

A SYSTEM DYNAMICS MODEL OF THE
NEW ZEALAND ECONOMY

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ABSTRACT

THIS PAPER DISCUSSES THE GENERAL STRUCTURE AND IMPLEMENTATION OF A SYSTEM DYNAMICS MODEL OF THE NEW ZEALAND ECONOMY. THE MODEL, CALLED SDMACRO, HAS BEEN DEVELOPED AT THE NEW ZEALAND PLANNING COUNCIL TO PROVIDE LIKELY TREND MOVEMENTS, SOME 10-15 YEARS INTO THE FUTURE, IN THE KEY MACRO-ECONOMIC AGGREGATES INCLUDING GROSS DOMESTIC PRODUCT, CAPITAL FORMATION, POPULATION, EMPLOYMENT, EXPORTS, IMPORTS, AND THE CURRENT ACCOUNT BALANCE. THE BASE CASE RUN OF THE MODEL IS PRESENTED TOGETHER WITH SCENARIOS WHICH SHOW OPTIMISTIC AND PESSIMISTIC FUTURE OUTLOOKS FOR THE NEW ZEALAND ECONOMY. IN ADDITION, THE PAPER BRIEFLY DESCRIBES HOW SDMACRO IS USED WITH A 22 SECTOR GENERAL EQUILIBRIUM MODEL, JULIANNE, AS PART OF ANOTHER PLANNING COUNCIL STUDY WHICH EXAMINES POSSIBLE NATIONAL AND SECTORAL DEVELOPMENT PATHS OF THE NEW ZEALAND ECONOMY UP TO 1995. FINALLY, SOME RECENT EXTENSIONS TO SDMACRO ARE OUTLINED.

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1. INTRODUCTION

SDMACRO, A MEDIUM-TERM SYSTEM DYNAMICS MODEL OF THE NEW ZEALAND (NZ) ECONOMY HAS BEEN DEVELOPED WITHIN THE FRAMEWORK OF THE NATIONAL SECTORAL PROGRAMME AT THE NEW ZEALAND PLANNING COUNCIL. THE FULL DOCUMENTATION AND COMPUTER LISTING OF SDMACRO, TOGETHER WITH A DISCUSSION OF A WIDE RANGE OF MODEL SCENARIOS, ARE PROVIDED IN HAYWOOD AND CAVANA (1986).

2. OVERVIEW OF THE MODEL

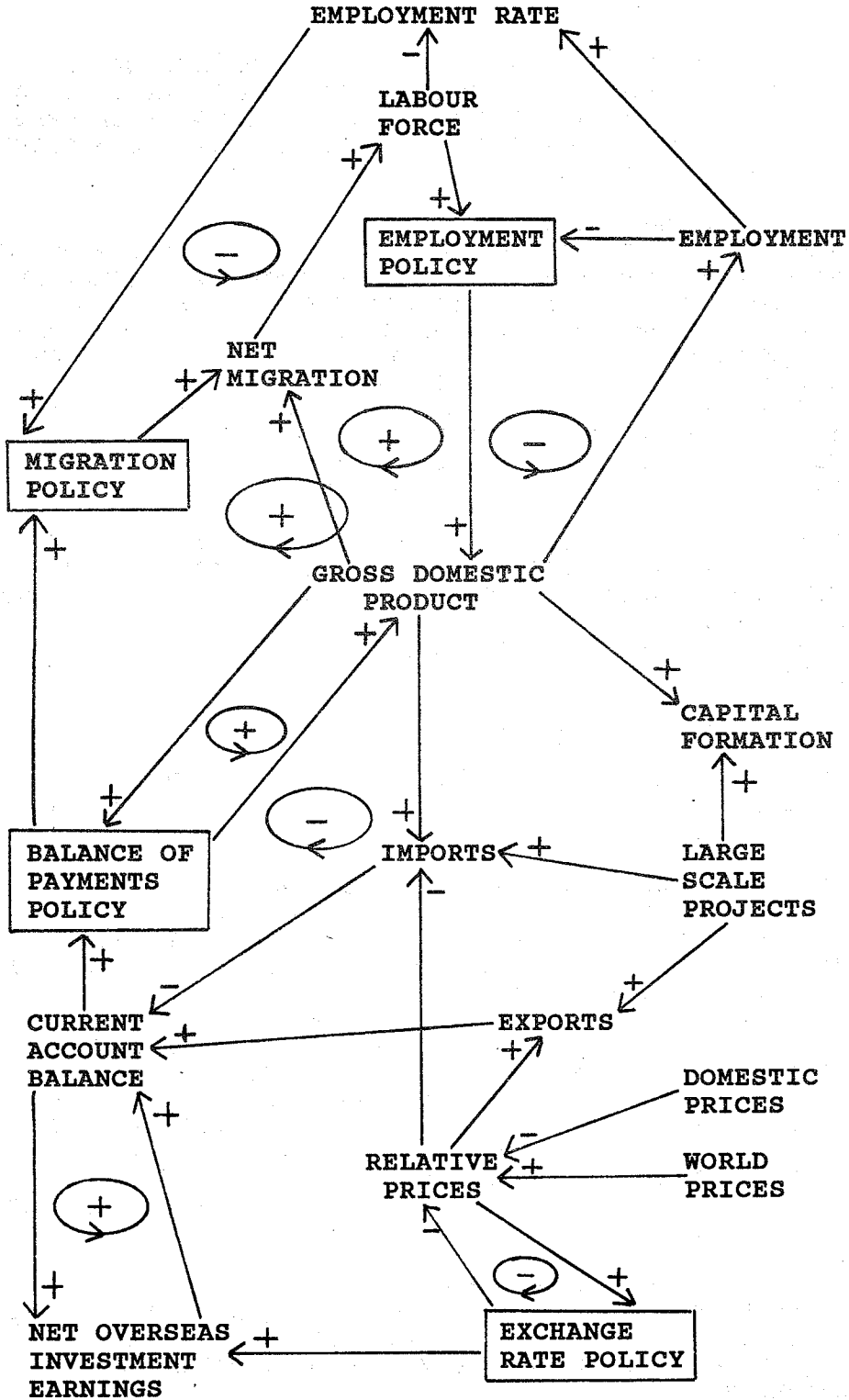
THE GENERAL STRUCTURE OF SDMACRO FOLLOWS, TO A DEGREE, THAT OF AN EARLIER MEDIUM-TERM MODEL OF THE NEW ZEALAND ECONOMY (HAYWOOD, 1980). SIMILARITIES INCLUDE THE EMPHASIS ON THE NATION'S EXTERNAL BALANCE AS A CONSTRAINT ON ECONOMIC GROWTH. IT WAS ALSO RECOGNISED THAT, FOR MEDIUM-TERM ANALYSIS, THE DEGREE OF DISAGGREGATION THAT COULD SENSIBLY BE MODELLED OR EXAMINED WAS LIMITED. FINALLY, THE EMPHASIS ON MODEL CONSTRUCTION WAS TO CAPTURE THE KEY ECONOMIC RELATIONSHIPS AND TO EXAMINE THE EFFECTS OF CHANGES IN THESE RELATIONSHIPS.

