

A Hedonic Price Model for Ski Lift Tickets

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Abstract:

Using a unique database of 85 ski resorts and 1,524 lifts and cable cars in Austria, we investigate the relationship between lift ticket prices for the 2005-2006 season and factors that influence the quality of ski resorts. We estimate a hedonic price function using OLS and robust regression techniques on length of ski runs, transport capacity (measured as vertical transport metres per hour), share of modern high-speed chairlifts and gondolas, age of mountain transport facilities, and measures of snow cover (i.e. mean altitude of peak lift stations, length of ski season and share of ski runs with artificial snow) as independent variables. In order to control for the price effects of associated ski areas covered by a multi-area ski pass, we use a set of dummy variables. We also apply spline functions in order to account for non-linearities. The empirical results show that the quality characteristics are positive and statistically significant in most of the cases, with an adjusted R^2 ranging between 0.6 and 0.7. Furthermore, the share of modern high-speed chairlifts and gondolas, measures of snow cover are more important than the length of ski runs and overall lift capacity in determining the price of lift tickets. Given the empirical estimates, we also provide a ranking of the ski resorts according to their quality characteristics.

Keywords: hedonic pricing, ski resorts, quality characteristics, spline functions

JEL classification: D4, C3, R4

1. Introduction¹

The Austrian Alps are one of the most popular ski destinations in Europe. However, Austria's ski resorts differ widely in characteristics such as quality of skiing (e.g. length of ski runs and availability of modern transport facilities), average snowfall, average slope altitude, scenery, distance of the resort from the nearest population centre, and number and quality of accommodations, amenities and promotional activities. Some ski resorts offer slopes totalling 200km of length or more, while others have just a fraction of that. Many ski resorts have invested heavily in new high-speed lifts and gondolas that are often installed at higher altitudes and with greater lift capacity. Others have good snow cover due to their excellent artificial snowmaking facilities. There are thus many different ski resorts with markedly different qualities. It is not surprising that lift ticket prices differ considerably across ski resorts. For example, the price of a six-day lift pass is 10% higher in Soelden than in Saalbach/Hinterglemm/Leogang although the two locations offer 150km and 205km of slopes, respectively. Choosing the best ski resort for one's ski holiday can sometimes be difficult, although the internet offers high-quality information on the prices and characteristics of ski resorts. Most of this information is provided by the resorts' own websites, but can also be found from other sources (see: www.bergfex.com). Magazines offering detailed information on ski resorts (such as "*Where to Ski and Snowboard in 2006*" by Chris Gill) are also helpful. Since these sources offer detailed information on lift ticket prices and resort quality, ski resorts are expected to face strong competition. As a result, differences in lift ticket prices should be due solely to quality characteristics and demand factors. In particular, we expect a strong correlation between price and service quality factors such as the length of ski runs and the number and share of modern high-speed and/or detachable chairlifts.

Hedonic price analysis facilitates an understanding of which characteristics are valued by consumers to what extent. It is frequently used to quantify the effects of housing and neighbourhood characteristics on house prices. For housing prices, empirical studies indicate a strong relationship between price and quality. There are also a number of studies that apply hedonic pricing models to the field of tourism. For instance, Papatheodorou (2002) and Espinet et al. (2003) estimate hedonic price models for Mediterranean resorts. Relatively little attention has been paid so far to the price-quality relationship as it concerns ski resorts. A notable exception is Mulligan and Llineares (2003), who studied the price-setting behaviour of U.S. ski resorts. Using data on 344 U.S. ski resorts from the

¹ I would like to thank Tyler Schaffner for proof reading and Wilfried Puwein and Egon Smeral for helpful discussions on this project. In preparation of this work, I had also extensive contact with managers of ski resorts. This work was to a large extent motivated by a presentation by Hannes Parth, CEO of Silvetta Seilbahn, entitled "Looking for the Best Ski Resort".

1996-1997 ski season, the authors find that ski areas with a larger vertical drop and faster chairlifts (measured as a dummy variable) charge higher lift ticket prices. Population size within 125 miles and number of competitors also have a positive and statistically significant effect on lift ticket prices.

In this paper, we apply the hedonic price model to investigate the pricing strategy of ski resorts. The most essential characteristics of ski resorts are total length (in kilometres) of ski runs, including ski routes; total lift capacity; share of modern high-speed transport facilities; mean altitude of peak cable-car and lift stations; and length of season. The hedonic price equations are estimated using OLS and robust regression techniques. In order to allow for a more flexible functional form, we also apply linear spline functions. Specifically, we use a piecewise linear spline function with a single knot. To our knowledge, this is the first application of the hedonic price model to ski resorts in a European country using micro-level data. Another aim of this paper is to provide a ranking of the ski resorts according to their quality characteristics.

The paper is structured as follows. Section 2 introduces the empirical model, in particular the specification of the hedonic price model and the hypotheses. Section 3 provides the data description, section 4 presents our empirical results, and section 5 concludes.

2. Empirical model

In order to investigate the price-quality relationship across ski resorts, we adopt a hedonic price model introduced by Rosen (1974). The model assumes that there is a perfectly competitive market with no significant transaction costs. If this is the case, the author shows that the textbook model of perfect competition can be extended to a case where consumers value various attributes in different ways. If all of the attributes are measured correctly, the correct functional form is chosen; if the information is perfect, the outcome of all the independent decisions of producers and consumers is an exact functional relationship between the quality-differentiated good and the attributes embodied in that good. The model predicts that attributes that are positively valued will have positive signs in the hedonic price equation. The market for ski destinations is assumed to be in equilibrium if skiers optimize their choice based on the lift ticket prices of alternative ski locations. Under the assumption of no search and information costs, the lift ticket prices of any ski resort can be described as a function of the resort's characteristics. We specify a ski resort's ticket price as a function of a number of characteristics:

$$\ln P_i = \alpha + \beta X_i + \varepsilon_i,$$

where i denotes the ski resort, P_i is the natural logarithm of the price of a day lift ticket (or alternatively, the price of a six-day lift pass). X_i is a vector of characteristics, and ε_i is white noise. X_i may be measured in logs or in levels. The partial derivative of P_i with respect to the characteristics, $\partial P_i / \partial X_i$, is referred to the marginal implicit price, which represents marginal willingness to pay for the ski resort's characteristics. For example, the partial derivative of the hedonic price function with respect to total length of slopes represents the additional amount that skiers would be willing to pay for an additional kilometre of slopes. Once the regression equation has been estimated, the estimated coefficients $\hat{\beta}$ and $\hat{\alpha}$ can then be used to calculate the logarithm of the predicted price level:

$$\ln \hat{P}_i = \hat{\alpha} + \hat{\beta} X_i + u_i.$$

We then obtain level prices through exponentiation of the predicted log values. The predicted price level reflects the quality of the ski resort: the higher the predicted lift ticket price, the higher the implicit value of the ski resort. That predicted price can then be compared with the observed price to reveal the ski resorts that are significantly over- or underpriced (Triplett, 2004). If the observed price is higher than the predicted price, one may conclude that the ski resort is overpriced given its attributes.

