A hedonic price model for ski lift tickets in the Dolomites

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ABSTRACT

Different alternative or complementary strategies have been advanced for the rejuvenation of the ski tourism product, thus favouring its economic and environmental sustainability, ranging from product differentiation, de-seasonalisation, creation of new, alternative businesses. This paper aims to provide new suggestions by means of the hedonic price model of ski lift tickets in the Dolomites. The model shows that a higher level of investment in modern lifts and snowmaking equipment undertaken by the resort pays off in terms of customers' perceived value-for-money relationship. The same is not true for investments in the enlargement of the skiable surface or the introduction of night skiing options and illuminated slopes. We found evidence that that non-participatory activities, such as different winter sports and on-slope entertainment, can improve the customer's perception of resort's quality. Finally, celebrity and reputation play an important role in determining the customers' perception of good-value-for-money destinations and deals. Implications for practitioners, aiming at improving the economic sustainability of the sky tourism product, are derived as well.

Keywords: *Hedonic price model, ski resorts, Dolomites.*

Introduction

Despite being the birthplace of Alpine ski as a recreational activity, the Alps are not exempt from the deep crisis and stagnation phase affecting the ski industry worldwide. Many authors have investigated the origins of this crisis, both on a national and international level (Macchiavelli 2002 & 2006; Minghetti 2005; Daidola 2005; Liquori 2010; Falk, 2013; Vanat 2016). It appears that many different, but sometimes interrelated factors have contributed to the crisis Alpine ski is facing, including the change in demand due to the evolution of vacation habits and the demographic shift and climate change. Different alternative or complementary strategies have been advanced for the rejuvenation of the ski tourism product, thus favouring its economic and environmental sustainability, ranging from product differentiation, de-seasonalisation, creation of new, alternative businesses. Technologies are being improved in order to minimise the huge costs lift providers are forced to face in order to provide a fast service and perfectly snow-covered slopes.

Yet, search for new, effective solutions to the problem continues. This paper aims to contribute to this search by means of the hedonic price model of ski lift tickets for the Dolomiti Superski network, a consortium reuniting twelve ski resorts in the Dolomites, a part of the Alps spreading over the border between the Veneto and Trentino-Alto Adige regions in Italy. Hedonic price models allow the determination of the relative importance, or weigh, of different attributes on the determination of a product's price. With respect to previous works (Alessandrini, 2013; Falk, 2008), the research aims at expanding the range of attributes recognised as possibly impacting ski lift tickets' prices, so as to gain a more comprehensive view of where ski tourism is heading, and what is important to skiers, nowadays. Identifying crucial elements consumers would be willing to pay for allows managers to re-think and adjust their products and prices accordingly, providing skiers with products they evaluate as better value for money and improving the economic sustainability of the sky tourism product.

The paper is structured as follows. We first provide a brief description of methods and data, together with our predictions on the effect of attributes on ski lift prices. Results are then presented. In the conclusions, implications of our work concerning the economic sustainability of winter tourism in the Alps are presented.

Methods and data

The hedonic pride method

Hedonic pricing is "an economic valuation technique based on revealed preferences" (Papatheodorou et al, 2012). The basic premise of the hedonic price method is that the price of a marketed good is related to its characteristics, or the services it provides. Lancaster (1966) stated this for the first time back in the late 60s, observing how consumer products are made of a bundle of different and separable characteristics, which might undergo the attentive scrutiny of a value-conscious consumer (Schwieterman, 1995).

More specifically, regression techniques make it possible to estimate the implicit price for each feature. In such a regression, the price (in our case, the price of the ski lift ticket) is the dependent variable, and the attributes are the independent or explanatory variables. Most studies conducted in the past have adopted the log-linear or the log-log forms, which are to be considered as preferable for a number of reasons (Andersson et al., 2010). In the log-linear formulation, which is the one we will adopt, the model is specified as follows:

$$\ln P_i = \alpha + \beta X_i + \varepsilon_i \quad (1)$$

where i is product index (the ski resort in our case); $\ln P_i$ is the natural logarithm of the price (of the ski lift ticket in that specific resort); α is the intercept, X_i is the vector for (resort's) attributes and ε_i is the error term.

The customer's willingness to pay for individual attributes, i.e. the implicit price of the attribute itself, is computed through the partial derivative of the dependent variable P_i with respect to the regressed characteristics, $\partial P_i/\partial X_i$. As for coefficients resulting from the regression, the significant ones will be interpreted as follows: if the coefficient has a positive sign, it means that the specific attribute contributes to boosting the overall transaction price, having a positive impact on individual utility levels, while a negative sign implies that the attribute will bring the price downwards (Thrane, 2005).

