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EXPORTING VERSUS IMPORT SUBSTITUTION IN NEW ZEALAND – A GENERAL EQUILIBRIUM ANALYSIS

by

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Abstract

Policies encouraging exporting activities, such as New Zealand's tourism marketing campaign, continue to be the norm across many economies. However, domestic industries that efficiently compete in the domestic market against imported products are usually overlooked. The New Zealand government is considering boosting funding for the *Buy NZ* campaign. This campaign can be viewed as encouraging import substituting activities as it aims to influence domestic consumer preferences between domestically produced and imported items. The rationale for such a campaign can be assessed by analysing the benefits of import substitution activities relative to those of exporting activities. This paper assesses these benefits using a 49 industry general equilibrium model of the New Zealand economy. Benefits assessed include the impact on consumption, employment and GDP.

JEL : F10 - International economics, trade, general; C68 - Computable general equilibrium models.

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EXPORTING VERSUS IMPORT SUBSTITUTION IN NEW ZEALAND – A GENERAL EQUILIBRIUM ANALYSIS

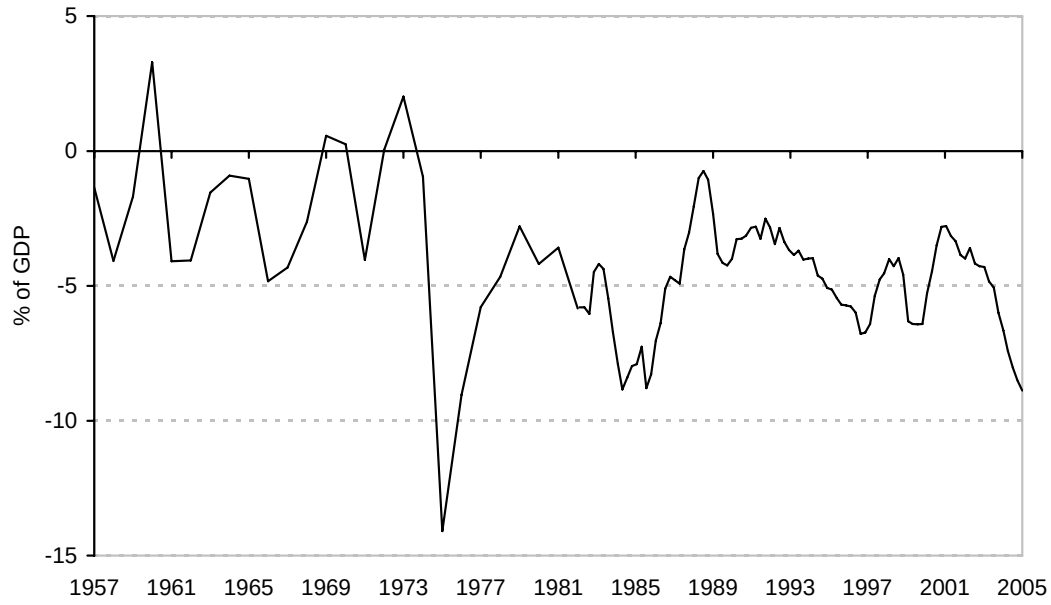
1 Introduction

New Zealand economic endeavour continues to be dominated by the export of primary commodities. Although many of these commodities are now processed beyond the stage of raw produce, the primary resource base of New Zealand's exporting activities remains.

Of the $29.2 billion of merchandise export receipts[1] in the 2005 calendar year, more than $16.6 billion was accrued from dairy, meat, fish, forestry, horticultural and wool products. A further $1 billion was obtained from the base metals aluminium commodity. The strive to "add more value" to New Zealand's raw commodity exports remains fundamental to many economic statements and policy proposals. These statements and proposals have taken many forms over several years. They have ranged from a focus on efficiency, productivity and input cost control, to the need to invest in new equipment and technology. Latterly, the government's stated drive is for an "economic transformation".

However, in a nutshell, New Zealand business and economic enterprise remains focussed on the need generate foreign exchange. New Zealand's long-standing current account deficit on its balance of payments (see Figure 1.1) testifies to the need for this focus.

