Analysing determinants of travellers' expenditures for food and beverage services at airports

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Abstract

By applying the Hurdle-Double model to 2,461 passengers at the Olbia-Costa Smeralda Airport (Sardinia, Italy), this study analyses whether sociodemographics, travel-related variables, flight-related variables and pre-intention to buy significantly influence passengers' expenditures for food and beverages. Our findings reveal that the 'decision to buy' is significantly influenced by sociodemographics (i.e. income) and flight-related variables (i.e. waiting time prior to embarking), while expenditure levels are significantly influenced by age, travel-related variables (i.e. type of accommodation) and pre-intention to buy. Managerial implications are discussed and suggestions for further research are given.

Keyword: Airport management, food and beverage services, expenditure behaviour, sociodemographics, travel-related variables, flight-related variables.

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Introduction

Since the 1990s, airports have been transforming themselves from simply functioning as a public transportation locus to complex, multi-purpose entities that deliver a wide array of services (Lu, 2014). As a result, their profits increasingly depend on non-aeronautical and commercial revenue (Graham, 2014; Rhoades *et al*., 2000; Yokomi *et al*., 2017). This occurred for several reasons. First, commercialisation and privatisation within the industry have given airports the freedom to diversify their business into new areas and to develop commercial policies (Hooper, 2002; Torres *et al*., 2005). Second, airline companies, especially low-cost carriers, have forced airports to practice cost-cutting and efficiency-saving measures to control the level of aeronautical fees (Castillo-Manzano, 2010). Third, sophisticated and experienced 'frequent-flyers' have many demanding needs and wants. Fourth, several under-used airports around the world need new ways to generate revenues (Francis *et al*., 2004).

All these pressures, exerted by regulatory bodies, airlines and passenger demands, have encouraged airports to greatly focus on commercial facilities, to increase revenues and to please their customers (Graham, 2014). This explains why in recent years airport managements attempted to become more active in planning and implementing marketing strategies that increase airport travellers' overall spending (Han *et al*., 2012)

According to ACI (2015), non-aeronautical revenue represented over 40% of airports' global profits. In 2010, non-aviation-related revenues accounted for $35 billion, of which $10 billion was generated by food and beverage services (hereafter, F&B) (The Moodie Report, 2014). Consuming F&B is one of the most frequent non-aeronautical activities that passengers enjoy at airports (Castillo-Manzano and López-Valpuesta, 2013; Echevarne, 2008). Lu (2014) reported that 40.7% of airport travellers buy food and beverages. By 2040, total annual airport passengers may reach 22.2 billion which likely will increase airports' F&B and retail services' revenues (ACI, 2017).

According to the existing literature, different types of passengers have different preferences and spending behaviours (Castillo-Manzano, 2010). Hence, it is pivotal for airports and their retailers to strengthen their knowledge about the main determinants of airport travellers' spending patterns (Crawford and Melewar, 2003; Doong *et al*., 2012). This would provide useful information for planning and implementing tailored retailing strategies, based on the characteristics of airports' target consumers.

To date, very little research has analysed passengers' expenditure behaviour at airports (Castillo-Manzano, 2010; Castillo-Manzano *et al*., 2018;

Torres *et al.*, 2005), and even less has been conducted in the specific context of F&B services (Torres *et al.*, 2005; Castillo-Manzano *et al.*, 2018). Furthermore, the existing studies devoted to analysing the influence of socio-demographics and travel-related variables provide both the academia and the industry with findings that are somehow contradictory. In addition, no published paper has investigated how check-in modes and the pre-intention to buy might influence passengers' expenditure behaviour. Hence, research is needed to deepen our understanding about this topic considering different airports or geographical areas (Lin and Chen, 2013) and a wider array of potential determinants of passengers' expenditures (Castillo-Manzano *et al.*, 2018). This study was conducted at Olbia-Costa Smeralda Airport (Italy) on a sample of 2,461 passengers. It aims to investigate the influence that socio-demographics (i.e. gender, age, income and nationality), travel-related variables (type of accommodation and frequency of travelling), flight-related determinants (check-in modes, waiting times prior to boarding) and pre-intention to buy on passengers' spending behaviour (decision to buy and amounts to be spent). To achieve this aim, a Double-Hurdle model was applied. A generalisation of the Tobit model (Gragg, 1971), this model is the most suitable when dealing with two separate, subsequent and independent decisions, such as 'buying decisions' and 'expenditure levels,' as in this study.

