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Applying an Econometric Shift-share Model to Regional Tourism Developments

Matthias Firgo, Oliver Fritz

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This paper is the first to apply an econometric shift-share model to tourism. The approach allows us to isolate the growth contributions of changes in regional touristic attractiveness from those induced by the structure of visitors, but does not share the caveats of the conventional shift-share approach. Our application to regional tourism in Austria reveals important results: First, differences in long-run performance between regions are mostly related to idiosyncratic changes in the tourist appeal of individual regions rather than a result of more or less favorable structures of visitors. Second, none of several mega-events during the period observed seem to have left prolonged positive effects on the tourist performance of the host regions. And third, performance appears uncorrelated with tourism intensity of a region. Thus, from a policy and destination management perspective, tourism authorities and local suppliers should mainly focus on upgrading the permanent destination attractiveness rather than investing too much effort into landing mega-events or targeting the visitor mix towards promising source markets.

Keywords: tourism developments, service exports, regional performance, shift-share regression analysis, visitor portfolio, Austria

JEL-Codes: L83, M30, O14, O25, R58

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1 Introduction

Shift-share analysis is a well-established method to decompose growth rates into a structural and a "competitive" performance component. The method was applied to empirical analysis as early as in the 1960s (Dunn 1960) and since then has undergone numerous extensions and improvements. The original shift-share equation is an identity that decomposes any sectoral growth rate into three components: a growth effect with respect to a reference area, which in regional applications is commonly the national economy ("national share"), a structural effect ("proportional shift"), and a factor of competitive performance ("differential shift"). The latter implies as a residual component of growth that indicates the relative competitive advantage or disadvantage of the specific regional sector at hand.

However, the traditional shift-share approach has been widely criticized despite numerous extensions of the original approach (see, e.g., Knudsen and Barff 1991). A major concern is that the approach fails to measure a region's performance independent of its given sectoral structure.[1] Consequently, the so-called dynamic regression shift-share analysis (Berzeg 1978) has been proposed to tackle these deficiencies.[2] In this approach, the shift-share identity is transformed into a stochastic, linear equation that can be estimated using standard econometric

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[1] Applying shift-share analysis in the field of tourism replacing industries with demand by source markets, this problem would imply that for two regions with identical growth rates, but different absolute numbers of a certain group of visitors, the shift-share equation will not result in equal differential shift components as expected. For an overview of shift-share applications in tourism research see Shi and Yang (2008).

[2] See Stockman (1988), Costello (1993), and Marimon and Zilibotti (1998) for prominent applications to the national level, and Möller and Tassinopoulos (2000), Toulemonde (2001), Blien and Wolf (2002), Patuelli et al. (2006), Südekum et al. (2006), Kowalewski (2011), LeGallo and Kamarianakis (2011), and Zierahn (2012) for more recent extensions and applications at the regional level.

methods. In such a framework, the structural composition of the regional economy has no influence on the measurement of a region's performance.

The purpose of the present paper is twofold: Firstly, at least to our knowledge, we are the first to apply an econometric shift-share approach to the tourism industry in order to disentangle structural (i.e. the regional visitor mix) and region-idiosyncratic components (as an indicator for tourist appeal or attractiveness of the region) in analyzing long-run tourism developments. To test the methodology and demonstrate its usefulness in a tourism context, we make use of annual data on the number of touristic overnight stays by origin country available at the level of Austrian NUTS 3 regions over a time span of eighteen years.

Secondly, we extend a model proposed by Marimon and Zilibotti (1998) to evaluate a region's "actual" performance by comparing it to its "virtual" counterfactual that excludes all region-specific effects.[3] Unlike the original model, our extension accounts for the fact that small absolute changes of the target variable (overnight stays in our case) might translate into high relative changes in regions with only minor tourist activities and thus rather low absolute numbers of overnight stays. Also known as "shipbuilding in the midlands"-problem (Möller and Tassinopoulos 2000), this issue becomes particularly relevant when analyzing spatial units of smaller scale (such as NUTS regions) and/or individual industrial sectors such as tourism rather than highly aggregated industrial sectors, and may drastically affect the measure of relative

[3] Marimon and Zilibotti (1998) introduced their model to assess the economic performance of European countries. The model was also applied to evaluate the within-country economic performance of regions (e.g. Toulemonde, 2001).

performance for all regions in original the Marimon and Zilibotti (1998) model due to the model constraints imposed.

The differences in absolute tourism numbers across regions are mainly determined by individual regions' endowments with respect to the scenic, historic and/or cultural appeal. However, growth in regional tourism is commonly determined by a number of other factors: Firstly, national tourism branding and promotion efforts aim at generating benefits across all tourist regions within the country. Secondly, the regional mix of visitors by their country of origin may push or depress total touristic demand in a region depending on how demand in a specific source market develops. Thirdly, the performance and growth of the regional tourism industries is heavily influenced by both private and public sector initiatives implemented at the regional or local level.

While national tourism promotion activities are mainly exogenous for individual regions, the latter two determinants can be directly and indirectly influenced by regional policy makers. Frequently used policies and activities by tourism agencies include, for instance, regional and local destination marketing efforts in promising source countries (thus attempting to change the existing visitor structure). Faulkner (1997) and Smeral and Witt (2002), among others, stress the importance of a favorable portfolio of visitors to assess the overall competitive performance of tourist destinations. Furthermore, both private and public entities are engaged in improving the local and regional tourism infrastructure in order to secure and enhance the destination's attractiveness and successfully cope with an increasingly competitive global tourism market. Disentangling the long-run effects induced by the structure of visitors from those of idiosyncratic changes in attractiveness should provide guidance as to which of these factors seems more relevant and thus may help in making decisions about resource allocation.

In the Austrian case we find substantial deviations in the growth rates of visitors from different countries of origin. However, our results suggest that for the long-run performance relative to peer regions, idiosyncratic shocks in regional tourist attractiveness are dominating the portfolio-effect of visitors' origin countries in about two thirds of all regions. Also, a number of mega-events during the period analyzed seem to have had temporal positive effects for the host regions compared to their peer regions at most. Thus, tourism administrations should focus on increasing the permanent attractiveness of local tourist supply rather than putting too much effort into enhancing the portfolio of their visitors with respect to their countries of origin or into landing mega-events.

