Comparing Framing Effects on Implicit Prices of Multiple Agricultural Water Quality between China and Japan:

A Lasso Meta-Analysis Based on Choice Experiments

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1. Introduction

This study employs Lasso regression to identify significant framing effects on WTP estimates for agricultural water quality improvements in China and Japan. Focusing on choice experiments, it provides robust insights into how framing effects vary across different cultural and geographical contexts, enhancing the validity of benefit transfer applications. Analyzing multiple agricultural water use scenarios contributes to a nuanced understanding of framing effects. Comparing China and Japan is crucial due to their distinct cultural, economic, and environmental contexts, which may lead to different responses in choice experiments. This comparison helps to understand how cultural and contextual differences influence the valuation of agricultural water quality improvements and informs tailored policy interventions accordingly.

2. Methodology and Data

For this meta-analysis, literature was selected from CNKI and CINNI databases using the keyword "water quality" and focusing on choice experiment studies with implicit price estimates of water attributes. After filtering for agricultural water studies from the past decade, excluding duplicates and those without water quality attributes, 7 Chinese and 3 Japanese articles were included. This process yielded 23 water quality WTP estimates for the meta-analysis.

3. Results

The Lasso regression output reveals critical predictors of the implicit price for water quality attributes, using two lambda values: the optimal lambda (88.03) from cross-validation and a lambda within one standard error of the minimum Mean Squared Prediction Error (355.378). Negative coefficients for IF indicate that respondents perceive

Figure1. Comparison of Variable Selection in Two Lasso Models

Selected Framing Variables	Lasso	Post-est OLS	Lasso	Post-est OLS
IF	-14.876	-14.697	-5.612	-23.081
WQF_index	2.106	-1.641		
WQF_ policy	-1.471	-8.283		
WQF_ segment	-6.186	-21.520		
CEMethod_LCM	-3.240	(omitted)		
CEMethod_RPL	4.967	9.961		
Num_Attributes	10.328	12.683	3.940	10.938
λ	88.0		355.378	
_cons	-39.148	-49.916	-5.977	-35.659

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higher levels of water improvement as requiring greater trade-offs, while positive coefficients for Num_Attributes emphasize the importance of comprehensive attribute information. The random parameter logit model's positive coefficients suggest it better captures respondent preferences by accounting for heterogeneity. The consistency across different lambda values underscores their robustness.

By incorporating significant framing effects variables identified through Lasso analysis into the meta-analysis, this study used a random-effects inverse-variance model. The forest plot includes Organic Agriculture, Eco-Compensation, Irrigation Water, and Livestock and Poultry Breeding Water, each of which shows substantial heterogeneity ($I^2 > 97\%$). Additionally, the overall aggregated effect size is 12.76 (95% CI: 9.44 to 16.08), indicating significant subgroup differences.

Meta-regression analysis reveals distinct framing effects on WTP for water quality improvements between China and Japan. Simpler descriptions of improvements are crucial for higher WTP. Japanese respondents exhibit a higher baseline WTP but show a decrease with higher improvement levels, suggesting potential saturation. Heterogeneity analysis shows varied impacts, with Organic Agriculture and Eco-Compensation showing negative effects, while Irrigation Water improvements increase WTP. Our study has passed publication bias and intraclass correlation tests, ensuring the robustness and reliability of our findings.

4. Conclusion

This research reveals critical insights into how different factors, including country-specific differences, framing effects, and methodological choices, influence the implicit prices of agricultural water quality improvements. The findings underscore the necessity of considering regional contexts and the design of choice experiments when evaluating and comparing WTP across different studies. These insights are vital for policymakers and researchers aiming to develop effective strategies for water quality management and valuation.

Reference

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