The hedonic pricing method has found several applications in economics, ranging from environmental issues to the real estate market (Gundimeda, 2016; Sirmans and Macpherson, 2003). Applications in tourism are found as well, which is not surprising given the definition of tourism product, as a "bundle of good and services" characterised by heterogeneity and plurality, that is to say that a number of different services and products are offered by a multiplicity of actors with the unique aim of satisfying tourists' demand (Candela and Figini, 2012). The tourism applications include the hotel industry (Espinet, 2003; Chen and Rotschild, 2010; Hamilton, 2007) and the package tours (Aguilò et al., 2003; Haroutunian et al., 2005).

As far as the ski sector, and more in general winter tourism is concerned, the first study of this kind was conducted by Mulligan and Llinares (2003), who underlined the positive and significant impact of state-of-the-art, detachable lift technology on ski pass prices, followed by Falk's analysis of price/quality relationship in Austrian ski resorts (Falk, 2008), Pawlowski (2011) and Alessandrini (2013).

Data

Our analysis refers to the Dolomiti Superski network. The network (legally defined as a consortium, its full name being *Federconsorzi Dolomiti Superski*), was established back in 1974 to group four main Dolomites' resorts under a common name, making them accessible using a common ski lift ticket. Other areas followed, and, as of 2016, the carousel includes twelve resorts,[1] offering more than 450 lifts and 1200 kilometres of slopes. Although the aim of this kind of structure is primarily to uniform the ticketing structure of the participating resorts, by letting skiers access all areas upon the purchase of a single ticket, it is relevant to underline that the existence of this complex structure is not binding for the customers who are not interested in the whole Superski area.

The dependent variable in this model is the price of a ski lift ticket as it is publicly available to customers. An official pricing list is provided for each one of the twelve resorts composing the consortium, in which rates are specified for the following categories:

- Adult; Senior; Junior; Child.
- Pre Season; Season; High Season.
- Duration days (from 1 to 30) or Season Pass.

This paper will focus solely on the *Adult* rate, hence not taking into account the other three age categories. Reductions for Senior (-10%) and Junior (-30%) skiers are proportional and recurring throughout the whole pricing list, and are therefore of little interest for the investigation. The *Adult* rate will be analysed in all three stages of the season, and five different duration ranges will be taken into account, so as to gain an insight into the relative weight of the product's attributes in different time frames and in several duration options.

The dependent variable included in the final specification will be, precisely, *daily price,* obtained dividing price by duration. This approach will be preferred over the simple price one for reasons linked to a too mechanic relationship between the dependent variable (price) and some of the control variables, especially the duration one. A control variable for duration will

[1] The twelve resorts are Civetta, San Pellegrino, Cortina, Kronplatz, Val di Fiemme, Gardena, Val di Fassa, Sexten, Marmolada, Valle Isarco, Passo Rolle, Alta Badia.

nevertheless be included in the model, in order to investigate possible discounts on duration, as explained in the following paragraph.

Explanatory variables considered for this model are divided into four main categories: i) technical and service attributes; ii) resorts' facilities and amenities; iii) reputation; iv) connections. In addition, a few interaction variables will be considered as well.

Technical and services attributes

Slopes length – Literature suggests that skiers' willingness to pay is positively related to the amount of skiable terrain (Falk, 2008; Alessandrini, 2013). While skiable area is measured in hectares in the US and Canada, the measurement unit commonly used in Europe is *kilometres*. *Skiable kilometres* (denoted as KM) are relatively easy information to find, since most marketing communication heavily relies on this data to promote a specific resort: a positive relationship is expected between the amount of skiable kilometres and the price for lift tickets.[2]

Lifts speed – On-slopes congestion is a widely addressed topic in the tourism literature focusing on ski resorts (Walsh et al., 1983; Williams and Fidgeon, 2000). The problem of queuing to get on the lift is partly solved through the installation of high-speed lifts, which will make the transportation of skiers to upper stations much faster, hence reducing waiting time[3]. One of the variables included in the model will be the *share of high-speed lift over the total number of lifts* (HSPEED), which is expected to hold a positive sign. In order to compute it, detachable lifts were taken as a proxy for high-speed lifts, since, as a matter of fact, this technology allows lifts to slow down when people enter or exit them and to speed up during the ride (simple lifts maintain the same speed in both phases).

Share of slopes with artificial snowmaking equipment – Climate change is a big issue in the industry, and resorts located on higher spots are assumed to have a competitive advantage, since they receive more snow and hence need to produce less of it artificially. Most ski resorts around the world are nowadays equipped with snow making cannons, which can obviate the problem of snow reliability. Dolomiti Superski praises itself on having 96% of its total slopes equipped with snow making equipment (Dolomiti Superski, 2016). The share of equipped slopes is hence very high throughout the whole network, although with some minor differences:

[2] We also considered a variable to measure the variety of slopes, proxied by the share of red and black slopes over total slopes, but we then omitted it due to multicollinearity problems.