2 Methodological approach: a shift-share regression model

The shift-share regression model at hand is an extension of a model by Marimon and Zilibotti (1998) originally applied to analyze the development of employment in Spain. Analogously, we decompose regional growth in touristic overnight stays of visitors from different groups of countries of origin into group-specific, temporal and regional components, which are constructed using dummy variables. The Marimon and Zilibotti (1998) model can be denoted as follows:

$$e(i,n,t) = \beta_{h(i)}h(i) + \beta_{m(i,n)}m(i,n) + \beta_{b(t)}b(t) + \beta_{f(i,t)}f(i,t) + \beta_{g(n,t)}g(n,t) + u(i,n,t), \quad i = 1,...,I; n = 1,...,N; t = 1,...,T; \qquad (1)$$

where *e(i,n,t)* is the growth rate of overnight stays of tourists of origin *i* in region *n* in period *t*. *h(i)* is a binary variable that is equal to 1 if growth rate *e* refers to tourist group *i* and is zero otherwise. *m(i,n)* is an interaction term of dummy variables that is equal to 1 for all growth rates covering tourists of group *i* in region *n*. *b(t)* is a dummy variable for time period *t*. *f(i,t)* is an interaction dummy for group *i* tourists and period *t*. Finally, *g(n,t)* is an interaction dummy for Region *n* and time period *t*.

The coefficients of these dummy variables measure the following different growth components:

- Coefficient $\beta_{h(i)}$ indicates the constant trend in growth for tourists of group *i* over the total period analyzed across all regions. Thus, vector β_h can be interpreted as tourist-group-fixed-effects. For groups that show a positive growth trend at the national level (in Austria e.g. tourists from China), this component will have a positive sign.
- Coefficient $\beta_{m(i,n)}$ captures deviations of visitor group *i* in region *n* from the national trend for this group (e.g. higher growth rates for guests from the Central and Eastern European countries (CEEC) in some of the eastern regions than in the rest of Austria).
- $\beta_{b(t)}$ covers cyclical effects that are independent of specific regions or visitor groups. Hence, $\beta_{b(t)}$ is a vector of time period-fixed-effects controlling for different states within a national tourism business cycle (for different periods *t*)

that might stem from relatively dry (warm) winter or humid (cold) summer seasons.

- $\beta_{f(i,t)}$ measures group-specific business cycles, i.e. temporal deviations from the group-specific long-run trend that do not show regional patterns (e.g. the recent decline in the number of Russian tourists following the substantial deviation of the Russian Ruble in 2014).
- $\beta_{g(n,t)}$ is an indicator for a regional business cycle that corresponds to a temporal region-specific deviation in aggregate (not group-specific) tourism (e.g. due to mega-events for positive or natural disasters for negative deviations).
- $u_{(i,n,t)}$ is a residual that is independent from all other components.

The model in equation (1) suffers from perfect multicollinearity between the regressors.[4] A common solution to this problem is to define some regressors as numeraires (reference groups). Marimon and Zilibotti (1998), and subsequently Toulemonde (2001), propose a different strategy to ease interpretation and define a set of restrictions on the coefficients of the independent variables. These restrictions are selected such that all different effects are orthogonal to each other and consequently independent. The advantage of this approach is that the coefficients reflect deviations from the average (across all regions) rather than deviations from a particular region serving as a reference group.

[4] Due to the linear dependencies of some of the dummy variables included, the model is not identified, i.e. an estimation of the coefficients is not possible.

Möller and Tassinopoulos (2000) discuss a potential estimation problem known in the literature as "shipbuilding in the midlands": Small absolute changes in sectors or regions of little relevance may correspond to high relative changes in these sectors/regions, which – due to the constraints – directly influences the coefficients of all other sectors/regions. This problem is very relevant in applications to small spatial units such as NUTS regions and/or disaggregated sectoral analysis such as tourism since growth rates in some regions or visitor groups of minor importance may be very high and vary substantially between two consecutive years. Thus, in contrast to Marimon and Zilibotti (1998) and Toulemonde (2001), we weight all *ß* by the shares (denoted by weight *a*) of the corresponding variables within the respective restriction equation.[5] Specifically, the following restrictions are made:[6]

Restrictions R1: $\sum_{n=1}^{N} a_{i,n}\beta_{m(i,n)} = 0, i = 1,...,I;$

Restrictions R2: $\sum_{i=1}^{I} a_{i,t}\beta_{f(i,t)} = 0, t = 1,...,T;$

[5] Referring to Marimon and Zilibotti (1998), Le Gallo and Kamarianakis (2011) suggest the estimation of a spatial autoregressive (SAR) model to account for spatial interdependencies between spatial units. However, in addition to the general problem of finding a spatial weights matrix reflecting the true data generating process (for a critical assessment see Gibbons and Overman, 2012), the present framework adds an additional dimension to the complexity of specifying the "true" weights matrix: Correct weights have to be found for spillovers between spatial units within and between specific sectors (tourist groups), which is likely to result in a complete arbitrariness. In addition, the conventional spatial autoregressive (SAR) model does not allow for weighted linear restrictions. Note, however, that we found a significant but extremely small positive value (of 0.02) for the spatial autoregressive parameter when estimating equation (1) as a SAR model with unweighted restrictions, based on a first order spatial contiguity matrix allowing for spatial within-visitor-group spillovers only, using the reduced form maximum likelihood estimator provided by the Spatial Econometrics Toolbox for MATLAB (see www.spatial-econometrics.com). However, the results of this exercise primarily reveal that omitting the "shipbuilding in the midlands" problem in the SAR model severely biases the results towards fast-growing minor tourist regions. Thus, we conclude that proper weighting in the restrictions should be given priority over spatial estimations given the problems associated with the latter. More details on this exercise are available from the authors upon request.

[6] The result is 2T+2I+N+1restrictions, two of which are not linearly independent. As Marimon und Zilibotti (1998) demonstrate, exactly 2T+2I+N-1 restrictions are necessary to identify the model.

Restrictions R3: $\sum_{t=1}^{T} a_{i,n}\beta_{f(i,t)} = 0, i = 1,...,I;$

Restrictions R4: $\sum_{t=1}^{T} a_{n,t}\beta_{g(n,t)} = 0, n = 1,...,N;$

Restrictions R5: $\sum_{n=1}^{N} a_{n,t}\beta_{g(n,t)} = 0, t = 1,...,T;$

Restrictions R6: $\sum_{t=1}^{T} a_{t}\beta_{b(t)} = 0;$

with the weights *a* being the respective shares in overnight stays within the dimensions relevant for the particular set of restrictions. This set of restrictions can be interpreted as follows:

R1: Coefficient $\beta_{m(i,n)}$ measures the deviation in regional growth of tourist group *i* from the national (i.e. average) growth path of the same group.

R2 and R3: Group-specific deviations at a specific point in time, measured by $\beta_{f(i,t)}$), average out over all tourist groups (R2) and also for each group *i* over time (R3).

R4 and R5: Coefficient $\beta_{g(n,t)}$ represents deviations of the regional growth paths from the national business cycle. These deviations are assumed to average out across all regions *n* at time *t* (R4) and also sum up to zero for each region *n* over time (R5).

