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Bowling in Hawaii

Examining the Effectiveness of Sports-Based Tourism Strategies

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We use daily airplane arrival data from Hawaii's Department of Business, Economic Development, and Tourism to determine the net change in tourism for a variety of sporting events. We find three events generate a positive and significant net impact on arrivals: the Honoulu Marathon, the Ironman Triathlon, and the Pro Bowl. We estimate that the Honolulu Marathon produces 2,183 to 6,519 in net arrivals while the Pro Bowl attracts about 5,596 to 6,726 in net arrivals and the Ironman Triathlon attracts between 1,880 and 3,583 net visitors. Overall, these events generate similar economic impacts on Hawaii's economy despite the fact that the state spends nearly two thirds of its sports tourism budget on the rights to the Pro Bowl while spending a fraction of that sum on the Ironman and nothing at all for the Honolulu Marathon. None of the three events attract the number of net arrivals claimed by their sponsors, and other sporting events do not generate any identifiable impact on the tourist arrivals whatsoever.

Keywords: *sports; stadiums; franchises; impact analysis; mega-event; tourism*

Introduction

Few states rely on tourism more heavily than Hawaii. Over 14% of the state's labor force is employed in the arts, entertainment, and recreation industry or the accommodation and food services industry. This figure of 5.5% points above the national average and second only to Nevada. Another 2.7% of the labor force is employed in related transportation fields, the highest percentage in the country (Bureau of Labor Statistics, 2008). Indeed, the very name of Hawaii's Department

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of Business, Economic Development, and Tourism shows the significance of the industry in the overall economic climate of the state.

The Hawaii Tourism Authority (HTA) was established in 1998 "as the lead state agency" for Hawaii's visitor industry. This same act also established the Tourism Special Fund, a set percentage of transient accommodations tax collections that is assessed on hotels, vacation rentals, and other accommodations. The HTA uses this fund to market, develop, and support Hawaii's visitor industry. Among its responsibilities as the state's tourism agency, the HTA is charged with the following:

- setting tourism policy and direction from a statewide perspective;
- developing and implementing the state's tourism marketing plan and efforts;
- administering programs and activities to sustain a healthy visitor industry;
- developing and monitoring implementation of the State Tourism Strategic Plan;
- coordinating tourism-related research, planning, promotional, and outreach activities with the public and private sectors (Hawaii Tourism Authority, 2007, p. 3).

In 2007, the HTA's budget was roughly US$70 million, the majority of which (US$37.5 million) were devoted to general marketing toward leisure visitors. More than 10% of the agency's budget (US$7.7 million) was dedicated specifically to sports marketing. HTA is the largest state-sponsored tourism agency in the United States with a budget over 5 times that of the average state. Indeed, Hawaii's spending on sport marketing alone exceeds the entire marketing budgets of over a dozen state tourism agencies (Hotel Online, 2005).

HTA gave assistance to a variety of sporting events in 2007, including canoe racing, fishing and surfing championships, and a volleyball tournament (Hawaii Tourism Authority, 2007). The agency also subsidizes a series of Professional Golfers Association (PGA) tournaments, the Ironman Triathlon, and a college bowl game (the Hawaii Bowl). The largest event hosted by the HTA is the National Football League's (NFL) Pro Bowl, an annual game between all-star teams from each conference, which takes place after the Super Bowl in late January or early February. Not only is the Pro Bowl the state's marquee event it also consumes a disproportionate amount of the HTA's annual budget. In 2004, the agency paid the NFL US$5.3 million for the rights to host the game, compared with US$2.1 million for its slate of PGA tournaments, and US$585,000 for all other events combined (Schaefers, 2004).

This raises two questions. First, is the public funding for promotion and attraction of sports tourism well spent? Second, is the amount spent efficiently allocated across events? We use daily airplane arrival data from Hawaii's Department of Business, Economic Development, and Tourism to determine the net change in tourism for a variety of sporting events. Daily arrival data allow us to isolate the impact of these sporting events, while controlling for the typical fluctuations that occur across different months and days of the week. Although arrival data prevent us from precisely estimating the dollar impact, which is the more relevant indicator of economic success,

we find three events generate a positive and significant net impact on arrivals: the Honolulu Marathon, the Ironman Triathlon, and the Pro Bowl. We estimate that the Honolulu Marathon produces 2,183 to 6,519 in net arrivals while the Pro Bowl attracts about 5,596 to 6,726 in net arrivals and the Ironman Triathlon attracts between 1,880 and 3,583 net visitors. At the upper end of our estimates, the Honolulu Marathon and the Pro Bowl attract a nearly identical number of visitors despite the fact that the HTA spends nearly two thirds of its budget on the rights to the Pro Bowl and spends nothing for the Honolulu Marathon while the Ironman brings in about half the number of new arrivals at less than a tenth the level of public subsidy. None of the three events attract the number of net arrivals claimed by their sponsors, and other sporting events do not generate any identifiable impact on tourist arrivals whatsoever.

