Università
Ca'Foscari
Venezia

Master Degree Programme
in Economics, Finance and Sustainability

Final Thesis

Evaluating Tourists' Willingness to Pay for an Entrance Fee to Cultural Heritage Cities: The Case Study of Venice

Supervisors:

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Matriculation Number: 898114

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Abstract

Overtourism in cultural heritage cities like Venice puts pressure on ecosystems and local economies, raising concerns about regulation. One proposed solution is a direct entry tax, but its effectiveness and public acceptance remain uncertain. This study examines the willingness of tourists to pay (WTP) for a daily entrance fee (EF) to Venice using a hybrid approach that combines dichotomous choice (DC) and open-ended (OE) methods, with demand functions estimated through logit and tobit regressions. The findings reveal a low acceptance rate (26%), with an unexpectedly high rejection rate at €5, possibly due to anchoring or strategic bias. The mean WTP is €13, while the revenue-maximising EF is €20. The WTP distribution is left-skewed, with greater demand elasticity between €10 and €15. Strong evidence suggests that WTP is higher among older visitors, those with higher incomes, women, and vacationers, while weaker results indicate lower WTP among domestic and daily visitors. Discrepancies between the elicitation methods raise concerns about the reliability of the WTP estimates. Future research should explore how prior exposure to an EF influences WTP, the role of trip context in stated valuations, and whether the DC format biases OE responses in contingent valuation studies.

Keywords: Entrance Fee; Cultural Heritage Sites; Willingness-to-pay; Contingent Valuation Method

Introduction

Venice has been a major travel destination for centuries, evolving from a historic trading hub to one of the world's most visited cultural heritage sites. However, since the mid-20th century, its resident population has declined from 170,000 in the 1950s to less than 50,000 today, while tourism has surged. On an average day, 102,500 people are present in the city, nearly double the estimated capacity of 52,000. The vast majority of visitors to Venice (86%) are international tourists, half coming from Europe. This surge in tourism has placed significant challenges on the city, affecting infrastructure, driving up living costs, and displacing local communities. Venice's delicate ecosystem is increasingly struggling with mass tourism, with overcrowding and the loss of traditional shops that disrupt daily life. Rising prices have made it difficult for local businesses to survive, while gentrification has shifted commercial activity toward short-term rentals and souvenir shops. In addition, the high number of daily trippers, who tend to spend less, has had an adverse effect as businesses adapt to low-cost demand, leading to a decline in service quality. In response, the city introduced the 'Contributo d'Accesso', a €5 entrance fee for daily visitors in 2024, marking the first direct tax on tourism. This measure reflects the ongoing debate between bottom-up movements advocating for stricter tourism controls and government policies, such as the 2019 indirect tourism tax and the newly implemented entry fee.

Like other cultural heritage cities such as Amsterdam and Barcelona, Venice has introduced various regulatory measures, including visitor caps and entry fees, to counteract overtourism. However, the EF remains highly debated. Supporters argue that it funds conservation and reduces congestion, whereas critics claim that it is ineffective, unfair, or unclear in its intention. The key challenge lies in balancing the equity-efficiency trade-off, ensuring fair access while generating revenues,

making it essential to study EF pricing based on visitor preferences. The analysis of a visitor *willingness to pay* for an entry tax helps to assess its effectiveness as a pricing mechanism, regulating visitor flows, raising funds, and ensuring social acceptance. Therefore, although this investigation does not evaluate the allocation of EF revenue, it examines whether direct taxation can serve as a viable funding tool by analysing the determinants of EF acceptability by visitors, their price sensitivity, and its potential to regulate tourist numbers.

To address these issues, we investigated the WTP of tourists for a *daily entrance fee*, exploring (i) how the combination of dichotomous choice and open-ended valuation methods elicits the WTP estimation, (ii) the determinants of visitors' characteristics that influence their willingness to pay, and (iii) which EF price maximises revenue and its associated impact on visitor numbers. The analysis employs the Contingent Valuation Method (CVM), a stated preference approach commonly used to evaluate non-market goods. By examining EF acceptability, price sensitivity, and methodological biases, this research contributes to the broader discussion on pricing policies for cultural heritage sites in the management of overtourism.

This study is organised as follows: Chapter 1 explores the existing literature, providing an overview of tourism in Venice, visitor trends, and the socio-economic and environmental challenges posed by overtourism. It also introduces the concept of willingness to pay (WTP) and the Contingent Valuation Method (CVM). Chapter 2 explains the research approach, including the survey design, sampling methods, and econometric models used for analysis. Chapter 3 presents the findings, examining survival probabilities, demand patterns, the main factors that influence WTP, and the level of EF that maximises revenue. Finally, Chapter 4 discusses the implications of the findings, acknowledges the limitations of the study, and offers suggestions for future research. In conclusion, Appendices 4 and 6 provide additional insight, with relevant references included where needed.

1 Literature Review

1.1 Overtourism in Venice

1.1.1 Historical Evolution

Venice is a city that evolved to welcome foreigners: from the VII century the Republic of Venice, known as "La Serenissima", was a hegemonic maritime power. As a commercial hub, it attracted merchants, diplomats, and travellers whose activities within the city shaped both its identity and landscape. These *early visitors* contributed to the development of occupations such as traders, bankers, dockworkers, and artisans (Lane, 1973). By the early 1700s, as maritime dominance declined, Venice became more reliant on its rich cultural and artistic heritage, attracting European aristocrats. In the 17th and 18th centuries, during the Grand Tour era in Venice, *elite visitors* aimed to enrich their cultural knowledge. Their presence led to guides, souvenir sellers, gondoliers, and hospitality workers, marking the beginning of a leisure-based tourism economy (Redford, 1996). By 1797, after the fall of the Republic, Venice faced major challenges to its industrial development, leading to a period of economic stagnation (Ianniello et al., 2022). In fact, Venice's geographical limitations made large-scale industrialisation unfeasible, so industrial growth moved to the mainland (Horváth, 2018). Later, the establishment of the Compagnia Italiana Grandi Alberghi (CIGA) in 1906, the Mostra Internazionale d'Arte Cinematografica in 1932, and the Casinò del Lido in 1938 started to attract *upper-class visitors* (Withey, 1997; Zanini et al., 2008; Cusmai, 2021). Meanwhile, Venice's historical centre reached a peak of 175,000 residents in 1951, but soon experienced significant outmigration, also due to the 1966 flood, which damaged most buildings, and reconstruction efforts prioritised the mainland (Ianniello et al., 2022). During

this period, tourism expanded, supported by the construction of Santa Lucia train station in 1954, Marco Polo airport in 1960, and the Tronchetto Terminal in 1961 (Zanini et al., 2008). Between 1951 and 1970, the population of the historical centre declined by 45%, while that of Mestre and Marghera increased by 80% (Comune di Venezia, 2024a). After World War II, tourism became a widespread phenomenon driven by a new middle class, improved infrastructure, and cultural commodification (Davidson, 2023). Sociological theories, such as John Urry's 'Tourist Gaze', highlight how destinations became must-see spots (Urry, 1990). In response to these global trends, Venice adapted, benefiting from the facilities mentioned above, the International Architecture Exhibition at the Venice Biennale (1980) and the UNESCO World Heritage designation (1987) (Montanari et al., 1995; Zanini et al., 2008). However, the significant increase in *mass tourism* raised sustainability concerns.

In conclusion, Venice's economy has evolved along with its visitors, adapting from its maritime roots to a cultural hub for elites and, more recently, a global tourist destination. This shift toward mass tourism has brought significant challenges, resulting in two simultaneous trends: a declining resident population and a growing pressure on local resources (Bertocchi et al., 2019).

1.1.2 Definitions, Recent Trends and Visitor Characteristics

The surge of mass tourism in Venice can be attributed to several factors. The rise of low-cost airlines made travel more affordable, while the growth of the sharing economy, through platforms like Airbnb, expanded accommodation options, increasing bed places in Venice's historic centre by 497% from 2008 to 2019 (Bertocchi et al., 2019). Moreover, cruise tourism played an important role, with an increase in 75% cruise visitors between 2013 and 2017 (Comune di Venezia, 2014; González, 2018). In addition, globalisation has expanded the non-Western middle class, and the Internet has made travel easier to plan, both contributing to Venice's overtourism (Horváth, 2018; Bertocchi et al., 2020).

Overtourism, defined as exceeding physical, ecological, social or economic capacities (European Parliament, 2018), implies negative externalities for residents and tourists, and on cultural and environmental assets. Two key metrics, the Tourism Density Rate (number of visitors per km^2 per day), and the Tourism Intensity Pen-

etration Rate (number of visitors per 1,000 inhabitants per day) (Vargena, 2021), place Venice in the 97th percentile among European destinations (Eurostat, 2024a). Overtourism can be evaluated through a comprehensive framework, namely *Tourist Carrying Capacity* (TCC), which measures the maximum number of visitors that a location can host without compromising the quality of life of residents or other socioeconomic functions (UNWTO, 1981; Bertocchi et al., 2020). Some constraints of TCC are the availability of beds, restaurants' capacity, and the waste management system (Zanini et al., 2008). In Venice, TCC estimates increased from 20,000 people in the 1980s (Costa et al., 1988) to 52,000 in 2019 (Bertocchi et al., 2020), yet the number of current visitors far exceeds these thresholds.

Between 2011 and 2023, arrivals, defined as unique individuals who stayed at least one night in registered accommodations, increased by 36%, while the total overnight stays increased by 34% reaching 12.63 million daily presences in 2023, with an average stay of 2.23 nights (Van der Borg, 2017; Bertocchi et al., 2020; Comune di Venezia, 2024b). Meanwhile, day-trippers (excursionists), which are not included in official statistics, are estimated to represent 44–80% of all visitors (Marzetti et al., 2012; Bertocchi et al., 2020). Taking into account both tourists and residents, the average daily presence in 2023 was about 102,500 people, far above the TCC.

Focussing on *socio-demographic characteristics*, in 2023, 74.8% of overnight stays were in the historical centre or Lido, and 25.2% on the mainland. Looking at 2023 arrivals (excluding day-trippers), foreigners represented 86.1%, Italians 13.9% (with 10.3% from Veneto). Among foreigners, 42.6% came from non-Italian European countries, and 43.4% from non-European countries. Similar proportions were reported in 2011 and 2017 (Comune di Venezia, 2012; Comune di Venezia, 2018). Since 2011, the main nationalities have been France, the United Kingdom, Germany, the United States, Australia, and China (Comune di Venezia, 2024b). Data from an online survey of 2,102 tourists (November–December 2020, Comune di Venezia, 2021) are shown in Table 1.1, acknowledging that they are affected by the COVID-19 pandemic and the under-representation of Asian visitors (as also noted by Anderson et al., 2019) and non-European countries in general (5% of respondents versus 43.4% actual share in 2023). The percentages are rounded, and low-frequency responses

are omitted.

Socio-demographics	**Frequency Percentages**
Gender	Male (60%), Female (40%)
Nationality	Italian (51%, Veneto: 19%), Foreigners (49%)
Top Foreign Nationalities	Germany (31%), France (16%), UK (15%) US (4%), Canada (0.7%) Australia (0.4%)
Average Age	50 years
Employment Status	Workers (66%), Retired (16%), Students (5%)
Purpose of Trip	Vacation (73%), Visiting friends/family (4%), Education (3%)
Length of Stay	Overnight visitors (83%, 20% first-time), Day-trippers (17%, 15% first-time)
First-Time Visitors	Italians (17%), Foreigners (83%)
Education	Italians with a university degree (51%), Foreigners (88%)
Daily Budget	Italians (€100), Foreigners (€122)

Table 1.1: Socioeconomic Characteristics of Visitors to Venice (2020 Sample, Comune di Venezia, 2021)

To contextualise these statistics, Eurostat's 2023 data on tourism in Italy show that in 2023 men were 49.7% of total travellers (excluding excursionists), with an average age of 46 years, and that domestic tourists spent on average €69 per night, while international visitors €115 (Eurostat, 2024b; Eurostat, 2024c; Eurostat, 2024d). In contrast, the 2020 survey (7% of all 2020 visitors) found 60% men, average age 50, Italians at 51%, spending €100 per day, while foreigners €122. Furthermore, day-trippers (17% of the sample) spent 39% less than overnight visitors, confirming Russo (2002) findings of 30% lower expenditures for same-day visitors. To conclude, first-time visitors were 7% among the total of Italian travellers and 36% among foreigners.

1.1.3 Implications of Overtourism

To better understand the implications of overtourism in Venice, its impacts can be examined in three dimensions of *sustainability*: environmental, economic, and social (Brundtland, 1987). In addition, political actions, both top-down and bottom-up,

show how institutions and citizens respond to these challenges.

From an environmental perspective, Venice's lagoon ecology is particularly vulnerable to natural and anthropic pressures. Rising sea levels and frequent flooding, worsened by climate change, threaten its foundations. Although the MoSE system, operational since 2020, has reduced severe flooding, issues such as stagnation in water, pollution, and declining biodiversity persist (Rova et al., 2019; D'Alpaos et al., 2021). In addition, cruise tourism (which brings a large number of day-trippers) and high boat traffic increase pollution, while the excessive use of resources puts pressure on the waste management system, further threatening the fragile ecosystem of the city (González, 2018; Scarpa et al., 2019).

The rapid growth of tourist arrivals has created significant challenges for the economic sustainability of Venice. Overtourism has made the city heavily dependent on tourism, limiting diversification and increasing its vulnerability to shocks in this low value-added sector (Ianniello et al., 2022; Eurostat, 2024e). As a result, this dependency shifts capital and labour toward tourism, crowding out other industries. The rising demand for tourist goods and services inflates rents and other costs, incentivising non-touristic businesses to convert into touristic sectors, which often offer higher returns. Moreover, public and private resources prioritise tourist infrastructure, diverting investments from local needs. For example, between 1976 and 2007, grocery stores fell by 61%, while tourist stores increased by 193% (Zanini et al., 2008). Gentrification, driven by real estate speculation, has transformed residential houses into short-term accommodations, worsening housing shortages (Seraphin et al., 2018; Bertocchi et al., 2020). As non-local actors determine the production of goods and services (Russo, 2002), residents leave due to rising living costs, limited services in non-touristic areas, and the profitability of short-term rentals (Bertocchi et al., 2019). Furthermore, day-trippers spend far less than overnight visitors, generating costs that exceed their contribution. Their short visits overcrowd public spaces, increasing maintenance expenses that their low spending does not cover. In addition, their preference for low-quality goods, driven by inelastic demand, creates adverse selection, pushing high-quality suppliers out of the market and lowering the overall quality of the economy (Bertocchi et al., 2020).

The depopulation of Venice reflects the social challenges of the city. The number

of residents in the historic centre has decreased from 175,000 in 1951 to 49,129 in 2023 (Comune di Venezia, 2024a). Social costs of overtourism include privatisation of public spaces, increased risks of vandalism and crime (Seraphin et al., 2018), and congestion in transportation systems (Zanini et al., 2008). Residents cite overcrowding and the lack of essential services as the most significant negative externalities (Bertocchi et al., 2019). In line with Lefebvre's 'Right to the City', these pressures diminish the control of residents over their urban environment and erode traditional lifestyles (King, 2019).

In response, bottom-up movements and institutional actions reflect growing discontent and efforts to reduce overtourism. For example, since 2012, the 'No Grandi Navi' campaign has fought cruise ship pollution, leading to a 2021 ban on large ships in the historic centre (Comitato No Grandi Navi, 2012; Forbes, 2016; Italian Republic, 2021a; Italian Republic, 2021b). In 2017, the 'Mi no vado via' protest highlighted Venice's housing crisis (ANSA, 2017). More recently, in April 2024, protesters opposed an entry tax of €5, arguing that it turns the city into a commodity without solving overtourism (Euronews, 2024). On the institutional side, measures included the introduction of visitor caps in 1987 by controlling access from the 'Ponte della Libertà' entrance (Montanari et al., 1995) and during the Venice Carnival of 2018 (González, 2018). In 2019 an *entrance fee* for excursionists was introduced, ranging from €3 to €10, and included in transportation tickets (World Economic Forum, 2019). This policy was reintroduced in 2024 as the 'Contributo d'Accesso', requiring day-trippers to pay a €5 entry tax online or at the time of arrival, for 29 days between April and July. According to the Municipality of Venice, the objective is to promote sustainable tourism and protect the cultural and environmental heritage of the city (Comune di Venezia, 2024c). However, while detailed data on its effects are unavailable, the municipality has reported that the fee has only 'slightly reduced' the number of visitors (Comune di Venezia, 2024d). This measure represents a key part of my investigation, as it is a highly debated issue among residents and tourists, providing an interesting case study to assess the willingness of tourists to pay for access to cultural heritage cities.

