

# Imported social norms, pricing and waste sorting: the role of tourist/resident interaction in a small island economy

Olivier BEAUMAIS<sup>\*\*</sup>, Dominique PRUNETTI<sup>†</sup>, Anne CASABIANCA<sup>†</sup>, Ludovic MARTEL<sup>†</sup>

<sup>†</sup>UMR 6240 LISA, University of Corsica, Campus Mariani BP 52 – 20250 Corte, and <sup>\*</sup>University of Rouen-Normandy, France

## Abstract

*This article explores the role of social interactions between tourists and residents, in a territory under heavy tourist pressure, around the sorting behaviours of household waste. While it is well established that these sorting behaviours respond both to monetary incentives and social norms, the way in which these two categories of motivations interact to form observed behaviours remains an open question.*

*In order to explore empirically this question, we focus on a specific field of study: that of a small island economy (Corsica) subject to significant seasonal tourist pressure. We use the Discrete Choice Experiment method, by proposing to the respondents (tourists and residents) to rank various waste management scenarios.*

*Estimation of rank-ordered logit models shows that the interactions between tourists and residents, measured by appropriate questions and scores, indeed influence sorting behaviour, suggesting a crowding-in effect between monetary incentives and sensitivity to social norms, at least for some individuals.*

JEL codes: Q53, C25, D64

## 1. Introduction

It is well documented that individual waste sorting behaviours are potentially driven by extrinsic motivations, such as those provided by economic instruments. When an incentive-based pricing system is in place (Bell et al., 2017; Bel and Gradus, 2016), individuals compare all possible waste disposal solutions on the basis of factors such as price level, time required for waste disposal, cost associated with storing sorted waste or distance to waste collection points before finally deciding on a level of sorting.

There is also a growing literature on the role played by social norms on individual waste sorting behaviour. Such motivation develops in the framework of social interaction that leads individuals to revise their standard norms in the light of their assumptions about the behaviour of others. For example, Viscusi et al. (2011, 2014) look at the impact of neighbourhood effects on the nonpecuniary benefits that individuals may derive from recycling activities. Among other benefits, they study the feeling of being virtuous or morally superior to neighbours that may be experienced by those who recycle, and establish that this specific nonpecuniary benefit is a more significant predictor of recycling behaviour than the external norms reflected in their beliefs about what their neighbours might think of them.

Brekke et al. (2010) address another form of motivation that stems from a feeling of 'duty' (see also Czajkowski et al., 2017; Hage et al., 2009). According to these authors, a duty-oriented individual is a socially responsible kind of person who will be suffering a loss of self-image if he does not fulfil his perceived personal responsibilities. 'Duty' implies both pleasure in giving and frustration at not giving enough. When in doubt over what they should do, people work out their individual responsibility by referring to the behaviour of their peers: the influence of social information comes into play here by

leading to social interaction in individual contributions. The empirical results obtained by the above authors suggest that 'duty' lies at the heart of recycling behaviour; that responsibility ascription is influenced by the perception of what other people do; and finally that individuals are reluctant to accept responsibility based on uncertain information.

'Duty' here can be considered an extension of the standard model of impure altruism (Andreoni, 1990): as is the case with impure altruism, 'duty' engenders a warm glow effect that increases with the size of the contribution. However, unlike impure altruism, this feeling of well-being declines with the amount of responsibility perceived and the fact of not giving enough, in line with research by Nyborg et al. (2006).

Indeed, Nyborg et al. (2006) demonstrate the existence of strong social interaction effects in recycling behaviour, even taking the fear of social sanctions into account. The results are consistent with the idea that 'duty'-based motivation is an important factor in recycling behaviour, that individual responsibility is influenced by social norms, and that responsibility is a burden that individuals are reluctant to accept. In particular, the authors note both a direct social interaction effect, mainly due to a preference for conformity, and a significant indirect social interaction effect that operates through responsibility ascription.

The heterogeneity of individuals' pecuniary and non-pecuniary motivation complicates the task of defining public policies that aim to encourage waste sorting by individual households. Some are influenced by the size of their waste collection bill while others are more responsive to information campaigns that emphasize their moral responsibility, or to 'nudges' (Kirakoian, 2016). Nor are these motivations independent of each other. For Berglund (2006), moral motives are an important variable in households' assessment of the cost associated with recycling efforts. Many individuals feel a strong 'moral commitment' to recycling activities and, as such, gain benefits. As a result, the real costs associated with individuals' recycling efforts tend to be lower than the opportunity cost of the time spent on waste sorting.

In their recent review of the empirical evidence of the role of social norms (and social norm interventions) on pro-environmental behaviours, Farrow et al. (2017) find strong support that social norms are effective at shaping pro-environmental behaviours, especially in the field of waste recycling<sup>1</sup>. They also suggest (p. 10) that "the interaction of social norm interventions with other types of pecuniary and non-pecuniary interventions would also seem a pertinent area for future research".

Actually, some research, mainly based on empirical studies, has shown that the introduction of incentive-based pricing aimed at strengthening individuals' intrinsic motivation<sup>2</sup> to increase their overall recycling efforts and, for those already involved in recycling initiatives, to enhance such efforts, could have a crowding-out effect (Frey and Oberholzer-Gee, 1997; Ferrara and Missios, 2012). The introduction of economic incentives in household waste management may modify the way some individuals view their involvement in waste prevention and sorting, leading them to

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<sup>1</sup> Farrow et al. (2017) report 11 empirical studies pertaining to recycling. See Table 2 and Table 3 of their paper.

<sup>2</sup> According to Ryan and Deci (2000), two leading authors on this topic, "intrinsic motivation is defined as the doing of an activity for its inherent satisfactions rather than for some separable consequence".

reduce rather than increase the personal efforts they make (Halvorsen, 2012 ; D'Amato et al., 2014, 2016).