Background

The HTA justifies spending on sporting events on three grounds. First, they contend that these events attract athletes, spectators, officials, and media, which increases revenue for Hawaiian accommodations, restaurants, and retail establishments. For example, the HTA estimated that the 2007 Pro Bowl attracted 27,625 visitors to Hawaii resulting in US$28.03 million in visitor spending and US$2.72 million in tax collections (Hawaii Tourism Authority, 2007, p. 22). Second, the HTA suggests that sporting events serve to publicize Hawaii to prospective tourists. "The positive media and publicity generated from national and international television/media coverage promotes Hawaii as a desirable sports venue and an attractive visitor destination." (Hawaii Tourism Authority, 2007, p. 22) Third, these events may improve the quality of life of the Island's residents by allowing them opportunities to watch or participate in the major sporting events.

As detailed in Baade, Baumann, and Matheson (2008) and Coates and Humphreys (2002), among others, sports economists have frequently dealt with similar claims. The question of whether sporting events directly lead to increases in economic activity has been the most widely explored in this literature. As opposed to economic impact studies commissioned by the sports teams or leagues, independent economists examining an area's economy before, during, and after major sporting events tend to find little or no economic impact from hosting major events. Economists cite the substitution effect, crowding out, and leakages as three primary reasons for the lack of economic impact.

The substitution effect occurs when consumers spend money at a mega-event rather than on other goods and services in the local economy. A local Hawaiian resident who goes to the Pro Bowl or a PGA tournament is spending money at the event that likely would have been spent elsewhere in the local economy in the

absence of the game. Therefore, the local consumer's spending on a sporting event is not new economic activity, rather a reallocation of local spending. For this reason, most economists suggest that spending by local residents be excluded from any economic impact estimates, and the HTA's own reports on the economic impact of the Pro Bowl mention only the 27,000 visitors to the Islands, not the remaining 23,000 locals who fill out the rest of the 50,000 total spectators for the game (Hawaii Tourism Authority, 2007).

Even if studies only include out-of-region visitors, they may still produce exaggerated estimates if a large portion of the nonlocal fans at a game are "casual visitors." These are out-of-town guests who go to a sporting event, but are visiting the host city for reasons other than the sporting event itself. As noted by Baade et al. (2008), "a college professor at an academic conference may buy a ticket to a local game, and therefore, the ticket would be counted as a direct economic impact of the sports contest. The professor, however, would have come to the city and spent money on hotels and restaurants in the absence of the sporting match, and again the money spent at the game substitutes for the money that would have been spent elsewhere in the local economy."

Similarly, *ex-ante* estimates may be biased upward if a traveler rearranges a planned visit to a city to coincide with a mega-event, a phenomenon known as "time-switching." Someone who has always wanted to visit Hawaii may decide to plan a trip during the Pro Bowl influencing his decision about when to come but not the decision whether to come. The Pro Bowl simply affects the timing of such spending while total tourism spending in Hawaii is unchanged.

The amount of spending that is new to the economy is thought to be quite large in comparison to the total amount of spending in the case of mega-event because these "premier" events are thought to attract large audiences from outside the local economy, many of whom come specifically for the event. As noted previously, the attendance at the 2007 Pro Bowl was 50,410, just over half of whom were estimated to have traveled to Hawaii for the game, whereas only 5% to 20% of fans at a typical Major League Baseball (MLB) regular season game, for example, are visitors from outside the local metropolitan area (Siegfried and Zimbalist, 2000).

The congestion caused by a mega-event that dissuades regular recreational and business visitors from coming to a city during that time is a second source of bias and is known as "crowding out." Although a city's hotels may be full of fans during the Pro Bowl, if the city's hotels are generally full of vacationers or conventioneers anyway, the Pro Bowl simply displaces other economic activity that would have occurred. In other words, the economic impact of a mega-event may be large in a gross sense but the net impact may be small. Scores of examples of this phenomenon exist. As a case in point, during the 2008 Summer Olympics, security restrictions and other concerns "virtually eliminated any boost in tourism here from the Olympics." Indeed, the number of visitors to Beijing in August 2008 as predicted by its tourism bureau was 450,000, "about the same as last August" (MacLeod, 2008).

Leakages represent a third source of bias. Money spent in local economies during the mega-events may not wind up in the pockets of local residents; however, the taxes used to attract these events are paid for by local taxpayers. While the economic multipliers do account for leakages, they are calculated using complex input–output tables based on an economic area's normal production patterns. These same interindustry relationships may not hold during the mega-events, however, leading to inaccurate multipliers.