1.2 The Willingness to Pay

1.2.1 Venice as a non-Market Good

The economic valuation of non-market goods began in the mid-20th century in the United States, recognising the inherent scarcity of environmental resources as highlighted by the economic principle of 'Spaceship Earth' (Boulding, 1966), addressing market failures such as the 'Tragedy of Commons'. Over time, the framework extended to cultural goods, which share non-excludability and non-rivalry characteristics but also differ. For example, Throsby (1984) notes that Cultural Heritage Sites (CHS) can be partially excludable, e.g., through entrance fees, but generating positive spillovers, such as enhanced human and social capital. Similarly, Licciardi et al. (2012) proposes that CHS can function as club goods, limiting access to paying visitors while still benefiting the broader community. However, overtourism pressures counterbalance, in different domains, these positive externalities. In our case, Venice can be seen both as a cultural asset through its historical heritage and as an environmental asset for its lagoon ecosystem, creating values that extend beyond direct market transactions. The literature classifies the benefits of CHS into *use value* and *passive (non-use) value* (Navrud et al., 2002; Licciardi et al., 2012). Estimating these values (prices) involves assessing Willingness to Pay (WTP), that is, the amount that an individual would sacrifice from their budget to improve the preservation of Venice while maintaining the same utility, or Willingness to Accept (WTA), the compensation required to cover a loss of preservation at the same level of utility. Venice's use values reflect tangible gains such as access to the CHS by paying an Entrance Fee (EF), the utility of potential reduced overcrowding due to the fee and tourism revenues for the local government and inhabitants. Non-use values involve intangible benefits such as altruism (ensuring access for others), bequest value (preservation for future generations), option value (future visit opportunities), and existence value (valuing preservation even if never visited).

Assessing WTP is subject to biases, including free-riding and hypothetical bias, that cause over- or under-estimation of real WTP, as detailed in Chapter 1.2.3. Various stakeholders, influenced by socio-demographic and psychographic factors, assign different use and non-use values to cultural goods (Duran-Román et al., 2021).

Correlated factors, such as travel distance, income, or education, complicate the aggregation of WTP to set a price that accounts for various preferences. These variables will be analysed in Chapter 1.2.4. In addition, non-use values are intangible and therefore hard to quantify. Furthermore, Hanley et al. (1998) finds that, for environmental goods, beyond a certain threshold, further improvements imply a decreasing marginal utility; this may also apply to CHS. Eliciting real WTP is further complicated by survey design, embedding effects (how the good is framed), temporal biases (WTP changes over time) and sampling limitations (see Navrud et al., 2002). Other challenges in the evaluation of CHS as non-market goods include difficulties in imagining marginal changes in their provision (Noonan, 2003) and their lack of direct substitutes, making them more vulnerable to irreversible losses than environmental resources (Licciardi et al., 2012).

1.2.2 Theoretical Framework

We refer to Champ et al. (2017) to address the theoretical foundations of non-market valuation. Preservation is a scarce resource involving trade-offs (e.g., tourism revenue versus cultural asset degradation), so its valuation aligns with standard neoclassical price theory. Moreover, individual preferences matter relatively, since residents and tourists in Venice experience a shared uniform provision of preservation determined by collective societal choices, regardless of personal preferences. Individuals are assumed capable of comparing market and non-market goods and ranking their preferences accordingly. Thus, the individual's utility function depends on the $X = \left[x_1, x_2, \cdots, x_n\right]$ vector of market goods and on the $Q = \left[q_1, q_2, \cdots, q_k\right]$ vector of Venice non-market goods, referring to both its use and non-use consumption. Given the set of relative prices $P = \left[p_1, p_2, \cdots, p_n\right]$ of X, decision-makers face:

$$\max_X U(X, Q) \quad \text{s.t.} \quad P \cdot X \leq y, \quad Q = Q^0. \tag{1.1}$$

Equation 1.1 consists of $P \cdot X \leq y$ that is the budget constraint for market goods (with y equal total income), and $Q = Q^0$ that is the fixed provision of non-market goods. Letting $X^* = X(P, Q, y)$ be the optimal consumption of market goods, the indirect utility function is $U(X^*, Q) = v(P, Q, y)$. In this model, Q^0 is the current

state of preservation of Venice, and Q^1 represents potential improvements achieved through policies such as reducing pollution or overcrowding. The Entrance Fee (EF) is a tax to fund such improvements.

Welfare economics provides two key measures for changes in non-market goods provision: the compensating welfare measure, or WTP, and the equivalent welfare measure, or WTA. From the initial utility level (v^0) we have:

$$v(P^0, Q^0, y^0) = v(P^1, Q^1, y^1 - WTP). \tag{1.2}$$

$$v(P^0, Q^0, y^0 + WTA) = v(P^1, Q^1, y^1). \tag{1.3}$$

WTP in Equation 1.2 is the amount that an individual gives up from their budget to achieve Q^1 while maintaining the same level of utility ($v^0 = v^1$). Instead, WTA in Equation 1.3 is the additional income needed under initial conditions to keep the utility constant after a decline in preservation (Q^0). Thus, WTP corresponds to improvements and WTA to compensation for losses.

The application of these measures to CHS and environmental resources is complex due to uncertainties, such as policy outcomes or how individuals perceive changes in provision. In fact, preservation outcomes often depend on policy decisions that lack transparency or effectiveness, while individual preferences reflect beliefs about optimal preservation and may arise from incomplete information. These factors make alignment with theoretical predictions difficult. Once acknowledged this uncertainty, Champ et al. (2017) propose:

$$\max_F \mathbb{E}_F[U(X, F)] \quad \text{s.t.} \quad P \cdot X \leq y. \tag{1.4}$$

$$v^E(P, y - OP, F^1) = v^E(P, y, F^0). \tag{1.5}$$

where F is the probability distribution of Q, $\mathbb{E}_F$ in Equation 1.4 denotes the expected utility operator over F, and v^E in Equation 1.5 the indirect utility function under beliefs F^0 and F^1 about Q. Equation 1.5 defines the condition of indifference between the initial and the new expected utilities. The Option Price (OP) is the amount of money an individual is willing to trade off from budget constraints to

achieve an improvement in Q, representing the WTP under uncertainty, accounting for subjective beliefs (F) about the status of preservation.

To conclude, using the Freeman III (1985) framework, we assess how changes in preservation affect social welfare (ΔW). Aggregate WTP (WTP_{total}) captures the collective valuation of changing from Q_0 to Q_1:

$$WTP_{\text{total}} = \int_{i=1}^{N} WTP_i \, di = \int_{i=1}^{N} \int_{Q_0}^{Q_1} MWTP_i \, dQ \, di, \tag{1.6}$$

where the Marginal Willingness to Pay ($MWTP_i$) in Equation 1.6 is defined as $MWTP = \frac{\partial U}{\partial Q} \Big/ \frac{\partial U}{\partial y}$ and represents the incremental value each individual i assigns to marginal improvements in preservation quality. MWTP and WTP both measure preservation value but differ in framing: when framed as a donation, MWTP may better represent willingness over non-use values, while for a mandatory payment vehicle (e.g., EF), WTP more likely reflects use values, such as access to CHS (B. Reiser et al., 1998; Roesch-McNally et al., 2016). A uniform EF generates Total Revenue $= EF \times N$. An efficient EF, set equal to the mean or median WTP to follow the equity principle or determined by a revenue maximisation approach (see Ihori, 2017), can achieve $\Delta W = WTP_{\text{total}} - \text{Total Revenue} = 0$. If EF-funded policies yield extra non-market benefits, $\Delta W > 0$ as societal welfare rises through enhanced preservation quality ($Q_1 > Q_0$).

1.2.3 The Contingent Valuation Method

Acknowledged the theoretical framework, the Contingent Valuation Method (CVM) operationalises the WTP estimation for preservation improvements through surveys. By eliciting preferences (e.g., option prices), CVM informs policies like EFs regarding the value the people assign to non-market goods. Initially developed for environmental goods, CVM is widely used for CHS (Rivas et al., 2019; Cárdenas-García et al., 2022; Göktaş et al., 2023, among others). WTP estimation approaches include revealed preferences (using observed behaviour, for example, travel costs and hedonic pricing) and *stated preferences* (hypothetical scenarios). Stated preferences can be direct (open-ended questions) or indirect (choice-based format) and can be distinguished between hypothetical WTP, with no real payments, and actual WTP,

involving real payments (e.g. auctions) (Breidert et al., 2016; Schmidt et al., 2020; Hofstetter et al., 2021).

The 1993 guide by Kenneth Arrow and Robert Solow on CVM for environmental goods provides a reference for cultural assets, widely cited in WTP studies (Noonan, 2003). Key guidelines include categorising consumption into use and non-use values, testing the survey through pilot questionnaires, excluding protest zero responses, and ensuring clarity and realism. The following are the main biases identified by Arrow et al. (1993) and the related literature:

- **Hypothetical bias:** respondents overstate WTP because they are not actually required to make a real payment;
- **Information bias:** respondents' answers are influenced by how the good or its context is presented (e.g., framing effect, salience bias);
- **Warm-glow bias:** respondents overstate WTP because they derive utility from the act of giving, irrespective of the utility the goods themselves provide;
- **Conformity bias:** respondents adjust their answers to align with social expectations;
- **Strategic bias:** respondents intentionally distort their preferences to influence policy outcomes, often to reduce personal costs (e.g., free-riding);
- **Protest Zero bias:** respondents state zero WTP as a protest against survey design, policy mechanisms, or authorities;
- **Elicitation effect:** WTP variations arise due to differences in the valuation methods (e.g., open-ended vs. dichotomous choice) or the proposed payment methods (e.g., donation vs. mandatory payment);
- **Sample bias:** the sample does not represent the population (e.g., self-selection bias).

The *payment vehicle* affects the stated WTP: mandatory payments, such as a tax, often yield higher WTP than donations by reducing strategic behaviours such as free-riding. They also influence perceptions of fairness and credibility, potentially

introducing biases such as hypothetical bias and protest responses (Ivehammarm, 2009).

The *hypothetical bias*, defined as 'reacting differently in simulated versus real markets' (Dong et al., 2011), challenges methodological reliability by often leading to overstated WTP values. A meta-analysis by Schmidt et al. (2020) found an average upward bias of 21%, alongside positive correlations between WTP and the level of information provided and the price of the good. For private goods, inelastic demand (few substitutes) makes hypothetical methods able to predict prices well (Miller et al., 2011). Furthermore, Báez-Montenegro et al. (2012) suggests that follow-up questions on the certainty to pay may help mitigate hypothetical bias.

Arrow et al. (1993) offers valuable insights on *information bias*, highlighting that providing enough information is essential for respondents to understand the valuation scenario, having so reliable WTP estimates. Surveys should also remind participants of their budget constraints and the availability of substitute goods. Thus, clear and credible information helps to improve the validity of the results. However, this comes with trade-offs. Studies have shown mixed results on the relationship between WTP and the level of information provided: some find positive correlations between information and WTP (Reynisdottir et al., 2008; Breidert et al., 2016), others no effect (Alberini et al., 2004). For CHS, too much detail may inflate WTP if respondents believe the fee directly solves overtourism.

To conclude, *elicitation effects* includes potential anchoring in Dichotomous Choice (DC) formats (Hofstetter et al., 2021) and overstatement in Open-Ended (OE) questions (Miller et al., 2011; Hofstetter et al., 2021; Schmidt et al., 2020). Combining DC with random bids and OE follow-ups should reduce anchoring (Hofstetter et al., 2021). For CHS preservation, Rivas et al. (2019) found a non-normal WTP distribution with a second mode at zero, as noted by Arrow et al. (1993). The median WTP is often a more reliable measure.

1.2.4 Case Studies on Relevant Variables

We now summarise findings on the variables of interest of this investigation influencing WTP, both for environmental and cultural goods, elicited via CVM surveys to both tourists and/or inhabitants. The effect of *gender* is negligible, although the

context may matter (Alberini et al., 2004; Dong et al., 2011; Rivas et al., 2019). *Age* often correlates negatively (Mmopelwa et al., 2007; Reynisdottir et al., 2008; Ibrahim et al., 2023, among others), but can be positive (Yung et al., 2015; Göktaş et al., 2023) or null (Dong et al., 2011; Rivas et al., 2019; Song et al., 2021). *Travel distance* typically shows a positive correlation with WTP values (Marzetti et al., 2012; Rivas et al., 2019; Ibrahim et al., 2023, among others). Research consistently finds that *income* is positively correlated with WTP (Song et al., 2021; Cárdenas-García et al., 2022; Göktaş et al., 2023, among others). *Education* often correlates positively (Song et al., 2021; Cárdenas-García et al., 2022; Göktaş et al., 2023, among others), although there are null effects (Dong et al., 2011). Its impact may reflect both higher income levels and greater awareness of preservation issues, as noted by Cárdenas-García et al. (2022). *Employment status* usually shows no effect (Alberini et al., 2004; Dong et al., 2011). Employment may act as a proxy for income or time availability, but appears to not independently influence WTP. For *first-time visitors*, the results vary: positive (Göktaş et al., 2023), negative (Breidert et al., 2016; Reynisdottir et al., 2008), or no effect (Song et al., 2021). Regarding *visit experience*, the findings also differ, with Ibrahim et al. (2023) identifying a positive correlation and Song et al. (2021) reporting no effect. The *length of stay* can be positively correlated (Song et al., 2021); in our case study, since day-trippers pay less expenses, this correlation may result.

To conclude, among the studies reviewed, the share of respondents with non-zero WTP ranges from a lower bound of 73.2% (Yung et al., 2015) to an upper bound of 92% (Reynisdottir et al., 2008). The literature identifies altruism, bequest and existence values as the predominant reasons for the willingness to pay for non-use values in CHS case studies (Licciardi et al., 2012; Marzetti et al., 2012). Reasons for zero WTP, whether protest or non-protest, include opposition to the fee itself, distrust in the government, the belief that preservation should rely on existing funds, as well as budget constraints or the sense of already contributing through travel expenses (Arrow et al., 1993; Rivas et al., 2019; Cárdenas-García et al., 2022, among others).

2 Methodology

2.1 Sampling Design

The study population consists of visitors to Venice. A visitor is defined as anyone travelling outside of their usual environment for leisure, business, education, or visiting friends or family, regardless of the duration of stay. The sample consists of tourists who visited Venice between September and December 2024, as the survey was conducted during this period. Although the non-use value of Venice benefits visitors, residents, and others interested in its preservation, our study targets tourists because the payment vehicle used to assess WTP is the EF. This *sampling frame* may over-represent tourists visiting in peak seasons while under-representing others. Seasonal factors influencing travel include weather, national holidays, and political conditions. For 2022-2023, the ten countries with the largest coverage deviations (five over-represented and five under-represented, adjusted for the average seasonality of the September–December period) accounted for only 5% of the total arrivals. Therefore, the seasonal bias in the sample frame is likely minimal (Osservatorio Turismo Veneto, 2024).

The *sampling approach* used a mix of probability-based sampling methods. QR code posters were placed in the five districts of Venice's historic centre for simple random sampling, while pocket-sized QR codes were distributed to every 10th person at key locations, including the exit of the Biennale di Venezia and St. Mark's Square, as part of a cluster sampling approach. Participants completed the survey online using their smartphones or other devices, with an average completion time of about five minutes. The survey received 216 responses in the pilot phase and 176 in the final phase, totalling 392 responses. With around 1,400 unique QR code scans, the overall response rate was 28%.

To minimise bias, participants were informed that the study was academic, anonymous, and independent of political institutions. Limitations include the survey being in English only, requiring a smartphone to complete, and restricting participation to those 18 years of age or older. Although anonymous, sensitive topics such as household income and political trust may have discouraged some participants from completing the survey. Importantly, a potential *self-selection bias* may arise from the descriptions in the manifests used for simple random sampling. Phrases like 'Help Venice', 'Quick survey on your willingness to pay', and 'Take 3 minutes to tell us what you think about an entrance ticket to Venice' (see Figure 1) could disproportionately attract people already interested in the preservation of Venice. In particular, the non-mandatory OE question on general opinions on addressing overtourism achieved a response rate of 47%, further suggesting that many respondents likely had prior opinions on overtourism and entrance fees, highlighting the potential for self-selection bias.

2.2 Survey Design

The survey aims to evaluate the WTP of tourists for a daily EF to Venice and examine how sociodemographic, psychographic, and travel-related factors influence it. Following Arrow et al. (1993), a pilot survey (Appendix 1: Pilot Survey) was conducted to test the structure and refine key questions, evaluating the WTP through three different approaches: a fair price (initially asked about the respondents themselves and later applied to hypothetical profiles of a student, a worker and a retired individual), a donation on top of the fair price and a maximum price above which the respondents would opt out of visiting Venice. The final survey (Appendix 2: Definitive Survey) presented a single DC question composed of random bids and an OE follow-up (bid mechanism presented in Chapter 2.4.1). The definition of 'tourist' in the pilot survey, based on UNWTO (2008), was updated to 'visitor' in the final survey to include a wider range of travel purposes and durations. In both surveys, the EF was introduced as a daily fee per person. In the final survey, this information was reiterated in each WTP question and was specified as applying to people aged 18+ (14+ in the pilot). Furthermore, in the final survey, it was clarified that the EF is conceived to be additional to the existing tourist tax ('tassa di

soggiorno') already paid by overnight visitors. Due to limitations in the elicitation method of the pilot survey, only the results of the definitive survey are presented. However, common questions, including sociodemographic and travel-related information, were aggregated to assess the representativeness of the sample, as detailed in Chapter 2.3.1.

A key limitation of the case study is ambiguity in what respondents are valuing, whether the fee funds preservation policies or simply grants access to the site. To address this, respondents were asked to choose their main motivation for paying, with options categorised into use values (affordability, reduced overcrowding) and non-use values (improving residents' quality of life, preservation). This clarified their intent and reduced vagueness. Protest responses, where no link was made between the fee and its purpose, were identified through reasons of unwillingness with options regarding ethical concerns (e.g., accessibility for all) and budget preferences (e.g., choosing to allocate the budget to other activities, with non-acceptance viewed either as protest behaviour arising from indifference to the EF's purpose, or as free-riding, reflecting an implicit rejection of the EF by prioritising other expenses).

