reported a number of runs (6) which illustrate the trade-offs in a self-reliance trade policy, and which give some indication of the trading policies which will aid in attempts to achieve the Lima target - 25% of world industrial production in the developing countries by the year 2000.

Biases in imports of capital machinery and manufactured goods into less developed countries are increased by 4% from 1970 on. By the year 2000, over 80% of demand for machinery in Africa is supplied from local

FIGURE 13: LOCAL PRICE TO PRODUCER OF FOOD IN NEW ZEALAND, IN LOCAL CURRENCY

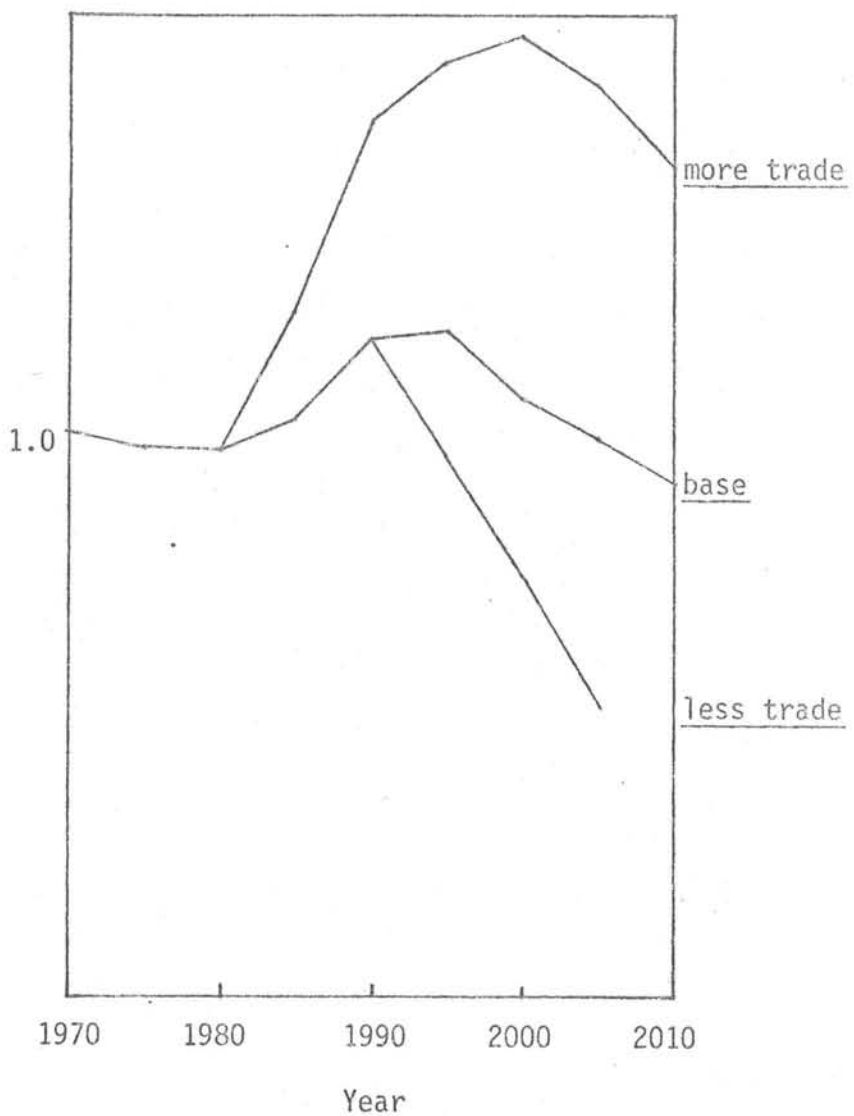
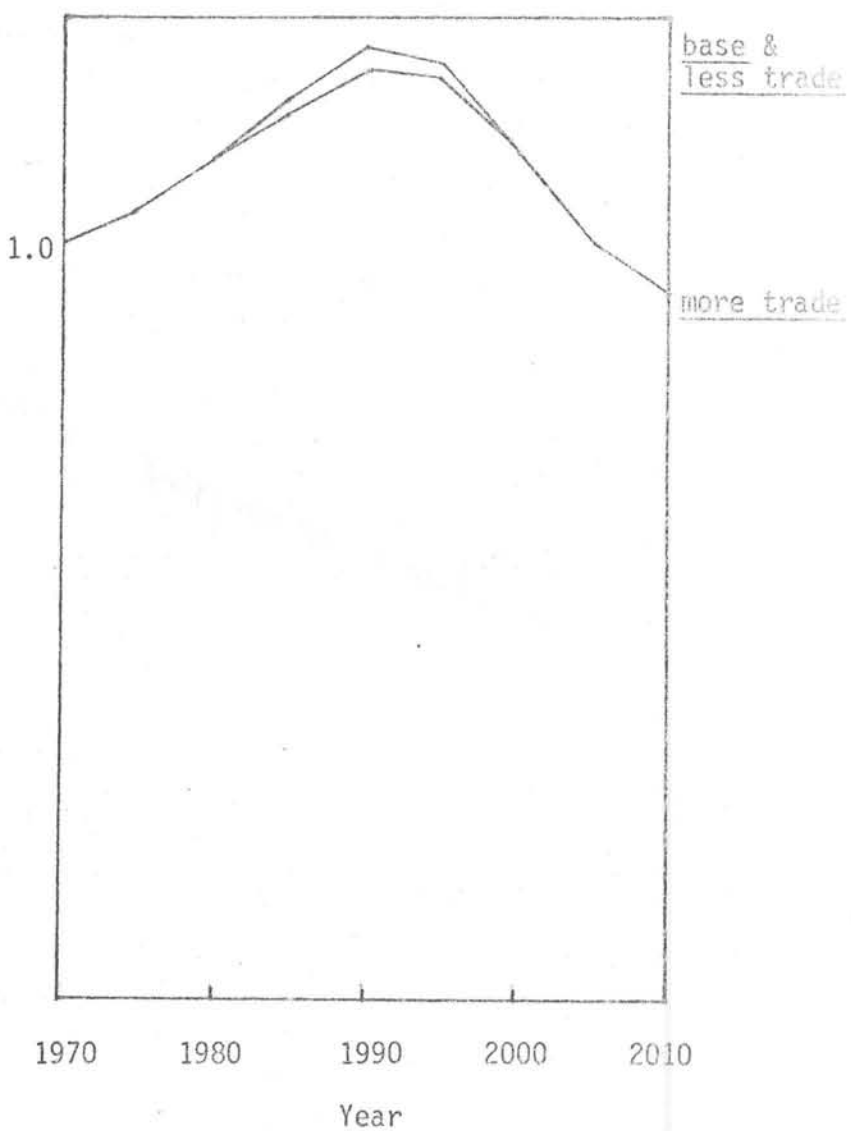


