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Influence of Travel Decision Parameters in a CGE Model Incorporating Tourism

A working paper by

Matthew Clark, Siobhan Dent and Greg Watts

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Background

- Valuing Tourism Research project
- Data construction
- Project Objective was a model to treat two types of issues:
  - The effects of tourism shocks on the broader economy
  - The effects of non-tourism shocks on tourism

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Acknowledgements

- Basis of QGEM-T is the Monash Multi-regional Forecasting model developed by COPS
- Tourism enhancements to QGEM builds on earlier work by Cole et al (1996) and Madden and Thapa (1999)

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Objective of this paper

- Ignore holiday and VFR tourism
- Gain an understanding of the most appropriate way to model business travel
  - How appropriate is our current theory
  - What are the appropriate values for the parameters underpinning this theory
- Confront what we don't understand

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Outline of paper

- Overview of QGEM-T
  - Database
  - Theory
- Business travel demand equations and parameters
- Simulation where we manipulate the demand equation parameters (effectively switch off the additional business tourism demand variables

QGEM-T data

18 tourism categories arising from

- 3 purpose of visit
  - Holiday
  - VFR
  - Business (personal and industry expenditure)
- Domestic travellers' destinations
  - Intra-state
  - Inter-state (expenditure in home and destination region)
  - Foreign Outbound (expenditure in home and destination region)
- Foreigner's destination
  - Foreign Inbound

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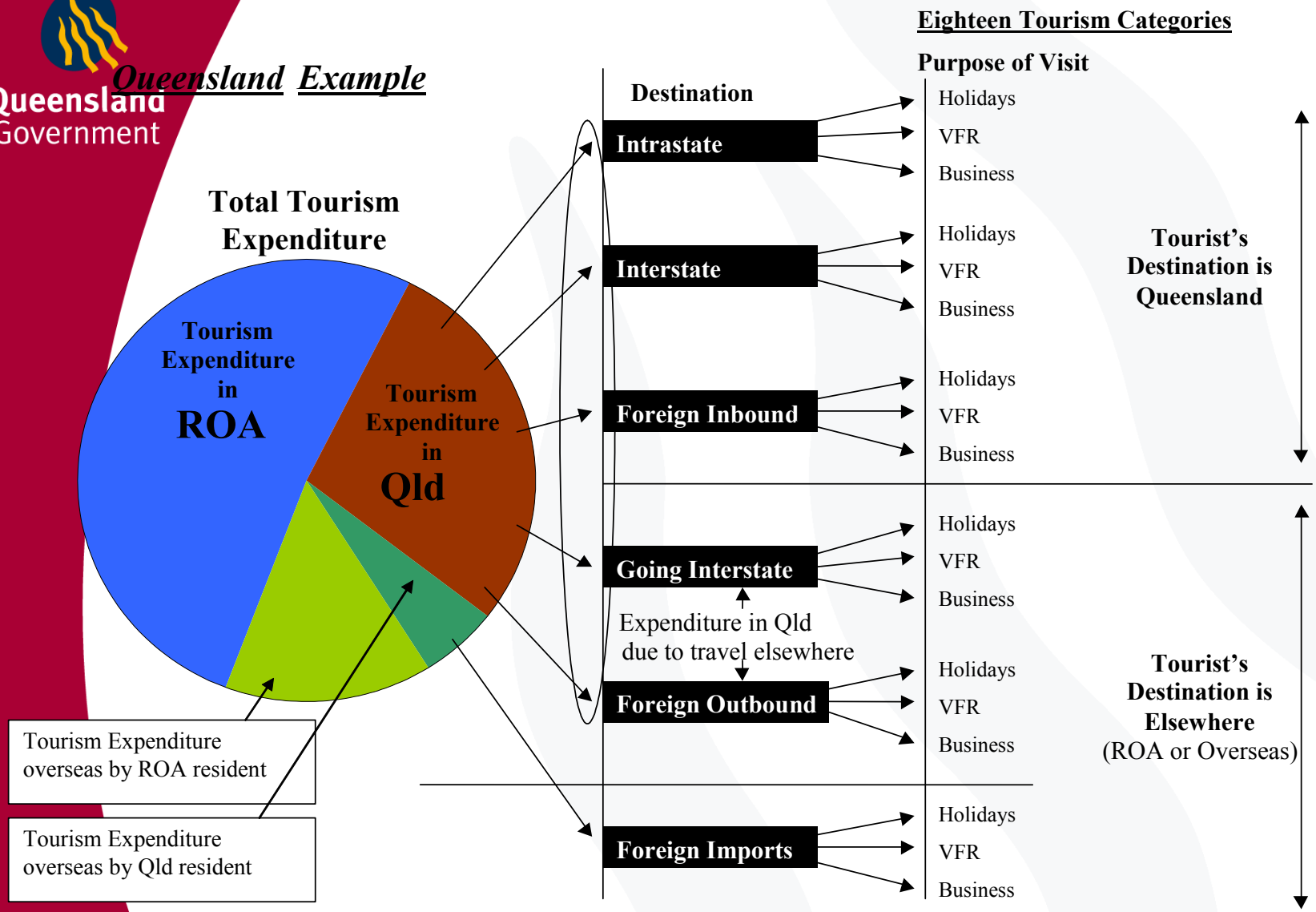