Figure 1.1 New Zealand BoP current account deficit: as a % of nominal GDP



[1] FoB value.

As a result, export promotion continues to be accepted as a necessary focus for New Zealand business. Recently, during government negotiations following last year's election, arguments to re-energise the *Buy NZ* programme have surfaced. In an economic sense, import substitution activities can be equivalent to export activities as long as relevant conditions are met.

However, advocates for import substitution have been relatively easily dismissed in the past. This has been due to an erroneous focus on job creation and the use of simplistic arguments derived from input-output multipliers. The robustness of the arguments in favour of a *Buy NZ* programme is further questioned when they have failed to acknowledge the limitations of such multiplier analysis. In particular, assumptions of no change in relative prices and of unlimited resource availability reinforce the partial nature of such analysis.

However, the importance of addressing the need to earn, and conserve, foreign exchange suggests potential policy options should not be so easily dismissed. To more rigorously assess the impact of import substitution programmes, general equilibrium analysis[2] should be undertaken. This is the subject of this paper.

[2] That is, in contrast to the partial equilibrium concepts of input-output analysis.

2 The model

2.1 Overview

The BERL computable general equilibrium (CGE) model of the New Zealand economy separately identifies 49 industries, 22 export commodities, eight household consumption commodities and 40 different occupation categories.

The model has its origins in the models developed by the Project on Economic Planning at Victoria University of Wellington in the early-1980s. Early applications focussed on trade policy questions, with simulations of tariff removals and GATT outcomes contributing to the "gains to free trade" argument prevalent at that time.

Originally based on the *ORANI* (Dixon *et al.*, 1982) model of the Australian economy, its structural framework is similar, arising from input-output relationships. Since then BERL has maintained and further enhanced the model as well as applied it to investigate numerous issues.[3] The latest version of the core model is based on the official *Statistics New Zealand* 1995/96 input-output data updated by BERL to a 2004/05[4] base year. This model can be used to simulate the effect of a policy, world price, world demand, productivity and/or behavioural shock and solves for the equilibrium outcome in a future snapshot year.[5]

A CGE model is a standard and widely used tool to investigate the impacts of economic shocks or events, or to measure the contribution of sectors or industries to the wider economy. The model captures the inter-relationships within industries, between exports, imports and consumption as well as their combined resource requirements.

The model follows standard neo-classical assumptions of market-clearing prices, profit-maximising firms and utility-maximising consumers. Its equilibrium is determined by the relative prices of production factors (resources) and outputs adjusting to ensure supply

[3] For examples of the model's application, see BERL and AERU (2003) and BERL (2003). Applications using a variant, modelling both the New Zealand and Australian economies, is described in Nana and Poot (1996) and Nana et al (1995).

[4] March years.

[5] A dynamic (or inter-temporal) version has also been developed (Nana, 2000), which enables the path of an economy over time to be modelled. Comparing a baseline path to one that incorporates the response to a shock(s) enables comparative dynamic (as opposed to comparative static) analysis to be undertaken. A key assumption within this framework is in incorporating cost(s) involved in the adjustment path as the economy moves towards its general equilibrium. In particular, there are costs (and limits) involved in redirecting investment from one industry to another. The static CGE model implicitly assumes costless transition over time – or that the snapshot year is sufficiently far in the future for these costs to be negligible.

equals demand in each of these markets.[6] In addition, embedded in the production structure of firms is the standard assumption of zero pure (economic) profits.

Policy simulations or experiments can be undertaken within alternative macroeconomic environments. The assumptions adopted to enforce a particular macroeconomic closure should be interpreted as relevant *ceteris paribus* assumptions.

The detailed model structure closely follows Dixon, *et al*. (1982) and is also noted in Poot, *et al*. (1988). A summary of key elements is provided below.

2.2 Key model structure

The separately identified industries in the model are listed in Table 6.1 in the appendix, along with their relevant ANZSIC[7] code.

