Regulation of the fishing activities in the lagoon of Venice, Italy: Results from a socio-economic study

Paulo A.L.D. Nunesa,*, Silvia Silvestrib,1, Michele Pellizzatoc, Vasco Boattob

aDepartment of Economics, University of Venice and Fondazione Eni Enrico Mattei, Campo S. Maria Formosa, Castello 5252, 30122 Venice, Italy
bDepartment Te.S.A.F, Faculty of Agriculture, Padova University, Italy
cAgri. te. co, Venice, Italy

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Abstract
In the last years, the overall fish industry in the lagoon of Venice has shown a gradual decline. In order to better understand this process, we carry out a socio-economic questionnaire next to the fisherman population. Questionnaire contains significant qualitative and quantitative data that allow us to evaluate the social and the cultural profile of the respondents, including information with respect to the different technological fishing characteristics involved, type and amount of the species harvested as well as the overall productivity of the activity. Furthermore, the questionnaire contains an economic valuation exercise so as to assess in monetary terms the preferences of the fishermen with respect to different alternative policy options that may characterize a future regulation of this economic activity. Estimation results show that fishermen welcome any regulation initiative that is characterized by: (1) banning all fishing activities during the night, (2) allocating fishing concessions areas to each fisherman in a way that minimize the distance between the fishing area and the harbor, and (3) by introducing of a labeling mechanism that certifies the origin of the product. Moreover, the underlying economic valuation mechanism reveals to sensitive to respondent’s motivational profile, including the overall trust and confidence that fisherman community places on the current institutional bodies. This result reveals to be of particular significance when attempting the design of an efficient, widely supported regulation of the fishing activity in the lagoon of Venice.

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1. Introduction

Fishing has always been one of the principal economic activities in Venice. Nevertheless, in the last years, the fish industry has shown a gradual decline, and has led either to a transition from multiple fishing methods to a concentration based mostly on one species, the bivalve Tapes philippinarum (see Nunes et al., 2004), or to a reduction in the number of fish belonging to typical lagoon species (see Boatto et al., 2002). In order to better understand the underlying steering mechanisms, we embrace a micro-economic approach that tracks the characterization of the individual behavior of the fishermen who operate in the lagoon of Venice. Against this background, that a socio-economic survey is carried out so as to shed light on the fishermen preferences, including information regarding his socio-cultural background, topology of fishing methods, as well as information concerning the type of species harvested. Finally, the survey combines the use of this information with an economic valuation exercise with the objective to estimate, and predict, fishermen responses to specific fish management practices, which, in turn can, be interpreted in terms of policy (or regulation) scenarios. The proposed economic valuation exercise is characterized by the use of the stated choice valuation method, a well-known survey based valuation tool used by economists.

The organization of the article is as follows. Section 2 describes the road map regarding the design of the survey and application of the questionnaire, putting forward the statistical analysis of the survey responses. Section 3 presents and discusses the stated choice valuation exercise, exploring the use of survey information regarding the individual fisherman motivational profile. Section 4 shows the estimation results, evaluating the potential of this socio-economic information in assisting the policy maker in the design of an efficient, widely supported regulation of the fishing activity in the lagoon of Venice. Section 5 concludes.
2. General characteristics of the fishermen and their economic activity

2.1. Population size

According to the Provincial authority of Venice, the institution responsible for issuing and controlling the emission of fishing permits in the lagoon of Venice, the number of fishermen is 33,619. These are distributed in two groups: 2746 designated as amateur fishermen and 30,873 designated as professional. More than half of the latter group comes from the southern basin of the lagoon of Venice and from the city of Chioggia, which has always been the principal centre of the fishing business in the province. In addition, about 22.5% of total fishing licenses are granted to fishermen in the central basin of the lagoon, which includes the islands of Pellestrina, San Pietro in Volta and Venice itself. The third largest group of fishermen, which account for about 14.9% of the registered licenses, is composed of fishermen that operate in the northern part of the lagoon, namely from the island of Burano and the harbors of Caorle and Cavallino. The remaining, and smallest, group of fishermen, accounting for only 3.6% of total licenses, come from the edge of the lagoon.