All in all, the extent of the interaction between monetary incentives and social norm perceptions or interventions remains an open question that has been given little attention in the recent literature on the influence of social norms on recycling behaviours (Viscusi et al., 2011). Do sensitivity to social norms strengthens extrinsic monetary incentives to recycle (crowding-in effect) or, on the contrary, weaken these incentives (crowding-out effect)?

In order to explore this issue empirically, we concentrated on a specific research context: that of a small island economy (Corsica), which comes under considerable seasonal pressure from tourism. With a population that more than doubles during the summer months, Corsica, and its coastal areas in particular, is a place of specific social interaction between tourists and residents, including on waste sorting issues. The influx of tourists has a direct impact on the amount of household waste produced in a region where waste recovery is relatively low (21.6% in Corsica in 2016 compared with 42% nationally<sup>3</sup>). During their vacations, tourists are likely to 'import' social norms for recycling that are more demanding than those that shape local residents' recycling behaviour.

Our objective was thus to study the role of social interaction between tourists and residents in terms of their recycling behaviour in a region subject to great pressure from tourism. To this end, we used the Discrete Choice Experiment method, where the individuals questioned in a field survey (tourists and residents) were asked to rank various household waste sorting scenarios. Rank-ordered logit model estimation show that tourist/resident interactions, measured by appropriate questions and scores, do indeed influence recycling behaviours, suggesting a crowding-in effect between extrinsic pricing motivation and social norm motivation, at least for certain individuals. To our knowledge, this is the first contribution made on this important issue.

The rest of the article is organized as follows. Section 2 describes the survey methodology, research context and questionnaire design. Section 3 presents the results and Section 4 offers the most salient conclusions.

## 2. Methodology, research context and questionnaire design

### *Methodology*

Collecting survey data by means of the Discrete Choice Experiment method is now standard in environmental economics, particularly in the literature on individual behaviour in reaction to public environmental regulations.

Various elicitation methods have been suggested, using a methodology based on Discrete Choice Experiment (Hoyos, 2010; Johnston et al., 2017). The most common approach consists in asking respondents to choose their preferred option from a set of mutually exclusive alternatives or scenarios, defined by attributes, thereby providing choose-one data that are usually analysed through a multinomial logit model or one of its extensions (mixed logit, latent class logit, etc.). When

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<sup>3</sup> <http://www.statistiques.developpement-durable.gouv.fr/indicateurs-indices/f/2487/0/taux-recyclage-dechets-municipaux.html>, data updated on January 22, 2018.

respondents are asked to rank the alternatives, rather than determining their preferred option, this provides ranking data that are commonly analysed using the rank-ordered logit model.

The same applies in the specific context of studies on household waste management that use Discrete Choice Experiment techniques. As shown in Table 1, these mainly collect choose-one data that are then analysed by estimating multinomial logit models.

<i>Author(s)</i>	<i>Elicitation method</i>	<i>Model<sup>4</sup></i>	<i>Main contributions</i>
Garrod and Willis (1998)	(1) Choice between 2 cards; (2) Further choice between the card chosen and 2 new cards	MLM	First article on the subject
Caplan et al. (2002)	Ranking of 3 cards (including status quo)	ROM	Discrete choice contingent ranking approach
Sasao (2004a)	Choice between 3 cards and opt-out option	MLM	NIMBY effect
Sasao (2004b)	Choice between 3 cards and opt-out option	MLM	NIMBY effect
Jamal (2006)	Choice between 3 cards (including status quo)	MLM	–
Jin et al. (2006)	Choice between 3 cards (including status quo)	MLM	CVM comparison and joint analysis
Caplan et al. (2007)	4 choices within 2 sets of cards (pairwise comparison)	BLM	Compensation tests between host and non-host communities
Sakata (2007)	Choice between 3 cards	MPM	Use of a multinomial probit model
Karousakis and Birol (2008)	Choice between 2 cards and opt-out option	MLM	–
Nakatani et al. (2008)	Pairwise comparison	OPM	Presence of dominant preferences and determination of utility function
Pek and Jamal (2011)	Choice between 3 cards (including status quo)	MLM	Comparison between choice of ‘labelled’ waste disposal options and technology-specific methods
Beaumais et al. (2015)	Ranking of 6 cards (including status quo); score given to the same 6 cards; choice not limited to cards among these 6.	ROM	Comparison of a standard ROM with a latent class model
Beaumais et al. (2016)	Ranking of 6 cards (including the status quo); score given to the same 6 cards; choice not limited to cards among these 6.	ROM	Comparison between a full ranking ROM and a ROM that took account of individuals’ heterogeneous ranking abilities

Table 1 – Discrete Choice Experiment and household waste disposal

From Table 1, it is also clear that ranking data have been little used in studies on household waste management. Yet the ranking of alternatives rather than the choice of preferred option provides more information per respondent, which results in efficiency gains at the econometric stage and thus enables work to be undertaken on relatively small sample sizes.

To our knowledge, Caplan et al. (2002) made the first contribution using a rank-ordered logit model in the field of waste management to study willingness to pay for household waste disposal in Ogden (Utah). The authors of this study used a questionnaire in which respondents were asked to rank a status quo option and two options (the same two options were given to all respondents) regarding waste separation services provided and price attributes.

However, since the introduction of the rank-ordered logit model (see Beggs et al., 1981; Chapman and Staelin, 1982), the cognitive burden associated with a ranking task has raised a number of concerns. Rather than ranking sequentially from top to bottom, respondents may focus specifically on their only preferred options. A set of information collected through a ranking task may thus provide ‘noisy’ data (Chapman and Staelin, 1982) and biased estimations.

<sup>4</sup> MLM: multinomial logit model; ROM: rank-ordered logit model; BLM: binary-choice logit model; MPM: multinomial probit model; OPM: ordered probit model.