HOWEVER, WHILE CERTAIN SIMILARITIES EXIST TO THE MODEL OUTLINED IN HAYWOOD (1980) A NUMBER OF SIGNIFICANT DIFFERENCES IN APPROACH, CONTENT AND METHODOLOGY ARE EVIDENT. IN PARTICULAR, THESE ARE THE INCLUSION OF RELATIVE PRICES, ADDITIONAL FEEDBACK LINKS, MORE COMPLEX POLICY REACTION FUNCTIONS, AND DIFFERENT EXCHANGE RATE REGIMES. IN ADDITION, THE MODEL IS DEVELOPED USING THE SYSTEM DYNAMICS METHOD WITH THE DYNAMO PACKAGE (PUGH, 1976), ALTHOUGH MANY OF THE BEHAVIOURAL EQUATIONS HAVE BEEN ESTIMATED USING ECONOMETRIC METHODS. AN INTERESTING FEATURE OF THE MODEL IS THAT IT DEMONSTRATES THE COMPLEMENTARY USE OF BOTH THE SYSTEM DYNAMICS AND ECONOMETRICS METHODS IN THE CONSTRUCTION OF A MODEL WITHIN A GENERAL ECONOMICS FRAMEWORK.

THE MAIN VARIABLES, LINKAGES AND FEEDBACK LOOPS IN THE MODEL ARE SHOWN IN FIGURE 1 AND DISCUSSED BRIEFLY BELOW. THE FIGURE ILLUSTRATES THE INTERACTIONS BETWEEN THE GROWTH/DECAY PROCESSES (POSITIVE FEEDBACK LOOPS) AND THE CONTROL MECHANISMS (NEGATIVE FEEDBACK LOOPS) WITHIN THE NZ MACRO-ECONOMIC SYSTEM. SDMACRO HAS BEEN DESIGNED TO EXAMINE THE DYNAMIC BEHAVIOUR GENERATED BY THESE INTERACTIONS OVER A MEDIUM TERM TIMESPAN.

FIGURE 1

A SIMPLIFIED INFLUENCE DIAGRAM FOR SDMACRO



2.1 GROSS DOMESTIC PRODUCT

IN THE MODEL, THE GROWTH RATE OF REAL GROSS DOMESTIC PRODUCT (QRP) IS DETERMINED ACCORDING TO THE WEIGHT (WTBP) GIVEN TO THE BALANCE OF PAYMENTS OBJECTIVE (QRPBP) AND THE EMPLOYMENT OBJECTIVE (QRPE):

$$QRP = WTBP * QRPBP + (1 - WTPB) * QRPE$$

IT IS ASSUMED APPROPRIATE POLICIES ARE ADOPTED TO MAXIMISE DOMESTIC GROWTH CONSISTENT WITH THE DESIRED EXTERNAL AND EMPLOYMENT OBJECTIVES. NO VIEW ON WHAT SPECIFIC SET OF POLICIES SHOULD BE ADOPTED TO ACHIEVE THIS GOAL IS GIVEN.

