



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Comparison of Complete Combinatorial and Likelihood Ratio Test: Empirical Findings from Residential Choice Experiments

Taro Ohdoko

Selected Poster presentation at the American Agricultural Economics Association Annual Meeting, Orlando, FL, July 27-29, 2008.

Copyright 2008 by Taro Ohdoko. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Comparison of Complete Combinatorial and Likelihood Ratio Test: Empirical Findings from Residential Choice Experiments

Taro Ohdoko, Post Doctoral Research Associate, Graduate School of Economics, Kobe University, JAPAN

Objective

In the context of benefit transfer, robust test statistics for transferability is required. Likelihood ratio test with scale parameter (Swait-Louviere (SL) Test) is frequently used to test preference homogeneity between two policy sites with the result of choice models.

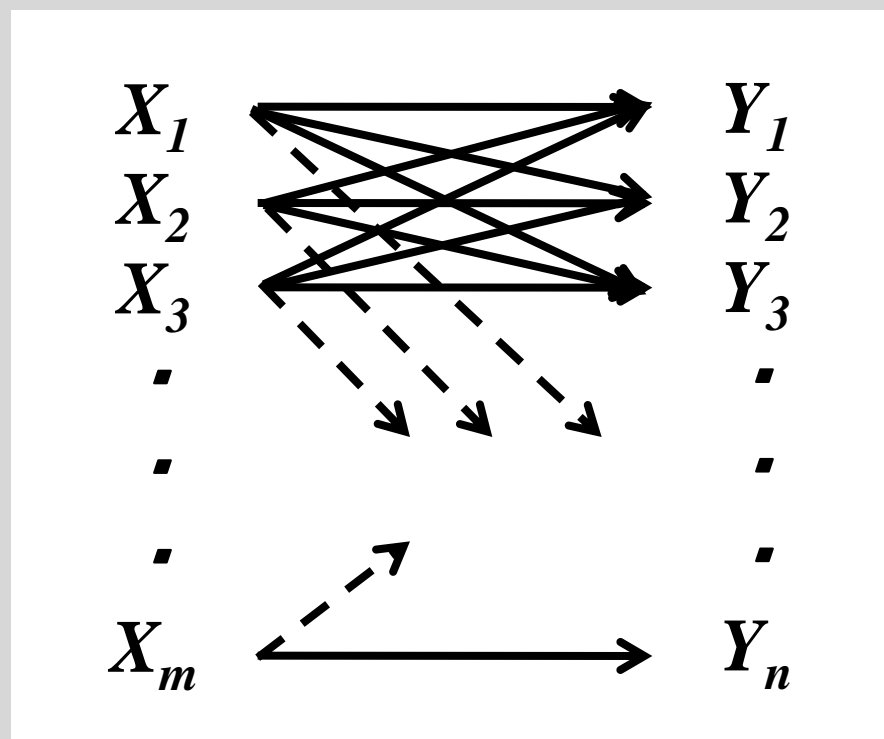
However, it may not be required to accept preference homogeneity since implicit price(IP, or called “marginal willingness to pay”) identity is only needed in order to conduct benefit transfer. Therefore, in this study, it is tested whether SL Test and test procedure for IP identity conclude same result or not. The objectives of this study are following:

1. Is SL Test fit in the context of benefit transfer?
2. What test procedure is appropriate in order to conduct benefit transfer?

Complete Combinatorial (CC)

In Poe et al. (2005), Complete Combinatorial (CC) is suggested to compare two vectors, such as IP of choice experiments.

CC calculates all the differences between components contained in the two vectors.



The test statistic is following. This statistic works in the same way as p-value. The probability calculates that express the rejection area of the benefit transferability. #(\cdot) is the number of variables which met the contained condition.

$$\gamma = \#(X_i - Y_j \leq 0) / m * n$$

Swait-Louviere (SL) Test

In Swait and Louviere (1993), they insisted that scale parameter should be considered when comparing mean parameters of choice models by using likelihood ratio test.

When there are two data sets (A, B), SL Test is used to consider whether estimated mean parameters are same or not.

$$\beta_A \lambda_A \longleftrightarrow \beta_B \lambda_B$$

Whether these are same or not.

Problem of SL Test

When conducting classical inference of choice model such as multinomial logit model for choice experiments, and testing benefit transfer by SL test, the problem below can occur (e.g. when homothetic (linear) utility functions distribute across policy sites).