1. Literature Review

In the existing literature, two main perspectives have been adopted to analyse the main determinants of economic expenditure in the tourism and hospitality industry: either macro-based (aggregated) and micro-based (individual) (Marroccu *et al.*, 2015).

These two perspectives also predominantly characterise the body of knowledge devoted to investigating factors that influence airports' commercial revenues (Castillo-Manzano *et al.*, 2018).

The macro-based studies show, for example, that non-aviation related revenues are significantly influenced by the specific type of airport (i.e. hub airport versus regional airport) (Castillo-Manzano *et al.*, 2018), the commercial area space, the number of domestic and international passengers, the proportion of business travellers, the number of flights and the type of airline company predominantly dominating the airport business (i.e. low-cost versus traditional carriers) (Appold and Kasarda, 2006; Fuerst *et al.*, 2011; Volkova and Müller, 2012). Other studies found that shopping behaviour also is significantly influenced by commercial variety, marketing strategies adopted by

airport retailers and airports' commercial environments (Castillo-Manzano *et al.*, 2018; Wattanacharoensil *et al.*, 2017).

The micro-based studies, show that expenditure behaviour at airports is influenced by several sociodemographic factors (e.g. age and nationality), number of travellers, travel frequency and flight-related variables (e.g. waiting time prior to embarking) (Castillo-Manzano, 2010; Geuens *et al.*, 2004; Lin and Chen, 2013). However, existing studies generally do not emphasise F&B or offer contradictory results.

When sociodemographic variables are considered, Geuens *et al.* (2004) found that men are more likely to be apathetic or mood shoppers, while women tend to shop more often at airports. Other studies showed that younger airport travellers (less than age 26) spend more in souvenir shops and cafés compared to older travellers (Perng *et al.*, 2010). Other studies (e.g. Castillo-Manzano, 2010) reported that age, employment status and education did not influence expenditure behaviour at airports. According to Graham, 2014, nationality also significantly influences airport spending behaviour. For example, Castillo-Manzano (2010) found that domestic passengers spend less than international passengers.

When travel-related characteristics are considered, leisure travellers, compared to business travellers, are more likely to make purchases at airports, given the former's greater sense of excitement would feel when travelling by air (Bork, 2006). This supports the general idea that leisure travellers spend more at airports than business travellers (Torres *et al.*, 2005). As one possible explanation, business travellers generally travel with fewer companions (Torres *et al.*, 2005). At the same time, business travellers who sometimes spend more than other types of travellers may have a higher spending budget, largely covered by their employers (Graham, 2014). According to Castillo-Manzano (2010), while passengers travelling with children are more likely to make purchases at airports, their average expenditures are lower than those of other travellers. According to Graham (2014), this customer group usually makes small, quick and inexpensive purchases to keep their children entertained. Long-haul leisure passengers tend to spend more than their short-haul counterparts, because they tend to arrive at the airports earlier, giving them more time to shop (Lin and Chen, 2013) and to make purchases (Castillo-Manzano, 2010; Graham, 2014). In fact, additional spare time at airports leads to greater spending, often in the form of F&B (Torres *et al.*, 2005). Similarly, expenditures are higher when passengers have to wait longer before boarding (Geuens *et al.*, 2004; Lin and Chen, 2013).

Regarding flight-related variables, Castillo-Manzano (2010) opined that purchasing F&B increases for individuals who fly frequently and do not have

a connecting flight. Because low-cost flights often lack free in-flight refreshments, their passengers frequently purchase F&B (Graham, 2014; Gillen and Lall, 2004). However, Castillo-Manzano (2010) found higher mean expenditures for individuals flying with traditional (standard-cost) airline companies. Based on the current literature, efficient check-in procedures can lower airport waiting times (Graham, 2014), which tend to reduce airport purchases. What remains unclear is whether the check-in mode (traditional versus online) has a direct, significant impact on the likelihood to spend and the related level of expenditure. This question is specifically explored in this study.