THE EMPLOYMENT RESPONSE OBJECTIVE FUNCTION IS INCORPORATED IN THE MODEL AS THE TABLE FUNCTION BELOW WHICH SPECIFIES THE DESIRED EMPLOYMENT RATE (ERD) IN THE NEXT YEAR GIVEN THE EXISTING EMPLOYMENT RATE (ER). THE DESIRED INCREASE IN EMPLOYMENT WHICH, VIA AN EMPLOYMENT-DOMESTIC GROWTH EQUATION, PROVIDES AN ESTIMATE OF THE INCREASE IN DOMESTIC ACTIVITY THAT WOULD NEED TO OCCUR TO MEET THE DESIRED INCREASE IN THE EMPLOYMENT RATE IN THE NEXT PERIOD:

$$ERD = TABXT (ERDT, ER, 0.92, 1.0, 0.02)$$
$$ERDT = 0.935/0.95/0.965/0.98/0.99$$

THE BALANCE OF PAYMENTS DESIRED GROWTH RESPONSE (QRPBP) IS ALSO SPECIFIED IN THE MODEL AS A TABLE FUNCTION DEPENDENT ON THE RATIO (CABQ) OF THE CURRENT ACCOUNT BALANCE TO GDP:

$$QRPBP = TABXT (QRPBPT, CABQ, -0.07, 0.01, 0.04)$$
$$QRPBPT = -0.02/0.03/0.08$$

2.2 GROSS FIXED CAPITAL FORMATION

CAPITAL FORMATION IN SDMACRO COMPRISES INVESTMENT ASSOCIATED WITH "TRADITIONAL" ECONOMIC ACTIVITY, AND THAT ASSOCIATED WITH THE "LARGE-SCALE PROJECTS".

AS THIS EXERCISE IS CONCERNED WITH MEDIUM-TERM RELATIONSHIPS IT IS APPROPRIATE TO FILTER OUT THE SHORT-RUN OR BUSINESS CYCLE INFLUENCE IN THE DATA BEFORE EXAMINING THE RELATIONSHIPS BETWEEN DATA. ONE METHOD OF FILTERING OUT THE BUSINESS CYCLE IS TO APPLY A MOVING AVERAGE TO THE DATA OF APPROXIMATELY THE SAME PERIOD OF THE CYCLE ITSELF, I.E. 3-5 YEARS. HOWEVER, USE OF MOVING AVERAGE DATA IN REGRESSIONS LEADS TO AUTO-CORRELATION IN THE RESIDUALS SO THAT ORDINARY LEAST SQUARES PARAMETER ESTIMATES ARE NOT EFFICIENT AND THE STANDARD ERROR ESTIMATES ARE BIASED. THIS PROBLEM CAN BE MINIMISED BY USING THE "AUTOREG" PROCEDURE THAT EXISTS IN SAS (SAS INSTITUTE INC. 1984) AND WAS ADOPTED IN THIS STUDY.

THE ECONOMETRIC RELATIONSHIP USED IN THE MODEL BETWEEN PERCENTAGE CHANGES IN TRADITIONAL GROSS FIXED CAPITAL FORMATION (CFTRNP) AND CHANGES IN DOMESTIC OUTPUT (QRP) IS GIVEN BELOW ("T" STATISTICS IN BRACKETS):

$$CFTRNP = -0.10428 + 4.088 QRP \quad R^{**2} = 0.944$$

(10.903) (14.216) 1965-80

2.3 POPULATION, LABOUR FORCE AND NET MIGRATION

THE NZ DEPARTMENT OF STATISTICS ESTIMATE OF POPULATION AND LABOUR FORCE, ASSUMING ZERO NET MIGRATION, ARE INPUT INTO THE MODEL AS EXOGENOUS PROJECTIONS. NET MIGRATION IS CALCULATED IN THE MODEL AS THE SUM OF NORMAL NET MIGRATION FLOWS PLUS THE NET INWARD MIGRATION RESULTING FROM AN ACTIVE IMMIGRATION POLICY. NORMAL NET MIGRATION IS ASSUMED TO DEPEND ON ECONOMIC CONDITIONS WITHIN NEW ZEALAND. THE RESULT OF ESTIMATING THE RELATIONSHIP BETWEEN THE FIVE YEARLY MOVING AVERAGE DATA OF NET MIGRATION (MIGN) AND THE ANNUAL PERCENTAGE CHANGE OF REAL GROSS DOMESTIC PRODUCT (QRP) IS:

$$\text{MIGN} = -18262 + 735684 \text{ QRP} \quad R^{**2} = 0.77$$

(5.074) (6.673) 1965-80

AT HIGH LEVELS OF EMPLOYMENT, IT IS ASSUMED THAT AN ACTIVE IMMIGRATION POLICY WILL BE INTRODUCED BY GOVERNMENT TO REDUCE LABOUR SHORTAGES, PROVIDING THAT THE BALANCE OF PAYMENTS IS AT THE SAME TIME IN A SATISFACTORY POSITION.

2.4 EMPLOYMENT

THE PERCENTAGE CHANGE IN EMPLOYMENT (EP) IN THE MODEL IS DIRECTLY RELATED TO MOVEMENTS IN DOMESTIC OUTPUT (QRP). THE ESTIMATED RELATIONSHIP IS:

$$\text{EP} = 0.00522 + 0.435 \text{ QRP} \quad R^{**2} = 0.82$$

(3.099) (7.960) 1965-80

2.5 EXPORTS AND IMPORTS OF GOODS

THREE CATEGORIES OF EXPORT GOODS ARE ASSUMED: TRADITIONAL (MEAL, WOOL AND DAIRY PRODUCTS), NON-TRADITIONAL (FOREST PRODUCTS, MANUFACTURING AND OTHER PRIMARY PRODUCTS), AND THOSE EXPORTS ASSOCIATED WITH THE "ADDITIONAL" LARGE-SCALE PROJECTS. IN THE BASE CASE TRADITIONAL AND NON-TRADITIONAL EXPORTS ARE ASSUMED TO INCREASE AT ANNUAL REAL RATES OF 1 AND 6 PERCENT RESPECTIVELY. THE ASSUMED GROWTH RATES ARE MODIFIED IF RELATIVE PRICE MOVEMENTS BETWEEN DOMESTIC AND EXPORT PRICES OCCUR. THE PRICE ELASTICITY FOR TRADITIONAL EXPORTS WAS ASSUMED TO BE 0.3 AND FOR NON-TRADITIONAL EXPORTS 0.7, GIVING ON AGGREGATE AN OVERALL PRICE ELASTICITY OF 0.5.

