Effects of ski lift ticket discounts on local tourism demand

Martin Falk and Miriam Scaglione

Martin Falk is Senior Research Fellow at the Austrian Institute of Economic Research (WIFO) Vienna, Austria. Miriam Scaglione is Professor at the Institute of Tourism, University of Applied Sciences and Arts Western Switzerland – Valais, Sierre, Switzerland.

Received 25 August 2017
Revised 15 November 2017
4 February 2018
Accepted 17 March 2018

Abstract

Purpose – *The purpose of this paper is to provide a first evaluation of the effectiveness of the early bird discount on ski lift tickets by estimating the impact on hotel overnight stays of the Saas-Fee destination.*

Design/methodology/approach – *The difference-in-differences (DID) approach is used to compare winter sport destinations with and without the price reduction before and after the introduction of the price discount. The sample is composed of the 54 largest Swiss winter sport destinations for the seasons 2013/2014 and 2016/2017.*

Findings – *DID estimations show an increase in overnight stays of Swiss residents by 50 per cent as compared to the control group. Quantile regression estimations for the conditional upper part of the overnight stays distribution reveal a lower average treatment effect of 38 per cent. However, DID estimates for total overnight stays (domestic and foreign) are much smaller – about 17 per cent – indicating that the price reductions are not effective in attracting foreign visitors. Results are not sensitive when taking into account a large number of control variables (elevation, size and snow making capacity).*

Research limitations/implications – *As tourists visiting winter sport destinations are interested in a mix of activities, lift ticket revenues or number of skier days should be used as an alternative outcome measure.*

Practical implications – *As positive effects on local tourism demand are mainly limited to Swiss tourists, such price strategies should be carefully considered. In the long term, the skiing market will stagnate or even shrink for several reasons (population ageing, climate change and changes in leisure preferences).*

Originality value – *This paper provides a first quantitative evaluation of price discounts in tourism research. Knowledge about the discounts and consumers reactions to sales promotions are of great interest to marketing managers in today's competitive ski market.*

Keywords *Sales promotion, Difference-in-differences analysis, Innovative pricing, Ski industry, Winter overnight stays*

Paper type *Research paper*

1. Introduction

In Switzerland, the performance of ski lift companies (measured as skier visits) declined by 8.2 per cent per year on average during the winter seasons 2011 to 2016. Based on revenues, the downturn was almost equally as strong at 7.4 per cent (source: Remontées Mécaniques Suisses). Analogue results for the accommodation sector in the same areas shows a decline in overnight stays by 1.1 per cent per year on average (Source: Swiss FSO). In response to the shrinking ski market and the strong appreciation of the Swiss Franc (CHF), some ski resorts reacted by adjusting their prices. Saas-Fee, one of the more remote resorts, was hit harder by the decline and decided to reduce the seasonal lift pass price by 80 per cent to CHF 222 in autumn 2016. During the four years prior to this action, overnight stays had deteriorated by 4 per cent per year on average. After the introduction of the price discount, overnight stays of domestic and foreign visitors respectively increased by 40 and 3.2 per cent as compared to the previous winter season. Although this indicates that the price discount has stimulated demand, the effects differ between domestic and foreign tourists.

This paper investigates the impact of the price discount of ski lift tickets on domestic and foreign overnight stays. The key research question is whether the discount has attracted new customers and to what extent. The direct effect of the price strategy is estimated by the difference-in-differences (DID) estimator by comparing winter sport destinations with and without the price reduction before and after the introduction of the price discount. Data are based on monthly overnight stays of the 54 largest winter sport destinations for the season 2013/2014 as compared to 2016/2017. Both seasons are comparable with respect to snow conditions (snow poor and mild in the European Alps) and timing of Easter (late in April). The standard DID analysis is augmented by a set of control variables (size, elevation and lift and snowmaking capacity).

This paper contributes to the literature on the demand effects of price reductions and promotional campaigns on purchase intentions and demand. Price discounts are the most common type of sales promotions used in the retail industry. Such sales promotions are implemented to stay present or to attract new customers as well as anticipate competitors' actions (Blattberg and Neslin, 1990). Studies on consumer goods show that promotional campaigns in the form of temporary price reductions strongly increase store sales in the short-term (Blattberg *et al.*, 1995). Nusair *et al.* (2010) find that direct discount promotions are more effective than non–monetary price campaigns in determining the purchase decision. Blattberg *et al.* (1995) suggest that price discounts have similar demand effects to any other price reduction, indicating that price elasticities are similar to promotional (price) elasticities.