The analysis of the present survey was carried out following interviews carried out on a sample group of fishermen who hold Type A fishing licenses. The survey was carried out in Summer 2002. Personal interviews were executed out next to fishermen when coming back from a fishing working day in the various parts of lagoon. We choose this sampling frame because it allows us to obtain a sample of respondents that represents as close as possible the total universe of lagoon’s fishermen. For this reason we did not use a sampling frame based on a list of the operators with a license, because first the licenses are not issued for exclusive fishing in the lagoon (and thus the universe of fishermen would also include open sea fishermen). Secondly, working from the permit database would miss those who fish in the lagoon without a permit. The questionnaire was administered in person. The interviewers were researchers with good knowledge of local fishing conditions and practices. The interviewers contacted 215 fishermen, 151 of which completed the questionnaire. The participation rate is therefore about 70%.

2.2. Individual profile

According to the survey results, many of the fishing enterprises that operate currently in the lagoon of Venice have begun their activity rather recently. In fact, about 45% of those involved in the fishing industry in the lagoon of Venice started their business activity after 1990.

However, only 9% declared that they had been operating in the lagoon for more than 40 years. The percentage of those who state they began to fish between 1970 and 1980, is also very low, at 14%. This can be explained by the widespread exodus which characterized the fishing industry in the past decades, given the preference for other employment opportunities, such as those to be found in manufacturing industries. There was also a low percentage of workers in the sector (9%) in the following decade, from 1980 to 1990. In these years the lagoon production became unstable for environmental reasons (e.g. dystrophic events such as the macro-algae blooms) and drove fishermen away from the lagoon, forcing them to fish in the open sea.

In contrast to the owners or entrepreneurs of land-based activities, whose average age tends to be over 50 years old, in the fishing industry, 73% of workers declare they are under 50. Furthermore, about 65% of those interviewed said they hoped to hand on their businesses from father to son, or at least to keep it within the family. In addition, the average educational level of the fishing workers is higher than the average of people employed in the agricultural sector in the mainland. In fact, only 25% stated that they had only achieved an elementary education level, while 20% said they held high-school leaving qualifications. The remaining part of the sample had followed an education program without completing their high-school studies.

The success of such business activities depends inter alia on the specialized training of the fishing crew. According to the survey results, 55% of the fishermen had received training on fishing techniques directly from their relatives, while, the others had got their basic experience from other people working in the fish industry. Only 5% said they had undertaken specific training courses. Finally, the large majority of the fishermen interviewed, about 95%, reported that they belong or are enrolled in a cooperative – see Fig. 1.

When asked about the major motive for such a decision, 53% of the respondents reported the incentives that such a participation puts forward in terms of the additional availability to credit. Other incentives for this participation refer to technical support, cited by 47.1% of the respondents, assistance with red-tape, about 66.7%, and help on insurance related issues, at 58%. In the questionnaire, each fisherman is also asked to single out the different systems of fishing currently used in the lagoon, as well their perceived diffusion among the fishermen community. Furthermore, it was necessary to make a distinction between the fishing operators that are focused on the main fish species that are present in the lagoon and the fishing operators that only work on the harvest of the Manila Clam (T. philippinarum). The results are presented in Section 2.3.
2.3. Species, fishing equipment and techniques

Bearing in mind the specific characteristics of the natural growth of the clams, this type of fishing has a season of approximately 200 days per year – see Solidoro et al. (2000). According to survey responses, each fisherman harvests about 150–200 kg of clams per day. Some of those interviewed admitted that the size of their catch could reach up to 1000 kg, well above the amount stipulated by the law. The most common type of equipment used in clam fishing includes the standard mechanical rake (rusca) and the vibrating rake. The present survey confirms these results. According to Fig. 2, manual rakes, such as hand rakes, is declared as being very little use in the fishing for clams. Such a fishing system, known as caparozzoli in Venice, has been replaced by the use of mechanical equipment, which requires less time and proposes higher efficiency. In fact more than 60% of the clam fishermen admitted they never use a manual rake and about 49% reported that they usually use a mechanical rake, even if the present regulation strictly prohibits its use in the lagoon area.

