



Using Microsimulation Models in the Social Policy Process

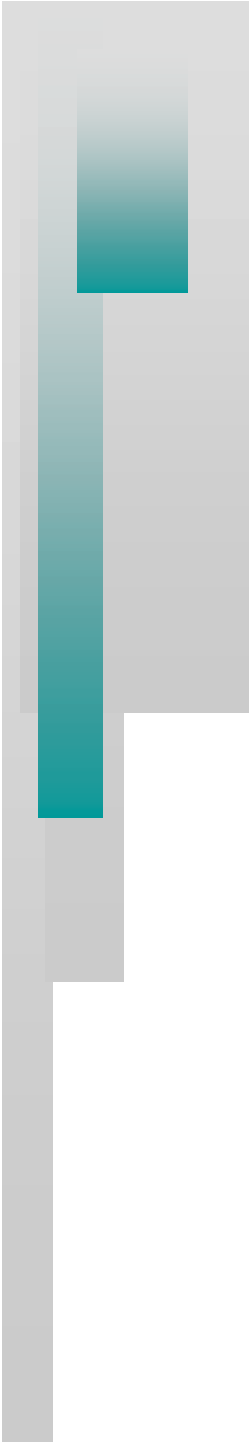
Ann Harding

Presentation to the *Criminal Justice Modelling
Workshop*, Queensland, 11 November 2003

National Centre for Social and Economic Modelling
(NATSEM), University of Canberra

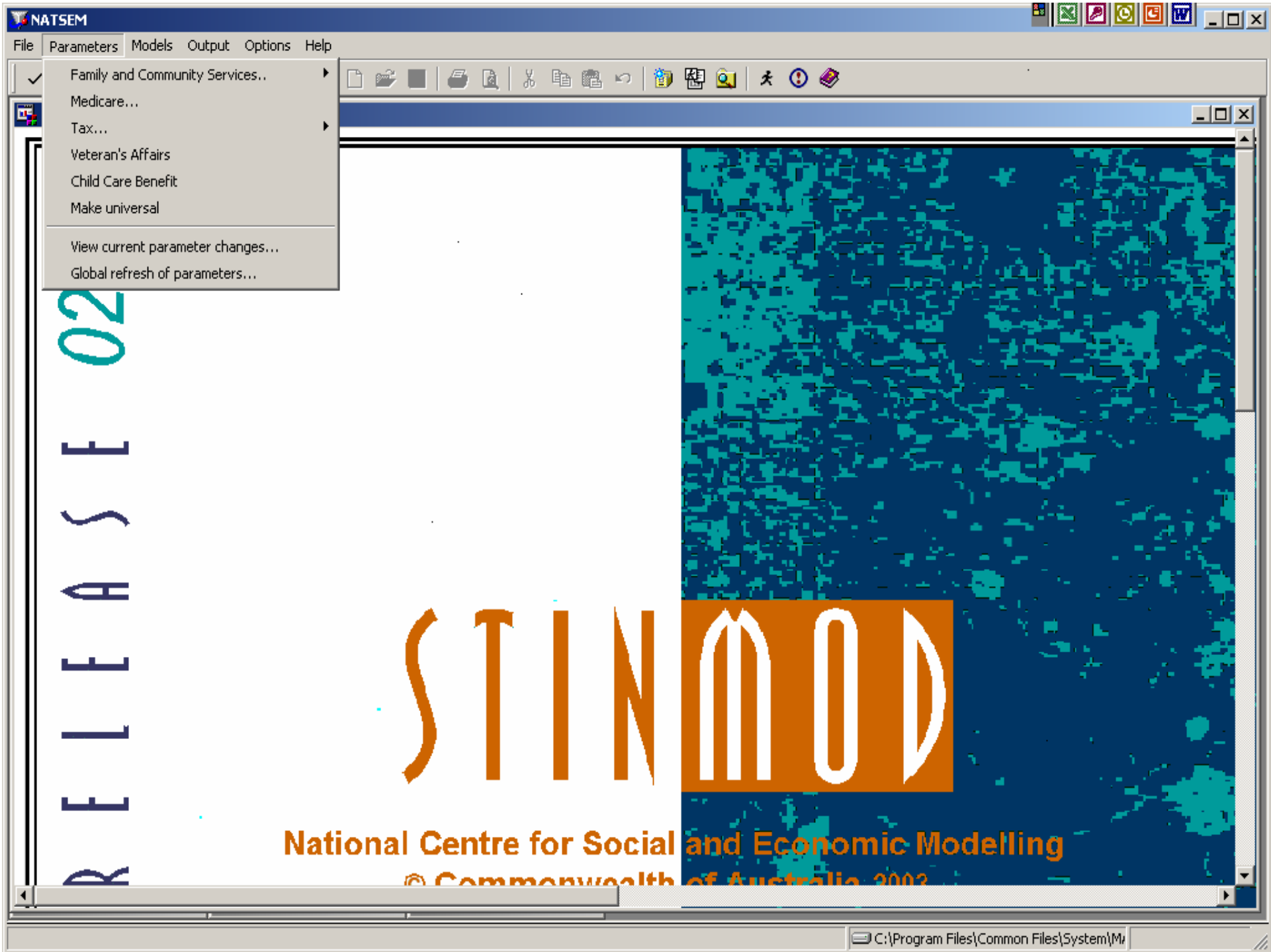
What are microsimulation models?

- Focus on individuals or households
- Start with large microdata sets (admin or sample survey)
- Primarily used to estimate impact of government policy change on these individuals or households
 - Impact on small sub-groups
 - Aggregate impact
 - Impact on government revenue or expenditure
- Types of models
 - static (the world today)
 - dynamic (projecting the future)
 - spatial



Imagine you are the Treasurer planning a tax cut

- STINMOD simulates all the major income tax and cash transfer programs (age pension, family payments etc)
- Built on top of ABS income survey data



NATSEM

File Parameters Models Output Options Help

Family and Community Services..

Medicare...

Tax...

Veteran's Affairs

Child Care Benefit

Make universal

View current parameter changes...

Global refresh of parameters...