Each industry produces a single output via a production function requiring a fixed combination of intermediate and primary factor inputs. At the secondary level, each intermediate input is a mixture of a domestically produced item and its imported equivalent. Producers can substitute between these two sources for each intermediate input in response to shifts in the relative price of each according to a CES[8] mixing function. Substitution elasticities are less than infinite to reflect, in part, the degree of aggregation as well as technological limits to such substitution. Similarly, the primary factor input comprises a CRESH[9] function, mixing 40 different types of labour and one physical capital resource.

Each industry's output is either sold to other industries for use as intermediate inputs, or sold to meet final demand agents. The classification of imports is such that the output of each domestic industry competes against one imported equivalent item, subject to the substitution elasticity noted above.

Final demand agents comprise other industries for the production of investment goods, domestic households for consumption, foreign demand for export and government.

Investment good production involves a similar CES mix of imported and domestic inputs. Aggregate investment is exogenous to the model, either as a fixed amount or as a set ratio

[6] That is, all factor and output markets.

[7] Australia and New Zealand Standard Industrial Classification 1996 (Rev 2).

[8] Constant Elasticity of Substitution.

[9] Constant Ratio of Elasticity of Substitution Homothetic.

to GDP. However, investment activity is allocated across industries endogenously, so as to equate expected rates of return.

Households allocate their income according to a LES[10] function across a consumption basket containing eight consumer categories. Again, within each of these categories, consumers can shift between domestically made items and their imported equivalents in response to relative price changes given the constraints of a CES function. Aggregate consumption is linked to household income, which is predominantly determined by employment income.

Government consumption demand is exogenous to the model, either at a set figure, or at a specified ratio of GDP.

Exports are modelled as facing a less than perfectly elastic demand curve. As such, foreigners demand more or less from New Zealand sources depending on the relative price competitiveness of New Zealand-made products *vis-à-vis* products from elsewhere. Differing elasticities amongst the commodities reflect, in part, aggregation as well as non-market barriers to the expansion of export sales. In general, New Zealand exporters of primary commodities such as dairy and meat face steeper demand curves than manufactures and service exporters.

The BERL CGE model is maintained, updated and solved using *GEMPACK*[11] modelling software.

Table 6.1 to Table 6.4 in appendix section 6 list the various categories of industries, consumption, exports and labour types incorporated in the model, along with a selection of base year data.

The model results presented in the following section should be interpreted in the sense of a set of comparative static experiments. The modelled outcomes are listed as changes in various economic measures caused by the shock under consideration.

[10] Linear Expenditure System.

[11] Pearson (1988).

3 Simulation experiments

As discussed above, the objective of these experiments was to assess the comparative impacts of exporting versus import substitution. To calibrate the experiments, simulations modelled the impact of an across-the-board 5% increase in demand for all New Zealand's exports. Such a shock should be interpreted as a 5% horizontal shift in the demand curve facing all New Zealand's export goods and services.

These were compared to experiments modelling a shift in consumer preferences against imports and towards their domestic equivalents. This shift is modelled as an *ex-ante* shift in the import proportion of domestic consumption spending. This preference or taste shift is set to a magnitude such that the resultant *ex-post* change in the trade balance is equivalent to that achieved in the comparable export demand shock.

These 'pairs' of simulations were conducted under a variety of macroeconomic environments.

3.1 Constrained productive resources environment

The factor market closure for the first set of experiments assumes no change in the aggregate level of productive resources[12] employed – although resources can be reallocated across industries. The macro outcomes under this environment are listed in Table 3.1.

The experiment labelled *sim01* reflects the results of a favourable shift in export demand, while that labelled *sim02* lists the outcome of a shift in consumer preferences against imports and towards their domestic equivalents. In this case, the preference or taste shift is of a magnitude such that the resultant change in the trade balance is equivalent to that achieved in *sim01*.

Given the assumed macroeconomic environment of no additional resources, overall activity as measured by GDP remains close to unchanged in response to the export demand shift. The gains from this shock are exhibited through higher real incomes, as reflected in higher wage rates, which consequently results in higher consumption levels being enjoyed.

Furthermore, the increased cost of New Zealand-made products has reduced their attractiveness relative to imported items. The consequent price-induced shift to imports

[12] That is, labour and capital stock.

results in a noticeable increase in the import ratio. This is reflected in the recorded increase in imports being much higher that that for overall GDP.

