

Putting dollar value on whaling

Can bargaining break deadlock in whaling conflict?

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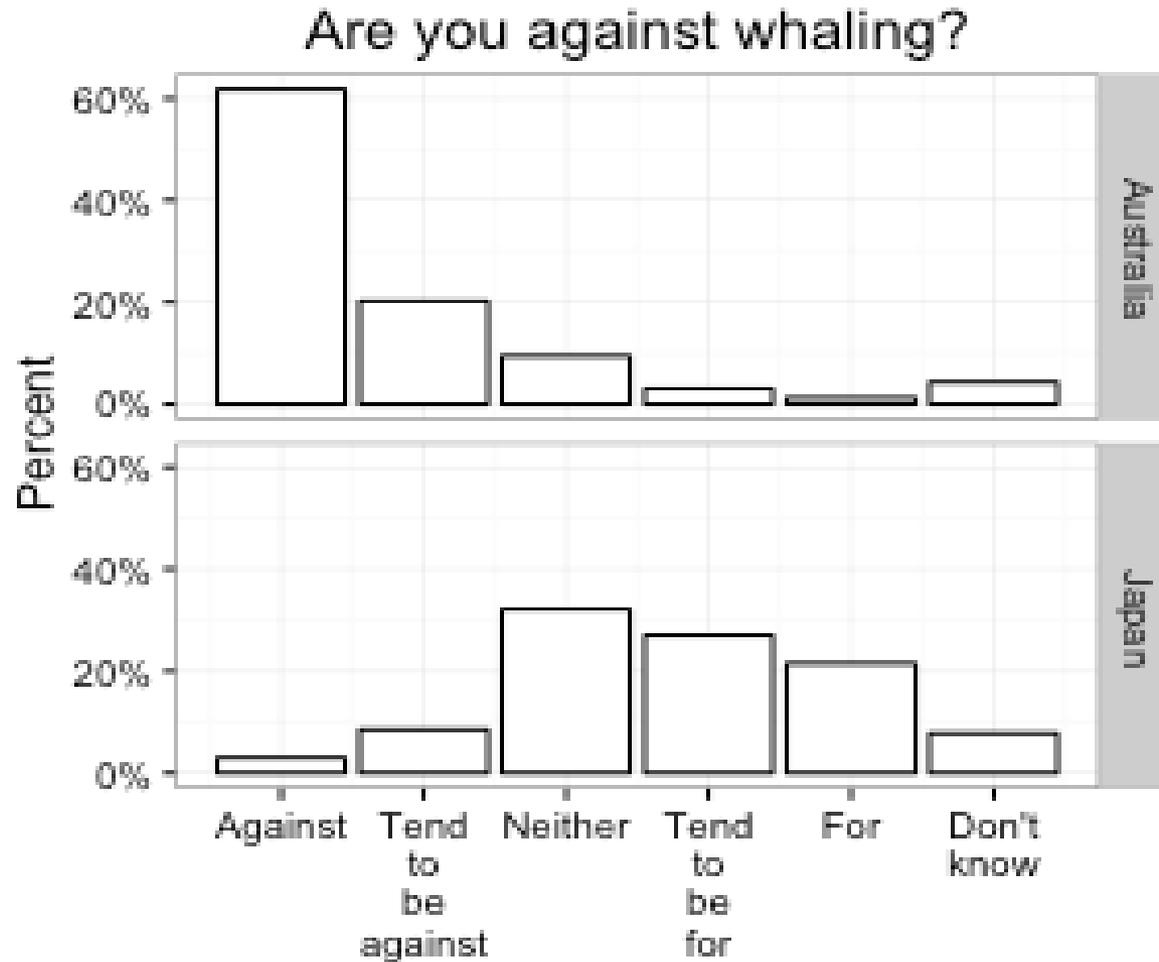
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Motivation

- International conflict over whaling
 - In 1987, the moratorium on commercial whaling initiated
 - Recent proposals to break the deadlock
 - Fishing quotas at the IWC meeting in 2010
 - Whale conservation market (Costello et al., 2012; Smith et al., 2014)
 - Recent conflict
 - In 2010 Australia filed a suit against Japan at the International Court of Justice
 - In 2015 Japan resumed whaling despite the court's ruling

Various opinions on whaling



Research question

- Can bargaining solve international conflict over whaling? Does Pareto-improving allocation empirically exist?
 - Australian household WTP to stop whaling is greater than Japanese household WTA for the ban.
 - Australian aggregate WTP is greater than Japanese aggregate WTA.

