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Valuing Australian Botanic Collections: A Combined Travel-Cost and Contingent Valuation Study

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Presentation Outline

- Background
- Research Questions
- Methodology
- Results
- Conclusions
- Acknowledgements



Background

- Biological collections not optimally utilised and often undervalued due to transaction costs.
- Botanic gardens face rising costs and a decline of their traditional uses in medicine and pharmacy (Garrod et al., 1993).
- Botanic gardens (and plant collections therein) also play a role as a public leisure amenity.
- About 40% of Australian population aged over 15 visits at least one botanic garden each year!



Selected Botanic Gardens

	ANBG (Canberra)	RBGM (Melbourne)	RBGS (Sydney)
Size (ha)	40	36	30
Total expenditures (\$M)	9.65	18.38	41.64
Own-revenue (\$M)	-	10.08	16.49
Govt. funding (\$M)	-	11.41	23.92
Total revenue (\$M)	10.45	21.49	40.41
No. of visitors (M)	0.43	1.71	3.85

Source: Annual Reports for financial year 2009-2010



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Research Questions

1. Since most botanic gardens charge no entry fees, a question arises as to the magnitude of benefits derived from free public access?
2. To gauge marginal willingness to pay (WTP) for an entry fee for access to botanic gardens.
3. Need to provide a convincing argument for the expenditure of large sums of public money needed to maintain biological collections?

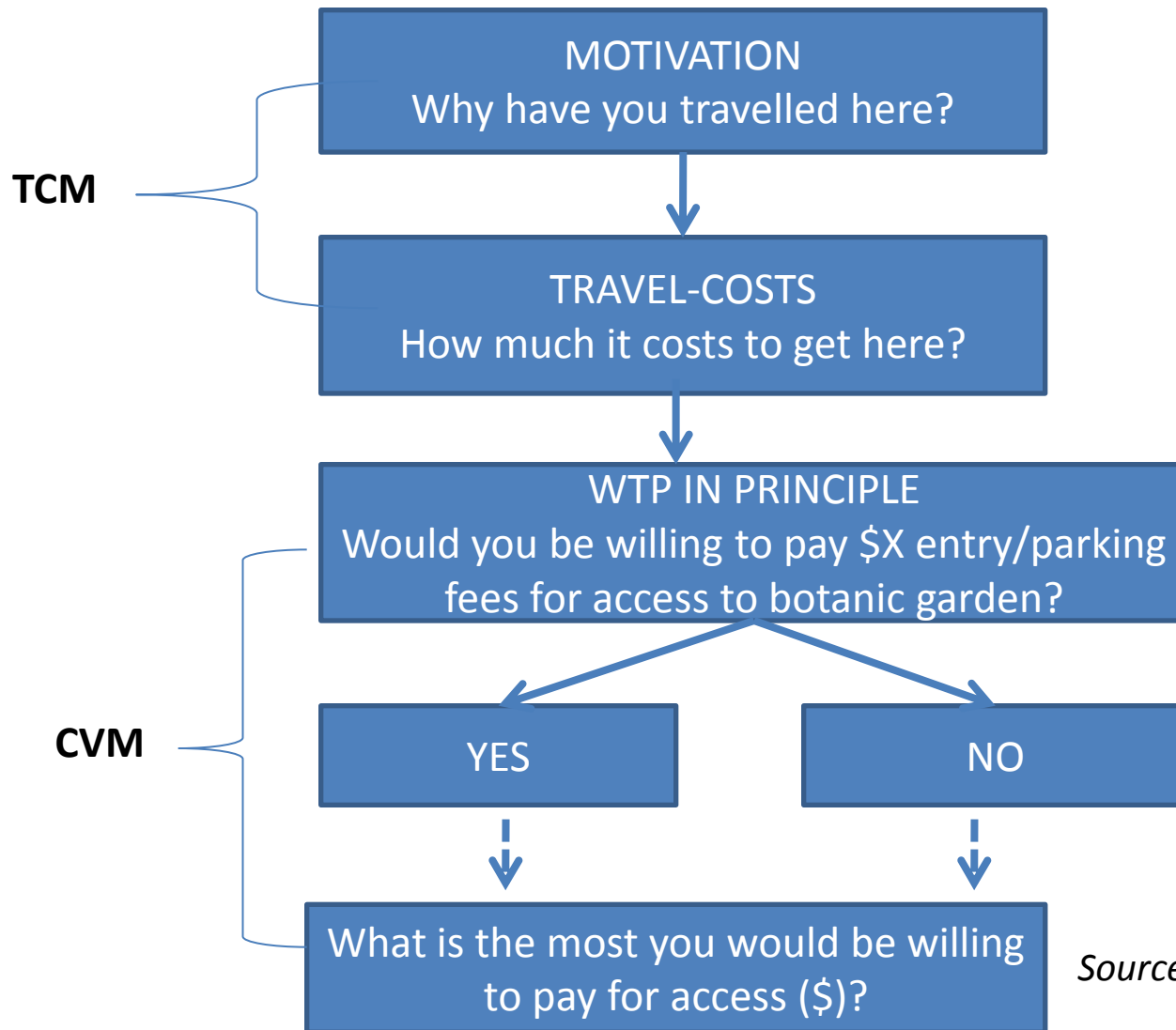


Methodology Outline

1. Travel-Cost (TCM) exercise to estimate the values visitors place on botanic collections.
 - ✓ This will address the question of what value visits to the botanic gardens are generating?
2. Contingent Valuation (CVM) exercise to query visitors for their willingness to pay (WTP) to gain access to botanic gardens.
 - ✓ The CVM will estimate WTP for entry in the form of a per unit price.