Within the economics of waste literature, Beaumais et al. (2015, 2016) explore this specific issue and suggest that appropriate questionnaire design could provide the information needed to observe respondents' real ranking capability. Their main idea was to make a cross-comparison through a series of questions designed to assess respondents' heterogeneous ranking capabilities. For this purpose, respondents were asked to carry out three ranking tasks on six alternative cards (including the status quo, with the other cards corresponding to waste management alternatives characterized by three attributes<sup>5</sup>): the first task required respondents to rank six household waste management scenarios according to their preferences; the second task required them to give a score (from 0 to 10) for each of the situations; finally, respondents were asked to choose from the cards they were shown the options that they found the most desirable. Beaumais et al. (2015, 2016) demonstrated that the data from this last task, which corresponds to the determination of a sub-ranking, are less 'noisy' than the data from the full ranking of the alternatives.

In any event, ranking data remain richer than data from choose-one elicitation tasks. For this reason, we adopted a questionnaire design aimed at collecting ranking data, especially since resource constraints limited the sample size that we could obtain.

### *Research context*

Despite significant improvements, waste management remains a key issue that is high on the regional policy agenda in Corsica<sup>6</sup>, particularly when it comes to implementation of the island's Land Management and Sustainable Development Plan (*Plan d'Aménagement et de Développement Durable de la Corse* or PADDUC). Corsica today produces a high volume of waste: an annual total of 190,622 tonnes of household and similar waste or 766 kg per capita annually in 2013 (SYVADEC, 2014)<sup>7</sup>, which is higher than the French national average (573 kg per capita annually in 2013, Ademe, 2016). As mentioned earlier, despite this large volume, the waste recovery rate is very low: 21.6% compared to 42% nationally.

This high volume of waste also fluctuates according to the amount of waste produced during the tourist season. Tourism is an important activity of the island's economy, as reflected in the tourist numbers reported by the Corsica Tourist Board (ATC: *Agence du Tourisme de la Corse*) for the 2015 season: over 3 million tourists for a population of 326,898<sup>8</sup>. In the summer season, population numbers rise sharply (six-fold or even tenfold in a number of towns), with an obvious impact on waste generation. It is therefore clear that a substantial proportion of average annual per capita waste generation, in comparison with the national rate, results from the size of the tourism sector in the island's economy. In the Balagne region in the north-west of Corsica where the present survey was conducted, specifically in the Calvi-Balagne municipal federation, the amount of waste produced increases fourfold between the months of January and August. These figures are largely identical to

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<sup>5</sup> Impact of waste management program (5 levels); time spent on sorting waste (5 levels) and the change in the waste (flat fee) (5 levels).

<sup>6</sup>Cf. CTC, 2014.

<sup>7</sup>These figures come from the 2014 Annual Report of SYVADEC (a joint association of Corsican municipalities in charge of household waste management). It is important to note that SYVADEC does not cover the whole of the island's population (although it comes close), representing 323,467 inhabitants in 2013, or 83% of the total population. The Calvi-Balagne municipal federation and Île-Rousse area, where the current research was conducted, are members of SYVADEC.

<sup>8</sup>Data from 31 December 2015, INSEE, 2016: [http://www.insee.fr/fr/themes/detail.asp?reg\\_id=99&ref\\_id=estim-pop](http://www.insee.fr/fr/themes/detail.asp?reg_id=99&ref_id=estim-pop)

those observed in two other municipal federations, Île-Rousse Balagne and E Cinque Pieve di Balagne, where waste generation increases threefold during the same period<sup>9</sup>.

After an incinerator project was cancelled in 2007, final waste in Corsica is currently disposed of only in landfill sites, which are reaching saturation point. Most waste produced in Corsica is therefore either buried or sent to the mainland for recovery (in the case of separately collected recyclable waste). Major efforts must therefore be made in terms of waste management and recovery to meet the objectives set in Corsica's new Waste Management Plan, which aims for waste recovery rates (over 45% for the cumulative total of household solid waste and 75% for household packaging waste; PPGDNC, 2013, p. 17) that comply with French legislative requirements and are thus much higher than the current figures (about 21% for household solid waste as a whole and 18% for household packaging in 2010; PPGDNC, 2013, p. 8). Waste sorting is therefore a vital factor in increasing the amount of recoverable waste, placing the individual preferences at the heart of the process.

### *Questionnaire design*

With this in mind, we carried out a Discrete Choice Experiment survey on tourists and local residents in three towns – Calvi, Île-Rousse and Algajola – situated on the Balagne coast. These towns offer a favourable field of survey as not only do they have a very large influx of tourists during the summer season but at the same time the municipal federations to which they belong have introduced selective waste collection. The survey was carried out during the months of July and August 2015, face to face, with the help of an application that had been developed and installed on digital tablets. Four versions of the questionnaire were produced: one for local residents and three for tourists (in English, French and Italian). A total of 88 usable questionnaires were obtained (43 completed by tourists and 45 by residents). Notice that, as mentioned earlier, the small sample size is not an issue, as each of the respondents was asked to perform a ranking task (see below) which generated 20 observations per respondent. Also notice that the representativeness of our sample is only checked in terms of tourist origins, as there is actually no detailed information on the structure (in terms of gender, age, income) of the tourist influx.

After a brief explanation of the aim of the survey, the interview was conducted in three phases, corresponding to the three sections of the questionnaire:

- The first phase enabled data to be collected on the respondent's attitude to waste sorting. After a first filter question on the respondent's status (resident or tourist and, in the latter case, country of residence), the following five questions dealt with current waste sorting practices<sup>10</sup>. The next three questions gave an initial indication of the extent of neighbourhood effect. Information was then collected on this neighbourhood effect and on attitude to waste sorting via a series of 18 (for residents) and 19 (for tourists) questions, where the respondents had to position themselves by indicating their agreement or disagreement on a five-point Likert scale.