FIGURE 14: EFFECTIVE CONSUMER PRICE OF MACHINERY IN NEW ZEALAND, IN LOCAL CURRENCY



Scale

production, compared to 20% in a constant trade bias run; the production is triple what it would have been without import restrictions.

The large increase in manufacturing capacity has its costs. The producer price of capital machinery is increased by 20% over the constant trade bias run. The increased investment in the capital machinery and manufactured goods sectors leads to a reduced investment in the other sectors, which thus produce less than they would have done. The raising of trade biases then leads to a reduction of about 12% in the consumer index in 2000.

Parker and Raftery comment on these model runs as follows:

> "... this experiment shows less developed countries substantially increasing their manufacturing capacity with only a small fall in living standards. However, this conclusion is only valid if the manufacturing industry can be built up by investing home-produced capital goods, rather than by importing advanced technology from the developed countries. On the other hand, it is possible that this experiment over-estimates the decrease in standard of living. Technical progress in SARUM is, at present, neutral, whereas it seems likely that when less developed countries industrialise, productivity will increase owing to technical improvements embodied in the new capital investment."

Similar trends are evident in the Interfutures "breakdown" scenario which also examined reduced trade between developed and developing regions (5). When the less developed regions are thrown onto their own resources for making capital machinery very high growth rates result for this sector; for example in Africa it grows at 19% per annum and in West Asia and North Africa at 28%. The share of developing countries plus China in capital machinery production is 33% in the North-South breakdown scenario, compared to 18-25% in other Interfutures scenarios. Since exports to the less developed regions are cut off, production is lower in developed regions - down by 40% in the EEC and by 57% in Japan.