It is well known that the functional form of the hedonic price function has to be determined from the data. Goodman (1978) introduced the use of linear Cox-Box transformation. Halvorsen and Pollakowski's (1981) introduced the highly general and flexible quadratic Cox-Box transformation that includes simple functional forms as special cases. Palmquist (2005) suggests that linear Box-Cox and even simple forms (linear and semi-log) are reasonable specifications for the hedonic price model. However, since some explanatory variables, such as share of slopes covered by artificial snow and share of high-speed lifts, are characterized by zero-valued observations, we cannot apply the Box-Cox function. Instead, we apply linear spline techniques (see Greene, 2003). In particular, some of the right-hand variables are modelled as partially linear using a spline function with one knot:

$$\ln P = \beta_0 + \beta_1 d_1(K)(X - K) + \beta_2 d_2(K)(X - K) + \phi Z,$$

where $d_1(K)$ denotes a dummy variable which takes the value 1 if $X \leq K$ and 0 if $X > K$; $d_2(K) = 1 - d_1(K)$ denotes a dummy variable which takes the value 1 if $X > K$. Z denotes a vector of other explanatory variables. Note that the model is specified by a spline function with two linear parts because of the small sample size. We consider a number of attributes of ski resorts. Ski resorts

differ in several ways, such as average snowfall, lift capacity, average altitude of slopes, distance of ski resorts from urban centres, and number and quality of accommodations, amenities and promotional activities (see Ormiston et al., 1996). Seven potential indicators of ski resort quality are chosen for this study. One important characteristic of a ski resort is the total length (in kilometres) of ski runs, including ski-routes. Furthermore, we use the standard measure of lift capacity, vertical transport metres per hour, as an explanatory variable:

$$VTMH = \frac{\text{lift capacity in skiers per hour} \times \text{vertical metres rise}}{1000}.$$

This is a measure of lift capacity in passengers per hour multiplied by vertical distance. It measures the number of persons who can be transported up the mountain at a speed of 1,000 metres per hour. For each ski resort we calculate the sum of the VTMH:

$$LC = \sum_1^J VTMH_j,$$

where j denotes the ski lift, regardless of type (this includes surface lifts, fixed and detachable chairlifts, aerial tramways, gondola ropeways such as MGDs, and funitel systems). Of course, large transport facilities reduce queues and make the ski resort more attractive. Besides total lift capacity, economic theory suggests that the structure of the transport facilities in question is also an important determinant of lift ticket prices. Ski lift technology should be convenient and fast in order to transport a large number of skiers while avoiding queues. Many forms of ski lift, such as T-bars and fixed-grip chairlifts (mostly two-person chairlifts) have been replaced by high-speed, high-capacity ski lifts. Our database also enables us to distinguish between highly comfortable high-speed chairlifts/cable cars and less comfortable fixed chairlifts, aerial tramways and surface lifts. The structure of transport capacity is measured as share of lift capacity of modern high-speed lifts and cable cars divided by total transport capacity:

$$LCSTRUCT = \frac{\sum_1^J VTMH_{HS_j}}{\sum_1^J VTMH_j},$$

where $VTMH_{HS}$ includes the transport capacity of high-speed chairlifts, modern gondola ropeways (e.g. monocable gondola detachables or MGDs) and funitel systems but excludes the

transport capacity of surface lifts and fixed-grip chairlifts. We expect that a high share of modern chairlifts, $LCSTRUCT$, to have a positive effect on ski lift ticket prices.

In addition, for each ski resort we calculate the weighted average age of the chairlifts and cable cars, where the weights η_j are the share of each lift in total lift capacity (measured as VTMH):

$$AGE = \sum_1^J \eta_j AGELIFT_j .$$

Snow is the most essential input factor for skiing. In order to measure the amount of snow cover, we use three indicators. First, we consider the use of snow-making machines. Installation of artificial snow-making equipment allows skiing with less natural snow, increases the length of the ski season and leads to an even cover of snow throughout the season. We measure the use of snow-making by the percentage of ski runs with artificial snow. Second, we include the altitude of the ski resort. In particular, we calculate the average altitude of each ski resort as a weighted average of the peak lift stations, where the weights, η_j , are the share of the capacity of lift j in the resort's total lift capacity, measured as VTMH:

$$ALT = \sum_1^J \eta_j ALTLIFT_j .$$

Third, we use the duration of the ski season, measured as the number of ski days in operation in the 2005-2006 season as an indicator of snow cover. One can assume that a longer ski season reflects good snow cover. Typically, resorts with glaciers can offer an early season start. Weather conditions are also important, but average snowfall data was not available for each of the 85 ski resorts observed here.

The hedonic price model is specified as follows:

$$\ln P_i = \alpha + \beta_1 \ln KM_i + \beta_2 \ln LC_i + \beta_3 LCSTRUCT_i + \beta_4 \ln ALT_i + \beta_5 \ln DAYS + \beta_6 ARTSNOW_i + \beta_7 \ln AGE_i + \delta_m \sum_1^m D_m + u_i$$

where \ln is the natural log.

- P* : price of a day lift ticket for adults in the 2005-2006 peak season; alternatively, price of a six-day ski pass for adults in the 2005-2006 peak season (both allowing for guest card discounts granted to those staying at the resort)
- KM* : total length of slopes in kilometres,
- LC* : total vertical lift capacity in persons per hour,
- LCSTRUCT* : share of high-speed chairlifts and gondolas,
- ALT* : average altitude of peak lift stations (excluding T-bar lifts),
- DAYS* : days of operation in the 2005-2006 ski season,
- ARTSNOW* : share of ski runs on artificial snow,
- AGE* : average age of cable cars and chairlifts (excluding T-bar lifts) in years,
- D_M* : dummy variables for mth associated ski areas accessible with a single lift pass without restrictions.

The dependent variable is the natural logarithm of the price of a day lift ticket during peak season (alternatively, the price of six-day lift pass). The right-hand variables are also in log form, except share of ski runs on artificial snow and share of high-speed chairlifts and modern cable cars in lift capacity. The reason is that both the percentage of slopes with artificial snow and share of high-speed chairlifts include few observations with zero values. We can formulate a number of hypotheses. Lift ticket prices increase with the total length of slopes, aggregate lift capacity, share of modern high-speed lifts and age of transport facilities. We also expect price to be positively correlated with the different measures of snow cover (i.e. length of ski season, percentage of slopes with artificial snow, mean altitude of peak lift stations).

The attractiveness of ski areas also depends on whether they are connected by ski bus to other ski resorts that are accessible with the same ski pass. For instance, Ski Arlberg offers a lift ticket valid with limited validity at all of its ski locations (Lech/Zuers, St. Anton, St. Christoph and Stuben), as well as bus rides between the locations. Ski Amadé, Zillertal (Ziller Valley Super Ski Pass) and Kitzbuehl & SkiWelt (Kitzbuehler Alpenpass) also feature interlinked ski areas covered by a joint lift pass and bus rides. However, they also place restrictions on ticket validity. For instance, the largest Ski

Alliance in Austria – Skiverbund Amadé, covering 28 ski resorts in the Salzburg province – is valid for a minimum duration of three days.² The common ski pass for Austria’s largest ski resort, SkiWelt & Kitzbuehl (420km of ski runs), is valid for a minimum six days. The five ski resorts in the Ziller Valley also share a common lift pass valid for a minimum of four days. Therefore, dummy variables addressing the price effects of interlinked ski resorts are only reasonable for the hedonic equation determining prices of six-day ski passes. In some cases, despite the lifts all being in the same province and featuring the same joint ski pass, there were no bus rides between the different ski areas and/or long distances between the area. When this is so, we do not account for the effect of a multi-area ski lift pass.