RELEASE 02

STINMOD

National Centre for Social and Economic Modelling

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INCOME TAX SCALE PARAMETERS



Income Tax Scale Steps

Year 2003-04 average parameters

	Income	Marginal Rate
Step One	0	0.00
Step Two	6000	0.17
Step Three	20000	0.30
Step Four	50000	0.42
Step Five	60000	0.47
Step Six	.	.
Step Seven	.	.
Step Eight	.	.
Step Nine	.	.
Step Ten	.	.

0	0.00
6000	0.17
20000	0.30
50000	0.42
60000	0.47

0	0.00
6000	0.17
21600	0.30
52000	0.42
62500	0.47

OK

Refresh

Cancel

Outcome by Family Type and Income

Estimated Change in Family Disposable Income - \$ pw

2003-04 budget changes

Outcome: ALL

Population: All Recipients

Year 2003-04 Model Run

Weekly Taxable Income	Family Type				ALL
	Married no childr.	Married + children	Sole Parent	Single Adult	
< 150	0.02	0.31	0.09	0.03	0.04
150-299	0.26	0.66	0.01	0.33	0.29
300-449	0.42	1.17	2.08	2.79	1.52
450-599	2.05	4.16	4.77	4.70	4.05
600-749	5.14	4.15	4.50	4.03	4.32
750-899	5.51	5.09	4.11	4.00	4.59
900-1049	7.07	6.36	5.48	5.86	6.29
1050-1199	8.40	8.11	8.36	8.95	8.49
1200-1349	8.79	9.20	10.60	11.02	9.48
1350-1499	9.31	10.03	*	11.02	9.94
1500+	14.02	13.98	11.52	11.02	13.70
TOTAL	5.99	8.31	2.24	2.75	4.64

ESTIMATED ANNUAL PORTFOLIO OUTCOMES

2003-04 budget changes

Year 2003-04 Model Run

Portfolio	Base Outcome \$m	Simulation Outcome \$m	Difference \$m
Outlays			
FaCS	53308.582	53308.582	0.00
DVA	5826.440	5826.440	0.00
Revenue			
TAX OFFICE	89908.649	87359.085	-2549.56
Net Outcome			2549.56

Victorian Dept of Human Services Concessions Model

- Used to investigate impacts of pricing and concessions changes to utilities and rates.
- Interface allows users to make changes to the various utilities and concessions parameter screens.
- Output screens allow the user to analyse the outcomes in terms of changes to household expenditure and concessions outlays by the government.
- Can drill down to different groups within the population such as geographic region.

Concessions Model Electricity pricing screen.

Electricity Pricing

Supply Charge: per quarter

Consumption Charges	Consumption (Kilowatt hours)	Cents per Kilowatt Hour	
Residential Tariffs GD and GR			
Step 1	<input type="text" value="0"/>	<input type="text" value="12.48"/>	
Step 2	<input type="text" value="1020"/>	<input type="text" value="13.16"/>	
Step 3	<input type="text" value="."/>	<input type="text" value="."/>	
			Percent of total consumption
Off peak loaded Managed Storage Water Heating Tariff Y6/YT		<input type="text" value="4.05"/>	<input type="text" value="20.00"/>
Off Peak Storage Water Heating Tariff Y8		<input type="text" value="4.82"/>	<input type="text" value="20.00"/>
Off Peak Storage Space Heating Tariff J6/JT		<input type="text" value="4.05"/>	<input type="text" value="20.00"/>
Off Peak Storage Space Heating Tariff J8		<input type="text" value="4.82"/>	<input type="text" value="20.00"/>
Off Peak Storage Space Heating Tariff J		<input type="text" value="4.82"/>	<input type="text" value="20.00"/>

Simulated outcomes of supply price increase.

Detailed Outcomes

\$/yr change in expenditure from change in Supply Price - AGL

Outcome: Outcome Measure:

Region: Tenure Type:

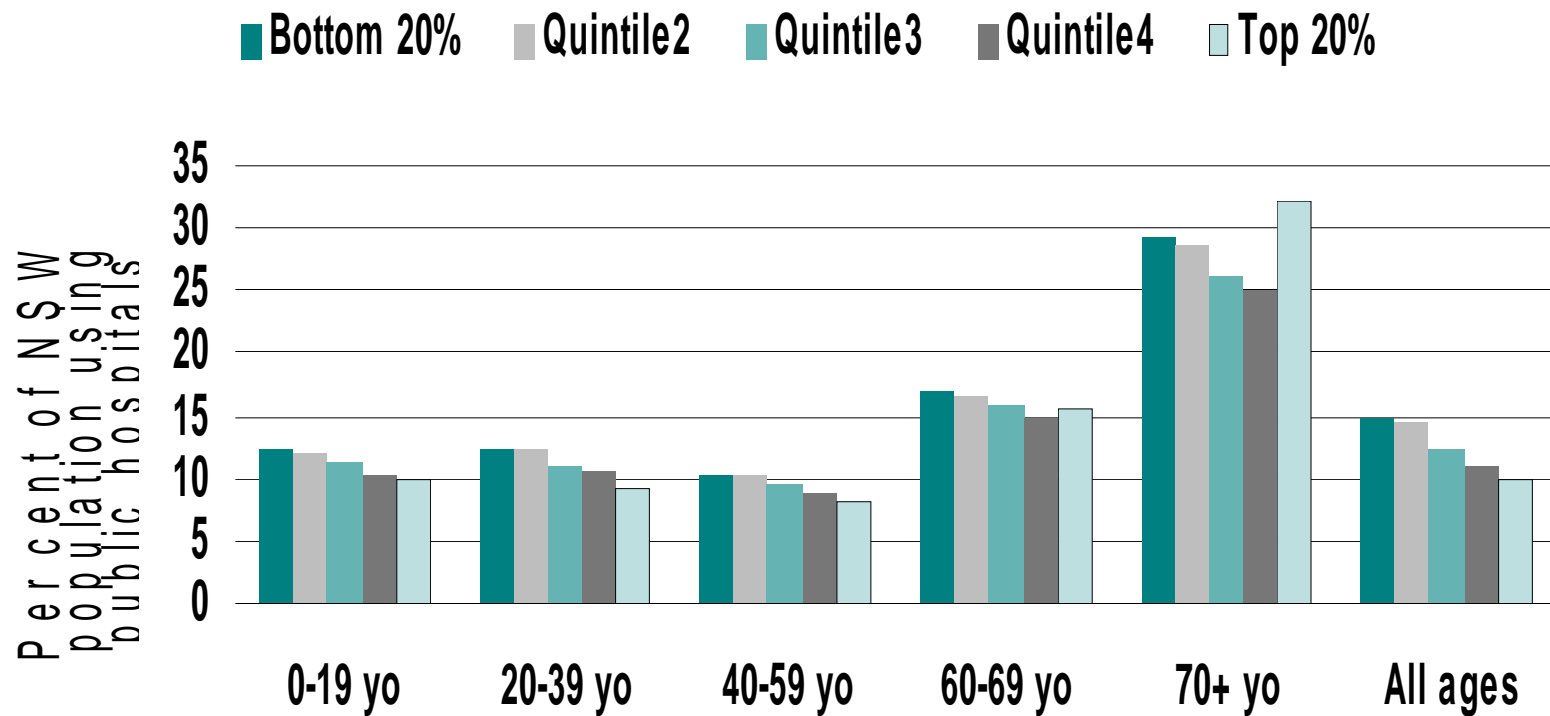
Household Type:

Annual Income of Reference Person	Household Type					All
	Couple	Couple With Dependants	Sole Parent	Single	Other	
No value	.	-29	.	0	-21.9	-18.7
< \$10000	-3.2	-6.6	-5.3	-4.8	-3	-4.6
\$10000-\$20000	0	0	0	.	0	0
\$20000-\$30000	.	-12.8	-13.8	.	0	-10.2
\$30000-\$40000						
\$40000-\$50000						
\$50000+						
All	-2.8	-10.4	-5.6	-4.5	-3.8	-5.3

Who uses NSW public hospitals: the rich or the poor?

- Have added measure of socio-economic status to NSW hosp administrative data
- Imputed income quintile of patients, by age, gender and the Census Collection District that they live in
- Policy questions:
 - Are poor more likely to use hospitals than the rich?
 - Are there differences between public and private hospital usage?

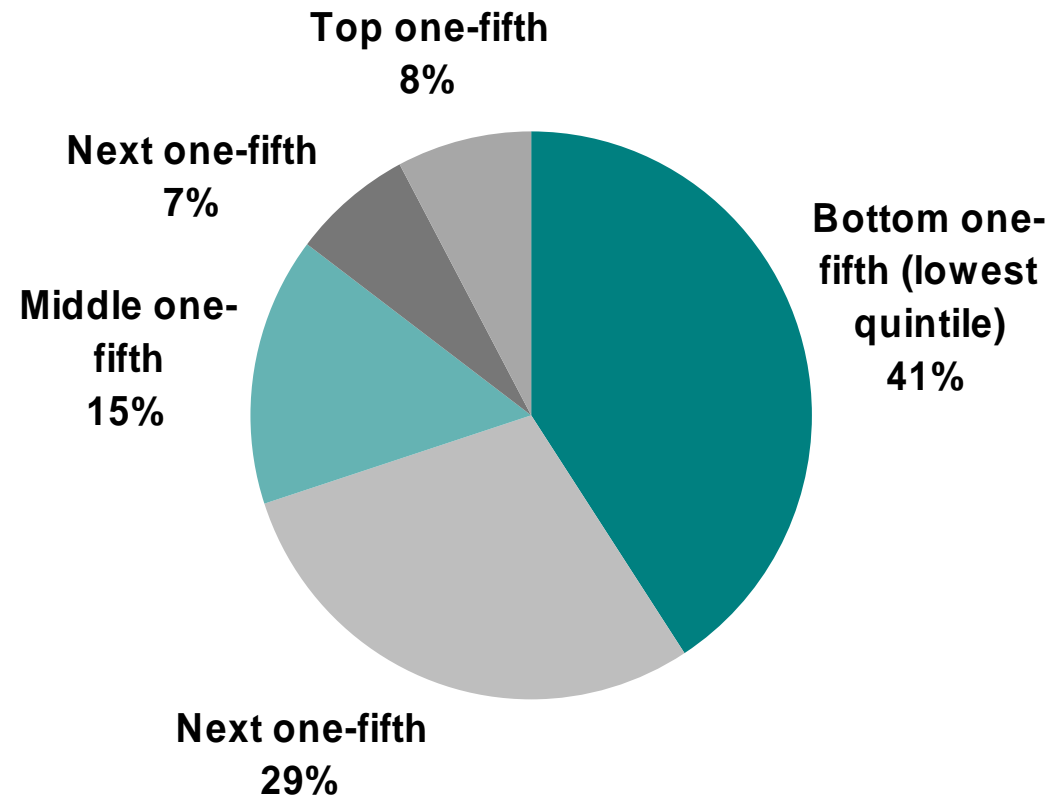
% of NSW population using public hospitals, 1996-97