The policy of self-reliance in the developing world, with reductions in trade with the developed world, then aids the achievement of the Lima target. The costs to the developing countries of the thrust for self-reliance are shown, and it is then over to the decision-makers to weigh the advantages and disadvantages of this policy. The costs in lost opportunity to the developed countries have also been shown. Self-reliance in the developing world removes markets from developed country industries, and it is not surprising therefore that OECD Interfutures should call such a policy "breakdown", or choose to emphasise the negative aspects of the policy (the decrease in per capita income).

The Department of the Environment also used SARUM to investigate the possible dynamic effects when aid is channelled into investment goods. Thus, worldwide, if aid is spent on consumption, the share of less developed countries in output of capital goods is the same as with no aid - about 18% in the year 2000. If the aid is specifically for investment goods, the share of less developed countries in the world output of capital goods is increased to about 27% in 2000.

The results for Africa emphasise the change. If aid is to consumption,

there is little change in production of goods by domestic industry, but imports increase by 60%. If aid is spent only on investment goods, the industrial base is enlarged, by a factor of 4.5 in 2000, with substantial improvement in living standards. Thus in 2000 the consumer index for Africa is about 1,200 dollars with no aid, 1,500 dollars with aid to consumption, and 2,000 dollars with aid to investment.

(c) Free trade with Australia

In a paper considering trade liberalisation strategies between Australia and New Zealand (10), Mula and MacRae of the Australian Department of Science and the Environment concluded that "if New Zealand isolates itself through trade from the rest of the world, while continuing to trade with Australia as in the past, it may lead to a reduced standard of living as measured in consumption per capita terms." However the message of the modelling is by no means as unequivocal as this quote would seem to indicate. As shown in figures 15 and 16 the reduction in the consumption index is small, about 4% in 2020, while the effect of the changed trading policy on the New Zealand manufacturing sector is considerable. There is a 60% increase in the labour force of that industrial sector by 2020 with isolation, compared to an increase of 16% in the free trade case. Obviously some balance must be struck between the various demands of the New Zealand economy.

(d) Pacific economic communities

An assessment of various Pacific Economic Communities by Mula, MacRae and Parker (7) shows the same patterns repeating, with increased trade leading to a reduction in production of manufactures in New Zealand, and an increase in production of food. The most marked change is achieved when an economic community with Australia, Japan and ESEA (East and South-East Asia) is formed, and comparisons between the reference run and a model run exploring the effects of the formation of this economic community are given in figures 17 and 18. As shown in figure 19, the reduction of trade barriers between members of this community leads to an increase of about 20% in the New Zealand consumption index over a period of 50 years.

It is noticeable that the formation of an economic community with Australia and North America (USA and Canada) has a smaller effect on the production of manufactures and on consumption per capita in New Zealand.

6. SOME OTHER NEW ZEALAND MODELLING

Is this relevant

(a) Eric Haywood

In "Forecasting the Economy in the Eighties", Haywood concluded that

> "those who, like myself, are more pessimistic about New Zealand's ability to achieve and sustain an export growth rate double that