In order to factor in interrelations among the ski resorts, one can also re-specify the hedonic model to allow for these spatial effects. The spatial-lag model is an appropriate tool when capturing neighbourhood spillover effects (Palmquist, 2005). The idea is that lift ticket prices of neighbouring ski areas influence the lift ticket prices of any given ski resort. Specifically, we expect, *ceteris paribus*, that higher lift ticket prices at a particular ski resort would lead to higher prices at neighbouring ski resort. In the spatial-lag model, the spatially weighted sum of neighbourhood prices (referred to as the spatial lag) is entered into the specification of the hedonic price equation as an explanatory variable. A general spatial hedonic model incorporating the spatial dependent variable and spatial correlated errors can be written as follows:

$$\ln P_i = \alpha + \rho W \ln P_i + \beta X_i + \varepsilon_i,$$

where $\varepsilon_i = \lambda W \varepsilon_i + \nu_i$ and W are the weighting matrix, ρ is the spatial lag model and λ is part of the error term. The spatial weight matrix can be specified as 1 minus the Euclidian distance between ski resort i and j (weights declining with distance). We test whether ρ and λ are equal to zero. As mentioned above, a simple solution to capture the effects of interlinked ski resorts would be to include geographical dummy variables for ski resorts that are part of ski alliances.

Proximity to population centres (Munich and Vienna) may also affect ski lift ticket prices. It is expected that ski lift ticket prices decrease with the distance of the ski resort from where skiers live or stay. For the U.S. and Canada, the further a ski resort is from where skiers live or stay, the less likely they are to visit. Since most Austrian ski resorts can be reached from Munich within two hours, we do not expect that distance is an important determinant of lift ticket prices in this study. Distance can be

²Ski Amadé first introduced minimum ticket durations for the 2004-2005 season.

directly entered into the model. We also consider the longest downhill valley run and the ski resort's year of foundation as additional explanatory variables.

3. Data and stylized facts

The data set is comprised of 85 ski resorts, representing 90% of all ski resorts in Austria featuring a minimum total slope length of about 5km. Our ski area information is taken from a number of sources. The Association of Austrian Cable Car Operators provides data on the length of ski runs in kilometres, ski runs covered with artificial snow and the number of ski lodges (<http://www.seilbahnen.at/winter/seilbahnen/files/winterfibel.pdf>; downloaded July 2006).³ In order to check the accuracy and reliability of the data, we also retrieved data from the website *www.bergfex.com* and from other magazines (e.g. *ADAC Ski-atlas 2005/2006*, *DSV-Atlas 2005/2006* and *Der Große Falk Ski Atlas Alpen 2006*). These sources also contain information on lift ticket prices. We collected data on two types of lift tickets for adults: the peak-season price of a day lift ticket and of a six-day ski pass. In addition, we take into account that some ski resorts offer discounts to guests with an overnight stay at the ski resort. The magazines also contain information on the lengths (in kilometres) of each resort's ski runs, ski routes, and longest run, as well as the percentage of slopes covered by artificial snow.

The information on lift characteristics comes from a variety of sources. The primary source is the cable car database (Seilbahnstatistik 2000/2001) provided by the Austrian Federal Ministry of Transport, Innovation and Technology. This database includes mountain lift capacity in persons per hour, vertical drop in metres, year of installation and altitude of the highest lift station. Mountain lift systems include detachable chairlifts (carriers for two, four, six or eight passengers with lift capacity of up to 4,000 persons per hour), fixed-grip chairlifts (carriers for one, two, four and six), funitel systems (up to 4,000 persons per hour), MGD gondolas (with lift capacity of up to 3,600 persons per hour), aerial ropeways and surface lifts such as T-bars with lift capacity of up to 1,400 persons. Year of installation is not available for surface lifts. Note that the data only refers to the 2000-2001 season. Therefore, we supplement this data with information from other sources, from the following in particular: "Seilbahnen, Lifte in Tirol 2004/2005" ("Cable Cars and Chairlifts in Tyrol") and "Seilbahnen, Sessel- und Schlepplifte in Vorarlberg 2005/2006" ("Cable Cars and Chair- and T-Bar Lifts in Vorarlberg"). For the remaining provinces (e.g. Salzburg, Styria, etc.), we use data from an

³ Note that in Europe, ski areas are measured by trail length, not by terrain area as in North America.

internet site (<http://www.lift-world.info/english.php>) that provides detailed data on each lift. We carefully checked the data from these different sources to ensure its accuracy and reliability. Overall, we found few inconsistencies. In total, we collected information on 1,524 chairlifts, cable cars and other lift systems.

Table 1 presents summary statistics on the variables for the sample used in the subsequent regressions. We report means, medians, standard deviation and minimum and maximum values. Day lift ticket prices range between €24 in Annaberg (in the Lower Austria province) and €39.50 in Lech/Zuers/St. Anton and in Soelden. The standard deviation of the lift prices is about 3.4, indicating a small variation in lift ticket prices across ski resorts. The price of six-day ski passes ranges between €108.50 in Annaberg and €193.50 in Soelden. The average length of ski runs (including ski routes) is 67 kilometres. The average lift capacity is 8,941 persons (indicating the capacity to transport 8,941 skiers up a mountain at a speed of 1,000 vertical metres per hour). The share of high-speed (detachable) chairlifts and modern gondolas in total lift capacity is 59%. The mean altitude of peak lift stations (i.e. uphill cable and chairlift terminals) is 1,916 metres. As expected, average altitude is highest at the glacier ski resorts (e.g. Pitztaler, with 3,001m; Stubai, 2,812m; and Soelden, 2,707m). Among the non-glacier ski resorts, this figure is highest at Ischgl/Samnaun with 2,518 m, followed by Kuehtai with 2,423m. The weighted average construction year of the mountain lift systems (excluding surface lifts) is 1994. The mean length of ski season is 144 days. On average, snowmaking facilities are in place on 61% of the runs.

Table 1: Descriptive statistics

	mean	median	std. dev	min	max
price of day lift ticket for adults (€)	32.2	31.5	3.4	24.0	39.5
six-day lift pass for adults (€)	156.2	156.5	18.3	108.5	193.5
total length of ski runs (km)	66.9	44.0	55.5	8.0	255.0
vertical transport metres (persons per hour divided by 1,000)	8941	5032	8462	980	38514
share of detachable chairlifts, detachable cable cars and funitels (%)	0.59	0.63	0.20	0.00	0.88
weighted mean altitude of peak lift stations (m)	1916	1837	385	1170	3008
length of ski season (days)	144	139	32	110	303
slopes with artificial snow (%)	0.61	0.67	0.29	0.00	1.00

Table 2 shows the correlation among the variables. As expected, there is significant correlation between lift ticket prices and different quality characteristics in most cases. The highest correlation can be observed between total transport capacity and lift ticket prices. As expected, there are also

some high correlation coefficients between the right-hand variables. For instance, total length of slopes and lift capacity are highly correlated, with a coefficient of 0.88 and a p-value of 0.00. In the empirical part of the paper, we perform an F-test of joint significance in order to deal with potential multicollinearity.