In the tourist and transport industry, price promotions are also common practices used to attract consumers and increase sales in the short term (Perdue, 2002; Duman and Mattila, 2004; Campo and Yagüe, 2008; Nusair *et al.*, 2010; Hyun Lee and Bai, 2014). Perdue (2002) investigates the impact of the introduction of heavily discounted ski season passes (75 per cent discount) on skiing behaviour. The author concludes that the increased participation more than offsets the decline in lift ticket revenue associated with the season programme.

Leisure-related travel, such as winter tourism, is generally regarded as highly price elastic (Buhalis, 2000). In their study based on a sample of skiers and snowboarders, Englin and Moeltner (2004) find that skiing demand is generally more responsive to price changes than to changes in snow pack. Recent empirical evidence for season passes reveals a rather low price elasticity as compared to half-day visitors and local groups as well as college students but significant and positive cross-price elasticities (Holmgren and McCracken, 2014; Holmgren *et al.*, 2016).

2. Conceptual background and empirical model

The empirical specification can be derived from the theory of recreation and travel demand where the number of trips taken depends on the cost of travelling to the site in question (in this case, winter sport resorts), cost of the stay, real income of the visitor countries, as well as on village or site-specific characteristics (Englin and Moeltner, 2004; Morey, 1981). The latter include ski area size, elevation of the terrain, ski lift capacity, ski lift quality and average annual snowfall. Representative individual data on recreation and leisure trips are difficult to obtain. To remedy this, we use aggregate data on overnight stays at the village level. Winter tourism demand is usually specified as a function of relative prices, real income of the visitor countries, timing of early Easter holidays and weather conditions (Falk, 2010; Demiroglu *et al.*, 2015). In the following, it is assumed that tourism impacts of real income of the visitor countries and relative prices do not differ much across the different Swiss winter sport destinations. This means that the effect of the business cycle movements and change in relative exchange rates on tourism inflows can be neutralised if both the treatment group (Saas-Fee destination) and control group (all other ski destinations in Switzerland) are affected the same way. This is called the common trend assumption. This assumption is not unreasonable given the short time period under investigation. It is also important to note that village-specific prices are not available. In addition, during the period of investigation, 15 January 2015, the Swiss National Bank decided to abandon the minimum exchange rate of CHF 1.20 per euro which was introduced on 6 September 2011. This led to a strong appreciation of the Swiss franc. This should have a strong negative effect on overnight stays, particularly in winter sport resorts with a high share of foreign tourists. Therefore, the empirical analysis is conducted separately for total overnight stays and for domestic overnight stays.

The key research question is whether the discount has attracted new customers and to what extent. In other words, the question is how overnight stays would have developed without the price decrease. In reality, of course, this cannot be observed. One possible solution is to compare the effects with a control group that in all other respects – except for the price change – exhibits characteristics identical to the treatment group. In the following, the standard DID approach by Card and Krueger (1994) is used to analyse the effects of the price discount. The estimator chosen compares the difference in hotels' overnight stays between the treatment group (villages affected by the price discount), namely, Saas-Fee destination's villages and the control group (villages not affected) before and after the introduction of the price discount. The number of treated cases is ten (each consisting of five months ranging from December to April for two winter seasons), and the number of observations in the control group is about 530. The standard equation is augmented by control variables specific to the ski area where the data are pooled over all months and across the control group's destinations. The usual assumption is that the time-varying effects (business cycle, inflation, exchange rates, calendar effects and weather conditions) are identical for both groups. The standard DID specification is augmented by a set of control variables and can be specified as follows:

$$\ln Y_{it} = \alpha_0 + \alpha_1 \cdot period_i + \alpha_2 \cdot treated_i + \alpha_3 \cdot period_i \cdot treated_i + \mathrm{X}_i \boldsymbol{\beta} + \varepsilon_{it} \quad (1)$$

