DO GOOD OLYMPICS MAKE GOOD NEIGHBORS?

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Abstract

Most studies of mega-events such as Olympic Games find a relatively small impact on the cities that host them. One reason given for this finding is that the event displaces tourists who otherwise would have come to the city. This paper documents such displacement by showing that expenditure at ski resorts in Colorado rose as a result of the 2002 Winter Olympic Games. In addition to supporting previous studies, the spillover effect suggests that cities and states that gain from spillovers might want to supporting bids for events by nearby cities.

I. INTRODUCTION

In 2005, New York failed in its attempt to host the 2012 Summer Olympic Games, as London was named the host city. Philadelphia responded to its neighbor's endeavor by submitting its own bid for the 2016 Olympics, which proved even less successful than New York's bid. In this paper, I provide evidence that, rather than imitating New York, Philadelphia would have been better off had it supported New York's bid for the Games.

More generally, I show that the Olympics can have significant spillover effects on surrounding communities if those communities provide amenities that are close substitutes for those found in the host city. Tourists who cannot visit the location of their choice because it is hosting an event, such as the Olympics or a political convention, will look for a reasonable alternative. Nearby cities, states, or regions that provide good substitutes for the host venue can free ride on the event by serving as outlets for otherwise frustrated tourists. A neighboring city or state could increase the opportunity for spillovers by offering logistical or financial assistance to the bidding city.

I provide evidence for this claim by looking at the spillover effects of the 2002 Winter Olympic Games on the ski tourist industry of neighboring Colorado. Of the sixteen Colorado counties that had ski resorts in 2002, ten experienced an increase in economic activity during the Olympic year. In all, the results show that the Salt Lake City Olympics added $160 million in real net taxable expenditure in these counties.

In the next section of this paper, I discuss the literature concerning public support of sports teams, facilities, and mega-events. In Section III, I develop an empirical model to test the prediction that the 2002 Winter Olympics positively affected the ski economy of Colorado. Using county-level data from the Colorado Department of Revenue and other sources, I construct a panel data set of real net taxable sales in Colorado counties that contain ski resorts for each month in 2000-2004. The results, which appear in Section IV, show evidence of significant spillovers from the 2002 Olympics into the Colorado ski industry. A conclusion follows.

II. PREVIOUS LITERATURE

The failure of sports teams and facilities to stimulate local economies is by now well known. Starting with the pioneering work by Baade and Dye (1990), economists have shown repeatedly that sports franchises and facilities have little financial impact on the cities that host them. Coates and Humphreys (2003) build on Baade and Dye's basic model to show that facilities have a limited geographic impact. Others, such as Rosentraub (1997) and Austrian and Rosentraub (1997), show that new facilities often affect only a narrow segment of the local economy (e.g., restaurants and sports bars) and that the boost they provide is often short-lived.

Several economists have tested whether the same can be said for mega-events. Following Porter (1999), I define a "mega-event" as any large-scale, organized gathering that draws large numbers of people to a limited geographic area for a relatively short period of time.

Examples of mega-events include the Super Bowl, the quadrennial political conventions, and, of course, the Olympics.

Porter's (1999) seminal study found that Super Bowls have no statistically discernible impact on the economies of the host cities. Baade, Baumann, and Matheson (2006) echo this finding in their study of how a broader array of mega-events, ranging from Super Bowls to World Cup matches, affected metropolitan areas in Florida from 1980 to 2005. Coates and Depken (2006) take a similar approach in looking at the economic impact of mega-events in Texas, though they broaden the definition even wider to include regular season professional events and intercollegiate football games as well as Super Bowls and World Series games. While Coates and Depken generally find that mega-events have little impact, they do find that the 2004 Super Bowl generated $34.7 million in taxable sales for Houston. This last finding contradicts Coates's (2006) earlier finding that the 2004 Super Bowl did not generate enough revenue to cover Houston's added expenses from hosting it.

