# The Economic Consequences of Professional Sports Strikes and Lockouts

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**Abstract**

*The NBA lockout of 1998-1999 resulted in the cancellation of a significant number of games. According to the claims made by proponents of sports-driven economic growth, cities with NBA franchises should experience significant negative economic losses from this work stoppage because of the lost spending in and around basketball arenas during this event. Although it will be several years before adequate data exist for a careful ex post evaluation of the effects of the lockout, an examination of the impact of past work stoppages in professional football and basketball can shed some light on the potential impact of the NBA lockout as well as the viability of professional sports as engines of economic growth in cities. The parameter estimates from a reduced form empirical model of the determination of real per capita income in 37 SMSAs over the period 1969-1996 suggest that prior work stoppages in professional football and baseball had no impact on the economies of cities with franchises. Further, the departure of professional basketball from cities had no impact on their economies in the following years. These results refute the idea that attracting professional sports franchises represents a viable economic development strategy.*

Keywords: Economic Development, Public Finance, Sports

## Introduction

The recent labor difficulties between the players and owners in the National Basketball Association resulted in the cancellation of a significant number of games. Such work-stoppages present economists with a natural experiment on the effects of professional sports on local economic development. If, as sports led development advocates argue, professional sports leverage greater economic activity, especially consumer spending, then the work-stoppage must have the opposite effect. Local economies must take a hit due to the absence of play. This paper examines the economic consequences of work stoppages in professional sports leagues on the economies of cities with professional sports franchises.

It will be a year or more before adequate data are available to conduct a careful ex post study of the economic consequences of the NBA lockout. However, the empirical analysis done by Coates and Humphreys (1999) implies two indirect methods for analyzing the effects of work stoppages in professional sports leagues on local economies.

The first method assesses the effects of work stoppages in both professional football and baseball to infer the likely impact of the NBA lockout. The NBA lockout during the 1998-1999 season lasted over 200 days and resulted in 424 games being lost, with 725 being played. As work stoppages in professional sports go, it was typical. For example, Major League Baseball had three significant work stoppages during the period 1969-1996. The least severe baseball strike occurred in 1972 when 85 games were cancelled and 1,859 games were played. The 1981 strike led to the cancellation of 712 games; 1,394 games were played. The 1994 strike resulted in the cancellation of 669 games as well as the postseason; 1,599 games were played. Although the latter two strikes are larger than the first, all three represent a considerable number of lost games. The National Football League had two work stoppages during this period, in 1982 and 1987. The 1982 strike lasted 57 days and reduced the number of games played from 16 to 9 per team. The 1987 strike lasted 24 days. The games scheduled for the third week of the season were cancelled and the games in weeks four through six were played by replacement players.

None of these work stoppages led to the loss of an entire season. If one treats the 1987 NFL games played with replacement players as cancelled games, then, with the exception of the 1972 baseball strike, the work stoppages in baseball and football are roughly the same duration and about the same magnitude as the NBA lockout. Consequently, if the work stoppages in baseball and football had a measurable effect on local economies, then one might expect that the NBA lockout would affect the economy in cities where these teams play. However, professional basketball may differ from pro football and major league baseball in some fundamental way that would alter its overall impact on an SMSA's economy. For example, basketball fans may be drawn more from within the SMSA than football of baseball fans. If this is the case, the effects of football or baseball strikes may be poor guides to the effects of a basketball lock out.

The second method exploits NBA franchise moves over the last 30 years. If the local economy was affected by the departure of an NBA franchise in the past, then one might expect that the current work stoppage would affect the local economy in a similar way.

Although strikes have received considerable attention from economists, relatively little is known about the economic impact of professional sports strikes. Zipp (1996) examined the effect of the 1994 baseball strike on a sample of 17 SMSAs; Zipp (1997) extended this analysis to include counties in Florida that host Spring Training games during the Spring 1995 portion of this strike. In both cases, no significant impact of this strike on local economies was found. To our knowledge, no investigations of the impact of strikes or lockouts in other professional sports, or other baseball strikes, have been done.

The existing evidence on the effect of professional sports on the local economy can be divided into two distinct groups. One group includes economic impact studies commissioned by teams or other interested parties. These ex ante exercises typically conclude that attracting a new professional sports team, or building a new stadium for an existing team will yield large positive gains for a city's economy.[1] These economic benefits flow directly from the construction and use of facilities and indirectly from "multiplier" effects as the increase in employment and spending generated from building and using the facility circulate throughout the local economy.