You are the Health Minister thinking about an increase in PBS co-payments

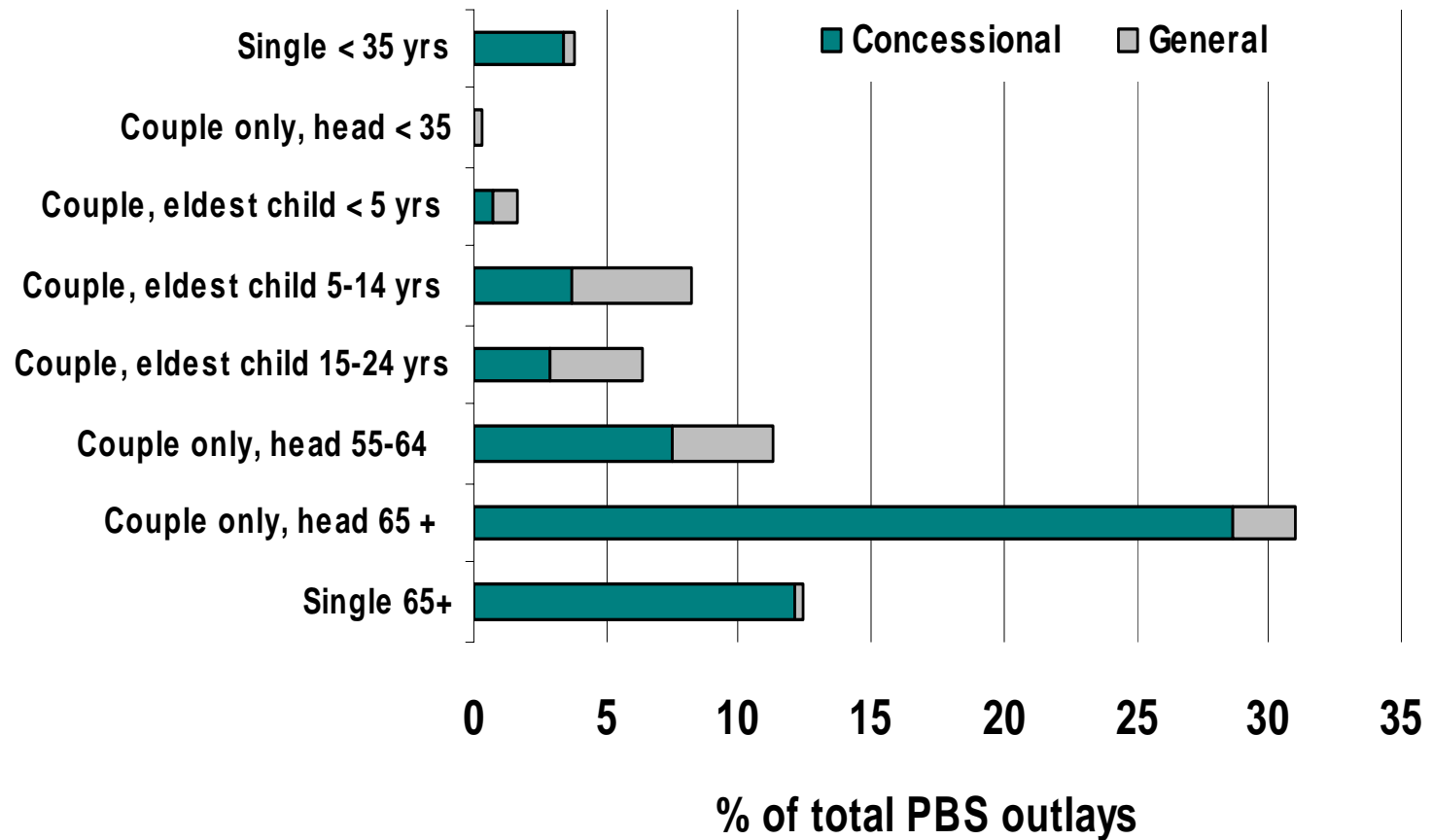
- PBS aims to provide affordable access to prescription medicines
- Concessional patients – paid up to \$3.60 per script in Jan 2002 (govt pays rest)
- General patients – paid up to \$22.40 per script in 02
- Cost Federal govt \$4.2 bn in 2001-02
- Intergenerational Report predicts PBS to be fastest growing area of Fed Govt spending to 2040

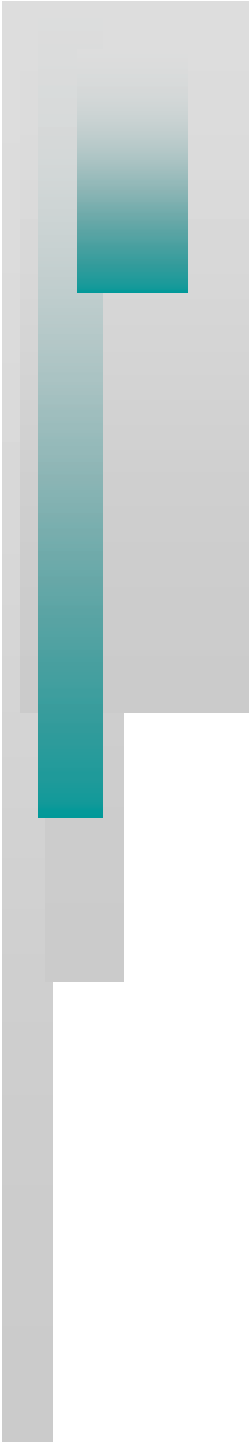
% of PBS outlays received by each income quintile of Aust'ns