Although Arrow et al. (1993) emphasize the importance of informing respondents when evaluating environmental goods, this study adopts a minimal information approach, recognizing that CHS differ from environmental goods. The survey does not explicitly mention the consequences of overtourism in Venice, except in the follow-up question on willingness to pay (Question 14a of Appendix 2: Definitive Survey), which is asked after the respondents have already stated their WTP (although they can revise their response if desired). This approach aims to reduce the upward bias related to information, assuming that the degree of information of the respondents can be inferred through the following self-reported awareness question: *"How informed are you about the problems caused by mass tourism on the sustainability of cities like Venice?"*. Furthermore, directly mentioning overtourism risks triggering a salience bias or framing effect, where respondents focus on proposed issues rather than their own experiences or pre-existing knowledge.

2.3 The Data

2.3.1 Statistics and Sample Representativeness

Complete baseline statistics are provided in Appendix 3: Baseline Statistics. These data were collected from survey questions detailed in Appendix 1: Pilot Survey and Appendix 2: Definitive Survey. Here, we compare the findings with the visitor characteristics data presented in Chapter 1.1.2, which includes the 2020 statistics from Comune di Venezia (2021) (surveyed tourists visiting Venice) and the 2023 data from Comune di Venezia (2024b) (official tourism statistics for Venice) and Eurostat (2024b), Eurostat (2024c), and Eurostat (2024d) (tourists visiting Italy). This comparison aims to evaluate the representativeness of the survey sample.

The *sociodemographic data* from the pilot and final surveys show some consistency with these sources. Male respondents represent 48% of the sample, similar to the 49.7% share of male tourists recorded in Italy in 2023. The average age is 40 years, less than Eurostat's 46 years and the 50 years in 2020 in Venice. Italians represent 22.2% of respondents (compared to 13.9% of tourists visiting Venice in 2023), 49.5% being non-Italian Europeans (42.3% in 2023) and 28.3% non-Europeans (43.4% in 2023), summing up to 77.8% foreigners. This share falls between the 86% of total foreign tourists visiting Venice in 2023 and the 49% reported in the 2020 survey. Of the Italian respondents, 18.5% are from the Veneto region, similar to the 19% reported in 2020 but higher than the 10.3% in 2023. The top foreign nationalities are German, British, and French among non-Italian Europeans, and American among non-Europeans, aligning with 2023 official statistics. Furthermore, 88.3% of the respondents have a university degree (77% among Italians, 51% in 2020), 93% among foreigners (88% in 2020). The employment status shows that 63.5% are workers (66% in 2020), 11% are retired (16% in 2020), and 12% are students (5% in 2020).

The *travel-related variables* reveal an average daily budget of €71 for Italian tourists (€69 in 2020) and €112 for international visitors (€115 according to Eurostat's 2023 data). However, excursionists spend about the same as overnight visitors, contradicting findings in the literature. Importantly, daily budget information is based only on 26.5% of the total sample, which limits their reliability. The

average duration of stay is 3.75 days, which is significantly longer than the average of approximately 2.3 days recorded between 2011 and 2023 (Comune di Venezia, 2024b). Day-trippers account for 21.7% of the surveyed visitors, consistent with the 17% reported in the 2020 survey but differing significantly from the 44-80% range cited in the literature. Among overnight visitors, 75.5% stayed in Venice's historic centre or islands (74.8% in 2023), while 24.5% stayed on the mainland (25.2% in 2023). In addition, first-time visitors represent 35.5% of the total sample, compared to 17.5% in the 2020 survey (Comune di Venezia, 2021). In conclusion, 62.4% of the respondents were aware of the 2024 EF and 96.4% identified themselves as tourists according to the revised definition of the UNWTO (see Chapter 2.1). The survey explicitly stated in its manifests and description that it was exclusively for tourists, helping to minimise responses from residents or non-tourists despite the online sampling.

Although many variables align with data on Venice and Italian tourism, some differences emerge. Respondents tend to be younger than expected, possibly reflecting a greater awareness of CHS sustainability among younger individuals, as age often correlates negatively with WTP. In addition, the online, smartphone-based survey format may have been more accessible to younger participants. Non-European tourists are under-represented, probably due to challenges in reaching Asian travellers (that made up 21.4% of Venice's non-Europeans visitors in 2023, Comune di Venezia, 2024b), as also noted in the Venice tourism literature. The lower share of day-trippers compared to literature findings may be due to their limited time in the CHS, reducing their probability of completing the survey. The higher average stay duration, unrelated to this as excursionists are excluded from official statistics, remains unexplained. To conclude, the finding that excursionists spend about the same as overnight visitors contradicts the literature, which typically shows higher spending by overnight visitors; the reasons for this inconsistency are unclear.

2.3.2 Outliers

In the CVM literature, Carson (1997) recommends identifying outliers based on an income-related criterion, such as detecting respondents with WTP values disproportionately high relative to their income. Using this approach, income ranges were

converted to midpoints (e.g. €30,000 for €20,000 to 39,999 and €300,000 for 'more than €200,000') to evaluate cases where the WTP exceeded 1%, 5%, or 10% of annual income (Alberini et al., 2004). No respondents surpassed these thresholds, so no outliers were identified using this method. In contrast, traditional outlier detection methods, such as the Interquartile Range (IQR) and the Mean Absolute Deviation (MAD), both designed for normally distributed data, detected too many data points as outliers, as some equal the highest random bid, leaving a suitable bound undefined. However, given the expectation of a bimodal, non-normal distribution for the stated WTP values elicited via the OE question (Arrow et al., 1993), as suggested by the preliminary results based on the pilot survey (see Appendix 4: Preliminary Results on the Pilot Survey), we applied an adjusted boxplot for skewed distributions proposed by Hubert et al. (2008). With an upper bound of €93.40, this method identified 3 outliers among the 168 valid responses, which were removed from the analysis.

2.4 Model Specification

2.4.1 The Dichotomous-Choice Question

Based on the results of the pilot survey (see Appendix 4: Preliminary Results on the Pilot Survey), eight bid levels were selected, defined as $\boldsymbol{b} = \{5, 10, 15, 20, 25, 30, 40, 50\}$, with $b \in \boldsymbol{b}$ and $P\{b = b_i\} = \frac{1}{8}$, where b_i represents the monetary value in euros of the daily EF proposed to individual i. The probability of an individual answering 'yes' to the DC question, '*Is* b_i *a daily fee you would pay to enter Venice?*', depends on whether their willingness to pay is greater than or equal to the proposed bid. This probability is captured by the binary indicator Y_i, where $Y_i = 1$ if $\text{WTP}_i \geq b_i$, and $Y_i = 0$ otherwise.

$$P\{Y_i = 1\} = P\{WTP_i \geq b_i\} \tag{2.1}$$

In Equation 2.1, WTP_i is an unobservable random variable, unknown to the investigator. From the observations in the sample, we estimate $ES(b)$, the *empirical survival function*, as a step function, derived from $F(b)$, the empirical cumulative distri-

bution function, and defined by $P\{y_i = 1\} = P\{\text{WTP}_i \geq b_i\} = 1 - P\{\text{WTP}_i < b_i\}$. Therefore, our estimates are given by:

$$\hat{ES}_n(b) = 1 - \hat{F}_n(b) = 1 - \frac{1}{n}\sum_{i=1}^{n} \mathbb{1}(b_i < b, Y_i = 1) \tag{2.2}$$

In Equation 2.2, $\mathbb{1}(b_i < b, Y_i = 1)$ is an indicator function that equals 1 if the proposed bid (b_i) is less than the threshold (b) and the respondent accepted the bid ($y_i = 1$), and 0 otherwise. n represents the total sample size. Therefore, $\hat{ES}_n(b)$ evaluates the proportion of individuals who accepted bids equal to or greater than b, $\forall b \in \boldsymbol{b}$, providing an empirical estimate of interval-type WTP (Vaart, 1998).

Beyond empirical analysis, we calculated a *probabilistic survival function*. We considered the vector $\boldsymbol{x}$ of individual characteristics, where $X_{n\times(k+1)}$ is the matrix of covariates. Following the theoretical framework presented by Hanemann et al. (1991) and Hanemann et al. (1996) regarding the Single-Bounded Dichotomous Choice (SBDC) approach, we denoted by $G_Y(\cdot)$ the cumulative distribution function (CDF) and $g_Y(\cdot)$ the probability density function (PDF) over the dependent variable Y. This leads to:

$$P\{Y_i = 1 \mid X\} = 1 - G_Y(b \mid X) = S(b \mid X) \tag{2.3}$$

In Equation 2.3, $S(b \mid X)$ represents the survival function, which calculates the probability of a 'yes' response to the DC question for each bid level, conditioned on covariates X. Based on the results of the pilot survey, we assumed a logistic probability function. Therefore, its form and marginal effects are given by:

$$P\{Y_i = 1 \mid X\} = 1 - G_Y(b \mid X) = 1 - \frac{e^{\gamma_0 + \boldsymbol{\gamma}_k' X + \gamma_{k+1} b}}{1 + e^{\gamma_0 + \boldsymbol{\gamma}_k' X + \gamma_{k+1} b}} \tag{2.4}$$

$$\frac{\partial P\{Y_i = 1 \mid X\}}{\partial z_j} = \frac{\gamma_j \cdot e^{\gamma_0 + \sum_{j=1}^{k+1} \gamma_j z_j}}{\left(1 + e^{\gamma_0 + \sum_{j=1}^{k+1} \gamma_j z_j}\right)^2}, \quad j \in \{1, 2, \ldots, k+1\} \tag{2.5}$$

Here, $G_Y(b \mid X)$ represents the logistic CDF, while $\frac{\partial G_Y(Z)}{\partial z_j}$ captures the marginal effect of each explanatory variable z_j on the logit-transformed probability of bid

acceptance. The estimators $\hat{\gamma}_j$ share the same derivation and are calculated by maximising the log-likelihood function under the Single-Bounded Dichotomous Choice (SBDC) framework, which models responses as Bernoulli trials (see Hanemann et al., 1996). In particular, the proposed bid is included as a regressor, consistent with approaches in the literature (e.g., Berrens et al., 2000; Bengochea-Morancho et al., 2005). Therefore, our probabilistic survival function, computed for an average respondent, estimate $\boldsymbol{\gamma}$ based on the entire dataset, with the CDF defined as:

$$G_Y(b \mid X) = \frac{1}{1 + e^{-\left(\gamma_0 + \sum_{j=1}^{k} \gamma_j \overline{x}_j + \gamma_{k+1} b\right)}} \tag{2.6}$$

In Equation 2.6, $\boldsymbol{\gamma}$ includes coefficients for gender, age, nationality, annual household income, employment status, trip purpose, information level regarding overtourism, a constant, and the bid level. These regressors, detailed in Appendix 5: List of Independent Variables, were selected based on the literature (see Chapter 1.2.4). The survival function, $\hat{S}_n(b \mid X) = P\{Y_i = 1 \mid X\} = 1 - \hat{G_Y}(b \mid X)$, is calculated by fixing covariates to their central tendencies (using the means of most variables and the median for income). Therefore, $\hat{S}_n(b \mid X)$ represents the probability of bid acceptance for an average respondent in the sample, calculated on the fixed matrix of covariates $\overline{X}$, resulting in the estimation of the vector of marginal effects $\hat{\boldsymbol{\gamma}}$.

Once again, the marginal effects of the regressors are calculated for the mean survival function, which represents the average respondent in the sample. These effects are computed $\forall b \in \boldsymbol{b}$, using the simplified formula $\frac{\partial P}{\partial z_j} = \hat{\gamma}_j \cdot \hat{G}_Y(b \mid X) \cdot (1 - \hat{G}_Y(b \mid X))$ from Equation 2.5. To estimate survival probabilities for specific respondent profiles, we adjusted the values of statistically significant covariates in the estimated econometric model to reflect how differences in individual characteristics deviate their probabilities from the mean ones. For example, to evaluate the impact of gender, we calculate the probabilities of bid acceptance for male and female respondents, while keeping all other covariates and estimators fixed. The difference in these probabilities, $\Delta P = P\{Y_i = 1 \mid \overline{\boldsymbol{x}}_{\text{gender}} = 1\} - P\{Y_i = 1 \mid \overline{\boldsymbol{x}}_{\text{gender}} = 0\}$, represents the marginal effect of gender on the probability of bid acceptance for each bid level. This method quantifies marginal effects as changes in probability, expressed in percentage points, determined by the magnitude and sign of the estimated coefficients.

Thus, this framework estimates both an empirical and a probabilistic *demand*

function for visiting Venice, conditioned on the daily entrance fee prices, following the SBDC approach, which allows us to control for covariates to verify whether tourist characteristics influence the likelihood of accepting entrance fees.

2.4.2 The Open-Ended Question

In our SBDC with an Open-Ended (OE) follow-up design, respondents who accept b_i shall report a WTP equal to or above the bid, while those who reject report a WTP below the bid, with zero as the lower bound. The unobservable variable WTP_i, as defined in Chapter 2.4.1, is proxied here by the WTP stated in the OE follow-up question, which is our dependent variable in this analysis. The question, conditioned on the respondent's previous answer (Y_i), presents either 'above' or 'below' b_i: '*What is the maximum price [above/below]* b_i *that you would be willing to pay as a daily entrance fee, beyond which you would decide not to visit Venice?*'. Four responses were excluded from the dataset for inconsistencies (e.g., $WTP_i < b_i$ when $Y_i = 1$).

In our case study, where theoretically WTP $\in [0, +\infty)$, the corner solution (WTP $= 0$) is a legitimate outcome of the utility maximisation problem of the respondents, and we can expect a significant share of zero-WTP (see Appendix 4: Preliminary Results on the Pilot Survey). Therefore, the linearity assumption is violated (Takeshi, 1985). As a result, we adopted a Tobit regression model, which is considered a more suitable estimation technique (Wooldridge, 2013; Amore et al., 2021). Following Hayashi (2000), we assume a latent variable WTP^* defined as:

$$
\begin{aligned}
WTP_i^* &= \alpha + \mathbf{x}_i'\boldsymbol{\beta} + \varepsilon_i, \quad i = 1, 2, \ldots, n, \\
WTP_i &= \begin{cases} WTP_i^* & \text{if } WTP_i^* > 0, \\ 0 & \text{if } WTP_i^* = 0. \end{cases}
\end{aligned} \tag{2.7}
$$

In Equation 2.7, $\varepsilon_i \mid \mathbf{x}_i \sim N(0, \sigma^2)$ and $\{WTP_i, \mathbf{x}_i\}\,(i = 1, 2, \ldots, n)$ are i.i.d., where WTP_i, defined as such, explicitly captures the structural presence of zero values. Clearly, when $Y_i = 1$, we have $WTP_i = \alpha + \mathbf{x}_i'\boldsymbol{\beta} + \varepsilon_i$, given that $\boldsymbol{b} \cap \{0\} = \emptyset$. Moreover, $0 \notin \boldsymbol{b} \implies \text{WTP}_i = 0 \implies Y_i = 0$. Furthermore, given the domain, the applied censor rule is $WTP^* = 0$, which replaces the standard $WTP^* \leq 0$. In this analysis, we adopted the covariates $\boldsymbol{x}$ defined earlier.

Recognising the structural presence of zero WTP, the estimated coefficients, referred to as *unconditional marginal effects*, measured among both willing and unwilling individuals, capture the effects of covariates in explaining both the probability of willingness to pay (WTP > 0) and the expected stated WTP amount. However, estimates $\hat{\boldsymbol{\beta}}$ may not fully capture a real-world decision-making process, where people first decide whether to pay and then determine their WTP amount. The first stage, in particular, may be influenced by omitted factors such as protest and non-protest arguments related to ethical concerns, fairness, or political trust, which are not fully captured by observable characteristics. Similarly, unobserved factors absorbed in the error term influence both stages simultaneously. To account for this, following Wooldridge (2013), we apply a transformation $f(\hat{\boldsymbol{\beta}})$ that scales the effects of the covariates by the probability of having a positive WTP. Therefore, we assume a two-stage decision-making process in which such omitted factors, potentially endogenous to the model, account for the first-stage decision. Thus, this interpretation suggests that individuals with a low probability of paying are more influenced by protest and non-protest concerns, whereas those with a high probability are less affected. To summarise, while ϵ still captures unobserved factors common between the respondents and both decision stages, incorporating this probability refines the model by indirectly accounting for the selection into the paying group. This ensures that the new estimated covariate effects, known as *conditional marginal effects*, are interpreted within a framework with a structural presence of zero WTP. Specifically, the transformation $f(\hat{\boldsymbol{\beta}})$ scales the predicted amount of WTP for each observation by weighting it according to the probability of having a positive WTP, given the characteristics of the individual relative to the average respondent.

$$\mathbb{E}[WTP \mid X] = P\{WTP > 0 \mid X\} \cdot \mathbb{E}[WTP \mid WTP > 0, X] \tag{2.8}$$

In the RHS of Equation 2.8, the second term, $\mathbb{E}[WTP \mid WTP > 0, X]$, represents the expected amount for those willing to pay, while the first term, $P\{WTP > 0 \mid X\}$, represents the selection probability, modelled using a normal CDF which is inherently non-linear. Consequently, a non-linear correction f, such as the inverse Mills ratio, is necessary to properly adjust the estimates. For people unwilling to pay, $P\{WTP > 0 \mid X\}$ is zero as they are in the lower bound of the CDF. As a

result, their expected WTP is also zero under Equation 2.8. The methodology used is briefly described in Table 3.5, with a detailed discussion available in Wooldridge (2013), Ch.17. To summarise, while unconditional marginal effects capture both selection into the paying group and the amount paid, conditional ones adjust for the structural presence of zero WTP by weighting coefficients according to the likelihood of payment. Our analysis considers both interpretations.