where Y_{it} is the number of overnight stays in the village i belonging to or located near a ski area. ln () denotes the natural logarithm. The *period* is a dummy variable that is equal to 0 in the baseline period and 1 thereafter, whereas *treated* is a dummy variable that is equal to 1 if the village is connected to the principal (main) ski area by a new lift-link and 0 otherwise. To account for the specific time-invariant characteristics of the ski areas, a set of control variables X is included. These include size of the ski area measured as vertical transport metres (or alternatively as the length of slopes), average elevation of the peak lift stations, snowmaking capacity, share of fast lifts and distance to the nearest town measured as road distance. The latter is an indicator for local accessibility via transportation networks. Ski resorts in close proximity to regional centres have clearly an advantage because of local market potential. Elevation is an indirect indicator for snow conditions because snow is less affected by high temperatures and lasts longer at high elevations. The share of fast lifts and snowmaking are indicators of the quality of the ski area and the lift infrastructure. In addition, a set of dummy variables indicating whether or not the ski area is part of a larger ski lift alliance is included (see Table AI in the Appendix for the descriptive statistics and a list of the included ski resorts). Finally, monthly dummy variables are included to account for seasonal effects with February representing the reference category. Parameter α_3 measures the average treatment effect (ATE) of the price discount, and ε_{it} is the error term. The equation can be estimated by ordinary least squares (OLS) with the standard errors clustered by villages.

To rule out the influence of weather conditions such as lack of snow (Steiger, 2011) and calendar effects (Easter, for instance) we use the winter season 2013/2014 (Easter Sunday 20 April 2014) as the base period. The follow-up period is defined as the winter season 2016/2017 (Easter Sunday 16 April 2017) after the introduction of the price discount in autumn 2016. According to the Swiss weather service, the two winter seasons share similar characteristics, i.e. higher than average temperatures in the mountain regions and lower than average snow cover. Not only the snow conditions and the time of Easter but also the business cycle is relatively similar in both winter seasons. In Switzerland, real GDP in constant prices in both winter seasons increased between 1 and 2 per cent per year. It would be preferable to also account for the quality of local infrastructure, presence of alternative transportation modes and environmental quality of the destination. Recent evidence show that Swiss ski destinations are leading in environmental quality and presence of fast internet (Kuščer *et al.*, 2017). However, detailed data at the village level are not available.

We expect that the pricing strategy will lead to a stronger demand effects for Swiss residents than for foreigners. The reason is that domestic residents are more flexible because the cost of travel to the destination is lower and that the internet-based marketing campaign is likely to be more effective at home than abroad. Foreigners usually plan and book their trip longer in advance and are thus less willing to change their destination. Malasevska and Haugom (2018) found that the responsiveness of skiing demand due to price changes is higher for local residents than for those who live further way.

It is important to note that not only that the control group exhibit characteristics similar to the treatment group but also that the standard DID method also rely on the assumption of a common trend in the average outcomes of the treated and non-treated groups over time. This assumption does not hold if there are neighbourhood or spill-over effects to other ski areas located a relatively short distance away from a given lift-linked area. However, it is likely that the price discount has disproportionally affected the neighbouring ski areas in the same province (that is Valais). To test for this market stealing effect, we extend the specification by adding an interaction term for ski destinations located in the Valais region:

$$\ln Y_{it} = \alpha_0 + \tilde{\alpha}_1 \cdot period_i + \tilde{\alpha}_2 \cdot treated_i + \tilde{\alpha}_3 \cdot Valais_i + \tilde{\alpha}_4 \cdot period_i \cdot treated_i + \tilde{\alpha}_5 \cdot period_i \cdot Valais_i + \mathrm{X}_i \boldsymbol{\beta} + \tilde{\varepsilon}_{it} \quad (2)$$

A significant negative coefficient for $\tilde{a_5}$ would indicate a market stealing effect on the neighbouring ski resorts due to the price discount.

OLS only allows for the estimation of the mean effects of the price reduction. However, estimating the average effect of the price discount might be misleading, as the level of overnight stays of Saas-Fee is considerably higher than those of the majority of competitors. Therefore, quantile regressions – targeted at the upper part of the distribution of overnight stays – are more appropriate. We use quantile regressions with standard errors clustered across groups (here, winter sport destinations) as suggested by Parente and Santos Silva (2016). For the given quantile (p), the estimation equation is given as follows:

$$Q_p(\ln Y_{it}|period, treated, X) = \tilde{\tilde{\alpha}}_0(p) + \tilde{\tilde{\alpha}}_1(p) \cdot period_t + \tilde{\tilde{\alpha}}_2(p) \cdot treated_{it} + \tilde{\tilde{\alpha}}_3(p) period_t \cdot treated_{it} + X_i \tilde{ß}(p) + (p)\tilde{\varepsilon}_{it} \quad (3)$$