Extracting data from our standard database – Foreign Inbound

	Farms	Manuf	Serv	Exports
Farms	5	1	1	1
Manuf	6	20	6	23
Services	12	12	30	45
Total	23	42	37	78

Exports
1
21
37
68

For_Inb
0
2
8
10

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Extracting data from our standard database – Foreign Inbound

	Farms	Manuf	Serv	For_inb	Exports
Farms	5	1	1	0	1
Manuf	6	20	6	2	21
Services	12	12	30	8	37
For_Inb					10
Total	23	42	37	10	78

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QGEM-T Behavioural Theory

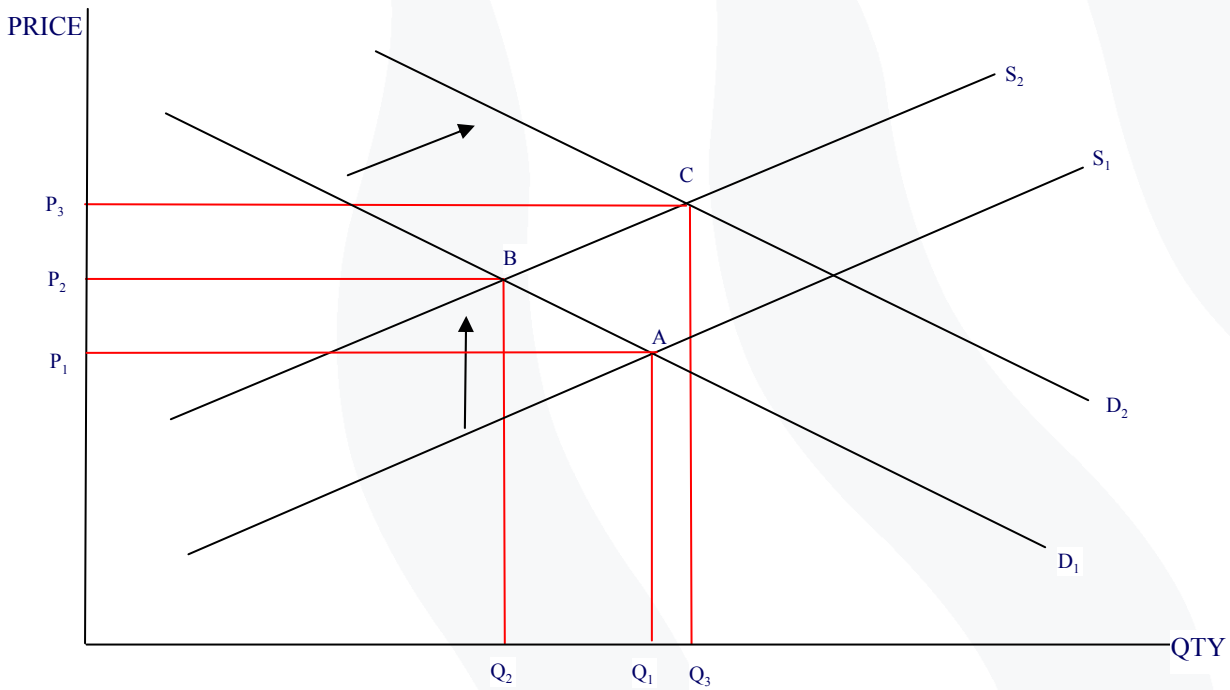
- Theoretical structure of QGEM enhanced to cater for the 18 tourism categories
- Modifications to both the behavioural equations and parameters
- We will only consider modifications that relate to tourism expenditure by business