FIGURE 15: GROSS CONSUMPTION PER CAPITA IN NEW ZEALAND

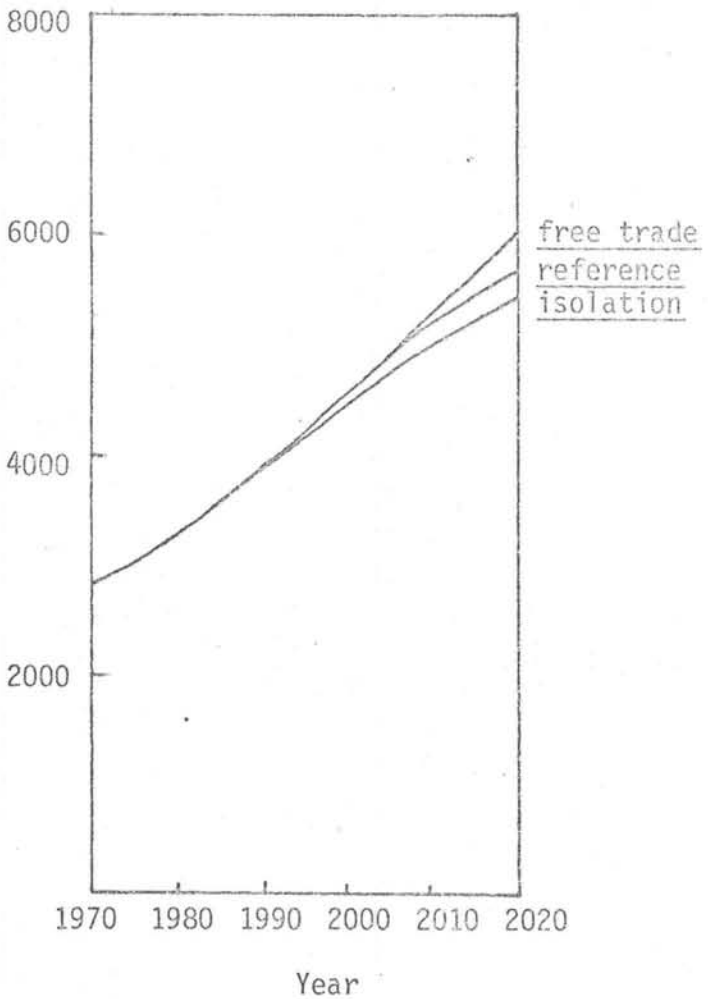


FIGURE 16: NET TRADE OF MANUFACTURES BY NEW ZEALAND