Table 2 : Correlation matrix (p-values in parentheses)

	ln price of day lift ticket (€)	ln price of six-day ski pass (€)	ln total length of ski runs (km)	ln vertical transport metres persons per hour	share of detachable chairlifts/gondolas (%)	ln wt. mean alt. peak lift stations (m)	ln ski season (days)	slopes with artificial snow (%)	ln construct. year of transport (years)
ln price of day lift ticket (€)	1.0								
ln price of six-day ski pass (€)	0.86 0.00	1.00							
ln total length of ski runs (km)	0.69 0.00	0.65 0.00	1.00						
ln vertical transport metres persons per hour	0.73 0.00	0.70 0.00	0.88 0.00	1.00					
share of detachable chairlifts/gondolas (%)	0.43 0.00		0.27 0.01	0.36 0.00	1.00				
ln weighted mean altitude of peak lift stations (m)	0.45 0.00	0.37 0.00	0.30 0.00	0.28 0.01	0.25 0.02	1.00			
ln length of ski season (days)	0.43 0.00	0.36 0.00	0.23 0.03	0.25 0.02	0.09 0.40	0.57 0.00	1.00		
slopes with artificial snow (%)	-0.17 0.11	-0.02 0.89	-0.15 0.17	-0.03 0.77	0.05 0.66	-0.37 0.00	-0.36 0.00	1	
ln construct. year of transport facilities (years)	-0.22 0.05	-0.21 0.05	-0.11 0.32	-0.22 0.04	0.13 0.22	-0.18 0.11	-0.12 0.26	0.12 0.27	1.00

4. Estimation results

4.1 Results for day lift tickets

Table 3 presents the OLS estimates of the log-linear hedonic price equations for day lift tickets, where the t-values are based on heteroskedastically consistent standard errors.⁴ We also provide estimates of a robust regression technique, which is an iterative, weighted least-squares procedure that puts less weight on outliers (see column 2). Overall, the fit of the model is quite good, with an adjusted R² of

⁴ Since the standard errors may be dependent within clusters (associated ski areas), one can adjust for cluster dependency. However, unreported results indicate that the standard errors do not change much when this dependency is taken into account.

0.66. This indicates that price dispersion among ski resorts can be mainly explained by their difference in characteristics. In other words, the variation in price is only to a small extent due to unobserved factors. Recall that the derivative of the hedonic price equation with respect to each explanatory variable is its marginal implicit price. Thus, the elasticities of the hedonic equation can be interpreted as the marginal WTP, assuming the market is in equilibrium. Some variables are not included in the regression because preliminary regressions indicate they are not significant. These variables include longest downhill valley run, year of resort foundation and average age of lift facilities.

Table 3: Hedonic price model for the price of an adult day lift ticket

	OLS		Robust regression	
	coeff	t-value	coeff	t-value
ln total length of ski runs in km ($\ln KM$)	0.031	1.58	0.031	1.49
ln vertical transport metres per hour ($\ln LC$)	0.046 **	2.65	0.049 **	2.52
share of high-speed chairlifts and gondolas ($LCSTRUCT$)	0.109 **	2.28	0.095 **	2.36
ln average altitude of peak stations ($\ln ALT$)	0.032	0.57	0.049	0.99
ln number of operational days in the 2005-2006 season ($\ln DAYS$)	0.110 **	2.68	0.098 *	1.96
share of runs with snowmaking facilities ($\ln ARTSNOW$)	-0.004	-0.15	0.001	0.03
dummy variable Ski Arlberg	0.110 **	6.96	0.108 **	2.21
constant	2.093 **	6.56	1.994 **	5.75
F-test $\ln KM = \ln LC = 0$ (p-value)	0.000		0.000	
F-test $\ln DAYS = \ln ALT = 0$ (p-value)	0.000		0.020	
Adjusted R^2	0.657			

Notes: t-values are based on white corrected standard errors. Significance at the 5 or 10% level is denoted by ** and *, respectively. The dependent variable is the logarithm of adult day lift ticket prices in peak season, adjusted for discounts on lift tickets with overnight stay at the ski resort.

The total length of slopes in kilometres has a positive but statistically insignificant effect on the day lift ticket logarithm. The individual insignificance of the length of trails possibly reflects multicollinearity between length of trails and vertical lift capacity. Therefore, we also report the results of the F-test of joint significance of both variables ($\ln KM = \ln LC = 0$), whose p-value of 0.00 indicates that vertical lift capacity and total length of slopes are highly significant. The magnitude of the impact of total length of slopes is quite small. An increase of 50% in total length of slopes (equal to 33.7 km) leads to a 1.6% increase in lift ticket price (from €32.20 to €32.70). As expected, vertical lift capacity is positive and statistically significant with an elasticity of 0.046. This suggests that an increase in vertical lift capacity of 10% leads to an increase of 0.46% in lift ticket price. The share of high-speed chairlifts and modern cable cars in total lift capacity is positive and statistically significant at the 1% level. To provide an indication of the effect's magnitude, we calculate the elasticity. The coefficient of 0.11 translates into an elasticity of 0.065 ($=0.59 \cdot 0.11$). Thus, an increase in the share of high-speed lifts from 0.59 (based on sample means) to 0.69 would lead to a 1% increase in lift ticket price. Both

the logarithm of average altitude of peak lift stations and the logarithm of number of days of operation in the 2005-2006 season are significant at the 1% level when included separately.⁵ When both variables are included in the regression, only the logarithm of length of season remains statistically significant at conventional significance levels. However, the F-test of joint significance of both variables ($\ln DAYS = \ln ALT = 0$) rejects the hypothesis that both coefficients are zero. The multicollinearity is expected since the length of ski season varies and depends on the altitude of the resort's peak lift stations. The coefficient of share of ski runs with artificial snow is not significant. This is somewhat surprising: one would expect ski resorts characterised by good snow cover to be more attractive than others. However, there is a significant relationship between the price of a six-day ski pass and the percentage of slopes covered by artificial snow (see table 5 in the next section). Concerning the dummy variables indicating the availability of multi-area ski passes at a ski resort, we find that the Ski Arlberg dummy is highly significant; this shows that lift ticket prices are higher in all sections of the ski resort.

In order to allow for a more flexible functional form, we also estimate spline functions. Table 7 in appendix shows the results of the linear spline analysis. We use two different intervals for three right-hand variables (i.e. total length of slopes, transport capacity and share of modern high-speed lifts). Our linear spline specification for the effect of share of high-speed chairlifts and gondolas specifies one linear effect between 0 and 0.74 (labelled as [0; 0.74]), corresponding to an effect of the share of high-speed lifts less than 0.74. The coefficient of share of modern chairlifts in the second interval is three times higher than in the first interval, indicating that lift ticket prices are an increasing function of share of high-speed lifts. However, the null hypothesis that the slopes of the relationship between share of high-speed lifts remain constant across the two intervals cannot be rejected. This also holds for the two other variables. Furthermore, estimated coefficients of the second interval measuring change in slopes and change in lift capacity indicate only small changes in the first interval.

We also test the significance of including the spatial autoregressive parameter. The spatially lagged dependent variable is positive but not significantly different from zero at conventional levels, indicating the absence of neighbourhood effects. Furthermore, the LM test cannot reject the null hypothesis that the spatial autoregressive parameter ρ is significantly different from zero. The tests for spatial effects were carried out for a range of spatial weights matrices based on a distance cut-off of 10, 15 and 20km.

⁵ Detailed estimation results are available upon request.

