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A Contingent Valuation Application Using Stata

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Context

The lack of a market to generate prices for services like waste disposal for the housing, and the collateral damages to environment, morbidity and discomfort for the families isn't the only concern to this matter.

Modern-day consumption dynamics, and how the families manage its garbage, it's become a mayor challenge for growing population.

In the Mexican situation, the local level administrations are financially highly dependent on the federal government, and have little say in the technical procedures and the modalities of taxes.

Context

The local administrations, are in the need to make the public spending more efficient, and to make an effort to restructure the few tax revenues they collect, as the property tax.

Waste disposal issues also represent the need to invest in education and awareness campaigns to avoid a major health problems.

Economic valuation methods can be used as tools to quantify environmental services, as well as a tool for the policy makers to determine the viability and to preserve the ecology.

The Goal

This presentation shows an empirical application for a logit based method, to support CVM (Contingent Valuation Method), and assess objections pointed for CVM surveys, and to provide a lesser-biased "willingness to pay" (WTP) measure.

This methodology aims to apply the Cameron and James (1987), using microdata from the National Income and Expenditure Household Survey from México (ENIGH 2014). The goal is to obtain a "likely" quantity, to be considered in CVM survey items, to apply to a environmental evaluation.

This exercise works with a property tax and maintenances fees, and the waste disposal way of the housing.

Theoretical Approach

Based on the CVM by Hanemann (1984) and regression outlined in Cameron y James (1987), consider the following utility function:

$$U = U(J, Q, Z, S)$$

where;

J	= 1 (properly waste disposal practices), = 0 (pollution due to bad waste disposal practices)
Q	Paying of a tax (property tax and maintenances fees) of environmental quality
Z	Hicksian expenditures
S	Household size and demographic size

The model analyses a utility function, whether if there is or isn't effects on the waste disposal service.

Theoretical Approach

Model asume that error distributions are a logistic function with mean 0 and variance $\pi^2\sigma^2/3$. When divided between σ to normalize, then you have a standard logistic function with mean 0 and variance $\pi 2/3$.
The probability that a variable with logistic distribution is less than or equal to a number x is equal to (1 + e-x) -1. From the above follows the equation:

$$Pr\,(Si_j) = [1 + e\,((-\alpha z_j/\sigma) - (\beta t_j/\sigma))]^{-1}$$

To known the WTP of an individual j you have to find the price at which will be indifferent to make the payment, when the follows equations are true:

$$\alpha_1 Z_1 + \beta\,(y_j - WTP_j) + \varepsilon_{j1} = \alpha_0 Z_j + \beta y_j + \varepsilon_{j0}$$

$$WTP_j = \alpha Z_j/\beta + \varepsilon_j/\beta,$$

$$WTP_j = \alpha Z_j/\beta$$

$$E_\varepsilon(WTP|\alpha,\beta,z) = \begin{bmatrix} \frac{\alpha}{\sigma} \\ \frac{\beta}{\sigma} \end{bmatrix}$$

Empirical Application

The data for this application was obtained from 2 datasets from ENIGH, Encuesta Nacional de Ingresos y Gastos de los Hogares (2014); housing information and expenditures, for the Mexican case.

- ENIGH collects amounts paid from property tax and maintenances fees paid
- The housing information sheet also show categorical variables to housing services
- A dataset was built with household and demographic sizes

Sample summary statistics

Variable	Obs	Mean	Std. Dev.
folioviv	19124	-	-
predial	6942	195.12	591.184
conservacion	6942	45.36	120.611
gasto_cor	19124	33133.00	31035.46

Source: Author's elaboration using ENIGH 2014.

Syntax

Setting the variables

```
global ylist [depvar]
global xlist [indepvars]
```

Logistic regression

```
logit $ylist $xlist
estat classification
```

Setting the vectors

```
ge alfa= _b[_cons] + _b[x2]*x2 + _b[x3]*x3 + _b[x4]*x4
+ … + _b[xn]*xn

ge beta= _b[x1]
ge wtp = mean(α/β)    median(α/β)   log(1+eα)/β
```

Data

- Dichotomous variables selected in the simple, weighted for total housing

Correct Waste Disposal	Waste disposal indirect payment		
	No	Yes	Total
No (Pollute)	3,324,183	697,188	4,021,371
Yes	13,597,415	13,509,610	27,107,025
Total	16,921,598	14,206,798	31,128,396

Source: Author's elaboration using ENIGH 2014.

- Revenues for local administrations, means and totals

	Mean	Std. Err.	Total
Property tax	203.82	0.18	2,900,000,000
Maintenances fees	65.97	0.03	937,000,000
Total	123.13	0.09	3,830,000,000

Source: Author's elaboration using ENIGH 2014.

Results

McFadden's R2	0.363		
Count R2	0.871		
c_waste_disposal	**Coef.**	**Std. Err.**	**z**
_cons	5.4622	.0004	
wd_fees	.00303	.0002	
hous_exp	.000051	.0125	
residents	-.13161	.0325	
location	-1.4024	.1320	

Source: Author's elaboration using ENIGH 2014.

```
Marginal effects after logit
      y  = Pr(c_waste_disposal) (predict)
         =   .9657078
```

- Welfare "likely" quantity

Variable	Obs	Mean	Std. Dev.	Min	Max
c_plus	31128396	**3.425474**	2.693789	-1.722356	35.70877

Conclusions

- This application represents an opportunity to discuss two recurrent objections to CMV surveys; the researcher creates the values, and WTP-WTA verification, providing a new decision before design the items on a survey.

- The methodology addressed here is consistent with Hueth and Mendieta (2000) and Revollo-Fernández(2015) applications, and can be functional to CVM survey data, this represents an opportunity to explain the need to do survey applications to valuate services.

- This exercise shouldn't be considered as a substitute for MVC welfare evaluations.

Basic References

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