



# *NIEIR's Approach to Tops-Down and Bottoms-Up Modelling*

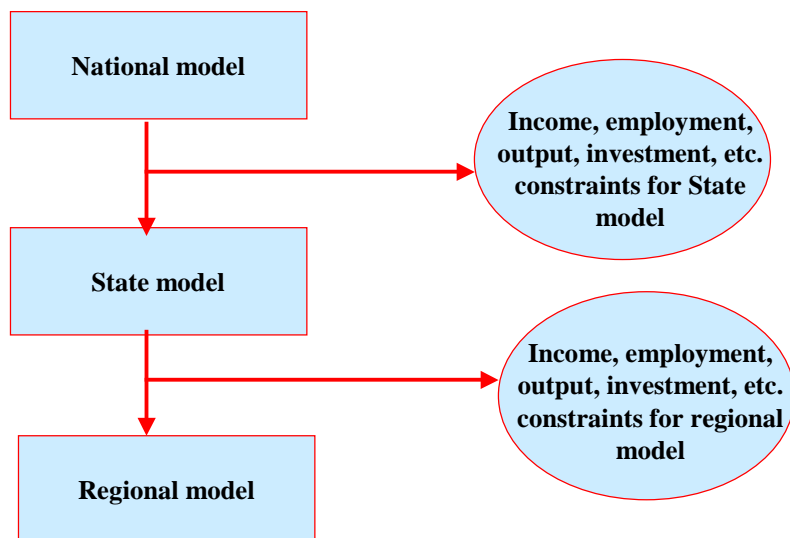
A presentation to the  
ABARE International Seminar

Presented by: **Dr Peter Brain**

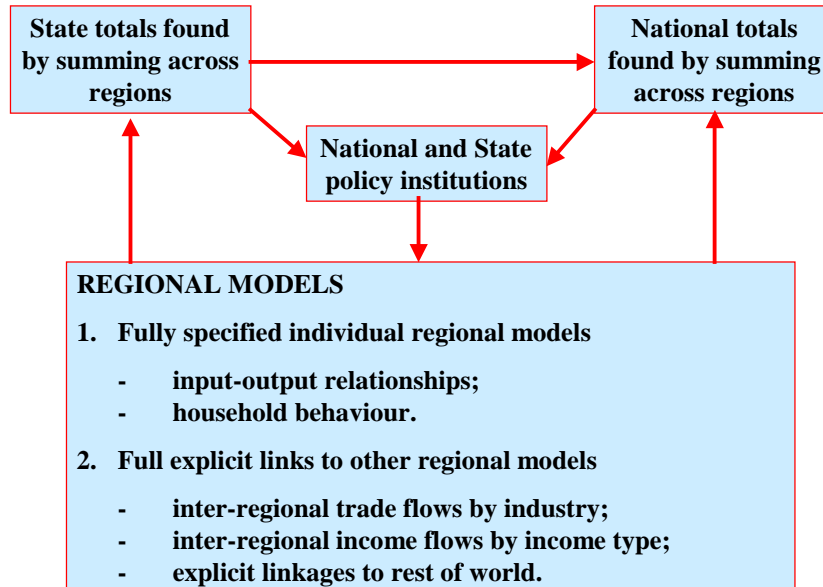
National Institute of Economic and Industry Research  
416 Queens Parade, Clifton Hill, Victoria, 3068  
Phone: (03) 9488 8444; Fax: (03) 9482 3262; Email: [admin@nieir.com.au](mailto:admin@nieir.com.au)

**28 May 2002**

## *The tops-down approach*



## *The bottoms-up approach*



## *Three reasons for using tops-down and bottoms-up*

- **Data availability.**
- **Parameter validation.**
- **Function stability.**



## *The history of model building at NIEIR*

**Before 1996:**      **Tops-down.**

**1996 – 2000:**      **Foundations put in place for  
bottoms-up modelling –  
securing the database.**

**2001 + :**              **Bottoms-up modelling.**



NIEIR

## *Data generation is core to bottoms-up modelling*

- 1. Regional selection.**
- 2. Industry selection.**
- 3. Household accounts.**
- 4. Consumption structure.**
- 5. Input-output relationship estimation.**
- 6. International trade flows.**
- 7. Inter-regional trade flows.**