3. Study area and descriptive statistics

Saas-Fee is located in the canton of Valais and is a well-known ski resort. Skiing and snowboarding is the main attraction in the winter season and has a long tradition with the first ski lift, opened in 1954. It is one of the top 5 Valaisanne ski destinations with Zermatt, Leukerbad, Verbier and Crans Montana, also known as the “Big Five”, and with 22 ski lifts and 400,000 skier visits, it belongs to the 20 largest ski lift companies in Switzerland. Due to the high elevation up to 3,500 metres (and the glacier), a long ski season can be guaranteed. The ski lift company Saas-Fee generates a turnover from lift ticket sales of about CHF 15 million (Source annual report 2015/2016). Skier visits are about 20 per cent lower than in 2008 (Remontées Mécaniques Suisses, various issues). Data on the annual report show that the ski lift company Saas-Fee has been making continuous losses for the past six years.

At the beginning of the winter season 2016/2017, Saas-Fee introduced a season pass for about CHF 222 (€199). However, the provision of the season pass was conditional on the sale of least 77,000 season ski passes, which was achieved before the end of the price action. The concept is based on a crowd funding approach.

The basic data source is the compulsory survey on tourist accommodation (HESTA) provided by the Swiss Federal Statistical Office (FSO). Data are available for domestic and foreign registered overnight stays in hotels and similar accommodation establishments by municipality at the monthly level. Foreign visitors are defined on the basis the country of the visitors' permanent residence.

There are about 2,300 villages in Switzerland. We select about 100 winter sport destinations that are closely located to a ski area. Villages belonging to the same ski area are aggregated (St. Moritz, Davos-Klosters etc.). The final estimation sample consists of 54 municipalities, of which 17 are in the State (canton) Valais, for two winter seasons. The estimation sample includes the following 5 months: December, January, February, March and April for 2013/14 and 2016/17. The total number of winter sports destinations is 54 which give 540 observations in total.

Ski area information is drawn from a number of sources. The information on lift characteristics and resort attributes mainly comes from official sources (Federal Department of the Environment, Transport, Energy and Communications) but also from commercial sources (ADAC Ski Atlas; DSV Ski Atlas, website www.bergfex.com.). The control variables are size, measured as total length of slopes in kilometres; or alternatively, as the total vertical lift capacity in persons per hour, measured as the sum of vertical transport metres per hour of each lift. Quality of equipment is measured as a share of fast lifts (e.g. detachable chairlifts, modern gondola ropeways or MGDs and funitel systems) in total transport capacity (i.e. vertical transport metres). The remaining control variables are weighted average altitude of peak lift stations (excluding t-bar lifts) and the share of ski runs with snowmaking facilities in per cent. In addition, we collect road distance to the nearest largest town (with a population of 50,000 or more) in kilometres using google maps. The final variable is a dummy variable for ski areas that are part of a greater ski network.

Table AI in the appendix presents the summary statistics on the variables for the sample used in the subsequent regressions. Figure 1 shows that domestic overnight stays in Saas-Fee increased by 40 per cent after the price reduction as compared to the winter season 2013/2014, while the remaining ski areas show an increase of 3 per cent. The increase is much less pronounced for total overnight stays.

4. Empirical results

OLS estimates show that the introduction of the discount on seasonal lift tickets gives a direct boost to overnight stays in the winter season. The average treatment effect of the reduced seasonal lift ticket is 17 per cent and significant at the 1 per cent level (Table I upper panel). This means that overnight stays in Saas-Fee are 17 per cent higher in the winter season 2016/2017 as compared to the control group and the base period 2013/2014 (exp(0.16)-1 = 17 per cent). The increase by 17 per cent is equal to 38,420 overnight stays given the initial level of 226,000 overnight stays. This means that without the pricing strategy, instead of the actual increase of 5.8 per cent (equal to 13,800 overnight stays); a loss of 24,620 overnight stays would have been observed (actual increase minus overnight stays due to pricing strategy = 13,800-0.17*226,000). DID estimates based on the median regression (Q 0.5) show similar results with a coefficient of 0.14, indicating that the estimates are not sensitive with respect to outliers or other influential observations.