Methodology (cont)



Source: Garrod *et al.* (1993)

Individual TC Model

$$V_{ij} = f(TC_{ij}, SS_{ij}, X_{ij}, e_i) \quad (1)$$

$$\ln V_{ij} = \beta_0 - \beta_1 TC + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n \quad (2)$$

$$CS = -\frac{1}{\beta_1} \quad (3)$$

V_{ij} is the number of visits by individual i to botanic site j in past 12 months,
 Tc_{ij} is travel cost by individual i to gain access to botanic site j ,
 SS_{ij} is the dummy variable to capture substitute site j ,
 X_{ij} is a vector of socio-economic variables of individual i ,
 E_{ij} is the error term assumed to be normally distributed.

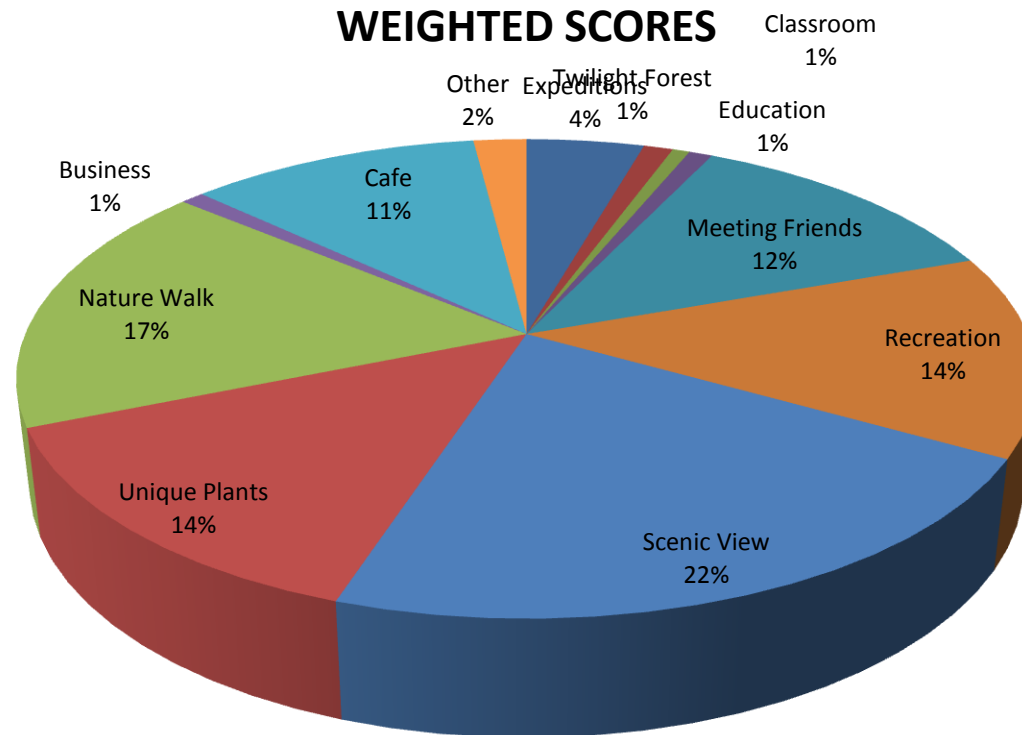


Survey Design

- TC/CV questionnaire using DC format with 7 bid levels (\$1 to \$10).
- Open-ended WTP follow up question.
- Follow up questions to detect problems.
- 2 pilot surveys.
- Full on-site surveys at 3 major botanic sites.
 1. ANBG Canberra (650)
 2. RBG Sydney (650)
 3. RBG Melbourne (300)