Table 3.1 Model results with fixed productive resources environment

	Export demand shift	Taste shift against consumer imports
experiment label	*sim01*	*sim02*
% change		
Real GDP	0.1	0.3
Household consumption	0.3	0.4
Export volume	0.5	-0.6
Imports	1.4	-0.6
Labour employed	*0.0*	*0.0*
Capital stock employed	*0.0*	*0.0*
Consumer prices	1.1	-0.3
Mean wage rate	1.5	0.2
Trade balance		
absolute change $m	123	123

In a similar resource-constrained environment, but faced with a consumer preference shift away from imports, gains are again reflected through higher incomes and higher consumption levels. The difference here, though, is that resources are shifted away from exports, and towards domestic production activity, consistent with the increased demand for domestically produced items. The preference-induced shift away from imports is clearly reflected in the result through aggregate imports declining despite an overall rise in activity as measured by real GDP.

3.1.1 Industry effects

Alternatively, with the higher demand for resources under the export demand shock, relative production costs rise, for example, as reflected in higher wage rates. This cost increase shifts resources to those export commodities that are more able to compete overseas – i.e. those facing more inelastic demand curves.

This is reflected in the sector summary listed in Table 3.2. Table 3.2 shows that traditional exports that have a more established customer base – like dairy and meat products – gain at the expense of manufactured exports and tourism which are less able to differentiate their products. This impact flows through into the employment results, with employment in metal

products and machinery being some 1.2% lower in order to release sufficient resources to enable the export industries to meet the export demand shock.

On the other hand, the consequences of the change in consumer preferences appear more balanced across sectors. In this instance lower export activity occurs across all categories. However, the employment shifts are not as great as those recorded in *sim01*. At the more detailed level, sector output and employment results do show a slight shift towards services, and away from goods sectors. This is consistent with the overall shift from exporting activity towards production for the domestic market, although the shifts remain of a small order of magnitude when compared to those registered in the export demand shock.

Table 3.2 Sector summary with fixed aggregate resources environment

	Export demand shift	Taste shift against consumer imports
experiment label	*sim01*	*sim02*
% change		
Export volumes		
Dairy products	3.7	-0.2
Meat products	3.6	-0.2
Horticulture	2.4	-0.4
Logs, wood and paper	-1.3	-0.9
Other primary commodities	0.2	-0.6
Other goods	-0.7	-0.8
Tourism	-0.9	-0.8
Other services	-1.5	-0.9
Sector employment		
Agriculture	1.5	-0.2
Other primary	-0.6	-0.3
Food, beverages & tobacco	0.6	-0.2
Metal products & machinery	-1.2	-0.3
Other manufacturing	-0.6	-0.2
Building and construction	0.3	0.1
Trade, restaurants & hotels	0.0	0.0
Transport & communication	-0.3	-0.1
Finance & business services	-0.2	0.0
Govt, education and health	0.0	0.2
Other services	0.1	0.0

3.2 Excess labour resource environment

Moving away from the fully resource-constrained environment, Table 3.3 lists the results of a pair of experiments undertaken assuming that excess labour is available. To activate this assumption in modelling terms requires an accompanying assumption that real wage rates remain unchanged as a result of the shocks being modelled. The two simulations here are labelled *sim03* and *sim04* being, respectively, the export demand shock and the consumer preference shift.

Given an environment where excess labour is available, gains from a favourable export demand shock are reflected through both higher GDP and higher consumption. The former arises directly from the availability of additional productive resources, while the latter occurs due to higher aggregate income resulting from additional employment. The increased cost of New Zealand-made products – reflected, in part, by the rise in nominal wages – has reduced their attractiveness *vis-à-vis* imports. Consequently, the import ratio rises noticeably as producers and consumers shift to relatively cheaper imports for their intermediate inputs and consumer products.

Table 3.3 Model results with excess labour environment

	Export demand shift	Taste shift against consumer imports
experiment label	*sim03*	*sim04*
% change		
Real GDP	0.5	0.7
Household consumption	0.7	0.8
Export volume	1.0	0.0
Imports	1.7	-0.3
Labour employed	0.8	0.9
Capital stock employed	*0.0*	*0.0*
Consumer prices	1.0	-0.5
Mean wage rate	0.9	-0.5
Trade balance absolute change $m	153	153

Where consumer preferences shift away from imports in an environment where excess labour is available, similar gains are experienced. Both higher overall GDP and household consumption levels are enjoyed.