According to Lu (2014), personal characteristics and travel-related variables, together with the shopping experience, moderate air travellers' impulsive and pre-planned buying behaviour. What remains unclear is whether a pre-intention to buy significantly affects the level of expenditure. This question also is specifically explored in this study.

Somewhat contradictory findings that exist in the current literature, coupled with a lack of empirical evidence about the influence of check-in modes and pre-intentions to buy, call for further empirical studies of airport systems. This would deepen the perspective of existing findings and investigate the impact of previously unexplored variables (specifically, check-in mode and pre-intention to buy) on airport travellers' spending behaviour. This study, conducted at Olbia-Costa Smeralda Airport, (Italy) fills this research gap by adopting a micro-based perspective.

2. Methodology

2.1. Study Settings and Data Collection

This study's data were collected at the Olbia-Costa Smeralda International Airport (Sardinia, Italy). For European airports with up to five million annual passengers, the Olbia-Costa Smeralda Airport in 2017 received the 'ACI Europe Highly Commended' quality prize, ranking second after the airport in Cork (Ireland). In 2017, the airport reached saw a total of 2.8 million passengers, of which about 48% were international. The airport has grown over the past few years, especially in its boarding area, its commercial space and its F&B offerings, which provide airport travellers with a wider array of stores and a wider variety of services, including bars, and cafés, fast food, restaurants and pizzerias, with different degrees of sophistication and prices.

The questionnaire was divided into three sections. The first asked respondents to provide sociodemographic, travel-related and flight-related information. The second asked respondents to report whether they bought F&B-related items at the airport, whether these were pre-planned and what they cost. The third asked respondents their level of agreement with a list of items specifically related to different F&B-related service features, their overall satisfaction with F&B offerings and their intention to recommend the airport's F&B services to others.

The questionnaire was originally written in Italian, but because different nationalities could appear in the sample, three different questionnaires were prepared, by two professional translators (in English, Italian and German). As in previous tourism-related studies (Seddighi *et al*., 2001), a back-translation method was adopted to guarantee quality assurance. We pretested the questionnaire with 30 airport travellers from the three different nationalities to assure that the questions were comprehensible. No concerns emerged. Hence, the three final questionnaires were considered definitive. Four trained interviewers collected the data face-to-face with 4,500 individuals in the airport's boarding area, from May to October 2015.

As directed by airport managers, to not interfere with other marketing research and activities carried out directly by the airport staff, interviewers had access to the boarding area only during specific timeframes during the week. Only individuals aged 18 and over took part in the study. In the end, a sample of 2,461 completed questionnaires was collected (response rate: 54.68%).

2.2. The theoretical and econometric specification

Expenditure behaviour can be analysed by studying buying probabilities (Alegre and Pou, 2004) and expenditure levels (Kozak, 2001). Econometric analysis is the most widely used approach when assessing travellers' expenditures (Brida *et al*., 2013).

The ordinary linear square (OLS) regression estimator (Kozak, 2001; Marcussen, 2011) is the most used econometric model to analyse expenditures. In OLS models, expenditures as a dependent variable, usually are transformed into logarithms, to provide a direct interpretation in terms of elasticity. Very few authors make use of pure or standardised values (here, the share of expenditures for categories of tourists' expenditures). Few existing studies use the Tobit model (Tobin, 1958; Zheng and Zhang, 2013; Alderighi *et al*., 2016). Even fewer adopt censored models, such as the Double-Hurdle (Disegna and

Osti, 2016; Jang and Ham, 2006). These models assume that expenditures cannot be lower than zero, meaning that several individuals report a zero value of expenditures. Based on prior research (McFadden, 1974), other researchers (e.g. Alegre and Pou, 2004) applied a binary, discrete choice, random, utility model to analyse expenditure behaviour.

In this study, which analyses determinants of expenditure behaviour at airports, the theoretical and econometric specification followed what has been suggested by existing studies devoted to analysing tourist/traveller expenditure behaviour adopting a micro-based perspective (i.e. Brida and Scuderi, 2013; Wang *et al.*, 2006).