NIEIR

## *The regional geographical structure*

Albury (C)	Burwood (A)	Deniliquin (A)
Armidale (C)	Byron (A)	Drummoyne (A)
Ashfield (A)	Cabonne (A)	Dubbo (C)
Auburn (A)	Camden (A)	Dumaresq (A)
Ballina (A)	Campbelltown (C) (NSW)	Dungog (A)
Balranald (A)	Canterbury (C)	Eurobodalla (A)
Bankstown (C)	Carrathool (A)	Evans (A)
Barraba (A)	Casino (A)	Fairfield (C)
Bathurst (C)	Central Darling (A)	Forbes (A)
Baulkham Hills (A)	Cessnock (C)	Gilgandra (A)
Bega Valley (A)	Cobar (A)	Glen Innes (A)
Bellingen (A)	Coffs Harbour (C)	Gloucester (A)
Berrigan (A)	Conargo (A)	Gosford (C)
Bingara (A)	Concord (A)	Goulburn (C)
Blacktown (C)	Coolah (A)	Grafton (C)
Bland (A)	Coolamon (A)	Great Lakes (A)
Blayney (A)	Cooma-Monaro (A)	Greater Lithgow (C)
Blue Mountains (C)	Coonabarabran (A)	Greater Taree (C)
Bogan (A)	Coonamble (A)	Griffith (C)
Bombala (A)	Cootamundra (A)	Gundagai (A)
Boorowa (A)	Copmanhurst (A)	Gunnedah (A)
Botany (A)	Corowa (A)	Gunning (A)
Bourke (A)	Cowra (A)	Guyra (A)
Brewarrina (A)	Crookwell (A)	Harden (A)
Broken Hill (C)	Culcairn (A)	Hastings (A)



## *The regional geographical structure (cont.)*

Hawkesbury (C)	Maitland (C)	Parry (A)
Hay (A)	Manilla (A)	Penrith (C)
Holbrook (A)	Manly (A)	Pittwater (A)
Holroyd (C)	Marrickville (A)	Port Stephens (A)
Hornsby (A)	Merriwa (A)	Queanbeyan (C)
Hume (A)	Moree Plains (A)	Quirindi (A)
Hunter's Hill (A)	Mosman (A)	Randwick (C)
Hurstville (C)	Mudgee (A)	Richmond River (A)
Inverell (A)	Mulwaree (A)	Rockdale (C)
Jerilderie (A)	Murray (A)	Ryde (C)
Junee (A)	Murrumbidgee (A)	Rylstone (A)
Kempsey (A)	Murrurundi (A)	Scone (A)
Kiama (A)	Muswellbrook (A)	Severn (A)
Kogarah (A)	Nambucca (A)	Shellharbour (A)
Ku-ring-gai (A)	Narrabri (A)	Shoalhaven (C)
Kyogle (A)	Narrandera (A)	Singleton (A)
Lachlan (A)	Narrromine (A)	Snowy River (A)
Lake Macquarie (C)	Newcastle (C)	South Sydney (C)
Lane Cove (A)	North Sydney (A)	Strathfield (A)
Leeton (A)	Nundle (A)	Sutherland Shire (A)
Leichhardt (A)	Nymboida (A)	Sydney (C)
Lismore (C)	Oberon (A)	Tallaganda (A)
Liverpool (C)	Orange (C)	Tamworth (C)
Lockhart (A)	Parkes (A)	Temora (A)
Maclean (A)	Parramatta (C)	Tenterfield (A)