Table 4: Actual and predicted prices of adult day lift tickets 2005-2006 and basic ski area characteristics

ski resort	actual	predicted lift		predicted lift		KM	LC	LCSTR	ART-	ALT	DAYS	AGE
	price, day	based on robust	rank	ticket prices	rank							
	lift ticket	regression	technique	based on OLS				-UCT	SNOW			
	€	€		€								
St. Anton	39.5	39.8	1	39.8	1	162	21366	0.58	0.27	2206	157	1991
Lech/Zuers	39.5	39.2	2	39.3	2	150	15418	0.63	0.27	2163	157	1989
Ischgl/Samnaun	35.0	38.2	3	38.0	3	240	31645	0.87	0.33	2519	157	1995
Saalbach/Hinterglemm/ Leogang	36.0	36.6	4	36.5	5	205	30306	0.82	0.75	1769	137	1996
Stubai Gletscher (glacier)	35.0	36.6	5	36.6	4	105	11180	0.73	0.14	2812	242	1993
Soelden (glacier)	39.5	36.6	6	36.3	6	150	28271	0.56	0.28	2707	162	1994
Serfaus/Fiss/Ladis	39.0	36.2	7	36.0	9	175	22180	0.78	0.69	2222	141	1998
SkiWelt Wilder Kaiser	33.0	36.2	8	36.1	8	255	38514	0.59	0.81	1492	139	1992
Mayrhofen/Hippach	33.5	36.1	9	36.0	11	161	26314	0.74	0.63	2055	141	1997
Obergurgl/Hochgurgl	38.0	35.9	10	35.7	13	130	15032	0.75	0.90	2657	165	1994
Kitzsteinhorn (glacier)	36.0	35.9	11	36.2	7	42	14229	0.73	0.14	2212	272	1997
Flachau/Wagrein/Alpendorf	35.0	35.9	12	35.8	12	194	25308	0.72	0.91	1641	143	1993
Pitztaler Gletscher (glacier)	34.0	35.9	13	36.0	10	25	3989	0.62	0.23	3008	242	1985
Hintertuxer Gletscher	35.0	35.7	14	35.7	14	110	11972	0.65	0.09	2652	202	1991
Kitzbuehl	36.5	35.6	15	35.4	16	158	33128	0.55	0.46	1749	141	1989
Planai/Hochwurzen/Hauser/ Kaibling/Reiteralm	36.0	35.5	16	35.5	15	130	22629	0.73	0.94	1624	154	1994
Hochzillertal/Hochfuegen/ Kaltenbach	35.0	35.4	17	35.2	17	145	17198	0.77	0.84	2036	141	1998
Zillertal Arena	34.0	35.2	18	35.1	18	129	22162	0.65	0.39	1993	141	1997
Obertauern	34.0	34.6	19	34.6	19	96	10829	0.81	0.90	2045	157	1997
Silvretta Nova	36.0	34.3	20	34.2	21	124	15727	0.59	0.52	1926	141	1988

Notes: *KM* denotes total length of slopes in kilometres, *LC* is total vertical lift capacity in persons per hour, *LCSTRCUT* is the share of high-speed chairlifts and gondolas, *ALT* is average altitude of peak lift stations (excluding T-bar lifts), *DAYS* are days of operation in the 2005-2006 ski season, and *ARTSNOW* is the share of ski runs on artificial snow, *AGE* is the average age of cable cars and chairlifts (excluding T-bar lifts) in years.

One key parameter of interest is the predicted price level that serves as a measure of the ski resorts' quality. Table 4 presents the predicted price and the observed price of a day lift ticket (peak season) for the top 20 ski resorts based on both OLS estimates and the robust regression method. In addition, we also provide an overview of the basic resort characteristics. According to this study, the highest-quality resort was St. Anton, followed by Lech/Zuers and Ischgl. Saalbach/Hinterglemm/Leogang was ranked fourth. Ischgl and Saalbach/Hinterglemm/Leogang are number one and two in the share of high-speed lifts. SkiWelt Wilder Kaiser offers the highest lift capacity and the longest slopes. The two Ski Amadé resorts (i.e. Flachau/Wagrein/Alpendorf and Planai/Hochwurzen/Hauser/Kaibling/Reiteralm) have the highest share of slopes with artificial snow. The glacier ski resorts are characterised by high altitude lifts and a long ski season.

The predicted price can also be compared with the observed price to reveal the ski resorts that were, statistically speaking, significantly over- or underpriced. If the observed price was higher than the predicted price, patrons may have overpaid for lift tickets; if it was below the predicted price, the resort was a good value for the money. Table 4 shows that Ischgl and SkiWelt offered the best deal for a one-day lift ticket, with a difference of €3 between the observed and predicted price, whereas Soelden and Serfaus-Fiss-Ladis were overpriced by €3. For the two Arlberg ski resorts, the predicted price was very close to the actual average price. Table 6 in appendix provides predicted and actual prices for the total sample including 85 ski resorts. As can be seen, Kuehtai, Hochoetz, Axamer Lizum, Alpbach, Nauders also offer a good value for money.

4.2 *Results for six-day lift passes*

The parameter estimates of the hedonic price model taking the price of six-day ski pass as the dependent variable is presented in table 5. Overall, the model fits the data quite well, with an adjusted R^2 of 0.61. Total length of ski runs and capacity of mountain lift systems are both positive and jointly significant at the 1% level. Increasing share of high-speed chairlifts, gondolas and funitel systems; higher average altitude of peak lift stations; and duration of ski season consistently increases the price of a six-day ski pass. Concerning the magnitude of the implicit prices, we observe the highest elasticities for a length of ski season of about 0.14, for a share of high-speed chairlifts/gondolas of about 0.11, and an average altitude of peak lift stations of about 0.09. As indicated by the elasticities, consumers are willing to pay only slightly more for increases in total length of ski runs and total transport capacity. The marginal implicit price of increasing total length of slopes by 1% (0.675km) is only 0.023%. In other words, skiers are expected to be willing to pay no more than €0.04 for a 1% increase in total length of slopes. The corresponding elasticity for transport capacity is 0.036. The elasticity of the prices with respect to share of slopes covered by artificial snow is somewhat higher at about 0.043. The results for the coefficients of the dummy variables measuring interlinked ski resorts are expected. In particular, the dummy variables for Ski Arlberg, KI West and Ski Amadé are all positive and statistically significant. In contrast, the dummy variable for Zillertal is significantly different from zero. Note that the effect on the price of the dummy variables is given as $((e^{\beta}-1) \times 100)$ (see Halvorsen and Palmquist, 1980).

The estimates based on the spline function are reported in table 7 of the appendix. With respect to share of high-speed chairlifts and gondolas, the two segments of the linear spline have different slopes. The marginal impact of share of modern high-speed lifts is again higher in the segment [0.74; max], indicating that the effect is more than three times as large as in the first segment. However, the F-test

is not significant at conventional levels. For the remaining variables, the reported F-statistics test as to whether the two segments of the linear spline have equal slopes cannot reject the null hypothesis that the effect is stable across the two intervals.

Table 5: Hedonic price model for six-day ski passes, 2005-2006

	OLS		Robust regression	
	coeff	t-value	coeff	t-value
ln length of ski runs in km (lnKM)	0.034	1.26	0.023	0.88
ln vertical transport metres per hour (lnLC)	0.028	1.13	0.036	1.46
share of high-speed chairlifts/gondolas/funitels (LCSTRUCT)	0.131 **	2.18	0.180 **	3.64
ln average altitude of peak lift stations (lnALT)	0.106 *	1.67	0.090	1.41
ln number of operational days in the 2005-2006 season (lnDAYS)	0.120 *	1.93	0.140 **	2.31
share of runs with snowmaking facilities (ARTSNOW)	0.060 **	1.92	0.070 **	2.03
Dummy variable ski Arlberg	0.136 **	6.62	0.147 **	2.46
Dummy variable KI West ski pass	0.143 **	4.91	0.147 **	2.30
Dummy variable Zillertal Super ski pass	0.026	0.82	0.022	0.57
Dummy variable ski Amadé ski pass	0.086 **	3.52	0.080 **	2.64
constant	3.144 **	7.31	3.098 **	7.23
F-test lnKM=lnLC=0 (p-value)	0.000		0.001	
F-test lnDAYS=lnALT=0 (p-value)	0.004		0.003	
elasticity LCSTRUCT	0.077 **		0.106 **	
elasticity ARTSNOW	0.037 **		0.043 **	
adjusted R ²	0.608			

Notes: Significance at the 5 or 10% level is denoted by ** and *, respectively. The number of observations is 85. The left-hand variable is the logarithm of price of a six-day ski pass (in €).