In fact, there is reason to believe that during the mega-events, a region's multiplier may fall in comparison to normal times leading to an overestimate of the true impact of these events on the local economy. Hotels, for example, routinely double or triple their room rates during mega-events, but the wages paid to hotel workers remain unchanged. In fact, workers may be expected to simply work harder during times of high demand without any additional monetary compensation. The return to capital (as a percentage of revenues) rises while the return to labor falls as a hotel's revenue increases without a corresponding increase in costs. Because capital income is more mobile than labor income, one might expect a fall in the multiplier effect during the mega-events because of these increased leakages (Matheson, 2004).

Because even well-executed *ex-ante* studies have difficulty accounting for crowding-out as well as the problems associated with the application of incorrect multipliers, numerous studies have looked back at the actual performance of economies that have hosted mega-events and have compared the observed economic performance of host cities to that predicted in *ex-ante* studies. *Ex-post* analyses such as Porter (1999); Baade and Matheson (2001, 2004, 2006); Coates and Humphreys (2002); Coates (2006); Coates and Depken (2006); Hagn and Maennig (2007a, 2007b); Jasmand and Maennig (2007); and Baade et al. (2008) similarly uncover little relationship between hosting major sporting events and real economic variables such as employment, personal income, personal income per capita, and taxable sales.

As noted previously, the HTA also suggests that sporting events serve to publicize Hawaii to prospective tourists. Sports fans may enjoy their visit to the city and return later raising future tourist revenues for the area. Corporate visitors, it is claimed, may relocate manufacturing facilities and company headquarters to the city. Television viewers might decide to take a trip to the host city at some time in the future based on what they see during the broadcast of the mega-event. Finally, hosting a major event might raise perception of the city so that it becomes a "major league" or "world class" city and travel destination. All of these claims are potentially true although little empirical research has conclusively demonstrated any long-run connections between hosting mega-events and future tourism demand, and there are not even any anecdotal examples of companies moving corporate operations to a city based on the hosting of a sporting event.

Ritchie and Smith (1991) do find that name recognition of Calgary rose significantly as a result of the 1988 Winter Olympics but also document that the boost was potentially short-lived. Similarly, Tieglund (1999) shows that rather than a boom in

tourism following the 1994 Winter Olympic Games, in fact, 40% of the full-service hotels in Lillehammer went bankrupt.

Other studies that attempt to quantify the media effects of large events often derive benefits from the media exposure that defy credulity. One study of the Borussia Mönchengladbach soccer team in Germany asserted the value of a single national broadcast of a soccer match played in Mönchengladbach to be equal in value to 20 targeted 30-second tourism advertising spots directed to the same size audience.

Although advertising benefits to mega-events certainly exist, two caveats must be mentioned. First, the presence of a mega-event may bring with it intangible costs as well as benefits. For example, the publicity associated with a sporting event may not always place a city in a positive light. Following the riots that occurred during the National Basketball Association (NBA) finals in Detroit in the early 1990s, the city's national image basked in the glow of car fires and burning buildings rather than the goodwill associated with an NBA championship. The bribery scandal that surrounded the 2002 Winter Olympics in Salt Lake City certainly did not enhance the city's reputation. Similarly, the international reputations Munich and Atlanta were tarnished by the terrorist events that occurred during the Olympic Games held in their respective cities.

Finally, the HTA notes that these events improve the quality of life of Hawaii's residents by allowing them opportunities to watch or participate in major sporting events. Again, it is clear that sports do bring some intangible benefits to local residents. As Rudy Perpich, the former governor of Minnesota, once quipped, "Without professional sports, Minneapolis would just be a cold Omaha." Similarly, while Hawaii is a tropical paradise, it is also small and isolated without the range of cultural amenities that other larger and more interconnected states offer. Of course, directly measuring these quality of life benefits is fraught with difficulty and academic studies are mixed on the subject. As noted previously, sports do not appear to make local residents richer but they may make them happier. Carlino and Coulson (2004) find that housing rental prices are higher in cities with professional sports teams indicating a higher willingness of buyers to pay for housing in cities with these amenities. Of course, cities with professional teams are generally larger metropolitan areas, which offer many other cultural attractions for which renters would also be willing to pay a premium.

Contingent valuation studies of professional sports franchises (Johnson, Groothius, and Whitehead, 2001; Johnson, Mondello, and Whitehead; 2006), stadiums and arenas (Groothius, Johnson, and Whitehead, 2004), and mega-events (Atkinson et al., 2008; Walton, Longo, and Dawson, 2008) also find that citizens exhibit a willingness to pay for sports teams and events beyond simply purchasing tickets. Maennig's (2007) *ex-post* analysis of the 2006 World Cup in Germany similarly concludes that claims of "increased turnover in the retail trade, overnight accommodation, receipts from tourism and effects on employment [are] mostly of little value and may even be incorrect. Of more significance, however, are other (measurable) effects such as the

novelty effect of the stadiums, the improved image for Germany and the feelgood effect for the population" (Maennig, 2007, p. 1).