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<sup>9</sup>Data collected from semi-directive interviews with the heads of waste management at the three municipal federations in Balagne for the 2008-2013 period. The objective of these semi-directive interviews was to characterize the waste sorting scenarios given to respondents in the Discrete Choice Experiment (see Section 3).

<sup>10</sup> More specifically, these questions concerned the following items: household composition and household members who sort the waste, types of materials currently sorted, explanation for not sorting certain materials, time spent on waste sorting.

- The second phase corresponded specifically to the application of Discrete Choice Experiment techniques. After specifying to respondents that they should speak on their own behalf (rather than on behalf of another household member), the different attributes and their levels were presented. On the basis of focus groups, it was decided to use four attributes (see Table 2), each with four levels, to characterize the waste management options presented to the respondents. The first attribute corresponded to the number of materials to be sorted. The second related to the first characteristic of the quality of the infrastructure available to users, which proved representative in the focus groups, i.e. the distance to waste collection points. The third attribute corresponded to the second characteristic associated with infrastructure quality, the frequency of waste collection, since this determines the rate at which the containers are filled and accordingly their availability to receive waste sorted by users. The final attribute was the monetary attribute. For residents, as payment vehicle, we naturally selected their current waste (flat) fee. The fourth attribute corresponded to a change in the waste fee at four different levels (+€10, +€15, +€20, +€25). The payment vehicle was similar for tourists with a family home in Balagne, as they also have to pay this fee. For the other tourists, who were not liable to pay the waste fee, the payment vehicle chosen was an individual tax for entry into Corsica, added to the boat or plane fare, at the same four levels as the change in the household waste fee used for the other respondents. Based on these four attributes, the cards were generated following a full orthogonal design<sup>11</sup>. Each respondent then had to rank four alternatives/scenarios (to which was added the status quo), four times.

Attributes	Levels
Number of waste materials to be sorted	None (automatic waste sorting facility; recyclable/non-recyclable items; recyclable/organic waste for composting/other; paper/glass/metal/plastic/other
Distance to waste collection point	0 meter (apartment block); <200 meters; 200-500 meters; >500 meters
Frequency of waste collection	Monthly; weekly; twice-weekly; daily
Waste fee / Tax for entry into Corsica	+€10 ; +€15 ; +€20 ; +€25

Table 2 – Attributes and levels

- The last part of the questionnaire concerned the respondent's socioeconomic profile.

### 3. Results

#### *An initial descriptive approach*

The first results presented in this section enable information to be provided on the current waste sorting behaviour of the respondents and on their motivations for sorting.

These results firstly concern the distribution of respondents' positions in relation to a series of 18 (residents' questionnaire) or 19 (tourists' questionnaire) statements, enabling neighbourhood effect, tourists/residents interaction and respondents' attitudes to waste sorting to be measured.

<sup>11</sup> An example of a set of cards is provided in Appendix.

Our basic idea was to elicit respondents' perceived norms regarding waste recycling. As Farrow et al. (2017, p. 2) recall, "the difference between descriptive and injunctive norms is the most prominent and widely utilized distinction. Whereas descriptive norms refer to what most people do, injunctive norms describe what most people approve of doing". Most of the statements included in the questionnaire were inspired by previous works on waste recycling. For example, the five first statements reported in Table 3 are adaptation of a statement used by Viscusi et al. (2014) as an indicator of injunctive social norms: "Other people in my neighborhood would be upset if they noticed someone putting recyclable materials into the garbage". "Sorting waste is a civic duty" was taken from the OECD survey used by Ferrara and Missios (2012), etc. The distribution of respondents between the five options given (from "Strongly agree" to "Strongly disagree") is summarized in Table 3.

Statement	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
I would be upset to know that one of my neighbours, at my home, in my country, does not sort waste	36.36%	23.86%	3.41%	14.77%	21.59%
I would be upset to know that a tourist, here in Balagne, does not sort waste	50%	28.41%	4.55%	7.95%	9.09%
My neighbours, at my home, in my country, would be upset to know that I do not sort waste	32.95%	25%	15.91%	11.36%	14.77%
Other tourists, here in Balagne, would be upset to know that I do not sort waste	27.27%	20.45%	15.91%	10.23%	26.14%
Balagne's inhabitants would be upset to know that I do not sort waste	47.73%	20.45%	11.36%	6.82%	13.64%
A logo/label telling you that the packaging is recyclable does influence my purchase decisions	20.45%	11.36%	1.14%	10.23%	56.82%
Sorting waste is a civic duty	47.73%	38.64%	4.55%	5.68%	3.41%
Sorting waste is a pleasure	11.36%	36.36%	7.95%	27.27%	17.05%
Sorting waste is a burden	4.55%	7.95%	1.14%	25%	61.36%
Sorting waste is a militant act	34.09%	22.73%	5.68%	14.77%	22.73%
Recycling is a major societal challenge	69.32%	28.41%	2.27%	0%	0%
I think that the fact that my neighbours sort waste has or may have an influence on the fact that I sort waste	25%	14.77%	3.41%	6.82%	50%
Relatives and/or friends tell me that I should sort waste	50%	21.59%	2.27%	4.55%	21.59%
Neighbours tell me that I should sort waste	44.32%	15.91%	2.27%	2.27%	35.23%
I enjoy doing what my neighbours or my relatives/friends think I should do	3.41%	10.23%	37.50%	13.64%	35.23%
I think that my neighbours should sort waste	72.73%	18.18%	5.68%	2.27%	1.14%
Tourists should sort waste (residents' version)/Balagne's inhabitants should sort waste (tourists' version)	67.05%	7.95%	5.68%	1.14%	18.18%
Tourists tell me that I should sort waste (residents' version)/Balagne's inhabitants tell me that I should sort waste (tourists' version)	46.59%	10.23%	3.41%	5.68%	34.09%
I enjoy doing what Balagne's inhabitants think I should do (tourists' version)	18.60%	20.93%	30.23%	13.95%	16.28%

Table 3 – Measurement of neighbourhood effect and respondents' attitude to waste sorting

The answers obtained appear to be consistent. Slightly more than 86% of respondents agreed or strongly agreed with the statement 'Sorting waste is a civic duty.' This is consistent with responses to the statement 'Sorting waste is a burden', where 86% of respondents indicated agreement or strong agreement (with a significant proportion claiming to 'strongly agree').

