Economic Impacts of Rotorua Nitrogen Load Reduction

District, Regional and National Evaluation

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Agenda

- Background (3 slides)
- Range of possible economic impacts and scenarios considered (3 slides)
- Modelling approach (4 slides)
- Results (3 slides)
- Caveats/ further considerations (1 slide)

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Background

- RPS has set a N load limit of 435 t N yr^{-1} for Lake Rotorua
- This implies a reduction of 270 t N yr^{-1} from the pastoral sector
- Envisaged that this will occur by N trading scheme, purchase of N discharge rights, on-farm changes, land use change
- STAG established to provide advice and oversight, including development of N trading scheme
- Fund of $40mil to purchase N discharge rights
- Fund of $5.5mil to provide advice/support for farmers

What is an economic impact assessment?

- Economics is a science about resource allocation to best provide for wellbeing (current & future generations)
- How do we measure and compare options in terms of wellbeing?
- Generally two approaches in economic analysis:
  - Cost benefit analysis
  - Economic impact analysis
- Economic impact assessment – value added and employment are *indicators* to help us understand likely changes in economic (& social) wellbeing

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What is value added?

- A measure of the ‘size’ of the economy
- Similar to GDP but excludes some tax/ subsidy categories
- Thus, industry value added is like the share of GDP attributed to that industry
- Calculated by summing the value of wages, salaries, gross operating profits
- Essentially the amount of ‘income’ generated by an activity

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What is not covered by this study?

- Our land/ecosystem base provides for our well being in many of ways, e.g.
  - Raw materials, waste assimilation
  - Recreation, aesthetic and cultural values
  - Non-use values
- No evaluation could ever fully predict all of the impacts and tradeoffs
  - Non market values difficult to measure and compare
  - Benefits/ costs delivered from complex systems
  - Impacts are long-lasting and the future is uncertain

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What is covered by this study?

- Two major themes considered:
  - What are the economy-wide implications of N reduction policies for pastoral sector under different allocation scenarios?
  - What might additional tourism mean for the district?
- For the first theme, principal data is the outputs of the farm system modelling (Doole et al. 2015)
- For the second theme, simple scenarios considered – i.e. 1%, 2% and 3% increase in tourism for Rotorua District

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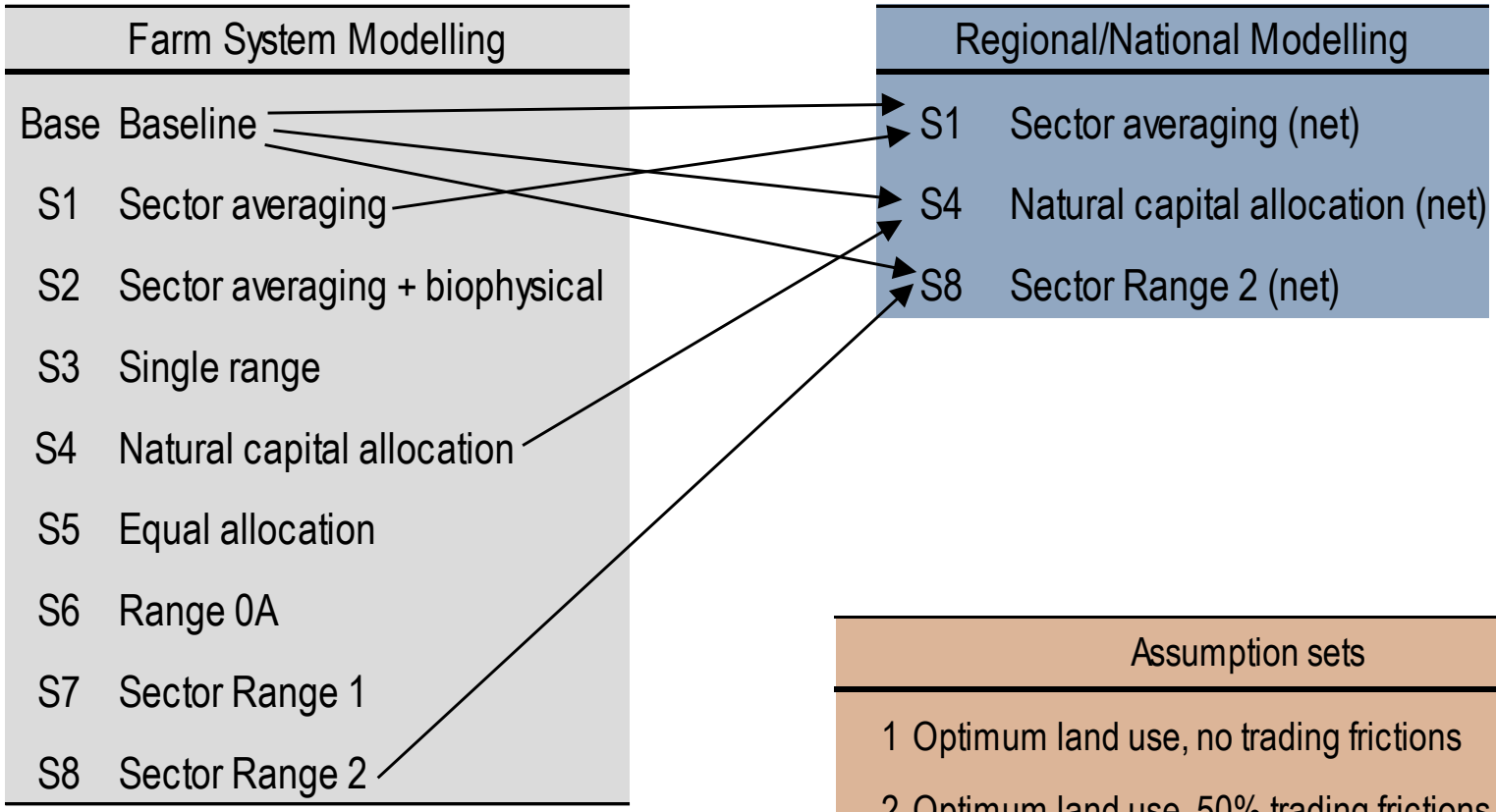
Allocation Scenarios & Assumptions