VARIOUS CATEGORIES OF IMPORTS OF GOODS ARE ASSUMED. THESE ARE TRADITIONAL (CONSUMER, CAPITAL AND INTERMEDIATE GOODS IMPORTED), AND THOSE IMPORTS/IMPORT SAVINGS ASSOCIATED WITH THE LARGE-SCALE PROJECTS. IN THE MODEL THE PERCENTAGE CHANGE IN TRADITIONAL IMPORTS (MGTRP) IS RELATED TO THE PERCENTAGE CHANGE IN REAL GDP (QRP) AND THE DIFFERENCE BETWEEN THE PERCENTAGE CHANGES IN IMPORT PRICES (PMP) AND DOMESTIC PRICES (PDP):

$$\text{MGTRP} = -0.054 + 2.878 \text{ QRP} - 0.567 (\text{PMP} - \text{PDP}) \quad R^{**2} = 0.92$$

(3.935) (6.925) (3.780) 1965-80

2.6 EXPORTS AND IMPORTS OF SERVICES

EXPORTS OF SERVICES ARE ASSUMED TO BE EXOGENOUS TO THE MODEL WITH A GROWTH RATE OF 6% P.A. IN THE BASE CASE. THIS RATE IS MODIFIED BY THE RELATIVE PRICE MOVEMENTS AND A PRICE ELASTICITY OF 0.5. IMPORTS OF SERVICES ARE ESTIMATED AT THE HISTORICAL RATIO OF 18 PERCENT OF TOTAL GOODS TRADE.

2.7 NET OVERSEAS INVESTMENT INCOME

IT IS ASSUMED "INVESTMENT INCOME" CREDITS MOVE 3.5% ABOVE WORLD INFLATION. "DIRECT PRIVATE INVESTMENT INCOME" DEBITS, I.E. FOREIGN INVESTMENT IN NZ, IS ASSUMED TO MOVE DIRECTLY WITH THE MOVEMENT IN DOMESTIC ACTIVITY AS REPRESENTED BY MONEY GDP. "OTHER INVESTMENT INCOME" DEBITS, PRIMARILY INTEREST PAID ON OVERSEAS LOANS BY NEW ZEALANDERS, IS BROKEN INTO TWO CATEGORIES. PAST PAYMENTS ARE ASSUMED TO REPRESENT INTEREST AND WILL REMAIN AT THAT LEVEL ADJUSTED FOR MOVEMENTS IN THE EXCHANGE RATE. THE INTEREST RATE ON NEW LOANS REQUIRED TO COVER THE CURRENT ACCOUNT BALANCE ARE BORROWED AT 3.5% ABOVE THE ESTIMATED WORLD INFLATION RATE.

2.8 DOMESTIC PRICE INDEX

THE PERCENTAGE CHANGE IN THE DOMESTIC PRICE INDEX (PDP) CONSISTS OF TWO ELEMENTS - INTERNALLY GENERATED INFLATION (PIP), ASSUMED TO BE 10% IN THE BASE CASE, AND IMPORTED INFLATION (PMP). THESE ELEMENTS ARE WEIGHTED ACCORDING TO THEIR APPROXIMATE IMPORTANCE IN TOTAL DOMESTIC ECONOMIC ACTIVITY:
$$PDP = 0.7 PIP + 0.3 PMP$$

2.9 EXCHANGE RATE INDEX

THE MODEL CAN BE SET TO OPERATE IN EITHER A "FIXED" OR "FLEXIBLE" EXCHANGE RATE MODE. IN THE BASE CASE THE EXCHANGE RATE, IN ITS "FLEXIBLE" MODE, ADJUSTS ACCORDING TO RELATIVE DIFFERENCES THAT EMERGE BETWEEN DOMESTIC AND EXTERNAL PRICES SO THAT NZ'S COMPETITIVE POSITION CAN BE RETAINED INTERNATIONALLY. ALSO AN OPTION EXISTS IN THE MODEL WHICH INTRODUCES A CONSTANT "UNDER" OR "OVER" SHOOTING OF THE ASSUMED EXCHANGE RATE ADJUSTMENT, WHICH CAUSES A GRADUAL DEPRECIATION OR APPRECIATION OF THE NATION'S REAL EXCHANGE RATE OVER TIME.

2.10 EXPORT AND IMPORT PRICE INDICES

THE EXTERNAL PRICE INDICES ARE MADE UP OF TWO COMPONENTS: OVERSEAS PRICES IN FOREIGN CURRENCY AND THE EXCHANGE RATE. IN THE BASE CASE EXPORT AND IMPORT PRICES, IN FOREIGN CURRENCY, ARE ASSUMED TO GROW AT 6 AND 6.5 PERCENT PER ANNUM RESPECTIVELY.

