Improving Value Estimates for Restoration of Mississippi's Barrier Islands

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General Problem

❑ The contingent valuation (CV) method is a stated preference approach to measure the value of non-market goods

 ▪ NOAA panel declared that CV is reliable valuation method following the Exxon Valdez oil spill case

❑ Single-bound (SB) vs. Double-bound (DB) dichotomous choice questions

 • Single-Bound Method:
   Would you be WTP $10 for an improvement in air quality
   from x to y? (Yes/No)
 • Double-Bound Method:
   Adds a follow-up depending on initial response:
   (If Yes to $10): Would you be WTP $20? (Yes/No)
   (If No to $10): Would you be WTP $5? (Yes/No)

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Pros and Cons between SB and DB

For the Single Bound Method

Pros:

- The simplest and most often utilized dichotomous choice method

Cons:

- It collects so little information from each respondent

For Double Bound Method

Pros:

- Improves reliability of responses
- More statistically efficient with more observations
- Tighter welfare estimates

Cons:

- Starting point bias
- Shifting effect
- Strategic bias

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Quasi-Double Bound Method

❑ This study develops and proposes a new method (called Quasi Double-Bound) to improve efficiency relative to SB method but does not suffer from biases of DB method

❑ The QDB method works by having respondents evaluate three different programs in the same survey instrument

❑ Assumptions

1. Only fundamental difference between the three scenarios is quantity

2. Utility is Non-decreasing in quantity

Example of QDB method

WTP $5?

WTP $4?

WTP $2?

Pros and Cons for QDB Method

Pros:

❑ By providing explicitly different prices and quantities for each program:

- ▪ Likelihood of respondent substituting own perceived quantity/quality contrary to researcher's intention (shifting effect) should be reduced

- ▪ Likelihood of creating a perceived bargaining situation (strategic bias) should be reduced

Cons:

❑ The QDB method requires 3 referendum questions, whereas DB requires 2 questions

- ▪ increased respondent fatigue

- ▪ ordering effect (similar to starting point bias): case where the position of a question in a sequence affects responses

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Specific Problem

❑ Petrolia and Kim (2009) measured Mississippi's coastal residents' WTP for restoration of the Mississippi's barrier islands with three different options: Status-Quo, Pre-Camille (1969), and Pre-1900

❑ We apply QDB method to obtain alternative welfare estimates for the Pre-Camille option by incorporating data from the smaller scale Status-Quo and larger-scale Pre-1900 scenarios (Pre-Camille is the option most discussed by policy makers)

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Research Objectives
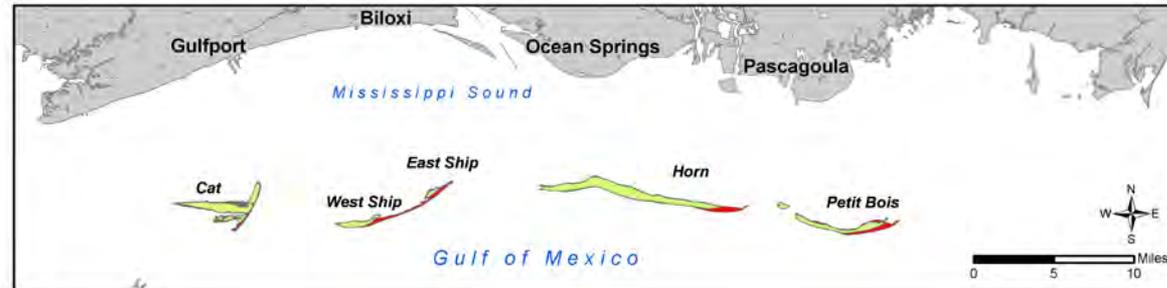
❑ Estimate Willingness to Pay (WTP) for restoration of Mississippi's Barrier Islands to the Pre-Camille scale using the Quasi Double-Bound method

❑ Test for consistency of QDB method and compare the efficiency and WTP estimate between the SB and QDB methods