However, the noticeable difference between these two simulations is the impact on export activity. In the absence of the requirement to expand exports, resources are shifted, in a relative sense, to producers servicing the domestic market. Without heightened pressures on resources New Zealand production costs are lower, which accentuates the shift away from imports. Thus the preference-induced shift to imports is supplemented by a price-induced shift away from imports as well. Thus the 0.8% increase in consumption levels accompanies a 0.3% fall in imports.

Of further note in this pair of experiments is the consequence of the assumed closure environment. That is, by assuming only excess labour is available but, at the same time, imposing a constrained aggregate physical capital environment implicitly favours relatively labour intensive activities. In general, service-oriented and manufacturing sectors are relatively more labour intensive compared to primary commodity and related industries. Furthermore, services and manufacturing in New Zealand are relatively less export-oriented than their primary counterparts.

Thus, *a priori*, this closure environment would be expected to favour the preference shift to imports shock compared to the export demand shock. This expectation is confirmed by these model experiments, with the impact on GDP, consumption levels and employment being greater in *sim04* compared to *sim03.*

Note the magnitude of the gains in *sim04* compared to *sim03* is constrained by the experiments being calibrated to ensure the same impact on the trade balance.

3.2.1 Industry impacts

The two shifts discussed above – i.e. away from export activities towards domestic-focussed sectors and towards relatively labour intensive activities – are reflected in the sector employment results for these two experiments listed in Table 3.4.

The most noticeable result here is that for the metal products & machinery sector. This is a relatively labour intensive industry as well as providing for domestic final demand.[13] In *sim03*, despite the favourable export demand shock, this industry is unable to successfully compete for resources with other more export-oriented sectors.[14] Consequently, the metal products & machinery sector records lower employment in the face of the demand shock. In

[13] Base year data shows that 66% of final demand sales for this sector is for domestic expenditure, with 34% destined overseas.

[14] For example, the agriculture and food, beverage & tobacco sectors. The latter sector includes food processing activities, which output much of New Zealand's meat and dairy products for export.

contrast, the preference shift against imports shock is more favourable for this sector. Thus, the impact on employment in the metal products & machinery sector is noticeably positive in *sim04* and in line with the aggregate impact on employment.

Note the employment gain in the food, beverages & tobacco sector in the face of the preference shift against imports is the smallest of all the sectors listed. This is consistent with the strong export focus for this sector.[15]

Table 3.4 Sector summary for excess labour environment

	Export demand shift	Taste shift against consumer imports
experiment label	*sim03*	*sim04*
	% change	
Sector employment		
Agriculture	2.4	0.8
Other primary	0.4	0.9
Food, beverages & tobacco	1.2	0.5
Metal products & machinery	-0.3	0.8
Other manufacturing	0.2	0.8
Building and construction	1.1	1.0
Trade, restaurants & hotels	0.8	0.9
Transport & communication	0.7	0.9
Finance & business services	0.7	1.0
Govt, education and health	0.7	0.9
Other services	0.9	1.0

3.3 Excess resources environment

Table 3.5 lists the results of experiments where it is assumed that both excess labour and physical capital resources are available. Effectively, this environment counters the bias of the previous two experiments, which favours labour intensive activities. Two simulations here are labelled *sim05* and *sim06* being, respectively, the export demand shock and the consumer preference shift. A third experiment under this environment is also listed in Table 3.5, labelled *sim07*. This simulates a preference shift away from imports where additional resources are available, but the increases in resources are constrained in aggregate to be of the same magnitudes as those recorded in experiment *sim05*.

[15] Base year data for this sector shows 66% of final demand sales are destined for exports.

