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Abstract

The National Collegiate Athletic Association (NCAA) basketball tournament qualifies as a sports mega-event, and cities across the United States compete vigorously with one another to host what is, by most measures, the premier intercollegiate sporting event in the United States. The promise of substantial economic impact has convinced cities to "invest" substantial sums of money to meet the demands of the NCAA. Boosters claim that the "Final Four" typically induces an influx of approximately 50,000 visitors as well as exposure to millions of television viewers. Does this fan and viewer interest translate into elevated levels of economic activity for the host city?

Our analysis of Men's NCAA tournaments since 1970 and Women's NCAA tournaments since 1982 indicates that the economic impact for host cities for the year the event is hosted is on average small and negative for the NCAA Men's Final Four and small and positive for the Women's FF. The economic impact, particularly for the men's tournament, appears to fall short of booster claims of a financial windfall. Furthermore, the economic impact does not correlate with either the size of the facility or the size of the city.. The sum of the evidence indicates that cities ought to exercise restraint in undertaking public spending to host the NCAA Final Four.

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Introduction and a Brief History of the NCAA Basketball Tournament

The Super Bowl, Olympic Games, all-star games and league playoffs for the four major professional sports leagues, and the National Collegiate Athletic Association (NCAA) basketball tournament qualify as sports mega-events in the United States. Convinced that these sports events produce substantial incremental economic activity, cities compete as vigorously to host them as the athletes who participate in the events. Seduced by the promise of an economic windfall, cities have spent significant amounts of money to host the NCAA basketball tournament. Are the benefits derived from hosting tournament regional games or the NCAA Final Four (FF) as substantial as boosters claim? The primary purpose of this paper is to assess the economic impact of the NCAA FF. In so doing at least three other questions will be addressed. First, does the size of the host city correlate in some way with the economic impact induced by the event? Second, how does the economic impact of the FF for women (FFW) compare to that of the FF for men (FFM)? Third, does the size of the facility in which the FF games are played influence the economic impact? Before addressing these questions directly, it is useful to consider how the NCAA has evolved in a financial sense, and how the NCAA has been able to parlay the popularity of its basketball tournament into considerable wealth. The evolution of its television contracts provides some particularly meaningful insight.

The NCAA basketball tournament currently commands among the most lucrative broadcast contracts in U.S. sports history. When the tournament began in 1939, few could have anticipated the financial significance the event would achieve. In the financial equivalent of an air ball, the National Association of Basketball Coaches, the event sponsors that first year, lost about $2,500 (Yoder, 2002). Fifty years later the television broadcast rights alone for the tournament exceeded $100 million.

To be precise in 1991 CBS paid $143 million for television rights, an increase of $89 million from the 1990 rights fee of $54 million. In the latest contract iteration announced November 18, 1999, CBS Sports extended its current pact with the NCAA to 2014. The $6-billion, 11-year new contract, one of the largest in U.S. sports history, represents a 220 percent increase defined in annual terms over the 7-year, $1.725 billion deal which expired in 2002. CBS has had the TV rights to the Division I tournament since 1982, but it should be noted that the latest agreement between CBS and the NCAA includes merchandising rights for tournament related products as well as rights to the games content on the Internet (CNN money, 1999).

The lucrative television contract reflects successful ratings. The FFM typically rates among the most watched sporting events for any given year. For example, in 2000, only the Super Bowl, the Orange Bowl, and the Olympics opening ceremony achieved ratings than the NCAA men's championship game (Isidore, 2001). Despite a ratings slippage from previous years, the number of viewers for the NCAA men's final exceeded the average rating for the World Series and the NBA finals average by almost 10 percent. Over the past five years the average share for the NCAA men's final exceeded the World Series and NBA finals averages by more than 30 percent (Isidore, 2001).

Growth in gambling revenues related to the event provides additional evidence on the tournament's significance in the world of sports. The Federal Bureau of Investigation estimates that $2.5 billion is bet illegally on the NCAA basketball tournament each year (Atkins, 1996).

The NCAA has developed a financial dependency on the tournament; it derives 90 percent of its budget from the event. In all likelihood, Cedric Dempsey, the NCAA President, would be unlikely to command a salary of $525,000 per year in the absence of the tournament.

The popularity and economic success of the NCAA tournament has attracted interest from other quarters to include cities throughout the United States. At a time when cities have attempted to bolster their sagging economies through reinventing themselves as cultural or recreational destinations, the NCAA basketball tournament represents an event that fits that developmental strategy.[1] Hosting a FF employs the tourist infrastructure cities have created in the last two decades. Utilization of this infrastructure is critical to the economic viability of the cultural destination strategy, and cities have competed vigorously for the NCAA tournament as a consequence.

Evidence on the NCAA's success in negotiating with networks for the rights to broadcast their games indicates that the NCAA has learned to use their market power to extract monopoly rents. Cities have to pay at least in kind to host the event, and the sizeable public expenditure required to accommodate the tournament often necessitates convincing a sometimes skeptical public that the event's public benefits exceed the civic costs. Economic impact studies relating to the FF have predictably proliferated. If we assume that cities are rational, then they presumably would not be willing to pay more to host a FF than the benefits derived from the event.[2] Assuming that cities have perfect

1 Scholars refer to the early 1980s as the post-federalist period. The Reagan administration had reduced federal revenue sharing, and, this development coupled with the flight of businesses from city centers, compelled a more entrepreneurial approach on the part of cities to their economic problems. These forces as well as financial developments in professional sports explain in large measure the spate of stadium, convention center, and hotel construction that has occurred in cities throughout the United States in the last two decades.

2 It could be argued that if multiple cities bid for the event, then the winning bid is likely to exceed the event's marginal revenue product. It is in the interest of the NCAA to encourage as many cities as possible to bid for its tournament.

information relating to the impact of the FF, then the price they pay to host it will not exceed their perceived marginal social product. Using the upper bound for estimating the cost a city incurs in hosting a FF would be the incremental economic activity the event stimulates. Indeed, if the NCAA appropriates all monopoly rents, then in a world of perfect information, the cost to the city equals the estimated economic impact.

City Perceptions on the Economic Impact from the NCAA Basketball Tournament

The estimated economic impact for the NCAA Final Four basketball varies widely as do the estimated impact for all sports mega-events. For example, a series of studies for the NBA All-Star game produced numbers ranging from a $3 million windfall for the 1992 game in Orlando to a $35 million bonanza for the fame three years earlier in Houston (Houck, 2000). In January 2001, The *Sporting News* designated Indianapolis as “the Best Final Four Host.” In celebrating the designation, the Indianapolis Convention & Visitors Association (ICVA) indicated that the 2000 FFM, which Indianapolis hosted, brought an estimated 50,000 visitors to Indianapolis and generated $29.5 million in economic impact (ICVA, 2001). This estimate of economic impact equaled slightly more than one-quarter of the $110 million economic impact estimated for a FFM reported in a 2001 article about the impact of the NCAA tournament (Anderson, 2001). The authors found a low booster economic impact estimate for the FFM registered $14 million, or approximately 13 percent of the high estimate (Associated Press, 1998).