3 Results

3.1 The Survival Function

The total sample size consists of 153 observations, adjusted by removing outliers, missing data, and inconsistent responses. Instead, the subsample that excludes protest responses includes 137 observations. Following the literature (see Chapter 1.2.3), we analysed both samples. The overall acceptance rate is 26.8%, a notably low value that results in unrealistic demand projections, particularly when compared to the actual outcomes of the 2024 EF policy (Comune di Venezia, 2024d). Figure 3.1 shows the share of acceptances for each bid. Interestingly, acceptance rates for €5 and €30 are lower than for some higher bids, contradicting the law of demand. Implications of this result are discussed in the Limitations section.

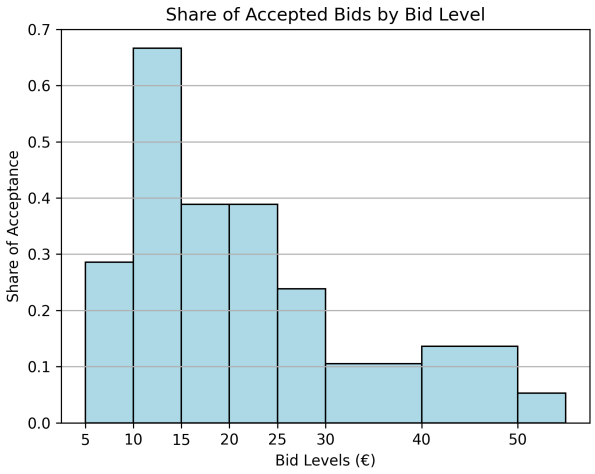

Figure 3.1: Histogram of Accepted Bids

The empirical survival functions in Figure 3.2 show the cumulative proportion of respondents willing to accept each level of bid or any higher bid, with values of $\hat{ES}_n(\boldsymbol{b}) = (26.8\%, 22.9\%, 16.3\%, 11.8\%, 7.2\%, 3.9\%, 2.6\%, 0.6\%)$. The fitted logistic

functions have a negative μ, which means that the estimated bid for 50% acceptance is negative, which is not aligned with reality. Moreover, the two step-functions passed the Kolmogorov-Smirnov (KS) test, showing no significant statistical difference, indicating that removing protest responses does not affect estimates based solely on empirical data.

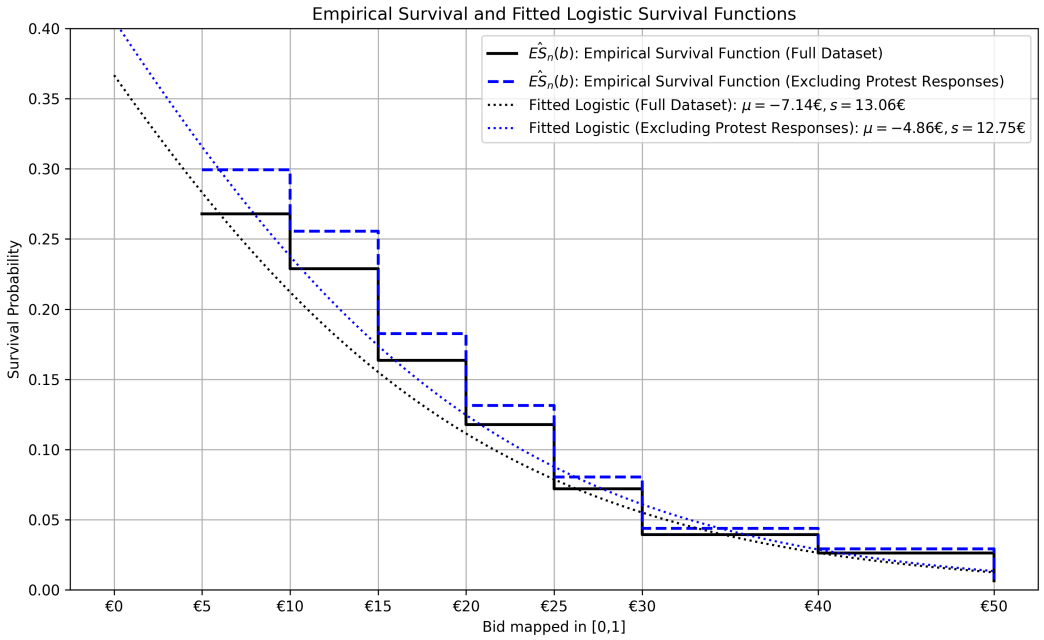

Figure 3.2: Empirical Survival Functions with their relative fitted logistic functions. Note: the x-axis represents bid levels interval [0,50] mapped to [0,1], ensuring that each interval reflects its actual proportion in the bid distribution (e.g., €0–5 accounts for 10% of [0,1], €30–40 accounts for 20%). The fitted logistic functions (μ, s) were estimated by fitting a logistic survival function to the empirical data using 'scipy's curve_fit' python function, which minimizes the sum of squared errors between the functions

.

Table 3.1 presents the logit regression results for the total sample, with the baseline probabilities computed using the following values of central tendencies for the covariates: $\boldsymbol{x} = (x_{\text{gender}} = 0.42,\ x_{\text{age}} = 40.98,\ x_{\text{ita}} = 0.31,\ x_{\text{nonitaeu}} = 0.45,\ x_{\text{status}} = 0.63,\ x_{\text{vacation\_trip}} = 0.72,\ x_{\text{income}} = 55.000,\ x_{\text{information}} = 0.58),\ \forall i = 1, \ldots, n$. The regression results for the subsample that excludes zero WTP are presented in Table 6.

Table 3.1: Logit Regression Results (Full Dataset)

Variable	$\hat{\gamma}$ ($\hat{\sigma}$)	**P**$>\|z\|$	**Variable**	$\hat{\gamma}$ ($\hat{\sigma}$)	**P**$>\|z\|$
Constant	-1.934 (0.909)	0.033 **	Italian	0.395 (0.602)	0.511
Gender	-0.907 (0.453)	0.046 **	Non-Italian EU	0.380 (0.530)	0.473
Age	0.027 (0.014)	0.061 *	Vacation Trip	1.272 (0.580)	0.029 **
Status	-0.144 (0.495)	0.771	Information	0.088 (0.441)	0.841
Income	0.005 (0.003)	0.099 *	Bid	-0.067 (0.017)	0.000 ***

Note: The dependent variable (Y) represents the binary response to the bid (yes/no). The model uses Maximum Likelihood Estimation (MLE) with a Pseudo R-squared value of 0.198. Values are approximated to three decimal places. Log-Likelihood: -71.300; LL-Null: -88.929; LLR p-value: 0.0001; No. of Observations: 153. AIC = 162.600, SC = 192.905, HQ = 174.910, Mean Error = -2.440×10^{-11}, RMSE = 0.394, MAE = 0.307, Theil's U1 = 0.459. The model correctly predicts 77.1% of the cases. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To check how well the model fits the data, we performed a χ^2-test on the confusion matrix, comparing the actual and expected frequencies. The test produced a very small p-value (6.92×10^{-6}), indicating a significant difference between the observed (empirical) and predicted (estimated) distributions. This suggests that the model does not align fully with the empirical distribution. Although it performs well overall, correctly predicting 77.1% of cases, this accuracy is largely driven by the high number of $Y_i = 0$ responses. As a result, the model favours the majority class but struggles to capture the patterns of the minority class ($Y_i = 1$), highlighting some limitations in its predictive power.

$$\hat{G}_Y(b \mid X) = \frac{1}{1 + e^{-f(b|X)}}, \quad \text{where } f(b \mid X) = -0.189 - 0.067 \cdot b \tag{3.1}$$

$$\hat{S}_n(\boldsymbol{b} \mid X) = \begin{cases} 47.25\% & \text{for } b = €5, \\ 39.00\% & \text{for } b = €10, \\ 31.33\% & \text{for } b = €15, \\ 24.56\% & \text{for } b = €20, \\ 18.86\% & \text{for } b = €25, \\ 14.23\% & \text{for } b = €30, \\ 7.79\% & \text{for } b = €40, \\ 4.13\% & \text{for } b = €50. \end{cases} \tag{3.2}$$

Equation 3.2 presents the acceptance rates of the estimated probabilistic survival function, showing a sharp drop in demand at the lowest bid. This outcome seems unrealistic, as, once again, contradicts the 2024 €5 'Contributo d'Accesso' policy results reported by the Municipality, which did not indicate such a significant decline (Comune di Venezia, 2024d).

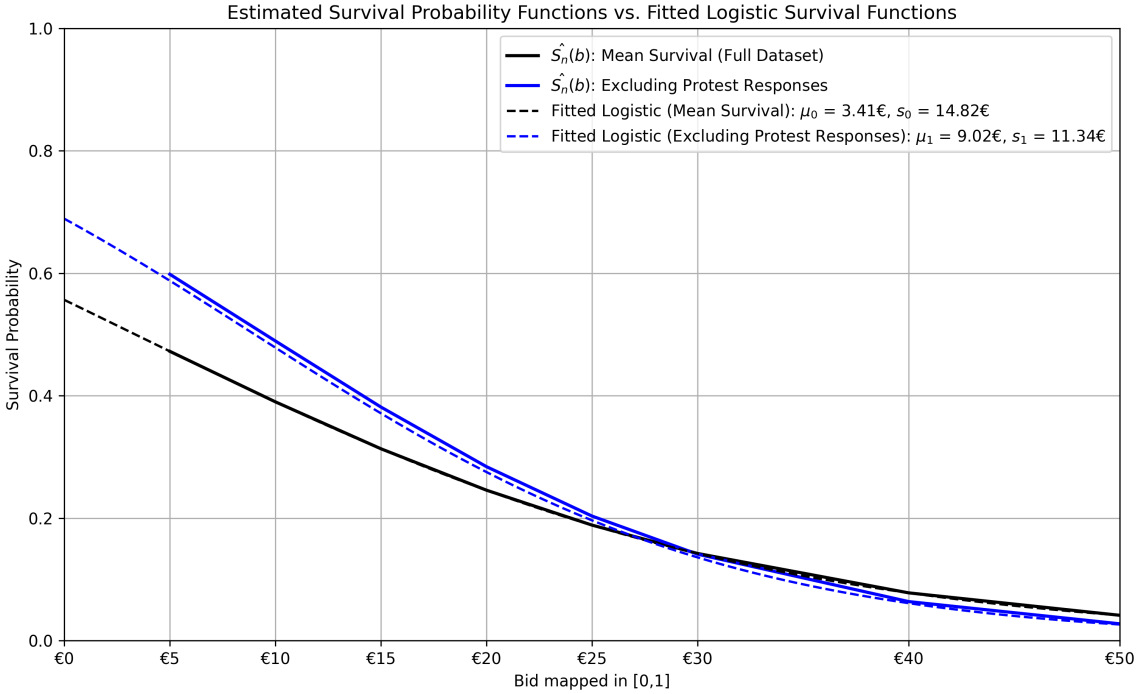

Figure 3.3: Survival Functions: Entire Dataset vs. Excluding Protest Responses. Plotting methodology described in Figure 3.2.

In Figure 3.3, we compare the estimated probabilistic survival functions of the average respondents in both samples. The fitted logistic functions closely match their respective estimates and individually pass the KS test, and the test fails when comparing the two fitted functions, indicating that excluding protest responses significantly alters the probabilistic survival distribution. As expected, removing respondents with $Y_i = 0$ increases the probability of accepting the bid. The estimated parameters for the fitted logistic functions suggest that the number of visitors would drop by 50% at a daily EF of around €3 (full dataset) and €9 (excluding protests). The shape parameters indicate that the sharpest decline in acceptance occurs between €10 and €15. Despite its limitations, this model appears to be more reliable than the empirical one.

Regarding the effects of covariates, from Table 3.1 and following the methodology presented in Chapter 2.4.1, we can see that women are more likely to accept bids than men, with differences ranging from 22.1% at €5 to 3.4% at €50. Furthermore, each additional year of age increases the probability of acceptance by 0.67% at €5, decreasing to 0.11% at €50. Younger respondents (25 years old) are less

likely to accept bids than older ones (50 years old), with differences from -16.5% (€5) to -2.5% (€50). Moreover, for every €1,000 increase in income, the probability of bid acceptance increases by 0.12% at €5, dropping to 0.02% at €50. Also, respondents in the 75th income percentile are 6.7% (€5) to 1% (€50) more likely to accept bids than those in the 25th percentile. In addition, the coefficient for an average bid indicates that for each €1 increase in the bid amount, the probability of acceptance decreases, with a drop of approximately 6.5%. To conclude with the statistically significant covariates, vacationers show the highest probability of acceptance compared to other travel purposes, namely business, education and visiting friends/family, with differences decreasing from 29.7% (€5) to 4.1% (€50). Figure 3.4 illustrates the survival functions for these profiles, showing demand variations conditioned on the characteristics of the respondent.

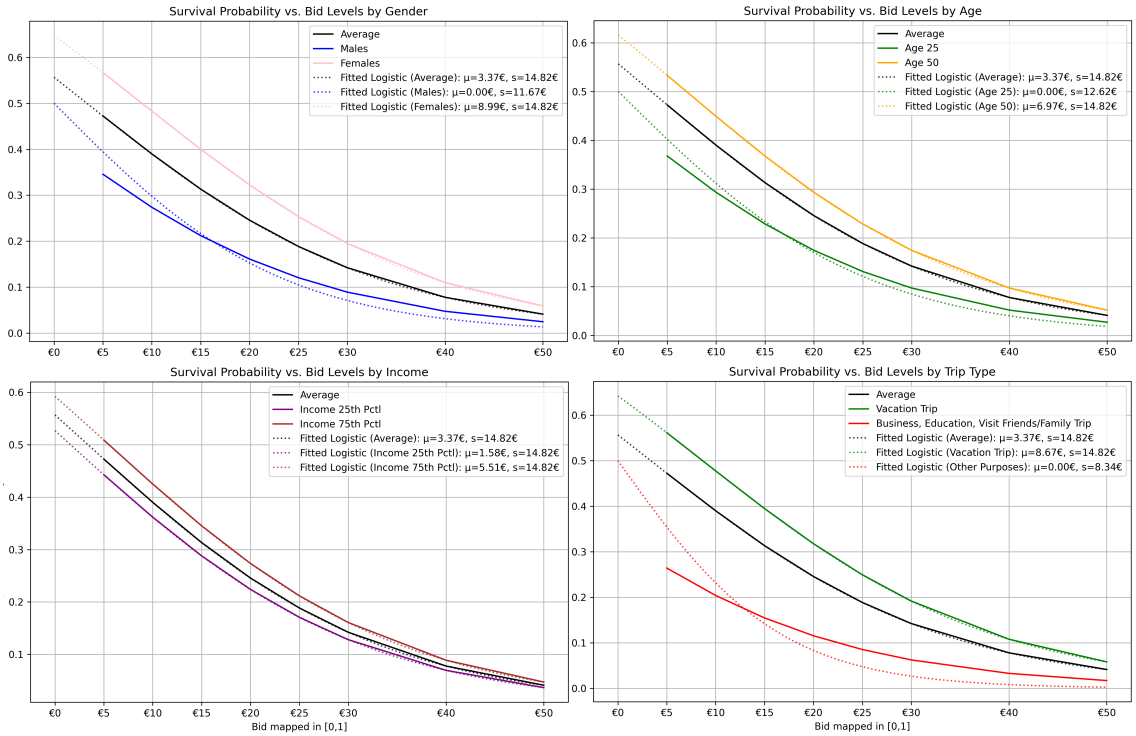

Figure 3.4: Survival Probability (y-axis) vs. Bid Levels (x-axis) by Covariates. Each subplot demonstrates the effect of statistically significant covariate (gender, age, income, vacation trip) on the survival probability across bid levels. Plotting methodology described in Figure 3.2.

These results show that demand becomes less elastic as the daily EF costs increase, indicating a convergence in the intent of the mean respondent to reject higher bids regardless of individual characteristics. This may reflects the nature of high

bids, which incentivise rejection for various reasons (e.g. perceived unfairness, budget constraints). Nevertheless, it is important to note that this effect likely arises from reduced variability in the dependent variable (fewer acceptances), which diminishes the influence of control variables on the predicted probabilities, a statistical phenomenon known as the 'floor effect'. Instead, despite potential limitations due to the small sample size or incorrect elicitation, the level of information about the problem of overtourism appears to have no significant effect, contrasting with the findings in some literature. Similarly, employment status does not show an effect, in agreement with previous studies, while travel distance also lacks significance, diverging from existing research. These findings are partially consistent when analysing the subsample excluding protest bias responses. However, in this case, the variables for gender and age do not show significant effects (see Appendix 6: Additional Results).