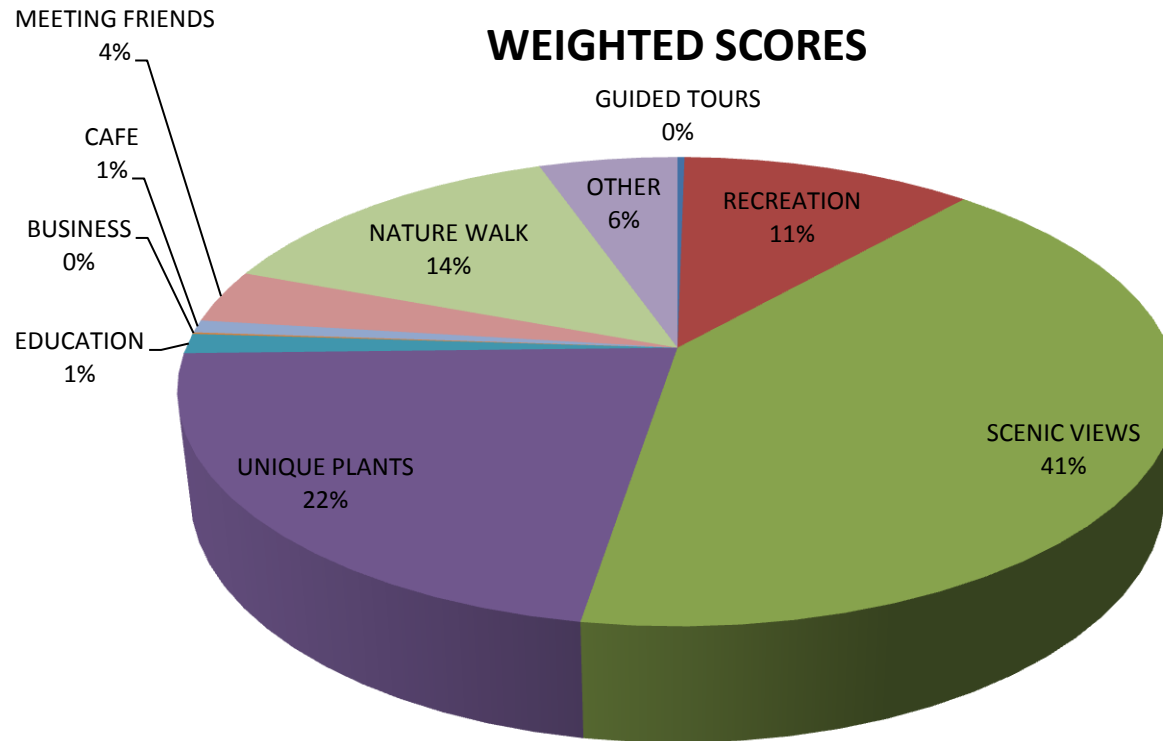
Results: What was the reason for your trip to the ANBG?



Source: ANBG survey (2010)



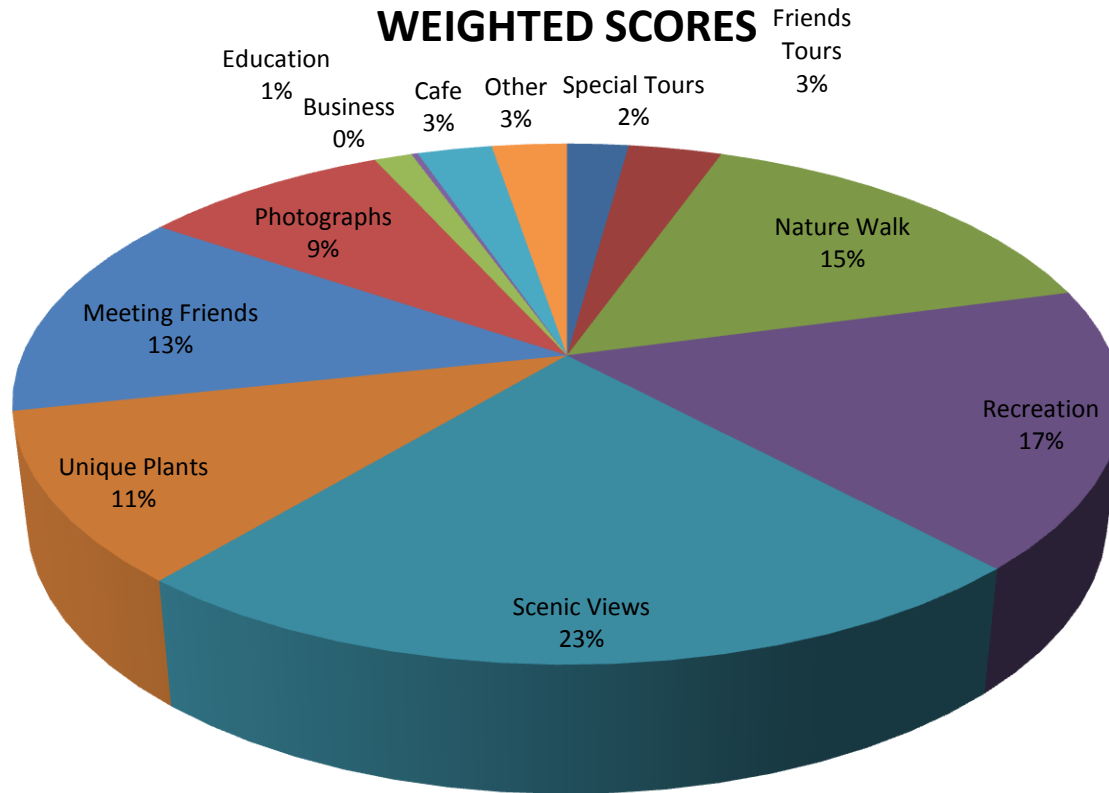
Result: Reason for trip to RBGM?



Source: RBGM survey (2010)



Result: Reason for trip to RBGS?