Summary of surveys

- Web-based surveys in Australia and Japan in Feb 2016
- Main items
 - Attitudes towards various environmental issues including whaling and conservation of endangered species
 - WTP to continue whaling (for pro-whaling respondents) (referred as WTA) and WTP to stop whaling (anti-whaling respondents) in single bounded dichotomous choice
 - Socio-economic characteristics
- Sampling: pre-screened based on gender, age, and residential regions (Japan only)
- Final sample: 2,254 (Australia) and 5,100 (Japan)

Contingent scenario: WTP (Australia)

	No cost	Additional costs	
	Case A (status quo)	Case B-1	Case B-2
Cost	None.	<i>At cost</i> each year for the next 20 years.	<i>At cost</i> each year for the next 20 years.
			
Next year and after	Continues with <i>no protection programme</i> for all the species in the above table.	Implements <i>a ban on Japan's whaling Antarctic Minke Whale</i> and <i>no protection programme</i> for the other whale species in the above table.	Implements <i>a complete ban on Japan's whaling</i> all the species in the above table.
The expected result after 60 years is	<ul style="list-style-type: none"> • Maintaining the current population trend. 	<ul style="list-style-type: none"> • a <i>50% increase</i> in the Antarctic Minke Whale population, compared with Case A. Also assume that the probability of the sightings during whale watching increases by 50%. • For the other species, the current population trend is expected to be maintained. 	<ul style="list-style-type: none"> • a <i>50% increase</i> in the population of all the species, compared with Case A. Also assume that the probability of the sightings during whale watching increases by 50%.

Contingent scenario: WTP (Australia)

Whale Species	Whale watching sites	IUCN Red List status	Current population trend	Total catches by Japan in 2013
Antarctic Minke Whale	Australia		Unknown	251
Sperm Whale	Japan	Threatened	Unknown	1
Common Minke Whale	Japan		Stable	95
Sei Whale		Threatened	Unknown	100
Common Bryde's Whale			Unknown	28

Data processing

- “Yes” or “No” answers to randomly offered bids
 - One-shot
 - 7 possible bids; \$1, 5 10, 30, 50, 70, 90
- Removed protest bids (Bateman et al., 2002)

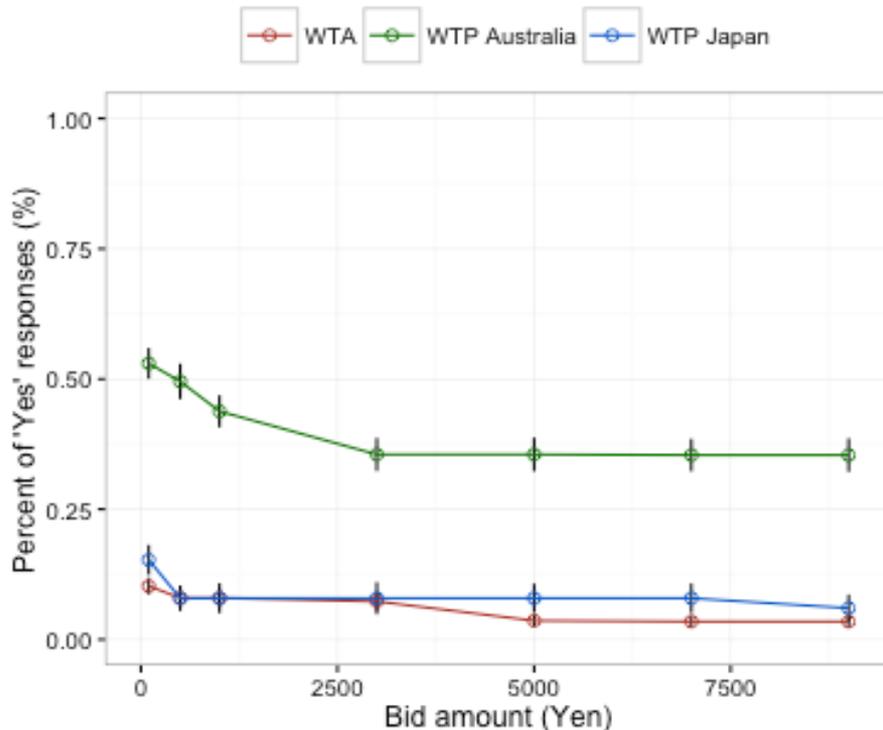
	WTA	WTP: Australia	WTP: Japan
# of protest bids (%)	1,934 (52)	605 (27)	649 (48)