[1]See Crompton(1995) for a review of this literature and Noll and Zimbalist (1997a) for a detailed discussion of the problems inherent to this approach.

The other group includes ex post studies carried out in academic settings. These may be formal cost-benefit studies of individual cities and their franchises or stadia, like Hamilton and Kahn (1997) or Rosentraub and Swindell (1991). Alternatively, these studies may use econometric techniques to estimate the effects of the sports environment on the economic vitality of a city using time series data on a single city, using cross-sectional data on a sample of cities, or using time-series cross-section data on a panel of cities over time. Among these empirical studies are Baade and Dye (1990), Baade (1996), and Coates and Humphreys (1999). Rosentraub (1997) provides a thorough examination of these issues, as well as a synthesis of the existing literature. The general conclusion of these studies is that stadia and professional sport franchises have little or no positive effects on the local economy, although they may reduce real per capita income in some cases.

## Empirical Analysis

We adopt the framework developed by Coates and Humphreys (1999) to analyze the effects of the professional sports environment on the economy in a Standard Statistical Metropolitan Area (SMSA) containing now or at some time in the last thirty years a franchise in one or more of either professional football, basketball or baseball. This framework employs a linear reduced form empirical model which relates the level of real per capita personal income in a metropolitan area in a given year, $y_{it}$, to a vector of variables describing the economic and business climate in that area during that year, $x_{it}$, and to a vector of variables which capture the role of stadia and franchises in the determination of economic activity, $z_{it}$. This linear reduced form empirical model is

$$y_{it} = \beta x_{it} + \gamma z_{it} + \mu_{it} \tag{1}$$

where $\beta$ and $\gamma$ are vectors of parameters to be estimated and $\mu_{it}$ is a disturbance term. By assumption, the disturbance term takes the form

$$\mu_{it} = e_{it} + v_i + u_t \tag{2}$$

where $v_i$ is a disturbance specific to SMSA $i$ which persists throughout the sample period, $u_t$ is a time $t$ specific disturbance which affects all areas in the same way, and $e_{it}$ is a random shock in SMSA $i$ at time $t$ which is uncorrelated across SMSAs and over time. Estimated this way, the regression purges the effect of national events on each jurisdiction in a given year and generates an SMSA specific impact. In other words, the level of income per capita at any point in time is determined by time- and location-specific events and the circumstances regarding sports franchises and stadia.

In equation (1), $x_{it}$ is a vector of variables that control for factors other than the professional sports environment that affect real per capita income in SMSAs. We employ four control variables in this study: the lagged level of real per capita income ($y_{i,t-1}$), the growth rate of the population in each SMSA, expressed in percentage terms, year dummy variables that capture other omitted factors that affect all SMSAs in the sample in each year, and SMSA-specific time trends that capture secular trends in individual SMSAs.[2]

The vector of sports environment variables, $z_{it}$, contains a variety of dummy variables to capture some of the variation in the sports environment in each of the 37 SMSAs that currently have or at some time in the past 30 years had a professional football, basketball or baseball franchise. This vector includes: dummy variables indicating the presence of a football, basketball or baseball franchise; dummy variables indicating the ten year periods following all football, basketball and baseball franchise entries and exits; variables indicating the ten year period following construction or renovation of a stadium or arena; variables indicating whether the stadium in each SMSA is a single or multiple use structure. $z_{it}$ also includes the seating capacity of all football, basketball and baseball stadia and those capacities squared. These capacity variables are intended to capture the idiosyncratic nature of each individual professional sports venue, as well as to reflect the incremental effects of renovation.

The entry, exit and construction variables take on a value of one in ten successive years: the year a franchise moves, or the year a stadium or arena opens, and the nine subsequent years, in

[2]The inclusion of a lagged dependent variable makes this model a dynamic panel model. Although lagged dependent variables cause bias in the parameter estimates, Monte Carlo evidence in Judson and Owen(1997) suggests that the bias affects the parameter on the lagged dependent variable, not the parameters on the independent variables. Kiviet (1995) reports similar results from panels with time dimensions 20% of the sample in this study.

order to capture the length of time it takes for the novelty of a new franchise or stadium to wear off, as has been suggested by Baade (1996), or for the despair from losing a team to subside. Baade and Sanderson (1997) estimate the novelty effect for ten cities. They find effects in the range of from seven to ten years. The entry and departure variables are BBE, FBE, BAE, BBD, FBD, and BAD, for baseball, football and basketball entry, and baseball, football and basketball departure, respectively. Construction variables are BACO, FBCO, BBFBC, and BBCO, for basketball, football only, joint football and baseball, or baseball only construction.

