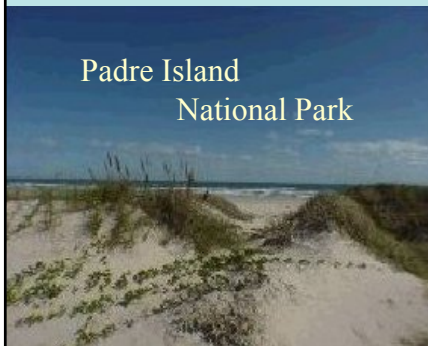


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Non-Monetary Values and Restoration Equivalents in a Random Utility Model of Beach Recreation



Padre Island
National Park

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Framework

- Purpose
- Model
- Data
- Results
- Conclusion

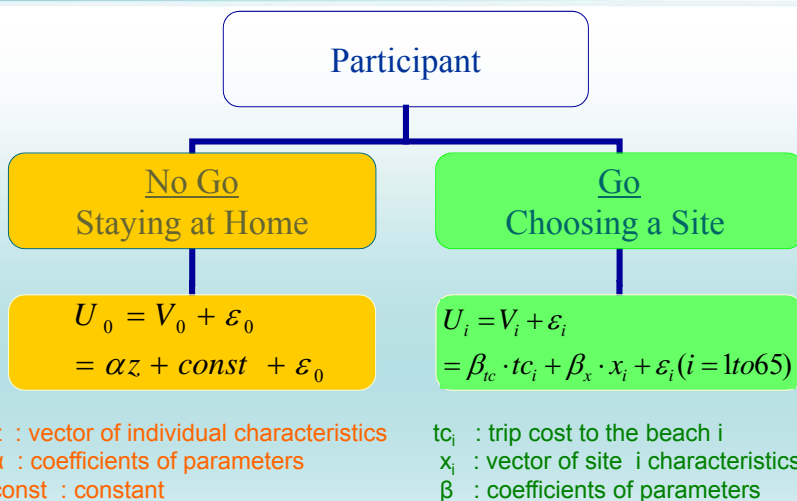
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Purpose

- Develop travel cost random utility model of beach choice in Texas to Value Beach Closures
 - Use choice data from survey of Texas residents
 - Choice model includes 65 beaches and a no-trip choice
- Special Interest in Non-Monetary Compensatory Policies in the case of beach closure due to oil spills

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Method 1: Random Utility Nested Logit



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Method 2 Compensatory Equivalents

$$V_i = V(tc_i, x_i, z, \alpha, \beta) \Rightarrow V_j = V(tc_j, x_j, z, \alpha, \beta)$$

$$V(tc_i, x_i, z, \alpha, \beta) = V(tc_j + C_{\text{monetary}}, x_j, z, \alpha, \beta)$$

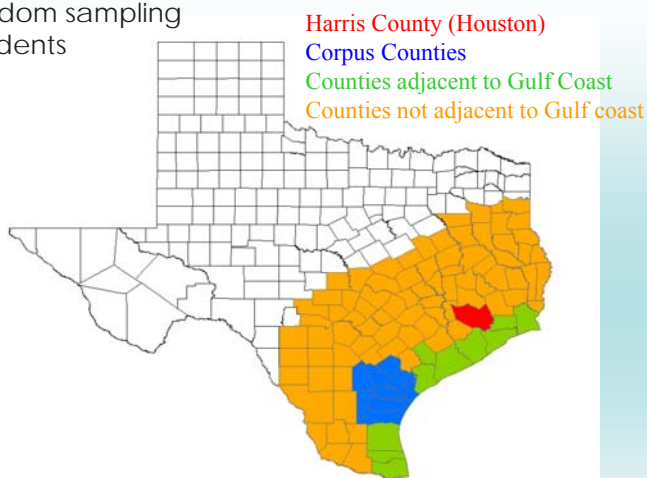
$$V(tc_i, x_i, z, \alpha, \beta) = V(tc_j, x_j + C_{\text{non_monetary}}, z, \alpha, \beta)$$

i: before beaches closure j: after beaches closure
 tc : travel cost x: site characteristic variables z: demographic variables
 α: coefficients of x and travel cost β: coefficients of z