Turning to the export demand shock, given an environment with no constraint on resource availability again leads to gains in both higher GDP and higher consumption. As expected, unconstrained resource availability leads to exporters taking maximum advantage of the favourable shock by expanding output and sales by the full amount of the 5% shift in export demand. Consequently, the additional employment and income ensures higher consumption spending can also be enjoyed. Given such an unconstrained environment, it is not surprising that this experiment yields the greatest positive impacts from an export demand shock compared to those under alternative environments (i.e. *sim01* and *sim03*).

Notably, the utilisation of resources expands in a balanced manner in that both labour and capital increase by similar magnitudes in the face of this shock. This suggests that the composition of export activity is neither relatively labour intensive nor relatively capital intensive.

Table 3.5 Model results with excess resources available

	Export demand shift	Taste shift against consumer imports	Taste shift but with K and L fixed as per *sim05*
experiment label	*sim05*	*sim06*	*sim07*
% change			
Real GDP	3.1	3.5	3.3
Household consumption	2.2	2.6	2.3
Export volume	5.0	3.3	3.8
Imports	3.2	0.8	1.2
Labour employed	3.2	3.6	3.2
Capital stock employed	3.1	2.7	3.1
Consumer prices	0.0	-1.6	-1.4
Mean wage rate	0.1	-1.6	-1.3
Trade balance absolute change $m	856	856	856

In an unconstrained resource environment, a consumer preference shift away from imports results in greater gains than those for the comparable export demand shock. Both higher overall GDP and household consumption levels are enjoyed.

The key difference between these two simulations (*sim06* compared to *sim05*) is the resource utilisation outcome. While *sim05* sees both labour and capital expand by similar magnitudes, the preference shift experiment (*sim06*) sees a clear shift to labour intensive activities. This implies that activities selling to the domestic market, and so favoured by the

preference shift away from imports, are relatively more labour intensive than the more export focussed activities.

To further confirm the labour intensive nature of activities focussed on domestic sales, *sim07* is presented. This experiment constrains the additional resources to be the same as in the more balanced *sim05* outcome. Consequently, the gains experienced by the preference shift shock are reduced as the availability of labour is not as large as in *sim06*.

Nevertheless, the higher GDP and consumption levels enjoyed remain marginally greater than those resulting from the export demand shock. This marginal difference can be traced to the greater balance in expansion across activities resulting from this shock. That is, the export demand shock has the effect of concentrating resources and activity to exporting. On the other hand, the preference shift shock allows resources to be distributed across both exporting and domestically focussed activities.

3.3.1 Industry impacts

As before, the difference in outcome between exporting and domestic sales activity in *sim07* compared to *sim05* is also reflected at the industry level, as listed in the sector summary Table 3.6. For example, the metal products & machinery and other manufacturing sectors are more favoured by the preference shift against imports, while the agriculture and food, beverages & tobacco sectors fare relatively better in the face of an export demand shock.

The differences in impact across the products in the consumption basket reflect, in part, the various income elasticities of the household consumer. In particular, the low income elasticity for food results in a muted effect on its consumption. In contrast, income-elastic groups like transportation[16] and apparel enjoy relatively greater gains in the face of both shocks.

[16] Including, for example, a large component of the holiday budget.

Table 3.6 Sector summary with excess resources environment

	Export demand shift	Taste shift against consumer imports	Taste shift but with K and L fixed as per *sim05*
experiment label	*sim05*	*sim06*	*sim07*
% change			
Export volumes			
Dairy products	5.0	0.9	1.1
Meat products	5.0	1.0	1.1
Horticulture	5.0	1.9	2.2
Logs, wood and paper	5.0	4.3	5.4
Other primary commodities	5.0	3.5	4.1
Other goods	5.0	4.2	4.8
Tourism	5.0	4.4	5.0
Other services	5.0	4.9	5.6
Real consumption			
Food	1.2	1.3	1.1
Housing	1.8	2.0	1.8
Household operation	2.6	2.9	2.6
Apparel	3.2	4.1	3.4
Transportation	3.5	4.6	3.8
Tobacco and alcohol	2.5	2.6	2.4
Other goods	1.5	1.9	1.6
Other services	2.2	2.3	2.1
Sector employment			
Agriculture	4.0	2.7	2.3
Other primary	3.7	4.3	4.0
Food, beverages & tobacco	3.5	2.8	2.7
Metal products & machinery	3.5	4.7	4.5
Other manufacturing	3.4	4.1	3.9
Building and construction	3.1	3.4	2.9
Trade, restaurants & hotels	3.0	3.5	3.1
Transport & communication	3.7	4.2	3.9
Finance & business services	3.1	3.8	3.2
Govt, education and health	3.0	3.5	3.2
Other services	2.9	3.3	2.8