3. MODEL BEHAVIOUR

A LARGE NUMBER OF SIMULATION RUNS WITH SDMACRO ARE REPORTED IN HAYWOOD AND CAVANA (1986). HOWEVER, ONLY THE BASE CASE AND THE OPTIMISTIC AND PESSIMISTIC SCENARIOS WILL BE PRESENTED HERE. THE OPTIMISTIC SCENARIO ASSUMES THAT THE NATION'S TERMS OF TRADE WILL IMPROVE BY 0.5% P.A. (COMPARED WITH -0.5% P.A. FOR THE BASE CASE) AND THE REAL ANNUAL GROWTH IN TRADITIONAL EXPORTS WILL BE 1.5% (1%), NON-TRADITIONAL EXPORTS 8% (6%) AND SERVICES 8%(6%).

THE PESSIMISTIC SCENARIO ASSUMES THAT THE NATION'S TERMS OF TRADE WILL DECLINE BY 1.5% P.A. AND THE ANNUAL REAL GROWTH IN TRADITIONAL EXPORTS WILL BE 1%, NON-TRADITIONAL EXPORTS 4% AND SERVICES 4%. IN ADDITION, IT IS ASSUMED THAT THERE WILL BE NO FURTHER "ADDITIONAL" BENEFITS FROM THE LARGE SCALE PROJECTS (COMPARED WITH 50% ADDITIONALITY FOR THE BASE CASE) AND THE LEVEL OF IMPORT SUBSTITUTION WILL BE LESS THAN THE HISTORICAL RATE (I.E. THE CONSTANT CO-EFFICIENT IN THE IMPORT EQUATION IN SECTION 2.5 WILL BE -4% RATHER THAN -5.4% FOR THE BASE CASE).

FIGURES 2 TO 4 DISPLAY THE MODEL RESULTS FOR THE CHANGE IN REAL GROSS DOMESTIC PRODUCT, THE UNEMPLOYMENT RATE AND THE ANNUAL NET MIGRATION FOR THESE SCENARIOS COMPARED TO THE BASE CASE. HISTORICAL DATA FROM 1960 TO 1983 ARE ALSO SHOWN FOR COMPARATIVE PURPOSES. TABLE 1 PROVIDES A SUMMARY OF THE MAJOR MACRO-ECONOMIC INDICATORS FOR EACH SCENARIO.