The Data

The analysis of the economic impact of sporting events in Hawaii is problematic because of the annual nature of the events. Most *ex-ante* analyses of sporting events are based on changes in the sports environment. For example, Coates and Humphreys (2002) and Baade and Matheson (2001, 2006) estimate the economic impact of all-star games and postseason play in the U.S. professional sports by analyzing annual data, and their analyses rely on the fact that either by design or the random nature of team success, these events take place in different cities year after year. Therefore, these studies can estimate the impact of an event by examining a local economy in a year that an event is held in comparison with the next year when the big game is played in a different city. Similarly, Coates and Depken (2006) and Baade et al. (2008) examine monthly taxable sales data and again rely on differences in the numbers or types of games played during specific months to estimate the impact of major sporting events on tax receipts.

Table 1 lists the events examined in this study: Pro Bowl, Hawaii Bowl, Hula Bowl, Ironman Triathlon, and several golf events. These events are chosen because of their prominence and notoriety and because of the funding they receive from the HTA. One final sporting event is also included, the Honolulu Marathon, despite the fact that it does not receive direct funding from the state. This marathon attracts over 25,000 runners annually, including over 15,000 entrants from Japan, regularly making this race 1 of the 10 most popular marathons in the world. The Honolulu Marathon Association estimated that the 2007 race generated US$108.9 million in visitor spending (Tsai, 2008). Table 1 also shows, however, that the major events held in Hawaii take place annually and in the same month each year (although there is often some variability in the exact time within each month). Thus, the use of annual or monthly data is not acceptable in measuring the economic impact of the major sporting events that take place in Hawaii.

However, Hawaii's Department of Business, Economic Development, and Tourism provides daily arrival data. These data include arrivals at all Hawaiian airports and range from January 1, 2004 to May 18, 2008. Arrival data are split into domestic and international arrivals. Over the sample frame, the average number of arrivals is 22,716 per day, with domestic arrivals typically accounting for three quarters of all arrivals.

These data offer two advantages over taxable sales data that are common to the impact analysis literature. First, daily data greatly reduce the amount of statistical noise compared to impact studies that use quarterly or monthly data. Second, a very large majority of visitors to Hawaii arrive by plane, which improves our measurement

Table 1
Event Dates

	2004	2005	2006	2007	2008
Football					
Pro Bowl (NFL)	Feb. 8	Feb. 13	Feb. 12	Feb. 10	Feb. 10
Hula Bowl (NCAA)	Jan. 17	Jan. 22	Jan. 21	Jan. 14	Jan. 12
Hawaii Bowl (NCAA)	Dec. 24	Dec. 24	Dec. 24	Dec. 23	–
Golf					
Mercedes-Benz Championship	Jan. 8-Jan. 11	Jan. 6-Jan. 9	Jan. 5-Jan. 8	Jan. 4-Jan. 7	Jan. 3-Jan. 6
Sony Open	Jan. 15-Jan. 18	Jan. 13-Jan. 16	Jan. 12-Jan. 15	Jan. 11-Jan. 14	Jan. 10-Jan. 13
Mastercard Championship	Jan. 22-Jan. 25	Jan. 20-Jan. 23	Jan. 19-Jan. 22	Jan. 18-Jan. 21	Jan. 17-Jan. 20
Turtle Bay Championship	–	Jan. 27-Jan. 30	Jan. 26-Jan. 29	Jan. 25-Jan. 28	Jan. 24-Jan. 27
Wendy's Champions Skins Game	Jan. 29-Feb. 1	Feb. 3-Feb. 6	Feb. 2-Feb. 5	Jan. 11-Jan. 14	Jan. 21-Jan. 24
SBS Open	–	Feb. 23-Feb. 26	Feb. 15-Feb. 18	Feb. 14-Feb. 17	Feb. 13-Feb. 16
Fields Open	–	–	Feb. 22-Feb. 25	Feb. 21-Feb. 24	Feb. 20-Feb. 23
Marathons/distance					
Honolulu Marathon	Dec. 12	Dec. 11	Dec. 10	Dec. 9	–
Maui Marathon	Sep. 19	Sep. 18	Sep. 17	Sep. 16	–
Ironman Triathlon	Oct. 16	Oct. 15	Oct. 21	Oct. 13	–

Note: The sample frame is from January 1, 2004 to May 18, 2008, which predates the 2008 Hawaii Bowl and any of the 2008 marathons/distance competitions. Jan. = January; Feb. = February; Sep. = September; Oct. = October; Dec. = December.

of the tourism effect of these sporting events. Indeed, Hawaii's remote location provides an almost unique opportunity to examine the effects of sporting events on overall tourism for an economy. Of course, while daily arrival data allow us to isolate the impact of the aforementioned sporting events, we cannot directly estimate the dollar impact, which is ultimately the most relevant indicator of economic success.