## *The regional geographical structure (cont.)*

Tumbarumba (A)	Yass (A)	Glen Eira (C) Total
Tumut (A)	Young (A)	Glenelg (S) Total
Tweed (A)	Unincorporated NSW	Golden Plains (S) Total
Ulmarra (A)	ACT	Greater Bendigo (C) Total
Uralla (A)	Alpine (S) Total	Greater Dandenong (C) Total
Urana (A)	Ararat (RC) Total	Greater Geelong (C) Total
Wagga Wagga (C)	Ballarat (C) Total	Greater Shepparton (C) Total
Wakool (A)	Banyule (C) Total	Hepburn (S) Total
Walcha (A)	Bass Coast (S) Total	Hindmarsh (S) Total
Walgett (A)	Baw Baw (S) Total	Hobsons Bay (C) Total
Warren (A)	Bayside (C) Total	Horsham (RC) Total
Warringham (A)	Boroondara (C) Total	Hume (C) Total
Waverley (A)	Brimbank (C) Total	Indigo (S) Total
Weddin (A)	Buloke (S) Total	Kingston (C) Total
Wellington (A)	Campaspe (S) Total	Knox (C) Total
Wentworth (A)	Cardinia (S) Total	La Trobe (S) Total
Willoughby (C)	Casey (C) Total	Loddon (S) Total
Windouran (A)	Central Goldfields (S) Total	Macedon Ranges (S) Total
Wingecarribee (A)	Colac-Otway (S) Total	Manningham (C) Total
Wollondilly (A)	Corangamite (S) Total	Maribyrnong (C) Total
Wollongong (C)	Darebin (C) Total	Maroondah (C) Total
Woollahra (A)	Delatite (S) Total	Melbourne (C) Total
Wyong (A)	East Gippsland (S) Total	Melton (S) Total
Yallaroi (A)	Frankston (C) Total	Mildura (RC) Total
Yarrowlumla (A)	Gannawarra (S) Total	Mitchell (S) Total



## *The regional geographical structure (cont.)*

Moira (S) Total	Whitehorse (C) Total	Gawler (M)
Monash (C) Total	Whittlesea (C) Total	Goyder (DC)
Moonee Valley (C) Total	Wodonga (RC) Total	Grant (DC)
Moorabool (S) Total	Wyndham (C) Total	Holdfast Bay (C)
Moreland (C) Total	Yarra (C) Total	Kangaroo Island (DC)
Mornington Peninsula (S) Total	Yarra Ranges (S) Total	Karoonda East Murray (DC)
Mount Alexander (S) Total	Yarriambiack (S) Total	Kimba (DC)
Moyn (S) Total	Unincorporated Vic Total	Lacedpede (DC)
Murrindindi (S) Total	Adelaide (C)	Le Hunte (DC)
Nillumbik (S) Total	Adelaide Hills (DC)	Light (DC)
Northern Grampians (S) Total	Alexandrina (DC)	Lower Eyre Peninsula (DC)
Port Phillip (C) Total	Barossa (DC)	Loxton Waikerie (DC)
Pyrenees (S) Total	Buranga West (DC)	Mallala (DC)
Queenscliffe (B) Total	Berri and Barmera (DC)	Marion (C)
South Gippsland (S) Total	Burnside (C)	Mid Murray (DC)
Southern Grampians (S) Total	Campbelltown (C) (SA)	Mitcham (C)
Stonnington (C) Total	Ceduna (DC)	Mount Barker (DC)
Strathbogie (S) Total	Charles Sturt (C)	Mount Gambier (C)
Surf Coast (S) Total	Clare and Gilbert Valleys (DC)	Mount Remarkable (DC)
Swan Hill (RC) Total	Cleve (DC)	Murray Bridge (RC)
Towong (S) Total	Cooper Pedy (DC)	Naracoorte and Lucindale (DC)
Wangaratta (RC) Total	Copper Coast (DC)	Northern Areas (DC)
Warrnambool (C) Total	Elliston (DC)	Norwood Payneham St Peters (C)
Wellington (S) Total	Flinders Ranges (DC)	Onkaparinga (C)
West Wimmera (S) Total	Franklin Harbor (DC)	Orroroo/Carrieton (DC)