The predicted ticket prices for six-day ski passes at the 20 best ski resorts in Austria, based on the stated quality attributes and using the robust regression technique, are shown in table 6. The predicted prices indicate that SkiWelt (covered by the Kitzbuehler Alpenpass) is the best ski resort in the country, followed by St. Anton and Lech/Zuers. Kitzbuehl (via the Kitzbuehler Alpenpass) comes in as the fourth best ski resort. Flachau/Wagrein/Alpendorf (#5), Planai/Hochwurzen/Hauser/Kaibling/Reiteralalm (#6), Ischgl/Samnaun (#7), Zauchensee/Flachauwinkl/Kleinarl (#8) and Obergurgl-Hochgurgl (#9) are also in the top ten. The difference between the observed and predicted prices indicates that SkiWelt Wilder Kaiser-Brixental, Flachau/Wagrein/Alpendorf, Planai/Hochwurzen/Hauser-Kaibling/Reiteralalm, Zauchensee/Flachauwinkl/Kleinarl, Hochzillertal/Hochfuegen/Kaltenbach and Mayrhofen/Hippach were all underpriced.

Graph 1 in appendix show the relationship between predicted and observed lift ticket prices for a 6 day ski pass for the selected ski resorts. The actual price of each ski resort is reported on the vertical axis,

and the predicted price from the regression is given on the horizontal axis. Data points that lie above this line are over-predictions: the predicted price exceeds the actual price. The opposite is true for data points that lie below the line: they are under-predictions.

Table 6: Actual and predicted prices of six-day lift passes, 2005-2006

	actual price, six-day ski pass	predicted price of six- day ski pass based on robust regression technique		predicted price of six-day ski pass based on OLS	
	in €	in €	rank	in €	rank
SkiWelt Wilder Kaiser-Brixental (Kitzbuehler Alpenpass)	190.0	193.1	1	192.7	1
St. Anton/St. Christoph/Stuben	189.0	189.6	2	189.7	2
Lech/Zuers am Arlberg	189.0	188.4	3	188.3	3
Kitzbuehl (Kitzbuehler Alpenpass)	190.0	187.0	4	187.3	4
Flachau-Wagrein-Alpendorf (Ski Amadé ski pass)	171.0	184.6	6	184.9	5
Planai/Hochwurzen/Hauser/Kaibling/Reiteralm (Ski Amadé ski pass)	171.0	184.8	5	183.9	6
Ischgl/Samnaun Silvretta Arena	177.5	179.3	7	179.3	7
Zauchensee/Flachauwinkl/Kleinarl (Ski Amadé ski pass)	171.0	178.0	8	177.9	8
Obergurgl-Hochgurgl	190.0	177.2	9	177.1	9
Stubai Gletscher (glacier)	178.8	175.0	10	175.1	10
Hochzillertal/Hochfuegen/Kaltenbach (Zillertaler Super Ski Pass)	168.0	174.3	11	174.5	11
Mayrhofen/Hippach (Zillertaler Super Ski Pass)	168.0	174.0	12	174.5	12
Dorfgastein-Grossarlal (Ski Amadé ski pass)	171.0	172.2	15	173.6	13
Hintertuxer Gletscher (glacier, Zillertaler Super Ski Pass)	168.0	171.1	17	173.0	14
Serfaus/Fiss/Ladis	169.0	172.7	14	172.7	15
Saalbach/Hinterglemm/Leogang	173.0	172.9	13	171.9	16
Gastein Stubnerkogel-Schlossalm (Ski Amadé ski pass)	171.0	168.8	20	171.0	17

5. Summary and Outlook

In this paper, we apply the hedonic price model to estimate skiers' marginal willingness to pay for various characteristics of ski resorts in Austria. The estimation results give an indication of which characteristics alpine skiers value and of how much more they are willing to pay for a lift ticket. We also estimate a spline function in order to allow for a more flexible functional form, but the log linear functional form can not be rejected. The empirical results indicate that price dispersion among ski resorts can be mainly explained by their difference in quality. Quality attributes account for between 60 and 70% of the variation in the price of both day lift tickets and six-day ski passes for the 2005-2006 season. The results clearly show that ski resorts offering longer ski runs, greater lift capacity (measured in vertical transport metres) and modern high-speed chairlifts and gondolas charge higher lift ticket prices. Furthermore, lift ticket prices demonstrate a significantly positive correlation to the

percentage of ski runs covered by artificial snow, the altitude of peak lift stations and the duration of the resort's ski season. However, the magnitude of the effect of the total length of ski runs and the corresponding aggregate lift capacity is quite small. Increasing length of ski runs (in km) by 10% leads to an increase in the price of a six-day ski pass of 0.23%. The corresponding figure for overall lift capacity is 0.36%. Much more important is the quality of the lift systems. A 10% increase in the share of high-speed lifts and cable cars leads to an increase in the price of lift tickets of 1.1%. Snow cover is also important. Further, the higher the mean altitude of a resort's peak lift stations is, the more it will charge for lift tickets, with an elasticity of 0.09. To summarize, the marginal WTP for a small change in quality characteristics is highest for ski resorts with modern high-speed lifts and good snow cover. Total length of runs and overall transport capacity is less important.

Another aim of this paper is to provide a ranking of ski resorts according to the observed quality of their characteristics, using the predicted price of lift tickets as a measure of quality. The predicted ticket prices can be viewed as the cost value, taking into consideration the characteristics of the ski resort. They are obtained by using the standard hedonic price model, in which the lift ticket prices are regressed on the attributes of the ski resort. Our predicted prices for a six-day ski pass indicate that SkiWelt (accessible via the Kitzbuehler Alpenpass) is the best ski resort in Austria, followed by St. Anton and Lech/Zuers. Kitzbuehl is ranked fourth. Flachau/Wagrein/Alpendorf, Planai/Hochwurzen/Hauser-Kaibling/Reiteralm, Ischgl/Samnaun, Zauchensee/Flachauwinkl/Kleinarl and Obergurgl-Hochgurgl are also in the top ten. However, the crucial factor influencing the ranking of ski resorts is the treatment of ski areas accessible via a multi-area ski pass. Not accounting for joint ski passes improves the ranking of ski resorts that are not part of a ski alliance. The predicted prices of day lift tickets indicate that St. Anton, Lech/Zuers, Ischgl/Samnaun and Saalbach/Hinterglemm/Leogang are the best choice for a day of skiing in Austria.

This paper provides some new insights into the price-quality relationship at ski resorts. Hedonic price models allow us to analyse the price competitiveness of ski destinations. The results are useful for consumers (skiers), tourism service providers, ski resort managers, cable car operators and technical specialists. For our future work we plan to extend the analysis by including other important ski destinations in Europe, such as France, Switzerland and Italy.