Perceived injunctive norms appear widely shared amongst respondents: a majority of them either strongly agree or agree with statements like "I would be upset to know that one of my neighbours, at my home, in my country, does not sort waste" or "I think that my neighbours should sort waste".

Also, interactions between tourists and residents related to injunctive norms are significant, considering the percentage of agreement ("Strongly agree", "Agree") with statements like "Balagne's inhabitants would be upset to know that I do not sort waste", "I would be upset to know that a



tourist, here in Balagne, does not sort waste” or “Tourists tell me that I should sort waste (residents’ version)/Balagne’s inhabitants tell me that I should sort waste (tourists’ version)”.

Regarding the number of materials sorted in the place of usual residence, Figure 3.1 shows that tourists sort considerably more materials than Balagne residents, which is consistent with the sorting rates observed in Corsica and on the French mainland (90% of the tourists in our sample are French).

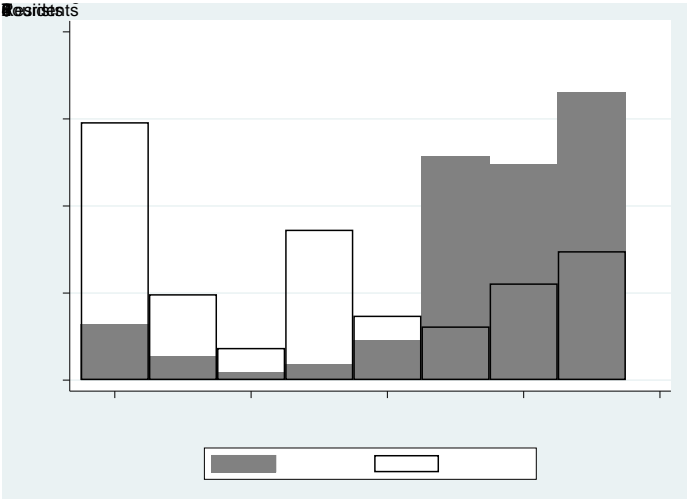


Figure 3.1 – Number of materials sorted by the household

Figure 3.2 enables a comparison to be made between tourists’ waste sorting behaviour when at home (in gray) and on vacation. In line with observations made by Dolnicar and Grün (2009), tourists clearly do less sorting at their holiday destination than at their usual place of residence. This undoubtedly reflects both a certain lowering of waste sorting standards and a reaction to household waste collection being organized differently from respondents’ usual practice at home.

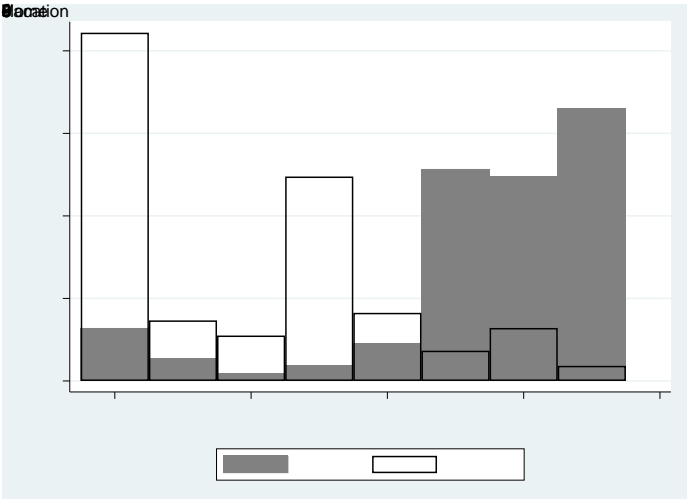


Figure 3.2 – Number of materials sorted by tourists on holiday and at their usual place of residence

Figure 3.3 indicates how tourists categorize their waste sorting efforts in relation to their neighbours (in gray) and to Balagne residents. Here, the response options are coded as follows: 1=Much less, 2=Less, 3=About the same, 4=More, 5=Much more, 6=Unsure. A substantial majority (around 60%)

consider that they sort around the same amount as their neighbours at their usual place of residence; note that this high percentage probably reflects what Viscusi et al. (2014) refers to as a positive self-assessment bias. However, these tourists are unable to compare themselves with Balagne residents (6=Unsure). In short, as intuitively expected, the tourist respondents consider themselves within the norm in terms of their sorting behaviour at their usual place of residence but cannot compare their own sorting behaviour with that of Balagne residents.

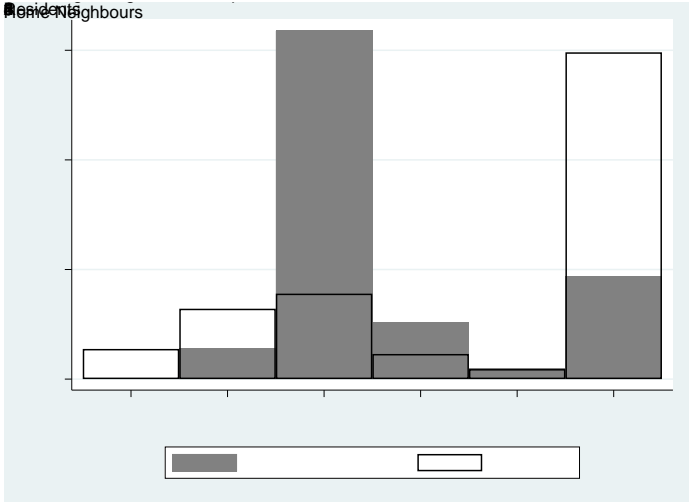


Figure 3.3 – Tourists’ self-evaluation of their waste sorting efforts in relation to their neighbours and to Balagne residents

Similarly, Figure 3.4 shows that tourists are unable to compare their own waste sorting behaviour with that of other tourists.