## *The regional geographical structure (cont.)*

<b>Renmark Paringa (DC)</b>	<b>Salisbury (C)</b>	<b>Walkerville (M)</b>
<b>Peterborough (DC)</b>	<b>Southern Mallee (DC)</b>	<b>Wattle Range (DC)</b>
<b>Playford (C)</b>	<b>Streaky Bay (DC)</b>	<b>West Torrens (C)</b>
<b>Port Adelaide Enfield (C)</b>	<b>Tatiara (DC)</b>	<b>Whyalla (C)</b>
<b>Port Augusta (C)</b>	<b>Tea Tree Gully (C)</b>	<b>Yankalilla (DC)</b>
<b>Port Lincoln (C)</b>	<b>The Coorong (DC)</b>	<b>Yorke Peninsula (DC)</b>
<b>Port Pirie &amp; Dists (M)</b>	<b>Tumby Bay (DC)</b>	<b>Unincorporated SA</b>
<b>Prospect (C)</b>	<b>Unley (C)</b>	<b>Tas</b>
<b>Robe (DC)</b>	<b>Victor Harbor (DC)</b>	<b>Darwin</b>
<b>Roxby Downs (M)</b>	<b>Wakefield (DC)</b>	<b>Brisbane</b>
		<b>Perth</b>



NIEIR

## *The regional industry structure*

<b>1</b>	<b>Sheep</b>	<b>25</b>	<b>Wine and spirits</b>
<b>2</b>	<b>Grains</b>	<b>26</b>	<b>Tobacco products</b>
<b>3</b>	<b>Beef Cattle</b>	<b>27</b>	<b>Textiles fibers, yarns &amp; woven fabrics</b>
<b>4</b>	<b>Dairy Cattle</b>	<b>28</b>	<b>Textile products</b>
<b>5</b>	<b>Other Livestock</b>	<b>29</b>	<b>Knitting mill products</b>
<b>6</b>	<b>Other Agriculture</b>	<b>30</b>	<b>Clothing</b>
<b>7</b>	<b>Services to agricult, hunting &amp; trapping</b>	<b>31</b>	<b>Footwear</b>
<b>8</b>	<b>Forestry and Logging</b>	<b>32</b>	<b>Leather and leather products</b>
<b>9</b>	<b>Commercial fishing</b>	<b>33</b>	<b>Sawmill products</b>
<b>10</b>	<b>Coal: oil and gas</b>	<b>34</b>	<b>Other wood products</b>
<b>11</b>	<b>Iron Ores</b>	<b>35</b>	<b>Pulp, paper and paperboard</b>
<b>12</b>	<b>Non-ferrous metal ores</b>	<b>36</b>	<b>Paperboard contain, paperbags &amp; sacks</b>
<b>13</b>	<b>Other mining</b>	<b>37</b>	<b>Printing and services to printing</b>
<b>14</b>	<b>Services to mining</b>	<b>38</b>	<b>Publishing; recorded media &amp; publishing</b>
<b>15</b>	<b>Meat and meat products</b>	<b>39</b>	<b>Petroleum and coal products</b>
<b>16</b>	<b>Dairy products</b>	<b>40</b>	<b>Basic chemicals</b>
<b>17</b>	<b>Fruit and vegetable products</b>	<b>41</b>	<b>Paints</b>
<b>18</b>	<b>Oils and fats</b>	<b>42</b>	<b>Medicinal &amp; pharmaceutical prod.; pesticides</b>
<b>19</b>	<b>Flour mill products and cereal foods</b>	<b>43</b>	<b>Soap and detergents</b>
<b>20</b>	<b>Bakery products</b>	<b>44</b>	<b>Cosmetic and toiletry preparations</b>
<b>21</b>	<b>Confectionery</b>	<b>45</b>	<b>Other chemical products</b>
<b>22</b>	<b>Other food products</b>	<b>46</b>	<b>Rubber products</b>
<b>23</b>	<b>Soft drinks, cordials and syrups</b>	<b>47</b>	<b>Plastic products</b>
<b>24</b>	<b>Beer and malt</b>	<b>48</b>	<b>Glass and glass products</b>