Another interesting result emerges from the analysis of the vibrating fishing equipment. Although the total number of operators using the vibrating fishing equipment officially limited to 63 vessels, and only for operations in the Adriatic Sea, the largest proportion of fishermen reported that they did not use it. However, about 15% admitted that it is also often used in the lagoon, even if all operators are aware its use is illegal. These answers signal the urgency to monitor efficiently this equipment that is responsible for a significant environmental damage to the lagoon bed and respective to environmental quality of the ecosystem (Solidoro et al., 2003; Nunes et al., 2004). This in turn, constitutes the reason why the law strictly prohibits the use of such an environmental damaging technology in the lagoon area.

On the basis of the collected data, backed and confirmed by a previous survey carried out by the Magistrato for Water Resources, we have outlined the lagoon of Venice’s main production for the most common species of fish, including gilt-head sea bream (Sparus aurata), sea bass (Dicentrarchus labrax) and grey mullets (Liza ramada “botolo”; Liza aurata “lotregano”; Liza saliens “verzelata”; Chelon labrosus “bosega”). The survey results show that there is not much use of trawl nets, and parangali, referring to a fishing line to which are attached up to 250 hooks – see Fig. 3. The use of fyke nets is, however, widespread and gilles nets are quite common. The fyke net fishing activity necessitates the control and the management of a wide area of the lagoon by a group of fishermen, while the collecting phase usually requires the work of only one fisherman; in this case average daily productivity is equal to approximately 2.5 kg/fyke net/day, and it reaches 5 kg/fyke net/day in ideal conditions.

In addition, 25% of the operators interviewed asserted they possess cages or fixed equipments for the fishing activity, such as casoni (warehouse for nets and other fishing tools), buse (for finfish fry storage), rafts (for mussels and clams selection and processing). Furthermore, the seine nets, or dragnet, one of the oldest type of commercial fishing net – it has a long documented history and has been depicted in art as far back as the 3rd millennium BC where it was shown in Egyptian grave paintings – it is still today reported as often used by 13% of the respondents, which demonstrates that the seine has changed relatively little through history – see Silvestri et al. (2006) for more details.

Finally, the survey explores fishermen perception with respect to future prospects of the economic activity. This analysis will be discussed in detail in Section 2.4.

2.4. Individual perception regarding the future prospect of the activity

The recent recession that is affecting the fishing sector has encouraged the formulation of new management strategies, including the introduction of new regulations and more stringent monitoring controls. The present questionnaire allowed us to gauge the fishermen’s reaction to these changes. In this context, 30% of the fishermen reported that they believe that the introduction of regulations would not favour the fishing activity. Their main argument refers to the fact that such any regulation would imply a constrain in the efficient use of time and equipment throughout the year. According to the respondents, this would be responsible for a reduction in the profits. Moreover the fishermen fear the competition from their outlaw ‘colleagues’, who would no doubt continue in their illegal activities. There is, however, the conviction that by following the new directives there would be a greater security of production and some improvement of the environmental conditions of the lagoon. In fact, if they were able to choose, about 60% of the operators would limit their lagoon activities to the fishing of just one of the species, and in particular to become a fish farmer in the lagoon, because in their opinion the catch would be easier to attain, thus with a guarantee of a greater profit. This choice of concentrating on just one product is usually in reference to the T. philippinarum. There were those who instead would prefer to run diversified fish farms, which would include the rearing of sea-urchins and oysters. In this context, the assessment of future prospects of the sector shows that 11% of the respondents did not express an opinion, while the remaining 90% was almost equally divided between three alternatives: weak growth, growth, and decline. A further analysis shows that those respondents who recently have began their activity and are involved in T. philippi-narum fishing express a positive belief in the future, while those who have been active with fyke and gilles nets see difficulties in their future prospects. Against this background, we propose to explore in detail the perceptions of the fishermen. Therefore, we develop a formal economic valuation exercise so as to elicit, and quantify in monetary terms, fishermen preferences with respect to specific fishing policies, as recently discussed in the local policy agenda. These are described in terms of different fish management practices and constitute the core of the economic valuation exercise. This will be presented in Section 3.