To fine tune the model, a preliminary OLS regression on our sample was run to test for the most suitable set of variables to be considered as exogenous determinants of expenditure. For passengers not making any purchases, the dependent variable was assumed to be zero. When respondents reported spending some money, the dependent variable was the logarithm of this actual expenditure. Afterwards, the dependent variable was modelled as a dummy variable, taking the value 1 if the respondent spent some money at the airport and 0 otherwise. Hence, the logit model allowed us to study the partial effects of determinants on purchasing probability. Independent variables were chosen based on previous research (Castillo-Manzano, 2010; Guens *et al*., 2004; Lin and Chen, 2013; Lu, 2014; Torres *et al*., 2005) and on the regression test's statistical significance. Results of this preliminary OLS regression suggest that the following determinants can be used to develop our model: sociodemographic characteristics (i.e. gender, age, income and nationality), travel-related determinants (type of accommodation and frequency of flying through Olbia Airport), flight-related determinants (check-in mode, waiting time to boarding) and pre-intention to buy (see Table 1).

To better understand subjects' behaviour, this study assumes that airport travellers' spending resulted from two subsequent, independent processes, namely: 'to buy or not to buy' (a participation decision) and how much money to spend (a quantity decision). Although the dependent variable's characteristics (i.e. travellers' expenditures) might lead one to choose the Tobit model, the independence between a participation decision and a quantity decision made the Tobit model inappropriate. The Tobit model uses the same set of variables, whose effects are the same for both participation and quantity equations. To overcome this 'bias', a Double-Hurdle model was adopted (STATA version 13).

The Double-Hurdle model, a generalisation of the Tobit model (Gragg, 1971), is based on the idea that two distinct hurdles have to be considered. Specifically, it estimates two separate regression models. In the first hurdle

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(the selection stage), purchase intention is estimated by using a Probit model (a participation equation). In the second hurdle (the last stage), an OLS regression model is used to estimate the amount of money that a consumer spends at the airport (a quantity equation). This model's outcome is given by two different sets of independent coefficients instead of a single set, which would have been obtained using the traditional Tobit model.

Table 1 – Independent Variables

Independent Variables	Definition
Male	Dummy=1 if respondents were male
Young Adults	Dummy=1 if respondents were younger than 35 years old
Foreigners	Dummy=1 if respondents were foreigners
Low-Income	Dummy=1 if respondents declared an annual income lesser than 30,000 euros
Waiting time to embarking	Dummy=1 if respondents did checks within 45 minutes before boarding
Traditional check in	Dummy=1 if respondents managed a traditional check in
First-time travellers at Olbia Airport	Dummy = 1 if the respondents had never been in Sardinia before the interview
Hotel accommodation	Dummy = 1 if the respondents stayed in a hotel
Pre-intention to buy	Dummy = 1 if the decision to buy F&B in airport was pre-planned

This study assumes that a passenger's F&B expenditures at airports ($ExpAir_k$) is determined by sociodemographics (S_k: gender, age, income and nationality), travel-related variables (TR_k: type of accommodation and frequency of air travel), flight-related determinants (FR_k: check-in mode and waiting time prior to embarking) and pre-intention to buy (IB_k) (see quantity Equation 1).

$$ExpAir_k = f(S_k, TR_k, FR_k, IB_k) \quad (1)$$

Then, the overall model to be used in our study can be specified as follows:

$$E_k = \alpha x + \varepsilon_k \ (2)$$
$$if \ \min(\alpha x + \varepsilon_k, \beta y + \epsilon_k) > 0 \ (3)$$

$E_k = 0$ otherwise

Equation 2 describes the quantity equation (Equation 1 reframed following a linear regression approach), Equation 3 represents the participation equation and x and y are vectors, respectively related to the quantity and participation equations. Both vectors incorporate the same determinants, namely: sociodemographics (S_k), travel-related variables (TR_k), flight-related variables (FR_k) and pre-intention to buy (IB_k). The error terms ε_k and ϵ_k are independent and normally distributed.