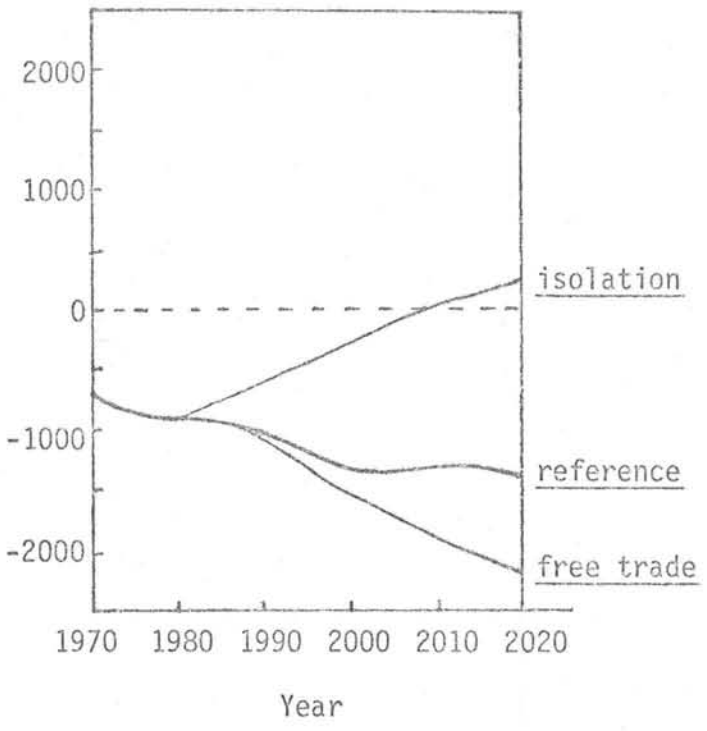


FIGURE 17: SALES OF MANUFACTURING SECTOR IN NEW ZEALAND

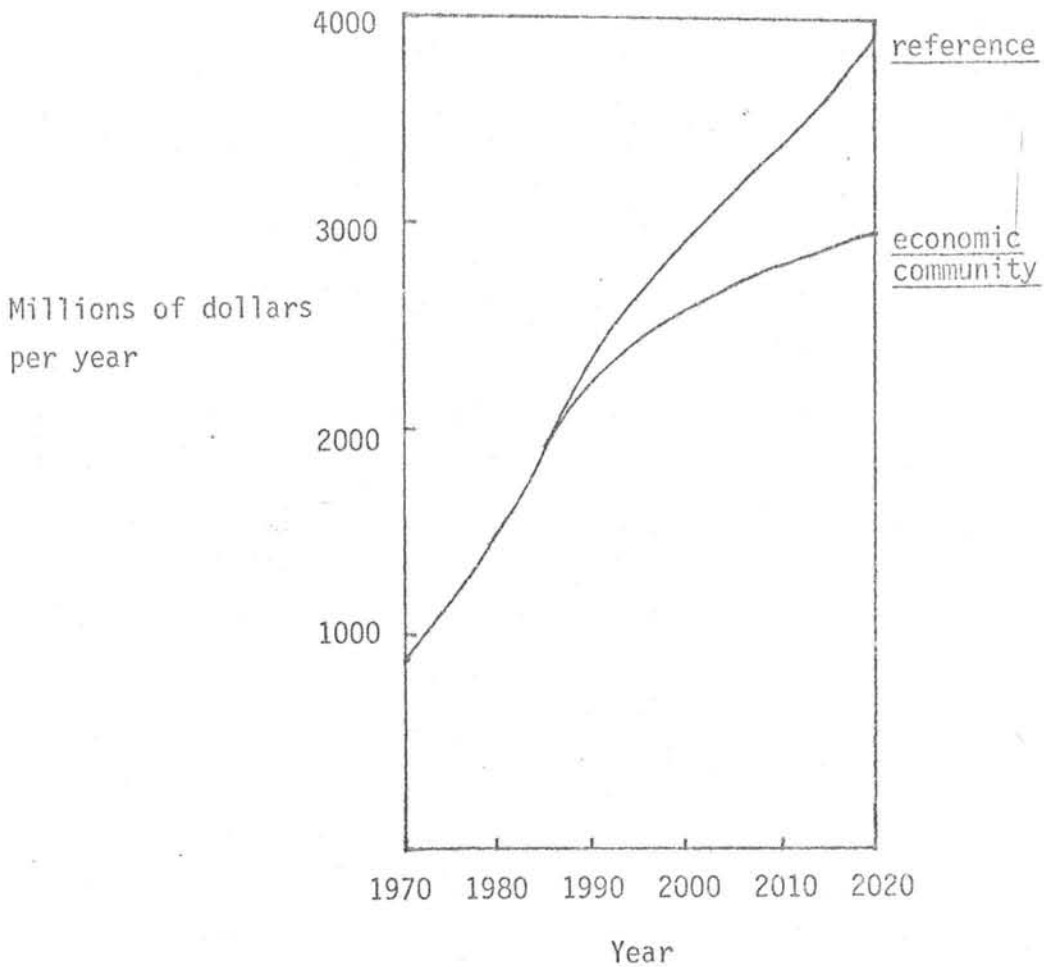