[3] A variable accounting for the average age of lifts (LIFTAGE) was in a first moment included in the model. This variable, however, showed a highly negative correlation with the variable HSPEED, and was consequently excluded from the final specification of the model.

for this reason, a variable accounting for the *share of equipped slopes* (ARTSNOW) is included in the model and assumed to have a positive impact on prices.[4]

Average resort altitude – Previous studies on the topic pointed out the positive impact of the resort's average altitude on its ski pass price (Falk, 2008; Pawlowski, 2011). The effect of *average altitude* (ALT) is, in fact, somehow twofold. Its main implication has been identified in terms of snow reliability, since higher slopes usually receive more snow and existing snow coverage lasts longer because of lower temperatures. In this case, customers would be expected to be paying a premium to ensure optimal snow coverage during their holidays. On the other hand, higher stations presumably also offer nicer views because of their advantageous position. In both cases, the effect of altitude on ski lift tickets' prices is envisaged as positive.

Kilometres of slopes for night skiing – Although night access to illuminated slopes is usually offered at a discounted rate, and hence is not included in the day ski pass rate, the presence of night options surely is a plus for any resort. A dummy variable denoting the *presence of night, illuminated slopes* (NIGHT) for every resort is included in the analysis, so as to further classify the offer of resorts' and the extent of investment into slopes construction, equipment and maintenance. This further effort to offer more to visitors should be positively valued, hence holding a positive sign in this model.

Duration and seasonality – Two control variables will be included, namely DUR (duration in days) and SEA (stage of season). As illustrated in the previous paragraph, the dependent variable is already adjusted by duration; yet, DUR will be included in the model so as to identify the discount effects on quantity, i.e. tickets' length. We therefore expect a positive coefficient. A variable SEA will be also embodied in the regression, in the form of two dummies, in order to identify the marginal effect of different season's stages with respect to the benchmark, which is in this case the *low season*. The dummy NORMALSEA will take value 1 in prices belonging to the regular/middle season; the dummy HIGHSEA will instead assume value 1 in case of *high season*. In low season, both variables will show value 0. We clearly expect both coefficients to be positive and significant.

Resort's facilities and amenities

Unlike most previous studies on hedonic pricing models in ski resorts, which almost exclusively focused on slopes' and lift's technical features and figures, this thesis aims at expanding the

[4] Following the literature, a further indicator of snow reliability is included in the model, i.e. the *number of days of operation* in the season under scrutiny, but it was then omitted due to multicollinearity problems.

range of attributes, to include also "non-participatory activities".

This enrichment of the model was first advanced by Koslow (2006), who defines non-participatory activities as "any product, service, or facility available to consumers at a winter resort which is not obtained with the purchase of a lift-ticket". For this reason, we introduce in the model *number of huts per km of slopes* (HUT), which contribute to creating the skiing and après-ski atmosphere, and which should positively impact on customers' willingness to pay.

Non-participatory activities are also important for another reason: not all tourists choosing to spend their holidays in the mountains are skiers. Minghetti (2006) reports a somehow surprising pattern affecting winter tourism in Italy: only 52% of the interviewees self-defined as skiers, while the remaining 48% identified as non-skiers. Among non-skiers, only 20% declared to be visiting the mountains for a choice, while the remaining 80% were in the resort because of skiing relatives or friends. This means that, if they could choose, they might have not chosen to be in the resort in the first place. Moreover, they need activities to do and places to stay while their companions hit the slopes: restaurants, lodgings, shopping, wellness centres, but also alternative activities are needed, in order to fulfil their need for fun and relaxation. It could possibly be stated that skiers, who travel with non-skiers, might be willing to pay a premium in order to have their companions entertained, as well as for being offered alternative activities to skiing, which they could enjoy, too. We therefore introduce a *cross-country skiing variable* (COUNTRY) accounting for total kilometres available to cross-country skiers, and a *tobogganing variable* (TOBO), again in kilometres. Both attributes are expected to be positively related to ski lift ticket prices.

Reputation

Resort's reputation, scenery or fame certainly do come to mind when thinking about the price people are required to pay to access their slopes. Reputation is linked to both word of mouth, online review, expert's opinion and trends. As such, it is perhaps the most hardly defined attribute of this list, and surely the most arguable. Hosting an *internationally recognised sports event* is sure to secure the resort some extraordinary media coverage, as well as shape its brand and image in viewers' and skiers' minds. For simplicity's sake, a dummy variable named REP is included in the model, which takes value 1 if the resort has ever hosted an international Alpine Ski competition (Olympic Games and FIS Alpine Ski World Championship are the considered events). In all other cases, the variable REP will take value 0. As explained above, the relationship between hosting an important sports event and resort price is envisaged to be positive.