Foreign Demand for Business Travel

Foreign demand for business travel determined by:

- The price of business travel
- Changes in the sales of foreign industries in the domestic regions (imports).

Foreign Demand for Business travel



Export demand equation

$$x4r_s = \sum_{nbt}\left(\frac{DEST\_SALES_{nbt,"foreign",s}}{\sum_{nbt} DEST\_SALES_{nbt,"foreign",s}} \times destsales_{nbt,s}\right) + EXP\_ELAST \times p4r$$

$$nbt \in non\text{-}business\ tourism\ commodities$$

$$s \in REGSOURCE$$

- x4r is the demand for *Foreign Inbound* business travel
- destsales is the percentage change in sales to each destination
- p4r is the purchaser's price of *Foreign Inbound* business travel
- EXP_ELAST is the price elasticity of demand for *Foreign Inbound* business travel

The Parameters

$$x4r_s = \sum_{nbt}\left(\frac{DEST\_SALES_{nbt,"foreign",s}}{\sum_{nbt} DEST\_SALES_{nbt,"foreign",s}} \times destsales_{nbt,s}\right) + EXP\_ELAST \times p4r$$

Two parameters:

- Export elasticity (inelastic)
- Implied parameter (1) – a 1% change in destsales increases demand for *Foreign Inbound* business travel by 1%.