Estimates for the FFW typically run less than that for the men’s tournament, and the authors’ research indicated a range of $7 million, for the FFW in Cincinnati in 1997 (Goldfisher, 1999) to $32 million for the event hosted by San Jose in 1999 (Knight Ridder News Service, 1999). In deriving his economic impact estimate for Cincinnati, Donald Schumacher opined: "'Our feeling is that the dollars that those people were to spend on entertainment and food was going to happen anyway.'" (Knight Ridder News Service, 1999)

The range of estimates suggests that in addition to correlating with tournament gender, the economic impact may systematically vary with the size of the city and the facility in which the games are played. The nature of the correlation between economic impact and the size of the city and/or the facility is sometimes difficult to discern from booster estimates, however. In Table 1 below estimates have been provided for the economic impact of an event similar to the FF, the NBA All-Star game, on host cities for selected years.

Table 1: Estimated Economic Impact Estimates for the NBA All-Star for Selected Years

Year/Statistic	City	Arena	Atten-dance	Days	Estimated Revenue	Revenue Per Visitor Day
1985	Indianapolis	Hoosier Dome	43,146	2	$ 7.5M	$ 86.91
1989	Houston	Astro-dome	44,735	2	$35.0M	$391.19
1992	Orlando	Orlando Arena	14,727	2	$ 3.0M	$101.85
1997	Cleveland	Gund Arena	20,592	4	$23.5M	$285.30

Source: Jeff Houck, "High-stakes courtship: Cities build new arenas to bring in major sports events, hoping to make big money," *FoxSportsBiz.com*, January 21, 2000.

The information recorded in Table 1 fails to reveal a pattern with regard to the relationship between the size of the city, facility, or attendance and economic impact.

While booster estimates show a wide variation on the economic impact of the FF, economists offer a more uniform appraisal of the economic impact of sports mega-events. In short, economic scholarship indicates that these events have relatively little impact on metropolitan economies. For example, when Stanford economist Roger Noll estimated a "zero" economic impact of the FFW on San Jose's economy. This estimate stands in stark contrast to the $20 to $30 million in economic impact estimated by various civic groups in San Jose (Knight Ridder News Service, 1999). What accounts for the dramatic difference? Economist Philip Porter summarized possible reasons for the inflated estimates provided by civic groups in commenting on the economic impact of the Super Bowl on South Florida's economy. Porter opined:

> Investigator bias, data measurement error, changing production relationships, diminishing returns to both scale and variable inputs, and capacity constraints anywhere along the chain of sales relations lead to lower multipliers. Crowding out and price increases by input suppliers in response to higher levels of demand and the tendency of suppliers to lower prices to stimulate sales when demand is weak lead to overestimates of net new sales due to the event. These characteristics alone would suggest that the estimated impact of the mega-sporting event will be lower than impact analysis predicts. When there are perfect complements to the event, like hotel rooms for visitors, with capacity constraints or whose suppliers raise prices in the face of increased demand, impacts are reduced to zero (Porter, 1999).

Economists Robert Baade and Victor Matheson (2000) also challenged an NFL claim that as a result of the 1999 Super Bowl in Miami, taxable sales in South Florida increased by more than $670 million dollars. Their study of taxable sales data in the region concluded that the NFL has exaggerated the impact of the Miami Super Bowl by approximately a factor of ten even when using assumptions that favored identifying a strong economic impact.

Are booster estimates on the economic impact of the NCAA basketball tournament similarly inflated? Given that these estimates often serve as a justification for significant expenses incurred in hosting the FF, the answer to this question should concern public officials. Theoretical issues that have implications for the size of the economic impact estimates are identified and analyzed in the paper's next section

Theoretical Issues

The exaggeration of benefits induced by a sports mega-event occurs for several reasons. First, the increase in direct spending attributable to the event may be a "gross" as opposed to a "net" measure. Direct spending has been estimated by some subsidy advocates through simply summing all receipts associated with the event. The fact that the gross-spending approach fails to account for decreased spending directly attributable to the event represents a major theoretical and practical shortcoming.

Eliminating the spending by residents of the community would at first blush appear to account for a significant source of bias in estimating direct expenditures. Surveys on expenditures by those attending the event, complete with a question on place of residence, would appear to be a straightforward way of estimating direct expenditures in a manner that is statistically acceptable. While such surveys may well provide acceptable spending estimates for those patronizing the competition, such a technique, however, offers no data on changes in spending by residents not attending the event.

It is conceivable that some residents may dramatically change their spending during the competition given their desire to avoid the congestion at least in the venue(s) environs. A fundamental shortcoming of economic impact studies, in general, pertains not solely to information on spending for those who are included in a direct expenditure survey, but rather with the lack of information on the spending behavior for those who are not.

Failure to account for this important distinction between gross and net spending has been cited by economists as a chief reason why sports events or teams do not contribute as much to metropolitan economies as boosters claim (Baade, 1996). The national appeal of the NCAA tournament, however, arguably allows for a convergence of the gross and net spending figures given the fact that the attendees come from outside the host city. A national sporting event could be characterized as "zero sum" from a national perspective, while still exercising a strong, positive economic impact on the host city. Stated somewhat differently, spending at the NCAA basketball tournament qualifies as export spending since most of it is thought to be undertaken by people from outside the city.

A second reason economic impact may be exaggerated relates to what economists refer to as the "multiplier," the notion that direct spending increases induce additional rounds of spending due to increased incomes that occur as a result of additional spending. Hotel workers and restaurant workers experience increases in income, for example, as a consequence of greater activity at hotels and restaurants. If errors are made in assessing direct spending, those errors are compounded in calculating indirect spending through standard multiplier analysis. Furthermore, precise multiplier analysis includes all "leakages" from the circular flow of payments and uses multipliers that are appropriate to the event industry. Leakages may be significant depending on the state of the economy. If the host city is at or very near full employment, for example, it may be that the labor essential to conducting the event resides in other communities where unemployment or a labor surplus exists. To the extent that this is true, then the indirect spending that constitutes the multiplier effect must be adjusted to reflect this leakage of income and subsequent spending.

Labor is not the only factor of production that may repatriate income. If hotels experience higher than normal occupancy rates during a mega-event, then the question must be raised about the fraction of increased earnings that remain in the community if the hotel is a nationally owned chain.[3] In short, to assess the impact of mega-events, a balance of payments approach should be utilized. That is to say, to what extent does the event give rise to money inflows and outflows that would not occur in its absence? Since the input-output models used in the most sophisticated *ex ante* analyses are based on fixed relationships between inputs and outputs, such models do not account for the subtleties of full employment and capital ownership noted here. As a consequence, it is not clear if economic impact estimates based on them are biased up or down.