Ranked by equivalent disposable income of their family using new OECD scales

% of PBS outlays by lifecycle group

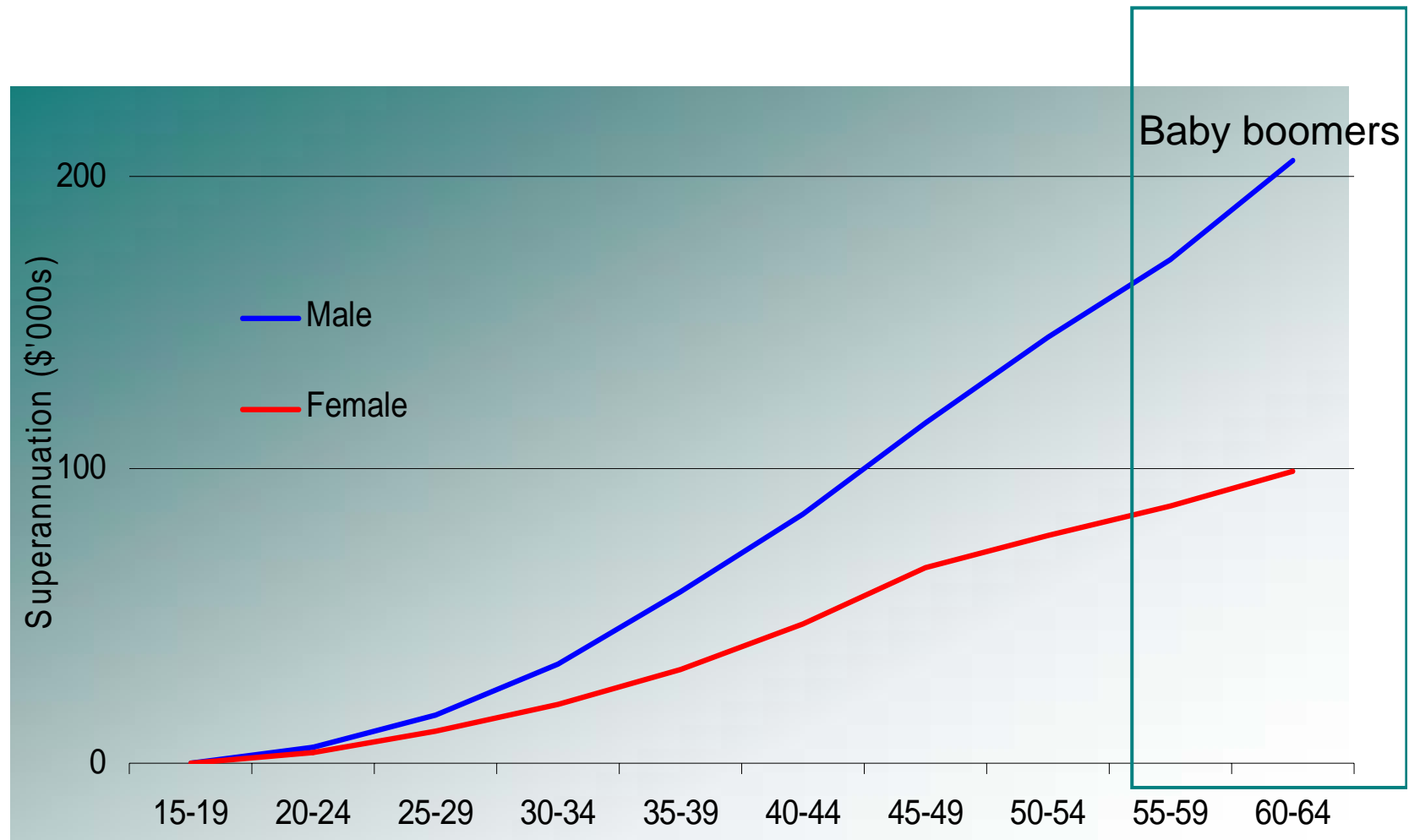




Have the baby boomers saved enough to live comfortably in retirement?

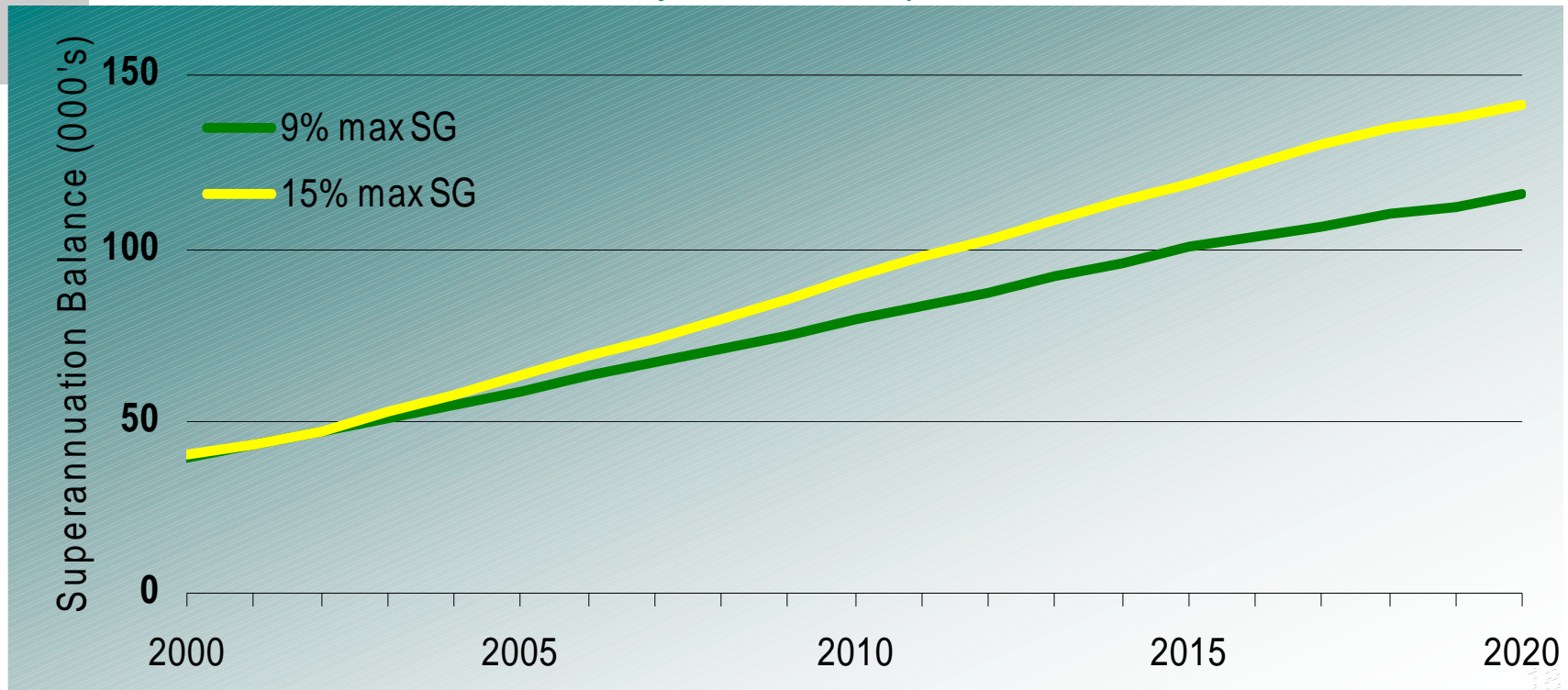
- Boomers born 1946-62 – huge cohort
- 65+ yr olds to rise from 16.7% of working age population in 2000 to 33% by 2030