The Model

To examine the impact of the individual sporting events on arrivals to Hawaii, we use intervention analysis on an autoregressive integrated moving average (ARIMA) model as outlined by Box and Tiao (1975). Others have used similar techniques to analyze a wide array of economic problems in sports including the effects of the most recent players' strikes on MLB attendance (Schmidt and Berri, 2002; Matheson, 2006) and the impact of professional sports on taxable sales in cities in Florida (Baade et al., 2008). Intervention analysis provides a formal test for the change in the mean of a series as a result of an exogenous shock at a specific point in time.

The general intervention ARIMA (P, D, Q) model for the arrival data is

$$z_t^* = \sum_{p=1}^{P} \Phi_p z_{t-p}^* + \sum_{n=2005}^{2008} \Lambda_n y_n + \sum_{q=1}^{Q} \Theta_q \varepsilon_{t-q}^* + \sum_{m=1}^{12} \alpha_m \mathrm{MS}_m + \sum_{d=1}^{6} \beta_d \mathrm{DS}_d + \sum_{s=1}^{S} \delta_s \mathrm{EVENT}_{st} + \varepsilon_t^*,$$

where z_t* is the first-differenced daily arrival in time period t, P is the number of lagged values of z_t* in the model known as the autoregressive (AR) dimension of the model, ϵ_t is an error term, Q is the number of lagged values of the error term representing the moving average (MA) dimension of the model, and EVENT_{st} is a vector of independent variables representing the effect of various sporting events as well as the effect of an earthquake in 2006. D is the number of times z_t is differenced to create z_t*. The model also includes a vector of monthly dummy variables (MS_m), a vector of daily dummy variables (DS_d), and a vector of yearly dummy variables (y_n) to account for yearly, seasonal, and daily differences in arrivals. The constant term is omitted because all months are included in MS_m.

Because the arrival data are nonstationary, we use the first difference of daily arrivals in our estimations. Augmented Dickey-Fuller and Phillips-Perron tests reject the existence of a unit root for the first-differenced data. The AR and MA dimensions of the models are determined through trial and error testing. Only the optimal AR and MA structures, as determined by the Akaike information criterion, are presented in the results. Estimations performed on undifferenced data, which we do not report here, returned similar results, which suggest that the data are not "over-differenced."

$EVENT_{st}$ contains the controls for sporting events. Table 1 presents these events and the dates they were held. For those traveling to Hawaii for any of these sporting events, it is uncertain when they would arrive. Because of the distance, it is unlikely that people would arrive the same day of the event. However, it is unclear exactly when arrivals would increase prior to a sporting event. For example, golf tournaments typically have four rounds that are held over 4 days, and some have preliminary events prior to the first round. In addition, it is likely many travelers arrive several days prior to the event to see some of the other attractions in Hawaii and to alleviate jet lag. Coates and Humphreys (2005) face a similar issue when estimating the novelty effect of new stadiums and used a series of F tests to determine the best specification. We begin as Coates and Humphreys (2005) by creating seven dummy variables for each event: a dummy for arriving 1 day prior, a dummy for arriving 2 days prior, and so on up to 7 days prior.[1] Because we observe each event multiple times (either four or five), the model should identify any systematic net increase in the number of arrivals. We also include a control for the 2006 Hawaii Earthquake, which occurred on Sunday, October 15th. Because the dependent variable is a daily difference, each of these events is also differenced.

Table 2 presents the model with seven dummy variables for each of the following events: Pro Bowl, college bowls (Hula and Hawaii), a golf event, the Ironman Triathlon, the Honolulu Marathon, and the Maui Marathon. We also present three specifications of the dependent variable: total arrivals, domestic arrivals, and international arrivals. Although not presented for brevity, daily, monthly, and yearly dummies are included in the model, so each coefficient can be thought of as a net difference from what is typical on that particular day of the week, month, and year. Only three events produced statistically significant estimates: Pro Bowl, Honolulu Marathon, and the Ironman Triathlon. As seen in Table 2, the results for college bowl games, professional golf events, and the Maui Marathon were not only insignificant in a statistical sense but also of a small magnitude in an absolute sense. Although care must be taken in ascribing values to coefficients that are not statistically significant, even a generous interpretation of the results suggests that either of the two college bowls played annually in Hawaii result in at most 1,700 additional arrivals, and golf events and the Maui Marathon are as likely to result in a reduction of tourist numbers as an increase.