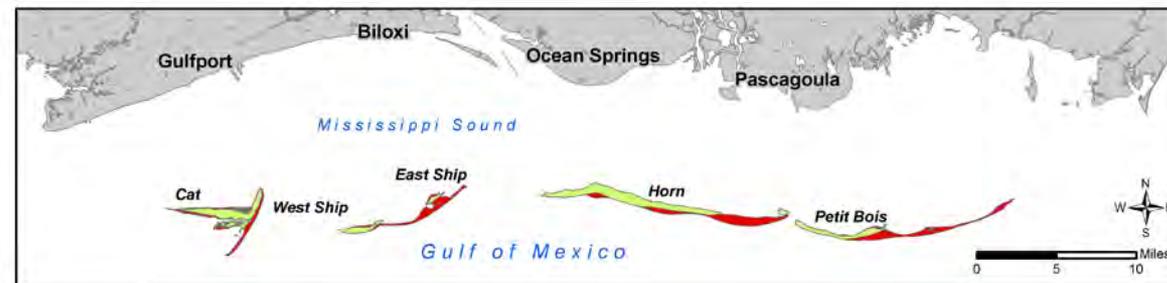# Study Area and Market Scenarios

Status Quo (current)

Pre-Camille (1969)

Pre-1900

*Special thanks to Carter and Blossom (Gulf Coast Geospatial Center) for providing maps

Survey Data

❑ Survey was conducted in summer of 2008

❑ 12 pages, 37 questions

❑ Mailed to 3,000 Mississippi households: half to a random sample of coastal residents, half to remaining 79 non-coastal counties

❑ 594 surveys returned (20%)

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Empirical Model: Dependent and Explanatory Variables

Variable	Description	Exp.Sign
Vote	=1 if willing to pay $X , =0 if not willing to pay $X	
Bid	Offered bid	-
Protection	Dollar allocation for Protection of the Mississippi coast from hurricanes and other hazards	+
Improvement	Dollar allocation for Improvement of Hurricane protection structure	-
Government	1 if No confidence; 0 otherwise	-
Reducing Damage	4 if importance of MSBI to reduce damages from storms and hurricanes is perceived as extremely important; 3 if somewhat important; 2 if no opinion; 1 if not important	+
Income	1 if < $20K; 2 if $20K -$40K; 3 if $40K-$60K; 4 if $60K-$80K; 5 if $80K-$100K; 6 if $100K or more	+
Comfort	1 if comfortable with survey questions; 0 otherwise	-
Question Order	1 if order of restoration question is descending; 0 otherwise	+/-

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Selected Results: Unbounded Probit Model

Variable	SB (N=444)			QDB (N=664)		
	Coef.	S.E	M.E	Coef.	S.E	M.E
Bid	-0.003**	0.001	-0.001	-0.007**	0.001	-0.002
Income	0.169**	0.045	0.052	0.156**	0.040	0.040
Protection	0.010**	0.004	0.003	0.009**	0.003	0.002
Improvement	-0.007*	0.003	-0.002	-0.005*	0.003	-0.001
Reducing Damage	0.538**	0.110	0.166	0.476**	0.092	0.124
Question Order	0.384**	0.135	0.120	0.107	0.123	0.028
Constant	-3.237**	0.797		-1.481*	0.615	
**, * Significant at p=0.01 and 0.05 respectively						

Median WTP with 95% C.I.

Models	Unbounded Probit	Bounded Probit	Unbounded I.C	Bounded I.C	Turnbull
SB	$144	$161	$148	$221	$150
	$127-$165	$138-$184	$130-$167	$215-$226	$135-$165
QDB	$205	$214	$205	$213	$149
	$199-$211	$203-$226	$200-$210	$208-$218	$132-$166

Means and variances between SB and QDB method were statistically different at 5% significance level for **all** models. (Turnbull not tested)

Summary and Caveats

❑ Median WTP using QDB method higher than SB method in 3 of the 5 models

❑ Variances using QDB method lower than SB in 4 of 5 models

❑ This study hypothesized that the QDB method should mitigate the issues of the starting point bias, shifting effect, and strategic bias

- Starting point bias: responses were significantly influenced by the question order, but we controlled for the ordering effect

- Shifting effect: the likelihood of respondents substituting their own perceived notions of quantity is reduced with QDB

- On strategic bias, while reducing most form of strategic bias, it may encourage some other form of strategic behavior

Conclusion

❑ This study introduces a new value elicitation method

❑ Evaluates the ability of the method to:

  ▪ Improve efficiency over SB method

  ▪ Mitigate biases of DB method

❑ Provides new information regarding the merits of this new method to economists who conduct non-market valuation research

❑ Further, this study provides more precise estimates of WTP to policymakers considering MS barrier islands restoration

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Thank you!

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