3. Results

3.1. Descriptive Analysis

From the overall sample (N = 2,461), only 24.06% of respondents bought food or beverages while at the airport (N = 592). This was a lower percentage compared to other studies (e.g. Lu, 2014). To avoid an excess of information related to the sample's descriptive statistics (buyers versus non-buyers), and since we focus on factors affecting the *level* of expenditures, this study's econometric analysis (Table 4) provides details about sociodemographics (Table 2), travel and flight-related variables and pre-intention to buy (Table 3), only for F&B shoppers.

Table 2 – Mean Expenditures by Sociodemographic Characteristics

Variables		Mean Expenditure (€)	%
Gender	Male	20.23	44.41
	Female	18.02	55.59
Age	18-24	15.72	19.35
	25-34	19.70	29.20
	35-44	16.28	21.22
	45-54	22.80	17.32
	55-64	17.36	8.32
	>65	29.63	4.58
Income	< 10.000	25.96	19.38
	10.000-14	23.20	6.94
	15.000-19	13.69	10.77
	20.000-24	20.18	8.13
	25.000-29	17.32	8.85
	30.000-34	11.54	8.85
	35.000-39	31.85	6.22
	40.000-44	20.18	5.98
	45.000-49	12.37	3.59
	50.000-59	16.52	5.50
	60.000-69	21.37	4.55
	70.000-79	33.86	1.67
	80.000-89	16.50	2.87
	90.000-99	19.42	2.87
	> 100.000	5.49	4.49
Nationality	EU (non-Italian)	21.10	50.94
	Extra EU	16.19	2.74
	Italian	16.96	46.31

Table 2 shows that F&B shoppers were mostly women (55.59%), young (18-34 years old: 48,55%) or middle-aged, (35-54 years old: 38.54%), international passengers (53.69%) or families or individuals with income less than €30.000 (54.07%). The mean expenditure was higher for males (€20.23), airport travellers older than 65 (€29.63), European (non-Italian)

passengers (€21.10) and individuals with medium-high income. The highest mean expenditure level was reported for individuals annually earning €35,000-40,000 (€31.85) or €70,000-80,000 (€33.86). Hence, our findings seem to contradict some prior studies, which reported that women (Geuens *et al.,* 2004) and younger airport travellers (Perng *et al.,* 2010) spend less, while confirming others (e.g. Castillo-Manzano, 2010), which indicated that domestic airport passengers spend less than international counterparts.

Table 3 shows that most purchases were impulsive (62.89%). This supports previous studies (e.g. Omar & Kent, 2001; Volkova, 2009) and contradicts others (e.g. Echevarne, 2008).

Table 3 – Mean Expenditure by Travel and Flight-Related Variables and Pre-Intention to Buy

Variables		Mean Expenditure €	%
Type of Accommodation	B&B	16.03	7.48
	Agritourism	19.34	3.15
	Other	27.88	3.35
	Second Home	18.29	8.86
	Rental Home	16.38	18.50
	Guest	16.18	10.63
	Hotel	20.68	48.03
Check-in mode	Traditional	18.15	58.29
	Online	19.78	41.71
Waiting time prior to embarking	< 30 minutes	22.14	10.90
	31-45 minutes	18.31	15.16
	46-60 minutes	18.73	21.47
	61-90 minutes	20.08	29.13
	91-120 minutes	15.33	11.93
	> 120 minutes	19.14	11.41
First-time travellers at Olbia Airport	Yes	20.99	38.18
	Not	17.73	61.82
Pre-intention to buy	Yes	23.55	37.11
	Not	16.82	62.89

Mean expenditures were higher for individuals who had planned earlier to buy F&B at the airport (€23.55), compared to those buying impulsively (€16.82). When the overall sample of F&B shoppers is considered, the mean

expenditure is €19, underscoring a higher level of expenditures compared to other existing studies (e.g. Torres *et al*., 2005). Hence, when compared to other airports, Costa-Smeralda seems to be characterised by a lower likelihood of buying and consuming F&B services but a higher level of spending.

One explanation is that Olbia's airport travellers fly mostly short-haul trips and need connecting flights to reach their destinations. This could make them postpone F&B purchases until they reach their final destination. This supposition further supports recent studies that indicate lower F&B spending at regional and peripheral airports, compared to hub airports (Castillo-Manzano *et al*., 2018).