As an alternative to estimating the change in expenditures and associated changes in economic activity, those who provide goods and services directly in accommodating the event could be asked how their activity has been altered by the event. In summarizing the efficacy of this technique Davidson opined:

The biggest problem with this producer approach is that these business managers must

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3 It is not altogether clear whether occupancy rates increase during mega-events. It may be that the most popular convention cities, those most likely to host the Final Four, would experience high occupancy even if they are not successful in hosting them. Evidence, however, suggests that room rates increase substantially during sports mega-events, but questions regarding the final destination of those additional earnings remain.

> be able to estimate how much ?extra? spending was caused by the sport event. This requires that each proprietor have a model of what would have happened during that time period had the sport event not taken place. This is an extreme requirement which severely limits this technique (Davidson, 1999).

An expenditure approach to projecting the economic impact of mega-events is likely to yield the most accurate estimates. Do *ex post* estimates on the economic impact of the NCAA basketball tournament conform to *ex ante* economic impact estimates on host cities provided by boosters of the event? In the next section of the paper, the model that is used to develop after-the fact estimates is detailed.

The Model

Ex ante models may not provide credible estimates on the economic impact of a mega-event for the reasons cited. An *ex post* model may be useful in providing a filter through which the promises made by event boosters can be strained. A mega-event's impact is likely to be small relative to the overall economy, and the primary challenge for those doing a post-event audit involves isolating the event's impact. This is not a trivial task, and those who seek insight into the question of economic impact should be cognizant of the challenges and deficiencies common to both *ex ante* and *ex post* analyses.

Several approaches are possible in constructing a model to estimate the impact an event has had on a city, and are suggested by past scholarly work. Previous models used to explain metropolitan economic growth have been summarized by Mills and McDonald (1992). They identified five theories: export base, neoclassical growth, product cycle, cumulative causation, and disequilibrium dynamic adjustment. All these theories seek to explain growth through changes in key economic variables in the short-run (export base and neoclassical) or the identification of long-term developments that affect metropolitan economies in hypothetical ways (product cycle, cumulative causation, and disequilibrium dynamic adjustment).

Our task is not to replicate explanations of metropolitan economic growth, but to use past work to help identify how much growth in economic activity in U.S. cities hosting the FF is attributable to the event. To this end we have selected explanatory variables from past models to help establish what economic activity would have been in the absence of the FF. Estimating the economic impact of the FF used involves a comparison of the projected level of economic activity without the event to the actual levels of economic activity that occurred in cities hosting the FF. The success of this approach depends on our ability to identify those variables that explain the majority of observed variation in growth in economic activity in host cities.

To isolate the mega-event's impact, both external and internal factors need to be considered. External factors might include, for example, a relocation of people and economic activity from the "rust/frost belt" to the "sun belt," changes in the disposition of the federal government toward revenue sharing, and changes in the demographic character of urban America. Internal factors might include a change in the attitude of local politicians toward fiscal intervention, a natural disaster, or unusual demographic changes. One technique would be to carefully review the history of cities in general and particular and incorporate each potentially significant change into a model. An alternative is to represent a statistic for a city for a particular year as a deviation from the average value for that statistic for cohort cities for that year. Such a representation over time will in effect "factor out" general urban trends and developments. For example, if we identify a particular city's growth in employment as 15 percent over time, but cities in general are growing by 10 percent, then we would conclude that this city's pattern deviates from the norm by 5 percent. It is the 5 percent deviation that requires explanation and not the whole 15 percent for our purposes in this study.[4]

In modeling those factors that are unique to individual cities, it is helpful to identify some conceptual deficiencies characterizing the demand side of *ex ante* and *ex post* models that exaggerated economic impact estimates. Many prospective economic impact studies, particularly those that are older, fail to make a distinction between gross and net spending changes that occur as a consequence of hosting a mega-event. If *ex post* studies failure to factor out the city's own secular growth path could embellish an estimate of the contribution of the NCAA basketball tournament. *Ex ante* studies even in very sophisticated forms are based usually on the premise that important economic relationships remain unchanged. It is, after all, historical experiences that defines the statistics upon which prospective impact estimates are based. However, if the event is significant in a statistical sense, will not the event modify historical experience? We cannot claim a significant impact, and at the same time claim that history will be unaltered. Our model, therefore, in various ways ?factors out" the city's historical experience. To continue with our example from above, if history tells us that a city that experiences a growth in employment that is 5 percent above the national average, before and after a mega-event, then it would be misguided to attribute that additional 5 percent to the mega-event. If after

4 It should be remembered that our intent here is not to focus on what accounts for all growth in cities. Rather our task is to determine how much a mega-event contributes to a city?s economy. It is true that trend-adjusting does not provide any economic insight about those factors responsible for metropolitan growth, but adjusting for trends enables us to focus attention on a smaller component of growth for a city which a mega-event may help explain.

the event, the city continued to exhibit employment increases 5 percent above the national norm, the logical conclusion is that the mega-event simply supplanted other economic developments that contributed to the city's above-average rate of growth. It will be particularly interesting to see if rates of economic growth forecast for cities hosting the NCAA tournament approximate what an *ex post* model not adjusted for a city's secular growth path would conclude.

The alternative to the technique outlined to this point, would be to carefully review the history of cities in general and particular, and explicitly incorporate each potentially significant change into the model. This technique has practical limitations to which past studies attest. Economists who have sought to explain growth using this technique have followed traditional prescriptions, and have developed demand- or supply-centered models through which to explain growth. To assess the relationships between costs and growth see Mills and Lubuele (1995), Terkla and Doeringer (1991), and Goss and Phillips (1994). Other scholars such as Duffy (1994) and Wasylenko (1985) have combined both demand and supply arguments. Both supply and demand models have strong theoretical underpinnings. Those who utilize a demand approach with some version of employment as the independent variable base their theory on the notion that the demand for labor is ultimately derived from the demand for goods and services. Those who favor a supply approach would argue that cost factors are the most critical in explaining employment in a metropolitan statistical area (MSA) or region.

Given the number and variety of variables found in regional growth models and the inconsistency of findings with regard to coefficient size and significance, criticisms of any single model could logically focus on the problems posed by omitted variables. Any critic, of course, can claim that a particular regression suffers from omitted-variable bias, it is far more challenging to address the problems posed by not including key variables in the analysis. In explaining regional or metropolitan growth patterns, at least some of the omitted variable problem can be addressed through a careful specification of the dependent variable. As noted above, representing relevant variables as deviations from city norms, leaves the scholar a more manageable task, namely that of identifying those factors that explain city growth after accounting for the impact of those forces that generally have affected regional or MSA growth. For example, a variable is not needed to represent the implications of federal revenue sharing, if such a change affected cities in ways proportionate to changes in demographic characteristics, e.g. population, used to calibrate the size of the revenue change for any particular city. Of course instead of representing the MSA dependent variable as a deviation from a national mean and its own secular growth path, a national mean and the MSA's growth path can be represented as independent variables. In fact, we chose to represent the mean rate of employment growth for MSAs and the city's growth path for employment for the previous three years as independent variables.