- Replaced uncertain “yes” with “no” (Blumenschein et al., 2008)

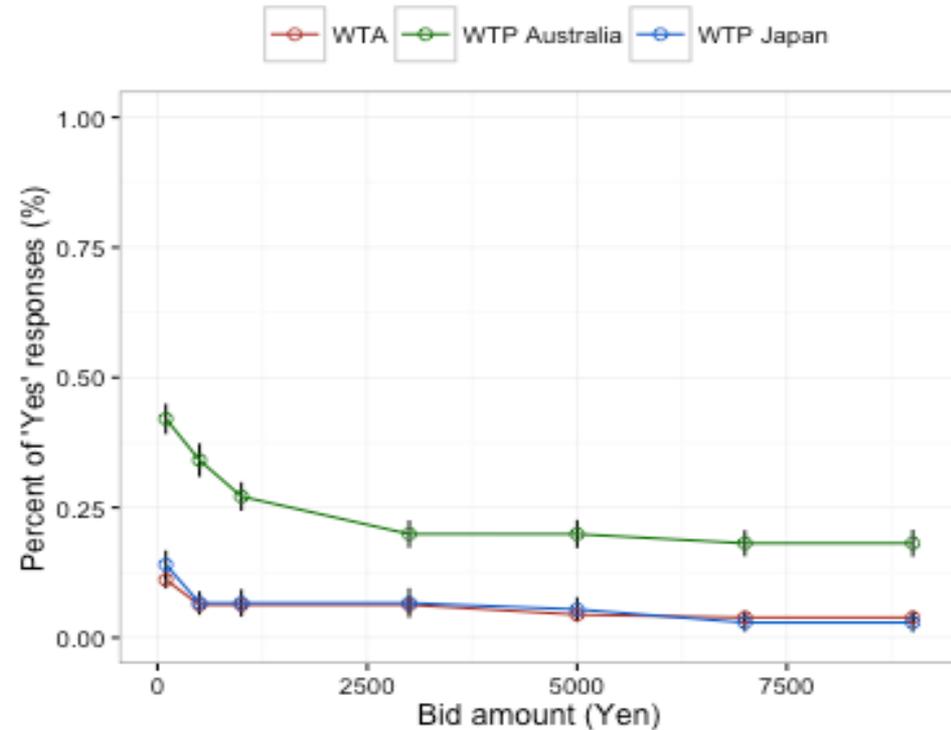
# of affected bids (%)	WTA	WTP: Australia	WTP: Japan
All whale species	938 (52)	490 (42)	351 (50)
Antarctic Minke Whale	833 (46)	741 (45)	299 (42)

Results

- Survival function using Turnbull nonparametric estimator (Haab and McConnell, 1997)
 - $P(b_{j-1} < w \leq b_j) = F_j - F_{j-1}$, where $F_j = (N_j / N_j + Y_j)$
 - All important estimates are significant at $p < 0.05$
 - All functions pass likelihood ratio test