3. Economic valuation of fishermen preferences with choice experiments

3.1. Identification of the regulation based attributes

The economic valuation exercise that we propose so as to assess fishermen preferences with respect to alternative fish regulation practices in the lagoon of Venice is developed by exploring a consumer choice framework that is based on the random utility model (McFadden, 1974). In practical terms, this means that we make the use the choice experiments, also referred in the non-market valuation literature as stated choice valuation method. This technique has been developed and applied in various fields that analyze individual choice behavior, including market research,
transportation research, environmental economics, and health economics (Louviere et al., 2000). Such a setting will be applied to so as to understand and predict fishermen choice behavior, translating their choices in monetary terms (van Den Bergh et al., 2002; Nunes and van Den Bergh, 2004).

In the present study, the set of alternatives used in the stated choice exercise, and which describe the full range of possible regulation alternatives, are described by: (1) period of fishing; (2) certification of the fishing product; (3) distance between the harbor and the fishing ground; and (4) the net monthly income. These attributes were considered as the major relevant elements entering in the fishermen utility function and thus the components of any policy package for regulating fish management practices. Formally, this means that the underlying empirical specification of the random utility model assumes that the systematic utility component is a function of the net income, period of fishing, certification scheme, and distance from the harbor to the fishing area. In addition, a set of group discussion with biologists, economists, policy makers and the local fishermen confirmed the validity of proposed range of attributes, including the creation of fishing areas concessions and certification of the harvest. The discussions also provided valuable information on possible different levels of the attributes.

Two fishing periods were considered for analysis: fishing during the daylight and fishing during the night. The latter constitutes the ‘status quo’ situation for many fishermen. This is not only because of idiosyncratic reasons related to fishing activity in the lagoon but also because many choose the fish illegally and choose to engage in such an activity during the night. As far as the certification is concerned, two systems were identified: with and without certification. The certification system that is identified as the ‘no-certification’ corresponds to the ‘status quo’ situation for many fishermen. In fact today, the fishing harvest that is produced in the lagoon of Venice is not formally certified as such. In other words, the range of fishing products that come directly from the lagoon of Venice do not have a certification label. On the contrary, the ‘yes-certification’ scheme will correspond to the situation where all the fishing products that come directly from the lagoon of Venice do have a certification label. This certification will allow consumers to be informed with respect to the origin of the fish and thus make (more) informed decisions. In addition, we take into account the geographical distance between the harbor, where the fishing boats are located, and the fishing area. The latter is characterized by the zoning of a parcel of the lagoon of Venice that is allocated – given concession – to a single fisherman or cooperative. We consider two (qualitative) levels for the distance between the fishing area concession and the harbor: far and near. The latter will not involve more than 45 min to reach it. Finally, we consider a vector for the fishermen income that range from 1250 to 1750€ net per month. We arrived at this price vector after group discussions, following the indications on current fishermen monetary return. In other words, we need to be sure that the proposed income range is appropriated for the alternative management practices involved, so as to ensure the credibility of the stated choice valuation question.

3.2. Stated choice valuation question

In the questionnaire, we describe a set of three alternative fishing management practices and ask respondents to state which one they prefer.

Each respondent faces a series of six stated choice questions. Our goal is to use the responses to the stated choice questions to value the attributes of the fishing management practices. To study the degree in which preferences for fishing management practices differ according to the degree of individual trust on the local institutions and their functioning, we introduce the following question: “Do you believe that current institutional setting, including the Provincia, Magistrato alle Acque and Regione, have an important role in the regulation of the fishing economic activities in the lagoon of Venice?” The goal in using this question is to assess whether the institutional setting has an impact in explaining individual behavior, i.e. his answering to the state choice questions. In addition to this question, we also introduce a set of motivational questions that respondents could answer using a five-point Likert scale, ranging from ‘completely disagree’ to ‘completely agree’. Fishermen express a clear attitude in favor of the introduction of a new regulation setting, including the assign of concession of exclusive fishing areas and fishing exclusively during the daytime. Furthermore, the extinction of one of the fish species in the lagoon...
is associated with important damage to the respondents. The goal is to use the answers to this set of questions together with the answers to the conjoint questions, which underpin the valuation of the fishing attributes as shown in Table 3. Valuation results are presented and discussed in Section 4.