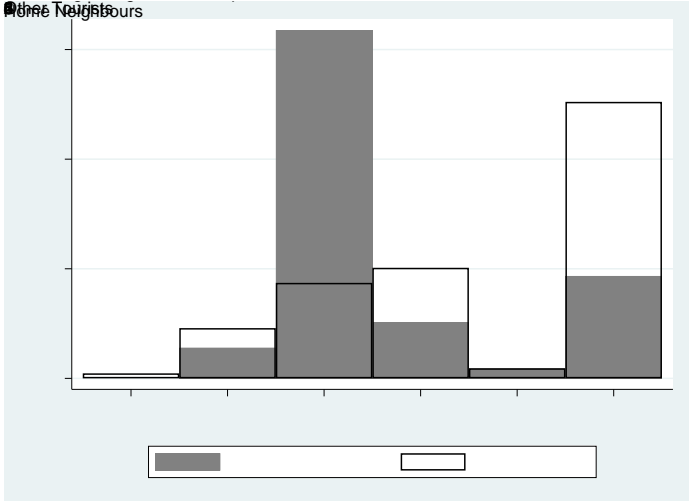


Figure 3.4 – Tourists’ self-evaluation of their waste sorting efforts in relation to their neighbours and to other tourists

Figure 3.5, on the other hand, shows a similarity in the way in which Balagne residents rate their waste sorting efforts in relation to both their neighbours and to tourists. The two distributions are close; this striking result can be compared with Balagne residents’ current waste sorting efforts, measured as the number of materials actually sorted. The practice of waste sorting is much less embedded in Balagne residents than in tourists. It is also possible that Balagne residents take local practices as their benchmark, considering that when in Balagne, tourists behave like local residents.

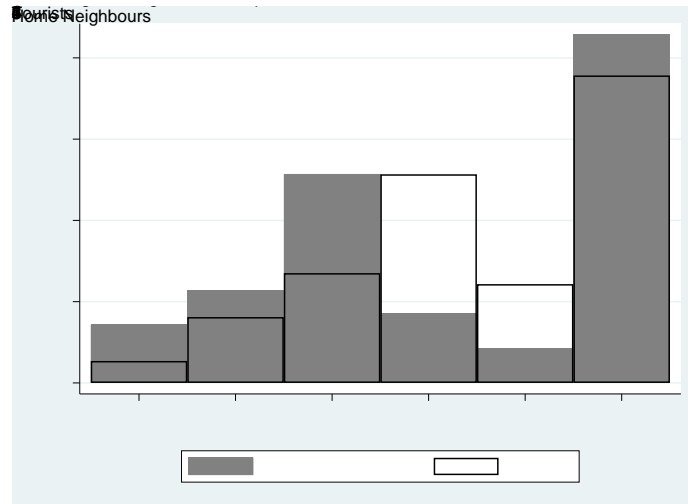


Figure 3.5 – Balagne residents’ self-evaluation of their waste sorting efforts in relation to their neighbours and to tourists

This interpretation can be confirmed by studying Figure 3.6. Here, Balagne residents compare themselves with other Balagne residents, in short, with their neighbours in the broad sense of the term. The two distributions are very close. One of the differences in relation to the comparison made by tourists (Figure 3.3) lies in category 6 (Unsure). A much larger proportion of tourists claim to sort waste about as much as their neighbours, placing themselves in a norm that probably comes from sustained waste sorting efforts.

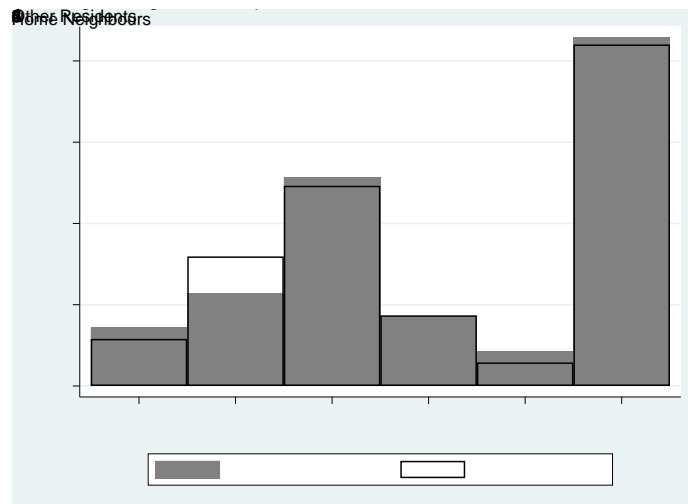


Figure 3.6 – Balagne residents self-evaluation of their waste sorting efforts in relation to their neighbours and to other Balagne residents

### *An approach based on the rank-ordered logit model*

Beyond this initial descriptive approach, the preparation of our econometric analysis began with a more in-depth analysis of the responses to the 18 questions summarized in Table 3<sup>12</sup>. The search for scales reflecting latent traits, using the Mokken Scale Analysis (MSA, Mokken, 1971), indicated that four items formed a consistent scale: ‘Recycling is a major societal challenge’; ‘Relatives and/or friends tell me that I should sort waste’; ‘Neighbours tell me that I should sort waste’; and, especially, ‘Tourists tell me that I should sort waste’ (residents’ version) and ‘Balagne’s inhabitants tell me that I