In their study of the impact of recent Olympic Games, Baade and Matheson (2002) find that, despite being hailed as an economic success, the 1984 Summer Olympics had no lasting impact on the Los Angeles economy. Baade and Matheson agree with Hotchkiss, Moore and Zobay (2003) that the 1996 Summer Olympics had a positive impact on Atlanta's economy, though they claim that the impact was less than Hotchkiss et al. find. Moreover, Baade and Matheson find that the Atlanta Olympics also had a transitory positive impact and might have harmed job creation in later years.

Mega-events like Super Bowls or Olympics have a limited effect on the local economy in part because people who are attracted by the event displace tourists or conventioneers who would have visited these locations had the event not taken place. The Utah Tourist Bureau, while enthusiastic about the expected long-term impact of the Winter Olympics on Utah's economy, recognized the potential for significant displacement during the Games. In a 2001 report, the Bureau cited a survey it had conducted of potential tourists. According to the survey, "[n]early 50 percent of non-resident skiers indicated that they would not consider skiing in Utah during 2002." The report supported this finding with data from Calgary that showed a 30 percent drop-off in ski tourism during the 1988 Winter Olympics.[1]

If the 2002 Winter Olympics had any spillover effects, they almost certainly involved Colorado's ski industry. The publicity surrounding the Games would have helped Colorado ski resorts by attracting tourists to the Rocky Mountain region as a whole. In addition, it is likely that skiers who otherwise would have gone to Utah resorts in the vicinity of Salt Lake City, such as Snowbird and Solitude, would see Colorado resorts, such as Vail and Aspen, as good substitutes. The Olympics could thus have caused vacationers to go to Colorado instead of Utah. Because only *additional* tourists add to expenditure in the community, holding a Super Bowl in Miami in the middle of the winter or a Winter Olympics in Salt Lake City in the middle of the ski season might simply result in a reshuffling of business.

III. BUILDING AN EMPIRICAL MODEL

Countywide gross taxable sales data from Utah suggest that the displacement of ski tourists may well have taken place. During the first quarter of 2002, the ski season surrounding the 2002 Winter Olympics, gross taxable sales for the six Utah counties containing ski resorts rose by only 0.01 percent over the first quarter of 2001, while the quarter-to-quarter GDP growth for the United States was 3.1 percent.[ii] These data suggest that skiers did not go to Utah during the Olympics. In this section, I build a model to test whether Colorado benefited from this relative decline.

The natural setting for analyzing spillovers is a disequilibrium model of the consumption of ski vacations. In this model, consumers cannot – or at least believe that they cannot – purchase the desired number of Utah ski vacations. Fixing consumption of a good or service above or below its Marshallian level affects the consumption of related items. I use this observation to generate testable hypotheses regarding the spillover effect of the Salt Lake City Olympics on the economy of Colorado.[iii]

In the standard model involving three goods, a consumer allocates his income among x, y, and z to maximize the utility function $U(x,y,z)$ subject to the budget constraint

$$P_x x + P_y y + P_z z = M$$

where P_i is the price of good i, and M is income. This yields the familiar equilibrium condition that the *MRS* equals the price ratio.

If x is fixed at $\bar{x}$, the consumer maximizes $U(y,z)$ subject to the constraint

$$M - p_x\bar{x} = p_y y + p_z z$$

It is easy to show that, when x is fixed, the amount of y or z that the consumer buys depends on how strongly complementary or substitutable each good is for x. In the context of this study, I assume that x is the quantity of skiing consumed in Utah during the period surrounding the Olympics. I also assume that, because of the Olympics, the quantity of x is fixed below the Marshallian level (x^*). For example, a potential tourist who believes that the Olympics preclude a ski vacation in Utah would set the quantity of skiing in Utah during this period at zero ($\bar{x} = 0$). If y is guidebooks about Utah, a complement to ski vacations there, the quantity of y demanded also falls below its equilibrium level. If z is Colorado ski vacations, which the consumer regards as a substitute for ski vacations in Utah, then the equilibrium quantity of z rises above its Marshallian level.