Source: RBGS Survey (2010)



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Estimated TC Models

Parameters	ANBG	RBGM	RBGS
Travel cost	-0.021 (-4.23) **	-0.008 (-5.59) **	-0.013 (-9.38) ***
Duration	-0.074 (-2.89) **	-0.106 (-2.59) ***	-0.127 (-10.56) ***
Substitutes	-0.058 (-2.62) **	-0.305 (-3.67) **	-0.571 (-17.24) ***
Income	0.001 (2.68) **	0.013 (6.11) ***	0.002 (5.07) ***
Age	-0.006 (-2.43) **	-0.001 (-2.44) **	-0.020 (-2.59) **
Gender	-0.3036 (-4.2) ***	-0.5086 (-5.98) ***	-0.2422 (7.68) ***
Constant	2.153 (16.33)	1.789 (10.30) ***	2.485 (48.35) ***
CS/trip (\$)	47.49	135.49	75.45



TC Results

- Travel cost is negative and highly significant ($p < 0.05$) in line with economic theory.
- Income, age and gender are highly significant .
- The CS per visit to ANBG, RBGM and RBGS are \$47.49, \$135.49 and \$75.45, respectively.
- Using mean length of the visit in hours (1.85 & 2.25), the CS estimate per hour is \$25, \$48 and \$29 for ANBG, RBGM and RBGS, respectively.



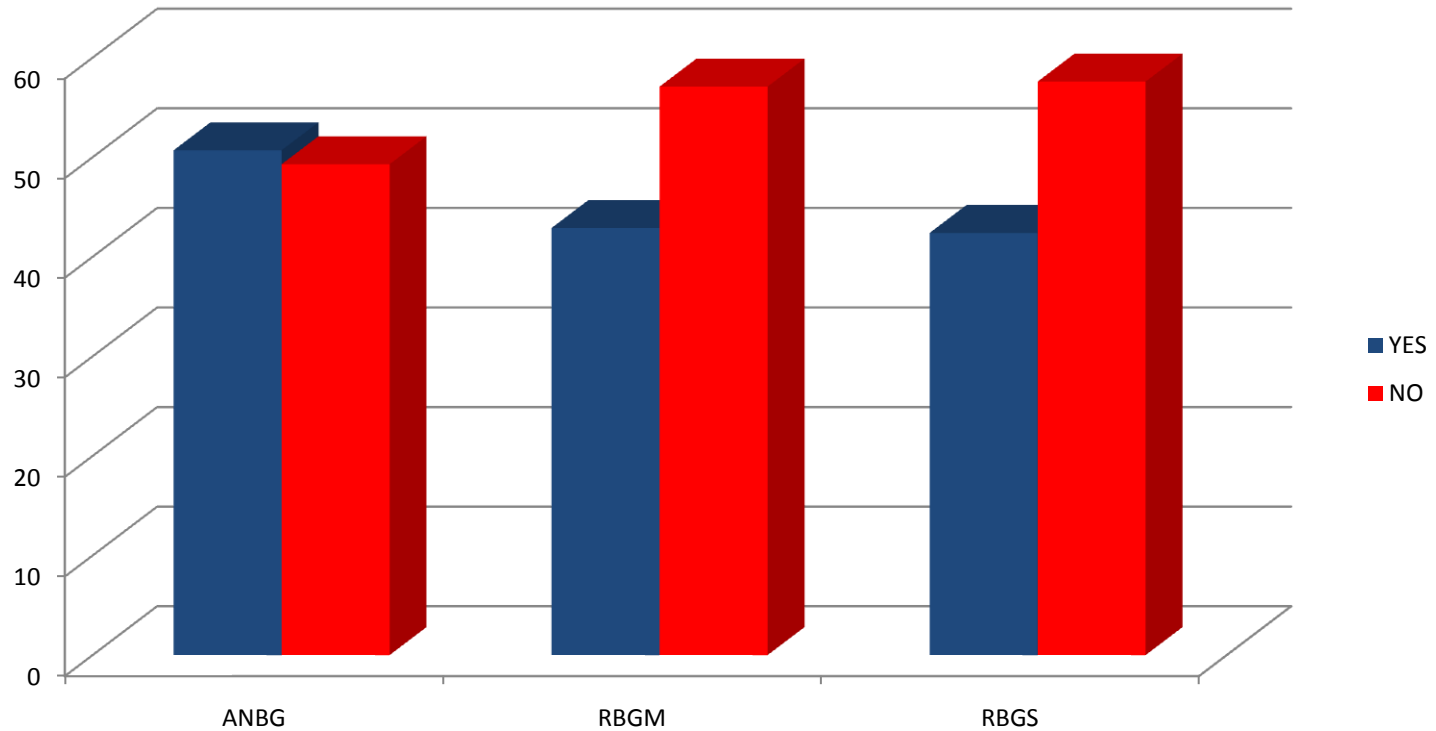
Consumer Surplus

	ANBG	RBGM	RBGS
Consumer surplus/trip (\$)	24.73	47.71	28.91
Proportion of travel costs	0.64	0.57	0.46
Total visitors per year	429,109	1,709,846	3,854,750
Total surplus (\$M)	6.79	46.50	51.26

- How do our estimates compare with others?
- Recreational value of botanic gardens in the UK was £0.26-£2.24 per trip (Garrod *et al.*, 1993)