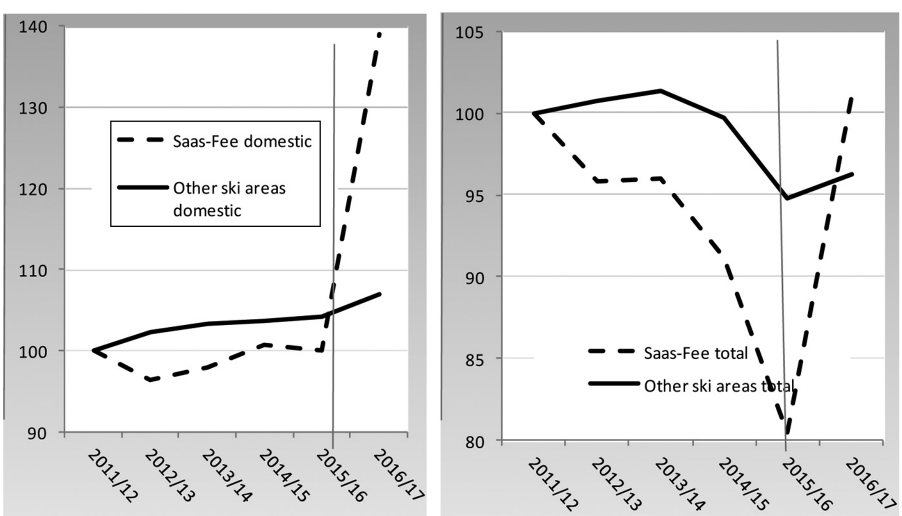
Quantile DID estimations for the upper part of the distribution of overnight stays show somewhat similar results. By using the 0.75 quantile regression model, the control group is limited to the group of ski resorts in the upper part of the distribution of overnight stays. The 0.75 quantile estimations show that the number of overnight stays in Saas-Fee in the winter season is 14 per cent higher in the year of the follow-up period as compared to the control group.

The control variables (*X* in equations 1 and 3) size, elevation, monthly dummy variables, share of fast lifts, lift capacity, percentage of slopes covered by snowmaking and participation in a large ski alliance are included in the estimations. The estimates in Table I show, as expected, a strong seasonal pattern in overnight stays with the lowest level of overnight stays being in April, the second lowest being in December and with February being the high season.

Among the other control variables, size measured as vertical transport metres of the lift equipment is the most powerful variable, whereas neither the quality of lifts nor the snowmaking coverage is significant in the majority of cases. The fit of the model is relatively good with a R^2 of 0.64 using OLS and a similar fit for the Quantile regression as measured by Pseudo R^2. The Parente–Santos Silva test detects the presence of intra-cluster (village) correlation in all of the cases. Ski resorts belonging to the Val d'Anniviers groups compose the only ski lift alliance kept as an exogenous variable in the regression, as its coefficient is significant.

Table I (lower panel) displays the DID estimation results for Swiss residents' overnight stays. In this case, the average treatment effect is much larger – around 48 per cent (=exp(0.40)-1)X100). This indicates that domestic tourists are much more responsive to the introduction of the innovative price strategy than foreign tourists. Again, we find somewhat smaller effects for the 0.75 DID estimations. In particular, the 0.75 quantile estimations reveal that domestic overnight stays increase by 38 per cent during the subsequent winter season. Thus, the magnitude of the price discount effect is slightly lower if it is based on quantile estimates than if it is on estimates achieved by OLS, but they coincide with the general

Figure 1 Evolution of overnight stays before and after the price reduction of the ski lift ticket for Saas-Fee (index base 2011/2012)



Source: Statistics Switzerland

Table I Difference in differences estimates of the impact of the Saas-Fee discount on seasonal lift tickets on total overnight stays