Estimated superannuation balance for those not retired in 2020

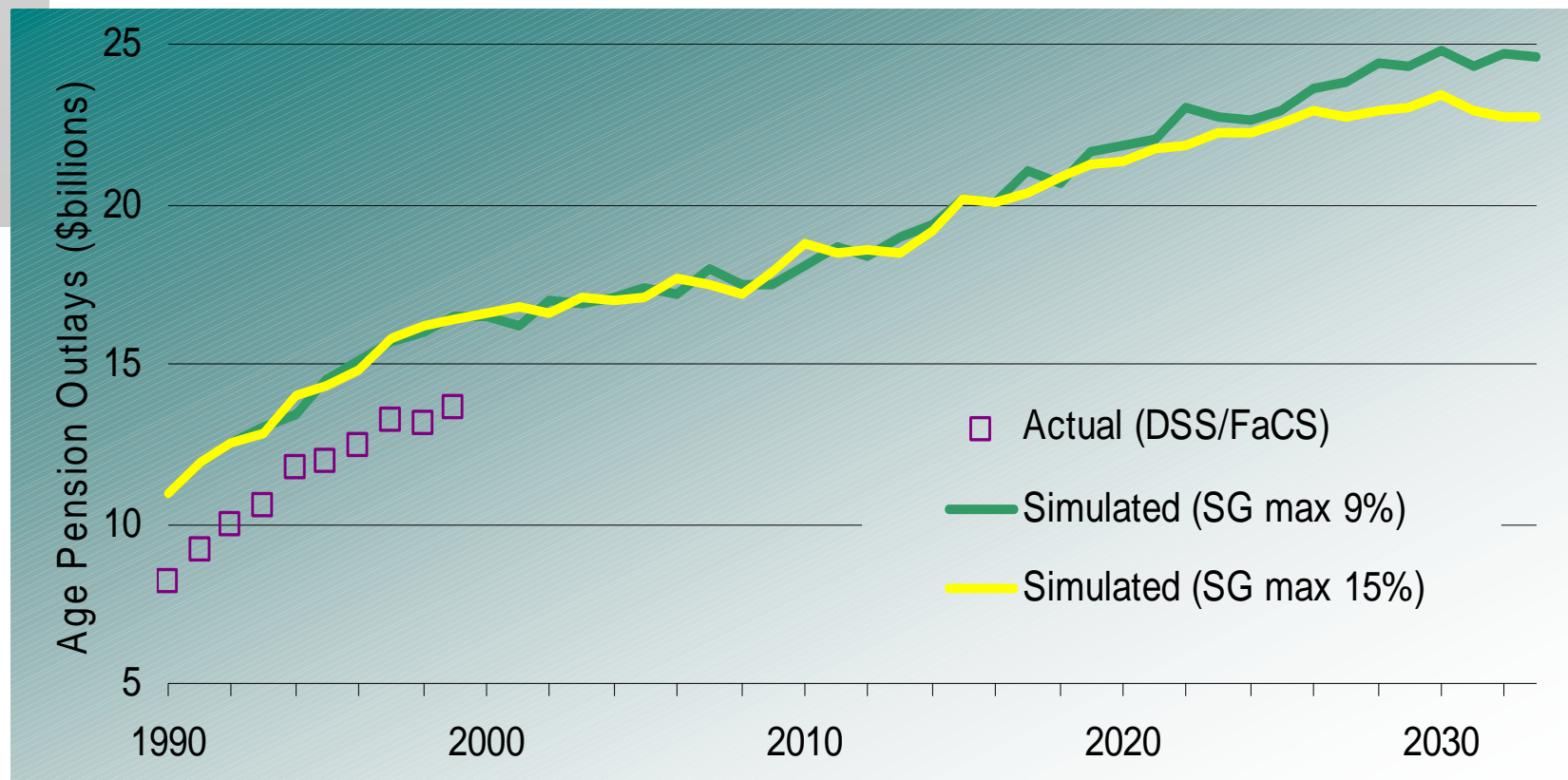


Can changing the SG rate help the boomers in their future retirement?