CVM: Principle Payment Question

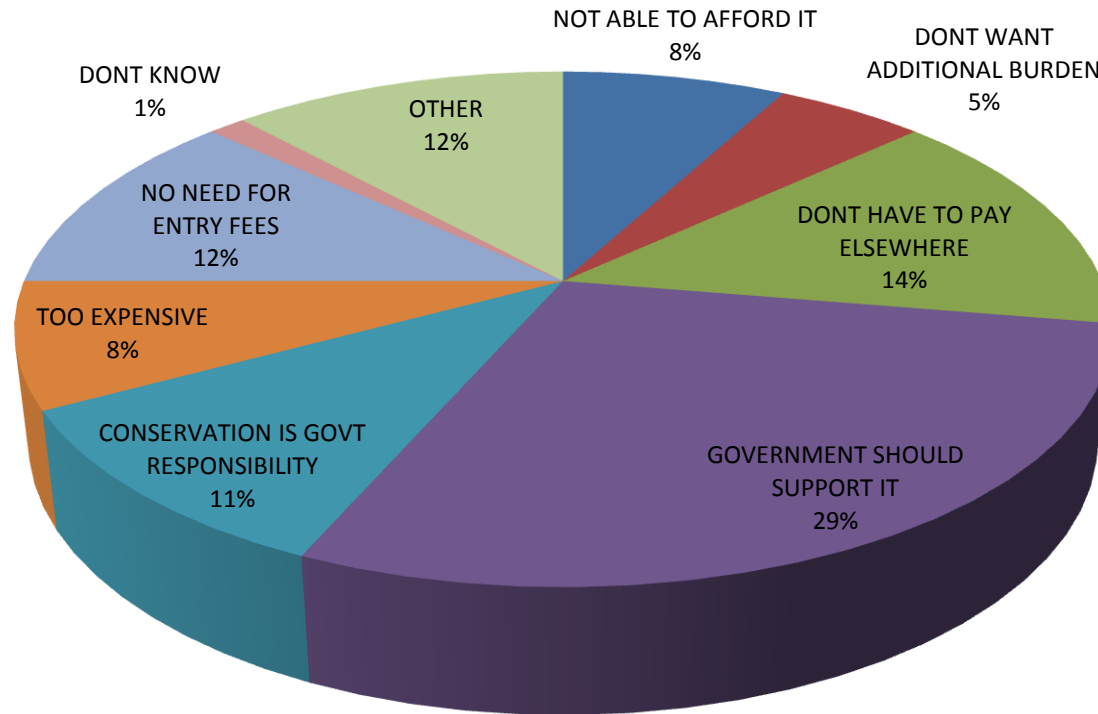


Would you be willing to pay entry fees of \$X for access to botanic garden?



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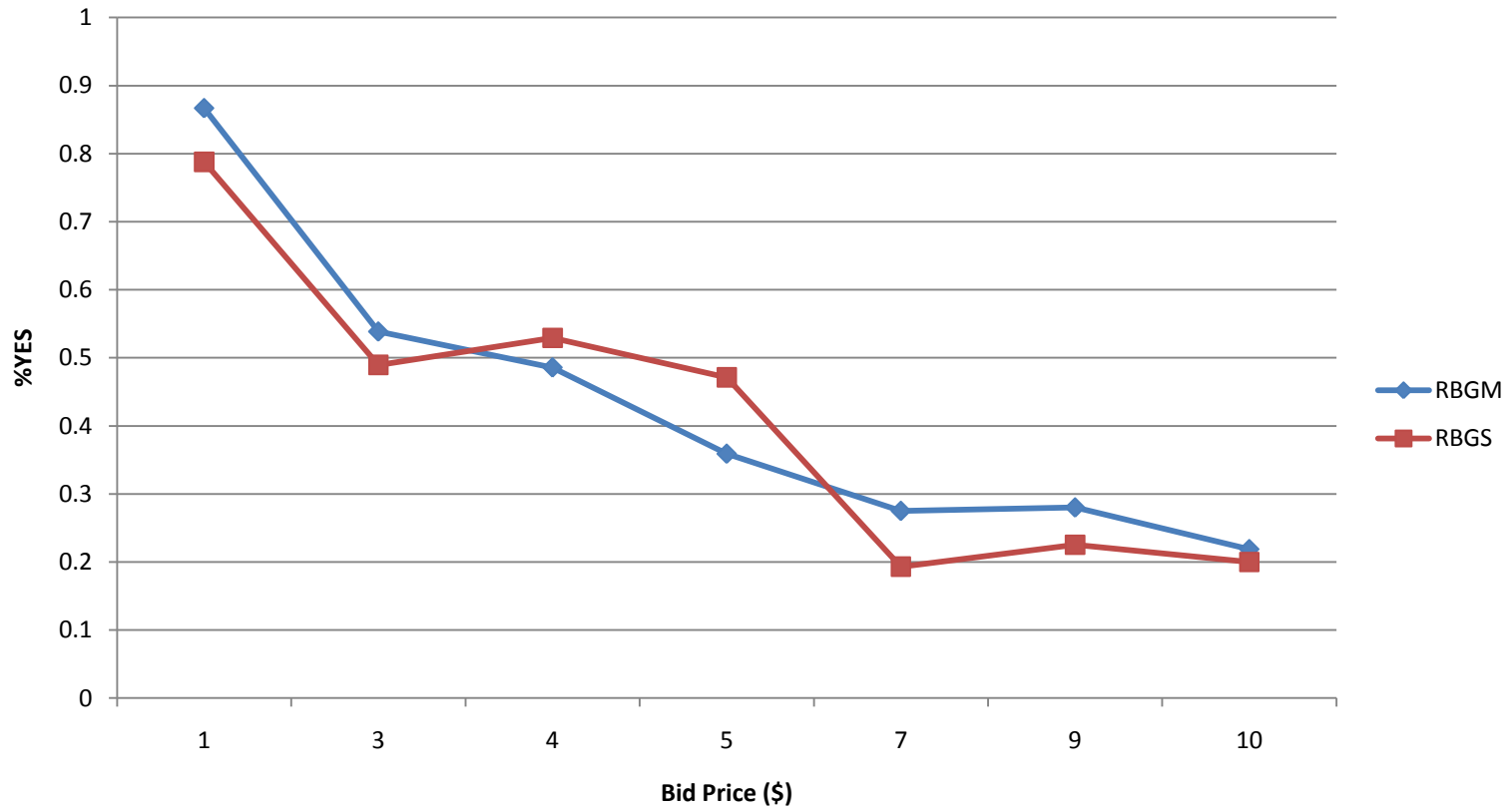
Reasons for 'opting out of the market'