4. Valuation results

4.1. Full sample model specification

In the present application, respondent’s answers to the conjoint questionnaire are used to predict the monetary impact of: (1) changing the period of the day when operators go fishing; (2) introducing a labeling mechanism that certifies the origin of the fishing harvest; and (3) changing the distance between the harbor and the fishing area, in which the fishermen has the permit to run his economic activity. The estimation results are presented in Table 1. According to the estimation results, the coefficients for all attributes are statistically significant at the 10% level, or better, and for this reason play a crucial role in explaining respondent’s choices. In particular, the probability of choosing a management practice is positively related to the presence of a certification mechanism and the net month income. On the contrary, the probability of choosing a management practice is negatively related to the distance between the fishing harbor and fishing area. In addition, the probability of choosing a management practice is negatively related to the distance between the fishing harbor and fishing area. In other words, an individual fisherman would be willing to pay 245 € for the introduction of such a regulatory mechanism.

4.2. Fisherman population split sample model specification

In Tables 3 and 4 we report an additional model formulation, which includes two sub-samples. In this scenario, we proceed to the splitting of the sample into two groups. One group, denoted by sub-sample A, refers to the set of respondents who answer ‘yes’ to the question “Do you believe that current institutional setting, including the Provincia, Magistrato alle Acque and Regione, have an important role in the regulation of the fishing economic activities in the lagoon of Venice?” In other words, these respondents show confidence and trust on the different institutions that are currently responsible for the setting of the regulatory body that the fishing activities in the lagoon of Venice are subject to.

In addition, the other group of respondents, denoted by sub-sample B, refer to the set of respondents who answered ‘no’ to the same question and therefore do not trust institutional setting as having an important role in the regulation of the fishing economic activities in the lagoon of Venice. This corresponds to approximately 20% of the respondents.

As before, estimation results show that as the probability of choosing a management practice is positively related to the presence of a certification mechanism and the net income. On the contrary, the probability of choosing a management practice is negatively related to the distance between the fishing harbor and fishing area. Finally, the probability of choosing a management practice is higher when fishing is done in the day rather than in the night. However, a close look into the statistical significance of each estimation results shows important results. First, in the sub-sample B, respondents with no trust in the regulatory institutions, the only regulation attributes that is statistically significant in terms of explaining respondent’s behavior is the introduction of a certification mechanism. In fact, the average individual WTP for this market policy mechanism is 403 €. Furthermore, this magnitude is about the double for the same attribute when evaluated among the sub-sample of respondents that show a confidence and trust on the institutions responsible for the design and implementation of regulatory policies. This is a very interesting result that puts

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of the day</td>
<td>1.3471</td>
<td>0.000⁰</td>
</tr>
<tr>
<td>Certification</td>
<td>0.6683</td>
<td>0.015⁰</td>
</tr>
<tr>
<td>Distance</td>
<td>1.2403</td>
<td>0.000⁰</td>
</tr>
<tr>
<td>Income</td>
<td>2.7209</td>
<td>0.004⁰</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.2085</td>
<td></td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Marginal implicit price</th>
<th>Point estimate</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of the day</td>
<td>495€</td>
<td>[28.3%; 39.6%]</td>
</tr>
<tr>
<td>Certification</td>
<td>245€</td>
<td>[14.0%; 19.7%]</td>
</tr>
<tr>
<td>Distance</td>
<td>455€</td>
<td>[26.0%; 36.5%]</td>
</tr>
</tbody>
</table>

Marginal implicit price corresponds to the ‘share’ of the marginal implicit price estimate with respect to the fishermen income.