Non-retired Baby Boomers' superannuation balance

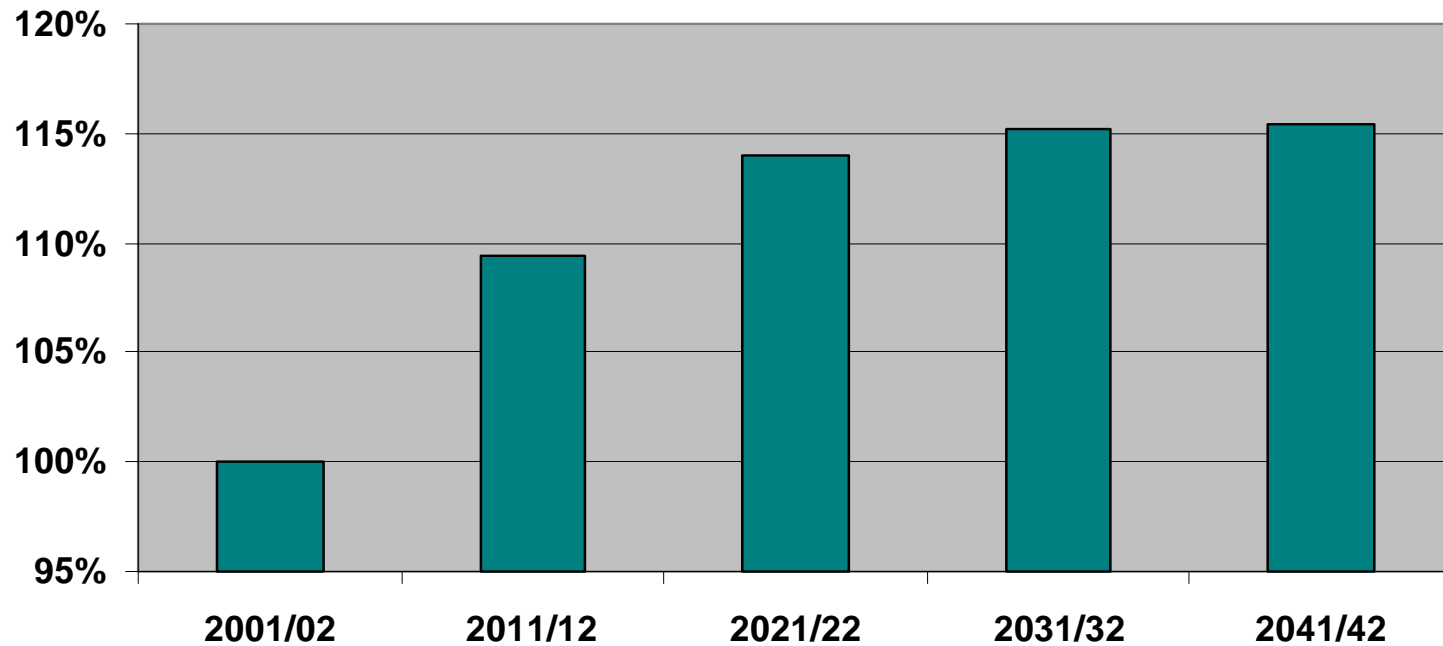


Doesn't help reduce Age Pension Outlays very much either



State govt worried about future number of concession card holders

Estimated % increase in no of concession card holders





The spatial dimension

- Key dimension of policy interest
- But standard microsimulation modelling hampered by low levels of geographic disaggregation

Result:

- The benefits to policy analysis of microsimulation have not flowed through to spatial (regional) issues

Characteristics of available datasets

	National surveys	Census of Pop & Hsg	?
Population detail	High	Medium	High
Geographic detail	Low	High	High

Synthetic Spatial Microdata

- Solution:

Combine the information-rich survey data with the geographically disaggregated Census data

- Using 'spatial microsimulation' to:

create detailed unit record data for small areas (synthetic spatial microdata)

- Results available for different areas, e.g.

Statistical Local Areas, Postal Areas, Census Collection Districts

Spatial microsimulation: Combining HES and Census Data

Source unit record data
(HES)

	Population chars	Aust weight
	$V_1 - V_n$	wt
Hhold 1	-	-
Hhold 2	-	-
...	-	-
...	-	-
...	-	-
Hhold m	-	-

Rewighting

Using Census
small-area
profile

Synthetic unit record data for
small areas

	Population chars	Weight for each small area
	$V_1 - V_n$	$wt_1 - wt_l$
Hhold 1	-	-
Hhold 2	-	-
...	-	-
...	-	-
...	-	-
Hhold m	-	-



Benefits of Creating Synthetic Spatial Microdata

- Allows – for small areas:
 - identification and analysis of specific socio-demographic groups
 - detailed and flexible analysis of population characteristics
 - analysis at various population levels:
e.g. persons, income units, households
- Provides the necessary platform for traditional microsimulation models
(to estimate the spatial impact of policy on particular groups within the population)

Applications at NATSEM

- MarketInfo – small-area household expenditure
- Centrelink – small-area projections of contact channel use
- SA Human Services – domestic violence
- AHURI – rent assistance, demand for housing assistance
- Geosciences Australia – community vulnerability
- ARC Linkage – Regional Dimensions

Queensland

Percentage of people in poverty, 2001 (before policy change)