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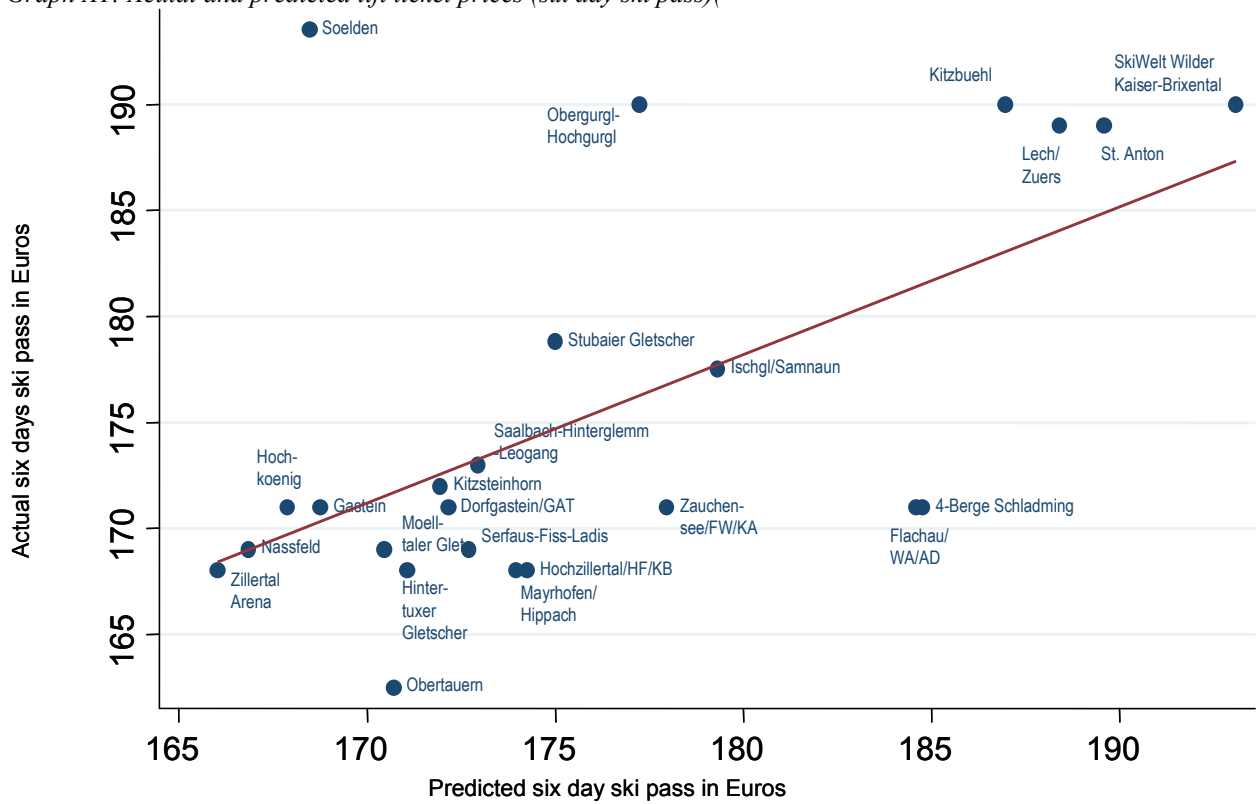
Appendix

Table 7: Results of the spline function

	dep variable: logarithm of price of an adult day lift ticket					
	(i)		(ii)		(iii)	
	coeff	t-value	coeff	t-value	coeff	t-value
ln total length of ski runs in km (lnKM)			0.029	1.44	0.034 *	1.78
ln total length of ski runs in km spline [0; 49]	0.030	1.24			0.045 **	2.62
ln total length of ski runs in km spline [49; max]	0.005	0.11				
ln vertical transport metres per hour (lnLC)	0.045 **	2.22				
ln vertical transport metres per hour spline [979; 6142]			0.040	1.58		
ln vertical transport metres per hour [6142; max]			0.012	0.35		
share of high-speed lifts (LCSTRUCT)	0.109 **	2.25	0.110 **	2.31		
share of high-speed lifts spline [0; 0.74]					0.075	1.47
share of high-speed lifts [0.74; 1]					0.380	1.14
ln average altitude of peak lift stations	0.033	0.57	0.037	0.63	0.031	0.57
ln number of operational days in the 2005-2006 season	0.110 **	2.68	0.108 **	2.58	0.113 **	2.87
ln share of runs with artificial snow	-0.004	-0.16	-0.004	-0.17	-0.004	-0.14
Dummy variable Ski Arlberg	0.109 **	5.47	0.109 **	6.38	0.114 **	6.99
constant	2.098 **	6.44	2.113 **	6.48	2.097 **	6.49
F-test spline intervals	0.664		0.624		0.400	
adjusted R ²	0.653		0.652		0.663	
	dep. variable ln of 6 day ski pass					
	coeff	t-value	coeff	t-value	coeff	t-value
ln total length of ski runs in km (lnKM)			0.031	1.110	0.036	1.310
ln total length of ski runs in km spline [0; 49]	0.037	1.100			0.027	1.070
ln total length of ski runs in km spline [49; max]	-0.009	-0.190				
ln vertical transport metres per hour (LCSTRUCT)	0.030	1.140				
ln vertical transport metres per hour spline [979; 6142]			0.022	0.690		
ln vertical transport metres per hour [6142; max]			0.015	0.340		
share of high-speed lifts	0.131 **	2.160	0.133 **	2.250		
share of high-speed lifts spline [0; 0.74]					0.108	1.510
share of high-speed lifts [0.74; 1]					0.269	1.060
ln average altitude of peak lift stations	0.104	1.620	0.110 *	1.640	0.104 *	1.650
ln number of operational days in the 2005-2006 season	0.120 *	1.910	0.119 *	1.870	0.123 *	1.960
ln share of runs with artificial snow	0.061 *	1.920	0.060 *	1.890	0.061 *	1.940
dummy variable Ski Arlberg	0.139 **	5.920	0.133 **	6.010	0.139 **	6.580
dummy variable KI West ski pass	0.146 **	4.820	0.137 **	4.060	0.145 **	4.930
dummy variable Zillertal Super Ski Pass	0.027	0.840	0.023	0.690	0.030	0.910
dummy variable Ski Amadé ski pass	0.087 **	3.600	0.084 **	3.480	0.083 **	3.470
constant	3.132 **	7.150	3.175 **	7.250	3.154 **	7.190
F-test spline intervals	0.529		0.922		0.599	
adjusted R ²	0.603		0.603		0.607	

Notes: Significance at the 5 or 10% level is denoted by ** and *, respectively. The number of observations is 85.

Graph A1: Actual and predicted lift ticket prices (six day ski pass)



Notes: Predicted prices are calculated based on regression results provided in Table 5.