Coates and Humphreys (2005) take another step and perform a series of F tests to determine the ideal specification in terms of the number of preevent or postevent periods to include. We do the same, and the net impacts of the Pro Bowl and Honolulu Marathon (or any of the statistically insignificant events) do not change substantially with the inclusion of anywhere from 3 to 7 days of arrivals prior to each event. The Ironman Triathlon produces statistically significant results only with the inclusion of arrivals 6 or 7 days prior to the event. For the Ironman, the only coefficient that is statistically significant is an increase of 1,880 arrivals occurring 6 days before the race. The inclusion of additional arrivals 5 days before the race, a coefficient significant at the 20% level but not at the 10% level, increases the estimate of the total number of

Table 2
Results for ARIMA Model Regressions

	Arrivals	Domestic	International
Log Likelihood	−13563.24	−13245.59	−12542.14
AR(1)	0.678*** (0.024)	0.671*** (0.024)	−0.742*** (0.060)
MA(1)	−0.920*** (0.050)	−0.870*** (0.048)	0.276*** (0.056)
MA(2)	−0.080** (0.034)	−0.130*** (0.033)	−0.492*** (0.026)
2006 Hawaii earthquake	−7014.407*** (1799.301)	−6057.394 (8612.219)	−951.434 (923.001)
Pro Bowl, arriving 1 day prior	1644.990** (691.913)	1324.702** (578.885)	61.760 (411.230)
Pro Bowl, arriving 2 days prior	2488.252** (1022.774)	2188.193** (993.264)	106.070 (406.639)
Pro Bowl, arriving 3 days prior	2592.887** (1176.258)	2354.060** (1116.841)	−11.210 (527.628)
Pro Bowl, arriving 4 days prior	1506.319 (1283.392)	1668.760 (1292.500)	−340.971 (444.601)
Pro Bowl, arriving 5 days prior	597.149 (842.998)	617.630 (1478.277)	−199.439 (356.295)
Pro Bowl, arriving 6 days prior	−173.118 (731.093)	−512.118 (492.684)	234.773 (416.741)
Pro Bowl, arriving 7 days prior	−1129.745** (476.365)	−836.494** (328.084)	−389.660 (406.893)
Honolulu Marathon, arriving 1 day prior	2444.159*** (371.263)	195.128 (342.959)	1905.783*** (373.459)
Honolulu Marathon, arriving 2 days prior	2510.093*** (622.667)	−289.422 (574.328)	2565.808*** (549.844)
Honolulu Marathon, arriving 3 days prior	1565.117** (788.391)	−617.865 (748.180)	2104.550*** (488.145)
Honolulu Marathon, arriving 4 days prior	−521.388 (802.512)	−1520.288* (877.828)	967.460** (393.638)
Honolulu Marathon, arriving 5 days prior	−2538.379*** (882.167)	−2409.535** (1021.849)	−89.663 (352.286)
Honolulu Marathon, arriving 6 days prior	−1797.939* (995.278)	−1506.344 (1084.790)	−221.281 (380.825)
Honolulu Marathon, arriving 7 days prior	−631.369 (731.718)	−788.673 (846.106)	221.964 (453.460)
Other Bowls, arriving 1 day prior	568.877 (530.300)	221.349 (370.503)	343.813* (191.626)
Other Bowls, arriving 2 days prior	399.009 (630.347)	390.171 (515.255)	85.446 (274.530)
Other Bowls, arriving 3 days prior	348.443 (533.441)	672.104 (512.918)	−204.037 (228.146)
Other Bowls, arriving 4 days prior	414.133 (575.297)	796.489 (478.844)	−273.852 (243.988)
Other Bowls, arriving 5 days prior	−308.587 (622.492)	397.579 (511.283)	−606.014** (356.295)
Other Bowls, arriving 6 days prior	0.923 (616.155)	149.647 (536.491)	−178.287 (284.323)
Other Bowls, arriving 7 days prior	208.457 (499.387)	235.402 (244.550)	−124.064 (171.503)
Golf Events, arriving 1 day prior	126.760 (320.048)	381.875 (244.550)	−289.430** (143.988)

(continued)

Table 2 (continued)