Assumption sets
1 Optimum land use, no trading frictions
2 Optimum land use, 50% trading frictions
3 5000 ha land use change, no trading frictions
4 5000 ha land use change, 50% trading frictions

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Input-Output Analysis

- Based on a matrix (IO table) describing the flow of goods and services among various sectors/ industries within an economy
- Essentially about inter-industry linkages, how the output of one industry requires inputs from other industries
- Useful for considering how changes initially impacting on one sector (or group of sectors) will ‘ripple’ through an economy
- M.E invested 18 months in developing a set of regional tables for use in IO analysis

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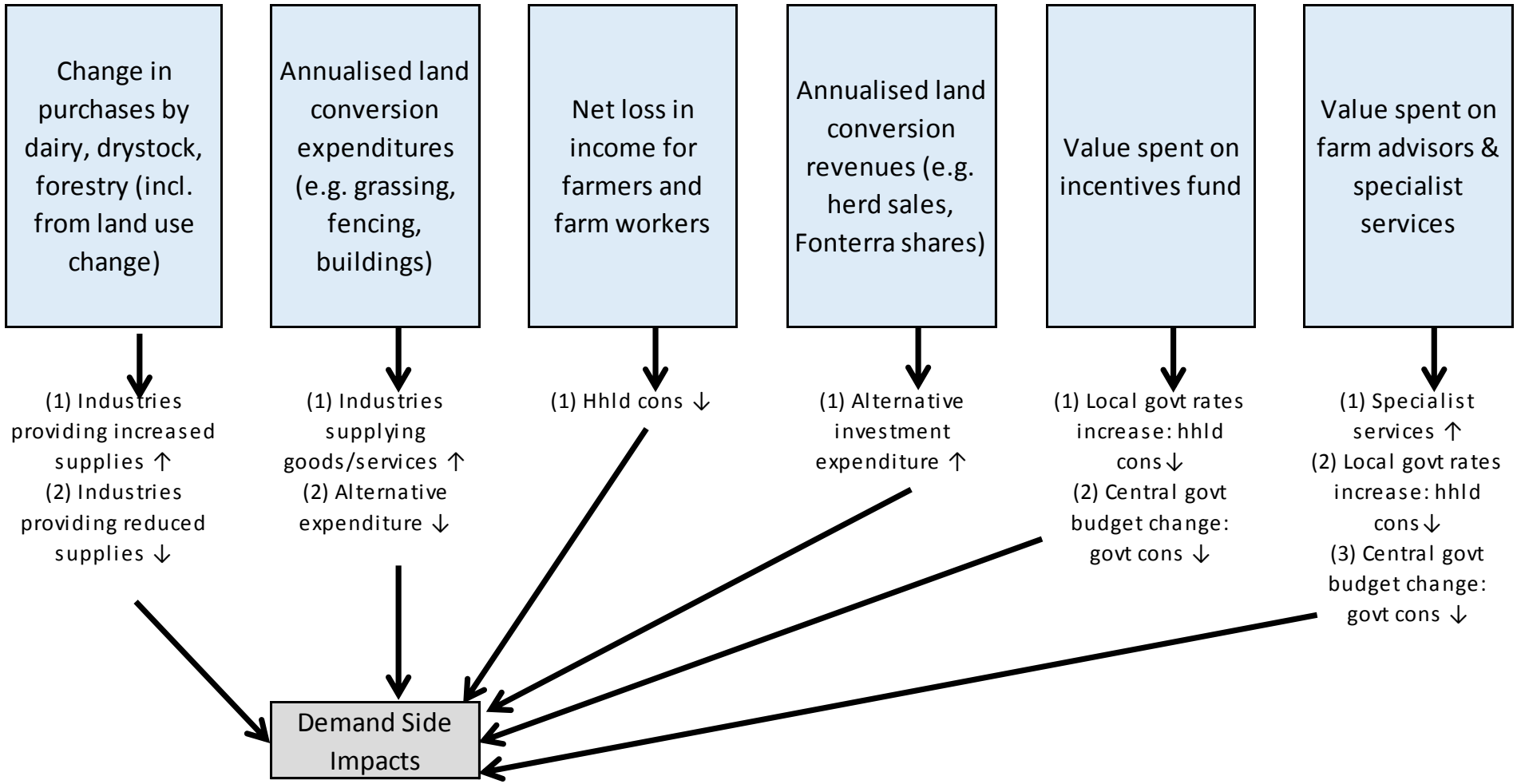
Example Column from IO Table

		Dairy Cattle Farming
Industries	*Primary Industries*	46
	Chemical manufacturing	10
	Other manufacturing	22
	Tertiary industries	63
Primary inputs		196
Total		337

Technical Coefficients

		Dairy Cattle Farming
Industries	*Primary Industries*	0.14
	Chemical manufacturing	0.03
	Other manufacturing	0.07
	Tertiary industries	0.19
Primary inputs		0.58
Total		1.00

Initial 'direct' impacts



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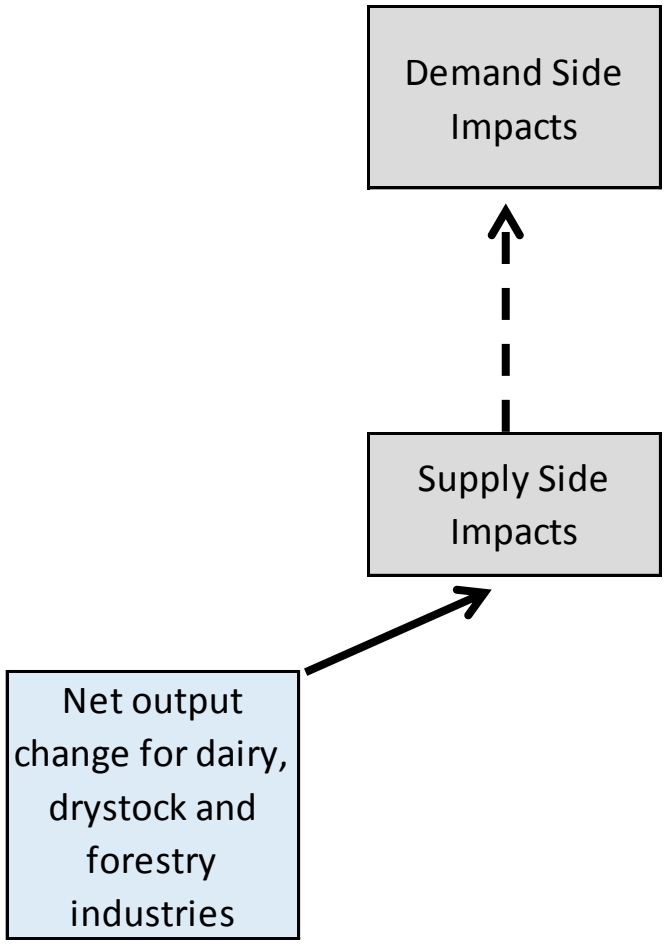
Initial ‘direct’ impacts (cont)