Source: RBGS survey (2010)



DC Bid Curves

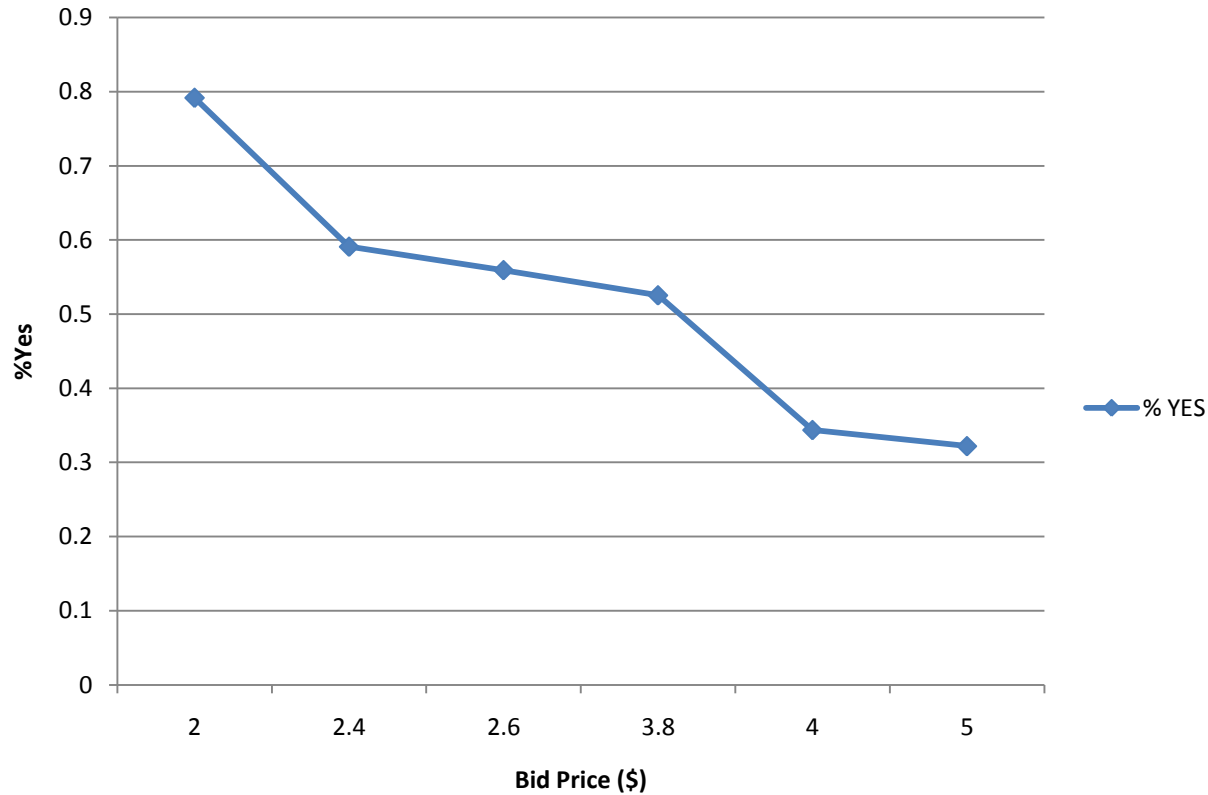


Proportion of respondents saying 'yes' declines with higher bid prices?