<sup>12</sup> Since the 19th question (“I enjoy doing what Balagne’s inhabitants think I should do”) was only asked of tourists, it was excluded from the in-depth analysis.

should sort waste' (tourists' version). This last item, central to our initial research objective, notably elicited very different responses: around 47% of respondents stated that they 'strongly agreed' with this statement, while 34% 'strongly disagreed'. It should be noted that MSA is a nonparametric approach, which makes it possible to analyse the proximity of responses to a set of items which, when they form a scale, enables a score to be created (Hardouin et al., 2011). In the present case, the responses were coded from 1 (Strongly disagree) to 5 (Strongly agree). A score was then created by adding together the four items for which MSA had established internal consistency. This internal consistency was assessed by calculating Loevinger's coefficient ( $H^S$ ), the commonly used rule of thumb being that a 'strong' scale is one in which  $H^S \geq 0.5$  (van Schuur, 2003). Here, the four questions that were identified form a strong scale ( $H^S = 0.8$ )<sup>13</sup>, enabling what we call a 'social pressure' score to be constructed with values ranging from 6 to 20. We think that this 'social pressure' score reflects the sensitivity of the respondent to injunctive social norms related to waste recycling as four out of the five corresponding statements pertain to what people *should* do. Notice that, compared to parametric approaches (the Rasch model, for example), MSA is based on less restrictive hypotheses, particularly with regard to the data generating process, and potentially enables more items to be retained to create the score obtained.

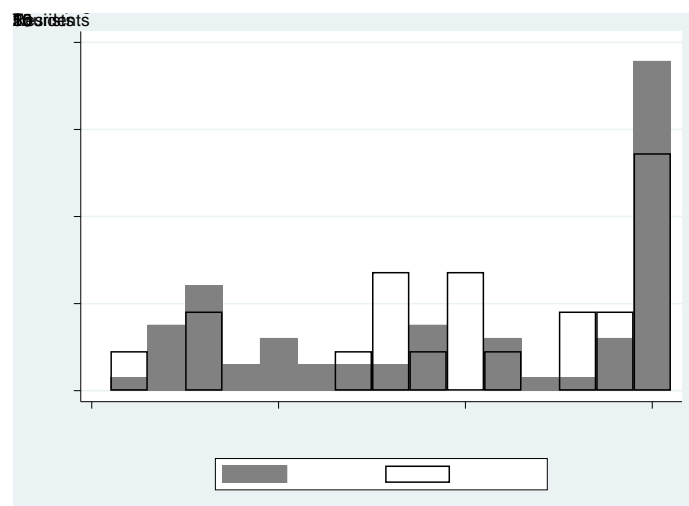


Figure 3.7 – Social pressure score

Here, an individual with a social pressure score of 6 is considered to show little sensitivity to the judgment of others, whereas an individual with a social pressure score of 20 is considered very sensitive to other people's opinions on household waste sorting, including those related to interactions between tourists and residents. Figure 3.7 suggests that this score distribution differs significantly between residents and tourists although the average remains close (15.54 for tourists and 14.84 for residents).

This social pressure score was then included in the rank-ordered logit model (Model 1), in interaction with the attributes<sup>14</sup>. The aim was to test the hypothesis that the weight individuals place on the different attributes varies according to their social pressure score. For that reason, we kept the model very simple, without seeking to introduce more socio-demographic variables as additional predictors. The use of interaction terms between attribute variable and the score variables enabled

<sup>13</sup> The internal consistency of the scale was confirmed by calculating Cronbach's alpha (alpha=0.82).

<sup>14</sup> Notice that additional interaction terms between social score, attributes and tourist/resident status were never found significant.

us to account for observed heterogeneity in behaviour, linked in particular to interaction between residents and tourists. In the latter perspective, a second rank-ordered logit model was estimated (Model 2), reducing the analysis to a score created solely from the response to the item (variable *soc\_int*) focusing specifically on the interaction between residents and tourists ('Tourists tell me that I should sort waste' (residents' version)/Balagne's inhabitants tell me that I should sort waste' (tourists' version)).

Table 4 reports the estimated coefficients for the two models. It should be noted that the variable coding each of these attributes was discretized, with level 2 used as a reference. For the attribute coding the number of materials to be sorted, the reference was therefore the 'recyclable/non-recyclable' category. For the attribute coding 'collection frequency', the reference was the 'weekly' category. The ASC variable (Alternative Specific Constant) is a constant that is coded 1 when the status quo is chosen and 0 in other cases. When the coefficient for this variable is significant and negative, as is the case here, the standard interpretation is that respondents are rejecting the status quo.

Variables	Model 1 Coefficients (p-value)	Model 2 Coefficients (p-value)
ASC	-0.684*** (0.000)	-0.681*** (0.000)
Automatic sorting	-0.713*** (0.000)	-0.752*** (0.001)
Recyclable items/organic waste/other	0.540*** (0.000)	0.577** (0.005)
Paper/glass/metal/plastic/other	0.566*** (0.000)	0.027 (0.889)
Monthly	-0.385* (0.034)	-0.274 (0.127)
Twice-weekly	-0.339** (0.002)	-0.425*** (0.000)
Daily	-0.030 (0.864)	0.019 (0.915)
Price	0.048*** (0.001)	0.013 (0.236)
Price X score	-0.003*** (0.000)	
Automatic sorting X <i>soc_int</i>		0.015 (0.800)
Recyclable items X <i>soc_int</i>		-0.009 (0.868)
Paper/glass, etc. X <i>soc_int</i>		0.171** (0.001)
Price X <i>soc_int</i>		-0.006* (0.025)
<i>N</i>	1,760	1,760
<i>LogLik</i>	-1,754.60	-1,754.66

p-values in brackets; \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

Table 4: Rank-ordered logit models

Interestingly, the second attribute ('distance to waste collection points') was never found to be significant, irrespective of the specification tested. This result probably reflects the specific characteristics of the area in which the research was conducted, a coastal strip where the density of waste collection points poses no problems.