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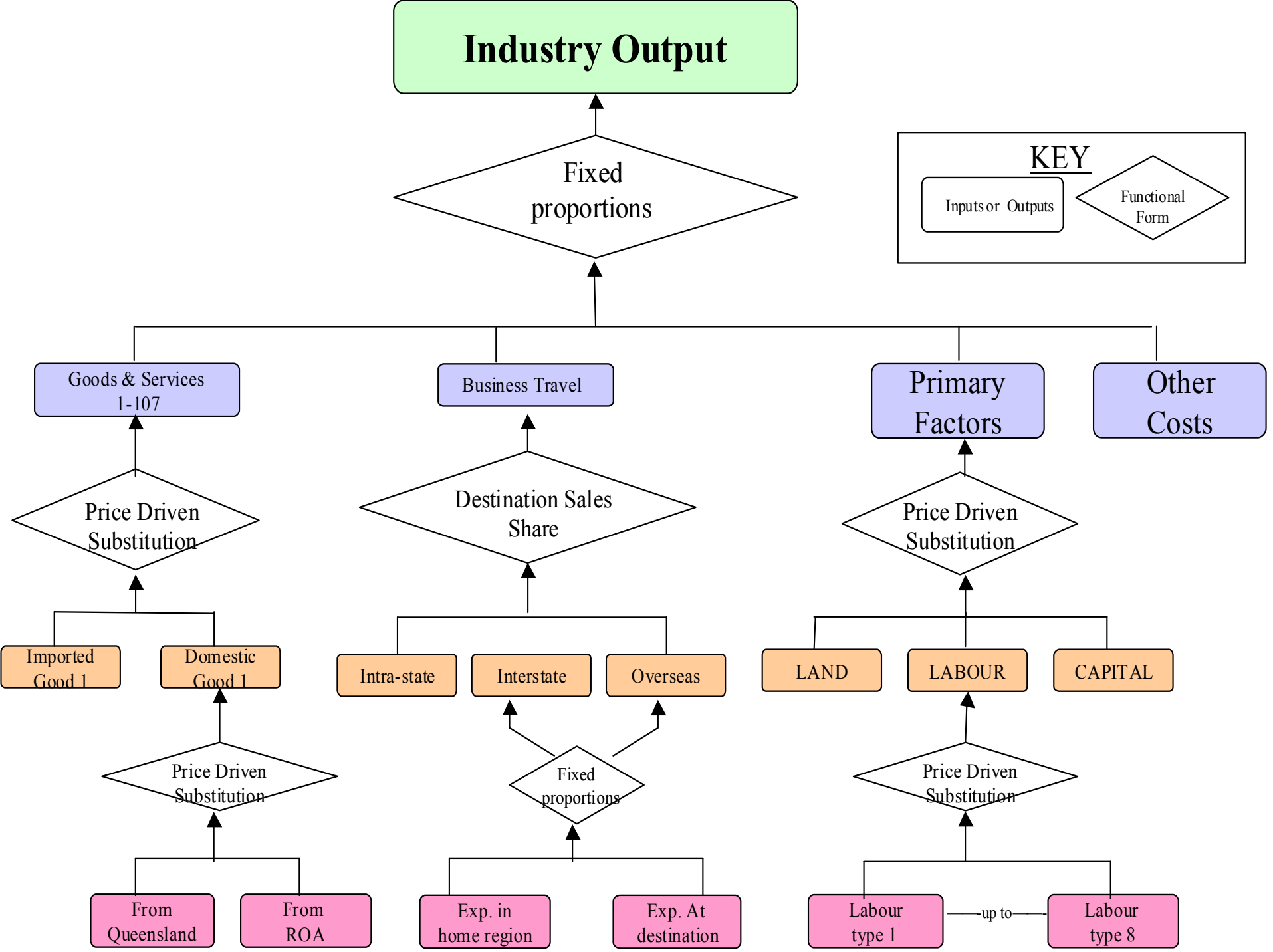
Domestic Industry demand for Business travel

- Aggregate demand varies in fixed proportion to industry output
- The demand for each tourism category within this aggregate is assumed to vary with changes to the destination shares of sales
- Demand for complementary tourism categories is assumed to move in fixed proportions


Industry Output
Fixed proportions
KEY
Inputs or Outputs
Functional Form
Goods & Services 1-107
Business Travel
Primary Factors
Other Costs
Price Driven Substitution
Destination Sales Share
Price Driven Substitution
Imported Good 1
Domestic Good 1
Intra-state
Interstate
Overseas
LAND
LABOUR
CAPITAL
Price Driven Substitution
Fixed proportions
Price Driven Substitution
From Queensland
From ROA
Exp. in home region
Exp. At destination
Labour type 1
up to
Labour type 8

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Cost minimising behavior

- Industries have no explicit substitution possibilities for business travel categories
- The tourism category has a spatial implication
- Implicit cost minimisation behavior through the dummy industries

Intermediate Input Demand Equations

$$x1o_{b,j,"Qld"} = \left(z_{j,"Qld"} + a1_{j,"Qld"}\right) + 100 \times del\_DSSHR_{j,"Qld","ROA"}$$

$$b \in Interstate, Going\ Interstate\ \ business\ \ travel$$

$$j \in IND$$

$$q \in REGDEST$$

- x1o is the demand for business travel
- Del_DSSHR is the change in an industry's sales share to each region
- z is activity
- a1 is a technical change term

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The Parameter

$$x1o_{b,j."Qld"} = \left(z_{j,"Qld"} + a1_{j,"Qld"}\right) + 100 \times del\_DSSHR_{j,"Qld","ROA"}$$

- Implies that for a 1% change in the destination share of sales, demand for the relevant business travel category will change by 1% also.
- Decreasing the parameter makes the equation behave more like a standard (non-tourism) demand equation