Regarding check-in mode, our findings reveal that the 58,29% of respondents who bought food and beverages have experience with web check-ins and reported slightly higher mean expenditures (€19.78) compared with those who did not check in using the internet (€18.15). Excluding respondents who stayed in 'other' types of accommodation (a residual and marginal category), 48.03% of interviewees stayed at hotels (48.03%). Airport travellers staying at hotels reported the highest mean expenditure (€20.68), while the lowest corresponded to B&Bs (€16.03). As a possible explanation, hotel guests might have higher available economic budgets for their holidays. This explanation is supported by previous studies, which reported higher spending levels by tourists residing at a hotel (e.g. Marrocu *et al*., 2015), compared to other types of accommodation.

Most respondents reported waiting 61-90 minutes before embarking (29.13%). Previous studies indicated that people with longer wait times spent the most on F&B (e.g. Castillo-Manzano, 2010). Surprisingly, our findings reported the highest mean expenditure for individuals checking in at the last minute (30 minutes or less in advance: 10.90% of respondents). Based on the so-called 'travel stress curve,' passenger stress decreases significantly as soon as they enter a boarding area (Scholvinck, 2000). Hence, based on the so-called opponent-process theory of emotion (Perng *et al*., 2010), once travellers have their boarding passes, their tension is relieved, and a feeling of excitement emerges that stimulates their spending behaviour (Thomas, 1997). This circumstance, coupled with the fact that 41.71% of our respondents checked in over the internet and therefore did not have to arrive early at the airport, could explain these results. Individuals utilising a web check in reported higher mean expenditures (€19.78) compared to others (€18.15). Finally, individuals with prior experience flying to Sardinia through Olbia-Costa Smeralda Airport (38.18% of all F&B shoppers) reported higher mean expenditures (€20.99) when compared to counterparts (€17.73).

3.2. Econometric Analysis

To further deepen our investigation, an econometric analysis was performed to analyse which of the considered variables significantly influenced expenditures. Table 4 shows the results of the Double-Hurdle model. The coefficients in the 'participation equation' column (the first hurdle) indicate how a given variable affects the likelihood (probability) of buying something at the airport, while coefficients in the 'quantity equation' column (the second hurdle) show whether a certain variable influences expenditure levels after the decision to make a purchase.

On the whole, our findings show that the determinants that significantly influence the 'decision to buy' and 'how much to spend' are completely different.

Specifically, our findings show that the buying decision (the participation equation) is significantly and positively influenced only by certain sociodemographics (i.e. income) and flight-related variables (i.e. waiting time prior to embarking). Airport travellers with an income up to 30,000 euros who waited up to 45 minutes prior to embarking were more likely to make purchases.

Table 4 – The Double-Hurdle Model

Variables	Participation Equation	Standard Error	Quantity Equation	Standard Error
Male	-0.03	0.07	0.07	0.08
Young	0.24	0.07	**-0.17***	0.09
Foreigners	0.24	0.08	0.35	0.1
Low-income	**0.15***	0.08	0.24	0.09
Traditional check in	0.01	0.07	-0.12	0.09
Waiting time prior to embarking	**0.17****	0.09	0.15	0.1
Hotel	0.11	0.08	**0.18****	0.09
First-time travellers at Olbia Airport	-0.26	0.08	-0.05	0.1
Pre-intention to buy	3.1	0.27	**0.9****	0.41
Constant	-1.1**	0.1	1.58**	0.45
* p<0.10, ** p<0.05,				

Expenditure levels (the quantity equation) are significantly influenced just by certain sociodemographics (i.e. age), travel-related variables (i.e. type of accommodation) and pre-intention to buy. Specifically, expenditures were lower for young adults and higher for respondents who stayed in a hotel and intended to make F&B purchases before arriving at the airport.