Table 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sub-sample A (n = 121)</th>
<th>Sub-sample B (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of the day</td>
<td>1.5843</td>
<td>0.6121</td>
</tr>
<tr>
<td>Certification</td>
<td>0.5770</td>
<td>1.0967</td>
</tr>
<tr>
<td>Distance</td>
<td>1.3807</td>
<td>0.7362</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.2505</td>
<td>0.1437</td>
</tr>
</tbody>
</table>

Table 4

<table>
<thead>
<tr>
<th>Marginal implicit price</th>
<th>Sub-sample A (n = 121)</th>
<th>Sub-sample B (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of the day</td>
<td>582€</td>
<td>n.a.</td>
</tr>
<tr>
<td>Certification</td>
<td>212€</td>
<td>403€</td>
</tr>
<tr>
<td>Distance</td>
<td>507€</td>
<td>n.a.</td>
</tr>
</tbody>
</table>
forward the idea that this group of respondents, who does not trust the current institutional setting, does not welcome any regulation in the activity that is anchored put forward by these same institutions. On the contrary, this group warmly welcomes the introduction of a market instrument such as the product certification mechanism. The remaining valuation results show that the ones who have trust in the current institutional setting and the total sample have similar WTP – and thus identical preferences – for the remaining regulation alternatives, including the ruling of the distance and period of fishing.

4.3. Policy cross effects

In addition, regime interactions coefficients are added to the main effects – see Table 5. According to its estimation results, the only regulation cross effect that is statistically significant, i.e. that is relevant is explaining fishermen behavior, is the one that captures the relationship between period of the day and distance. Since the estimated value is positive, it means that these two attributes are compliments. In other words, fishermen value more a closer distance between the harbor and the fishing, when they are fishing during the day. In the same way, fishermen value more the option of fishing during the day whenever they are submit to a regulation practice that assigns a fishing concession that is near to the harbor. The economic valuation of such a behavior is reflected in the welfare measurement of this two regulation attributes. In fact, an average respondent is WTP about 232€ for fishing during the day than during the night. However, the same respondent is WTP up to 330€ for fishing during the day if he is guaranteed that is fishing concession is near to the harbor. In addition, is WTP about 266€ for fishing near to the harbor than fishing far from the harbor. However, the same respondent is WTP up to 597€ for having his fishing concession near to the harbor if he is guaranteed that regulation establishes that the fishing activities in the lagoon are only allowed during the day and not during the night.

4.4. Individual motivations cross effects

The valuation survey also contained a set of motivational sections – see Table 6. We explore this type information by assessing its respective impact on the valuation results. Bearing in mind such answering pattern, we are able to embed this information in the valuation exercise by creating cross effect variables. Table 7 shows the estimation results, including the marginal implicit price.

As we can see, the attitude of the respondents with respect to a regulation of the fishing activities in the lagoon of Venice and the establishment of an exclusive fishing area granted in concession (captured by the variable _rego) does not play a role in explaining fishermen answering behavior. In fact, the respective cross effect is

### Table 5

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>p-Value</th>
<th>Marginal implicit price estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of the day</td>
<td>0.6969</td>
<td>0.117**</td>
<td>232€</td>
</tr>
<tr>
<td>Certification</td>
<td>0.7613</td>
<td>0.008*</td>
<td>333€</td>
</tr>
<tr>
<td>Distance</td>
<td>0.8007</td>
<td>0.001*</td>
<td>266€</td>
</tr>
<tr>
<td>Certification × period of the day</td>
<td></td>
<td></td>
<td>n.a.</td>
</tr>
<tr>
<td>Certification × distance</td>
<td></td>
<td></td>
<td>n.a.</td>
</tr>
<tr>
<td>Period of the day × distance</td>
<td>0.9920</td>
<td>0.057*</td>
<td>330€</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td></td>
<td>0.1437</td>
<td></td>
</tr>
</tbody>
</table>

* Dummy variable with 1 = ‘fishing during the day’ and 0 = ‘fishing during the night’.
* Dummy variable with 1 = ‘with certification’ and 0 = ‘no-certification’.
* Dummy variable with 1 = ‘near’ and 0 = ‘far’.