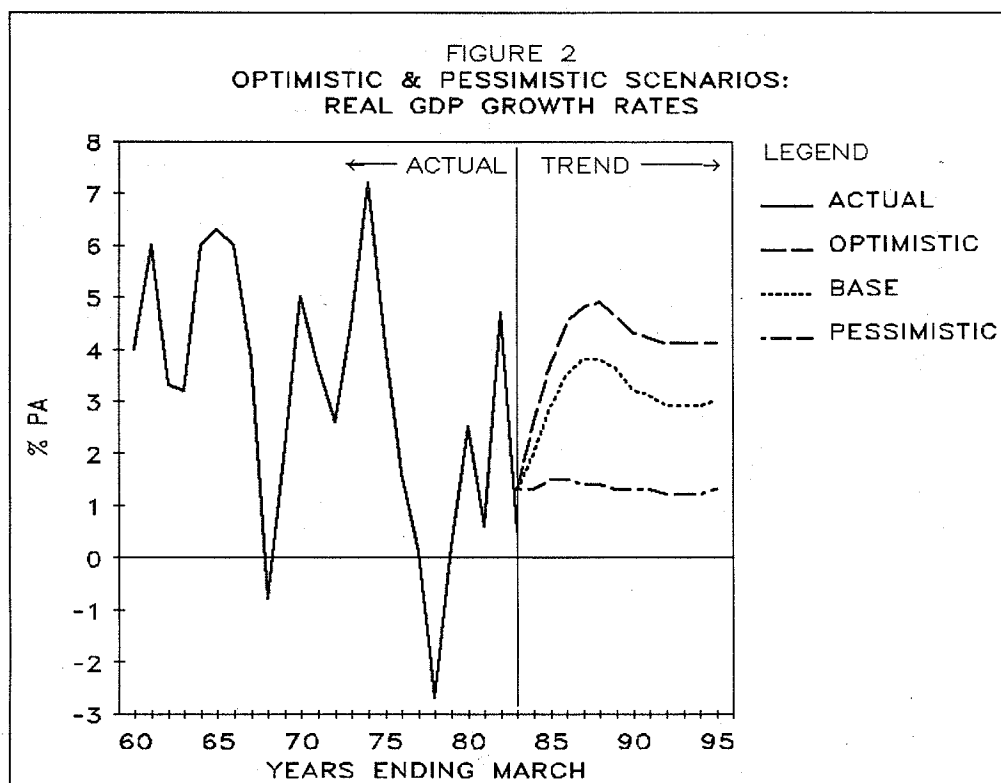


FIGURE 3
OPTIMISTIC & PESSIMISTIC SCENARIOS:
UNEMPLOYMENT RATES

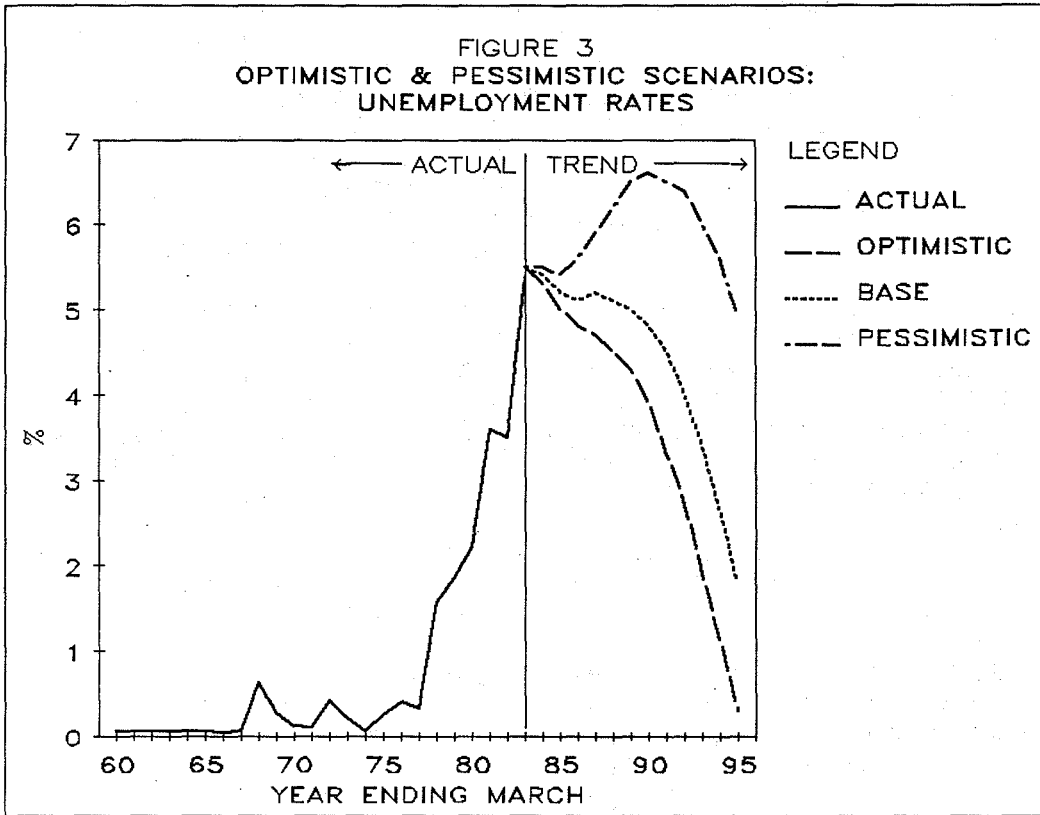


FIGURE 4
OPTIMISTIC & PESSIMISTIC SCENARIOS:
NET MIGRATION

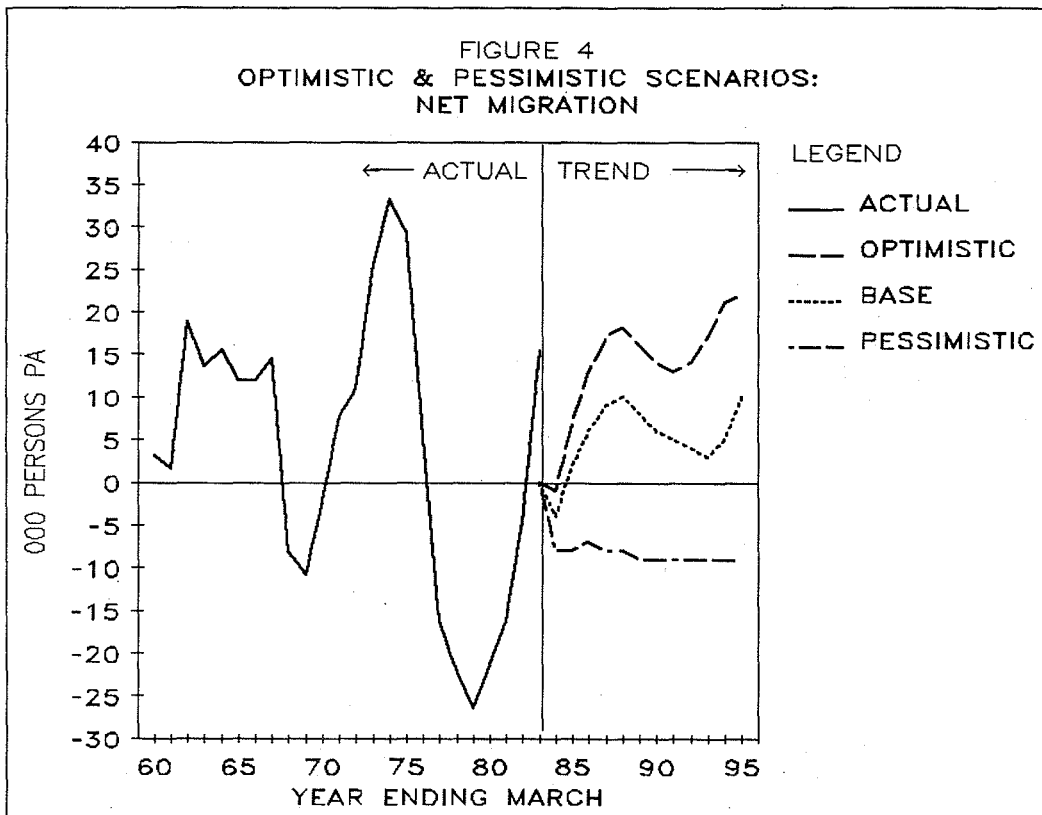


TABLE 1

SUMMARY OF THE MAJOR MACRO-ECONOMIC INDICATORS BY SCENARIO

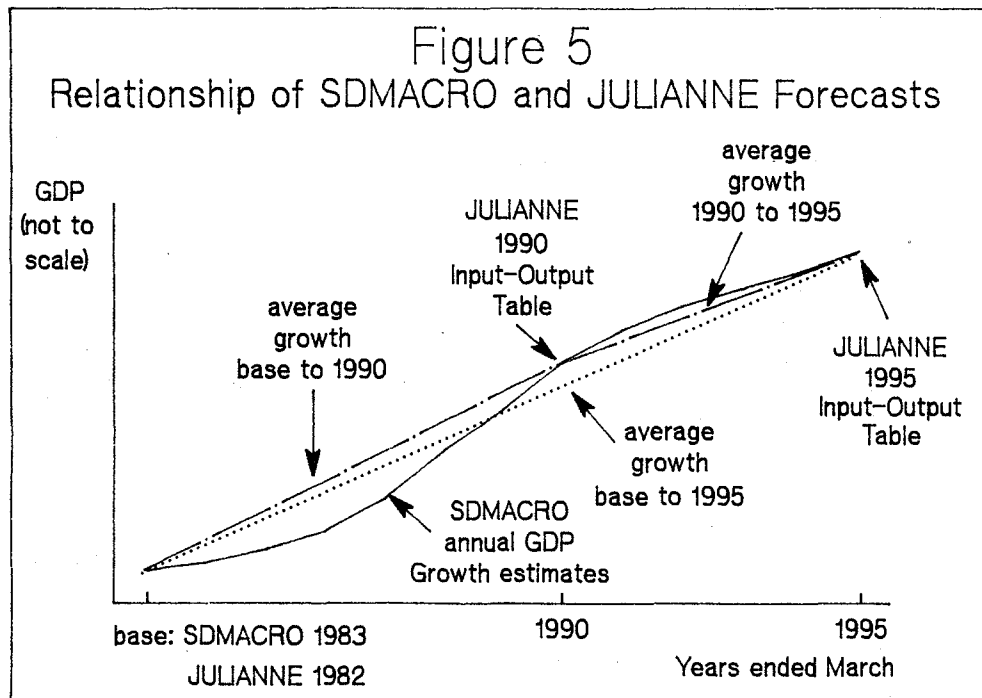
	Initial Values (1983)	Final Values (1995)		
		Base Case	Pessimistic Scenario	Optimistic Scenario
Real GDP				
- Value (1983 \$000m)	32.0	46.0	37.5	51.8
- Growth Rate, 83-95 (% p.a.)	-	3.1	1.3	4.1
Real GDP per capita				
- Value (1983 \$000)	9.9	12.9	10.9	14.1
- Growth rate, 83-95 (% p.a.)	-	2.2	0.8	3.0
Real Investment/GDP ratio (%)	22.5	18.7	14.0	25.0
Population				
- no. (000)	3230	3579	3426	3680
- Growth rate, 83-95 (% p.a.)	-	0.86	0.49	1.09
Total net migration between 1983-95 (000)	0	53	-100	154
Employment no. (000)	1300	1622	1483	1707
Unemployment rate (%)	5.5	1.8	4.9	0.3
Real Exchange Rate	100	99	99	99
Terms of Trade	100	94	84	106
Real Exports of Goods & Services				
- Value (1983 \$000m)	9.4	15.1	11.8	19.3