R6: National cyclical movements $\beta_{b(t)}$ are defined as temporal deviations from the national growth trend.

The estimation results obtained are then used to calculate a hypothetical time series of tourist overnight stays for each region. This "virtual" growth rate (e^{virt}) of overnight stays for each tourist group *i* in period *t* can be written as:

(2) $$e^{virt}(i,t) = \beta_{h(i)} + \beta_{b(t)} + \beta_{f(i,t)}.$$

These tourist group-specific growth rates are calculated using the estimates of the coefficients of those dummy variables of equation (1) that are not region-specific. Therefore, they are equal over all regions. Based on these growth rates hypothetical (virtual) absolute overnight stays (E^{virt}) for each region *n* and each regional tourist group *i* can be estimated by:

(3) $$E^{virt}(i,n,t) = e^{virt}(i,t) \cdot E^{virt}(i,n,t-1).$$

The generation of the hypothetical number of overnight stays (E^{virt}) is based on the actual number (E^{act}) for the initial year, i.e. $E^{virt}(i,n,t_0)= E^{act}(i,n,t_0)$. These base year numbers of overnight stays are used to calculate the virtual values for *t+1*, and the *t+2* virtual values are based on the virtual values for *t+1* etc. Summing over all tourist groups provides the virtual total overnight stays for each region *n* in period *t*. This time series reflects the regional development to be expected from the structure of visitors if all regional factors (deviation of the regional from the national development of a specific tourist group, region-specific business cycles) had been excluded.

Comparing the hypothetical development (E^{virt}) with the actual numbers (E^{act}) allows an assessment of the positive or negative influence of region-specific factors and thus provides an indicator for regional performance independent of a region's visitor mix and national tourism trends. For this purpose we calculate indicator *W(n,t)* as ratio of the actual over the hypothetical level of overnight stays for each region *n* and every period *t*.

(4)
$$W(n,t) = \sum_{i=1}^{I} E^{act}(i,n,t) \Big/ \sum_{i=1}^{I} E^{virt}(i,n,t).$$

W(n,t) above (below) 1 implies that regional tourism developed better (worse) than predicted on the basis of national effects: the actual level lies above (below) the hypothetical one and it can be concluded that region-specific factors exerted a positive (negative) influence. In contrast to the traditional shift-share analysis, these results are not biased by structural preconditions (c.f. Toulemonde, 2001). If a region is specialized in fast-growing tourist groups in period t = 1, its growth rate will outperform that of other regions; however, its actual growth path may still lie below its hypothetical level (*W*<1) implying that the region, given its favorable visitor mix, should have grown even faster than it actually did and thus failed to fully exploit its full potential.

3 An Application to Austrian Tourism

3.1 Industry Background and Data Base

In 2013, Austria counted 36.8 million arrivals and 132.6 million overnight stays by domestic and international tourists according to Statistics Austria. The value added generated by tourists contributed to 5.6% of total Austrian GDP, not including indirect and induced effects (Laimer et al. 2014). A country ranking based on nights spent at tourist accommodations per inhabitant sees Austria in fourth place among the EU 27 countries just behind Malta, Cyprus and Croatia and way ahead of traditional tourism countries such as Greece, Spain or France and Italy.

While the demand for Austrian tourism destinations is more or less equally distributed over the winter and summer seasons, a regional perspective on the number of overnight stays reveals a significant spatial heterogeneity (Figure 1): While alpine regions in the West and Southwest accounted for 74% of total overnight stays in 2014, regions in the North, East and Southeast of the country – with the exception of the capital city of Vienna (Wien) with a share of about 10%) – are observing significantly fewer overnight stays. However, medium-term growth rates by region suggest that these less tourism-intensive regions have gained in performance over Western and especially southwestern regions (Figure 2). A list of regions and NUTS codes is provided in Table A in the appendix.

Figure 1 *Regional shares in total overnight stays 2013 in %*

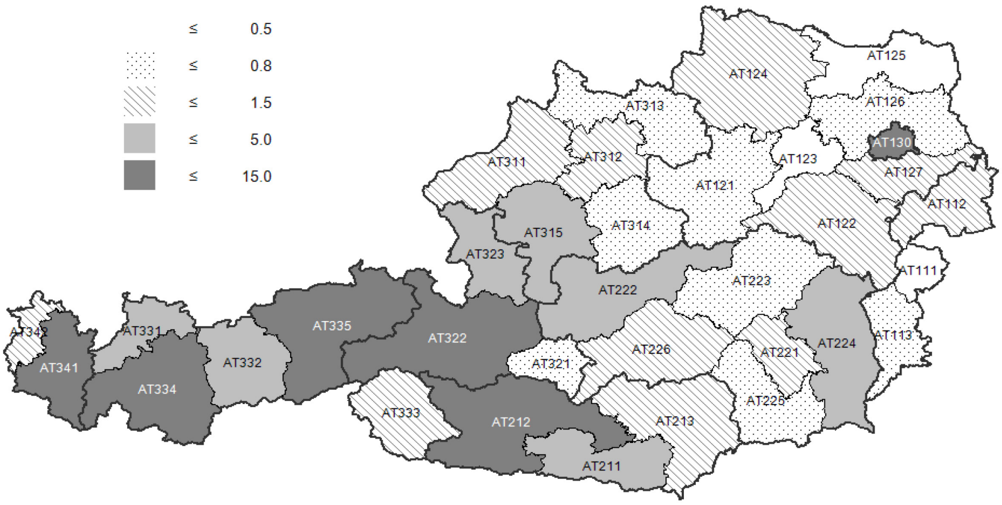
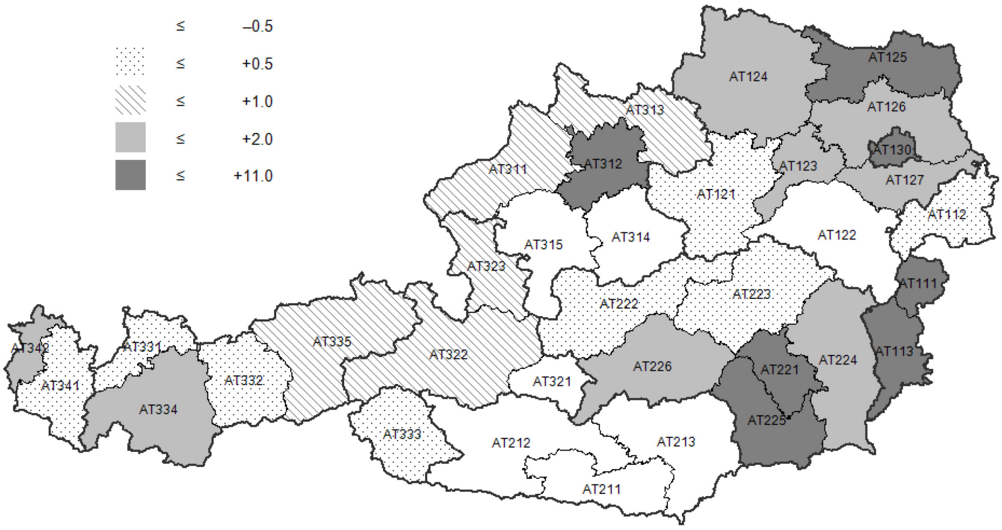