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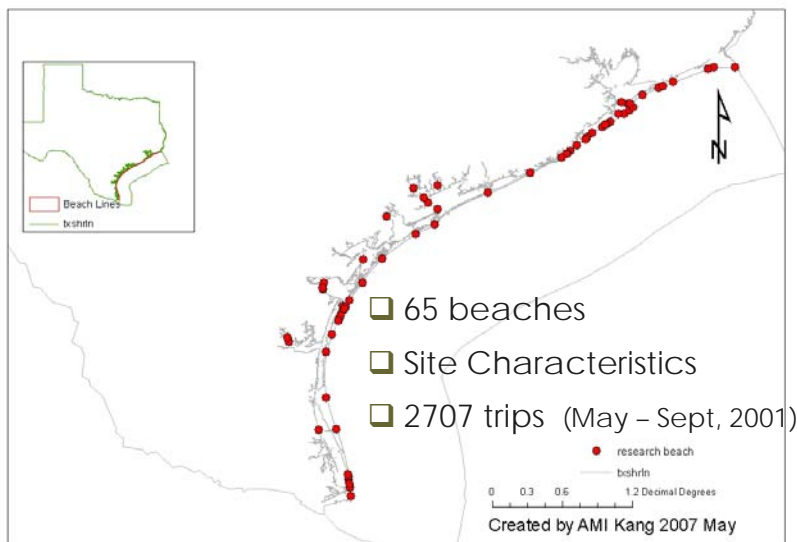
Data : Texas Residents

- Demographic Information
- Stratified random sampling of Texas Residents



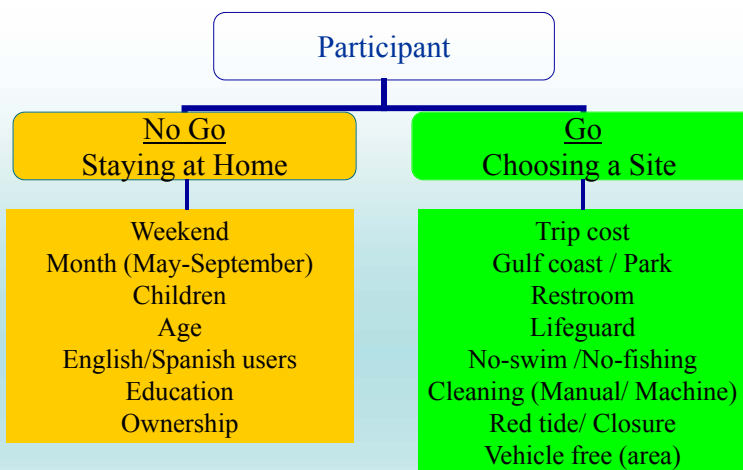
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Data: Choice Sets



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Variables used in the model



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Estimation Results: Participation

Variable	Coefficient Estimate	Variable	Coefficient Estimate
Constant	-8.4 (20)	May	.85 (8.1)
Weekend	1.2 (21)	June	.72 (6.7)
Kids	.14 (2.2)	July	.66 (6.1)
Age	-.02 (1.8)	August	.65 (5.7)
Age Sq	.0002 (1.5)		
Spanish	.11 (1.2)		
High Sch	-.20 (2.7)	N = 884	
College	.14 (1.8)		
Grad Sch	.43 (4.4)		
Full Job	.20 (3.3)		
Cottage	.33 (3.3)		
Boat	.41 (6.6)		
Pool	-.28 (3.9)		

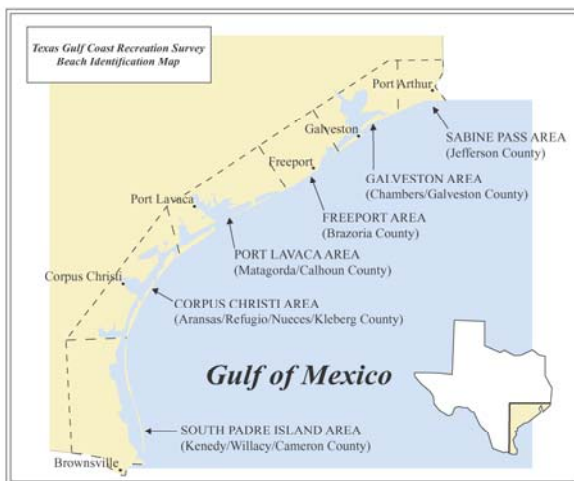
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Estimation Results: Site Choice