Following the same logic, independent variables should also be normalized, that is represented as a deviation from an average value for MSAs or as a fraction of the MSA average. It is important, for example, to model the fact that relocating a business could occur as a consequence of wages increasing in the MSA under study or a slower rate of wage growth in other MSAs. What matters is not the absolute level of wages in city i, but city i's wage relative to that of its competitors. What we propose, therefore, is an equation for explaining metropolitan employment growth which incorporates those variables that the literature identifies as important, but specified in such a way that those factors common to MSAs are implicitly included.

The purpose of *ex ante* studies is to provide a measure of the net benefits a project or event is likely to yield. To our knowledge there is no prospective model that has the capacity for measuring the net benefits of a project relative to the next best alternative use of those funds. If we assume that the best use of funds has always occurred prior to a mega-event, then the growth path observed for a city can be construed as optimal. If this optimal growth path, identified by the city's secular growth trend, decreases after the mega-event occurs, then the evidence does not support the hypothesis that a publicly subsidized mega-event put those public monies to the best use. A negative or even insignificant coefficient for the NCAA basketball tournament variable variable is *prima facie* evidence that the mega-event is less than optimal. Everything discussed in this section of the paper to this point is intended to define the regression analysis that will be used to assess changes in income attributable to the FF in host cities based on historical data between 1970 and 1999 for the FFM and between 1982 and 1999 for the FFW.[5]

Equation (1) represents the model used to predict changes in income for host cities.

$$\Delta Y_t^i = \beta_0 + \beta_1 \sum_{i=1}^{n} \frac{\Delta Y_t^i}{n_t} + \beta_2 \Delta Y_{t-1}^i + \beta_3 W_t^i + \beta_4 T_t^i + \beta_5 OB_t^i + \beta_6 TR_t^i + \epsilon_t^i \qquad (1)$$

5 It should be noted that the women's field has experienced a steady expansion in terms of the number of teams participating. In particular the field grew 32 to 40 teams in 1986, 40 to 48 teams in 1989, 48 to 64 teams in 1994. This expansion is noteworthy for the purposes of this report because there arguably should be a positive correlation between the size of the FFW field and economic impact.

where for each time period t,

MY_t^i	= % change in income (GDP) in the ith metropolitan statistical area (MSA),
n_t	= number of cities in the sample,
W_t^i	= nominal wages in the ith MSA as a percentage of the average for all cities in the sample,
T_t^i	= state and local taxes in the ith MSA as a percentage of the average for all cities in the sample,
OB_t^i	= a dummy variable for oil boom and bust cycles for selected cities and years,
TR_t^i	= annual trend,
ε_t^i	= stochastic error.

For the purposes of our analysis the functional form is linear in all the variables included in equation (1). The equation was calculated for each host metropolitan area over the period identified in the previous paragraph for the FFM and FFW. For two host sites, Dallas-Fort Worth in 1986 and East Rutherford, New Jersey in 1996 for the FFM, the economic impact was estimated for Dallas and Fort Worth and Newark and New York City separately. For most cities, autocorrelation was identified as a significant problem and therefore, the Cochrane-Orcutt method was used for all regressions. Not every variable specified in Equation (1) emerged as a statistically significant predictor in the regression model for every city. Insignificant variables were removed from the model until only predictors significant at the 5% level remained. In all cases, average income growth was a significant predictor with the other variables being significant in smaller number of the cities. The variables used for each city are shown in Table 2.

Table 2: Variables used in model to predict income growth

Host MSA	**Predictors**					
Albuquerque, NM	Constant	Avg. Growth				
Atlanta, GA	Constant	Avg. Growth				
Austin, TX	Constant	Avg. Growth	Taxes as %	Trend		
Charlotte, NC	Constant	Avg. Growth	Wages as %	Trend		
Cincinnati, OH	Constant	Avg. Growth	Taxes as %	Trend		
Dallas, TX	Constant	Avg. Growth	Taxes as %	Lagged Income Growth	Trend	Oil Bust
Denver, CO	Constant	Avg. Growth	Wages as %			
Fort Worth, TX	Constant	Avg. Growth				
Greensboro, NC	Constant	Avg. Growth				
Houston, TX	Constant	Avg. Growth	Oil Bust			
Indianapolis, IN	Constant	Avg. Growth				
Kansas City, MO	Constant	Avg. Growth				
Knoxville, TN	Constant	Avg. Growth	Wages as %	Trend		
Lexington, KY	Constant	Avg. Growth				
Los Angeles, CA	Constant	Avg. Growth				
Minneapolis, MN	Constant	Avg. Growth	Trend			
New Orleans, LA	Constant	Avg. Growth				
New York, NY	Constant	Avg. Growth	Trend			
Newark, NJ	Constant	Avg. Growth	Trend	Wages as %		
Norfolk, VA	Constant	Avg. Growth				
Philadelphia, PA	Constant	Avg. Growth	Wages as %	Taxes as %	Trend	
Richmond, VA	Constant	Avg. Growth	Trend			
Salt Lake City, UT	Constant	Avg. Growth	Taxes as %			
San Antonio, TX	Constant	Avg. Growth				
San Diego, CA	Constant	Avg. Growth				
San Jose, CA	Constant	Avg. Growth				
Seattle, WA	Constant	Avg. Growth				
St. Louis, MO	Constant	Avg. Growth				
Tacoma, WA	Constant	Avg. Growth	Wages as %	Trend		
Tampa, FL	Constant	Avg. Growth				
Washington, DC	Constant	Avg. Growth				

As mentioned previously, rather than specifying all the variables that may explain metropolitan growth, we attempted to simplify the task by including independent variables that are common to cities in general and the ith MSA in particular. In effect we have devised a structure that attempts to identify the extent to which the deviations from the growth path of cities in general ($3MN_t^i / n_t$) and city i's secular growth path MN^i_{t-1},[6] are attributable to deviations in certain costs of production (wages and taxes), and dummy variables for the oil boom/bust cycle.

Relative values wages and tax burdens are all expected to help explain a city's growth rate in employment as it deviates from the national norm and its own secular growth path. As mentioned above, past research has not produced consistency with respect to the signs and significance of these independent variables. Some of the inconsistency can be attributable to an inability to separate cause and effect. For example, we would expect higher relative wages over time to reduce the rate at which employment is growing in an MSA relative to other cities. That would be true, *ceterus paribus*, if wages determined employment. If, however, high rates of employment increased an MSA's wage relative to that of other cities, it may be that the opposite sign emerges. We do not have as a consequence *a priori* expectations with regard to the signs of the coefficients. That should not be construed as an absence of theory about key economic relationships. As noted earlier, we included those variables that previous scholarly work found important.