Figure 2 *Regional growth rates in overnight stays between 1995 and 2013*
Average annual growth rates in %



The shift-share regression model introduced in section 2 is estimated using annual data on the number of overnight stays by the visitors' countries of origin between 1995 and 2013.[7] We distinguish between ten different (groups of) countries of origin (Table 1). Austria (domestic tourists), Germany, Italy, and Switzerland (incl. Liechtenstein) were included individually because of their high shares in total overnight stays. All other countries were grouped as shown in Table 1 either due to a lack of significance of the individual countries or because data are available as aggregates for the respective country group only for at least some of the years covered in the analysis (as is the case for the Benelux countries and UK/Ireland).

[7] The data was provided by Statistics Austria.

Table 1 *Origin country groups and their shares in overnight stays*

Countries of origin	*1995*	*2013*
Germany	49.9	38.3
Austria	25.7	27.0
Benelux*	6.4	9.1
CEEC**	1.7	6.9
Switzerland***	2.5	3.5
UK and Ireland	2.4	2.7
Scandinavia	1.5	2.2
Italy	1.9	2.1
Rest of EU 15****	2.3	2.1
Rest of the world	5.8	6.2
	100.0	100.0

* Belgium, Netherlands, Luxembourg; ** Croatia, Czech Republic, former Yugoslavia, Hungary, Poland, Russia, Slovakia, Slovenia, Ukraine;*** incl. Liechtenstein; **** France, Greece, Portugal, Spain.

The number of overnight stays is available at the NUTS 3 level for the 35 Austrian NUTS 3 regions; of these, eight "small" regions with little touristic relevance were merged to four pairs of adjacent regions[8] to reduce the "shipbuilding in the midlands" problem (see section 2 above). Thus, our sample consists of 31 regions, 10 origin countries/origin country groups and 19 years.

3.2 Results

Before describing the results on the long-run touristic performance of Austrian NUTS 3 regions in more detail, it seems worthwhile to look at the econometric results on differences in growth trends by source markets as they are not constrained to sum up to zero.[9]

[8] These regions are Mittel-/Südburgenland in the federal state of Burgenland, Weinviertel/Wiener Umland-Nord and Mostviertel-Eisenwurzen/St. Pölten in the state of Lower Austria (Niederösterreich), as well as Innviertel/Mühlviertel in Upper Austria (Oberösterreich).

[9] Note that we refrain from illustrating the remaining 1,067 coefficients following from the regression model of equation (1). However, full regression output tables are provided by the authors upon request.

Table 2 *Average regional annual growth rates in overnight stays by group of origin*

Region	*Growth rate*	*t-stat.*	
Austria	0.012	(1.44)	
Benelux	0.008	(0.85)	
CEEC	0.085	(9.41)	***
Germany	-0.008	(-1.05)	
Italy	0.022	(2.30)	**
Rest of EU 15	0.013	(1.17)	
Rest of the world	0.056	(4.70)	***
Scandinavia	0.041	(4.21)	***
Switzerland	0.030	(2.92)	***
UK and Ireland	0.024	(2.41)	**

Results based on equation (1), only coefficients of origin-fixed effects *h(i)* displayed. *** (**) [*] … significant at the 99% (95%) [90%] level. The remaining coefficients estimated are not displayed.

The results in Table 2 indicate that the group of CEEC countries experienced the highest average annual growth rates in overnight stays (8.5% p.a.) across regions, followed by countries summarized as "Rest of the world" (5.6%). Other positive growth rates significant at the 99% level are found for Scandinavian (4.1%) and Swiss (3.0%) tourists. Additionally, the growth rates for Ireland (2.4%) and Italy (2.2%) are significant at the 95% level. The large heterogeneity in regional growth rates between tourist groups implies that regional differences in visitor shares by country (i.e. intended or unintended regional specialization with respect to source markets) may indeed matter for regional tourism performance.

Estimated values of our main regional performance indicator *W* are illustrated in four groups (see Figures 3 to 6) each composed of regions similar in topography (e.g. cities, alpine regions) and/or type of tourism attractions (e.g. culinary and wellness regions).[10] A value of *W*>1 on the vertical axis indicates that a region's actual

[10] A list of all regions including NUTS codes and regional groups is provided in Table A in the appendix.

performance was better than its "virtual" one, i.e. growth in overnight stays was higher than expected based on non-idiosyncratic (region-specific) effects.