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DC Bid Curve (ANBG)



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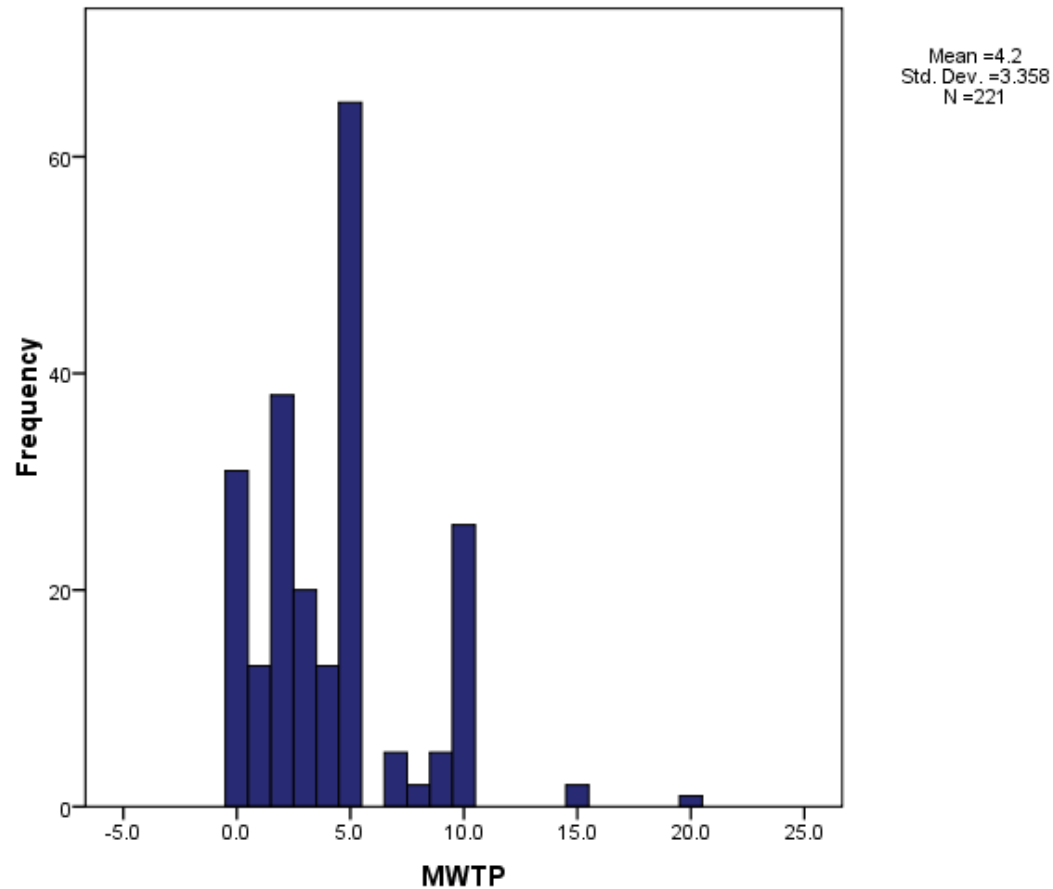
Estimated Logit Models

Parameters	Model 1 (ANBG)	Model 2 (RBGM)	Model 3 (RBGS)
Bid price	-0.6794 (-5.84)	-0.2841 (-5.34)	-0.2931 (-9.25)
Constant	-2.2644 (-5.81)	-1.2096 (-3.98)	-1.2141 (-6.74)
Log likelihood	-402.12	-147.26	-372.22
Chi-2 value	37.11	33.35	101.85
Obs.	607	240	621

The estimated coefficients on bid price have the expected negative signs and are statistically significant in all models.