Connections

The latter category of variables includes both data about how different resort slopes are connected with one another, making them accessible with multi area ski passes (Falk, 2008). As for the multi-area ski pass variable, the Dolomiti Superski represents a peculiar example, since being a network itself, it provides customers with the possibility of purchasing a day or season ski pass valid for all twelve resorts. This type of skipass will not, however, be taken into account in the present analysis, since the aim is to focus on single resorts instead than on the network. Having said that, there are two officially recognised *ski tours*, which can be accessed with a Dolomiti Superski ski pass, and which represent strength for the whole system. In the case of ski tours, resorts are officially connected to each other by means of lifts and slopes, and sometimes shuttle buses, making it much simpler to visit more resorts in one day. The first ski tour, the most popular one, is called *Sellaronda*, and it spreads over four resorts, namely Alta Badia, Gardena Valley, Arabba/Marmolada and Fassa Valley. A dummy named SELLARONDA is included in the model, in which resorts included in the tour are assigned value 1, while all the others assume value 0. The second ski tour is named after the most tragic event occurred in the Dolomites' area, World War I, also known as the Great War. *The Great War Ski Tour* roughly runs along what once was the border between Italy and Austria-Hungary. This second ski tour is somehow less famous than the Sellaronda. A dummy named GWAR is included in the model in order to pinpoint the possible effect on ski pass prices.

Interaction variables

Six interaction variables are included in the final specification of the model, in order to further investigate the relationship between some of the independent variables:

- HSPEEDDUR: the relationship between high-speed lifts and duration is expected to be negative, since the shorter the stay, the strongest the need for high-speed lifts, in order to avoid queuing and have more time to enjoy the slopes.
- KMDUR: it is presumed that the two variables are positively related, since the largest the resort, the most likely it should be that skiers decide to spend more time there. Similarly, during a long stay in a destination (which is a proxy for the ski pass duration), skiers might be willing to pay a premium in order to have a larger surface to enjoy.
- NORMALSEADUR and HIGHSEADUR: since the seasonality is represented in the model by two dummy variables (normal and high season), which refer to a benchmark

(low season), the relationship between season and duration must be investigated by means of two separate interaction variables. It is expected that both show a positive sign, meaning that the customers' willingness to pay for a longer duration (e.g. one extra day) will be higher in high season and in middle season than in low season.

- NORMALSEAHSPEED and HIGHSEAHSPEED: as in the previous case, these variables investigate the relationship between the season's stage and another independent variable, namely the share of high-speed lifts. This analysis must include both the variable accounting for normal/middle season and the one for high season; hence two interaction variables are yielded. The relationship is expected to be positive, in that high season usually corresponds to higher levels of crowding and queuing, and skiers are expected to recognise the need for high-speed lift solutions in order to have a speedier transportation system.

Data sources

Different sources were used to obtain the data described in the previous section. Dolomiti *Superski's official website* (www.dolomitisuperski.com) and *catalogue* [5] (DSS Catalogue, 2015) were the main sources of reference. Data refer to the winter season 2015-2016.

Data about prices, skiable surface, number of lifts, slopes' level of difficulty, high speed lifts, artificial snow-making, season's length, number of huts, cross-country skiing and tobogganing were obtained from either the website or the catalogue. This highlights the fact that these attributes are also used as promotional items in the consortium's marketing efforts, making them stand as resorts' qualifiers and linking them to ski lift ticket prices, although not in a direct way.

International FIS races' information was obtained from the Dolomiti Superski news report for season 2015-2016.[6] The average altitude of ski stations was computed combining ski maps, provided on the Dolomiti Superski website, and "*Tabacco"*[7] hiking maps (scale 1: 25,000), which were useful to obtain precise altitude data.

Estimation results

Table 1 presents the OLS estimates of the log-linear hedonic price equation. Both the log-linear

[5] Available at https://issuu.com/dolomitisuperski/docs/dolomiti_superski_brochure_2015-16__d640d869e70cca (last accessed 15/09/2016)
[6] Available at http://www.dolomitisuperski.com/it/service/stampa/testi (last accessed 15/09/2016)
[7] http://www.tabaccoeditrice.it/eng/azienda.asp

and the log-log formulation were tested,[8] and finally the log-linear specification was preferred over the log-log one because of its better performance in terms of adjusted R^2.

In doing so, coefficients obtained from the OLS regression are to be interpreted in percentage terms when applied to the dependent variable. For instance, a 1-unit increase in one of the independent variables, such as KM of slopes will correspond a percentage increase (or decrease) of the dependent variable equal to the coefficient of the independent variable (e.g. if the coefficient is 0.85, an increase of 1 KM will cause an increase of 85% in the ski lift ticket price).