In order to determine the effect of the work stoppages in professional sports on local economies, two dummy variables were created, one each for baseball and football strikes. Each takes the value one in each year of a pro football or baseball work stoppage for cities that have franchises in those sports.

One might question the choice of SMSAs as the unit of measure in this analysis. A considerable amount of research conducted in the 1950s and '60s found no impact of strikes on the national economy; perhaps SMSAs are large enough relative to the size of a professional sports team to obscure the effects of a strike. Neumann and Reder (1984) found evidence that strikes against some firms in an industry affected output of that industry in about a quarter of the 63 three-digit SIC code industries they studied. The three-digit SIC code industries examined by Neumann and Reder (1984) are of comparable size to the SMSAs in our sample, which suggests that our geographical unit of measurement may not be too large for the question at hand. [3] We have more to say about this issue below.

Table 1 provides descriptive statistics and variable definitions for the data used in this study.

[3] Consider the first four three-digit SIC code industries in the Food industry in the Neumann and Reder sample: Meat Products (SIC 201), Dairy Products (SIC 202), Fats and Oils (SIC 207) and Miscellaneous Food Products (SIC 209). In 1982, the mid-point of our sample, the the annual value of shipments in the Meat Products industry was larger than the annual personal income in all but four of the SMSAs in our sample; annual shipments in the Dairy Products industry were larger than the annual personal income in all but eight of the SMSAs in our sample; annual shipments in Miscellaneous Food Products was close to the median personal income from our sample and for Fats and Oils, the smallest of these four three-digit industries, eight SMSAs had personal income smaller than the annual value of shipments in this industry.

The data are annual and cover the period 1969-1996. Income and population data come from the Regional Economic Information System (REIS) CD-ROM, distributed by the U.S. Department of Commerce, Bureau of Economic Analysis. Data on sports franchises, stadia, and strikes come from Noll and Zimbalist (1997b), Quirk and Fort (1992) and the *Information Please Sports Almanac* (1996). The data set differs from that in Coates and Humphreys (1999) in two ways. First, two additional years of data are included. These additional years are beneficial because several new stadia and new franchises came into existence in the early to mid-1990s.[4] The effects of these will now be more accurately captured because of the additional years of data. Second, data on franchise entries and exits were recoded, particularly for the early years of the data, to conform with histories reported in Quirk and Fort (1992).

Random and fixed effects estimations of Equation (1) without the baseball and football strike variables included as regressors are shown on Table 2. The first point to note is that the random effects results are consistent with those reported in Coates and Humphreys (1999). The sports environment variables as a group are clearly important variables. For the random effects model, the F-statistic under the null hypothesis is 1.77, the 5% critical value with 19 and 905 degrees of freedom is about 1.62.[5] For the fixed effects model, the F-statistic is 1.66 with 19 and 868 degrees of freedom. The critical value is, again, about 1.62. Consequently, in either the random or fixed effects model the null hypothesis of no effect of the sports environment may be rejected.

Few of these variables are individually significant, however. And which ones are significant depends upon random versus fixed effects. Of those that are individually significant in the random effects specification, baseball stadium capacity and that capacity squared are so at the 5% level. Football stadium construction and basketball entry are also significant, but at the 10% level. In the fixed effects estimation, only entry of a basketball team and entry of a football team are individually significant.

The economic control variables are correctly signed and statistically significant in almost all model specifications. The parameter estimated for lagged per capita income and the growth rate of

[4]Newly opened stadia include Camden Yards in Baltimore, Jacobs Field in Cleveland, The Ball Park in Arlington, and Coors Field in Denver. New franchises include the Colorado Rockies and Florida Marlins.

[5]The value 1.62 corresponds to an F distributed random variable with 20 and 200 degrees of freedom.

the population are shown on Table 2. Although not reported, all but one of the parameters on the SMSA-specific time trends are statistically significant, as are most of the parameters on the year dummies. Coupled with the significance of lagged real per capita income and the growth rate of the population, these results suggest that a considerable amount of non-sports related factors that affect real per-capita income have been accounted for.