	Arrivals	Domestic	International
Log Likelihood	−13563.24	−13245.59	−12542.14
Golf Events, arriving 2 days prior	−240.853 (370.626)	−45.834 (301.488)	−241.078 (186.673)
Golf Events, arriving 3 days prior	−135.118 (375.691)	−164.427 (312.653)	−24.946 (193.379)
Golf Events, arriving 4 days prior	−269.644 (364.111)	−353.619 (317.252)	21.059 (169.670)
Golf Events, arriving 5 days prior	177.996 (356.651)	−234.336 (314.483)	360.669** (154.355)
Golf Events, arriving 6 days prior	341.103 (334.316)	−101.257 (283.330)	387.759** (173.917)
Golf Events, arriving 7 days prior	119.358 (273.362)	−35.815 (215.341)	134.760 (155.164)
Ironman Triathlon, arriving 1 day prior	−373.165 (1283.242)	−72.939 (924.019)	−275.335 (622.084)
Ironman Triathlon, arriving 2 days prior	453.315 (1792.218)	615.724 (1522.897)	−165.026 (1264.520)
Ironman Triathlon, arriving 3 days prior	831.864 (1785.355)	626.313 (2027.090)	200.915 (576.611)
Ironman Triathlon, arriving 4 days prior	1717.917 (2241.225)	1612.733 (2544.055)	129.923 (613.187)
Ironman Triathlon, arriving 5 days prior	1703.418 (1137.539)	1424.850 (1934.866)	286.218 (540.554)
Ironman Triathlon, arriving 6 days prior	1880.291*** (545.837)	1116.765 (1160.730)	822.383*** (231.920)
Ironman Triathlon, arriving 7 days prior	−198.103 (452.454)	644.824 (877.402)	−802.991*** (174.423)
Maui Marathon, arriving 1 day prior	−600.540 (371.263)	−519.303 (937.787)	616.219* (357.992)
Maui Marathon, arriving 2 days prior	366.036 (1525.108)	328.462 (1173.697)	504.330 (568.229)
Maui Marathon, arriving 3 days prior	−9.815 (1255.336)	298.163 (824.165)	25.865 (612.280)
Maui Marathon, arriving 4 days prior	67.564 (1258.874)	58.560 (857.408)	276.073 (492.974)
Maui Marathon, arriving 5 days prior	−1254.912 (1063.865)	−735.934 (939.197)	−226.741 (729.581)
Maui Marathon, arriving 6 days prior	−299.212 (939.813)	269.312 (793.726)	−273.184 (763.968)
Maui Marathon, arriving 7 days prior	−14.877 (810.468)	48.874 (642.872)	324.144 (612.352)

Note: Dummy variables for each month and each day except Wednesday are included but not presented here. Coefficients listed with standard errors in parentheses. In addition, *, **, and *** represent statistical significance at the 10%, 5%, and 1% thresholds, respectively. AR = autoregressive; MA = moving average.

additional arrivals to 3,583. The nature of the Ironman Triathlon is such that it is not likely to attract a large number of spectators from outside the state. Instead, the increase in tourists is probably because of the arrival of the athletes and their support teams. Unlike the Honolulu Marathon, the physical demands of the Ironman necessitate an arrival in Hawaii well in advance of the race itself (Hawaii Island Economic Development Board, 2003).

The Pro Bowl has a positive and significant impact on the arrivals for each of the 3 days prior to the game. The largest positive estimate is about 2,593 and occurs 3 days prior to the game. This is almost a 12% increase in tourist arrivals from an average February day. The domestic and international specifications suggest that the vast majority of these extra tourists are domestic travelers. Using only the statistically significant controls for arrivals in the 3 days prior to the event, the Pro Bowl appears to increase net arrivals into Hawaii by 6,726 visitors.

The Honolulu Marathon, which is one of the world's largest, also produced positive and significant net impacts for each of the 3 days prior to the event. The largest positive estimate is about 2,510 and occurs 2 days prior to the race. This is about a 10.7% increase from an average December day. Unlike the Pro Bowl, in this case, the positive net impacts are primarily driven by international travelers. Again, using only the statistically significant controls for arrivals in the 3 days prior to the race, we estimate the net impact of the Honolulu Marathon is 6,519 tourists, roughly the same magnitude as the Pro Bowl.

For both the Hawaii Marathon and the Pro Bowl, the "crowding out" effect is clearly evident. Although there is little reason to doubt the HTA's estimates that 27,000 visitors attend the Pro Bowl, the arrival statistics indicate that only about 6,500 extra visitors arrive in Hawaii in the time period prior to the Pro Bowl. Either three quarters of the out-of-state fans were coming to Hawaii anyway, despite the Pro Bowl, or roughly 20,000 Pro Bowl fans displaced other tourists. Similarly, although the Honolulu Marathon attracts 15,000 Japanese runners, the net increase in arrivals in the period prior to the race is less than half this figure.

Taking the idea of crowding out one step further, both the Pro Bowl and the Honolulu Marathon exhibit a statistically significant decline in tourism 5 or 6 (Honolulu Marathon) or 7 days (Pro Bowl) before the event. One possible explanation for this result is, again, that regular tourists are crowded out by sports tourists. Because of its distant location, regular tourists often spend periods of at least 1 week in the state. If visitors cannot find hotel accommodations during the following weekend after their arrival due to a sporting event, they are unlikely to make the choice to arrive in the previous week in the first place. These events may be replacing regular visitors planning on staying an entire week with sports visitors staying only for the weekend of the event, an outcome that would certainly negatively affect the economy. Including the statistically significant negative results in the week prior to the events reduces the net increase in arrivals for the Pro Bowl and Honolulu Marathon to 5,596 and 2,183, respectively.