INSERT TABLE 1 ABOUT HERE

The overall fit of the model is highly satisfactory, with an adjusted R^2 of 0.9864, which means that nearly 99% of the variation is the dependent variable can be explained by the parameters included in the regression. This very high result is mainly due to the presence of two necessary control variables, namely DUR and the two season's dummies NORMALSEA and HIGHSEA.

These first three variables in Table 1 appear to be significant at the 1% level and they all show the expected signs: an increase in one day of duration causes on average a 3% decrease in the daily price of ski lift tickets, hence confirming the existence of some discounts on the length of the purchased ticket. On the other side, regular season's prices show an average 8% increase with respect to the low season prices, while prices in high season increase by 20% with respect to the benchmark, i.e. low season.

As for the skiable surface, measured in kilometres (KM), the coefficient is surprising and far different from what was expected. Indeed, it was assumed in the first place that the larger the skiable surface, the higher the premium customers would have been willing to pay for the ski lift ticket. However, the OLS estimate shows a different reality: the coefficient is significant at the 1% level (t-stat = -2.43), but the sign is negative, meaning that the amount of skiable surface and the ski pass price are inversely related, and that a 1-km increase in the skiable surface will lead to a 0.04% decrease in the price.

Despite the very small figure, this result is somehow surprising, especially if one thinks that most marketing efforts led by ski resorts revolve around the skiable surface. The result also collides with the existing literature on the topic, however, where the length of ski runs was found out to be positively related with ski pass prices. This is true for Falk (2008), Pawlowski (2011) and Alessandrini (2013), although the variable was reported to be statistically significant

[8] The log-log model presented an R^2 of 0.9700, and all variables included in both specifications showed the same pattern of significance and very similar coefficients.

only in the latter case. One could argue that, skiable surface ranging from quite large to very large, the skiers have enough terrain to enjoy and in fact dislike a surface too big to be enjoyed during the time of their stay.

As for artificial snowmaking, the variable ARTSNOW is also statistically significant at the 1% level (t = 7.56), and the coefficient sign corresponds to the expected one. The relationship between artificial snowmaking and prices appears indeed to be positive. Both Falk (2008) and Alessandrini (2013) pointed out similar result in their own researches, finding that artificial snowmaking did indeed positively affect prices, although not to an extent which could be considered statistically significant. It is important to remark that artificial snowmaking may affect both willingness to pay and costs, which in turn may have an impact on prices.

Similarly, high-speed lifts (HSPEED) appear to have a positive and very significant effect on ski lift ticket prices (t-stat = 4.18). A 1% increase in the share of high-speed lifts (which now range from the 22% to the 78% over the total lifts) in a resort would lead to a 15% increase in the price of the ski lift ticket for that resort. This confirms the theory first pointed out by Mulligan and Llinares (2003), stating that state-of-the-art, detachable lift technologies do make a difference for customers, who are consequently willing to pay a premium over the ticket's price in order to benefit from more *modern* lifts. This result is consistent with previous research on international ski resorts, with the exception of the only Italian case analysed, Alessandrini (2013), who reportedly did estimate a negative, non-significant coefficient.

Perhaps the most surprising and unexpected result is the one concerning average altitude (ALT). In the existing literature, the effect of altitude on the price of ski lift tickets has been thoroughly investigated, and it has yielded different results. Both Falk (2008) and Pawlowski (2011) reported average altitude to have a positive and significant impact on prices, justifying the fact with explanations mainly related to snow reliability. Indeed, the highest the location, the more likely it is to get natural snow and enjoy longer seasons. Alessandrini (2013), however, found that in the Italian Appennines the relationship was negative and significant, meaning that skiers are not willing to pay an extra for higher elevations; in fact, the opposite is true. The same is confirmed by the present research, where the variable ALT is negative and statistically significant at the 1% level (t-stat = -7.41). The explanation pointed out by Alessandrini, revolving around the fact that the Appennines receive less snow than the Alps because of their latitude, and hence altitude is not as relevant, does not hold in the Dolomiti Superski case. Two possible explanations can be formulated in this case. The first one is that resorts located at higher altitudes are more difficult to access. The second possible explanation for the negative coefficient of the variable ALT is related to the very high costs brought along by artificial

snowmaking at a lower altitude, which can have an impact on costs, and in turn on prices.

The final technical feature included in the model is the variable NIGHT, a dummy taking value 1 if the resort is equipped with illuminated slopes for night skiing. The result is again surprising and does not coincide with the author's expectations: in fact, the coefficient is not significant (t-stat = -1.03) and, in addition, it does carry a negative sign, meaning that skiers would not pay a premium for night skiing, but rather would choose to pay less if more night skiing options were available. The only previous citation of night skiing in the literature has been advanced by Pawlowski (2011), who, similarly, did not find any statistically significant link between night skiing and price.