Open-Ended WTP: RBGM

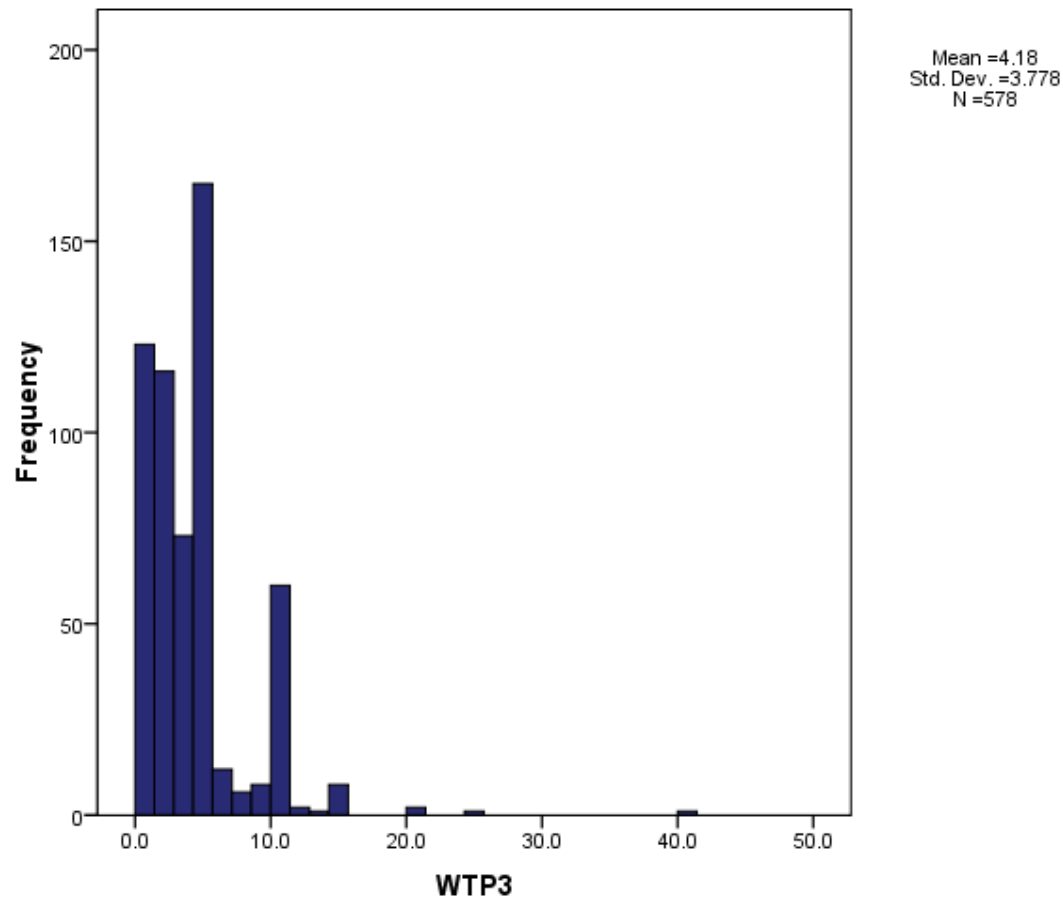


What is the most you be willing to pay via entry fees?



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Open-Ended WTP: RBGS

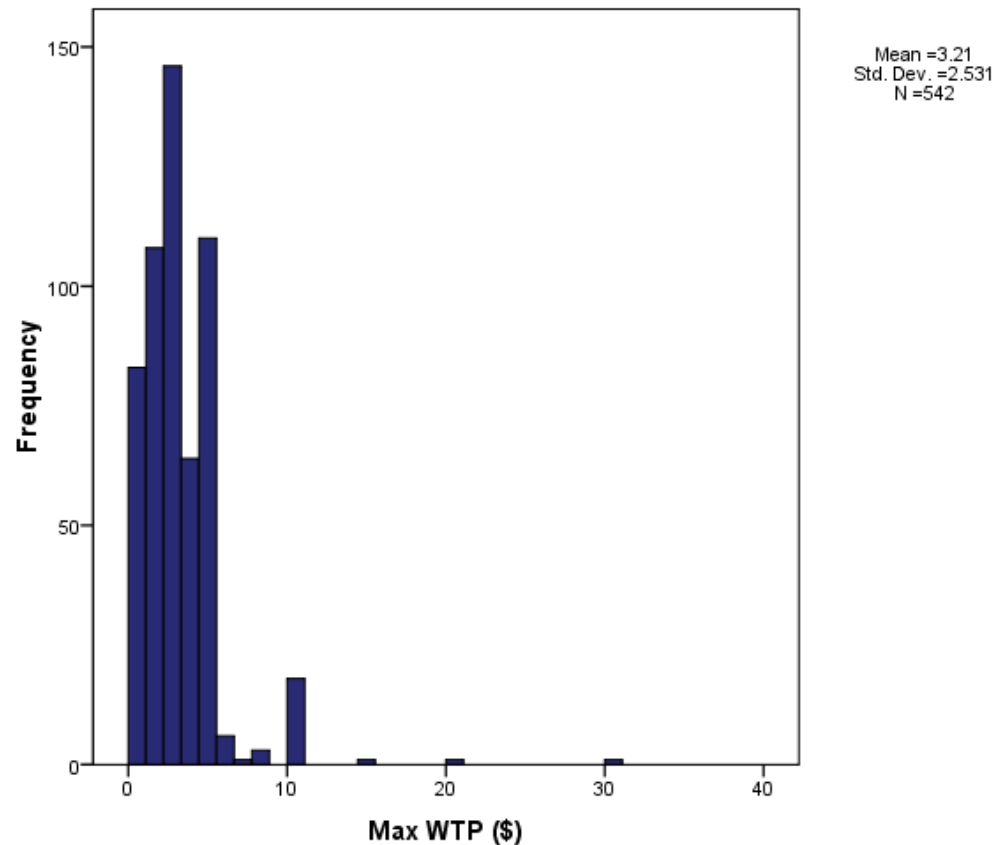


What is the most you be willing to pay via entry fees?



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Open-Ended WTP: ANBG



What is the most you be willing to pay via parking fees?



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Estimates of Mean WTP (\$)

Model	ANBG (parking fee)	RBGM (entry fee)	RBGS (entry fee)
Logit	3.48	5.18	5.03
Open-ended	3.21	4.20	4.18
Turnbull	2.97	4.11	3.81

All parametric mean WTP values are bounded from below by the estimated lower bound Turnbull means.



Conclusions

- Visitors place a relatively high price tag for recreational opportunities in botanic gardens.
- Average consumer surplus of \$34 per visit is large than estimates in other countries.
- But smaller than value of recreational fishing in Australia (\$167/trip: Prayaga *et al.* (2010)).
- Positive WTP for entry/parking fees (\$3-\$5).
- Welfare benefits of recreation outweigh the operational costs at selected botanic gardens!



Conclusion (cont)

- TCM and CVM results imply visitors with a high travel cost have a lower WTP for a policy change. Some budget constraint is active!
- The two methods are complementary in terms of obtaining the overall monetary values.
- The CVM is eliciting WTP for entry in the form of a per unit price while the TCM is estimating a consumer surplus. These are different things!



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