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Purpose

- Investigate the impact of
  - Adding the Δ in destination sales shares to Aust. industries' business travel demand equations
  - Adding the Δ in import volumes to foreigners' business travel demand equations

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Simulations

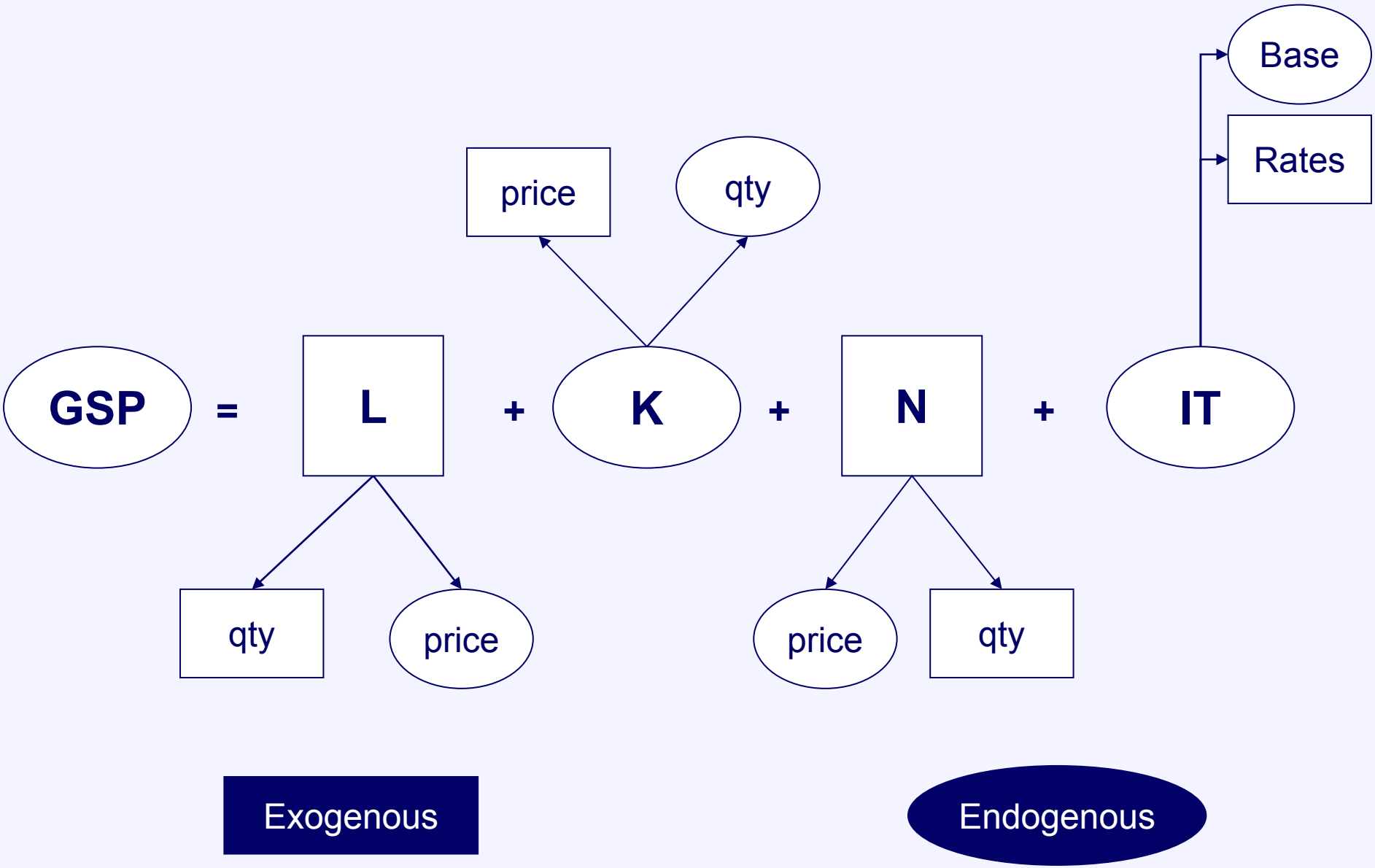
Business travel demand - treatment 1:

- Aust. industries' demand moves with Δ in industry output
- Foreigners' demand moves with Δ in $F price of business travel

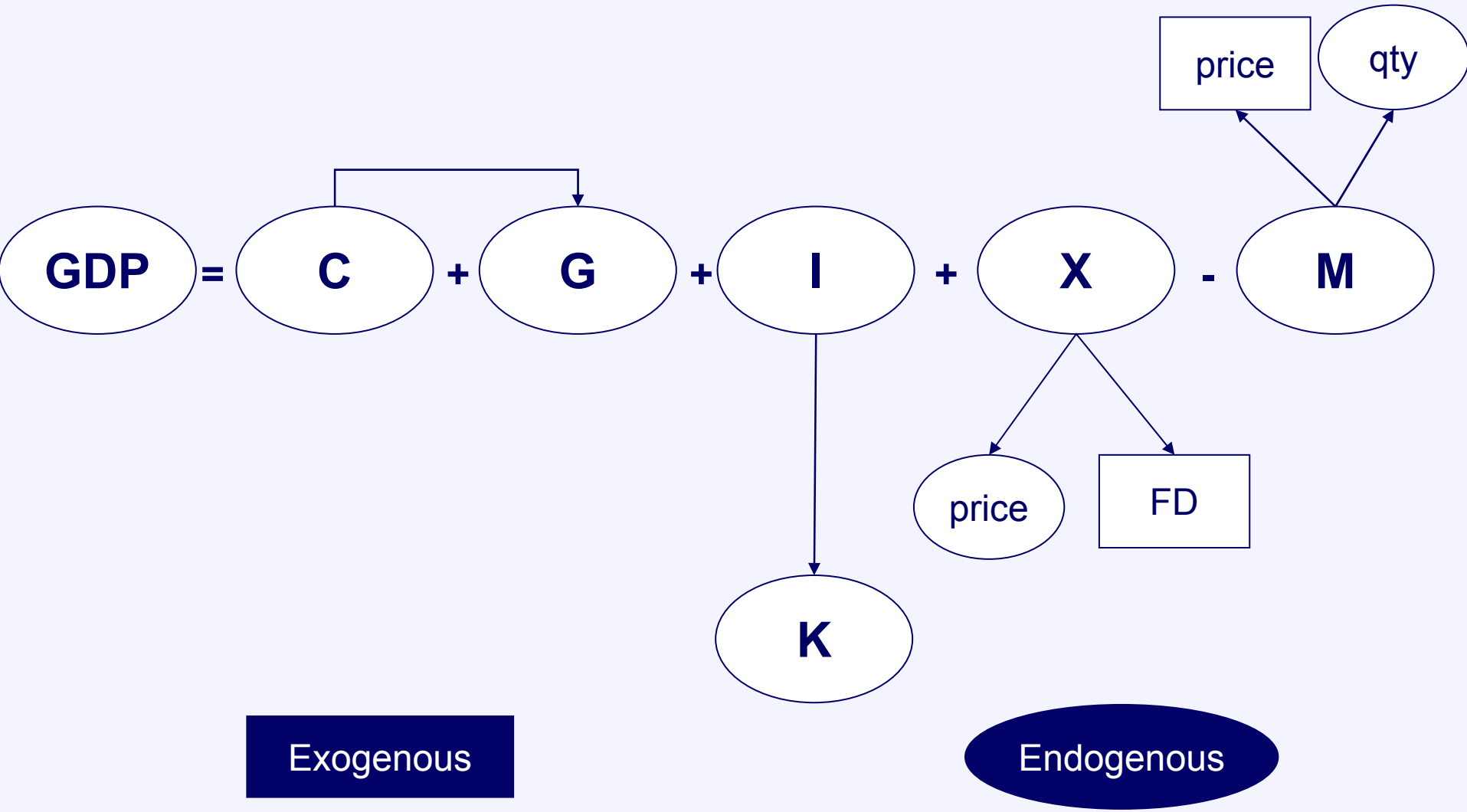
Business travel demand - treatment 2:

- Aust. industries' demand = Simulation 1 + Δ in destination sales shares
- Foreigners' demand = Simulation 1 + Δ in foreign import volumes

Income Side Closure



Expenditure Side Closure



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Shock

- 10% ↑ labour productivity in QLD
- Large enough shock to cause Δ in destination sales shares

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Results

Macro – income side

	QLD	ROA
Real GSP	7.15%	0.34%
Employment	0%	0%
Capital	3.14%	0.99%

Results

Macro – expenditure side

	QLD	ROA
Real GSP	7.15%	0.34%
Real consumption	4.19%	0.57%
Real investment	3.25%	0.86%
Foreign exports	18.55%	-0.81%
Foreign imports	6.66%	0.37%
GSP deflator	-3.89%	0.66%
Interstate exports	5.19%	2.57%

Treatment 1

Business travel demand - treatment 1:

- Aust. industries' demand moves with Δ in industry output
- Foreigners' demand moves with Δ in $F price of business travel

Changes in Demand QLD Business Travel

Travel Category	QLD
	Quantity change
Interstate (Bus_inter)	7.29%
Going Interstate (Bus_ginter)	7.29%
Intrastate (Bus_intra)	7.30%
Foreign Outbound (Bus_for_o)	7.29%
Foreign Imports (Bus_for_imp)	7.51%
Foreign Inbound (Bus_for_i)	4.34%

Business travel demand > QLD GSP

- Larger share of business travel purchases made by high growth industries
- Example
  - *Services to Mining* activity +8.16%
  - 1.1 times economy-wide average
  - 5% *Services to Mining* intermediate input costs on business travel
  - 2% is the economy-wide average

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International travel demand strongest

- Greater proportion of *bus_for_imp* purchased by export-orientated industries
- Example
  - *Meat Products* activity +8.46%
  - 1.2 times economy-wide average
  - *Meat Products* buys 0.7% of *bus_for_imp*
  - *Meat Products* buys 0.3% of business travel aggregate

Foreigners' business travel demand

- Demand by foreigners moves with Δ in $F price of business travel
  - Export elasticity of -1.5
  - $\uparrow$ in demand reflects $\downarrow$ in $F price

Treatment 2

Business travel demand - treatment 2:

- Aust. industries' demand = Simulation 1 + Δ in destination sales shares
- Foreigners' demand = Simulation 1 + Δ in foreign import volumes

Virtually no Δ in macro results

- QLD GSP same result to 3 sig. figures

Foreigners' business travel demand

Foreign Inbound (*Bus_for_i)*	**QLD**
	Quantity change
Treatment 1	4.34%
Treatment 2	11.02%
Difference between the 2 treatments	6.68%

Foreigners' business travel demand

- The ↑ in NT import volumes the same
- Adding "sales share" treatment leads to ↑ in foreigners' business travel demand relative to Treatment 1.

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Australian Industry Travel Demand

- At the industry level
  - Assumption that ↑ share of sales to one region then ↓share of sales to others
  - Demand for 1 tourism category ↑ then demand for other tourism categories ↓

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Industry Examples

	QLD	ROA	Foreign
Coal Oil & Gas			
Δ in sales shares	-0.005	0	0.005
Business travel demand	↓	-	↑
Wholesale Trade			
Δ in sales shares	0.016	-0.019	0.003
Business travel demand	↑	↓	↑

Differences between the treatments

QLD industries' business travel demand

Travel Category	QLD
	Quantity change
Interstate (Bus_inter)	0.005%
Going Interstate (Bus_ginter)	0.001%
Intrastate (Bus_intra)	0.009%
Foreign Outbound (Bus_for_o)	0.012%
Foreign Imports (Bus_for_imp)	0.011%

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Aggregate Travel Demand

- What is true at the industry level isn't always true at the aggregate level
- Including the Δ in sales shares led to an $\uparrow$ in aggregate demand for each category
- Currently investigating why