The rationed maximization problem above suggests a simple empirical model to test the hypothesis that the constraint imposed by the 2002 Olympics had spillover effects for the Colorado economy. The general form of the empirical model is:

$$y_{it} = X_{it}\beta + \sum_s \gamma_{is} D_{is} + \varepsilon_{it} \qquad (1)$$

where y_{it} is the measure of economic activity in area i at time t. The vector of control variables, X_{it}, contains variables that differ across counties and/or over time. It contains both continuous and dummy variables. These variables capture the fact that economic

activity may grow over time, vary by season, or differ across areas because of population, location, or other observable factors. Finally, D_{is} is a series of dummy and interaction variables denoting the period in which spillovers might have occurred. If the event had a spillover effect on community *i*, then the coefficient, γ_{is}, should be positive and statistically significant.

To test the hypothesis that the 2002 Winter Olympics affected the ski tourist industry in Colorado, I estimate how they affected the monthly value of real net taxable sales in Colorado counties that contained ski resorts over the period 2000-04. The Colorado Department of Revenue posts monthly figures for gross sales, retail sales, and net taxable sales for each county on its website. Changes in taxable sales have several advantages as a measure of economic impact. First, such spending closely tracks the type of spending that would result from an increase in tourism. Second, figures on taxable sales are generally more readily available for short periods of time and relatively small localities than is the case for income or employment. The ability to measure taxable sales for relatively narrow time periods and geographic areas enables researchers to isolate the impact of a mega-event on a local area. (See Baade, Baumann, and Matheson, 2006.) To account for the effect of inflation on net taxable sales, I deflated sales using monthly CPI data from the Bureau of Labor Statistics. While real net taxable sales could increase if either price or quantity rises, an increase in *real* net taxable sales represents an increase in the relative prices charged by the ski industry. For my purposes, an increase in either the quantity of tourists or relative price charged to them is still a positive spillover.

Seven control variables account for changes in real net taxable sales over time and across counties in Colorado. Four of the control variables vary across time but not across counties. Two vary across counties but not across time, and one varies across both time and county.

The first time-varying control is a trend term. It rises from 1 in January 2000 to 60 in December 2004 and captures the general upward movement in net taxable sales in Colorado's ski areas. The second time-varying control variable, a separate monthly dummy for December, accounts for the increased sales that accompany the holiday season.

The third time-varying variable is a quarterly dummy. Because many small businesses report their sales data on a quarterly basis, the monthly report of net taxable sales in each county surges every three months. I therefore include a dummy variable to denote a month at the end of a quarter (March, June, September, or December). To account for the possibility that each month might have a unique impact on economic activity, I also run a specification that discards the quarterly variable and includes eleven dummy variables for each month. November, the month with the lowest level of activity, is the default.

Because the demand for ski vacations is likely to be highly income-elastic, the fourth time-varying control is a measure of the business cycle, the national unemployment rate from the Bureau of Labor Statistics. The unemployment rate varies from 3.98 percent in

2000 to 6.0 percent in 2003. I do not use more localized unemployment rates because the ski tourist industry depends on economic conditions outside of Colorado.

Two cross sectional variables capture the capacity of the counties to accommodate additional tourism. I assume that the number and size of the resorts set the capacity of each county to absorb spillovers. To measure the size of the resorts in a county, I use the total number of ski lifts at all of the resorts in the county. Because the counties in question depend heavily on ski tourism, I expect real net taxable sales to vary directly with the number of resorts and lifts.

Population is the one variable that differentiates both counties and years. One would expect real net taxable sales in a county to be positively related to its population. Countywide population data come from the Bureau of the Census.

The central variables in this study capture the impact of the 2002 Winter Olympic Games. I measure the impact with a series of dummy and interaction variables. The dummy variables denote the time period surrounding the 2002 Winter Olympics. Specifically, they designate the month that the Olympics took place (February 2002), the season in which they took place (December 2001 through March 2002), and the Olympic year. In this paper, the Olympic year does not coincide with the calendar year. Instead, it runs from December 2001 through November 2002. That allows the Olympic month to be nested within the Olympic season and the Olympic season to be nested within the Olympic year. The interaction variables allow for the possibility that counties with

greater capacity might be able to exploit the spillovers more fully than counties with smaller capacity. I therefore interact each of the above dummy variables with the number of resorts and the number of ski lifts in each county. The means, standard deviations, and values of key variables appear in Table 1.