	Dependent variable total overnight stays							
	OLS		*Quantile regressions*					
			Q 0.25		*Q 0.50*		*Q 0.75*	
Explanatory variables	*coeff.*	*t-value*	*coeff.*	*t-value*	*coeff.*	*t-value*	*coeff.*	*t-value*
Period	−0.11***	−3.60	−0.15**	−2.01	−0.13***	−2.60	−0.10*	−1.92
Treated	0.84**	2.49	0.90***	3.02	0.88***	2.58	0.26	0.43
Period X treated (Saas−Fee)	0.16***	5.02	0.21***	2.80	0.14***	2.76	0.13***	2.60
Month December (ref. cat. February)	−0.64***	−12.97	−0.49***	−4.12	−0.52***	−4.95	−0.58***	−7.60
Month January	−0.23***	−8.95	−0.17*	−1.81	−0.20***	−2.60	−0.16*	−1.91
Month March	−0.15***	−5.38	−0.01	−0.22	−0.11	−0.89	−0.18*	−1.79
Month April	−1.39***	−11.51	−1.42***	−6.71	−1.29***	−6.69	−0.90***	−4.05
ln vertical transport metres	1.16***	4.82	1.54***	3.65	1.36***	5.52	1.09***	5.00
ln average elevation peak stations	2.09*	1.79	2.60*	1.87	1.02	0.78	1.69	1.04
% snowmaking	1.59	1.60	1.50	0.69	1.73	1.28	1.58	1.37
% share of fast lifts	1.17	1.36	0.83	0.78	1.07	1.25	0.88	0.87
Val d'Anniviers	1.86***	5.30	2.21***	8.11	1.96***	5.43	1.14*	1.77
Constant	−17.95**	−2.08	−25.55***	−2.85	−11.45	−1.06	−13.47	−1.17
Marginal effect of the price discount[a]	17.4		23.4		15.0		13.9	
R^2 or Pseudo R^2	0.64		0.64		0.64		0.64	
Parente–Santos Silva test (*p*-value)			0.00		0.00		0.00	
	Dependent variable: domestic overnight stays							
	OLS		Quantile regressions					
			Q 0.25		Q 0.50		Q 0.75	
	coeff.	t-*value*	coeff.	t-value	coeff.	t-*value*	coeff.	t-*value*
Period	−0.04	−0.89	−0.11	−1.02	−0.01	−0.18	−0.01	−0.22
Treated	0.93***	2.68	1.30	1.58	0.84**	1.96	0.54	1.29
Period X treated (Saas-Fee)	0.40***	8.82	0.45**	2.08	0.41***	7.99	0.32***	5.39
Month December (ref cat. February)	−0.69***	−13.08	−0.72***	−5.11	−0.54***	−4.12	−0.58***	−6.59
Month January	−0.23***	−10.07	−0.24*	−1.89	−0.18***	−2.66	−0.12**	−2.37
Month March	−0.21***	−8.66	−0.11	−0.85	−0.12	−1.05	−0.23***	−3.31
Month April	−1.58***	−11.75	−1.52***	−5.74	−1.37***	−8.15	−1.32***	−8.17
ln vertical transport metres	0.95***	3.60	1.16***	3.56	1.13***	4.19	0.95***	4.16
ln average elevation peak station	1.66	1.38	1.67	0.78	0.65	0.40	0.64	0.60
% snowmaking	1.93**	2.00	1.60	0.85	1.92	1.42	1.57	1.38
% share of fast lifts	1.40*	1.69	1.33	1.25	1.40*	1.93	0.95	1.21
Val d' Anniviers	1.20***	3.34	1.76***	4.14	1.29***	3.37	0.47	0.77
Constant	−13.51	−1.50	−15.91	−0.96	−7.23	−0.55	−4.65	−0.61
Marginal effect of the price discount in per cent	49.2		56.8		50.7		37.7	
R^2 or Pseudo R^2	0.59		0.59		0.59		0.58	
Parente–Santos Silva test (p)			0.00		0.00		0.00	

Notes: Asterisks ***; **; and *denote significance at the 1, 5 and 10% level; the dependent variable is the logarithm of the number of total or domestic overnight stays in the winter season at the village level; standard errors are clustered by ski destinations; number of observations is 540, and the number of treated cases is 10; [a]Marginal effects are calculated as ((exp(coeff.)-1)*100

pattern that domestic overnight stays are much more receptive than foreign overnight stays. Given that the observed increase was 29.9 ≅ 30 per cent, the analysis shows that without the pricing strategy, the loss in domestic overnight stays would have been between 8 and 18 per cent, depending on the calculation method.

Several robustness checks are provided. First, an additional analysis is conducted to investigate whether or not the price reduction has drawn visitors from the neighbouring ski areas in the same province as Saas-Fee. The results show that the interaction term between ski resorts in Valais and the period dummy is not significant, which in turn indicates that gains in new customers in Saas-Fee do not occur at the expense of the neighbouring ski areas (see Table A2 in the Appendix). This might indicate that the magnitude of the cross-price elasticities is low and that Saas-Fee is rather a complement than a substitute for the remaining ski resorts in Valais. Second, other base years for the DID estimates are used. Appropriate base periods include 2008/2009 and 2010/2011, when Easter Sunday was also relatively late in April (12 April and 24 April, respectively). Unreported results are quite similar but somewhat larger. This can be explained by the fact that the winter season 2016/2017 was characterised by relatively poor and mild snow in the mountain areas, with high elevation ski areas such as Saas-Fee benefiting more than the low elevation ski resorts. In contrast, snow conditions in the winter season 2013/2014 are comparable to the winter season 2016/2017. Third, the model is re-estimated with foreign overnight stays instead of total overnight stays or domestic overnight stays. Unreported results show that the effect of the price discount is not significant or even negative. Fourth, another robustness check concerns the possible effects of the appreciation of the Swiss franc during the sample period. Restricting the estimation sample to resorts with a higher than average share of foreign overnight stays (36 per cent and more) results in similar effects of the price discount on total overnight stays (with a coefficient of 0.186 as compared to 0.16 for the total sample).