Table 8: Predicted and actual lift ticket prices

ski area	price of day lift ticket	predicted price of day lift ticket	differ-ence	rank	actual 6 day ski pass	predicted 6 day ski pass	differ-ence	rank
Alpbach	28.5	31.5	3.0	41	140.0	149.7	9.7	49
Annaberg	24.0	25.8	1.8	85	108.5	118.2	9.7	85
Axamer Lizum	27.5	30.8	3.3	56	135.0	145.4	10.4	64
Bad Kleinkirchheim/St. Oswald	35.0	33.0	-2.0	29	169.0	157.7	-11.3	33
Berwang/Bichlbach	31.5	28.6	-2.9	78	159.5	128.6	-30.9	82
Brandnertal	31.0	30.4	-0.6	64	139.0	137.2	-1.8	77
Brunnalm	30.5	31.1	0.6	48	155.0	154.3	-0.7	38
Christlum	29.0	29.6	0.6	72	120.0	139.7	19.7	73
Dachstein/West	30.5	32.2	1.7	34	152.2	146.2	-6.0	60
Damuels	33.0	31.1	-1.9	49	147.0	147.2	0.2	54
Diedamskopf	31.5	30.9	-0.6	54	147.0	144.6	-2.4	65
Dorfgastein/Grossarlal	35.0	33.5	-1.5	26	171.0	172.2	1.2	15
Ehrwald	31.5	29.9	-1.6	67	159.5	146.4	-13.1	58
Fieberbrunn	31.0	30.9	-0.1	55	157.0	145.6	-11.4	63
Filzmoos	30.5	28.8	-1.7	76	171.0	152.4	-18.6	42
Flachau/Wagrein/Alpendorf	35.0	35.9	0.9	12	171.0	184.6	13.6	6
Galtuer Silvretta	30.5	31.2	0.7	46	145.0	151.6	6.6	45
Gastein Stubnerkogel-Schlossalm	36.0	33.9	-2.1	24	171.0	168.8	-2.2	20
Gerlitzten	31.0	31.1	0.1	52	152.0	152.7	0.7	41
Golm	34.0	31.9	-2.1	36	169.5	157.5	-12.0	34
Grosseck-Speiereck	30.0	31.2	1.2	47	168.5	146.9	-21.6	56
Gruenau-Kasberg	29.0	29.7	0.7	68	137.0	141.3	4.3	71
Heiligenblut	32.0	31.1	-0.9	51	155.0	142.7	-12.3	70
Hinterstoder-Hoess	32.0	30.7	-1.3	59	140.5	147.2	6.7	53
Hintertuxer Gletscher	35.0	35.7	0.7	14	168.0	171.1	3.1	17
Hochficht	27.0	28.1	1.1	81	121.0	132.5	11.5	81
Hochjoch	36.0	31.8	-4.2	39	169.5	146.7	-22.8	57
Hochkar	27.5	26.8	-0.7	84	124.5	125.1	0.6	84
Hochkoenig	35.0	33.6	-1.4	25	171.0	167.9	-3.1	22
Hochoetz	27.0	30.8	3.8	58	129.0	147.0	18.0	55
Hochzeiger	31.0	32.7	1.7	30	146.0	161.1	15.1	28
Hochzillertal/Hochfuegen/Kaltenbach	35.0	35.4	0.4	17	168.0	174.3	6.3	11
Ischgl/Samnaun Silvretta Arena	35.0	38.2	3.2	3	177.5	179.3	1.8	7
Kals-Glocknerblick	30.5	27.2	-3.3	83	155.0	126.0	-29.0	83
Kappl	31.5	31.5	0.0	40	156.5	150.7	-5.8	47
Katschberg/Aineck	31.5	31.4	-0.1	42	156.5	149.6	-6.9	50
Kaunertaler Gletscher	33.0	33.3	0.3	28	144.0	159.7	15.7	31
Kitzbuehel	36.5	35.6	-0.9	15	190.0	187.0	-3.0	4
Kitzsteinhorn	36.0	35.9	-0.1	11	172.0	171.9	-0.1	16
Koessen	29.8	29.1	-0.7	75	132.1	139.3	7.2	76
Kreischberg	29.5	29.7	0.2	70	133.0	139.5	6.5	74
Kuehtai	27.5	31.9	4.4	37	142.0	154.1	12.1	40
Lech/Zuers am Arlberg	39.5	39.2	-0.3	2	189.0	188.4	-0.6	3
Lermoos-Grubigstein	31.5	30.6	-0.9	60	159.5	146.0	-13.5	61
Loferer Alm	28.0	29.6	1.6	71	133.0	133.5	0.5	80
Loser Altaussee	29.0	29.3	0.3	74	149.0	140.0	-9.0	72
Mayrhofen/Hippach	33.5	36.1	2.6	9	168.0	174.0	6.0	12
Mellau	29.9	29.7	-0.2	69	147.0	142.9	-4.1	69
Moelltaler Gletscher	35.0	34.3	-0.7	22	169.0	170.5	1.5	19
Nassfeld	35.0	34.3	-0.7	21	169.0	166.8	-2.2	23

ski area	price of a day lift ticket	predicted price of a day lift ticket	differ- ence	rank	actual 6 day ski pass	predicted 6 day ski pass	difference	rank
Nauders	29.5	32.6	3.1	32	150.5	155.8	5.3	37
Obergurgl/Hochgurgl	38.0	35.9	-2.1	10	190.0	177.2	-12.8	9
Obertauern	34.0	34.6	0.6	19	162.5	170.7	8.2	18
Patscherkofel	26.5	28.4	1.9	79	115.0	136.3	21.3	78
Pitztaler Gletscher	34.0	35.9	1.9	13	159.0	161.6	2.6	27
Pitztalrifflsee	33.5	31.8	-1.7	38	146.0	143.7	-2.3	67
Planai/Hochwurzen/Hauser/Kaibling/RA	36.0	35.5	-0.5	16	171.0	184.8	13.8	5
Radstadt/Altenmarkt	35.0	30.5	-4.5	62	171.0	166.3	-4.7	24
Riesneralm	27.5	28.8	1.3	77	149.0	143.3	-5.7	68
Saalbach/Hinterglemm/Leogang	36.0	36.6	0.6	4	173.0	172.9	-0.1	13
Schmittenhoehe	36.0	33.4	-2.6	27	172.0	160.5	-11.5	29
Seefeld-Rosshuette	29.5	29.4	-0.1	73	159.5	144.0	-15.5	66
See-Medrigalm	28.5	30.5	2.0	63	141.0	149.2	8.2	51
Semmering-Hirschenkogel	27.5	28.2	0.7	80	142.0	139.4	-2.6	75
Serfaus/Fiss/Ladis	39.0	36.2	-2.8	7	169.0	172.7	3.7	14
Sillian-Hochpustertal	31.0	31.4	0.4	44	155.0	156.9	1.9	35
Silvretta Nova	36.0	34.3	-1.7	20	169.5	159.6	-9.9	32
SkiWelt Wilder Kaiser/Brixental	33.0	36.2	3.2	8	190.0	193.1	3.1	1
Soelder Winterwelt	39.5	36.6	-2.9	6	193.5	168.5	-25.0	21
Sonnenkopf	32.0	31.4	-0.6	45	135.0	145.6	10.6	62
Spieljoch	33.5	30.2	-3.3	65	168.0	152.3	-15.7	43
Sportgastein	36.0	31.4	-4.6	43	171.0	164.2	-6.8	26
St. Anton/St. Christoph/Stuben	39.5	39.8	0.3	1	189.0	189.6	0.6	2
Steinplatte	31.5	32.4	0.9	33	157.0	159.9	2.9	30
Stubai Gletscher	35.0	36.6	1.6	5	178.8	175.0	-3.8	10
Stuhleck	30.0	30.6	0.6	61	147.0	152.1	5.1	44
Tannenheim-Neunerkoepfle	26.5	27.7	1.2	82	123.0	133.5	10.5	79
Tauplitzalm	29.0	30.1	1.1	66	149.0	146.4	-2.6	59
Turracher Hoehe	33.0	31.0	-2.0	53	169.0	156.6	-12.5	36
Warth/Schroecken	34.0	32.6	-1.4	31	147.0	151.3	4.3	46
Wildkogel	31.0	32.0	1.0	35	151.5	150.2	-1.3	48
Wildschoenau-Schatzberg	29.6	30.8	1.2	57	138.4	147.3	8.9	52
Zauchensee/Flachauwinkl/Kleinarl	35.0	34.0	-1.0	23	171.0	178.0	7.0	8
Zetttersfeld	30.5	31.1	0.6	50	155.0	154.2	-0.8	39
Zillertal Arena	34.0	35.2	1.2	18	168.0	166.0	-2.0	25