4 Conclusions

The modelling results show the importance of the macroeconomic environment when assessing the relative impact of an export demand shock compared to a preference shift away from imports. For policy purposes, this finding reinforces the need to clarify the macro environment within which any analysis is undertaken. In other words, assumptions incorporated within the *ceteris paribus* condition – whether implicit or explicit – can make a considerable difference to the analysis of policy proposals under investigation.

As expected, where resources are constrained gains are limited to higher real wages and thereby higher incomes and consumption levels. However, if excess (or underutilised) resources are available for allocation, gains become more pronounced through greater employment and overall activity as measured by real GDP.

In the New Zealand context, the comparative results also confirm that activities focussed more on sales to the domestic market are relatively more labour intensive than those that are predominantly export oriented. Thus, where labour availability is not constrained the shock shifting preferences away from imports fares better than a comparable export demand shock. However, the difference in magnitudes is not large.

It is clear, though, that export encouragement and import substitution have similar outcomes at the macro level and there appears no *a priori* reason for one policy option to be favoured over the other. However, at the micro level there remain considerable differential impacts. These differences depend primarily on the relative factor intensity of industries as well as their relative export, versus domestic, sales focus.

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6 Model classifications and base data

Table 6.1 Industry classifications in BERL CGE model

#	Industry	ANZSIC	Base year gross output 2005 $m
1	Horticulture and fruit growing	A011	2,498
2	Mixed livestock and cropping	A0121, A0122, A01591	1,032
3	Sheep and beef cattle farming	A0123-A0125	1,368
4	Dairy cattle farming	A013	5,226
5	Other farming and services to agriculture, hunting & trapping	rest A01, A02	2,706
6	Forestry & logging	A03	3,412
7	Commercial fishing	A04	821
8	Coal mining	B11	262
9	Oil & gas extraction and exploration	B12, B1511, B1512	1,045
10	Other mining & quarrying and services to mining	B13, B14, B1514, B1520	766
11	Meat processing	C2111	7,903
12	Dairy product manufacturing	C212	11,867
13	Other food processing & mfg	rest C21	11,383
14	Textiles, clothing, footwear & leather mfg	C22	3,930
15	Log sawmilling, timber dressing & other wood product mfg	C231, C232	4,462
16	Paper and paper product mfg	C233, C239	4,581
17	Printing, publishing & recorded media	C24	4,488
18	Petroleum	C251, C252	1,995
19	Chemical and chemical product mfg	C253, C254	5,458
20	Rubber and plastic product mfg	C255, C256	2,913
21	Non-metallic mineral product mfg	C26	2,849
22	Basic metal manufacturing	C271-C273	2,724
23	Structural, sheet and fabricated metal product mfg	C274-C276	4,526
24	Machinery and equipment mfg	C28	12,781
25	Other manufacturing	C29	2,445
26	Electricity generation	D361pt	1,944
27	Electricity transmission & supply	D361pt	5,068
28	Gas supply	D362	907
29	Water supply	D3701	831
30	Construction	E	30,083
31	Wholesale & retail trade	F, G	42,972
32	Accommodation, cafes & restaurants	H57	5,440
33	Road transport	I61, I661	5,450