NIEIR

## The regional industry structure (cont.)

49	Ceramic products	78	Mechanical repairs	}
50	Cement, lime and concrete slurry	79	Other repairs	}
51	Plaster and other concrete products	80	Accommodation, cafes and restaurants	}
52	Other non-metallic mineral products	81	Road transport	}
53	Iron and steel	82	Rail, pipeline and other transport	}
54	Basic non-ferrous metals and products	83	Water transport	}
55	Structural metal products	84	Air and space transport	}
56	Sheet metal products	85	Services to transport; storage	}
57	Fabricated metal products	86	Communication services	}
58	Motor veh. & parts; other transprt equip.	87	Banking	}
59	Ships and boats	88	Non-bank finance	}
60	Railway equipment	89	Other financial services	}
61	Aircraft	90	Insurance	}
62	Photographic and scientific equipment	91	Services to finance, invest. & insurance	}
63	Electronic equipment	92	Ownership of dwellings	}
64	Household appliances	93	Other property services	}
65	Other electrical equipment	94	Scientific research, tech. & computer serv.	}
66	Agricult., mining & construct. machinery; lifting & material handling equip.	95	Legal, accounting, marketing and business management services	}
67	Other machinery and equipment	96	Other business services	}
68	Prefabricated buildings	97	Government administration	}
69	Furniture	98	Defence	}
70	Other manufacturing	99	Education	}
71	Electricity supply	100	Health services	}
72	Gas supply	101	Community services	}
73	Water supply; sewerage & drainage serv.	102	Motion picture, radio and television services	}
74	Residential building construction	103	Libraries, museums and the arts	}
75	Other construction	104	Sport, gambling & recreational serv.	}
76	Wholesale trade	105	Personal services	}
77	Retail Trade	106	Other services	}



NIEIR

## Regional household accounts

Wages and salaries  
Other exertion income  
Investment income  
Social Security income

Total income

Savings  
Consumption expenditure

Total income

### Microsimulation model (unit record data)

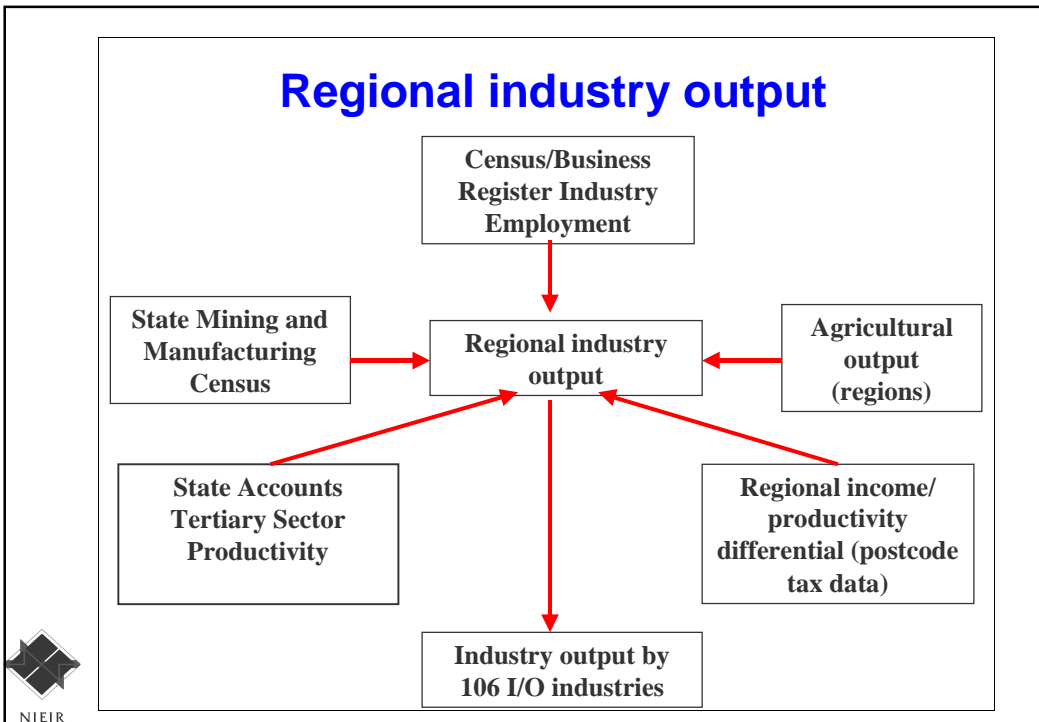
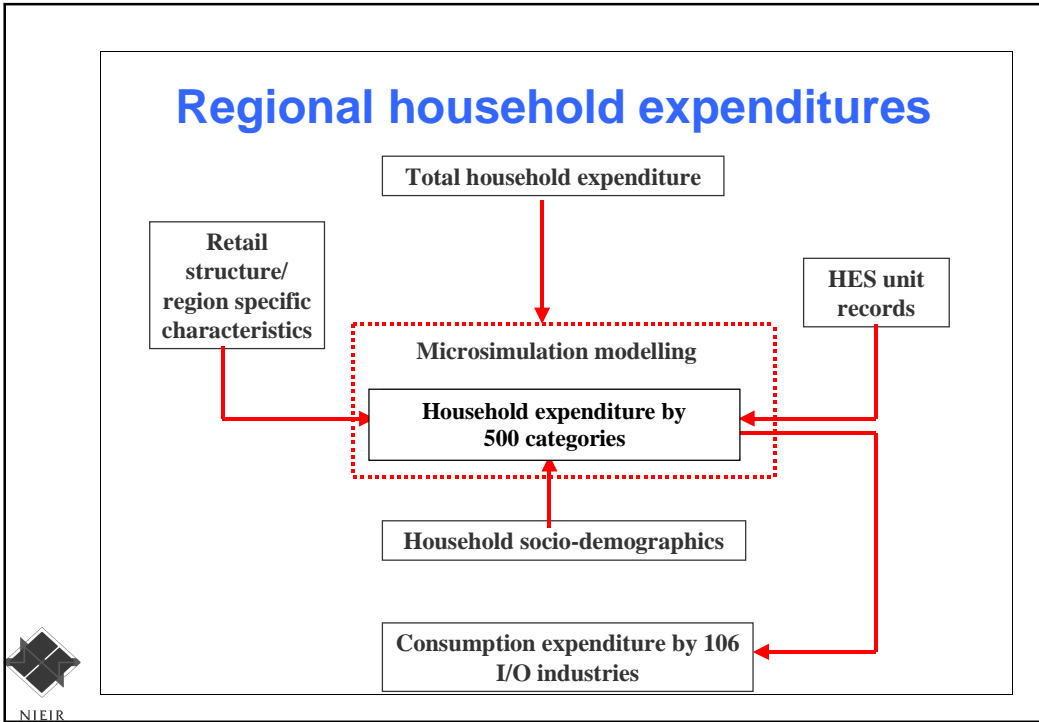
Value of dwelling  
Household financial assets  
Household financial liabilities  
Other net household assets  
  