3.2 The Stated Willingness to Pay

In this analysis, we consider the same sample of 153 respondents as in the previous section, while also plotting results for the subsample of non-protest respondents. Figure 3.5 presents the distribution of the WTP of the respondents, aggregated in intervals of €5. As we can see, the distribution is non-normal. Figure 3.6 illustrates the cumulative survival distribution, showing the share of respondents with a WTP greater than or equal to the lower bound of each €5 interval, following the formulation of Equation 2.2, adjusted to fit this model. Given that 21.56% of the respondents reported zero WTP, the share drops to 78.44% at WTP $> \epsilon <$ €5 and 67.97% at €5 or more. The complete set of empirical survival probabilities is presented in Equation 3.3, considering bins up to €50, since WTP above this threshold account for only 2.6% of the total sample. As observed, the highest drop rates occur in the lower price intervals, with the most significant decline observed between €10 and €15, consistent with a left-skewed distribution. Once again, the drop in €5 appears to be unrealistic, especially when considering the 2024 EF outcomes. Using these empirical data, we estimate the fitted logistic functions for both samples, as shown in Figure 3. Here, the estimated median WTP, where 50% of the respondents would accept such EF level, is approximately €11, with the inflection point

(where the demand elasticity is highest) occurring around €10. In addition, the KS test confirmed that there is no statistically significant difference between the fitted functions.

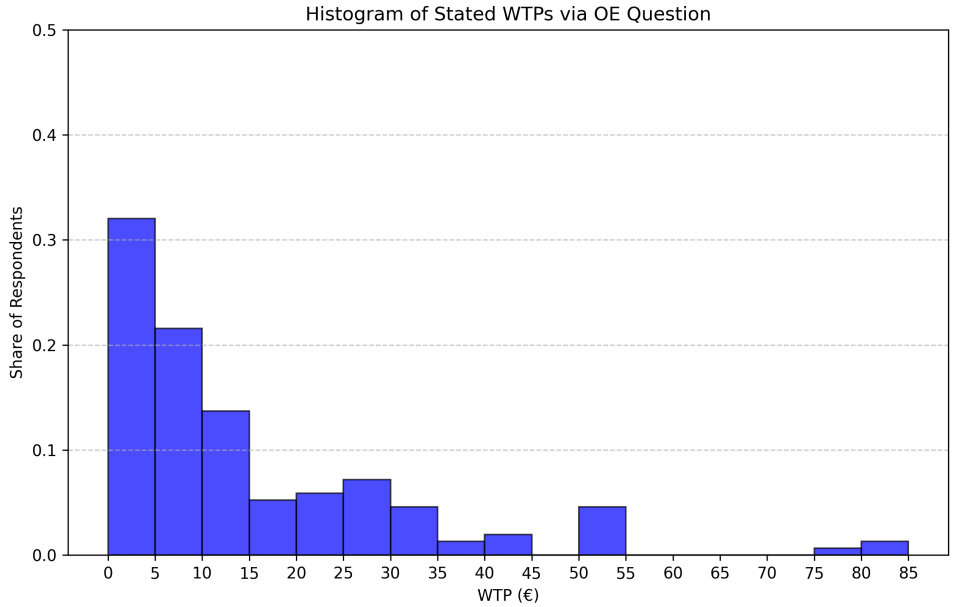

Figure 3.5: Histogram of WTP responses from the OE question, with €5 bin increments on the x-axis and share of respondents on the y-axis.

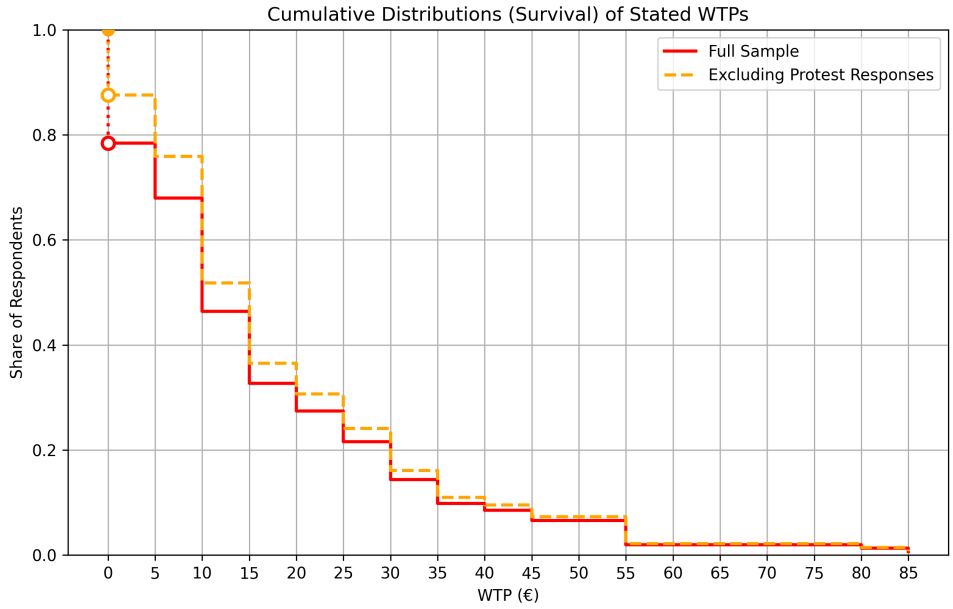

Figure 3.6: Cumulative Survival WTP Distributions. The two functions are computed for datasets including and excluding protest responses.

$$\hat{ES}_n(\boldsymbol{b}) = \begin{cases} 67.97\% & \text{for } b = €5, \\ 46.41\% & \text{for } b = €10, \\ 32.68\% & \text{for } b = €15, \\ 27.45\% & \text{for } b = €20, \\ 21.57\% & \text{for } b = €25, \\ 14.38\% & \text{for } b = €30, \\ 8.50\% & \text{for } b = €40, \\ 6.54\% & \text{for } b = €50. \end{cases} \tag{3.3}$$

Table 3.2 presents the key metrics for the observed WTP stated. The €0 mode reflects the high share of respondents with zero WTP (about one in five), while the large standard deviation highlights significant variability. The mean value falls within the interval where the demand elasticity is highest. Instead, Table 3.3 summarises the reasons behind the willingness or unwillingness of respondents to pay, based on closed-ended questions 14a and 14b (Appendix 2: Definitive Survey). For those willing to pay, non-use values (existence and bequest) dominate, aligning with the literature. Among unwilling respondents, key concerns include scepticism about the effectiveness of the EF in countering overtourism and the argument that they already contribute to Venice preservation through their expenses. Around one in four provided an open-ended reason, mostly aligning with predefined options, underscoring the political nature of the topic. This is also evident in the high engagement with the non-mandatory OE question on overtourism, where nearly half of respondents shared their views.

Table 3.2: Key Metrics of the Definitive Survey WTP Responses

Mean	**Median**	**Mode**	**Second Mode**	**SD**
€13.08	€7.00	€0.00	€5.00	€16.20

Table 3.3: Willingness/Unwillingness to Pay Reasons

Category (Sample %)	**Subcategory (Category %)**	**Reason (Subcategory %)**
Willingness (78.44%)	Use Value (15.82%)	Less Overcrowding (76.29%)
		Affordability (23.71%)
	Non-Use Value (79.98%)	Preservation of Heritage (69.56%)
		Residents' Quality of Life (30.44%)
	Other (4.2%)	-
Unwillingness (21.56%)	Protest (50.48%)	Pricing is Unfair (37.5%)
		Already Supporting Economy (62.5%)
	Non-Protest (26.25%)	Prefer Spending Elsewhere (12.5%)
		Distrust in EF Efficacy (87.5%)
	Other (23.23%)	-

Tables 3.4 and 3.5 present the regression results of the Tobit model. In the subsequent analysis, values in parentheses represent the conditional marginal effects defined in Chapter 2.4.2, which indicate the effect of covariates among those willing to pay. The OLS results are provided in Table 7. Statistically significant variables include age ($\alpha = 1\%$), gender ($\alpha = 10\%$), annual household income ($\alpha = 10\%$), and vacation as the purpose of the trip ($\alpha = 5\%$). These variables and the sign of their coefficients align with the DC question analysis (see Table 3.1). Specifically, for age, each additional year increases WTP by 30 cents (20 cents), with a total increase of €8 for the average 50-year-old respondent compared to 25. For income, a 1,000 euro increase raises WTP by 4 cents (3 cents), with a €2 difference between the 25th and 75th income percentiles. Moreover, the gender coefficient shows that men have a WTP of approximately €5.5 (€5) lower than women. This implies that women's WTP is 42.05% higher than the average respondent (78.57% higher for the median). Furthermore, for vacation trips, those travelling on vacation show a significantly higher WTP, with a difference of €8.5 (€7.5). Thus, vacationers have a WTP 64.99% higher than the average respondent (over 100% higher for the median). Importantly, the smaller conditional marginal effects are due to the weighting transformation that adjusts for the probability of a positive WTP, consisting of an estimated average probability of 70.31%, compared to the empirical probability of 78.44%.

Table 3.4: Tobit Regression Results (Unconditional Marginal Effects)

Variable	$\hat{\boldsymbol{\beta}}$ $(\hat{\boldsymbol{\sigma}})$	**P**$>\|z\|$	**Variable**	$\hat{\boldsymbol{\beta}}$ $(\hat{\boldsymbol{\sigma}})$	**P**$>\|z\|$
Constant	-11.817 (5.937)	0.046 **	Italian	7.132 (4.386)	0.103
Gender	-5.671 (3.190)	0.075 *	Non-Italian EU	4.336 (3.889)	0.264
Age	0.313 (0.104)	0.003 ***	Vacation Trip	8.682 (3.727)	0.020 **
Income	0.038 (0.022)	0.090 *	Information	-3.824 (3.116)	0.219
Status	0.982 (3.545)	0.781			

Note: The dependent variable (WTP) represents the willingness to pay. The model uses Maximum Likelihood Estimation (MLE). Values are approximated to three decimal places. Log-Likelihood: -542.562; Chi-squared (8) = 28.228, p-value = 0.0004; No. of Observations: 153. Criteria: AIC = 1105.123, SC = 1135.428, HQ = 1117.434. Mean Error = 2.689, RMSE = 15.309, MAE = 10.520, Theil's U1 = 0.452. Standard deviation of the error term (σ) = 17.761 (1.186). Left-censored observations = 33; right-censored observations = 0. Residual normality test: Null hypothesis (errors are normally distributed); Chi-squared (2) = 28.121, p-value = 7.829×10^{-7}. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3.5: Tobit Regression Results (Conditional Marginal Effects)

Variable	$f(\hat{\boldsymbol{\beta}})$ (CI 95%)	**Variable**	$f(\hat{\boldsymbol{\beta}})$ (CI 95%)
Gender	-4.900 (-4.955, -4.846)	Italian	6.197 (6.124, 6.269)
Age	0.220 (0.213, 0.227)	Non-Italian EU	3.785 (3.751, 3.820)
Income	0.027 (0.026, 0.028)	Vacation Trip	7.452 (7.374, 7.529)
Status	0.858 (0.852, 0.865)	Information	-3.333 (-3.365, -3.302)

Note: The table reports the estimated conditional marginal effects on observed WTP, obtained by scaling the Tobit coefficients by the probability of having a strictly positive WTP. Estimates incorporate the inverse Mills ratio adjustment for censoring, following $f(\hat{\boldsymbol{\beta}}) = \Phi\left(\frac{X\hat{\boldsymbol{\beta}}}{\sigma}\right) \cdot \hat{\boldsymbol{\beta}}$ for continuous variables and $\Delta\mathbb{E}(WTP \mid X)$ for discrete variables. C.I. at 95% are computed using the delta method. The probability of a positive WTP is estimated using Eq. 2.8, and expected WTP is adjusted for censoring. Calculations were performed in Python using NumPy and SciPy, assisted by Copilot, following Wooldridge, 2013, Ch. 17.

These results indicate that while trip purpose and gender have a notable impact, income and age effects are minimal, although statistically significant. As seen in the DC analysis, awareness of overtourism, nationality (contrary to the literature), and employment status show no significant effect. In addition to this, despite the limitations of the pilot survey, its findings, consistent with the OLS and Tobit models, show a positive correlation with age, while Italians are willing to pay about 50% less than non-Italians. Furthermore, daily travellers tend to pay around 45% less than the average respondent, in accordance with the literature, which associates a greater travel distance with greater willingness to pay and lower spending by daily visitors. To conclude, the results combining both surveys data confirm that WTP positive correlates with age, while Italians, on average, exhibit a lower WTP compared to other nationalities. The regression results and analysis can be found in Appendix 4: Preliminary Results on the Pilot Survey and Appendix 6: Additional Results.

3.3 Optimal Entrance Fee Levels

Following efficiency and equity-based principles presented in Chapter 1.2.2 regarding EF prices, we estimate the impact of a daily EF on visitor numbers using 2023 data on Venice's total visitor presence, which accounts for the total days visitors stayed in a year, plus an additional 21.7% to account for daily-trippers, based on our investigation. Therefore, by computing three levels of EF, one that maximises revenue (efficiency), one based on the mean (€13.08), and one based on the median (€7), we identified the corresponding declines in visitor numbers. To account for the implausibility of the drop in tourists at €5 estimated by our models, we assumed drops of 0 and 10 percent when EF = €5. Specifically, the assumed drops in total presences imply that visitor behaviour differs only between €0 and €5. Beyond €5, visitors follow the same demand pattern estimated from the empirical survival functions, specifically:

$$\text{Drop Rate at } b = \frac{\hat{ES}_n(b_{\text{prev}}) - \hat{ES}_n(b)}{\hat{ES}_n(b_{\text{prev}})} \tag{3.4}$$

Figure 3.7 presents the demand functions for both elicitation methods, plotting EF levels against total annual revenues (in millions). In particular, we plotted three demand functions for the OE analysis, including two based on assumptions and one that incorporates the full empirical $\hat{ES}_n(\boldsymbol{b})$, while only the two assumed functions were used for the DC analysis. The empirical function was excluded in the DC case due to its unrealistic drop at €5. The U-shaped curves peak around €20 for all cases. Table 8 details the revenues and estimated annual presences at the EF levels based on equity and efficiency principles. Based on these results, we estimate 11.5k–22k daily visitors at €20, 16k-30.5k at €13.08, and 25k-40k at €7. Given Venice's 50k Tourist Carrying Capacity (Bertocchi et al., 2019) and the addition of a plausible 20k among residents and other daily city users (e.g., students, workers, and daily commuters), these figures suggest that the EF could help mitigate overtourism. However, it is important to acknowledge that these estimates do not account for seasonality, assume a uniform EF throughout the year, and rely on survival functions with limitations discussed in Chapters 3.1 and 3.2.

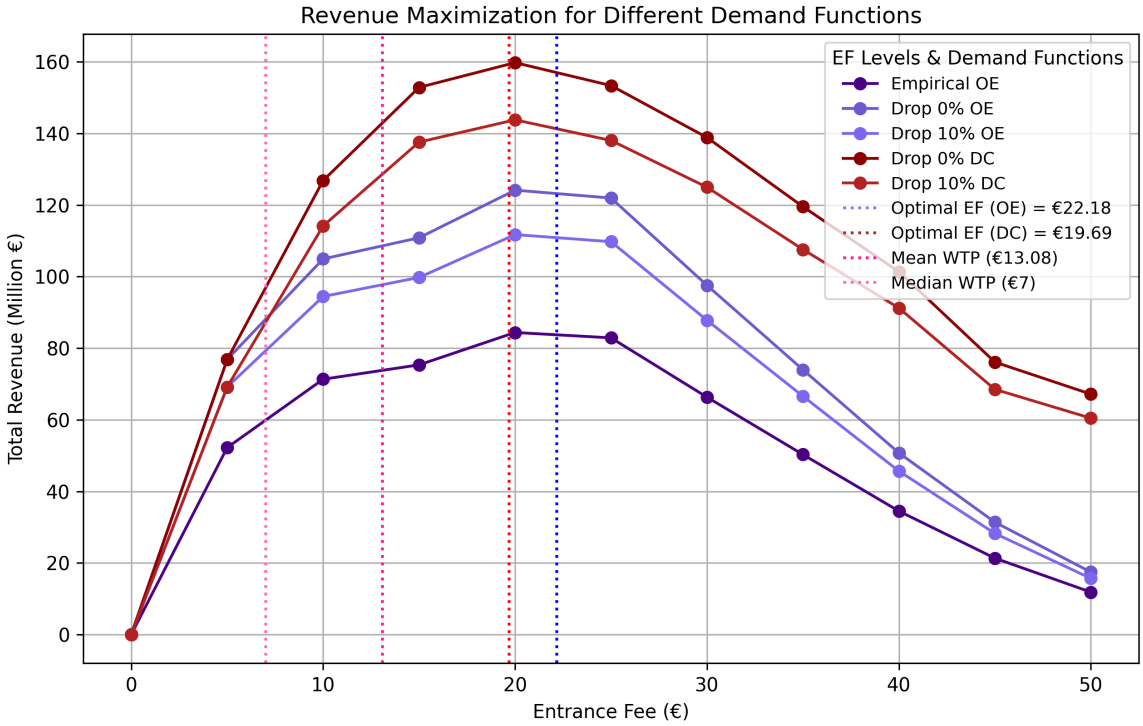

Figure 3.7: Revenue Maximization Functions for Empirical and Assumed Demand Functions. The x-axis represents EF levels (€), while the y-axis shows total annual revenue (in millions), assuming the EF is applied throughout the year based on 2023 visitor data. The optimal EF is identified using spline interpolation (UnivariateSpline in Python) to determine the maximum point of the functions, as equity-based levels do not align with survival intervals.