Results

The model identified in Table 2 for each city is used to estimate income growth for each city for each year analyzed, 1970-1999 for the FFM and 1982-1999 for the FFW. The predicted income

[6] Growth rates for employment in the previous year was used to account for estimation problems created by a single aberrant year that could occur for a variety of reasons to include a natural disaster or a change in political parties with accompanying changes in fiscal strategies. Technically speaking the model was more robust with this specification, and the values for the cross correlation coefficients did not suggest a multicolinearity problem.

growth is then compared to the actual income growth that each MSA experienced for the year in which the city hosted the FF. The predicted city real incomes are based on data for the individual cities covering the period 1969 through 1999. Using the difference between actual and predicted growth for the host city's economy, a dollar value estimate of this difference can be determined. If it is assumed that any difference between actual and predicted income can be accounted for by the presence of the FF, then a dollar estimate of the impact of the NCAA basketball tournament for cities hosting the event can be generated. Estimates for the real economic impact of the FFM and FFW based on regressions for equation (1) are recorded in Table 3 and 4, respectively.

Table 3: Estimated Real Economic Impact on Host Cities from the FFM, 1970-1999

Year	Final Four Location	Actual Growth	Predicted Growth	Difference	Net income gains/losses	t-stat	Real Income ($000s)	St. Res.
1970	College Park, MD	5.186%	2.856%	2.330%	1,646,176	2.29	70,651,320	0.0102
1971	Houston	5.180%	5.184%	-0.004%	-1,415	0.00	36,981,510	0.0235
1972	Los Angeles	4.317%	4.362%	-0.045%	-70,679	-0.03	157,065,115	0.0138
1973	St. Louis	2.730%	3.223%	-0.493%	-242,814	-0.76	49,203,393	0.0065
1974	Greensboro, N.C.	-1.256%	-1.359%	0.103%	16,838	0.13	16,394,609	0.0077
1975	San Diego	2.428%	0.497%	1.931%	617,429	1.80	31,973,621	0.0107
1976	Philadelphia	3.619%	3.630%	-0.011%	-11,117	-0.02	102,070,263	0.0072
1977	Atlanta	5.844%	5.411%	0.433%	185,267	0.45	42,770,498	0.0096
1978	St. Louis	3.665%	4.394%	-0.729%	-389,427	-1.12	53,418,826	0.0065
1979	Salt Lake City	1.572%	1.879%	-0.307%	-49,872	-0.22	16,253,420	0.0137
1980	Indianapolis	-3.732%	-2.372%	-1.360%	-369,660	-0.95	27,184,118	0.0143
1981	Philadelphia	0.260%	0.164%	0.096%	100,339	0.13	104,368,055	0.0072
1982	New Orleans	0.409%	0.216%	0.193%	52,899	0.16	27,372,301	0.0122
1983	Albuquerque	6.118%	3.858%	2.260%	225,330	1.40	9,969,697	0.0161
1984	Seattle	4.060%	5.937%	-1.877%	-837,648	-1.06	44,621,753	0.0177
1985	Lexington, KY	4.122%	4.748%	-0.625%	-48,800	-0.48	7,802,668	0.0129
1986	Dallas	3.088%	3.893%	-0.805%	-558,260	-0.82	69,349,066	0.0098
1986	Fort Worth	3.180%	5.516%	-2.336%	-694,457	-1.57	29,728,452	0.0149
1987	New Orleans	-2.523%	-1.323%	-1.200%	-327,808	-0.98	27,326,363	0.0122
1988	Kansas City	2.136%	3.606%	-1.470%	-579,044	-1.38	39,384,302	0.0107
1989	Seattle	6.049%	5.006%	1.043%	605,511	0.59	58,030,571	0.0177
1990	Denver	1.861%	0.682%	1.179%	530,055	0.86	44,953,686	0.0137
1991	Indianapolis	0.623%	-1.344%	1.967%	686,591	1.38	34,901,643	0.0143
1992	Minneapolis	4.648%	3.393%	1.255%	943,036	1.35	75,122,731	0.0093
1993	New Orleans	1.328%	1.046%	0.282%	82,519	0.23	29,271,596	0.0122
1994	Charlotte	5.014%	4.314%	0.700%	224,538	1.01	32,095,003	0.0069
1995	Seattle	2.394%	3.719%	-1.325%	-867,355	-0.75	65,483,377	0.0177
1996	Newark	2.022%	1.784%	0.238%	155,950	0.28	65,525,280	0.0086
1996	New York City	3.603%	3.847%	-0.244%	-695,103	-0.16	284,878,337	0.0151
1997	Indianapolis	3.355%	3.267%	0.088%	36,570	0.06	41,635,975	0.0143
1998	San Antonio	7.050%	7.133%	-0.083%	-31,282	-0.08	37,464,702	0.0109
1999	Tampa/St. Pete	1.751%	3.364%	-1.613%	-1,029,775	-1.03	63,826,713	0.0156
	Average	**2.631%**	**2.670%**	**-0.039%**	**-44,278**	**-0.02**	**52,448,368**	**0.0118**

Table 3 records various estimates derived from the regressions for the individual cities that enable computation of the dollar differences between actual real income growth rates and the estimated increase (decrease) in real dollar income (1999 dollars) for the host city generated by the model. The most important conclusion suggested by the numbers in Table 3 is that the FFM induced a statistically significant outcome only once. That occurred in 1970 when College Park, Maryland hosted the tournament. The size of the impact indicates the presence of other unusual and substantial economic activity in College Park in 1970 which may have been statistically attributed to the FFM, but improperly so.

Although only a single site produced a statistically significant net gain or loss in real income from the FFM, it is noteworthy that the model used generates a differential between the actual and estimated city incomes of a mere -.039 percent. Using this model the average real economic impact (in 1999 dollars) from the FFM over the period 1970 through 1999 is estimated at -$44.28 million, or the model indicates that the average host city experienced a reduction in real income of $44.28 million as a consequence of the event. This compares to typical booster estimates predicting gains ranging from $25 million to $110 million. The median estimated economic impact equaled a loss of $6.44 million. The model estimates indicate that fifteen (seventeen) of the host cities experienced real gains (losses) from the FFM. Since but one outcome emerged as statistically significant in the 32 MSAs analyzed, not too much should be read into these estimates of gains and losses, but the consistency of statistically insignificant outcomes does cast doubt on the credibility of at least the more robust booster claims for a financial windfall from hosting the FF.