Table 3 adds professional sports strike variables to the empirical model. These results use a fixed effects estimator; a Hausman test rejected a random effects specification in favor of fixed effects for this model. Introducing the strike variables has virtually no effect on any of the other coefficient estimates. Interestingly, both strike variables have positive coefficients, the opposite of what one would expect based on the theory of sports led development. Neither, however, is individually statistically significant. Additionally, an F-test on the null hypothesis that both coefficients are zero has a value of 0.956, in the random effects model, and a value of .908 in the fixed effects model, clearly indicating that the null not be rejected. It does not appear that past work stoppages in professional baseball or football had a measurable impact on real per capita personal income in cities with these franchises.

Although imprecisely estimated, the parameters on the strike variables suggest that real per capita income rises in SMSAs during years that the professional sports teams in these SMSAs are on strike. The increase in real per capita income associated with these strike-years represents a small fraction of per capita income in the SMSAs in the sample; 0.38% of the average level of income in our sample in the case of baseball strikes and 0.17% in the case of football strikes. Still, this differs from the claims made by proponents of professional sports as engines of economic development; if professional sports make important contributions to the economy, then in their absence incomes should be fall, not rise.

Several possible explanations exist for our results. One is substitution in private spending. Attending a professional sporting event is one of many entertainment options in metropolitan areas. Fans could alternatively go out to dinner and a movie, or bowling, during a sports strike. If these alternative activities have higher local spending multipliers than does spending on professional sports, then income could be higher during strikes.

Differences in the impact of public and private spending represents a second explanation. Professional sporting events increase metropolitan government spending by driving up spending on public safety, crowd and traffic control, et cetera. If this category of public spending declines during a strike, and the metropolitan government either borrows less or collects fewer taxes or fees as a result of this decrease in spending, then additional money will remain in the pockets of private citizens. Furthermore, if the marginal impact of these additional private dollars exceeds the marginal impact of these dollars in public hands, then total income in the metropolitan area would increase. There would also be a decrease in deadweight loss in this case.

Finally, our results may reflect the effects of professional sports on the productivity of workers. If workers spend time discussing the outcome of last night's game rather than devoting this time to job-related activities, then these workers will be less productive, in terms of output produced per unit of time. Less output will be produced, and less income generated. Fewer such opportunities exist during sports strikes. Therefore, other things equal, during these strikes one would observe higher productivity, production, and income.

One might argue that the lack of statistical significance of the strike variables arises because the severity of the strikes varies dramatically. For example, during the smallest baseball strike the ratio of games canceled to games played is .046. During the most severe baseball strike (1981) the ratio is .511. That is, fully a third of the scheduled games were lost that year. For football, the worst strike reduced the season from 16 to 9 games, a ratio of games lost to games played of .778. The 1987 NFL season lost only one week of games, though games for three additional weeks were played by replacement players.

To check for differential effects by severity of the work-stoppage, separate dummy variables for each strike were created. These variables take value one for a city with a franchise in the sport suffering from the work-stoppage in a particular year and take value zero for all other years and all cities without a franchise in that sport. For the fixed effects model reported on Table 3, the effects of these strike variables are mixed. The t-statistic is greater than one in absolute value for both the baseball strike of 1994 and the football strike of 1982. Neither variable is close to individually significant, however. Additionally, only the baseball strike in 1994 and the football strike of 1987 have the correct sign, indicating the strike reduced economic vitality in cities with franchises. The F-statistic under the null of no significance of these strike variables is .878. The null cannot be rejected.

Including these strike variables can be viewed as a relatively strong test of the direct effect of professional sports on local economies. The evidence from these tests is clearly opposed to the notion that professional sports has any significant effect on the local economies. It also suggests that one should expect little or no repercussions on the local economies of cities with professional basketball franchises despite the duration of the NBA lockout of 1998-1999.[6]

Recall that Neumann and Reder (1984) found effects of strikes against some firms in an industry in only about 25 percent of the industries they studied. They hypothesize that the strikes against a few firms have little impact on the industry as the unstruck firms expand production to fill the excess demand. In other words, the products of different firms in the industry are close substitutes for one another. Advocates of sports led development might argue that the effects of strikes in professional sports have important effects on local income but that those effects are hidden by substitution into other recreation activities during the strike. But then the failure of these advocates to adequately consider substitution effects in their economic impact studies is laid bare. It is only by ignoring the substitution effects that large effects of stadiums, arenas and franchises, and of strikes, can be consistent with the findings of this paper.