To sum up, the price reduction attracts new domestic customers but fails to attract foreign customers. However, the skiing markets are stagnating or even shrinking (Sainaghi, 2008). This means that the price reduction and the resulting increase in demand goes at the expense of the market share of ski destinations outside the Valais region. Furthermore, such drastic price reductions may provoke similar actions by competitor companies (Steenkamp *et al.*, 2005). In this case, the effects of price reductions may not be long-lasting. In general, strong price reductions should be seen with scepticism; because they may deteriorate consumers' perception of quality, consumers' expectations for the brand and may cast some doubt on the value proposition (Dodson *et al.*, 1978; Nusair *et al.*, 2010).

5. Conclusions

In the battle to stabilise market shares in a shrinking worldwide ski market, Saas-Fee has introduced an innovative price strategy. Stakeholders argue that the massive price reduction for season ski passes leads to a strong increase in number of visitors to the ski destination in the winter season. So far, evidence of this has mainly been anecdotal. Thus, this study is the first attempt to empirically investigate the effect of this price strategy on the number of overnight stays at the village level. As the characteristics of ski areas differ widely, we include several control variables such as size, elevation, lift and snowmaking capacity and share of fast lifts.

The results show that the new price concept mainly stimulates Swiss overnight stays and – to a lesser extent – total overnight stays. Compared to the base winter season, the price discount leads to an increase in the number of Swiss residents' overnight stays in Saas-Fee by 48 per cent on average in hotels and related accommodations. Estimates are slightly higher when narrowed down to the upper part of the distribution of about 38 per cent as indicated by the 0.75 quantile estimators. Total overnight stays, however, increase only moderately by 17 per cent using OLS and by 14 per cent using 0.75 Quantile DID.

Several implications for Swiss ski resort business management can be drawn from these empirical results. Knowledge about the discounts and consumers' reactions to sales promotions are of great interest to marketing managers in today's very competitive ski market. The results show that the price reduction has successfully attracted more customers, thus, increasing revenues. However, the increase in the number of overnight stays is solely due to domestic residents, who are less likely to be new customers. The increase in domestic visitors to foreign visitors may lead to a change in the composition of different types of tourism expenditure (ski instructor, restaurant visits). Swiss tourists are more experienced skiers and have a higher average income than foreigners. As the positive effects on overnight stays are limited to Swiss tourists, such price strategies should be carefully considered.

Some limitations should be noted in the present analysis. In the study, the outcome variable is measured as the number of overnight stays in the corresponding ski area villages rather than as the output of the local ski lift company itself, where the price reduction can be observed for ski lifts tickets of the corresponding lift company. It is well-known that tourists visiting winter sport destinations are interested in a mix of activities, including downhill skiing, cross-country skiing, snowshoeing, hiking, enjoying nature and scenery or visiting a spa. In future work, lift ticket revenues or number of skier days (=skier visits) should be used as an alternative outcome measure. However, using overnight stays as the outcome variables has advantages, because it makes it possible to study the wider effects of the innovative price concept on registered overnight stays. Data are limited to hotel and similar establishments excluding self-catering accommodation which makes up nearly half of the overnight tourists (www.tourobs.ch, data from Nov 2014 to Oct 2015).

Finally, the analysis uses monthly data on overnight stays pooled over two winter seasons. It would be preferable to use panel data models and a longer time period. However, this requires information on local weather data at the monthly level which are difficult to obtain at the detailed municipality level.

Several ideas present themselves as potential avenues of future work. First, the DID analysis is a promising approach that can be applied to evaluate other innovative pricing strategies. Some ski lift operators are currently considering dynamic pricing models prices where ticket prices fluctuate in real time according to the number of tickets sold. Second, the subsequent winter seasons have to be included in a future analysis. This would make it possible to study the medium-term effects of the price reduction and also makes it possible to control for time-varying variables such as real income of the visitor countries. Third, the price discount is likely to have caused an increase in the price of accommodations. Studying these effects would thus be another interesting subject for future research.