In Model 1, with the exception of the price attribute, the interaction effects were not found to be significant. This suggests that the number of materials to be sorted (attribute 1) and waste collection

frequency (attribute 2) are not perceived differently according to individuals' sensitivity to the opinions of others on their waste sorting behaviour.

On the other hand, several levels of the first attribute ('number of materials to be sorted') were significant. The 'automatic sorting' coefficient is significant and negative, implying a rejection of automatic sorting compared to the 'recyclable/non-recyclable' reference category. The coefficients for the options 'recyclable/organic waste/other' and 'paper/glass/metal/plastic/other' are significant and positive, indicating a preference for multi-material recycling rather than simpler two-material sorting ('recyclable/non-recyclable').

Respondents also seem to be against monthly or twice-weekly waste collection (significant and negative coefficients, one at the 5% threshold and the other at the 1% threshold). The norm here seems to be weekly collection, while the non-significance of daily collection probably reflects the perception that this is an implausible option.

Interpretation of the price attribute coefficient is worthy of attention. At first sight, a significant and positive price attribute coefficient (0.048,  $p$ -value=0.001) could be seen as implying that individuals give a higher ranking to more expensive options. However, the interaction effect with the social pressure score, which varies from 6 to 20, is also significant. For a value of 6, the cumulative price coefficient is 0.027, which is significant ( $p$ -value=0.008). It seems therefore that individuals who care less about the judgment of others give a higher ranking to expensive solutions. At the other end of the scale (score equal to 20), the cumulative price coefficient is -0.02, which is highly significant ( $p$ -value=0.004). Individuals who are sensitive to the judgment of others therefore react normally to extrinsic motivation; for these individuals, extrinsic monetary incentives are reinforced by social norm perceptions (judgment of others), reflecting a crowding-in effect.

A number of differences emerge when the analysis focuses on the specific issue of tourist/resident interaction (Model 2). As mentioned earlier, the variable *soc\_int* corresponds to the statement concerning this interaction ('Tourists tell me that I should sort waste' (residents' version)/Balagne's inhabitants tell me that I should sort waste' (tourists' version)), coded from 1 (strongly disagree) to 5 (strongly agree). This specification of the model seems to indicate a slight preference for a waste sorting system that differentiates more materials (positive and significant coefficient for the 'recyclable/organic waste/other' category). In this model, the interaction variable 'Paper/glass, etc. X *soc\_int*' is significant and positive, indicating that individuals who are particularly sensitive to tourist/resident interaction tend to favour alternatives that involve sorting more materials. Finally, as before, the price attribute merits particular attention. The interaction score here (*soc\_int*) varies from 1 to 5. When the score is 1, the cumulative price coefficient equals 0.007 and is non-significant ( $p$ -value=0.427). When the score is 5, the cumulative price coefficient equals -0.05 and is significant at the 5% threshold ( $p$ -value=0.044). This result accordingly suggests that individuals who show little sensitivity to tourist/resident interaction are indifferent to price, while for those who claim to be sensitive to such interaction, see the price effect on their choice strengthened (crowding-in effect).

#### 4. Conclusion

In a recent but yet already influential paper, Nyborg et al. (2016) argue that social norms are important “to enforce collectively desirable outcomes”. One of the examples given in this paper concerns the recycling of household waste: as recycling can be made easily observable by each other (e.g. recycling by curbside collection), a modest social norm intervention may suffice to create a tipping point, i.e. to turn a vicious cycle into a virtuous one.

In this perspective, from our analysis, three main results seem to us to be worth highlighting.

First, tourists can be observed to make less effort sorting waste at their holiday destination. This change in behaviour is likely to result from both the specific context of being on vacation, which lends itself to a certain relaxing of standards in relation to the usual routine, and the different organization of waste sorting at their holiday destination. Tourists do not find the infrastructure that they are accustomed to having available at their usual place of residence – infrastructure that the literature has shown to be important for waste sorting behaviour.

Second, a descriptive analysis of the survey data also shows that there is genuine interaction between tourists and residents on the issue of waste. A high percentage of respondents (around 47%, see Table 3) claim to be sensitive to this interaction.

Finally, econometric analysis confirms the influence of tourist/resident interaction on respondents’ ranking of waste sorting scenarios. Specifically, our results suggest that individuals who are sensitive to the judgment of others when it comes to household waste sorting as well as being sensitive to tourist/resident interaction tend to react more strongly to economic incentives than others. For these individuals, there is therefore a crowding-in effect in terms of both extrinsic monetary incentives and sensitivity to social norm.

Taken together, we believe that these results pave the way for the implementation of recycling promotion policies combining monetary incentives and social norm interventions targeted at tourists *and* residents.

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**Appendix – Example of a set of cards**

0	Programme 1	Programme 2	Programme 3	Programme 4	Programme 5	<b>CANCEL</b>
Number of waste materials that have to be sorted	None: automatic waste sorting equipment	Recyclable/ Not recyclable	Recyclable/Organic waste for composting/Others	Paper/Glass/Metal /Plastics/Others	Statu Quo (nothing changes)	
Distance	0 meters (collective dwelling)	>500 meters	0 meters (collective dwelling)	>500 meters		
Frequency of waste collection	two times per week	Once per week	two times per week	Once per week		
Cost	20	15	20	15		
Rank the programmes by order of preference. Choose the programme you prefer first.						
	1	2	3	4	5	<b>OK</b>

**Figure A1 – Example of a set of cards – English version of the survey**