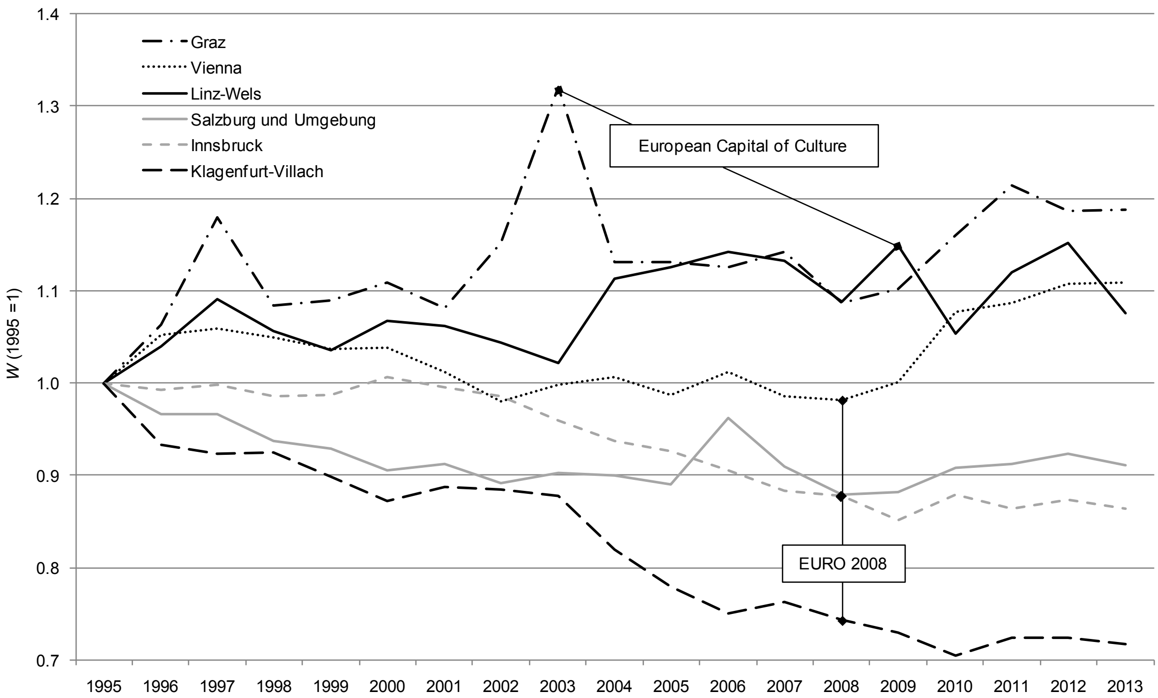
The results for the group of Austrian city regions (Figure 3) reveal significant differences in regional performances and an interesting development over time: The values for Graz and Linz are constantly above 1, while Vienna improved its performance only after the economic crisis of 2009. For Salzburg, Innsbruck and Klagenfurt-Villach, on the other hand, the competitive positions erode during the whole sample period. Moreover, during that period a number of mega-events took place in these city regions; the fact that the values of W do not increase after those events clearly indicates that they did not result in positive relative long-term effects for the host regions' tourism industry even though such alleged benefits often served as key arguments in the ex-ante political justification for organizing these (often very costly) events in the first place.[11] Graz (2003) and Linz (2009) are examples for such "missing" long-run event benefits since they were selected to serve as European Capitals of Culture[12] in the recent past. Both cities saw their index values W go up in the respective event years, with a substantially higher increase for Graz than for Linz. Both cities then experienced a sharp decline in their relative tourism performance in the year immediately after the Capital of Culture events. This implies that the high level of touristic appeal associated with the numerous cultural events taking place during the European Capital of Culture year quickly faded in the following years.

[11] However, the events might have influenced the structure of tourists, which is controlled for in the current analysis. Thus, in case the events induced a shift towards fast-growing tourist groups, this equally affects actual and virtual growth and does therefore not lead to changes in our attractiveness measure.

[12] See http://ec.europa.eu/programmes/creative-europe/actions/capitals-culture_en.htm for details.

Similar conclusions can be drawn for the four Austrian host cities of the European Football Championship in 2008 (Vienna, Salzburg, Innsbruck and Klagenfurt). Figure 3 doesn't reveal any subsequent changes in the long-run trends that could be associated with this event. These results are in line with previous findings in the literature on the economic impacts of sports events. Fourie and Santana-Gallego (2011), for example, report increased tourism levels in the year of the event only for some types of global sports events (Summer Olympics; FIFA World Cup) but not for others.[13]

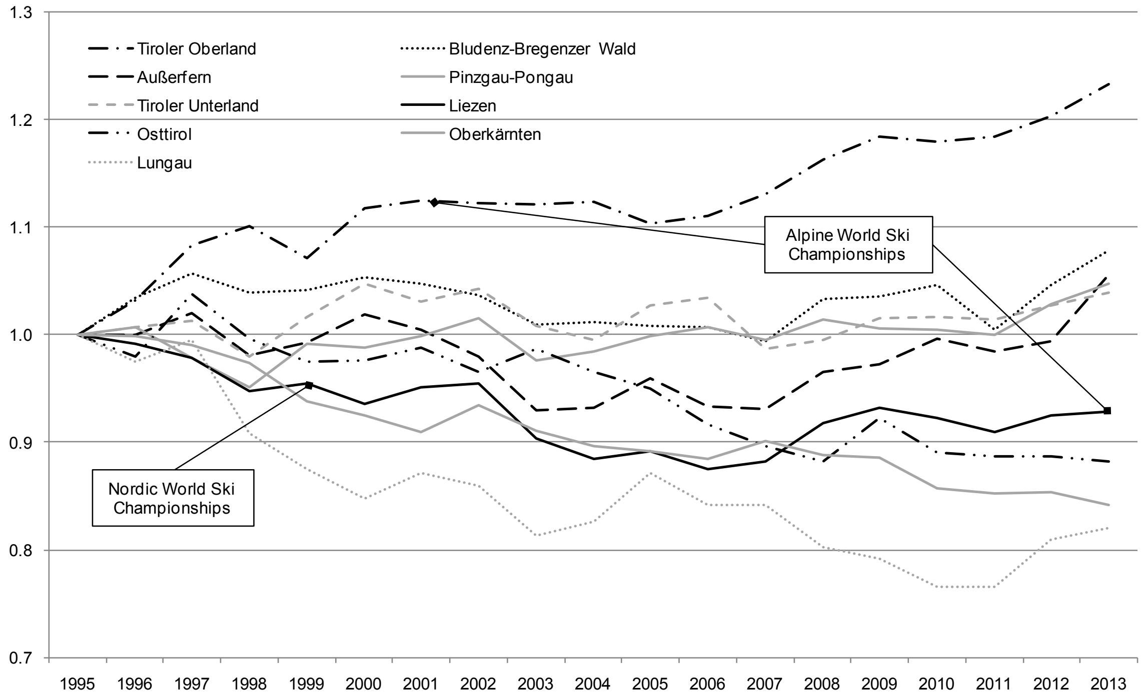
Figure 3 *Actual to virtual growth in major city regions*



[13] The authors emphasize that potential positive impacts of such events crucially depend on their size, their timing and the level of pre-event tourism demand in the host regions.

The results for alpine regions in Austria (Figure 4) point towards a South-West divide in terms of touristic competitiveness with many of the largest, internationally most reputed and highly tourist-intensive Western regions ahead of others.