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Results – Sector and Location

Sector	Scenario 8							
	Lake Catchment		Rotorua District		Bay of Plenty Region		New Zealand	
	Value Added $2015 mil)	Jobs (MECs)	Value Added $2015 mil)	Jobs (MECs)	Value Added $2015 mil)	Jobs (MECs)	Value Added $2015 mil)	Jobs (MECs)
Optimum Land Use, no trading friction								
1 Sheep, beef & grain	-1.8	-48	-1.8	-48	-1.8	-48	-1.8	-50
2 Dairy farming	-3.6	-60	-3.6	-60	-3.6	-61	-4.0	-65
3 Forestry	2.7	15	2.8	15	2.7	15	2.8	15
4 Other primary	0.0	0	0.0	0	-0.1	-1	-0.3	-4
5 Agriculture and forestry support	-0.1	-1	-0.1	-2	-0.3	-5	-0.6	-10
6 Meat manufacturing	0.0	0	0.0	0	-0.1	-1	-0.4	-5
7 Dairy manufacturing	0.0	0	-0.2	-1	-0.3	-2	-2.8	-14
8 Wood and paper manufacturing	0.7	10	0.8	11	0.9	13	1.3	19
9 Other manufacturing	0.0	-2	-0.1	-2	-0.2	-3	-1.3	-16
10 Utilities	0.0	0	0.0	0	0.0	0	-0.4	-1
11 Construction	0.1	2	0.1	2	0.1	2	-0.1	-2
12 Wholesale & retail trade	-0.1	-2	-0.1	-2	-0.2	-3	-0.9	-14
13 Transport	0.0	0	0.0	0	-0.1	-1	-0.7	-9
14 Scientific, profess. & admin. servs	-0.1	-1	-0.1	-1	-0.2	-3	-1.0	-16
15 Local & central government	0.0	1	0.0	1	0.0	1	-0.2	-2
16 Other services	-0.2	-1	-0.2	-1	-0.3	-2	-2.4	-21
Total	-2.3	-88	-2.5	-89	-3.4	-97	-12.9	-192
Share of Total	0.09%		0.09%		0.03%		0.01%	

Results – by Scenario

Loss in New Zealand industry value added per unit of nitrogen load reduction ($/kg)

Sector	Sc enario 1	Scenario 4	Scenario 8
Optimum land use, no trading frictions	49	49	49
Optimum land use, 50% trading frictions	60	99	55
5000 ha land use change, no trading frictions	64	64	64
5000 ha land use change,50% trading frictions	54	73	45

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Results – Rotorua District

Impacts on Rotorua Value Added ($2015mil)

Sector	Scenario 8		
	Farm-System Impacts[1]	Tourism Impacts[2]	Total
Optimum Land Use, no trading friction			
1 Sheep, beef & grain	-1.8	0.0	-1.8
2 Dairy farming	-3.6	0.0	-3.6
3 Forestry	2.8	0.0	2.8
4 Other primary	0.0	0.0	0.0
5 Agriculture and forestry support	-0.1	0.0	-0.1
6 Meat manufacturing	0.0	0.0	0.0
7 Dairy manufacturing	-0.2	0.0	-0.2
8 Wood and paper manufacturing	0.8	0.0	0.8
9 Other manufacturing	-0.1	0.0	0.0
10 Utilities	0.0	0.0	0.0
11 Construction	0.1	0.0	0.1
12 Wholesale & retail trade	-0.1	0.2	0.1
13 Transport	0.0	0.2	0.2
14 Scientific, profess. & admin. servs	-0.1	0.1	0.0
15 Local & central government	0.0	0.0	0.0
16 Other services	-0.2	0.9	0.8
Total	-2.5	1.4	-1.1

Notes: 1. All impacts discussed in this report except those relating to tourism
2. Assuming a 1% increase in Rotorua District Tourism-Related Expenditure

Caveats/ Further Considerations

- Relatively long time horizon for policy (>15 years)
- IO model assumes structural relationships and relative prices will continue
  - e.g. what if dairy commodity prices continue to grow at a relatively higher rate than forestry
- Will there be other N mitigation options open in the future
- Forestry is one type of low N land use, will other options emerge?

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