Interest rates  
State account constraints

Household saving

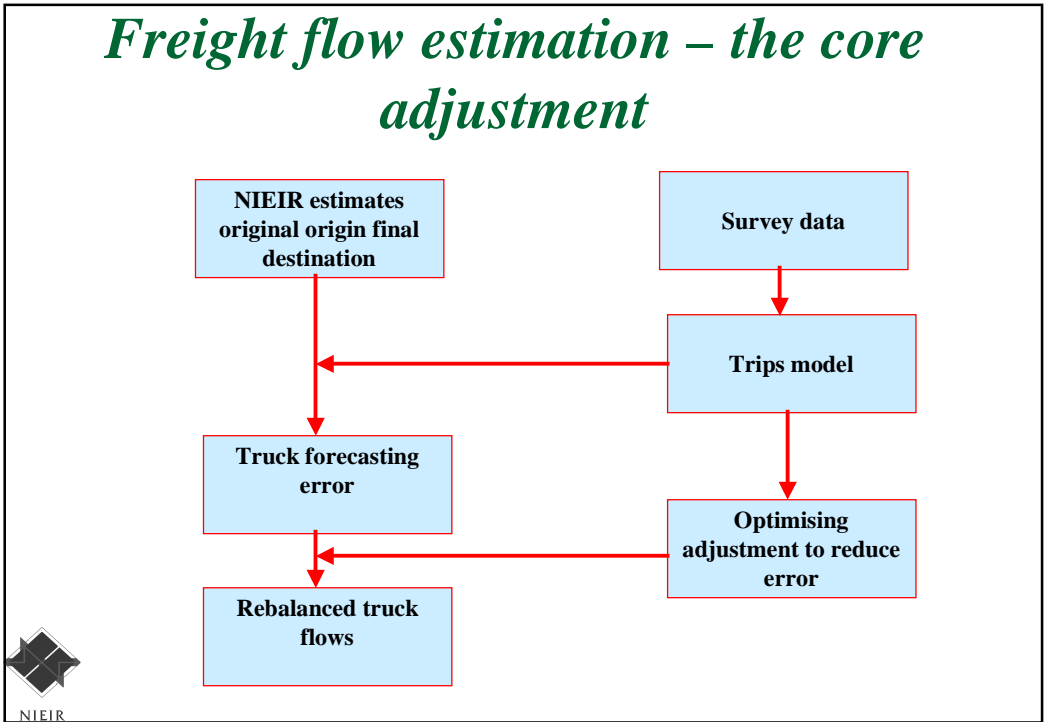
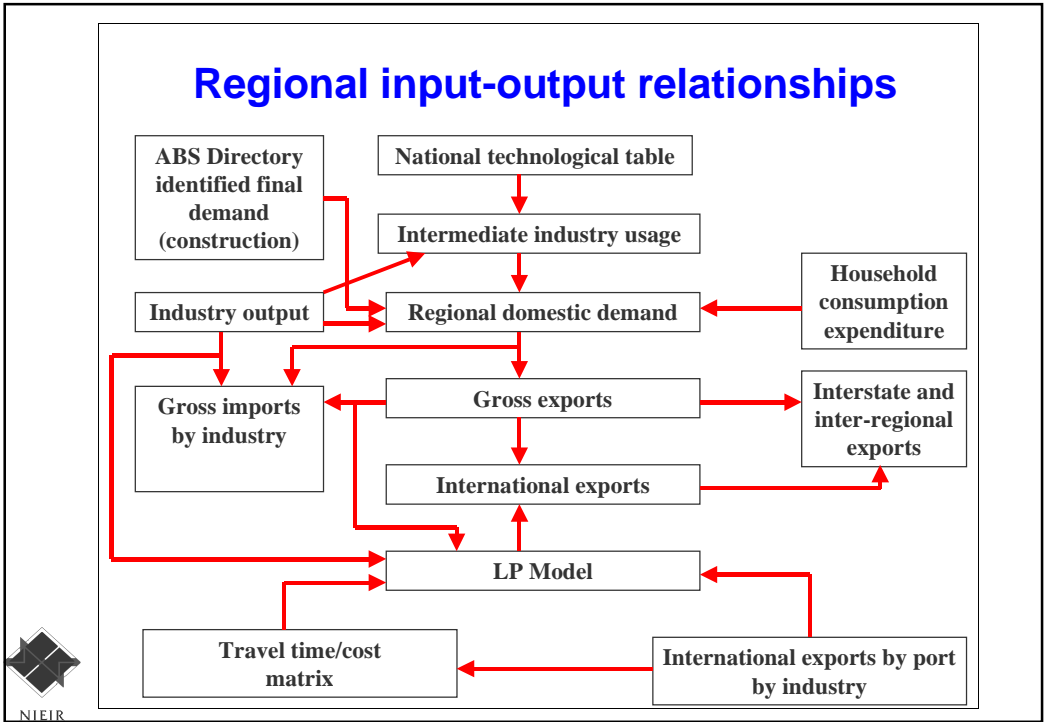
Household socio-demographic characteristics