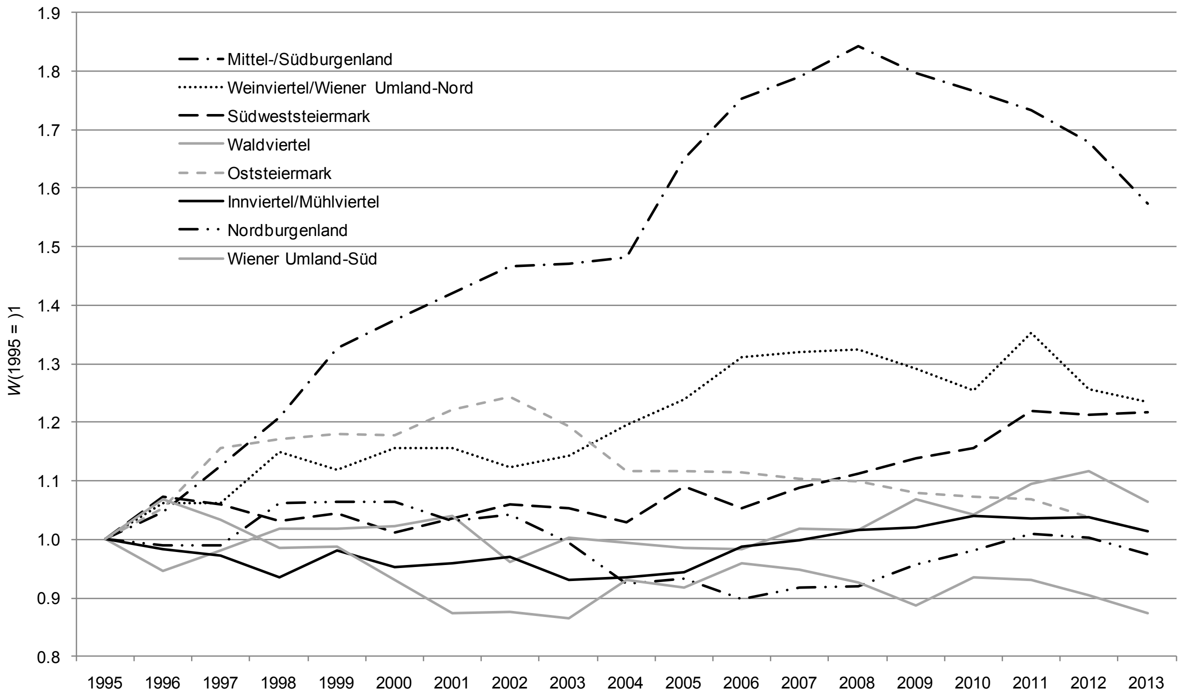
Figure 4 *Actual to virtual growth in alpine regions*



Western regions like Bludenz, Tiroler Unterland, Pinzgau-Pongau and, in recent years, Außerfern, mostly show a stable performance level; for Tiroler Oberland, a region that hosts some of the largest ski resorts in Austria and records the second highest number of total overnight stays among all Austrian NUTS 3 regions, a longer-term increase in the performance is estimated. Liezen in the southern state of Styria made a turnaround in 2008 and 2009 with its performance level stabilizing ever since. The main tourist destination in that region, Schladming, hosted the Alpine Skiing World Championships in early 2013; while the event did not increase the region's performance in that year, it remains to be seen if longer-term benefits can be accrued. Contrary to alpine regions in the Western parts of the country, the results suggest a clear deterioration of competitiveness for the remaining alpine regions in the South (Osttirol, Oberkärnten, Lungau).

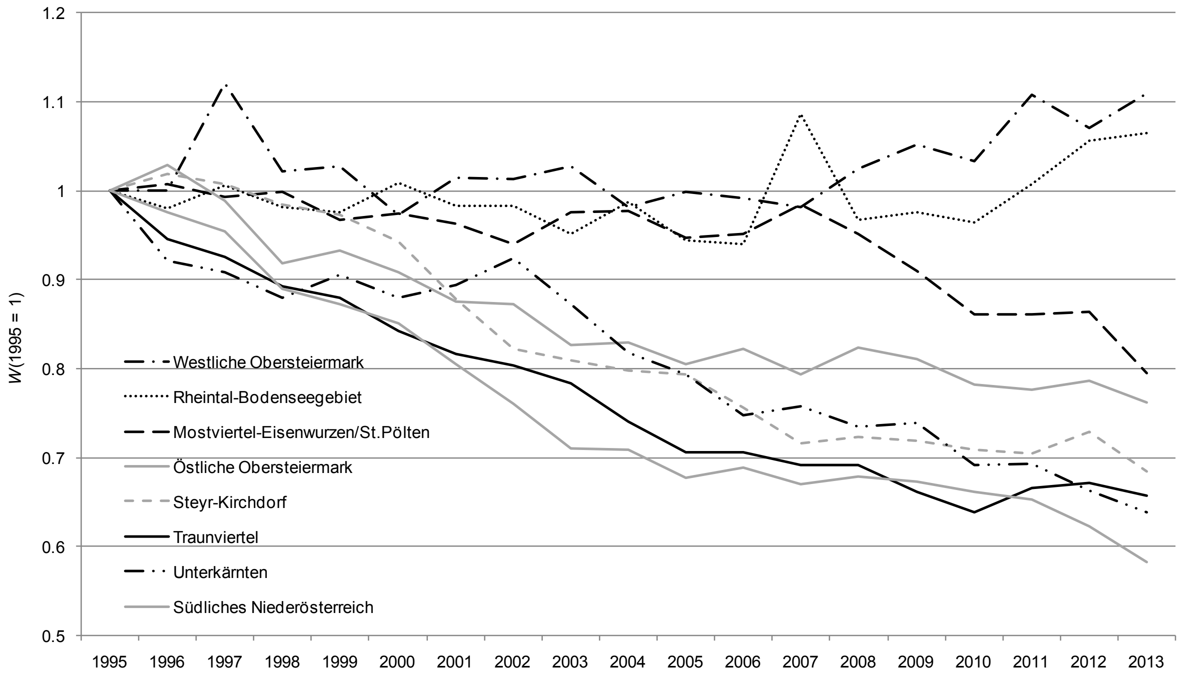
The group of culinary art and wellness regions (Figure 5) is much less tourism-intensive and includes mostly regions in the East and North of Austria. Lacking mass tourism attractions, many of these regions have specialized in more sustainable tourism concepts with highly individualized offers for shorter term vacations and thus domestic tourists, many of which travel to the destinations from nearby Vienna. The performance index (*W*) shows values above 1 for most of these regions reflecting the considerable (mostly publically financed) investments in the tourism infrastructure (mostly in large thermal spas) in many of these regions, temporarily boosting tourism, especially in the regions of Mittel-/Südburgenland or regions in Styria (Oststeiermark, Südweststeiermark). Spa tourism regions, however, while booming in the years succeeding these investments, have lost much of their formerly acquired competitive edge in more recent years because of major changes in the competitive environment: Resorts across the Hungarian and Slovenian border substantially increased their quality standards while prices stayed below those of their Austrian competitors. Furthermore, larger spa sites are increasingly under pressure from the recent trend of hotels investing in wellness facilities and offering tourists a more exclusive experience beyond mass tourism features.