34	Water and rail transport	I62, I63, I662	2,595
35	Air transport, services to transport, storage	I64, I65, I663,I664, I67	8,712
36	Communication services	J71	7,525
37	Finance and insurance	K	15,340
38	Ownership of owner-occupied dwellings	L771190pt	13,049
39	Other property services	rest L77	10,928
40	Scientific research & technical services	L781, L782	3,933
41	Computer services	L783	2624
42	Legal, accounting & other business services	L784-L786 (xL7865-66)	13,178
43	Govt administration & defence	M, Q9631-Q9633	15,239
44	Pre-school, primary, secondary & other education	N84 (xN843) O871	5,407
45	Post-school education	N843	2,404
46	Hospitals, nursing homes, aged accommodation & other community care	O861, O872	6,935
47	Medical, dental and other health services	rest O86	3,481
48	Cultural and recreational services	P	6,430
49	Personal and other services, pest control and cleaning services, waste disposal & sewerage services	D3702, L7865-66, Q (excl Q9631-Q9633)	4,411
		TOTAL	**318,330**

Table 6.2 Consumption commodity categories in BERL CGE model

#	Consumption category	Base year spending 2005 $m
1	Food	16,821
2	Housing	16,378
3	Household operation	11,919
4	Apparel	3,469
5	Transportation	12,920
6	Tobacco and alcohol	4,262
7	Other goods	7,779
8	Other services	13,978
	TOTAL	**87,530**

Table 6.3 Export commodity categories in BERL CGE model

#	Export commodities	Base year exports 2005 $m
1	Dairy	7,324
2	Meat	4,452
3	Wool	1,268
4	Horticulture	2,182
5	Fish	1,322
6	Other food, beverages and tobacco	2,211
7	Textiles	1,784
8	Logs	829
9	Wood	1,033
10	Paper	1,410
11	Oil products	205
12	Other chemical products	2,805
13	Coal	85
14	Minerals	325
15	Ceramics	63
16	Base metals	1,713
17	Fabricated metal products and machinery	2,824
18	Other manufactures	207
19	Tourism	7,711
20	Transportation	1,916
21	Education	350
22	Other services	1,124
	TOTAL	**43,142**

Table 6.4 Labour occupation types in BERL CGE model

#	Occupation	NZSCO[17]	Base year employment (2005 FTEs[18] 000s)
1	Legislators and administrators	11	3.8
2	Corporate managers	12	218.6
3	Physicists, chemists, mathematicians and related professionals, life science professionals	211, 212, 221	8.4
4	Computing professionals	213	17.0
5	Architects, engineers and related professionals	214	32.1
6	Health professionals, nursing & midwifery	222, 223	50.1
7	Tertiary teaching professionals	231	16.4
8	Other teaching professionals	232-235	64.1
9	Business professionals	241	50.6
10	Legal professionals	242	11.9
11	Other professionals	243-245	19.6
12	Physical science and engineering technicians, life science technicians and related	311, 321	27.7
13	Computer equipment controllers	312	10.7
14	Optical and electronic equipment controllers	313	7.2
15	Ship and aircraft controllers and technicians	314	4.3
16	Health associate professionals	322, 323	13.6
17	Finance, sales and administrative associate professionals	331, 332	85.6
18	Government and social work associate professionals, careers and employment advisors	333, 334, 335	24.8
19	Safety and health inspectors, environmental protection and other associate professionals	315, 337, 338	6.2
20	Writers, artists, entertainment and sports associate professionals	336	29.7
21	Office clerks	41	162.0
22	Customer services clerks	42	61.9
23	Travel attendants and guides	511	5.2
24	Housekeeping and restaurant services workers	512	57.0
25	Personal care and other personal service workers	513, 514	52.5
26	Protective services workers	515	25.8
27	Salespersons, demonstrators and models	52	118.3
28	Farmers, growers and animal producers	611-612	117.2
29	Forestry and related workers	613	6.7
30	Fishery workers, hunters and trappers	614	4.3

[17] New Zealand Standard Classification of Occupations, 1999.

[18] Full-time equivalents

31	Building trades workers	71	91.1
32	Metal and machinery trades workers	72	53.1
33	Precision trades workers	73	12.1
34	Other craft and related trades workers	74	20.7
35	Industrial plant operators, stationary machine operators	81, 82	95.7
36	Railway engine drivers, ships deck crews and related workers	831, 834	2.2
37	Motor vehicle drivers	832	39.7
38	Agricultural, earthmoving and other materials handling equipment operators	833	15.8
39	Building and related workers	84	9.5
40	Labourers and related elementary service workers	91	98.6
		TOTAL	**1,751.7**