As for the non-participatory activities, two out of the three considered variables included in the final specification were found to be statistically significant at the 1% level, while the tobogganing variable TOBO appears to be statistically significant only at the 10% level (t-stat = -1.63). Being one of the marketing-oriented figures chosen by Dolomiti Superski for its catalogue, despite the fact of not being directly offered by lift providers, the length of cross-country skiing slopes (COUNTRY) does indeed have a significant impact on ski lift tickets' prices, its coefficient showing a positive sign (t-stat = 2.79). There is no insight in the existing literature about the possible effect of cross-country skiing, as a non-participatory activity on ski lift tickets prices, but according to the OLS result, it could be argued that non-participatory activities are worth-investigating and could bring along advantages for the same lift providers. The second non-participatory activity included in the model accounts for the number of huts per km for each resort (HUT). The coefficient for HUT is positive, as expected, and significant at the 1% level (t-stat = 7.06). This corroborates Koslow's results (2006), in which the number of restaurants in a ski resort positively affects ski lift ticket prices in the same resort. This is, in general, a further confirm of the fact that non-participatory activities, whose profits do not belong to the lift provider, do play an important role in the determination of the ski lift ticket's price, and they do count for tourists when making their destination's choice. Interesting managerial implications can be deducted from this result, as will be discussed later on in the following chapter.

The REP dummy shows a positive coefficient, and is statistically significant at the 1% level (t-stat = 8.59). Hence, major sports events giving the highest visibility and assuring the top quality of infrastructures pays off.

On to the connection dummy variables, SELLARONDA and GWAR, the results are different and contrasting. The SELLARONDA effect is statistically significant (t-stat = 9.32) and in line with the author's expectations, while the GWAR coefficient is not significant and

carries a negative sign (t-stat = -0.98). Both results can be accounted for looking at the relative popularity of the two tours.

As for the relationship between high-speed lifts and ski pass duration (HSPEEDDUR), the relation is negative, as foreseen, and significant: the willingness to pay for high-speed lifts decreases as the ski pass' length increases; this is justifiable by assuming that a shorter stay requires faster connections, in order to be able to enjoy the whole surface without overcrowding problems. The interaction between the season's stage and the duration (NORMALSEADUR and HIGHSEADUR) partially reflect expectations: while customers seem to be willing to pay a premium for one extra ski pass day in high season with respect to low season, the same is not necessarily true for the regular/middle season, since its coefficient is not statistically significant (t-stat = 1.39).

Instead, there appears to be almost no relationship at all linking the stage of season to the share of high-speed lifts in the resort (NORMALSEASPEED and HIGHSEASPEED). The assumed need for fast lifts in peak season in order to avoid overcrowding is not confirmed by the OLS results. Finally, the most surprising and worth-investigating result is the one concerning the relationship between slopes' length and ski pass duration (KMDUR). In this case a significant coefficient is estimated (t-stat = -3.58), although with a negative, unexpected sign. This implies that customers' willingness to pay for an extra ski pass day decreases as the skiable surface increases. This is coherent with the coefficient shown by the variable KM, also unexpectedly negative.

Conclusions

Synthesis of results

This paper has analysed four categories of variables possibly impacting ski pass prices have been identified: *technical and service attributes*, which were the main focus of past research on the topic, *non-participatory activities*, *connections* and *reputation*.

The empirical model has demonstrated that a higher level of investment in modern lifts and snowmaking equipment undertaken by the resort pays off in terms of customers' perceived value-for-money relationship, confirming the existing literature on the topic. The same is not true for investments in the enlargement of the skiable surface or the introduction (or enlargement) of night skiing options and illuminated slopes. New to the literature, we found evidence that that non-participatory activities, such as different winter sports and on-slope entertainment can improve the customer's perception of resort's quality. For European ski

resorts, where ski and alternative activities are managed by different stakeholders and hence are not necessarily coordinated, this identifies a possible challenge.

Finally, celebrity and reputation play an important role in determining the customers' perception of good-value-for-money destinations and deals. This is confirmed by the positive implicit price assigned to resorts hosting international ski competitions or those belonging to the well-known Sellaronda ski tour, an institution for Dolomiti Superski patrons and ski enthusiasts in general.

Implications for a more economically sustainable ski tourism product

Several different strategies and policies can be implemented in order to make resorts better off, and lead them towards a rejuvenation path instead than a decline path that would bring them out of the market. Resorts, which are struggling to survive, simply cannot afford to cut down their prices even further in order to attract more people, because there exists a threshold beyond which costs can no longer be covered by revenues, and this would mean serious problems for the firm. In this context, our results suggest some ideas and proposals which could improve the economic sustainability of firms and destinations involved in the sky tourism product.