FIGURE 18: SALES OF FOOD SECTOR IN NEW ZEALAND

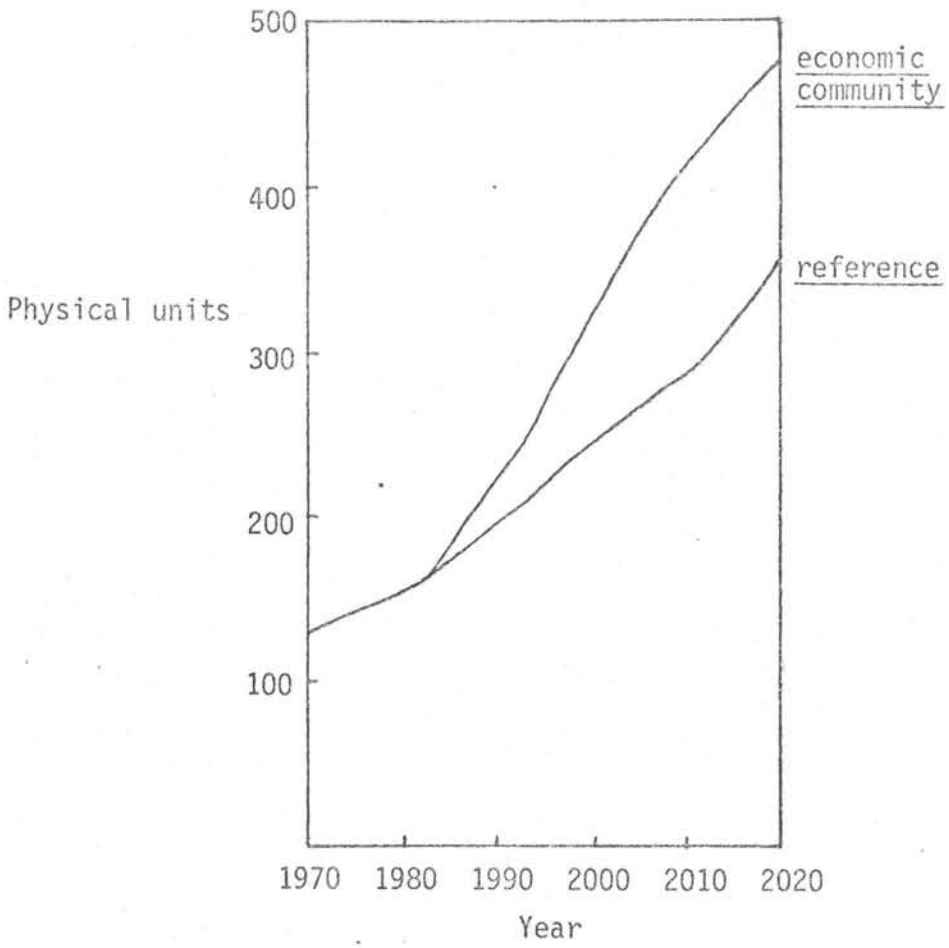
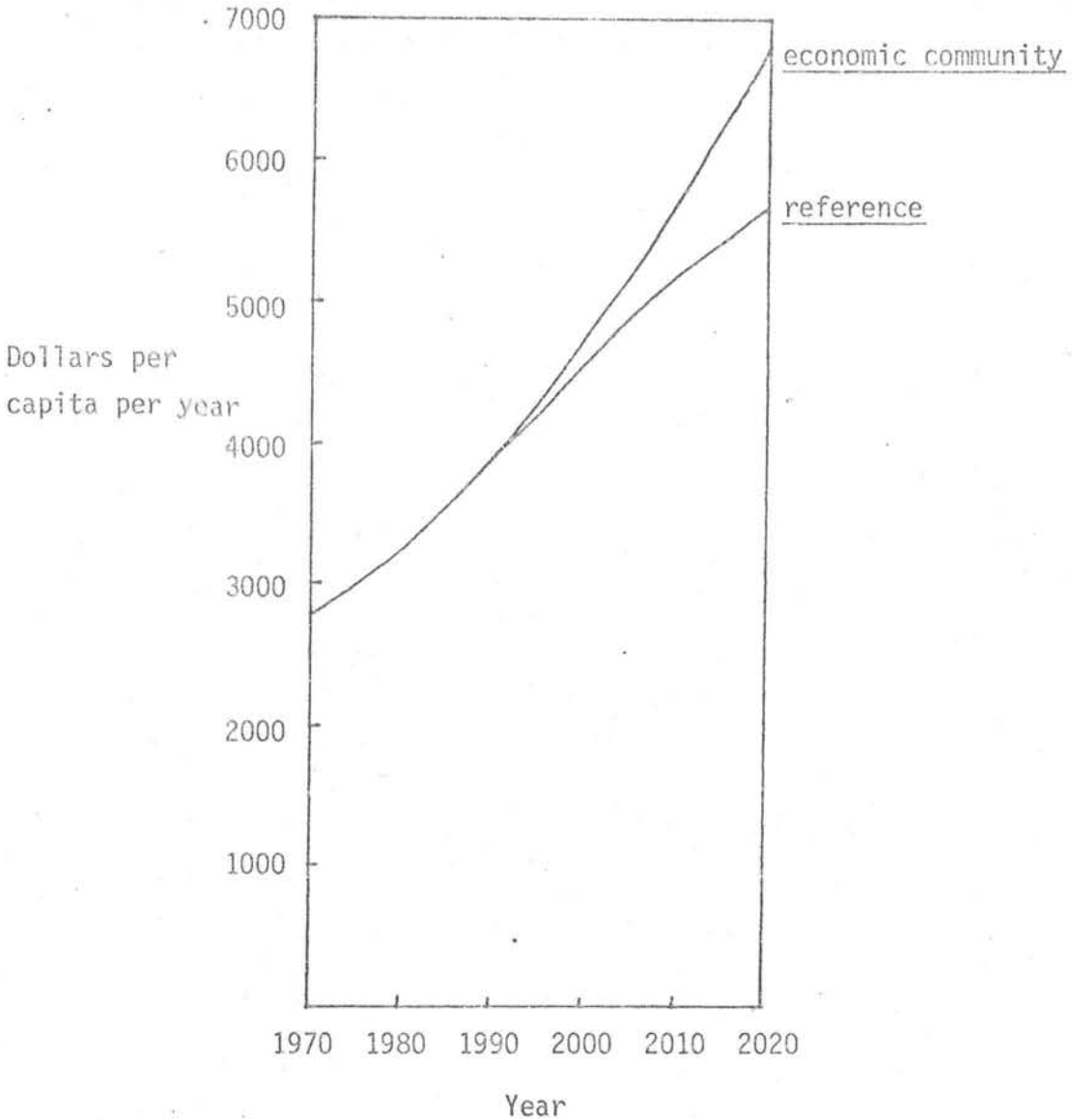