In Table 3.6, the differences in the annual presences are shown with respect to 2023, calculated for the three levels of EF in each scenario. The last column shows the differences in revenues computed with respect to EF = €20 when the tax is set according to the equity principle. In particular, revenue drops remain roughly the same across scenarios because the underlying drop rates are identical, based on empirical survival levels. In fact, for all demand functions plotted within each elicitation method, the only source of variation arises from the two assumed scenarios of a different decrease at €5, which influence the initial number of visitors. However, since the relative changes across the EF levels remain the same, the percentage decline in revenues remains proportionate across all cases, although the absolute visitor numbers differ.

EF (€)	Scenario	Daily Presences (% w.r.t. Baseline)	Revenue Difference (% w.r.t. EF = €20)
7.00	Drop 0%	-12.68% (-6.95%)	≈ -32.16% (-59.66%)
	Drop 10%	-21.40% (-16.26%)	
	Empirical	-40.66% (—)	
13.08	Drop 0%	-44.17% (-27.45%)	≈ -10.60% (-9.57%)
	Drop 10%	-49.77% (-34.74%)	
	Empirical	-62.06% (—)	
20.00	Drop 0%	-59.59% (-48.01%)	—
	Drop 10%	-63.63% (-53.22%)	
	Empirical	-72.54% (—)	

Table 3.6: Visitor and Revenue Changes by EF. Daily Presences and Revenue Differences are relative to 2023 baseline. The "Scenario" column specifies different assumptions: (i) no drop at the EF = €5 (Drop 0%), (ii) a 10% drop, and (iii) the empirically estimated drop for the stated WTP. Drop rates are computed using the formula in Eq. 3.4.

From Figure 4 and Figure 5, we observe that DC demand functions are more inelastic due to lower baseline acceptance rates, which compress acceptance differences and reduce drop rates between bids. With three out of four respondents unwilling to pay, price sensitivity is low. Moreover, the elasticity gap between DC and OE decreases as EF decreases. While DC demand projects about 30% more visitors at €20 and €13.08 (see Table 8), this gap narrows to 6% at €7, leading to a sharper revenue drop at €7 but a more comparable decline at €13.08. This convergence at lower EF levels arises from the assumed common starting points at €5. However, the estimated visitor drops at €13.08 and €20 appear unrealistically high, while at €7, visitor numbers seem more reasonable, though determined by the assumed demand scenarios.

4 Conclusion

4.1 Key Findings

The following presents the key findings of our investigation, acknowledging the limitations discussed in Chapter 4.2. Importantly, in this investigation, the WTP is asked for a *daily entrance fee* to Venice applied uniformly to each tourist over 18 years of age and for each day of their stay.

Findings on the non-normality of the WTP distribution and the proportion of zero-WTP respondents are also consistent with results from the pilot investigation and the literature. Moreover, findings related to covariates are considered robust when they remain consistent across both elicitation methods, so supported by Logit and Tobit estimates. The correlations between income and vacation trips also hold in the OLS model. Weak evidence on domestic (Italian) visitors arises from results in both the pilot survey and the combined dataset, remaining robust across both EF price measures in the pilot study (the 'reasonable' and the 'maximum' EF price) and confirmed by Tobit and OLS methods. The insights into excursionists represent the weakest finding, emerging only from the OLS regression on the reasonable EF in the pilot survey ($\alpha = 5\%$).

- **WTP distribution:** the WTP distribution is non-normal and left-skewed, with the highest price sensitivity observed at EF levels between €10 and €15.
- **Unwilling individuals:** around 20% of visitors are unwilling to pay any EF, mainly due to scepticism about its effectiveness in addressing overtourism and the belief that their existing expenses already contribute sufficiently. Among them, approximately 50% provided protest responses, meaning that approximately one in ten respondents in the total sample can be classified as protest

respondents.

- **WTP values:** the mean WTP is €13, with a median of €7, highlighting significant variability in responses. In addition, approximately 90% of the visitors opt out at around €25.
- **Daily trippers:** excursionists account for approximately 20% of the visitors.
- **Revenue-maximising EF:** the EF that maximises revenue is €20, while setting it at €13 or €7 allows approximately 35% more visitors.
- **Explanatory variables:** we found strong evidence that gender, age, income, and purpose of the trip correlate with WTP, while statistically significant results on domestic visitors and being a daily traveller are less reliable:
  - women are 22% more likely than the average respondent to accept a €5 EF and have a WTP approximately €5 (42%) higher than men;
  - older people are willing to pay more, with 50-year-old willing to pay on average €8 more than 25-year-old visitors, with an average increase of €0.13 to €0.30 per additional year;
  - higher income correlates with higher WTP, with an average difference of €2 between annual household incomes of €85,000 and €30,000;
  - vacationers are 30% more likely than the average respondent to accept a €5 EF and have a WTP that is €8 higher than those visiting for business, education, or personal reasons;
  - domestic (Italian) respondents exhibit a WTP roughly half that of the average visitor, while daily travelers are willing to pay about 40% less than the average respondent.

Among these results, the correlations between WTP and income, travel distance, and being a daily traveller align with the existing literature. However, the results on age, gender, and travel purpose show mixed evidence in the literature, suggesting that their effects may be context dependent on entrance fees framed as a mandatory payment for accessing cultural heritage cities. The results on employment status do not show a significant effect, aligning with the literature. However, a potential

endogeneity issue may arise as income and status are likely linked. In conclusion, perceived knowledge of overtourism, measured by a Likert scale, does not show a significant effect. A possible explanation is that its impact may be bidirectional, as the effectiveness of EF remains debated and visitor opinions vary widely.

4.2 Limitations

In this section, we highlight the limitations of our study, distinguishing between those arising from methodological failures and those that might be inherent to assessing WTP for a mandatory entry tax on cultural heritage sites. We also propose interpretations and directions for future research.

- **Selection bias:** the content of the QR code manifests may have disproportionately attracted visitors already concerned about overtourism. Indeed, the high response rate (one in two individuals) on the overtourism-related non-mandatory question suggests that those with prior opinions were more likely to participate, potentially introducing bias into the results. In addition, the survey was available only in English. Furthermore, the online survey format could have excluded some people; in fact, the average age of the sample is younger than that of the population.

- **Sample representativeness:** while the sample aligns with most visitor characteristics, the estimated average stay of 3.75 days exceeds the historical average of 2.4 days. Moreover, while our findings consistently indicate a lower WTP for excursionists, the fact that they allocate the same daily budget as overnight visitors contrasts with the existing literature.

- **Demand function anomalies:**

  - implausibly high visitor drop rates (-32% to -47%) at €5 contrast with real-world observations from Venice's 2024 €5 EF policy. This raises questions about the accuracy of the estimated demand functions. Nevertheless, the relative changes in demand, based on interval-type WTP drop rate proportions, consistently indicate that a revenue-maximising EF of €20 is optimal across both elicitation methods. This suggests that while

the absolute visitor drop at €5 remains questionable, the underlying drop rate patterns may still be reliably captured;

- violation of the law of demand: at €5, fewer acceptances were observed compared to higher fees, contradicting economic rationality;
- differences in demand functions across elicitation methods: while both methods identify the same optimal EF, their demand distributions differ, possibly due to unusually low acceptance rates in the DC question. The random bid design may not have effectively minimised reference point bias, potentially triggering emotional or psychological biases against the EF.

We acknowledge that selection bias and sample representativeness problems reflect limitations of the investigation, while those concerning the overall low acceptance rate and the violation of the law of demand at €5 may arise from the nature of the phenomena under investigation. Beyond the generally low acceptance rate (26% across all bids), the implausibly low acceptance at €5, contradicting real-world behaviour (Comune di Venezia, 2024d), raises concerns about such potential biases: (i) a limited sample size, as Arrow et al. (1993) recommends at least 1,000 observations for reliability; (ii) a strategic bias, where a low EF could signal a weaker commitment to preservation, encouraging free-riding; however, removing protest responses, in line with literature practices, does not alter the results; (iii) an anchoring effect, where respondents may have associated the €5 EF with the recently introduced 'Contributo d'Accesso', triggering psychological biases. However, further analysis of our data found no significant correlation between fee awareness and bid acceptance or WTP values. Nevertheless, as Lindhjem et al. (2018) notes, even minor design changes can influence WTP estimates for public goods with moral aspects. This adds uncertainty to all results, particularly those not robust across both survey methods, and raises questions about how awareness of existing EFs affects stated values for cultural heritage sites.

We now propose interpretations regarding the overall low acceptance rate that, while speculative, are based on our findings and could be valuable for future research. It may be that, contrary to the literature (see Chapter 1.2.3), the hypothetical bias, if present (as we did not explicitly test for it), leads respondents to understate rather

than overstate their WTP for accessing cultural heritage sites via an EF. Instead of stating the maximum amount they would pay to avoid opting out, they may report what they perceive as fair, without fully recognising the mandatory nature of the payment and its associated opportunity costs. This is reflected in the mean WTP of €13 from the definitive survey, which falls between the €7 'reasonable' price and the €30 'maximum' price reported in the pilot questionnaire. Another consideration is that since the respondents were already in Venice, their stated WTP could reflect a hypothetical fee for another visit rather than their initial decision to come, potentially lowering their WTP. To conclude, we also believe that it may be the case that for an average respondent, the decision to visit a cultural heritage site depends on external factors (e.g., planned trips, special events, or the social context, where the city is a setting rather than the main source of utility), and if such situational triggers were absent at the time of the survey, respondents may have perceived a lower relevance, leading to an underestimation of their true WTP. Future research could explore how travel motivations and trip context influence WTP, with a stronger focus on contingent factors in decision-making. Furthermore, further studies should clarify whether visitors primarily perceive the EF as an access fee, a contribution to conservation, or a combination of both, moving beyond the traditional use vs. non-use value framework.

Appendix 1: Pilot Survey

The following questionnaire was created using Google Forms. The questions marked with an asterisk (*) were mandatory for respondents.

Description:
This survey aims to determine how much you would be willing to pay as a daily entrance fee to Venice, applied to each tourist over 14 years old for each day of their stay. Project: Balancing tourism: the introduction of tourist entrance fees to manage overcrowded destinations. This survey is for tourists only. VERA, an independent research centre, is not affiliated with the government. Data are used exclusively for research purposes and are completely anonymous.

Questionnaire:

1. **Sex***
   - Male
   - Female
   - Prefer not to answer
2. **Age***
   - Open-ended question.
3. **Place of Origin***
   - List of countries (not shown here for brevity).
4. **Level of Education***
   - Primary

- Secondary
- Higher/University
- Prefer not to answer

5. **Current Status***
   - Worker
   - Student
   - Working Student
   - Retired
   - Unemployed
   - Other (please specify)

6. **Based on the following definition, do you consider yourself a tourist?*** ***A tourist is someone who travels outside their usual environment for leisure, business, or other purposes, without earning income from the place visited, for less than a year***
   - Yes
   - No

7. **First time in Venice?***
   - Yes
   - No

8. **How long ago did you arrive in Venice?***
   - Less than 24 hours ago
   - 1 to 2 days ago
   - 3 or more days ago

9. **For how many days are you visiting Venice?***
   - Daily trip

- 2 days
- 3 days
- More options (not shown here for brevity).

10. **Between April and July 2024, Venice implemented an entry fee exclusively for daily travellers. Were you aware of this?***
    - Yes
    - No
11. **Consider the foreign tourists Luca, a 20-year-old student, Joe, a 70-year-old retired individual, and Anna, a 40-year-old worker. What do you think would be a reasonable daily entrance fee to Venice for them?***
    - Luca (student): Open-ended question.
    - Joe (retired individual): Open-ended question.
    - Anna (worker): Open-ended question.
12. **If you consider €0 to be the reasonable daily entrance fee for all of them, what is the main reason for this?**
    - I believe it is unfair to charge visitors extra fees.
    - I don't trust that the money will be used effectively.
    - Other (please specify).
13. **If an additional amount on top of the reasonable daily fee that would be applied to you could further help reduce overtourism in Venice, how much extra would you be willing to pay?**
    - Open-ended question.
14. **At what price would the daily entrance fee to Venice be so expensive that you would decide not to take the trip?***
    - Open-ended question.

15. **Which of the following best describes your household composition?***
    - Living alone
    - Couple, no children
    - More options (not shown here for brevity).
16. **What is your annual household income?***
    - Less than €19,999
    - €20,000 - €39,999
    - €40,000 - €69,999
    - €70,000 - €99,999
    - €100,000 - €149,999
    - €150,000 - €199,999
    - €200,000 or more
17. **How much trust do you have in the ability of the local government of your country of origin to implement effective policies?***
    - Scale from 0 (No trust at all) to 5 (Complete trust).
18. **Do you have any opinions on the entrance fee or managing overtourism?**
    - Open-ended question.

The pilot survey included additional questions, later removed, such as Likert scale statements on visit experience, the importance of sustainability for Venice and changes in experience compared to previous visits. Data were also collected on companions, type of accommodation, travel style, and daily budget as a proxy for income (€0–€49, €50–€99, €100–€149, €150–€199, €200–€249, and €250+). Except for the daily budget, these variables are excluded from Appendix 3: Baseline Statistics and the analysis in Appendix 4: Preliminary Results on the Pilot Survey.

Appendix 2: Definitive Survey

The following questionnaire was created using Qualtrics. The questions marked with an asterisk (*) were mandatory for respondents. A dagger (†) indicates that the order of the answer options was randomised during display.

Description:

This survey aims to determine how much you would be willing to pay as a daily entrance fee to visit Venice. The fee applies to visitors 18 years old and above, for each day of their stay, regardless of whether they spend the night in the city. This survey is intended exclusively for visitors to Venice. VERA is a research centre at Ca' Foscari University, not affiliated with any government entities. All data collected will be used exclusively for research purposes and will remain completely anonymous. Approximate time needed: 3-5 minutes.

Questionnaire:

1. **Gender***
   - Male
   - Female
   - Prefer not to answer
2. **Age***
   - Open-ended question.
3. **Place of Origin***
   - List of countries (not shown here for brevity).
4. **Level of Education***

- Primary
- Secondary
- Higher/University
- Prefer not to say

5. **Status***
   - Worker
   - Student
   - Working Student
   - Unemployed
   - Retired
   - Other (please specify)
6. **First time in Venice?***
   - Yes
   - No
7. **How long ago did you arrive in Venice?***
   - Less than 24 hours ago
   - 1 to 2 days ago
   - 3 or more days ago
8. **For how many days are you visiting Venice?***
   - Daily trip
   - 2 days
   - 3 days
   - More options (not shown here for brevity).
9. **Where are you staying overnight during your visit?***
   - Venice historical centre / Islands

- Mestre
- Other (please specify)

10. **What is the main purpose of your trip to Venice?*†**
    - Vacation
    - Business
    - Visit friends or family
    - Education
    - Other (please specify)

11. **Based on the following definition, do you consider yourself a visitor?***

    A visitor is someone who travels outside their usual environment for leisure, business, education, or visiting friends or family, regardless of whether their stay lasts an hour, a week, or a month.
    - Yes
    - No

12. **Is a daily fee you would pay to enter Venice?***

    Please note that this fee applies per day: for example, if you stay two days, the total cost will be € 2 × .
    - Yes
    - No

13. **What is the maximum price above / below that you would be willing to pay as a daily entrance fee, beyond which you would decide not to visit Venice?***

    Please note that this fee applies per day. Enter a number (€).
    - Open-ended question.

14a. **Follow-up Question (Yes): What is the main reason you are willing to pay an entrance fee to visit Venice?*†**

- I am willing to pay if it helps improve the quality of life for Venice's residents.
- I feel it's fair for tourists to help preserve Venice's heritage for its historical value.
- Including an entrance fee in my trip budget is affordable for me.
- I would pay because it would make my visit more enjoyable by reducing overcrowding.
- Other (please specify)

14b. **Follow-up Question (No): What is the main reason you are not willing to pay an entrance fee to visit Venice?*†**

- I believe visiting Venice should be accessible to everyone, regardless of income.
- I would rather spend my budget on other activities during my visit to Venice.
- I believe that entrance fees are not an effective way to address overtourism.
- I am already supporting the local economy by spending here, so I don't think an additional fee is fair.
- Other (please specify)

15. **Between April and July 2024, Venice implemented an entry fee exclusively for daily travellers. Were you aware of this?***

- Yes
- No

16. **What is your annual household income?***

- Less than €19,999
- €20,000 - €39,999
- €40,000 - €69,999

- €70,000 - €99,999
- €100,000 - €149,999
- €150,000 - €199,999
- €200,000 or more

17. **How informed are you about the problems caused by mass tourism on the sustainability of cities like Venice?***
    - Scale from 0 (Not informed at all) to 5 (Very well informed).
18. **Do you have any opinions on the entrance fee or managing over-tourism?**
    - Open-ended question.

