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Using a Choice Experiment to Assess the Multiple Values of Land in Agricultural Uses in a Peri-urban Area: An Application to Edmonton, Canada

Haoluan Wang
Department of Resource Economics and Environmental Sociology, University of Alberta
haoluan@ualberta.ca

Brent M. Swallow
Department of Resource Economics and Environmental Sociology, University of Alberta
brent.swallow@ualberta.ca

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Using a Choice Experiment to Assess the Multiple Values of Land in Agricultural Uses in a Peri-urban Area: An Application to Edmonton, Canada

Haoluan Wang* and Brent M. Swallow, Department of Resource Economics and Environmental Sociology * Email: haoluan@ualberta.ca

Introduction

Over the last 30 years, the Alberta Capital Region (the City of Edmonton and 23 surrounding cities, towns, villages and municipal districts) has experienced rapid population growth, economic development, and conversion of agricultural land into alternative land uses.

Between 2000 and 2012, growth rates for population and developed areas in Alberta Capital Region are approximately 30% and 50%, respectively. For all newly added developed areas, almost 90% were converted from agricultural land. Figure 1 shows that the conversion has primarily taken the form of suburban development on the periphery of the cities.

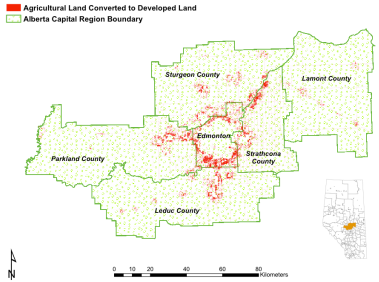


Figure 1 Agricultural Land Conversion in the Alberta Capital Region (2000-2012)

Some values (e.g., the market value of agricultural commodities) accrue mainly to private individuals and firms, while others (e.g., biodiversity conservation values) accrue to society in general. Values of some agricultural uses, such as those associated with the production of "local food", regulation of water and air quality, or maintenance of peri-urban green spaces, may be weighed very differently by different interest groups.

The objectives of this paper are three-fold:

- ✓ estimate the nonmarket values, in terms of the willingness to pay (WTP), that residents of the region place on conserving land in different types of agricultural use
- ✓ explore the links between those values and residents' affinity with different ecosystem goods and services
- ✓ identify areas and strategies that are of particular interest for conservation

Theoretical and Empirical Models

Random Utility Theory and Multinomial Logit Model

$$V_{ik}(Z_i, y_k - p_i)^* = b_0(sq) + b_1(grain_acres) + b_2(hay_acres) + b_3(live_acres) + b_4(highway_acres) + b_5(city_acres) + b_6(acres) + b_7(cost)$$

**: Commercial Vegetable Farm as the default of type of agricultural use, Conservation Buffer as the default of adjacent area, With 10-km Buffer from Currently Developed Land as the default of land proximity*

Data and Methods

- ✓ Selected expert focus groups and randomly selected public focus group
- ✓ Internet-based survey instrument: pilot study and full launch (n=320)

Table 1 Attributes and Attribute Levels in Choice Experiments

Attribute	Level	Description
Type of Agricultural Use	• Grain/Oilseed Farming • Livestock Grazing on Native Pasture • Hay Land • Commercial Vegetable Farm	Major types of agriculture in the Capital Region
Acres Conserved	• 200 • 500 • 1000 • 2000	A range of farm sizes from small to large. The average farm size in Alberta is 515 acres
Adjacent Area	• Adjacent to Primary Highway • Adjacent to Conservation Buffer	Land area to distinguish the adjacent landscape
Location Proximity	• Within City Limits • Within 10-km Buffer from Currently Developed Land	Land location to distinguish the proximity to the city
Property Tax or Rent Increase for Next Year Only ($)	• 25 • 50 • 100 • 300 • 600	Property tax or rent increase next year only as the cost to implement conservation strategies

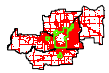
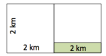
	Conservation Strategy	Status Quo
Type of Agricultural Use	Livestock Grazing on Native Pasture	No Public Conservation Strategy for Land in Agricultural Uses
Location Proximity	Within City Limits 	
Acres Conserved	200 acres (2 km x 0.4 km) 	
Adjacent Area	Adjacent to Primary Highway	
Property Tax or Rent Increase Next Year Only	$ 100	$ 0

Figure 2 Example of Choice Set Used in Survey Instrument

Empirical Results

Table 2 Multinomial Logit Model (MNL) Coefficient Estimates and WTP Comparison

Attribute	Alberta Capital Region[a]		City of Edmonton[b]	
	Coefficient (Std. Err)	WTP Estimate (CAD $)	Coefficient (Std. Err)	WTP Estimate (CAD $)
grain_acres	-0.00032**	-0.11852**	-0.00032**	-0.11765**
	(0.00013)	(0.04815)	(0.00015)	(0.05515)
live_acres	-0.00018	-0.06667	-0.00005	-0.01838
	(0.00014)	(0.05185)	(0.00016)	(0.05882)
hay_acres	-0.00032***	-0.11852***	-0.00038***	-0.13971***
	(0.00012)	(0.04444)	(0.00013)	(0.04779)
highway_acres	0.00021**	0.07778**	0.00022**	0.08088**
	(0.00012)	(0.04444)	(0.00010)	(0.03676)
city_acres	-0.00018*	-0.06667*	-0.00009	-0.03309
	(0.00010)	(0.03704)	(0.00011)	(0.04044)
acres	0.00062***	0.22963***	0.00054***	0.19853***
	(0.00012)	(0.04444)	(0.00014)	(0.05147)
cost	-0.00270***	-	-0.00272***	-
	(0.00023)		(0.00060)	
sq	-0.79440***	-	-0.74788***	-
	(0.10293)		(0.11782)	
Observations	2560		1904	
Log-likelihood	-1517.59		-1147.95	
AIC	3051.2		2311.9	

Standard errors are in parentheses, *** 1% significant level, ** 5% significant level, * 10% significant level
a: Using all the data in the sample; b: Only using the data from respondents who reside in the City of Edmonton

Conclusions

- ✓ Residents are generally in favor of the proposed conservation strategies to conserve land in agricultural uses.
- ✓ Commercial vegetable farm, land adjacent to primary highways and land within 10-km buffers from currently developed land are the most preferred type of attributes.
- ✓ Heterogeneity exists regarding the status quo in terms of respondents' demographics and attitudinal indicators.
- ✓ Attitudes toward agricultural land conversion rate, need for conservation and infill development do explain grouping in preferences from Latent Class analysis.
- ✓ For agricultural uses, "food for local market" has the highest percentage and "recreation" the lowest regarding the importance of ecosystem services.

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