FIGURE 19: GROSS CONSUMPTION PER CAPITA IN NEW ZEALAND



> which occurred over the last decade will tend to accept that the final outcome is likely to be closer to that portrayed in Scenario 2 rather than 4." (3)

Both of these scenarios included the large-scale investment programme. Scenario 2 assumed historical export growth and Scenario 4 improving export growth. While the difference between the model employment projections and Department of Statistics labour force projections moves from -40,000 in 1981 to a maximum of -60,000 in 1985 before recovering to +10,000 in 1990 in the improving export growth run, Scenario 4, the recovery is less successful in the Scenario 2 which Haywood feels to be more realistic, and the difference is then -30,000 in 1990.

There is less difference between these two scenarios in both the current account balance and the net income from overseas investment, the latter growing from about -$600 million in 1980 to -$2,200 million in 1990. Other Planning Council documents have similarly stressed the increasing importance of the negative invisibles balance to the total balance of overseas exchange transactions.

Of particular importance is Haywood's conclusion regarding large-scale projects. Thus:

> "The above analysis is deliberately simplified but it shows that the large-scale projects will not have a lasting effect on the growth rate; the effect is probably of shorter duration and less than most people believe if the results of this study are accepted."

> "It is estimated that the total contribution of the large-scale projects to the level of economic activity in the second half of the decade will be in the order of 6 percent. However, their contribution to the growth rate will have ended by 1988. Unless additional projects or new sources of export growth and import substitution are found the growth rate will fall back to its recent historical average of 2.5 - 3.5 percent per annum after this date."

Van Moeseke's study of the impact of an aluminium smelter on the national economy (13) suggests further that this particular large-scale project must

> "at first sight appear implausible since it flies in the face of these policies: it requires power at a small fraction of our marginal cost; far from contributing to diversification it would use up nearly one-half of all of New Zealand's present hydro energy; and finally it cannot hope to rival bauxite- and steam coal-rich Australia's comparative advantages."

Although SARUM does not model invisibles transactions, there is an indication of continuing negative terms of trade throughout the 1980s, as illustrated by the downward drift of the exchange rate (figure 10).

The analysis of productivity given by Haywood shows a correlation between change in real GDP and change in persons employed. His calculations of

increases in output per person employed required in order to maintain the 1979-80 employment position increases from 0.3% in 1981 to a maximum of 1.2% in 1985 and then decreases to 0.8% in 1990. His modelling indicates that values of the order of 1.5%, as assumed in the SARUM experiments, may be achieved.

The import constraint applied by Haywood, and justified by reference to historical data, is absent in SARUM. The considerable policy changes implied in the SARUM "less trade" experiment may be related to the import substitution projections of the Project on Economic Planning (15) in which the degree of import substitution is set at 70% of the potential maximum in each sector (13). Haywood has modelled modest variations from past trends; SARUM has been used to explore major policy changes which will alter that economic pattern.