Manifests:

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Appendix 3: Baseline Statistics

Table 1: Baseline Statistics of Respondents (Pilot and Definitive Surveys)

	Frequencies (%)		
Variable	**Pilot**	**Definitive**	**Combined**
Gender			
Male	109 (50.5%)	79 (45%)	188 (48%)
Female	98 (45.4%)	94 (53.4%)	192 (49%)
Other	9 (4.1%)	3 (1.6%)	12 (3%)
Total	216 (100%)	176 (100%)	392 (100%)
Age			
Average (years)	40	41	40
Median (years)	36	36	36
SD (years)	15	16	15
Total	216 (100%)	176 (100%)	392 (100%)
Nationality			
Italians	33 (15.2%)	54 (30.8%)	87 (22.2%)
Non-Italian Europeans	117 (54.2%)	77 (43.6%)	194 (49.5%)
Non-Europeans	66 (30.6%)	45 (25.6%)	111 (28.3%)
Total	216 (100%)	176 (100%)	392 (100%)

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	Frequencies (%)		
Variable	**Pilot**	**Definitive**	**Combined**
Education			
Primary	1 (0.5%)	-	-
Secondary	27 (12.5%)	13 (7.4%)	40 (10.2%)
Higher / University	186 (86%)	159 (90.3%)	345 (88.3%)
Prefer not to say	2 (1%)	4 (2.3%)	6 (1.5%)
Total	216 (100%)	176 (100%)	391 (99.8%)
Status			
Worker	138 (64%)	111 (63%)	249 (63.5%)
Student	27 (12.5%)	20 (11.4%)	47 (12%)
Working Student	14 (6.5%)	18 (10.2%)	32 (8.2%)
Retired	21 (9.7%)	22 (12.5%)	43 (11%)
Unemployed	16 (7.3%)	5 (2.9%)	21 (5.3%)
Total	216 (100%)	176 (100%)	392 (100%)
First Time in Venice			
Yes	88 (40.7%)	51 (29%)	139 (35.5%)
No	128 (59.3%)	125 (71%)	253 (64.5%)
Total	216 (100%)	176 (100%)	392 (100%)

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Table 1 – continued from previous page

	Frequencies (%)		
Variable	**Pilot**	**Definitive**	**Combined**
Length of Stay			
Daily trip	56 (26%)	29 (16.5%)	85 (21.7%)
2 days	52 (24%)	14 (8%)	66 (16.8%)
3 days	24 (11.1%)	44 (25%)	68 (17.4%)
4 days	20 (9.3%)	29 (16.5%)	49 (12.5%)
5 days	20 (9.3%)	19 (10.8%)	39 (10%)
6 days	19 (8.8%)	6 (3.4%)	25 (6.4%)
7 days	14 (6.5%)	20 (11.3%)	34 (8.7%)
More than a week	11 (5%)	15 (8.5%)	26 (6.5%)
Total	216 (100%)	176 (100%)	392 (100%)
Length of Arrival			
Less than 24 hours ago	45 (43.3%)	45 (25.6%)	90 (32.1%)
1 to 2 days ago	38 (36.5%)	42 (23.9%)	80 (28.6%)
3 or more days ago	21 (20.2%)	89 (50.5%)	110 (39.3%)
Total	104 (48.1%)	176 (100%)	280 (71.4%)
Tourist			
Yes	104 (100%)	166 (94.3%)	270 (96.4%)
No	0 (0%)	10 (5.7%)	10 (3.6%)
Total	104 (48.1%)	176 (100%)	280 (71.4%)
2024 EF Awareness			
Yes	70 (57.4%)	116 (65.9%)	186 (62.4%)
No	52 (42.6%)	60 (34.1%)	112 (37.6%)
Total	122 (56.5%)	176 (100%)	298 (76%)

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	Frequencies (%)		
Variable	**Pilot**	**Definitive**	**Combined**
Income			
Less than €19,999	17 (15.7%)	24 (13.7%)	41 (15.6%)
€20,000 - €39,999	21 (19.5%)	38 (21.7%)	59 (22%)
€40,000 - €69,999	22 (20.4%)	32 (18.2%)	54 (20.2%)
€70,000 - €99,999	18 (16.7%)	27 (15.3%)	45 (16.8%)
€100,000 - €149,999	12 (11.1%)	14 (7.9%)	26 (9.7%)
€150,000 - €199,999	9 (8.3%)	11 (6.2%)	20 (7.5%)
€200,000 or more	9 (8.3%)	13 (7.4%)	22 (8.2%)
Missing data	-	17 (9.6%)	-
Total	108 (50%)	176 (100%)	267 (68.1%)
OE Question Overtourism			
Response	108 (50%)	76 (43.2%)	184 (47%)
No Response	108 (50%)	100 (56.8%)	208 (53%)
Total	216 (100%)	176 (100%)	392 (100%)
Place of Overnight Stay (including day-trippers)			
Venice historical centre / Islands	-	118 (67%)	-
Mestre	-	27 (15.4%)	-
Other	-	31 (17.6%)	-
Total	0 (0%)	176 (100%)	176 (44.9%)

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	Frequencies (%)		
Variable	**Pilot**	**Definitive**	**Combined**
Purpose of the Trip			
Vacation	-	121 (68.8%)	-
Education	-	15 (8.5%)	-
Visit friends or family	-	27 (15.3%)	-
Business	-	7 (4%)	-
Other	-	6 (3.4%)	-
Total	0 (0%)	176 (100%)	176 (44.9%)
Self-reported Awareness of Overtourism in CHS			
1 (Not informed at all)	-	13 (7.4%)	-
2	-	21 (12%)	-
3	-	56 (31.8%)	-
4	-	40 (22.7%)	-
5 (Very well informed)	-	29 (16.5%)	-
Missing data	-	17 (9.6%)	-
Total	0 (0%)	176 (100%)	159 (40.6%)
Daily Budget			
€0–€49	24 (23%)	-	-
€50–€99	38 (36.6%)	-	-
€100–€149	24 (23%)	-	-
€150–€199	5 (4.8%)	-	-
€200–€249	5 (4.8%)	-	-
€250+	8 (7.8%)	-	-
Total	104 (48.1%)	0 (0%)	104 (26.5%)
Political Trust			
1 (Low Trust)	39 (18%)	-	-
2	41 (19%)	-	-
3	83 (38.5%)	-	-

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	Frequencies (%)		
Variable	**Pilot**	**Definitive**	**Combined**
4	42 (19.5%)	-	-
5 (High Trust)	11 (5%)	-	-
Total	216 (100%)	0 (0%)	216 (55.1%)

Notes:

1. All numbers are rounded to the first decimal approximation. Age values are approximated to the nearest whole number.
2. The average stay duration is 3.39 days for the pilot Survey, 4.12 days for the Definitive Survey, and 3.75 days for the combined data. These averages were calculated as weighted means, treating the response 'More than a week' as 10 days of visit.
3. The average daily expenditure is estimated at approximately €71 for Italian tourists and €112 for foreign tourists. These averages were calculated using the value in the third percentile of each expense range (e.g., €50–€99 as €75) and treating the response 'More than €250' as a daily expenses of €300.
4. The following questions were included in both the pilot and final surveys, but appeared in a different order: First time in Venice, How long ago did you arrive in Venice, How many days are you visiting Venice, Awareness of the 2024 entry fee.
5. The definition of tourist/visitor changed between the pilot and final Surveys; however, the responses were aggregated for statistical analysis. In Chapter 2.3.1, when evaluating sample representativeness, 112 respondents who were not asked whether they identified as tourists (due to the question being absent from the survey at the time) were assumed to be tourists.
6. For the status variable, responses originally classified as 'Other' were reallocated to predefined categories (e.g., 'Freelancer' or 'Teacher' classified under 'Worker').
7. Although the Income and the Self-reported Awareness of Overtourism in CHS questions were mandatory, 17 responses were missing in the Final Survey, likely due to technical issues during response recording in Qualtrics. These missing responses are not included in the calculation of the total frequency for the combined dataset.
8. Outliers are included in all statistics.

Appendix 4: Preliminary Results on the Pilot Survey

4.1. Statistical Analysis

The following results are based on data from Appendix 1: Pilot Survey, with baseline statistics presented in Appendix 3: Baseline Statistics. Given the changes made to the questions during the pilot phase, these results should be interpreted with caution. In fact, the primary aim of this analysis is to validate the hypothesis of non-normality in the WTP distribution and to determine optimal bid levels for the Definitive Survey (see Chapter 2.4.1).

Table 2: Summary Statistics of Pilot Survey WTP Responses

WTP Type	Mean	Median	Mode	Second Mode	SD
Fair WTP	€7.53	€5.00	€0.00	€10.00	€8.03
Marginal WTP	€6.20	€5.00	€0.00	€5.00	€6.84
Maximum WTP	€33.76	€20.00	€20.00	€10.00	€39.96

WTP Type	Zero-WTP (%)	Total Responses
Fair WTP	23.00%	208
Marginal WTP	26.40%	174
Maximum WTP	3.30%	211

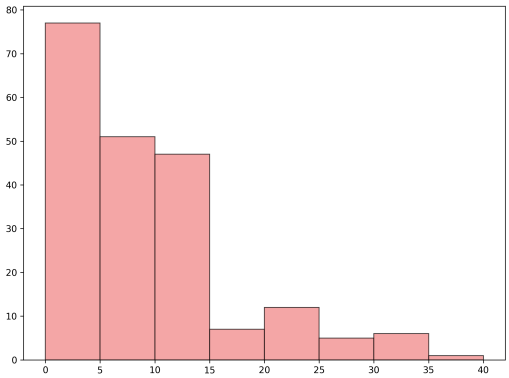
Notes:

1. The fair WTP corresponds to Question 11, the marginal WTP to Question 13, and the maximum WTP to Question 14 of Appendix 1: Pilot Survey. Importantly, 110 (51%) of the fair WTP responses were obtained through the OE question: "*What would be a reasonable daily entrance fee for visiting Venice?*", while the remaining responses came from Question 11 on the worker-specific question.

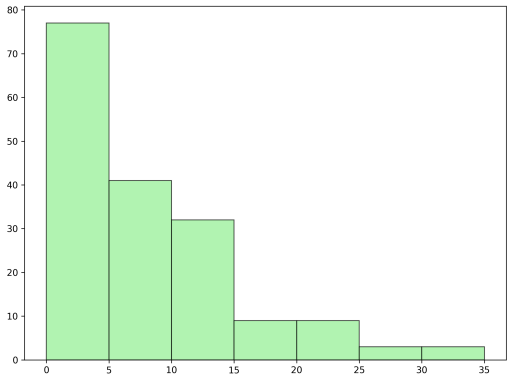
2. Outliers were removed using the adjusted boxplot method for skewed distributions by Hubert et al., 2008. This resulted in the exclusion of 7 responses (3.2% of the total) from the fair WTP, 10 (5.4%) from the marginal WTP, and 3 (1.4%) from the maximum WTP.

3. The zero-WTP share represents the proportion of respondents who reported a willingness to pay of €0.

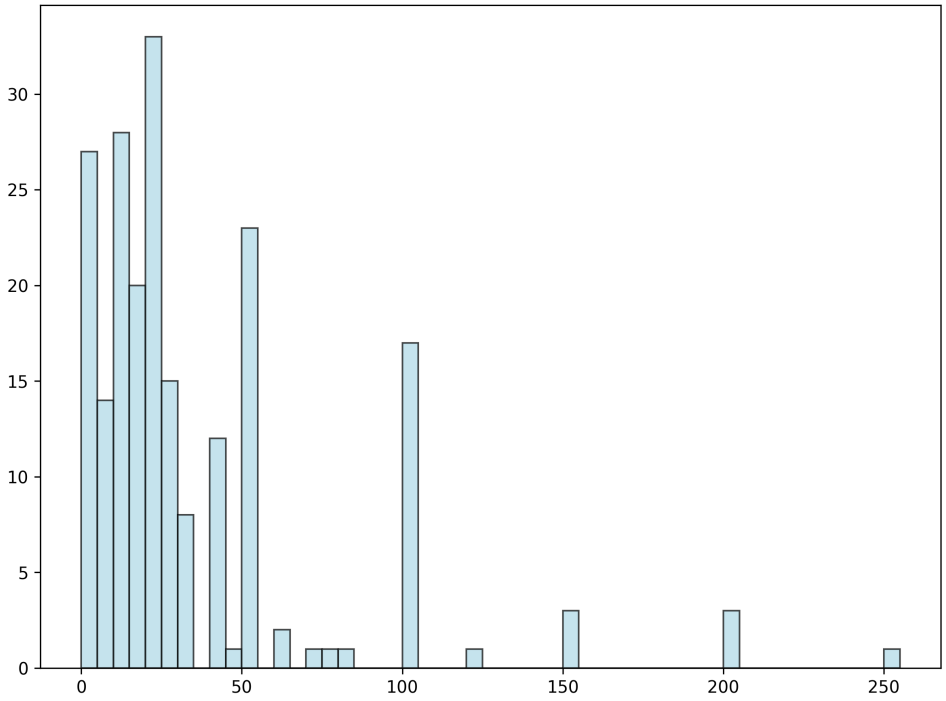
4. The lower response rate for marginal WTP reflects its status as the only non-mandatory question.



Fair WTP Distribution



Marginal WTP Distribution



Maximum WTP Distribution

Figure 2: Histograms of Fair, Marginal and Maximum WTP distributions. X-axis: WTP values expressed in €. Y-axis: frequency.

4.2. Regression Results

Table 3 presents the regression results for the covariates available for most respondents regarding Question 11 of the Pilot Survey, which refers to the reasonable daily entrance fee associated with the Worker profile. Of these responses, 110 (51%) were obtained through the open-ended question: "*What would be a reasonable daily entrance fee for visiting Venice?*". Similarly, Table 4 displays the regression results for the same covariates available to most respondents with respect to Question 14 (see Appendix 1: Pilot Survey). Briefly commenting the results, for the Fair WTP (reasonable daily entrance fee), the covariates that are robust across both models (OLS and Tobit) are age and Italian nationality. Age is positively associated with WTP, increasing by €0.13–€0.16 per year (1% significance in OLS, 5% in Tobit), while being Italian reduces WTP by €3.83–€4.92 (5% significance in OLS, 10% in Tobit). For the Maximum WTP, the covariates significant across both models are Italian nationality and daily tripper status. Italians show a strong negative effect, reducing WTP by €19.28–€22.10 (10% in OLS, 5% in Tobit), while the daily trips show a significant decrease of €15.21–€16.38 (5% in both models). Given that the mean Fair WTP is €7.53, Italians are willing to pay 51%–60% less, while for the Maximum WTP (€33.76), Italians pay 57%–65% less and daily trippers 45%–48% less than the average respondent.

Table 3: Regression Results for Fair WTP

OLS Regression					
Variable	$\hat{\hat{\tau}}$ ($\hat{\hat{\sigma}}$)	**P**$>\|t\|$	**Variable**	$\hat{\hat{\tau}}$ ($\hat{\hat{\sigma}}$)	**P**$>\|t\|$
Constant	5.0296 (2.7151)	0.0654 *	Italian	-3.8363 (1.5513)	0.0142 **
Gender	-2.3759 (1.6798)	0.1587	Non-Italian EU	2.2046 (1.6525)	0.1837
Age	0.1358 (0.0515)	0.0090 ***	Status	0.9672 (1.6714)	0.5634
First-Time	-1.3809 (1.7015)	0.4180	Daily Tripper	-2.9904 (1.3865)	0.0322 **
Tobit Regression					
Variable	$\hat{\hat{\tau}}$ ($\hat{\hat{\sigma}}$)	**P**$>\|z\|$	**Variable**	$\hat{\hat{\tau}}$ ($\hat{\hat{\sigma}}$)	**P**$>\|z\|$
Constant	2.5747 (3.6347)	0.4788	Italian	-4.9227 (2.6421)	0.0624 *
Gender	-3.5408 (2.1108)	0.0935 *	Non-Italian EU	3.1329 (2.1336)	0.1419
Age	0.1612 (0.0652)	0.0134 **	Status	0.6899 (2.0187)	0.7325
First-Time	-1.8098 (2.1314)	0.3958	Daily Tripper	-3.2073 (2.0104)	0.1106

Note: The dependent variable (*Fair WTP*) represents the reasonable daily entrance fee in euros. The OLS regression includes 214 observations and uses robust standard errors (HC1). The adjusted R^2 is 0.078, with an F-statistic of 5.41 (p-value < 0.001). The Tobit model also includes 214 observations, with a left-censoring threshold and a sigma estimate of 13.87 (1.94). Statistical significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Regression Results for Maximum WTP

OLS Regression					
Variable	$\hat{\tilde{\tau}}$ ($\hat{\tilde{\sigma}}$)	**P**$>|t|$	**Variable**	$\hat{\tilde{\tau}}$ ($\hat{\tilde{\sigma}}$)	**P**$>|t|$
Constant	46.0762 (20.0975)	0.0229 **	Italian	-19.2785 (9.9149)	0.0532 *
Gender	-9.0558 (9.0095)	0.3160	Non-Italian EU	3.5590 (9.7486)	0.7154
Age	0.2151 (0.2982)	0.4715	Status	-1.2141 (12.2304)	0.9210
First-Time	-9.6745 (8.0148)	0.2288	Daily Tripper	-16.3798 (7.2484)	0.0249 **
Tobit Regression					
Variable	$\hat{\tilde{\tau}}$ ($\hat{\tilde{\sigma}}$)	**P**$>|z|$	**Variable**	$\hat{\tilde{\tau}}$ ($\hat{\tilde{\sigma}}$)	**P**$>|z|$
Constant	47.5478 (20.0682)	0.0178 **	Italian	-22.1051 (10.6507)	0.0379 **
Gender	-10.0365 (9.0488)	0.2674	Non-Italian EU	2.7977 (9.7974)	0.7752
Age	0.1905 (0.3036)	0.5303	Status	-2.2618 (12.2288)	0.8533
First-Time	-9.7854 (8.0627)	0.2249	Daily Tripper	-15.2066 (7.3255)	0.0379 **

Note: The dependent variable (*Maximum WTP*) represents the maximum willingness to pay in euros. The OLS regression includes 214 observations and applies robust standard errors (HC1), with an adjusted R^2 of 0.017 and an F-statistic of 2.67 (p-value = 0.011). The Tobit model includes 214 observations, with a left-censoring threshold and a sigma estimate of 64.55 (11.68). Statistical significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix 5: List of Independent Variables

Table 5: List of Independent Variables

Variables	**Definitions**	**Sample (%)**
Gender	1 = being a male; 0 = otherwise	41.8%
Age	Continuous variable	-
Nationality: Italian	1 = being Italian; 0 = otherwise	30.7%
Nationality: Non-Italian Europeans	1 = being European but non-Italian; 0 = otherwise (reference category)	45.7%
Annual Household Income	interval variable: the mid-point of each income category is considered	-
Employment Status	1 = being a worker; 0 = otherwise	62.7%
Purpose of the trip: Vacation	1 = vacation as reason to visit Venice; 0 = education, business, or visiting friends/family as reason to visit Venice	77%
Level of Information	1 = high-level of information; 0 = low-level of information	57.5%

Notes:

1. High- and low-informed individuals are categorised based on responses to the Likert scale from Question 17: scores of 4 and 5 are high-informed, 1 and 2 are low-informed. For "Moderately informed" (score 3), the variable 'Length of arrival' was used: respondents who arrived 3+ days before the survey are highly informed (17% of the total sample), otherwise they are low informed (21%). This aligns with the information bias discussed in Chapters 1.2.3 and 2.2.