### Table 6

<table>
<thead>
<tr>
<th>Codification statement</th>
<th>Completely disagree</th>
<th>Disagree</th>
<th>Indifferent</th>
<th>Agree</th>
<th>Completely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>catt</td>
<td>45.9</td>
<td>8.1</td>
<td>8.1</td>
<td>13.5</td>
<td>24.3</td>
</tr>
<tr>
<td>trop</td>
<td>24.3</td>
<td>18.9</td>
<td>8.1</td>
<td>27.0</td>
<td>21.6</td>
</tr>
<tr>
<td>imp</td>
<td>75.7</td>
<td>21.6</td>
<td>2.7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>marg</td>
<td>51.1</td>
<td>10.8</td>
<td>10.8</td>
<td>5.4</td>
<td>21.6</td>
</tr>
<tr>
<td>illeg</td>
<td>13.5</td>
<td>24.3</td>
<td>18.9</td>
<td>29.7</td>
<td>13.5</td>
</tr>
<tr>
<td>Provincia, Magistrato alle Acque and Regione</td>
<td>51.1</td>
<td>10.8</td>
<td>10.8</td>
<td>5.4</td>
<td>21.6</td>
</tr>
<tr>
<td>_rego</td>
<td>8.1</td>
<td>2.7</td>
<td>8.1</td>
<td>43.2</td>
<td>37.8</td>
</tr>
<tr>
<td>gior</td>
<td>2.7</td>
<td>0</td>
<td>2.7</td>
<td>10.8</td>
<td>83.8</td>
</tr>
</tbody>
</table>

not statistically significant across all the three attributes under analysis. On the contrary, the individual who prefers to run their fishing activity during the day shows, on average, a higher probability to choose for fishing during the day. In fact, he will be willing to pay to fish during the day more 123€ than the average respondent to be able to fish during the day. This result can be interpreted as signaling the internal validity of the proposed conjoint valuation exercise: the respondents who think that fishing during the day is preferred over fishing during the night do choose the policy regulations that include this option. In other words, there is coherence between stated and reported consumer behavior. In addition, Table 7 shows that fishermen who feel a stronger responsibility for the weak environmental conditions in the lagoon of Venice (captured by the variable _catt) are willing to pay less 99€ for fishing during the day rather than the average respondent. According to Table 4, average respondent was willing to pay 582€, fishermen who feel a stronger responsibility for the weak environmental conditions in the lagoon of Venice is only willing to pay 483€ (which corresponds to 582–99€).

Following this reasoning, we can see that all respondents who did not report a clear preference for the non-extinction (captured by the variable _imp) are willing to pay less 392€ for fishing during the day rather than the average respondent. In fact, the latter is only WTP 190€ whereas the former is only WTP 190€ (which corresponds to 582–392€). The same category of respondents is willing to pay less 126€ than the average respondent for the introduction of a certification mechanism. In fact, fishermen who thinks that it is important to block the illegal fishing activities, as well as the other who think the contrary, are willing to pay about 212€ for the introduction of a certification mechanism.

### 5. Conclusions

In the last years, the overall fish industry in the lagoon of Venice has shown a gradual decline. In order to understand this evolving process, we carry out a questionnaire. The respondent’s answers to the questionnaire portray significant information that allow us to evaluate the social and the cultural profile of fishermen that currently operate in the lagoon of Venice. In addition, the survey contains important information with respect to the technical and productive features regarding the range of fishing activities, with special focus on the type and amount of the species harvested, the dimension of the fishing area, the distribution of activity during the year, the technology used as well as the overall productivity of the fishing system. The results emphasize, for the fishing clam, that the principal systems employed is the mechanical rake, and secondly the manual systems, and, for the fisheries with a commercial value, a more spread use of fyke nets, gilles nets and cages, respect to the seine nets, trawling nets and hooks. Finally, we applied a valuation exercise so as to assess the preferences of the fishermen with respect to different aspects that characterize a future reconvension or regulation of their economic activity. Estimation results show that fishermen welcome any regulation initiative that is characterized by only allowing fishing during day (and thus ban fishing during the night); or characterized by allocating fishing concessions areas to each fishermen in a way that minimize the distance between the fishing area and the harbor. In addition, fishermen are very receptive to the introduction of a labeling mechanism that certifies the origin of the product. Moreover, the magnitude of these results depends upon the overall trust and confidence that fishermen allocate on the current institutional and regulatory body as well as their motivational profile. The results of this economic valuation exercises reveal to be of particular significance in the design of an efficient, widely supported regulation policy. This implies, _inter alia_, the preference of fishermen for a market policy instrument, i.e. product certification. Finally, any direct government intervention may be doomed to fail if the local institutions do not engage in a set of activities so as to re-obtain the trust from this important stakeholder.

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### References