As noted previously, the use of arrival data prevents us from directly estimating the dollar impact of these events. However, if one were to apply the figures on visitor spending per attendee used by the HTA in their own analyses of the Pro Bowl, 5,596 additional visitors translates into a US$5.7 million impact on the state's economy (Hawaii Tourism Authority, 2007). As the state pays the NFL US$5.3 million for the right to host this event, if these figures are accurate, the NFL manages to extract almost the entire direct benefit of the game from the host city.

Although the additional spending on the Pro Bowl roughly matches the additional spending generated by the event, public finance economists would generally raise concern about the possibility of income transfers caused by the implicit subsidization of the tourism industry. In this case, however, the HTA's budget is financed by a set percentage of transient accommodations tax collections that is assessed on hotels, vacation rentals, and other accommodations. Because spending on accommodations tends to be the single largest expense for most visitors, those businesses benefiting most from the increased number of tourists as a result of the Pro Bowl are also those businesses paying for the subsidy in the first place; therefore, concerns about redistribution seem minor.

In terms of the Honolulu Marathon, the race organizers estimate roughly US$2,300 in spending per visitor to the race (Honolulu Marathon, 2008). If it is assumed that marathon runners and their guests spend the same amount during their visit as the tourists they displace, the result is a net increase in economic activity of US$5.1 million because of the event. Again, the Honolulu Marathon appears to provide similar economic benefits to the Pro Bowl without the corresponding expenditures on the part of the HTA. Of course, the revealed net impact of the Honolulu Marathon is a fraction of the US$109 million in gross economic impact touted by the race's organizers (Honolulu Marathon, 2008).

The dollar figures for the economic impact of the Ironman Triathlon are the most difficult to estimate because of a lack of survey data on the behavior of Ironman-related visitors. The Hawaii Island Economic Development Board (2003), however, does note that Ironman visitor tends to engage in particularly long visits and their spending significantly exceeds that reported by of Pro Bowl visitors, for example. If it is assumed that Ironman participants spend sums similar to those spent by Honolulu Marathon visitors, the economic impact of the Ironman could range between US$4 and US$8 million. Again, this is roughly in the same ballpark as the economic impact of the Pro Bowl, and while the Ironman Triathlon, unlike the Honolulu Marathon, does receive direct funding from the HTA, its subsidy is a fraction of the Pro Bowl.

It is fair to mention one caveat to the results presented here. It is impossible with the available data to determine whether any of the displaced visitors reschedule their trips to other weeks. It is theoretically possible that the Pro Bowl (or other events) may increase tourism during periods other than the week of the game by displacing tourists from the week of the Pro Bowl to another time. Still, it is clear that crowding out is an obvious problem that is not typically addressed by *ex-ante* economic impact analyses.

Conclusions

Cities and states often use spectator sports as a vehicle for economic growth. Hawaii has a government agency that is devoted to attracting, and in some cases, financing sporting events to increase tourism in the short term and to raise the state's profile in the long term. Compared to other economic impact analyses, Hawaii offers an interesting case study because of the availability of daily arrival data and the state's remote location, which allows us to isolate the impact of hosting a variety of sporting events net of typical fluctuations in tourism.

We find three events generate a positive and significant net impact on arrivals: the Hawaii Marathon, the NFL's Pro Bowl, and the Ironman Triathlon. The HTA spends roughly two thirds (US$5.3 million) of its budget for the rights to the Pro Bowl. Based on the results presented in this article, this investment results in between 5,596 and 6,726 extra tourists coming to Hawaii. In comparison, the Hawaii Marathon, which receives no direct funding from the HTA, attracts between 2,183 and 6,519 extra tourists while the Ironman Triathlon, with a subsidy a fraction the size of that received by the Pro Bowl, attracts 1,880 to 3,583 extra visitors. Unlike the Pro Bowl, much of net tourism caused by the Honolulu Marathon and the Ironman Triathlon is because of the participants. Although there are some costs and inconveniences associated with the two races, they are likely to be small in comparison with the Pro Bowl even before figuring the US$5.3 rights fee million to bring the event to Hawaii.

Of course, the power of the NFL to extract higher rents from the HTA than the Honolulu Marathon Association or the Ironman Triathlon despite the fact that the races could quite reasonably make the claim that they bring in a similar or higher number of visitors should come as no surprise to economists. Unlike the NFL's control over its brand, no single organization can claim a monopoly on the distance of 26.2 miles, the length of a marathon, or the distances of a traditional "Ironman length" triathlon. Even though we ultimately can only roughly quantify the dollar effect of these sporting events, it seems apparent that the Marathon and the Triathlon are bargains compared with the large investment necessary to bring the Pro Bowl to Hawaii.

Note

1. For 4-day golf tournaments, we count backward from the final round.

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