Variable	Coefficient Estimate	Variable	Coefficient Estimate
Trip Cost	-.022 (27)	Region2	1.1 (3.9)
Gulf	.42 (3.0)	Region3	2.0 (4.5)
StatePark	.22 (0.8)	Region4	.83 (2.3)
Padre	1.25 (5.2)	Region5	1.4 (4.4)
Rest Room	.59 (6.3)	Region6	1.6 (4.7)
Lifeguard	.22 (2.1)	Length	.25 (8.3)
Concessions	-.51 (5.0)	Inclusive	.73 (17)
Machine Clean	.85 (7.6)		
Manual Clean	.35 (3.0)		
No Fish	-.069 (.58)	N = 884	
No Swim	-.82 (3.7)	Trips = 2707	
Remote	-.11 (1.0)	Sites = 65	
Auto Free	.65 (4.9)		
Auto Free Area	.30 (2.1)		
Closure	-.74 (3.6)		
Red tide	-1.63 (5.0)		

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Monetary Values



Total Loss for a Week Day in May	\$129,078
Per Trip Loss	\$39.77
Total Loss for a Weekend Day in May	\$390,746
Per Trip Loss	\$39.98

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Non-Monetary Compensatory Values

$$V(tc_i, x_i, \beta) = V(tc_j, x_j + C_{non_monetary}, \beta)$$

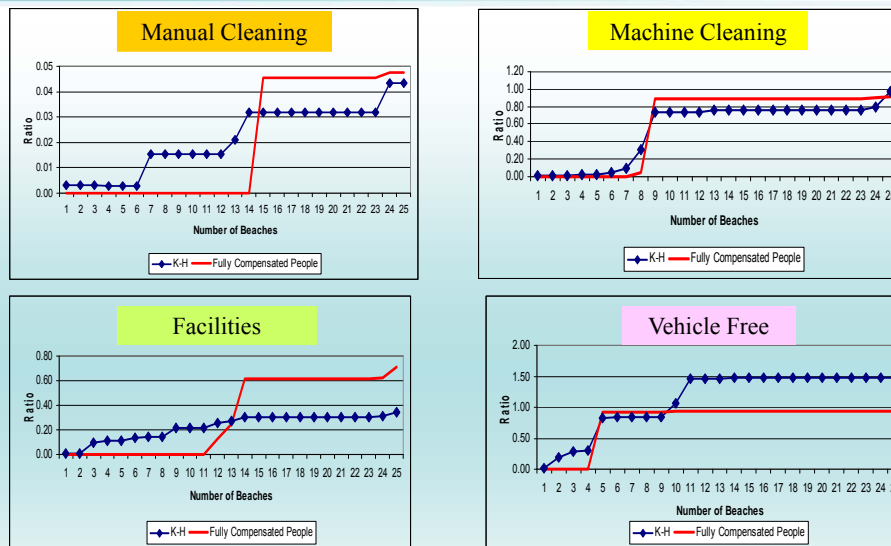
$$\sum_{k=1}^{884} \sum_{i=1}^{66} V(tc_{ik}, x_{ik}, \beta)$$

$$= \sum_{k=1}^{884} \sum_{j=1}^{60} V(tc_{jk}, x_{jk} + C_j, \beta)$$

- What *percentage of whole social welfare* loss will be compensated with new public service in the undamaged beach? [Kaldor-Hicks Criteria]
- What *percentage of the people* will be fully compensated with new public service in undamaged beach? [%]

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Application of Non-Monetary Equivalents Compensatory Policy: *Near Beach Strategy*



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Conclusion & Future works

- Quantifying and evaluating the social welfare contribution of non-monetary compensatory equivalents will be plausible to develop compensation policy in the RUM model.
- Mixed logit and more specified nested logit model are developed to improve the Texas beach demand model.
- The cost of implementation of different non-monetary compensatory policies will be considered.
- Updating site characteristics, which have potential as non-monetary compensatory equivalents, will be useful to develop more flexible public policy.

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