3.3. Robustness Check

To assure that our assumption about the independence between participation and quantity equations is valid, a Heckman (1979) regression model was run. Our model is based on the assumption that the quantity equation is distorted by the existence of an implied participation process, which is strictly correlated with the quantity equation. To overcome this issue, Heckman (1979) inserted an additional independent variable in the quantity equation, called Mill's ratio, which formalises the dependence between the two decision processes. It is calculated as the ratio between the probability that an individual falls in the 'participation category' and the cumulative probability of an individual's decision. If the participation and quantity equations are dependent and subsequent decisions, the Mill's ratio is different from zero, with an acceptable level of significance, and the two equations are related (and vice-versa). Hence, Heckman's model needs to be used to identify the determinants of both the participation and the quantity equations. However, when the Mill's ratio is zero, with an acceptable level of significance, the two equations need to be considered independent and the Double-Hurdle model proposed by Cragg (1971) becomes the most suitable one.

Regressors (the expenditure determinants considered in our analysis) and the disturbance term in the participation equation (4) determine whether an observation falls into the 'participation category' (E > 0) or not (E = 0). In particular, during the first step of the econometric analysis (the one related to the decision to buy or not to buy), a latent variable (B^*_t) is considered that describes the net benefit of the participation. This latent variable depends on a set of different variables (our regressors) and a disturbance term: if the net benefit is greater than zero, the individual falls into the participation category.

Taking into consideration the sample's censored nature, the dependent variable is given by the expenditure level reported by travellers (E_k). The latent variable (B^*_t) is the net benefit of making purchases while at the airport. Therefore, the expected value of expenditures [i.e.: $\xi (E_t)$] can be determined as follows:

$$\xi (E_k \mid B^*_k > 0) = \alpha x + \hbar \, \lambda \, (\alpha \, x) \quad (5)$$

where $\lambda (\alpha x)$ is the Mill's ratio and x is a vector related to sociodemographics (Sk), travel-related variables (TRk), flight-related variables (FR_k) and the pre-intention to buy (IB_k). The Heckman model is estimated by running an OLS where the Mill's ratio is an independent variable, as are all the other determinants of travellers' expenditures. The results are presented in Table 5.

Table 5 – The Heckman Model

Variables	Coefficients	Standard Error
Male	0.08	0.08
Young	-0.28 ***	0.1
Foreigners	0.21*	0.11
Low-Income	0.17*	0.09
Traditional check in	-0.09	0.08
Waiting time prior to embarking	0.05	0.1
Hotel	0.11	0.09
First-time travellers at Olbia Airport	0.07	0.12
Pre-intention to buy	-0.34	0.72
Mill's ratio	-0.52	0.53
Cons	2.96 ***	0.81
* p<0.10, ** p<0.05, *** p<0.01		

Overall, the not significance of Mill's ratio supports the decision to deal with two independent hurdles and strengthens the decision to treat traveller's expenditures in the airport with the Double-Hurdle Model (Cragg, 1971).

Conclusion

This study aimed to investigate the sociodemographic, travel-related and flight-related determinants of travellers' expenditures at airports, in terms of the decision 'to buy or not to buy' and 'how much to spend.'

From our overall sample, just 24.06% of airport travellers made purchases, mostly impulsively (62,89%), generating a net expenditure of €19. Furthermore, the findings revealed that the 'decision to buy' is significantly influenced solely by sociodemographics (income) and flight-related variables (i.e. waiting time prior to embarking), while the level of expenditures is significantly influenced by age, a travel-related variable (type of accommodation) and pre-intention to buy.

From a theoretical point of view, this study deepens the scientific debate around spending behaviour in F&B-related airport retailers by comparing its conclusions those of previous studies. For example, when compared to some existing studies (e.g. Lu, 2014), our results note, in some instances, a lower likelihood to make F&B purchases. However, in other instances, this study also reports higher actual spending compared to other studies (e.g. Torres *et*