Partition of resorts into smaller areas to be sold separately – The possible reasons lying behind the negative marginal impact of slopes length on prices have been already discussed in the previous section. If we were to adopt the "too-large-to-be-enjoyed" version, we could turn these large dimensions into a different, alternative product to be sold to skiers in order to get higher profits. This could be done by segmenting each resort into smaller areas, according to their difficulty characteristics, their geographical position or possibly a theme. By doing so, skiers would be able to purchase, for a smaller but not proportional price, different ski passes for different areas of choice: this would allow them to pay a bit less but choosing exactly the product they are interested in. If the matter was that ski areas are too big to be fully enjoyed, this system would allow skiers a smaller area, but still sufficient for their entertainment, for a slightly smaller price. This option could be appealing to younger skiers or snowboarders, who are either interested in lower fares or in particular types of slopes and terrains.

Fast tracks – As demonstrated by the OLS model, the relationship between ski pass' duration and willingness to pay for high speed lifts is inversely related, meaning that the shorter the stay, the higher the desire for faster commuting. This prepares the ground for the introduction of a *fast track* option, purchasable, in addition to the normal ski lift ticket, at the beginning of the stay. Costs for the resort would be quite limited, since only a second waiting

line equipped with turnstiles would have to be put in place in order to accommodate this new type of customers. Fast track tickets could be available for purchase at the ticket office, and would be available in different duration patterns, as well. One could potentially but a three-day ski pass and pair it with a one-day fast track supplement, if needed, although the solution is precisely thought for half-day and one-day tickets' holders.

The après-ski deal – In an ideal scenario, we could assume that lift providers, knowing that the presence of huts and restaurants can increase their customers' willingness to pay, would most probably decide to subsidise their maintenance and the construction of new ones. However, it is not as simple as it might look like, especially because of the deep structural crisis the ski industry is undergoing: lift providers struggle with higher and higher costs, especially related to artificial snowmaking, and would hardly be able to subsidise new activities, unless they are certain that the increase in the ski pass' price resulting from the investment would be able to cover the costs of the investment itself in times that are reasonable for them.

There might be some strategies to be activated in the short term, through the creation of package products: while this is not an issue in corporate destinations, where both lifts and huts belong to, or are managed by the same corporation, it might become an issue in community destinations, like the resorts belonging to the Dolomiti Superski network. A new type of ski pas could be issued, giving access to the slopes as well as granting some advantages for patrons in the existing huts located along the slopes. For instance, a specific *après-ski deal*, composed of a regular, non-refundable ski pass and a number of drinks or aperitifs, or even meals, in partner huts, could be sold.

The All-Round Snow deal – Similar to the après-ski deal in its motivation and structure, this is another type of package deal, which could be put together and sold by lift providers. It would consist in a double ski-pass (result of an agreement with the cross-country ski providers), sold of course at a higher price than the regular one, giving access to both Alpine ski slopes and cross-country ski tracks. Since the postulate behind this is that skiers usually go on holidays with some non-skiing relative or friend, the deal could be either enjoyed by a single person who wishes to try both activities, or could be used by two different subjects at a time.

References

Aguiló, E., Alegre, J. and Sard, M., (2003), "Examining the market structure of the German and the UK tour operator industries through an analysis of package holiday prices", *Tourism Economics,* Vol. 9, pp. 255-278.

Alessandrini, S. (2013), "Quality of ski resorts and competition between the Emilian Appennines and Altipiani Trentini. An estimate of the hedonic price", *Review of Economic Analysis*, Vol. 5, pp. 42-69.

Andersson, D.E. (2010), "Hotel attributes and hedonic prices: an analysis of internet-based transactions in Singapore's market for hotel rooms", *The Annals of Regional Science*, Vol. 44, pp. 229-240.

Candela, G. and Figini, P. (2012), *The Economics of Tourism Destinations*, Heidelberg: Springer.

Chen, C. and Rothschild, R. (2010), "An application of hedonic pricing analysis to the case of hotel rooms in Taipei", *Tourism Economics*, Vol. 16, pp. 685-694.

Daidola, G. (2006), "Il cortocircuito dello sci di massa", in: WWF (Eds.), *Alpi, Turismo e Ambiente: alla ricerca di un equilibrio*, pp. 38-42. Retrieved from: http://alpi.wwf.it/dossier-alpi.html (last accessed 29/07/2016)

Espinet, J.M., Saez, M., Coenders, G. and Fluvia, M. (2003), "Effect on prices of the attributes of holiday hotels: a hedonic pricing approach", *Tourism Economics*, Vol. 9, pp. 165-177.

Falk, M. (2008), "A hedonic price model for ski lift tickets", *Tourism Management*, Vol.29, pp. 1172-1184.

Falk, M. (2013), "A survival analysis of ski lift companies", *Tourism Management*, Vol. 36, pp. 377-390.

