Time for waste, waste of time? Assessing heterogeneous values of time spent recycling using a latent-class rank-ordered logit approach

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Extended abstract

Despite the fact that the value of time spent recycling (or sorting) has long been recognized as a major determinant of the households' recycling behavior, very few empirical studies have attempted to provide estimates of it. This is in contrast to the long tradition of the value of travel time literature, which, from the work of Cesario (1976), recommending to choose a value of travel time equal to 1/3 of the respondent's wage rate, now provides more subtle insights on the distribution of the value of travel time, as in Fezzi *et al.* (2014).

A noticeable exception is the work of Halvorsen (2008) in which the opportunity cost of time used recycling is approximated by the household's stated willingness-to-pay for leaving recycling to others. However, to date, there are no direct estimates of the value of time spent recycling. Given that, our paper contributes mainly in two ways to the waste management literature.

First, in the spirit of the models of time allocation, we propose a theoretical framework in which household's time spent recycling is influenced by non-pecuniary motives, such as social and moral norms.

Second, the predictions of the theoretical model are tested using data from a choice experiment on waste management conducted in 2008 in Corsica. A representative sample of the Corsican population was surveyed (530 individuals). Each respondent has to rank six waste management options defined by three attributes: the environmental impact, the time weekly spent recycling, and the monetary cost (change in annual waste fee per household).

In order to analyze the data, we extend the basic latent-class logit model to the latent-class rank-ordered logit model, to make it suitable to rankings data. Using usual information criteria, we found that a two-class model fits better the data. The class shares are approximately 76% and 24%. Individuals belonging to each class do react to the cost attribute and the time attribute as expected. But class-two individuals are less sensitive to the level of environmental degradation. It seems that they do not distinguish the various levels of environmental degradation, but only have a positive willingness-to-pay for a low, or very low degradation of the environment, compared to a high degradation of the environment (environmental impact attribute).

In the current version of the model, the class membership is influenced by two variables: the actual time spent recycling and the home-ownership status. The probability to belong to class-one increases with the actual time spent recycling (habit, social/moral norms?), and individuals who own their home are more likely to be class-one members.

The value of time spent recycling is derived from the estimates and are reported in Table 1.

As can be seen from Table 1, the value of time ranges from €4.38 to about €6 per hour for class-one

Table 1: Value of time - €/h

	Mean	Std	Min	Max
Both classes	5.21	1.14	2.75	5.99
Class 1	5.78	0.36	4.38	5.99
Class 2	3.18	0.46	2.75	4.33

individuals, and from €2.75 to €4.33 for class-two individuals, showing significant heterogeneity. In terms of revenue share (Table 2), the value of time ranges from 13% to 76% for class-one individuals, and from 8% to 53% for class-two individuals.

Table 2: Value of time - Share of the revenue

	Mean	Std	Min	Max
Both classes	41	18.23	8.38	75.73
Class 1	45.48	17.55	12.57	75.73
Class 2	25.67	10.59	8.38	53.43

Finally the kernel density estimate of the share of the value of time spent recycling in the revenue exhibits high heterogeneity.