□ Brisbane, Statistical Division

Percentage of people in poverty, 2001

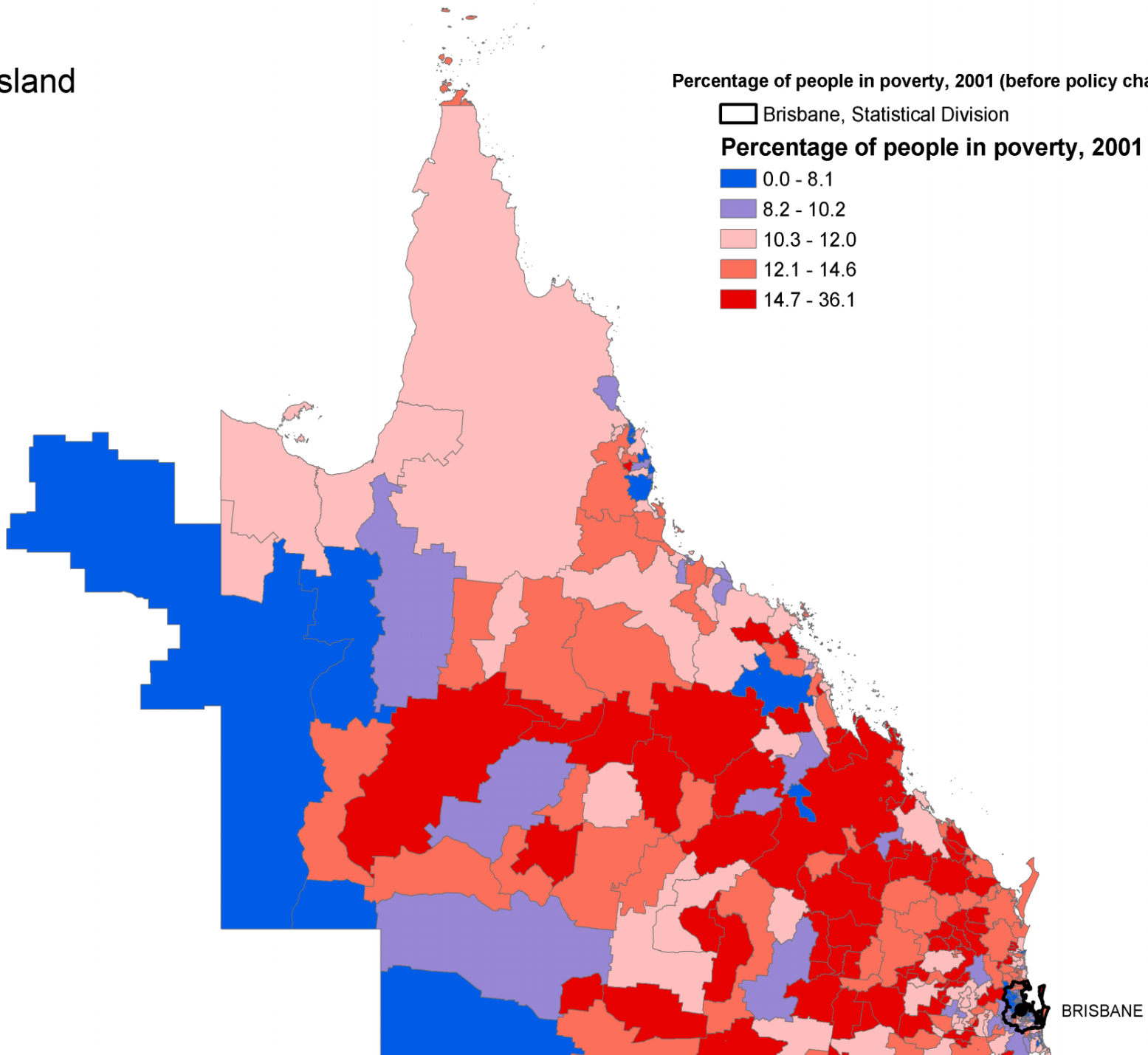
0.0 - 8.1

8.2 - 10.2

10.3 - 12.0

12.1 - 14.6

14.7 - 36.1



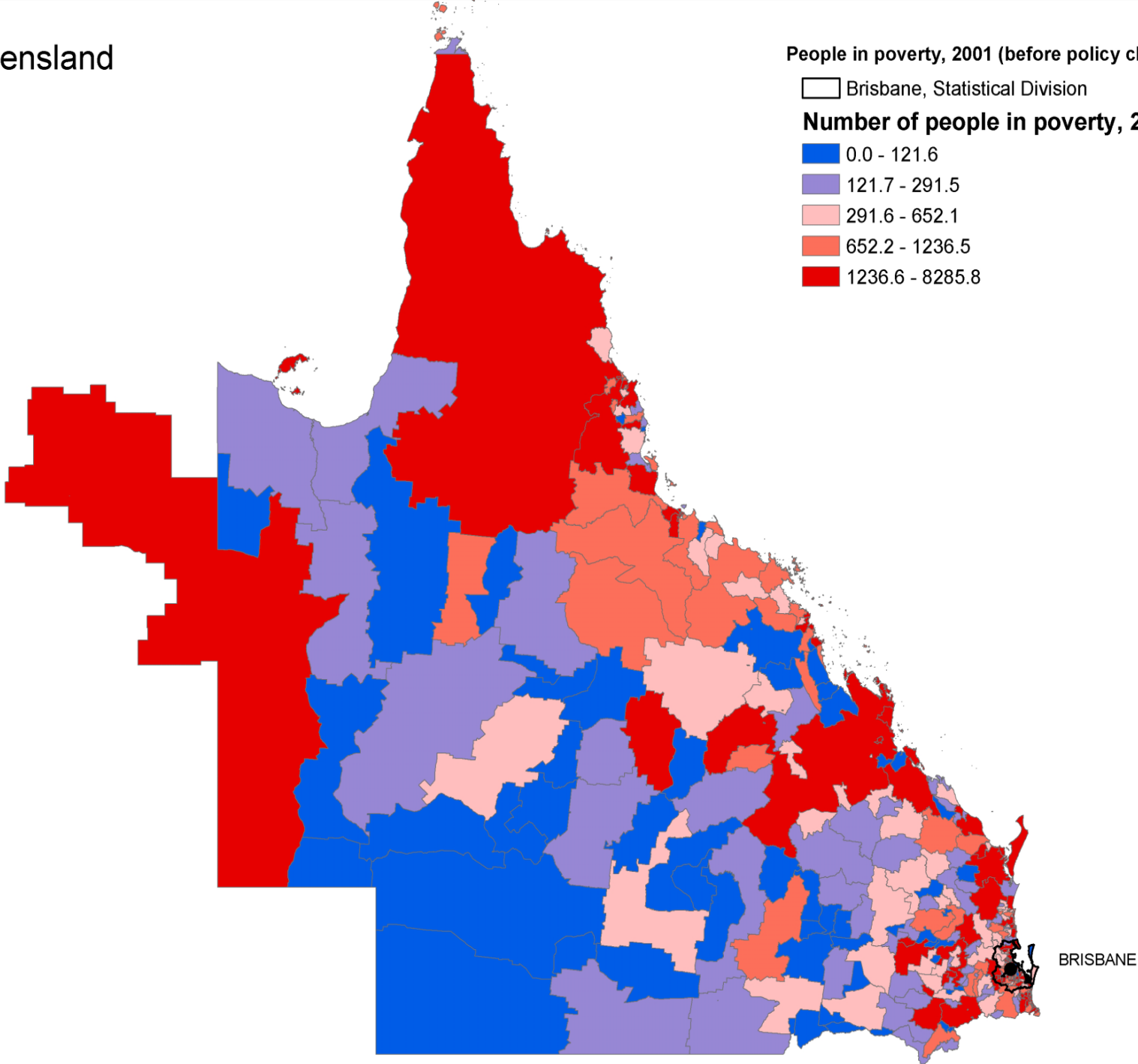
Queensland

People in poverty, 2001 (before policy change)

□ Brisbane, Statistical Division

Number of people in poverty, 2001

- 0.0 - 121.6
- 121.7 - 291.5
- 291.6 - 652.1
- 652.2 - 1236.5
- 1236.6 - 8285.8



BRISBANE

Govt concerned about future aged care needs and costs

- CAREMOD model to simulate current and future characteristics of older Australians
- At a detailed regional level (SLA)
- Imputing functional status and thus likely need for different types of care
- And forecasting future incomes and assets of old
- Industry partners: NSW Dept of Ageing, Disability and Home Care and Fed Dept of Health and Ageing

Conclusions

- Policy makers need to quantify the distributional impact of possible policy changes
- Who wins, who loses, by how much - and where do they live
- Both now and in 30 years time
- Major improvements in computing technology and data -> sophisticated decision support tools