- Growth rate, 83-95 (\$ p.a.)	-	4.0	1.9	6.2
Current account balance/GDP ratio (%)	-5.3	-2.1	-4.7	-0.1

4. ROLE OF SDMACRO IN THE NATIONAL SECTORAL PROGRAMME

THE PURPOSE OF THE NZ PLANNING COUNCIL'S NATIONAL SECTORAL PROGRAMME IS TO PROVIDE A GENERAL INDICATION OF THE LIKELY SECTORAL AND NATIONAL DEVELOPMENT PATH OF THE NEW ZEALAND ECONOMY SOME FIVE TO TEN YEARS IN THE FUTURE. THE PROGRAMME, WHICH IS DISCUSSED FULLY IN THE REPORT OF THE NATIONAL SECTORAL WORKING GROUP (1986), COMPRISES THREE MAJOR ELEMENTS:

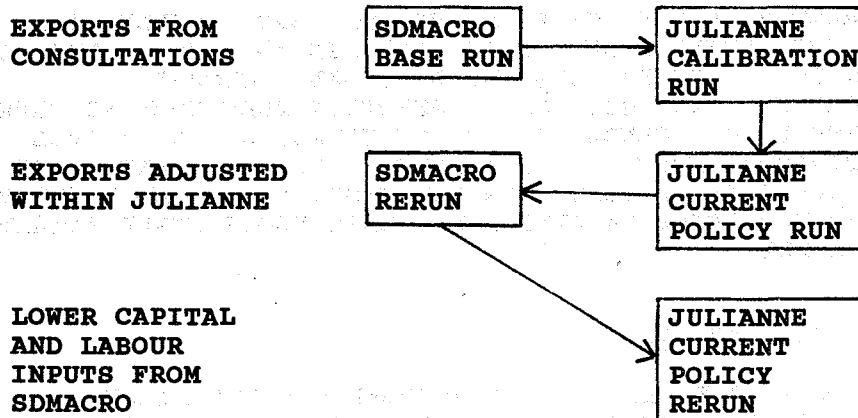
- A PROGRAMME OF RESEARCH AND CONSULTATIONS WITH A RANGE OF SECTORAL ORGANISATIONS IN BOTH THE PRIVATE AND PUBLIC SECTORS TO PROVIDE QUALITATIVE AND QUANTITATIVE INFORMATION FOR THE MODEL RUNS.
- A SYSTEM DYNAMICS MODEL, SDMACRO, DESIGNED TO PRODUCE MEDIUM TERM TREND VALUES OF THE MAJOR MACRO-ECONOMIC VARIABLES.
- A NON-LINEAR GENERAL EQUILIBRIUM MODEL, JULIANNE, WHICH GENERATES COMPATIBLE SECTORAL AND NATIONAL PROJECTIONS OF A RANGE OF VARIABLES INCLUDING OUTPUT, EXPORTS AND EMPLOYMENT FOR EACH OF 22 SECTORS FOR NOMINATED FUTURE YEARS.