Figure 5 *Actual to virtual growth in culinary art and wellness regions*



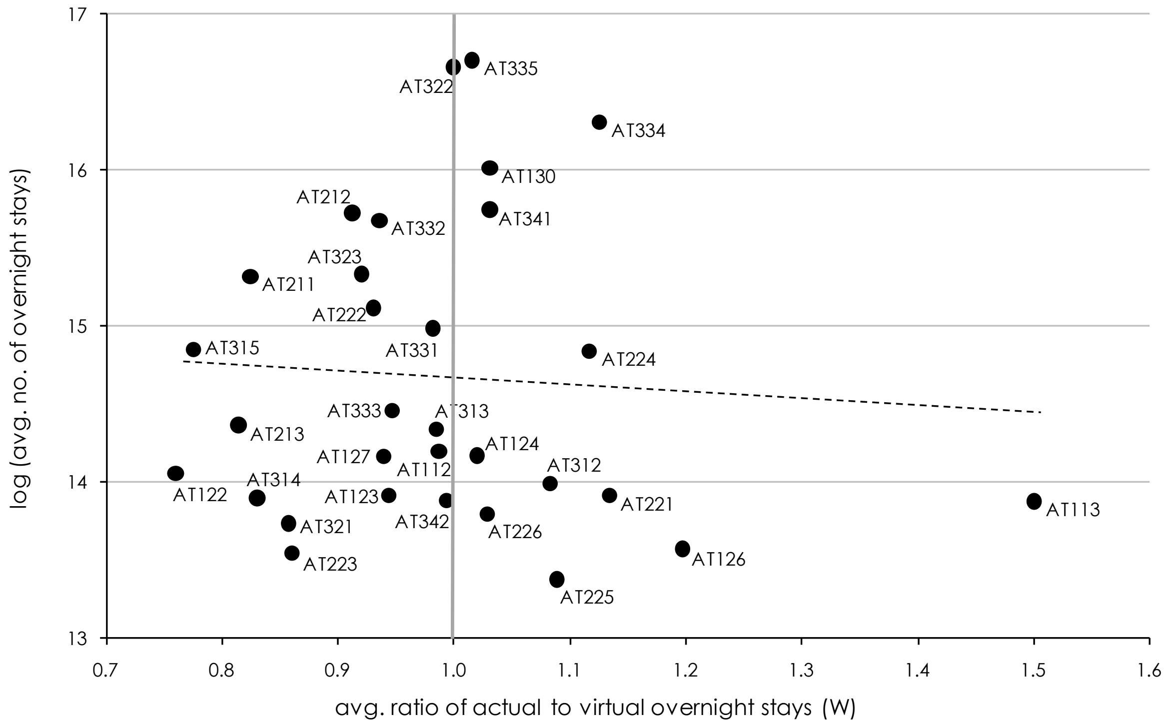
Finally, the group of "mixed regions" (Figure 6) is the most heterogeneous one both in topography and main tourism attractions. Most of them are rather rural regions located in the foothills of the Alps and many (but not all) of them are the least tourism-intensive regions of all. These regions have mostly lost in performance over time with $W<1$ and steadily decreasing. Only Rheintal-Bodensee in the very west and Westliche Obersteiermark in Styria (with the latter specializing in Eastern European markets, especially the Hungarian one) remain at or above the initial level of $W=1$. Many of these regions suffer from a lack of attractions or were not able to cope with structural changes in the tourism industry.

Figure 6 *Actual to virtual growth in mixed regions*



Across all regions, Figure 7 illustrates that there is no significant correlation between the level of overnight stays and changes in the relative performance. While the biggest improvements in performance (largest average values in *W* during the period monitored) are observed at both extremes of the regional distribution by the volume of overnight stays, Figure 7 neither points in the direction of a general catching-up of less touristic regions, nor towards a leapfrogging in the performance of the major tourist regions.

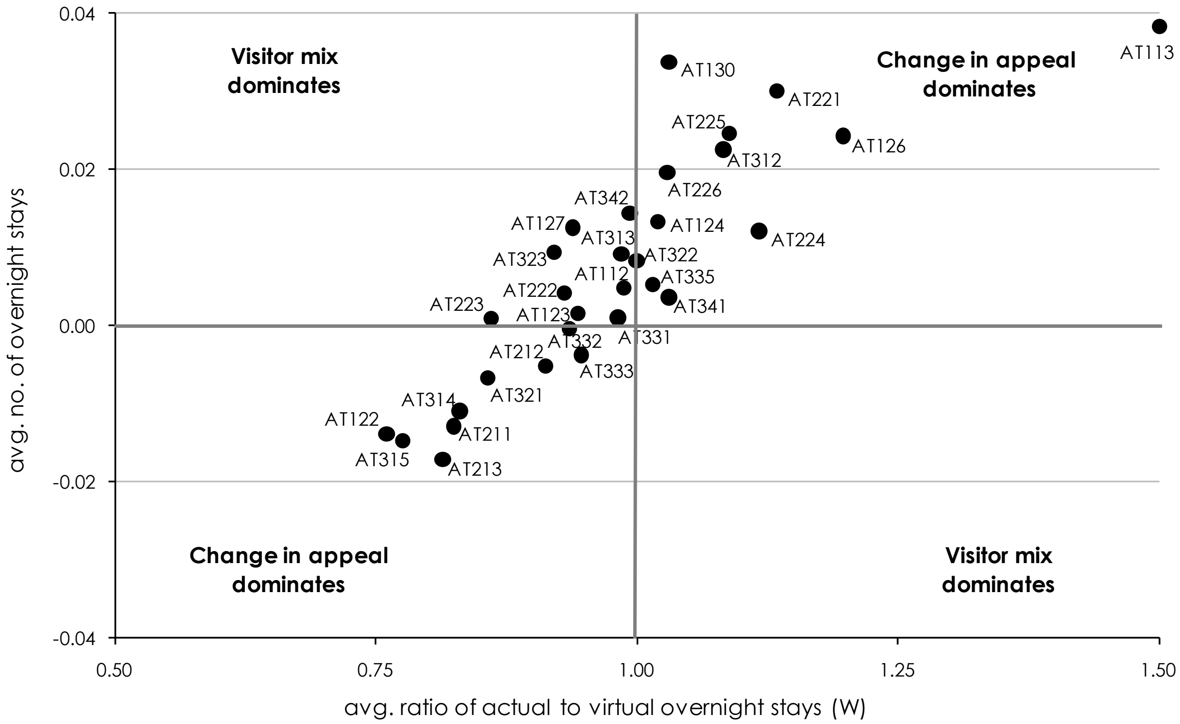
Figure 7 *Ratio actual to virtual (W) vs. absolute levels of overnight stays*
Averages per region during the 1995 to 2013 period



Dashed line is the regression line. The regression coefficient of -0.42 is insignificant at the 90% significance level.