Table 4: Estimated Real Economic Impact on Host Cities from the FFW, 1982-1999

Year	Final Four Location	Actual Growth	Predicted Growth	Difference	Net income gains/losses	t-stat	Real Income ($000s)	St. Res.
1982	Norfolk, VA	2.386%	1.107%	1.279%	301,173	1.14	23,548,604	0.0112
1983	Norfolk, VA	5.438%	4.334%	1.104%	274,075	0.99	24,829,141	0.0112
1984	Los Angeles	6.106%	5.549%	0.557%	1,126,315	0.40	202,210,958	0.0138
1985	Austin, TX	9.650%	8.855%	0.795%	140,125	0.44	17,615,321	0.0179
1986	Lexington, KY	4.062%	4.762%	-0.701%	-56,905	-0.54	8,119,584	0.0129
1987	Austin, TX	-1.332%	0.689%	-2.021%	-359,706	-1.13	17,801,691	0.0179
1988	Tacoma, WA	3.158%	4.881%	-1.722%	-206,003	-0.83	11,959,528	0.0208
1989	Tacoma, WA	3.964%	4.473%	-0.509%	-63,226	-0.25	12,433,616	0.0208
1990	Knoxville, TN	2.794%	1.865%	0.929%	123,285	0.84	13,266,060	0.0111
1991	New Orleans	1.389%	-0.600%	1.989%	561,798	1.63	28,252,166	0.0122
1992	Los Angeles	0.653%	0.930%	-0.277%	-656,728	-0.20	237,085,976	0.0138
1993	Atlanta	4.156%	3.426%	0.730%	632,556	0.76	86,651,567	0.0096
1994	Richmond, VA	2.610%	2.273%	0.337%	85,097	0.29	25,260,772	0.0117
1995	Minneapolis	3.139%	3.809%	-0.670%	-545,102	-0.72	81,384,321	0.0093
1996	Charlotte, NC	4.293%	4.390%	-0.097%	-34,150	-0.14	35,342,319	0.0069
1997	Cincinnati	3.648%	3.867%	-0.219%	-96,373	-0.31	43,992,399	0.0070
1998	Kansas City	6.544%	6.620%	-0.076%	-38,603	-0.07	50,555,987	0.0107
1999	San Jose	11.925%	4.775%	7.150%	5,482,913	3.38	76,684,098	0.0212
	Average	**4.145%**	**3.667%**	**0.477%**	**370,586**	**0.32**	**55,388,562**	0.0133
	Excluding San Jose	**3.686%**	**3.602%**	**0.084%**	**69,860**	**0.14**	**54,135,883**	0.0129

Table 4 records results relating to the economic impact of the FFW for the period 1982 through 1999. The outcomes for the FFW parallels that for the FFM in several respects. First and foremost, all outcomes proved statistically insignificant except for the 1999 tournament hosted by San Jose. The San Jose result very likely reflects frenzied economic activity in Silicon Valley relating to the Internet boom during that time period. Second, if San Jose is eliminated, the average difference between the predicted and actual growth rates in real income for the host MSAs equaled something less than one-tenth of one percent. Third, negative and positive net real income outcomes associated with the tournament were equivalent for the FFW if San Jose was included, but exhibited a greater incidence of negative outcomes if San Jose was excluded. These outcomes taken together approximated those from the FFM. One noteworthy difference between the FFW and FFM results relates to the average net change in real income induced by the tournament. Recognizing the substantial caveat relating to the interpretation of a statistically insignificant outcome, the results indicate that the FFW generated on average a net gain in income equal to approximately $70 million dollars.

Despite the paucity of statistically significant outcomes for the FF, we can use confidence intervals to develop a range for the likely impact for the FFM and FFW. If we use a 95 percent confidence interval to establish an estimated range of economic impact from the FF, expressed in 1999 dollars, the range of impact for the FFM is a $ 64.74 million positive impact to a $140.48 million negative impact. Using a 95 percent confidence interval, the economic impact of the FFW (excluding San Jose) ranges from a $ positive impact to a $ negative impact.

Several explanations exist for the range of economic impacts. First, the model does not explain all the variation in estimated income, and, therefore, not all the variation can be attributable to the FF. Information in Tables 3 and 4 indicates variation in the residuals that is non trivial from year to year for some cities. Heteroscedasticity (variance of a disturbance term is not the same across observations), therefore, does pose a problem. We have addressed this problem by standardizing the residuals, and using that statistic in estimating p-values.[7] The heteroscedasticity problem is particularly apparent in cities such as Houston (FFM), Tacoma (FFW), and San Jose (FFW). It is arguable that each of these

7 The residuals in the "Difference" column in Tables 3 and 4 are divided by the standard deviation of the yearly residuals for the appropriate city. The mean of these standardized residuals is divided by the square root of 32 or 18 (the sample size for FFM and FFW, respectively) in order to find a t-statistic with 31 and 17 (= n-1) degrees of freedom. The resulting p-values shown in Table 5 assume normality of the residuals.

metropolitan economies is dominated by a cyclical industry, oil in Houston, forestry in Tacoma, and computer related activity in San Jose, for example, and that explains the variation in their disturbance terms.

Second, the FF is not held on consecutive days. The "crowding-out" effect covers a weekend and a Monday evening when the championship is played. It may be that this scheduling interferes with two weeks of alternative conference activity and thus induces a more substantial crowding-out effect than the number of games might otherwise suggest.

Third, the spending of residents of the host city may be altered to the detriment of the city's economy. Residents may not frequent areas in which the event occurs or the fans stay. Fourth, if the games are televised, some fans may stay inside to view the games rather than going out as they normally might.

It is important to realize that the host cities for the FF are large, diverse economies for which even a sports mega-event will account for a small portion of that city's annual economic activity. For example, in Lexington, Kentucky, the smallest host city in our sample, even a $100 million dollar increase in economic activity would raise the city GDP by only 1.28%, a statistically insignificant amount given the standard error of the estimates for the city's regression model. While a $100 million dollar impact would not emerge as statistically significant for any single city, one would expect that on average, host cities would have higher than expected economic growth in Final Four years. An average increase of $100 million over a large sample of cities may emerge as statistically significant even if the increase is not significant in any single city. While it is not uncommon for an individual city to deviate from its expected economic growth path by even $1 billion in a given year, it would be quite unusual for a sample of 18 or 32 cities to exhibit lower than expected economic growth if a mega-event should, according to boosters, be contributing up to $100 million in unanticipated economic benefits. Tables 5 and 6 provide estimates on the probabilities that various levels of economic impact will be induced by the FFM and FFW respectively based on the observed economic growth rates and the calculated standard errors. Inspiration for these tables derived from the claims for economic impact noted in the paper's introduction.