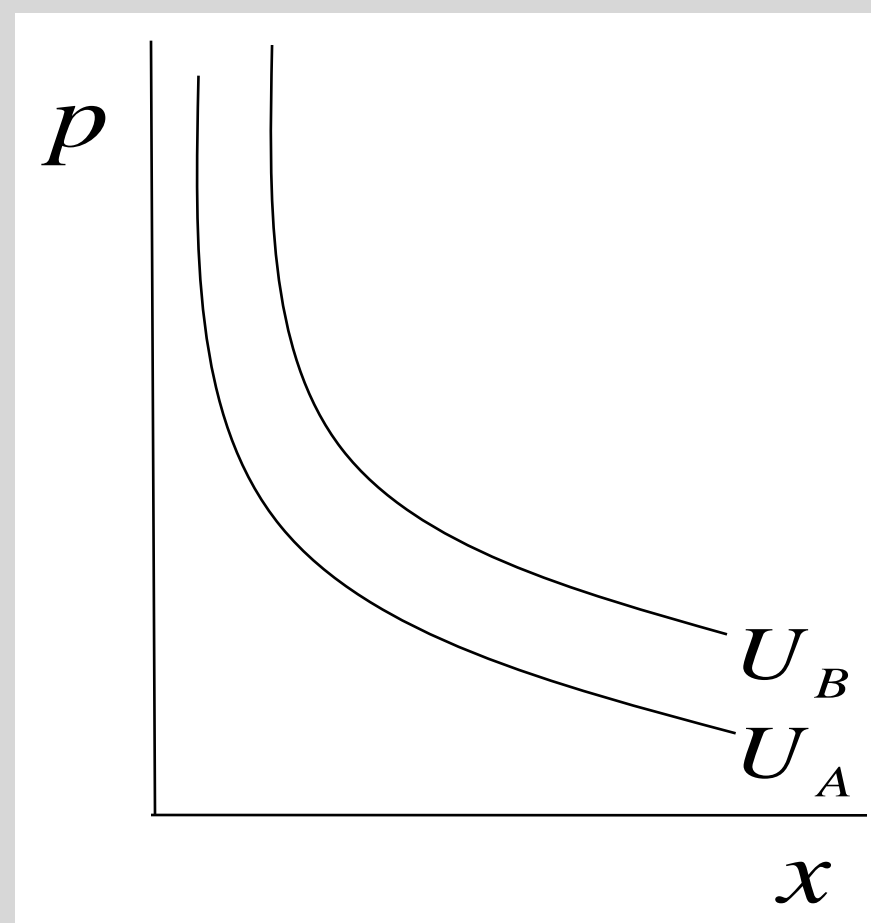
Equality is rejected by SL Test

$$\beta_A \lambda_A \neq \beta_B \lambda_B$$

$$-\beta_A^x \lambda_A / \beta_A^p \lambda_A = -\beta_B^x \lambda_B / \beta_B^p \lambda_B$$

Equality is accepted by using IP

Homothetic utility functions distribute across policy sites (A, B).



Material (Choice Experiment)

In Odoko et al. (2007), residential choice experiments were conducted to clarify the benefit of the air pollution reduction policy. The attributes adopted are following. The questionnaire surveys were conducted around Kobe and Yokohama, Japan. After estimating each utility function, only the attributes of “Air Pollution Rank” and “Price of Room” are used for comparison in this study.

Profile attributes of choice experiments	Explanations of attributes
Area Space	The number of rooms contained.
Built Year	The passed year since condominium has been built.
Required Time from Station	The required time on foot from nearby station to the condominium.
Air Pollution Rank	The rank set by using nitrogen oxides and particulate matter concentration.
Room Direction	The direction of the balcony contained in the room of condominium.
Price of Room	The price of room if one purchases.

Comparison Result

By estimated utility functions and IP of the air pollution reduction policy, tests of transferability are conducted. The result from comparison of SL Test and CC are following.

	Data around Kobe	Data around Yokohama	Pooled Data (with Relative Scale Parameter Considered)
Log-likelihood	-307.37	-1002.04	-1367.88
Test Statistic of SL Test			116.94
Result			Transferability is rejected at 10% level

CC Test Statistic	0.338
Result	Transferability is not rejected at even 30% level

Opposite conclusions arise!!

Choice Set Example

	Condominium Room1	Condominium Room2	Condominium Room3
Area Space	Current State	4+living, dining, and kitchen	2+living, dining, and kitchen
Built Year	Current State	15-year-old	0-year-old
Required Time from Station	Current State	10 minutes	20 minutes
Air Pollution Rank	Current State	E (worst ranking)	A (best ranking)
Room Direction	Current State	South	Other Direction
Price of Room	Current State	- 3million yen	+ 1million yen

Inference Model for Choices

Random utility theory and conditional logit model are adopted.

$$U_i = V_i + \varepsilon_i = \sum_{m=1}^M \beta_m \lambda x_m + \varepsilon_i$$

$$P_i = \frac{\exp(V_i)}{\sum_{j=1}^J \exp(V_j)}$$

Discussion and Conclusion

1. Although SL test rejects the transferability of benefit, CC accepts that in this study.
2. It is implied that IP identity can be accepted even if the utility homogeneity is rejected.
3. When conducting the benefit transfer, it is only necessary to clarify IP identity.
4. Above all, it can be said that the assumption of the utility homogeneity is too rigid to test benefit transfer.

Using CC is more appropriate when researching and conducting benefit transfer.

Reference

- [1] Swait J. and Louviere J. (1993) The Role of Scale Parameter in the Estimation and Comparison of Multinomial Logit Models, Journal of Marketing Research, Vol.30, pp.305-314.
- [2] Poe G., Giraud K. and Loomis J. (2005) Computational Methods for Measuring the Differences of Empirical Distributions, American Journal of Agricultural Economics, Vol.87, No.2, pp.353-365.
- [3] Odoko T., Kokubu K. and Takeuchi K. (2007) The Benefit Transfer of Air Pollution Control Measures and The Environmental Accounting, Environmental Science, Vol.20, No.1, pp.7-20.