In my opinion a major contribution of Haywood's paper is the "insistence that the study be written largely in the first person" since this "makes the assumptions and value judgements adopted much clearer to the reader than they would have been otherwise". I would join Haywood in acknowledging the role of Margaret Bell from the Planning Council Secretariat in arguing for this approach. I have argued on a number of occasions for an explicit recognition of the importance of the viewpoint of the analysts. "In judging the value of any future picture it is then of prime importance to consider who is presenting the scenario, for whom (this is the key factor) and with what aim in mind." (16) Differences of opinion in the interpretation of model experiments have been noted in the previous section.

(b) Project on Economic Planning

The results of the SARUM experiments support Philpott's criticism (15) of "the conventional economic wisdom" which includes an emphasis on more competition. The model shows the trade-offs involved in changing trade patterns and shows that a demand for cut-backs in trade barriers as a general cure to New Zealand's economic ills may be too simplistic. Philpott's argument for minimum import content is consistent with an aim for a range of economic activity rather than a specialised economy based on comparative advantage in a free trade situation. The need for balanced development has similarly been argued by van Moeseke (17).

As Parker and Raftery (6) pointed out in reference to appropriate trade policies for developing nations, considerations absent from the models may guide the final choice; the models simply illustrate some implications of alternative policies.

Hunn, in a working paper for a CFF Decision Analysis Group (18), argues that since the world has entered a period of considerable uncertainty, a mixed approach allowing for a diversity of developments and the ability to change direction should be prepared for. He suggests a two-tiered approach: "a modest subsistence level economy, topped up by a Panglossian "best of all possible world" economy which in times of war or recession could be scaled back relatively painlessly and quickly."

7. GLOBAL STRUCTURAL CHANGE

None of the models have sufficiently considered the continuing structural changes in key industries throughout the world. There has been a steady evolution in the distribution of industries such as steel, ship-building and the automotive industry following shifts in comparative advantage due to lower wage levels and greater efficiency of new plants in the newly industrialised nations. Centres of production are shifting from Europe to Japan and then to South Korea and Brazil. The effect of the structural change is particularly strong in the United Kingdom where an increasing proportion of manufactured goods is now imported. Similarly the share of Japanese automobile imports in the USA market is now considerable and the Danish and Swedish shipbuilding industries are seriously affected. The crisis is compounded by the world-wide down-turn in economic activity, and by an oversupply in productive capacity as, for example, capacity utilisation rates for steel production in OECD countries dropped from 91% in 1973 to 71.5% in 1975. Although the shipbuilding capacity of South Korea may be equal to one-third of world demand by 1981, five additional yards are planned for the period 1982 - 1986 (5), and the process can be expected to continue.

An internationalisation of industry and an international division of labour is developing. "In the mass-market sub-sectors, activity is increasingly concentrated in the multi-national firms because of their ability in the fields of marketing, innovation and worldwide organisation of production. At all levels, there is increasing specialisation within each industry." (5)

Several possible future trends may be identified.

(a) Moves towards free trade will strengthen existing trends. The following quote from OECD Interfutures (5) illuminates the New Zealand situation as a host country for overseas investment. "One factor which justifies the progressive abandonment of trade restrictions in the area of high technology goods is that the sale of technology very often implies the development of dependent relationships which, in the long run strengthens the purveyor's position."

(b) Success in achieving the stated aim of collective self-reliance within the non-aligned movement will largely counteract those trends, but will continue to remove markets for manufactured goods from the developed world.

(c) Developed countries suffering from this process may introduce protectionist policies to support their ailing industries. Such moves to protectionism, coupled with an increasing inability to afford imports, may continue to undermine our traditional markets.

The significance of the continuing structural change for Australian industry as ASEAN nations industrialise, bringing together a mix of new equipment and the latest technology, and cheap labour, was emphasised in 1979 by delegates from the Australian Club of Rome to the Club of Rome 10th Anniversary Meeting. The degree of protection and support to be provided to New Zealand industry in the face of increasing competition is similarly a matter of current concern here.

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