THE RELATIONSHIP BETWEEN THE PROJECTIONS GENERATED BY SDMACRO AND JULIANNE IS ILLUSTRATED IN FIGURE 5. SDMACRO PROVIDES A CONTINUOUS GROWTH PATH FOR SELECTED MACRO-ECONOMIC VARIABLES, E.G. GDP, EMPLOYMENT AND INVESTMENT UP TO 1995 FROM A BASE YEAR OF 1983, WHEREAS JULIANNE PROVIDES "SNAP SHOTS" OF TWO FUTURE TIME PERIODS, 1990 AND 1995, FROM A BASE YEAR OF 1982.



SOURCE: NATIONAL SECTORAL WORKING GROUP, 1986, P22.

FIGURE 4
SEQUENCE OF MODEL RUNS



THE SDMACRO BASE RUN IS USED WITH INFORMATION FROM THE SECTORAL CONSULTATIONS TO CONSTRAIN THE JULIANNE CALIBRATION RUN. IN THIS RUN JULIANNE IS REQUIRED TO REPLICATE IN 1990 AND 1995 SDMACRO FIGURES FOR EMPLOYMENT, THE REAL EXCHANGE RATE, THE TERMS OF TRADE, THE BALANCE OF TRADE AND TOTAL EXPORTS; TO WORK WITHIN A TOTAL CAPITAL STOCK WHICH IS COMPATIBLE WITH THE SDMACRO TIME PROFILE OF CAPITAL FORMATION; AND TO APPROXIMATE THE INVESTMENT TO GDP RATIO IN SDMACRO IN THE NOMINATED YEARS. IN ADDITION JULIANNE IS REQUIRED TO REPLICATE SECTORAL EXPORT GROWTH RATES AND SECTORAL RATES OF DEPRECIATION AND TECHNICAL CHANGE AS DERIVED FROM THE CONSULTATIONS. THE MAJOR RESULTS OF THIS CALIBRATION RUN INDICATE THAT TO SECURE THE LEVEL OF EXPORTS FORESEEN IN THE SECTORAL CONSULTATIONS THE MODEL REQUIRES SUBSTANTIAL INCREASES IN EXPORT SUBSIDIES ABOVE THE LEVEL PREVAILING IN 1981/82 AND TO SECURE A LEVEL OF IMPORTS COMPATIBLE WITH THE SDMACRO TRADE BALANCE REQUIRES THE REMOVAL OF ALL TARIFF PROTECTION.

HOWEVER, TO PRODUCE RESULTS MORE CONSISTENT WITH THE CURRENT POLICY SETTINGS IN NEW ZEALAND, THE JULIANNE CURRENT POLICY RUN REQUIRED FOUR MAJOR CHANGES FROM THE CALIBRATION RUN: THE MODEL IS TOLD THAT NO SUBSIDIES ARE TO BE PAID ON EXPORTS; FOR COMPETING IMPORTS TARIFF EQUIVALENTS ARE TO BE REDUCED TO A MAXIMUM OF 25 PERCENT AND TARIFFS ON NON-COMPETING IMPORTS ARE TO BE REDUCED TO ZERO; AND TO ENABLE THE MODEL TO DETERMINE ITS OWN EXPORT PRICES, THE SDMACRO CONSTRAINTS ON TERMS OF TRADE AND THE REAL EXCHANGE RATES ARE REMOVED. THIS RUN RESULTED IN LOWER EXPORT GROWTH RATES AND A LOWER RATIO OF IMPORTS TO GDP. IN THE RERUN SDMACRO IS REQUIRED TO REPLICATE JULIANNE'S PROJECTIONS IN 1990 AND 1995 FOR THE TERMS OF TRADE, REAL EXCHANGE RATE, AND REAL EXPORTS OF GOODS AND SERVICES. THE LOWER LEVELS OF EMPLOYMENT AND INVESTMENT GENERATED BY THE RERUN OF SDMACRO ARE USED TO CONSTRAIN A FURTHER RUN OF JULIANNE. AT THIS STAGE THE SECTORAL IMPLICATIONS OF THE RUNS OUTLINED ABOVE WERE EXAMINED AND SOME FURTHER POLICY EXPERIMENTS WITH JULIANNE UNDERTAKEN.

5.0 FURTHER DEVELOPMENTS TO SDMACRO

CURRENTLY SDMACRO IS BEING UPDATED AND EXTENDED FOR FURTHER MEDIUM TERM POLICY ANALYSIS AS PART OF THE NZ PLANNING COUNCIL'S ONGOING NATIONAL SECTORAL PROGRAMME. THE GDP POLICY REACTION FUNCTION HAS BEEN EXPANDED TO INCLUDE THE POLICY IMPACT OF NZ'S LEVEL OF OVERSEAS DEBT AND NZ'S PRICE LEVELS COMPARED WITH INTERNATIONAL LEVELS. IN ADDITION, NZ'S DOMESTICALLY GENERATED PRICE INFLATION HAS BEEN ENDOGENIZED WITHIN THE MODEL.

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