Table 5: Probabilities for Various Levels of Economic Impact Induced by the FFM

Economic Impact	Probability of such an impact or greater having occurred
$103.6 million	5.00%
$100.0 million	5.55%
$78.45 million	10.00%
$50.00 million	19.47%
$25.00 million	31.41%
$ 0.00 million	45.83%
negative	54.17%

Table 6: Probabilities for Various Levels of Economic Impact Induced by the FFW

Economic Impact	Probability of such an impact or greater having occurred	Probability of such an impact or greater having occurred (excluding San Jose)
$150.0 million	25.25%	7.68%%
$100.0 million	49.71%	21.42%
$99.50 million	50.00%	21.64%
$75.00 million	62.70%	32.25%
$50.00 million	74.39%	45.04%
$40.75 million	78.00%	50.00%
$25.00 million	83.50%	58.42%
$ 0.00 million	90.10%	70.80%
negative	9.90%	29.20%

As the estimates recorded in Table 5 indicate, our analysis of the FFM suggests that the event has a greater chance of imparting a negative economic impact than of benefitting the host communities. Gains of the magnitude indicated by the most optimistic promoters of the Men's Final Four are highly remote. The results presented in Table 6 of our analysis of the Women's Final Four are more encouraging for the boosters with an economic impact of about $40 million being predicted in the model that excluded the San Jose outlier. It is significant to note, however, that an economic impact of zero for the FFW cannot be rejected at a reasonable level of certainty even including San Jose in the model.

One final set of calculations can be made with this data. We have previously noted that a major shortcoming of all *ex post* economic analyses of mega-events is the fact that even the biggest spectacles, such as the FF, have relatively small economic impacts compared to the size of the cities that host the event. Because of this fact, one should expect that any economic gains from hosting these events, should any gains exist, should be more likely to surface in smaller host cities. As mentioned previously, a $100 million increase in GDP represents 1.28% of Lexington's 1985 economy, while the same $100 impact represents merely 0.035% of New York City's 1996 GDP. Any economic benefit imparted by the FF would be likely to be obscured by natural but unpredictable variations in the New York City economy, but would be more liable to show up in Lexington's much smaller economy. Therefore, if the FF really does have a significant economic impact, there should be a significant negative correlation between city size and the difference between actual and predicted economic growth. In fact, the simple correlation between these two variables is -0.024, or almost non-existent.

The Spearman Rank-correlation, which should account for any undue influence in the simple correlation statistic caused by particularly large host cities such as Los Angeles and New York City, between the two variables is 0.067. Not only is the correlation nearly zero, in this case it actually has the incorrect sign. This result give further credence to the idea that the economic impact of these events is small.

Similarly, one should expect that the number of visitors to the event should influence the total economic impact. Over the past 30 years, the FFM has been held in venues ranging from mid-sized basketball arenas holding 15 to 20 thousand fans to large, indoor football stadiums that are converted to basketball arenas for the event. These stadiums can hold from 40 to 65 thousand fans. If the boosters are correct, the larger the number of attendees, the larger the expected economic impact. If the adherents to the "crowding-out" hypothesis are correct, the larger number of attendees will simply result in a larger number of other visitors being crowded out of the metropolitan area. The economic impact, therefore, will be the same regardless of the size of the venue. In fact, the simple correlation between the estimated real dollar impact of the event and the number of attendees for the FFM is -0.007. The lack of correlation between the number of attendees and the observed economic impact suggests that bigger crowds don't lead to bigger gains but simply lead to bigger displacements of regular economic activity.

Conclusions and Policy Implications

The NCAA Final Four tournaments for men and women have achieved sports mega-event status. Cities vigorously compete to host the Final Four because a perception exists that the event provides a financial windfall in the short run through exporting a sports service and in the long run through image enhancement. This paper analyzed the short-run economic impact. High profile sporting events generally require substantial expenditures on a campaign to attract the event, state of the art infrastructure, and security which taken together generally imply a significant commitment of public resources. The ability of a city to attract a Final Four often depends on convincing a sometimes skeptical public that hosting the event generates economic profit. A motive for exaggerating the impact of a mega-event clearly exists, and that explains the purpose for this assessment of the impact of the NCAA basketball tournament finals for men and women.

The evidence suggests that the economic impact estimates provided by Final Four promoters routinely exaggerate the true economic impact of the event. The fundamental flaw in booster estimates pertains to underplaying the substantial substitution effects which accompany mega-sports events. In short, the event not only stimulates spending by non residents, but it reduces spending by other non-residents and residents alike. An accurate assessment of first-round changes in net new spending induced by the Final Four is critical to precise renderings of its economic impact on the host city.

The evidence presented suggests that neither the Final Four for Men or Women boost the local economy much if at all. The highest probability corresponds to the event having a zero or negative economic impact for the FFM, and just over a 5 percent probability exists that the event will stimulate the host economy by more than the $100 million estimated by some event promoters. For the FFW, the results suggest a nearly 30 percent probability that the event will have a negative economic impact, and nearly an 80 percent probability that the event will generate an economic impact of $100 million or less. In an analysis of the Final Four for men over a 30-year period and for women over an eighteen-year period, only on two occasions did either event emerge as inducing a statistically significant change in the host city's real income. The consistency of the statistically insignificant findings coupled with low probabilities for achieving the economic benefit typically ascribed to the event by its advocates argues for restraint in committing substantial public resources to the event. The evidence indicates that the economic impact of the Final Four will more likely be the equivalent of a financial "air ball" than an economic "slam dunk."