al., 2005). Furthermore, the fact that most F&B purchases were impulsive (Omar & Kent, 2001; Volkova, 2009) confirms some prior studies while contradicting others (e.g. Echevarne, 2008). Our study also confirms previous research that suggested that women do not, in fact, spend more at airports (e.g. Castillo-Manzano, 2010). Compared to earlier studies (e.g. Castillo-Manzano, 2010; Castillo-Manzano and López-Valpuesta), our findings also show that the likelihood of buying F&B at airports is significantly influenced by passengers' resources. Low-income respondents spend more because F&B shopping at airports largely solves instantaneous, physiological needs with small convenience purchases. The significant influence of waiting time prior to embarkation confirms existing studies (e.g. Lin & Chen, 2013). However, the fact that this variable does not significantly affect expenditure levels contradicts other studies (e.g. Castillo-Manzano, 2010). Our conclusion that younger travellers spend less confirms the results of prior studies, which report that young adults tend to congregate in bars and cafés (e.g. Perng *et al*., 2010). However, it also contradicts other studies that did not factor in spending behaviour at airports (e.g. Castillo-Manzano, 2010). This study also suggests that reported nationality does not significantly influence spending behaviour, which contradicts some prior studies (e.g. Castillo-Manzano, 2010; Graham, 2014). Finally, our findings conclude that both staying at a hotel and having pre-planned F&B purchases raise expenditures. While this confirms many prior destination-based studies (e.g. Marrocu *et al*., 2015), these variables do not influence the likelihood to buy. While check-in mode did not affect buying behaviour, it is interesting to note that individuals using web check-ins spent more than customers using other check-in methods.

To sum up, our findings do not confirm all of those in the existing literature, providing instead contradictory evidence to prior studies carried out in different contexts. This study proposes that airport spending is largely impulsive and that airport-based characteristics (e.g. size, location, peripheral versus regional/hub airport and other criteria), sociodemographics and destination-based characteristics (e.g. types of visitors) need to be carefully considered.

From a managerial point of view, our findings suggest that airport managers and retailers need to develop marketing strategies that stimulate customers' natural inclinations to make impulsive purchases. For example, since most passengers are repeat purchasers, a fidelity card programme could be set up to incentive 'frequent airport travellers' to make purchases at airports rather than somewhere else (such as at destination F&B retailers, in-flight, or at other connecting airports). Similarly, to increase the number of actual

shoppers, airport managers could provide on-time passengers at Olbia Airport with bonuses and discounts for instantaneous purchases.

Our results also suggest that airport managers should recognise nuances in the way the that travellers' spending behaviour is based on their sociodemographics, travel- and flight-related characteristics and pre-intention to buy. For example, the fact that young adults spend less than older passengers could incentivise airport managers and their F&B retailers to lower the costs of their products and/or to widen the assortment of F&B items by including those that are usually favoured by millennials, such as: healthy and natural food, craft beer (Aquilani *et al*., 2015) or drinks promoting energy, immunity, digestive health (CBD Marketing, 2017). Also, because travellers staying at hotels spend more on F&B (and at destinations in general) than those residing in other types of accommodations (Marrocu *et al*., 2015), airport managers, policy makers and destination marketers could co-market activities that attract the highest possible number of travellers interested in booking a hotel.

Although the study showed no significant differences in spending behaviour based on check-in mode, the fact that mean F&B expenditures are higher for passengers using a web check-in suggests that airports should incentivise the highest number of individuals to use this check-in mode. This also might reduce queuing time and operating costs, limit crowding in terminals and increase passengers' overall satisfaction. However, this suggestion may not be valid for non-F&B-related retail services. How the check-in mode might affect spending behaviour, in addition to related managerial implications, should be investigated in future studies.

While this study helps fill a gap in the existing knowledge base and proposes some implications for airport managers, limitations still remain. First, it is highly site-specific and is based on a non-probability, convenience, sampling technique. Hence, its findings are not generalisable. In the future, a more careful research design and cross-airport comparison studies could help verify the robustness of our findings. Second, our study focused on actual expenditures reported by travellers and did not directly consider the moderating effect that passengers' economic budgets could exert on their spending behaviour. This aspect would merit investigation in future studies. Furthermore, it would be useful to consider a wider variety of travel-related elements (e.g. travel party components and group size) and flight-related variables (e.g. type of airline company and frequency of flying), as well how airport retailers affect customers' expenditures (Lin and Chen, 2013). Finally, this study did not offer a product category-based analysis (e.g. typical/non typical food, typical/non typical wines, etc.) of passengers' expenditure behaviour (i.e. "decision to buy" and "decision on how much to spend"). Similarly, the

study did not offer an analysis based on the main motivation driving passengers to spend in F&B services while at the airport (i.e. "to buy F&B related souvenirs" and/or to "satisfy their eating needs"). These aspects would merit to be investigated in future studies.

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