<INSERT TABLE 1 ABOUT HERE>

I use the above information for the 16 counties in Colorado that contained at least one ski resort from 2000 through 2004 to form a panel data set. One complication with this data set arises because Colorado created a new county in November 2001. To create Broomfield County, Colorado split off parts of four counties, including Boulder County, which contains the Nederland ski resort.[iv] However, the creation of Broomfield County had no effect on Nederland, and its impact on Boulder County as a whole was negligible. Neither real retail sales nor any of the independent variables deviated from trend at the time that Broomfield County was formed

Because I want to capture specific differences across counties rather than attributing them to a single, fixed county effect, I estimate this equation using a random effects model.

$$RNTRS_{it} = \beta_0 + \beta_1 TR_t + \beta_2 DEC_t + \beta_3 QTR_t + \beta_4 UE_t + \beta_5 RES_i + \beta_6 LIFT_i + \beta_7 POP_{it} + \gamma_1 OYR_t + \gamma_2 OSEA_t + \gamma_3 OMO_t + \sum \delta_j INTER_j + \varepsilon_{it} \quad (2)$$

where

$RNTRS_{it}$ = Real net taxable retail sales in Colorado county i in month t

POP_{it} = Population of county i in month t

RES_i = Number of resorts in county *i*

$LIFT_i$ = Number of ski lifts in county *i*

TR_t = Trend variable.

QTR_t = Dummy variable to capture quarterly reports of revenue (replaced by monthly dummies in my second specification)

DEC_i = Dummy variable to capture holiday sales

UE_t = Nationwide unemployment rate in month *t.*

OYR_t = Year in which the Salt Lake City Games took place (December 2001-November 2002)

$OSEA_t$ = Ski season surrounding the Olympics (December 2001 – March 2002)

OMO_t = Month in which the Olympics took place (February 2002)

$INTER_j$ = A set of interaction effects involving the Olympic month, season, and year and a county's number of resorts and ski lifts

I expect the coefficient of the trend variable (β_1) to be positive, reflecting overall growth since 2000. I also expect the coefficients of the dummies for December (β_2) and the end of the quarter (β_3) to be positive because of the regular spikes in actual and reported activity at these times. In my second specification, which includes a full set of monthly dummies, I expect the coefficients replacing β_3 to have large, positive coefficients during the ski season, particularly December, as well as during the months at the end of each quarter. I expect the coefficient on the national unemployment rate (β_4) to be negative, reflecting overall movements in the economy. Because they reflect the size of the local economy, I expect the coefficients on resorts (β_5), ski lifts (β_6), and population (β_7) to be positive. If the 2002 Winter Olympics had spillover effects on Colorado, the coefficients

on the dummy variables relating to the 2002 Olympics (γ_i) will be positive. If counties that had a greater capacity to absorb the spillovers experienced greater economic benefits, the interaction effects (δ_j) should also be positive.

IV. RESULTS

The results of the random effects regression appear in Table 2. The specification using dummy variables for December and for the quarterly months appears in the first column. The specification that includes dummy variables for each month appears in the second column. The final specifications include only variables that have t-statistics that exceed 1.0. Overall, both specifications fit the data well, as the chi-square statistic exceeds the 99 percent significance level.

<INSERT TABLE 2 ABOUT HERE>

Surprisingly, the trend coefficient is negative, suggesting declining sales over time. The negative trend is probably offset by the positive coefficient on population, which steadily grew over the period. As expected, the quarterly dummies and the dummy for December have a strong positive effect on economic activity in column 1. In column 2, only March and December have coefficients that were close to statistically significant. Economic activity in Colorado followed nationwide trends, with real net taxable sales moving contrary to the nation's unemployment rate. The number of resorts in a county does not have a statistically significant effect on economic activity, but the size of the resorts, as reflected by the number of ski lifts, has a strong positive effect. The insignificant impact

of resorts probably reflects the fact that the correlation between resorts and ski lifts was 0.88.