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Appendix

Table AI Descriptive statistics

Variables	*Mean*	*SD*	*Minimum*	*Maximum*
Overnight stays total (Swiss residents and foreigners) (number)	18,672	32,921	7	191,506
Overnight stays Swiss residents (number)	9,831	16,327	1	111,410
Vertical transport metres (persons transported uphill of about 1,000 metres per hour)	7,641	6,624	879	28,770
Average elevation of lift stations (peak) in metres	2,180	304	1,650	2,889
Percentage of slopes covered by snowmaking facilities	0.23	0.19	0.00	0.95
Share of fast lifts in per cent	0.44	0.24	0.00	0.87
	Percentages			
Ski lift alliance on ticket prices (binary variables)				
Val d' Anniviers	0.04			
Quatre Vallées	0.04			
Aletsch ski resorts	0.04			

Notes: The list of the 54 ski sports destination includes: Adelboden-Lenk, Anzère, Arolla, Arosa, Bellwald, Bivio, Blatten-Belalp, Braunwald, Brigels-Waltensburg, Bruson, Champéry-LesCrosets-Morgins-Torgon, Chandolin-St-Luc, Crans-Montana, Davos-Klosters, Elm Sernftal, Engelberg, Evolène, Flims-Laax-Falera, Flumserberge, Grächen, Grimentz, Grindelwald total, gstaad-Saanenmöser, Hoch-Ybrig, Klewenalp, Lenzerheide Rothorn-Schwarzhorn, Leysin, Meiringen-Hasliberg, Melchsee-Frutt, Morgins, Nax-Mont-Noble, Nendaz-Veysonnaz-Thyon, Obersaxen, Ovronnaz, Pizol, Riederalp, Rosswald, Saas Fee, San Bernardino, Savognin, Scuol-Ftan, Sedrun-Disentis, Sörenberg, Splügen, St. Moritz, Stoos, Val Müstair, Verbier, Vercorin, Villars-Gryon, Wildhaus, Wiler-Lauchernalp, Zermatt, Zinal. The dummy variable Val d' Anniviers is ski-lift alliance including Chandolin-St-Luc and Zinal. The dummy variable 4 Vallées includes Nendaz-Veysonnaz-Thyon and Verbier, the dummy Aletsch includes Blatten-Belalp and Riederalp
Source: See text

Table AII Difference in differences estimates of the impact of the Saas-Fee discount on seasonal lift tickets on Swiss overnight stays (with interaction term for ski areas in Valais)

Explanatory variables	*OLS* *coeff.*	t-*value*	*Median regression (Q 0.50)* *coeff.*	t-*value*
Period	−0.082	−1.60	−0.033	−0.37
Treated (Saas-Fee)	−0.162	−0.36	−0.128	−0.16
Ski resorts in Valais	−1.346***	−3.19	−1.221**	−2.19
Period X treated (Saas-Fee)	0.438***	8.55	0.405***	4.44
Period X ski resorts in Valais	0.106	1.11	0.027	0.19
Month December (reference category February)	−0.692***	−13.02	−0.574***	−4.90
Month January	−0.223***	−9.65	−0.166***	−2.67
Month March	−0.207***	−8.54	−0.186	−1.36
Month April	−1.577***	−11.71	−1.423***	−9.51
ln vertical transport metres	0.905***	4.18	1.009***	4.05
ln average elevation peak stations	3.836***	2.61	2.804	0.94
% snowmaking	1.614*	1.91	0.843	1.07
% share of fast lifts	1.348*	1.86	1.383	1.39
Val d' Anniviers	1.507***	4.73	1.508***	3.09
Constant	−29.207***	−2.74	−21.969	−0.95
R^2 or pseudo R^2	0.680		0.660	
Parente–Santos Silva test (*p*-value)			0.000	

Notes: Asterisks ***; **; and * denote significance at the 1, 5 and 10% level. The dependent variable is the logarithm of the number of Swiss overnight stays in the winter season at the village level. Standard errors are clustered by ski destinations. Number of observations is 540, and the number of treated cases is 10

Corresponding author

Miriam Scaglione can be contacted at: miriam.scaglione@hevs.ch