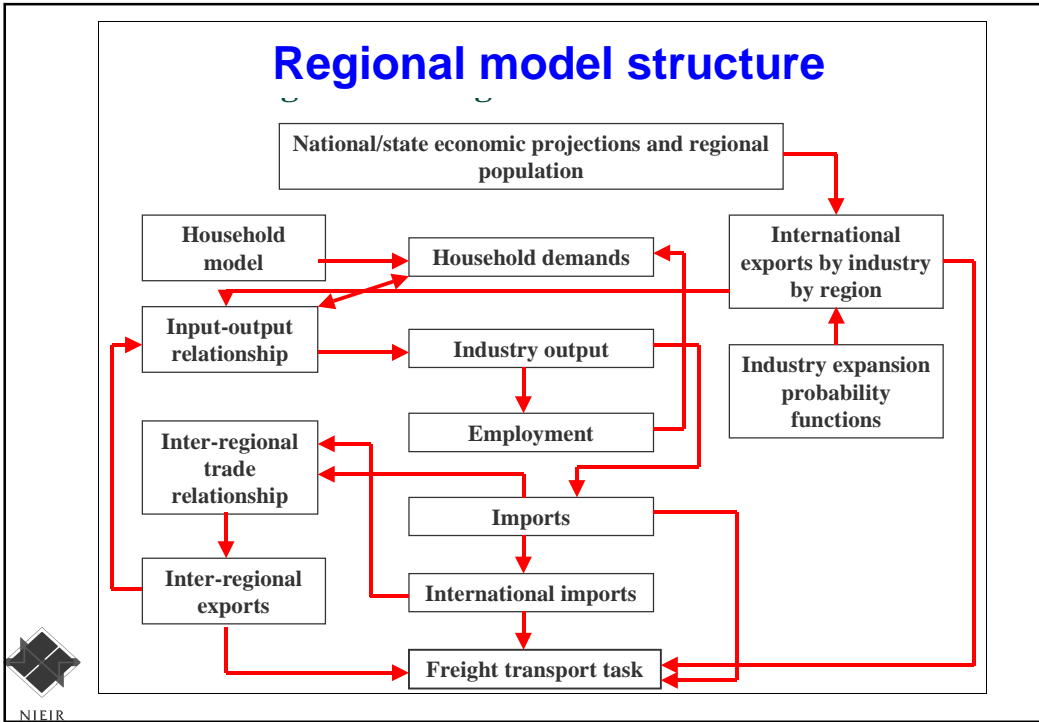


NIEIR









### Scoresby LGAs: total household disposable income dependency (per cent)

	Bayside	Cardinia	Casey	Frankston	Dandenong	Kingston
Bayside	23	1	1	2	2	4
Cardinia	0	22	1	0	0	0
Casey	0	6	16	2	2	1
Frankston	1	2	2	21	6	2
Dandenong	2	11	15	8	29	5
Kingston	7	5	8	10	10	28
Knox	1	4	4	2	3	2
Maroondah	1	1	1	1	1	1
Monash	5	9	12	7	13	8
Mornington	1	2	2	9	1	1
Whitehorse	2	2	2	2	2	2
Other Melbourne	57	33	37	37	32	47
<b>Total Scoresby</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Total Scoresby region</b>	<b>43</b>	<b>67</b>	<b>63</b>	<b>63</b>	<b>68</b>	<b>53</b>
<b>Total Scoresby region – excluding own LGA</b>	<b>21</b>	<b>44</b>	<b>47</b>	<b>42</b>	<b>39</b>	<b>25</b>

The table shows the percentage of total household disposable income dependency for various Scoresby LGAs. The total for each LGA is 100%. The total for the Scoresby region is 43%, and the total for the Scoresby region excluding each LGA's own contribution is shown in the final row. The 'NIEIR' logo is visible in the bottom left corner.

**Scoresby LGAs: total household disposable income dependency (per cent) – continued**

	Knox	Maroondah	Monash	Mornington	Whitehorse
Bayside	1	1	1	1	1
Cardinia	0	0	0	0	0
Casey	1	0	1	1	0
Frankston	1	1	1	5	2
Dandenong	5	2	4	4	2
Kingston	4	2	5	5	3
Knox	23	7	3	1	3
Maroondah	4	21	1	0	2
Monash	10	6	28	4	7
Mornington	1	1	1	55	1
Whitehorse	5	6	3	1	21
Other Melbourne	46	53	52	22	58
<b>Total Scoresby</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Total Scoresby region</b>	<b>54</b>	<b>47</b>	<b>48</b>	<b>78</b>	<b>42</b>
<b>Total Scoresby region – excluding own LGA</b>	<b>31</b>	<b>26</b>	<b>20</b>	<b>23</b>	<b>21</b>



## *Bottoms-up modelling and energy analysis*

### 1. Regional energy forecasts at the:

- SD
- SSD
- LGA
- Postcode

### 2. Energy demand data obtained from:

- microsimulation
- company database
- production estimate



## ***Bottoms-up modelling and energy analysis (cont.)***

### **3. Types of forecasts:**

- **energy demand**
- **customer numbers**
- **maximum demands (MD, MMQ):**
  - . **terminal station demand;**
  - . **zone substation demand.**

### **4. Air conditioning sales projections by focus.**

**Usage by half hourly intervals.**

**Temperature sensitivity of demand is  
double of six years ago.**