In both columns of Table 2, the Olympic year has a significant positive impact and the Olympic season has a significant negative impact on economic activity. Both impacts, however, are at least partly offset by interaction effects. Olympic year interacted with the number of resorts negatively affects economic activity, so the Olympic year effect is negative (i.e., the interaction effect dominates Olympic year dummy) for counties with more than two resorts. Olympic season interacted with the number of lifts has a positive impact so that the Olympic Season effect is positive for counties with more than 20 ski lifts.

Table 3 shows the combined effect of the dummy and interaction variables on economic activity in each county in the sample. It uses the coefficients from column 2 of Table 2.[v] The first column shows the impact of the 2002 Games during the Olympic season. Because the Olympic season occurs during the Olympic year this column captures the sum of four effects: the coefficients of the two dummy variables, the number of resorts times the coefficient of the interaction effect of the Olympic year and the number of resorts, and the number of ski lifts times the coefficient of the interaction effect of the Olympic season and the number of ski lifts. The second column shows the impact of the 2002 Games during the Olympic year excluding the Olympic season. The effects use the coefficients from column 2 of Table 2. (Using column 1 yields roughly the same results.)

<INSERT TABLE 3 ABOUT HERE>

Table 3 reports that, of the 16 counties in the sample, eleven counties showed increased economic activity during the Olympic season, and five showed decreased activity. None of the decreases, however, was statistically significant, while two counties showed a statistically significant increase during the Olympic season. These two counties, Eagle and Summit, have the most ski lifts in Colorado. While Eagle County has only two resorts, one of those resorts is Vail, the largest (as measured in ski lifts) resort in Colorado.

During the rest of the Olympic year, 14 of 16 counties showed increases in economic activity. Of these, 8 counties had statistically significant increases. Again, none of the declines was statistically significant. These counties all had only one resort, and they had relatively few lifts.

Adding the impact of the 2002 Winter Games for all counties during the Olympic season yields an increase in real net retail sales of about $73 million. The total impact for the other months of the Olympic year comes to an increase of about $91 million for the rest of the year, for a total increase of over $160 million.

V. CONCLUSION

This study examines the spillover effects of the 2002 Olympic Games on the ski industry in Colorado. I show that the 2002 Games provided a considerable boost to Eagle and

Summit Counties during the Olympic season and to eight other Colorado counties during the remainder of the Olympic year. Overall, I find that the 2002 Games added over $160 million in real net retail sales to the economies of the 16 Colorado counties with ski resorts.

Previous research has frequently claimed that tourists who attend mega-events simply replace tourists who would have come to town anyway, but it never provided evidence of displacement. By showing that the 2002 Games, which did little for the economies of Salt Lake City and Utah, had a large impact on Colorado, I provide an important piece of empirical evidence that had been missing from previous analyses. Showing that an alternative destination experienced significant gains as a result of the 2002 Winter Olympics establishes that a substitution effect exists.

Because Colorado did not help Salt Lake City in its bid for the 2002 Winter Olympics, Colorado free-rode on Utah's efforts and expenditure to host the Games. If Salt Lake City had been unsuccessful in its bid, Colorado would not have seen increased ski tourism. This finding suggests that, while the Olympic Games might be questionable investments for the cities that host them, nearby states and cities might want to encourage their neighbors to host such mega-events. Thus, Philadelphia might have been better off if it had supported New York's bid for the 2012 Games rather than focusing on its own (ultimately unsuccessful) bid for the 2016 Games.

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Table 1:
Means and Values of Selected Variables

County	Real Net Taxable Sales[a]	Population	Resorts	Ski Lifts
Boulder	$170,702 (19,075)	276,908 (375)	1	12
Chaffee	$14,650 (338)	16,680 (32)	1	5
Clear Creek	$4,466 (98)	9,384 (17)	1	9
Eagle	$76,863 (3529)	44,746 (192)	2	49
Garfield	$54,658 (964)	46,599 (200)	1	4
Grand	$16,978 (526)	12,845 (35)	2	30
Gunnison	$15,341 (446)	14,028 (9)	1	16
La Plata	$47,645 (944)	45,533 (114)	1	10
Lake	$2,726 (76)	7,773 (7)	1	5
Mesa	$125,793 (2,545)	122,156 (462)	1	3
Mineral	$848 (73)	877 (5)	1	7
Pitkin	$42,644 (2,178)	14,817 (6)	4	41
Routt	$30,618 (1,025)	20,461 (57)	2	23
San Juan	$930	569	1	1