APPENDIX

Table A1: Cities and years used to estimate model in Table 1 and 2

City Name	1969 Population	1969 Rank	1999 Population	1999 Rank	Wage Data availability	Region
Albany, NY	797,010	50	869,474	68	1969-1999	Mideast
Atlanta, GA	1,742,220	16	3,857,097	9	1972-1999	Southeast
Austin, TX	382,835	88	1,146,050	49	1972-1999	Southwest
Baltimore, MD	2,072,804	12	2,491,254	18	1972-1999	Mideast
Bergen, NJ	1,354,671	26	1,342,116	44	1969-1999	Mideast
					(State data 1969-1999)	
Birmingham, AL	718,286	54	915,077	65	1970-1999	Southeast
					(State data 1970-1971)	
Boston, MA	5,182,413	4	5,901,589	4	1972-1999	New England
Buffalo, NY	1,344,024	27	1,142,121	50	1969-1999	Mideast
					(Average of cities)	
Charlotte, NC	819,691	49	1,417,217	42	1972-1999	Southeast
Chicago, IL	7,041,834	2	8,008,507	3	1972-1999	Great Lakes
Cincinnati, OH	1,431,316	21	1,627,509	33	1969-1999	Great Lakes
Cleveland, OH	2,402,527	11	2,221,181	23	1969-1999	Great Lakes
Columbus, OH	1,104,257	33	1,489,487	40	1972-1999	Great Lakes
Dallas, TX	1,576,589	18	3,280,310	10	1972-1999	Southwest
Dayton, OH	963,574	42	958,698	63	1969-1999	Great Lakes
Denver, CO	1,089,416	34	1,978,991	25	1977-1999	Rocky Mountains
Detroit, MI	4,476,558	6	4,474,614	7	1976-1999	Great Lakes
Fort Lauderdale, FL	595,651	70	1,535,468	38	1969-1999	Southeast
					(State data 1988-1999)	
Fort Worth, TX	766,903	51	1,629,213	32	1976-1999	Southwest
					(State data 1976-1983)	
Grand Rapids, MI	753,936	52	1,052,092	58	1976-1999	Great Lakes
Greensboro, NC	829,797	48	1,179,384	47	1972-1999	Southeast
Greenville, SC	605,084	67	929,565	64	1969-1999	Southeast
					(State data 1969)	
Hartford, CT	1,021,033	39	1,113,800	52	1969-1999	New England
Honolulu, HI	603,438	68	864,571	69	1972-1999	Far West
Houston, TX	1,872,148	15	4,010,969	8	1972-1999	Southwest
Indianapolis, IN	1,229,904	30	1,536,665	37	1989-1999	Great Lakes
Jacksonville, FL	610,471	66	1,056,332	57	1972-1999	Southeast
					(State data 1988-1999)	
Kansas City, MO	1,365,715	25	1,755,899	28	1972-1999	Plains
Las Vegas, NV	297,628	116	1,381,086	43	1972-1999	Far West
Los Angeles, CA	6,989,910	3	9,329,989	1	1969-1999	Far West
					(State data 1982-1987)	
Louisville, KY	893,311	43	1,005,849	61	1972-1999	Southeast
Memphis, TN	848,113	45	1,105,058	55	1972-1999	Southeast
Miami, FL	1,249,884	29	2,175,634	24	1969-1999	Southeast
					(State data 1988-1999)	
Middlesex, NJ	836,616	47	1,130,592	51	1969-1999	Mideast
					(State data 1969-1999)	

Milwaukee, WI	1,395,326	23	1,462,422	41	1969-1999	Great Lakes
Minneapolis, MN	1,991,610	13	2,872,109	13	1972-1999	Plains
Monmouth, NJ	650,177	62	1,108,977	53	1969-1999 (State data 1969-1999)	Mideast
Nashville, TN	689,753	57	1,171,755	48	1972-1999	Southeast
Nassau, NY	2,516,514	9	2,688,904	16	1969-1999	Mideast
New Haven, CT	1,527,930	19	1,634,542	31	1969-1999 (Average of cities)	New England
New Orleans, LA	1,134,406	31	1,305,479	45	1972-1999	Southeast
New York, NY	9,024,022	1	8,712,600	2	1969-1999	Mideast
Newark, NJ	1,988,239	14	1,954,671	26	1969-1999 (State data 1969-1999)	Mideast
Norfolk, VA	1,076,672	36	1,562,635	36	1972-1999 (State data 1973-1996)	Southeast
Oakland, CA	1,606,461	17	2,348,723	19	1969-1999 (State data 1969-1987)	Far West
Oklahoma City, OK	691,473	56	1,046,283	60	1969-1999	Southwest
Orange County, CA	1,376,796	24	2,760,948	15	1969-1999 (State data 1982-1987)	Far West
Orlando, FL	510,189	76	1,535,004	39	1972-1999 (State data 1988-1999)	Southeast
Philadelphia, PA	4,829,078	5	4,949,867	5	1972-1999	Mideast
Phoenix, AZ	1,013,400	40	3,013,696	12	1972-1999 (State data 1972-1987)	Southwest
Pittsburgh, PA	2,683,385	8	2,331,336	21	1972-1999	Mideast
Portland, OR	1,064,099	37	1,845,840	27	1972-1999	Far West
Providence, RI	839,909	46	907,795	66	1969-1999	New England
Raleigh-Durham, NC	526,723	73	1,105,535	54	1972-1999	Southeast
Richmond, VA	673,990	60	961,416	62	1972-1999	Southeast
Riverside, CA	1,122,165	32	3,200,587	11	1969-1999 (State data 1982-1987)	Far West
Rochester, NY	1,005,722	41	1,079,073	56	1969-1999	Mideast
Sacramento, CA	737,534	53	1,585,429	34	1969-1999 (State data 1982-1987)	Far West
St. Louis, MO	2,412,381	10	2,569,029	17	1972-1999	Plains
Salt Lake City, UT	677,500	58	1,275,076	46	1972-1999	Rocky Mountains
San Antonio, TX	892,602	44	1,564,949	35	1972-1999	Southwest
San Diego, CA	1,340,989	28	2,820,844	14	1969-1999 (State data 1982-1987)	Far West
San Francisco, CA	1,482,030	20	1,685,647	29	1969-1999 (State data 1982-1987)	Far West
San Jose, CA	1,033,442	38	1,647,419	30	1972-1999 (State data 1982-1987)	Far West
Seattle, WA	1,430,592	22	2,334,934	20	1972-1999 (State data 1982-1999)	Far West
Syracuse, NY	708,325	55	732,920	73	1969-1999	Mideast
Tampa, FL	1,082,821	35	2,278,169	22	1972-1999 (State data 1988-1999)	Southeast
Tulsa, OK	519,537	74	786,117	71	1969-1999	Southwest
Washington, DC	3,150,087	7	4,739,999	6	1972-1999	Southeast
W. Palm Beach, FL	336,706	105	1,049,420	59	1969-1999	Southeast

(State data 1988-1999)

Complete data on population, income, and employment was available for all cities from 1969 to 1999. This implies that data on real income growth and real income growth lagged one year was available from 1971 to 1999. Data regarding state and local taxes as a percentage of state GDP was available for all cities from 1970 to 1999, and was obtained from the Tax Foundation in Washington, D.C. Wage data from the Bureau of Labor Statistics Current Employment Statistics Survey was available for cities as described above. When city data was not available, state wage data was used in its place. When possible, the state wage data was adjusted to reflect differences between existing state wage data and existing city wage data. For MSAs that included several primary cities, the wages of the cities were averaged together to create an MSA wage as noted in Table A1.

The "Oil Bust" dummy variable was included for cities highly dependent on oil revenues including Dallas, Denver, Fort Worth, Houston, New Orleans, Oklahoma City, and Tulsa. The variable was set at a value of 1 for boom years, 1974-1976 and 1979-1981, and at -1 for the bust years, 1985-1988. While this formulation does imply that each boom and bust is of an equal magnitude, the variable does have significant explanatory value nonetheless.

Each city was placed in one of eight geographical regions as defined by the Department of Commerce. The region to which each city was assigned is shown in Table A1. Employment, income, and population data were obtained from the Regional Economic Information System at the University of Virginia which derives its data from the Department of Commerce statistics.

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