Gundimeda, H. (2016) "Hedonic Price Method – a concept note", Chennai: Madras School of Economics. Retrieved from: http://coe.mse.ac.in/dp/hedonic%20price.pdf (last accessed 04/09/2016)

Hamilton, J.M. (2007), "Coastal landscape and the hedonic price model of accommodation", *Ecological Economics*, Vol. 62, pp. 594-602.

Haroutunian, S., Mitis, P. and Pashardes, P. (2005), "Using brochure information for the hedonic analysis of holiday packages", *Tourism Economics*, Vol. 11, pp. 96-84.

Koslow, M. (2006), "The effects of non-participatory characteristics: the case of lift tickets", *Issues in Political Economy*, Vol. 15, pp. 31-45.

Liquori, A. (2011), "Turismo montano e turismo della neve: tendenze e prospettive", in: CAI-TAM (Eds.), *Atti aggiornamento nazionale CAI-TAM 2010. Montagna, neve e sviluppo sostenibile: quali prospettive*, pp. 14-24, Milan: Club Alpino Italiano.

Macchiavelli, A. (2002), "Problemi e prospettive del turismo della neve", in Pechlaner and Manente (Eds.) (2002) *Manuale del Turismo Montano",* pp. 151- 171, Milan: Touring University Press.

Macchiavelli, A. (Ed.) (2006), *Il Turismo Montano tra Continuità e Cambiamento,* Milan: Franco Angeli.

Minghetti, V. (2006), "Neve e turismo in Italia: come cambia la domanda", in: WWF (Eds.), *Alpi, Turismo e Ambiente: alla ricerca di un equilibrio,* pp. 24-37.
Retrieved from: http://alpi.wwf.it/dossier-alpi.html (last accessed 29/07/2016)

Mulligan J.G. and Llinares E. (2003), "Market segmentation and the diffusion of quality-enhancing innovations: the case of downhill skiing", *The Review of Economics and Statistics,* Vol. 85, pp. 445-461.

Papathodorou, A., Lei, Z. and Apostolakis, A. (2012), "Hedonic price analysis", in Dwyer L., Gill A., Seetaram N. (eds.) (2012) *Handbook of Research Methods In Tourism. Quantitative and qualitative approaches,* pp. 170-182, Cheltenham: Edward Elgas.

Pawlowski, T. (2011), "Hedonic prices for ski lift passes in Europe", *The Empirical Economics Letters,* Vol. 10, pp. 819-825.

Schwieterman, J. (1995), "A hedonic price assessment of airline service quality in the US", *Transport Reviews,* Vol. 15, pp. 291-302.

Sirmans, G.S and Macpherson, D.A. (2003), "The valuation of housing characteristics", Research paper completed for the National Association of Realtors.

Thrane, C. (2005), "Hedonic price models and sun-and-beach package tours: the Norwegian case", *Journal of Travel Research*, Vol. 43, pp. 302-308.

Vanat, L. (2016), *2016 International Report on Snow and Mountain Tourism*, 8th Edition, Genève, retrieved from: http://www.vanat.ch/RM-world-report-2016-vanat.pdf (last accessed 29/07/2016)

Walsh, R.G., Miller, N.P. and Gilliam, L.O. (1983), "Congestion and willingness to pay for expansion of skiing capacity", *Land Economics,* Vol. 59, pp. 195-210.

Williams, P. and Fidgeon, P.R. (2000), "Addressing participation constraint: a case study of potential skiers", *Tourism Management,* Vol. 21, pp. 379-393.

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Table 1: OLS log-linear model estimates

Variables	Coefficient	Standard error	t-value
constant	3.7311***	0.0493	75.67
DUR	-0.2902***	0.0022	-13.49
NORMALSEA	0.8121***	0.0135	6.03
HIGHSEA	0.1994***	0.0136	14.67
KM	-0.0037**	0.0002	-2.43
ARTSNOW	0.1855***	0.0246	7.56
HSPEED	0.1477***	0.0354	4.18
ALT	-0.0002***	0.0000	7.41
NIGHT	-0.0055	0.0053	-1.03
COUNTRY	0.0002***	0.0001	2.79
TOBO	-0.0002	0.0002	-1.63
HUT	0.2753***	0.0390	7.06
REP	0.1038***	0.0121	8.59
SELLARONDA	0.5304***	0.0057	9.32
GWAR	-0.0077	0.0079	-0.98
HSPEED*DUR	-0.0076***	0.0023	-3.29
KM*DUR	-0.0004***	0.0000	-3.58
NORMALSEA*DUR	0.0015	0.0011	1.39
HIGHSEA*DUR	0.0026**	0.0011	2.41
NORMALSEA*HSPEED	0.0065	0.0217	0.30
HIGHSEA*HSPEED	0.0096	0.0216	0.44
R^2	**0.9864**		

Number of observations: 180. Significance at the 1%, 5% or 10% level is denoted by ***, ** and * respectively. Robust standard errors are reported.