All whale species



Antarctic Minke Whale

Lower-bound estimate of the mean household WTA/WTP in US\$

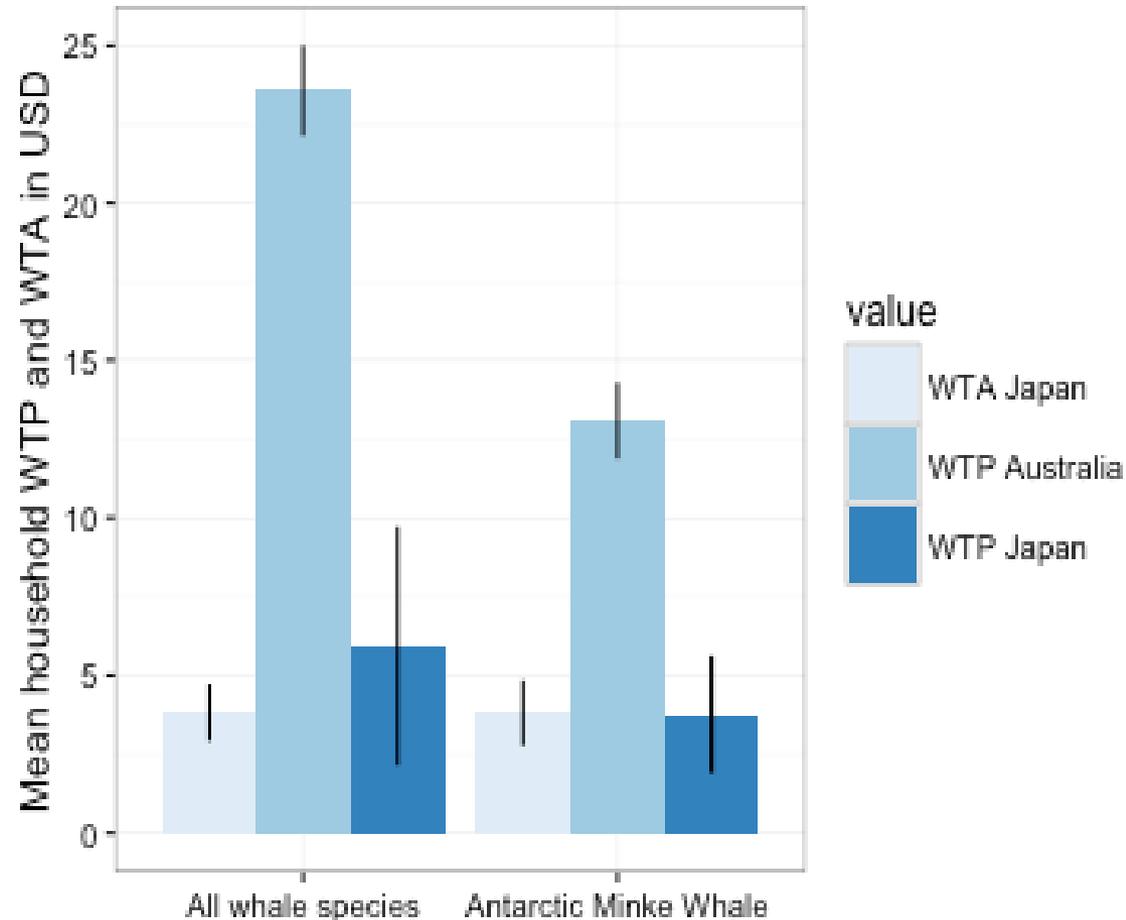
$$LB_{WTP} \sim \left(\sum_{j=1}^{M+1} b_{j-1} p_j, \right.$$

$$\left. \sum_{j=1}^{M+1} b_{j-1}^2 [V(F_j) + V(F_{j-1})] \right.$$

$$\left. - 2 \sum_{j=1}^M b_j b_{j-1} V(F_j) \right)$$

where

$$V(F_j) = F_j(1 - F_j) / (N_j + Y_j)$$



Note: The numbers shown are the mean. Error bars indicate 95% confidence interval

Public's aggregate WTA/WTP

- Aggregate WTA/WTP = number of relevant households X household mean
- Expected welfare change

Policy options (million US\$)	Gain (Australia)	Loss (73% Japan)	Gain (27% Japan)	Net change
Complete ban on Japan's Whaling	175	145	82	+ 112
Ban on Antarctic Minke Whale hunting	97	145	52	+ 4

Note: Annual payment for 20 years

Policy implication

- Possibility as a policy choice
 - Two-country negotiation
 - Monetary transfer US\$145-175 million (annually for 20 yrs) from Australia to Japan for a complete ban on whaling is Pareto-improving allocation.
 - What should Japan do with US\$145-175 million?
 - Vessel buyback and direct compensation to whalers
 - 3 whaling vessels and 156 (up to 352?) crews
 - Industry-wide compensation including distributors and retailers
 - 500 to 600 persons (personal communication with JWA)
 - Indirect compensation for preservation of culture
 - e.g. Museum as cultural heritage

Policy implication

- Possibility as a policy choice
 - How big is US\$145-175?
 - US\$2 million (2013 whaling industry value in Japan)
 - Includes coastal whaling
 - US\$11 million (2015 gov. transfer to the Institute of Cetacean Research)
 - US\$530 billion (2014 Australian government expenditure)
 - US\$5 billion towards environmental protection
 - US\$145 and 175 million are 2.9% and 3.5%, respectively

Conclusion

- Provides strong support for the bargaining solution of the whaling conflict.
 - Monetary transfer US\$145-175 from Australia to Japan for a complete ban on whaling is Pareto-improving allocation.
 - But, no such equilibrium exists for Antarctic Minke Whale.

Thank you!

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