Figure 8 illustrates the relation between average annual growth of overnight stays in the 1995 to 2013 period and the average annual ratio of actual to virtual growth (*W*) for each region. Regions in the upper right (lower left) quadrant experienced an increase (decrease) in actual overnight stays and an increase (decrease) in their performance throughout the period observed. Thus, for these regions changes in their relative tourist appeal dominated actual developments. Regions in the upper left (lower right) quadrant had a positive (negative) growth in overnight stays but lost (gained) relative performance. In those regions, the structure of visitors dominated growth effects induced by relative changes in the tourist appeal. The majority of regions with an increase in the actual number of overnight stays also improved their relative performance (*W*); furthermore, all regions with shrinking numbers of overnight stays suffered from a loss in *W*. This implies that there is no region with a decline of overnight stays due to an unfavorable visitor mix. Only about one third (10 out of 31) of all regions[14] showed positive actual growth rates despite a relative loss in performance.

Figure 8 *Changes in the actual to virtual growth ratio (W) vs. actual annual growth*
Region averages during the 1995 to 2013 period



Thus, it can be concluded that in the majority of regions idiosyncratic regional changes in tourist attractiveness outweigh effects induced by the structure of visitors following origin-specific tourist trends in the visitors' home countries. These results suggest that changes in idiosyncratic attractiveness are the main growth drivers in

[14] The majority of these regions is located in the eastern parts of Austria and has thus benefited from the relative closeness to the fast-growing markets of the CEE countries.

tourism but a lack of relative increases in appeal can sometimes be compensated by a favorable guest mix. However, regions with a traditionally high share of tourists from fast-growing markets need to improve their attractiveness relative to their (domestic) competitors in order to ensure a sustained positive growth performance.

4 Conclusions

In this paper we extended the regression shift-share approach introduced by Marimon and Zilibotti (1998), so it can be applied to spatially and structurally disaggregated industry levels without suffering from the so-called "shipbuilding in the midlands"-problem (i.e. high relative but negligible absolute changes in small regions and/or industrial (sub-)sectors driving the overall results because of the linear constraints in this model). The ratio of actual to virtual growth (i.e. growth that results from the structural composition of the economy but not from location-specific developments) provides an indicator of how a region or country performed relative to what would have been expected from its sectoral composition. In contrast to the traditional shift-share approach this indicator is not biased by structural effects. Applying the model to the Austrian tourism sector we suggest this method also as a tool for an analysis of industry specific developments that can be used even at disaggregated regional levels.

Our empirical analysis reveals a number of important results and implications for policy makers: Firstly, our results indicate that tourism policy makers should focus less on the composition of tourists (i.e. a favorable visitor mix) since for the majority of regions we find that in explaining actual growth levels, changes in the region-specific attractiveness dominate effects induced by the composition of a region's visitor portfolio in terms of countries of origins. Furthermore, the vast majority of those regions that have performed poorly in the long run shows patterns of a steadily declining level of performance, while well-performing regions are characterized by less stable developments with frequent peaks and troughs.

Secondly, our results reveal that a number of mega-events did not have a long-run impact on regions' tourism performance compared to their peer regions. If at all, such events are found to have induced a temporal and thus not sustained increase in performance only in the year they took place. For none of the four host cities of the European championship in football (EURO 2008 in Vienna, Salzburg, Innsbruck and Klagenfurt) we found subsequent changes in the long-run trends that could be associated with the event; also for the European Capitals of Culture, Graz and Linz, such effects were apparent only for the year of the event, leaving no visible longer-run traces. This leads to the conclusion that tourism induced by mega events may be crowding out other forms of tourism (e.g. culture, congresses) or result in an intertemporal substitution of tourist trips.[15] In a nutshell, a successful long-run development in tourism requires both a favorable portfolio of tourists (with above-average shares of faster growing source markets), but first and foremost an infrastructure that fits well with actual trends in tourism. In this respect we conclude that tourism authorities and suppliers should mainly focus on an ongoing upgrading

[15] However, if such events affect the structure of visitors towards fast-growing tourist groups, this equally affects actual and virtual tourism and thus does not change a region's position with respect to the performance measure used throughout this paper. Also, cultural events may shift the structure of tourists with respect to age and wealth and thus affect the average spending per tourist, which again is not being taken stock of in the present analysis.

of the attractiveness of their tourist infrastructure (as illustrated by Plaza et al. (2015) for the case of a culture-led city brand). While marketing efforts in fast growing source markets may be a useful complement to measures increasing the destination's attractiveness, investments in landing mega-events rarely seem to pay off and provide a sustained growth boost

Thirdly, we find that alpine regions in the western parts of Austria, regions with tourism based on culinary art and wellness and some of the major city regions have performed better in the long-run while especially alpine regions in the South and most of the "mixed" regions (associated with scenery dominated by foothills and/or lakes) have had a rather poor performance when controlling for the regional structure of visitors.

An interesting future extension of the current analysis could be dedicated to differences in developments in winter and summer seasons. The model may also be used to evaluate the performance with respect to individual groups of tourists in each region at each period in time. It allows an identification of those tourist groups that account for most of the total performance of each region. However, we leave such analysis to further research endeavors. Also, future econometric research could focus on relating changes in the actual/virtual tourism ratio to changes in amenities and cultural offers to identify the drivers of attractiveness and performance.[16]

[16] Similar studies were conducted by Capone and Boix (2008) who relate tourism growth to local tourist production systems and by Patuelli et al. (2013) who analyze the relation between tourism flows and UNESCO World Heritage Sites.

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Appendix

Table A *Region codes, region names and region groups*

NUTS Code	*Region Name*	*Region Group*
AT112	Nordburgenland	culinary art and wellness
AT113	Mittel-/Südburgenland	culinary art and wellness
AT122	Südliches Niederösterreich	mixed
AT123	Mostviertel-Eisenwurzen/St.Pölten	mixed
AT124	Waldviertel	culinary art and wellness
AT126	Weinviertel/Wiener Umland-Nord	culinary art and wellness
AT127	Wiener Umland-Süd	culinary art and wellness
AT130	Vienna	city
AT211	Klagenfurt-Villach	city
AT212	Oberkärnten	alpine
AT213	Unterkärnten	mixed
AT221	Graz	city
AT222	Liezen	alpine
AT223	Östliche Obersteiermark	mixed
AT224	Oststeiermark	culinary art and wellness
AT225	Südweststeiermark	culinary art and wellness
AT226	Westliche Obersteiermark	mixed
AT312	Linz-Wels	city
AT313	Innviertel/Mühlviertel	culinary art and wellness
AT314	Steyr-Kirchdorf	mixed
AT315	Traunviertel	mixed
AT321	Lungau	alpine
AT322	Pinzgau-Pongau	alpine
AT323	Salzburg und Umgebung	city
AT331	Außerfern	alpine
AT332	Innsbruck	city
AT333	Osttirol	alpine
AT334	Tiroler Oberland	alpine
AT335	Tiroler Unterland	alpine
AT341	Bludenz-Bregenzer Wald	alpine
AT342	Rheintal-Bodenseegebiet	mixed