2. The annual household income in the category 'More than €200,000' is approximated as €300,000.

3. All numbers are rounded to the first decimal approximation.

Appendix 6: Additional Results

6.1. The Dichotomous Choice Question (Chapter 3.1)

Table 6: Logit Regression Results for Excluding Protest Responses

Variable	$\hat{\hat{\gamma}}$ ($\hat{\hat{\sigma}}$)	**P**$>\|z\|$	**Variable**	$\hat{\hat{\gamma}}$ ($\hat{\hat{\sigma}}$)	**P**$>\|z\|$
Constant	-1.309 (0.956)	0.171	Italian	0.093 (0.637)	0.884
Bid	-0.088 (0.020)	0.000 ***	Non-Italian EU	0.178 (0.572)	0.756
Age	0.023 (0.015)	0.133	Income	0.008 (0.003)	0.012 **
Gender	-0.785 (0.485)	0.106	Vacation Trip	1.303 (0.611)	0.033 **
Information	0.354 (0.475)	0.456			

Note: The dependent variable (Y) represents the binary response to the bid (yes/no). The model uses Maximum Likelihood Estimation (MLE). Values are approximated to three decimal places. Log-Likelihood = -62.792, LL-Null = -83.604, Pseudo R-squared = 0.249, LLR p-value = 3.851×10^{-6}, Observations = 137. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.2. The Open-ended Question (Chapter 3.2)

Table 7: OLS Regression Results (Full Dataset)

Variable	$\hat{\tilde{\gamma}}$ ($\hat{\tilde{\sigma}}$)	**P**$>|t|$	**Variable**	$\hat{\tilde{\gamma}}$ ($\hat{\tilde{\sigma}}$)	**P**$>|t|$
Constant	-3.814 (4.869)	0.434	Italian	3.537 (3.632)	0.331
Gender	-3.351 (2.652)	0.208	Non-Italian EU	2.419 (3.209)	0.452
Age	0.235 (0.087)	0.008 ***	Income	0.034 (0.019)	0.071 *
Status	1.854 (2.948)	0.530	Vacation Trip	5.852 (3.048)	0.057 *
Information	-2.658 (2.603)	0.309			

Note: The dependent variable (WTP) represents the willingness to pay. Values are approximated to three decimal places. Observations = 153. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Adjusted $R^2 = 0.100$; F-statistic = 3.119 (P-value = 0.0028); RMSE = 14.908; MAE = 10.619; Theil's U1 = 0.423.

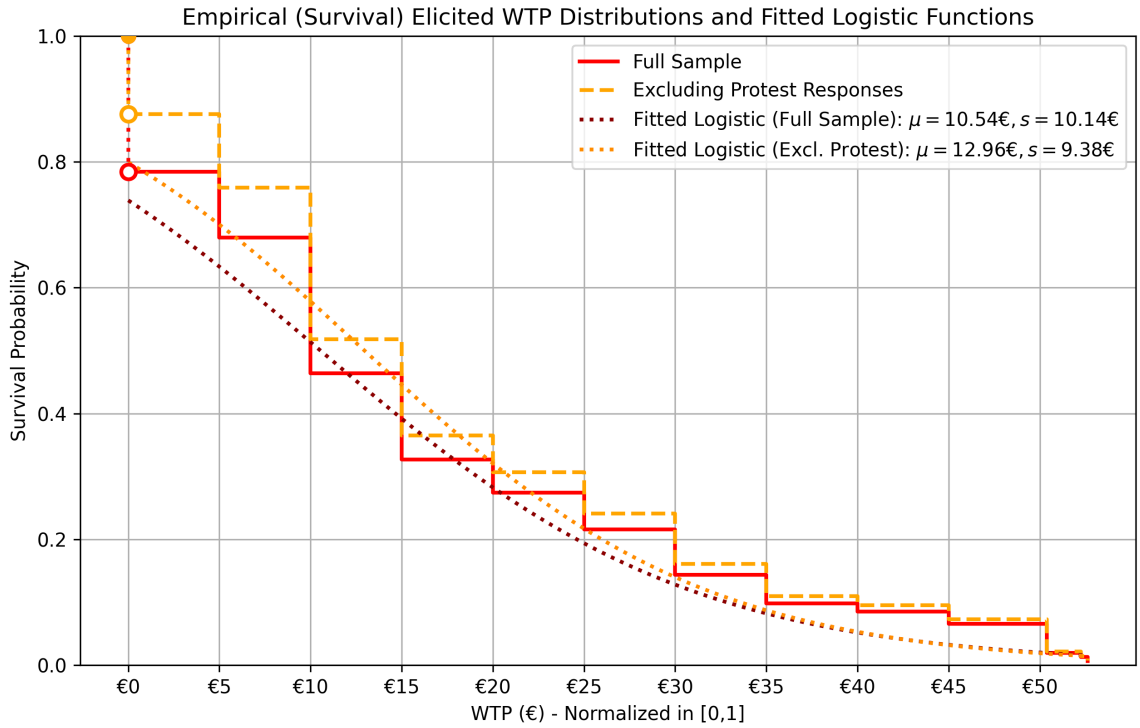


Figure 3: Cumulative (Survival) WTPs Distributions for both samples. Note: WTP step-functions are fitted with logistic models using a mapped bid scale, where bins up to €50 were scaled differently (covering 95% of the interval [0,1]) while values above €50 (2.6% of total sample) were compressed. KS tests confirm no significant differences between empirical and fitted distributions ($p > 0.27$) and between the two fitted functions ($p = 0.97$). The two functions are computed for datasets including and excluding protest responses. Plotting methodology described in Figure 3.2

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6.3. Estimating the Optimal Entrance Fee (Chapter 3.3)

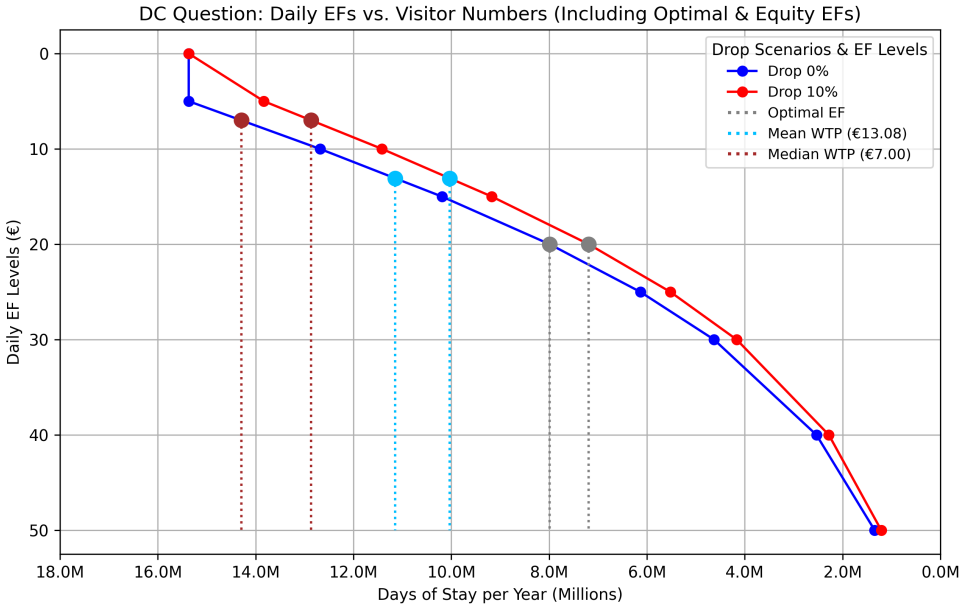

Figure 4: Impact of entrance fee levels on visitor numbers under the DC-based demand function. The two curves represent the assumed drop scenarios at €5: 0% (blue) and 10% (red). Vertical dotted lines indicate the efficiency-based EF (€20, gray) and the equity-based EFs at mean (€13.08, blue) and median (€7.00, brown) WTP.

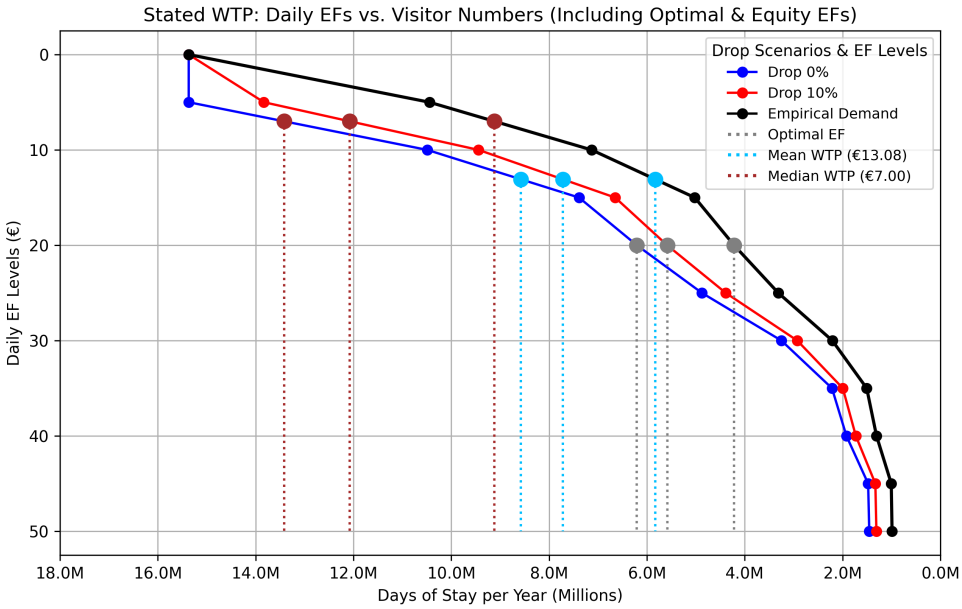

Figure 5: Impact of entrance fee levels on visitor numbers under the OE-based demand function. The curves represent: (i) Drop 0% (blue), (ii) Drop 10% (red), and (iii) Empirical Demand (black). Vertical dotted lines indicate the efficiency-based EF (€20, gray) and the equity-based EFs at mean (€13.08, blue) and median (€7.00, brown).

Table 8: Visitor Numbers and Revenues under Different EF Levels for OE and DC Demand Functions. Total 2023 Days of Stay (Visitor Numbers) are shown for the two drop scenarios (0% and 10%), while empirical values are available only for OE-based demand.

Demand Function		**Efficiency-Based EF (€20)**			**Equity-Based EF (Mean, €13.08)**			**Equity-Based EF (Median, €7.00)**		
		Drop 0%	**Drop 10%**	**Empirical**	**Drop 0%**	**Drop 10%**	**Empirical**	**Drop 0%**	**Drop 10%**	**Empirical**
DC Question	Visitors (M)	7.99	7.19	-	11.15	10.03	-	14.30	12.87	-
	Revenue (M €)	159.77	143.79	-	145.82	131.24	-	100.07	90.06	-
OE Question	Visitors (M)	6.21	5.59	4.22	8.58	7.72	5.83	13.42	12.08	9.12
	Revenue (M €)	124.13	111.71	84.37	112.23	101.01	76.28	93.92	84.53	63.84
% Difference (DC vs. OE)		+28.7%	+28.6%	-	+29.9%	+30.0%	-	+6.5%	+6.5%	-

6.4. The Results of the Combined Survey

Table 9 includes the findings that combine question 13 (Definitive Survey) with question 14 (Pilot Survey, which asks the WTP over which respondents would no longer travel to Venice), while Table 10 includes findings combining question 13 (Definitive Survey) with question 11 (Pilot Survey, referring to the reasonable fee for the worker profile), which captures a fair EF price. In particular, the control variables differ from other models as they reflect shared covariates between surveys. Importantly, different elicitation methods for the dependent variables make these analyses worth taking with caution. Briefly commenting on the statistically significant variables in both models, for the combined WTP of the OE question of the Definitive Survey and the WTP over the reasonable daily EF, age is positively correlated with the dependent variable, with each additional year increasing the WTP by €0.12–€0.14 (OLS/Tobit, 5%). Instead, for the dependent variable of the OE follow-up question (Definitive Survey) and the maximum WTP of the Pilot Survey, being Italian significantly reduces WTP by €15.42–€16.75 (OLS/Tobit, 5%).

Table 9: Regression Results (Combined Dataset): Maximum WTP

OLS Regression					
Variable	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\sigma}}}$)	**P**$>\|z\|$	**Variable**	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\gamma}}}$)	**P**$>\|z\|$
Constant	26.891 (11.579)	0.020 **	Italian	-15.423 (6.173)	0.013 **
Gender	-3.826 (5.909)	0.518	Non-Italian EU	2.286 (6.457)	0.723
Age	0.186 (0.175)	0.290	Status	2.238 (7.427)	0.764
First-Time	-5.013 (5.139)	0.330	Daily Tripper	-6.239 (4.767)	0.191
Tobit Regression					
Variable	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\sigma}}}$)	**P**$>\|z\|$	**Variable**	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\sigma}}}$)	**P**$>\|z\|$
Constant	20.467 (12.470)	0.101	Italian	-16.746 (7.253)	0.021 **
Gender	-6.690 (6.352)	0.292	Non-Italian EU	3.352 (7.170)	0.640
Age	0.263 (0.192)	0.171	Status	1.425 (7.854)	0.856
First-Time	-5.003 (5.758)	0.385	Daily Tripper	-2.160 (5.124)	0.673

Note: The dependent variable (WTP) represents willingness to pay. The OLS regression uses robust standard errors (HC1) and includes 367 observations, with an R^2 of 0.033. Predictive statistics: mean error = -3.652e-14, RMSE = 51.333, MAE = 26.113, Theil's U1 = 0.5719. The Tobit regression uses maximum likelihood estimation, with left-censored observations = 40 and no right-censoring. Predictive statistics: mean error = 4.058, RMSE = 51.55, MAE = 24.603, Theil's U1 = 0.59736. Statistical significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Regression Results (Combined Dataset): Fair WTP

OLS Regression					
Variable	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\sigma}}}$)	**P**$>\|t\|$	**Variable**	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\sigma}}}$)	**P**$>\|t\|$
Constant	5.171 (3.154)	0.102	Italian	2.185 (2.414)	0.366
Gender	-2.713 (1.523)	0.076 *	Non-Italian EU	0.526 (1.799)	0.770
Age	0.117 (0.052)	0.026 **	Status	2.899 (1.624)	0.075 *
First-Time	0.053 (1.737)	0.976	Daily Tripper	-2.180 (1.877)	0.246
Tobit Regression					
Variable	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\sigma}}}$)	**P**$>\|z\|$	**Variable**	$\hat{\hat{\boldsymbol{\beta}}}$ ($\hat{\hat{\boldsymbol{\sigma}}}$)	**P**$>\|z\|$
Constant	1.788 (3.898)	0.646	Italian	2.971 (2.962)	0.315
Gender	-4.084 (1.870)	0.029 **	Non-Italian EU	1.325 (2.223)	0.551
Age	0.140 (0.064)	0.028 **	Status	2.839 (1.985)	0.153
First-Time	-0.117 (2.134)	0.956	Daily Tripper	-1.051 (2.289)	0.646

Note: The dependent variable (WTP) represents willingness to pay. The OLS regression uses robust standard errors (HC1) and includes 365 observations, with an R^2 of 0.0347. Predictive statistics: mean error = 3.65×10^{-17}, RMSE = 13.914, MAE = 9.4646, Theil's U1 = 0.4801. The Tobit regression uses maximum likelihood estimation, with left-censored observations = 80 and no right-censoring. Predictive statistics: mean error = 2.3856, RMSE = 14.148, MAE = 8.9529, Theil's U1 = 0.5274. Statistical significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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