	(87)	(1)		
San Miguel	$11,099 (498)	6,982 (27)	1	16
Summit	$59,810 (2,473)	24,560 (61)	4	77

[a]*In thousands*
Standard errors in parentheses

Table 2:
Determinants of Economic Activity in Colorado Ski Counties in 2000-2004[a]

Variable	*Coefficient*[b]	*Coefficient*
Trend	-338.02	-461.90
	(2.52)	(6.52)
Quarterly Dummy	5,593.96	-
	(1.97)	
March Dummy	N/A	7,896.17
		(1.75)
December Dummy	11,580.19	16,920.37
	(2.34)	(3.73)
Nationwide Unemployment Rate	-3,515.88	-
	(1.13)	
Number of Ski Resorts in County	-	-
Number of Ski Lifts in County	567.30	567.16
	(2.68)	(6.50)
County Population	0.64	0.63
	(10.13)	(10.12)
Olympic Year	19,962.56	18,143.9
	(2.93)	(2.80)
Olympic Season	-12,018.65	-14,365.2
	(1.52)	(1.79)
Olympic Year	19,962.56	4,092.90
	(2.93)	(1.13)
Number of Resorts X Olympic Year	-7,964.33	-7,964.64
	(2.32)	(2.32)
Number of Lifts X Olympic Season	688.16	688.17
	(2.51)	(2.51)
Constant	29,144.78	15,935.9
	(2.51)	(2.30)
Chi-Squared	171	169

Number of Observations	960	960

[a]*Dependent Variable: Real Net Taxable Sales in thousands of dollars*

[b]*t-statistics in parentheses*

Table 3:
Predicted Impact of 2002 Winter Olympics on Economic Activity in Colorado Ski Counties 2000-2004

County	Impact of Olympics – In Season[a]	Impact of Olympics – Out of Season
Boulder	$4,072 (0.80)	$10,179 (2.75)
Chaffee	-$745 (0.13)	$10,179 (2.40)
Clear Creek	$2,008 (0.38)	$10,179 (2.07)
Eagle	$21,570 (2.42)	$2,215 (0.17)
Garfield	-$1,433 (0.24)	$10,179 (2.48)
Grand	$8,495 (1.58)	$2,215 (0.27)
Gunnison	$6,825 (1.36)	$10,179 (0.35)
La Plata	$2,696 (0.51)	$10,179 (1.99)
Lake	-$745 (0.13)	$10,179 (2.40)
Mesa	-$2,121 (0.35)	$10,179 (0.39)
Mineral	$631 (0.11)	$10,179 (2.23)
Pitkin	$135 (0.02)	-$13,714 (1.26)
Routt	$3,677 (0.75)	$2,215 (0.34)

San Juan	-$3,498 (0.54)	$10,179 (2.70)
San Miguel	$6,825 (1.36)	$10,179 (1.59)
Summit	$24,910 (1.69)	-$13,715 (0.72)
TOTAL	$73,301	$91,186

[a]*In thousands. t-statistics in parentheses*

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[1] Utah Office of Tourism, "2002 Winter Olympic Games – Impacts, Images, and Legacies," *Presentation to the 32nd Annual Conference of the Travel and Tourism Research Association*, available online at http://travel.utah.gov/research_and_planning/2002_olympics/documents/OlympicTTRA.pdf, June 12, 2001.

[ii] Growth in Salt Lake County was only 2.7 percent. See Economic and Statistical Unit, "Utah Sales Taxes," online at http://www.tax.utah.gov/esu/sales, viewed November 21, 2006. Utah provides only gross quarterly, rather than net monthly, data.

[iii] One could derive a similar result by assuming that the price of a ski vacation in Utah rose dramatically during the Olympics and fell immediately afterwards.

[iv] Adams, Jefferson, and Weld were the other counties involved.

[v] Using column 1 of Table II yields similar results that, if anything, are more favorable to my conclusion. These results effectively provide a worst-case scenario.