An alternative approach to assessing the importance of the lock-out is to examine the effects of a professional basketball team leaving a city. In the results reported above, the basketball team departure variable is one for each of ten years after a team leaves a city. The coefficient estimate is generally negative, consistent with the sports led development hypothesis that professional sports is, or can be, an engine of economic growth. However, the departure variable is never individually statistically significant, though the t-statistic is generally slightly greater than one in absolute value.

The lock-out is not, however, a permanent departure from the city. It seems a stretch to think that its effect will carry through ten years. For this reason, an additional test of the departure of a basketball team examines the effect in the year after the team leaves. There are nine instances

[6] But the caveat regarding differences between professional sports mentioned above still applies.

of NBA franchises departing one city for another in the period 1969-1996. As an alternative to the previous models, additional models are estimated using a dummy variable that is equal to one in only the year following the departure of a basketball franchise. This variable is not statistically significant in either the random or the fixed effects model. In addition, it has a positive sign, suggesting that in the year after a basketball team leaves a city real personal income per capita rises.

This positive sign is, of course, at odds with the theory of sports as a catalyst for economic development. Explanations for positive signs on the franchise departure variables include those mentioned above in the discussion of positive coefficients on the strike variables. Because the departure of a franchise is a permanent event, while strikes are temporary, the long run effects of professional sports on metropolitan economies discussed by Coates and Humphreys (1999), like compensating earnings differentials and substitution in public spending, also apply in this case.

## Conclusion

In this paper we proceed from the assumption that professional sports can effectively enhance local economic development. Under this assumption, work stoppages in professional sports should have harmful effects on the economies of the regions that are home to franchises. If this is true, then the lock-out in the NBA at the beginning of the 1998-1999 season will have negatively affected the economies of many major metropolitan areas in the United States.

Fortunately, the evidence does not support the assertion that professional sports influence the economic health of SMSAs. Previous research has found little economic benefit and in some cases harmful effects of the sports environment on cities' economies. The results of this paper are consistent with those conclusions. Work stoppages in baseball and football have never had significant impact on local economies. The departure of a franchise in any sport, particularly in basketball, has never significantly lowered real per capita personal income in a metropolitan area. This is good news for SMSAs with NBA teams. The recent lock-out will likely have had no effect, and possibly even a beneficial effect, on their economies.

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**Table 1**

**Variable Definitions, Means and Standard Deviations**

| Variable | Mean | Std. Dev. | Definition |
|---|---|---|---|
| RPCPI | 14062.0 | 2377.1 | Real per capita income |
| DPOP | 0.013 | 0.014 | Growth Rate of Population (%) |
| BBCAP | 36.536 | 31.272 | Baseball Stadia capacity, thousands |
| FBCAP | 48.098 | 35.077 | Football Stadia capacity, thousands |
| BACAP | 10.473 | 9.966 | Basketball Stadia capacity, thousands |
| BBCO | 0.033 | 0.179 | baseball stadium constructed, last ten years |
| FBCO | 0.096 | 0.295 | football stadium constructed, last ten years |
| BBFBC | 0.102 | 0.303 | baseball / football stadium constructed, last 10 years |
| BACO | 0.225 | 0.418 | basketball arena constructed, last ten years |
| BBF | 0.615 | 0.487 | baseball franchise present |
| FBF | 0.705 | 0.456 | football franchise present |
| BAF | 0.598 | 0.491 | basketball franchise present |
| BBE | 0.079 | 0.270 | any baseball franchise entered, last 10 years |
| BAE | 0.231 | 0.422 | any basketball franchise entered, last 10 years |
| FBE | 0.101 | 0.302 | any football franchise entered, last 10 years |
| BBD | 0.028 | 0.165 | any baseball franchise left, last 10 years |
| BAD | 0.103 | 0.304 | any basketball franchise left, last 10 years |
| FBD | 0.056 | 0.230 | any football franchise left, last 10 years |
| BADS | 0.008 | 0.0892 | year following basketball team departure |
| BBST | 0.093 | 0.291 | baseball franchise during a baseball strike |
| FBST | 0.052 | 0.222 | football franchise during a football strike |
| BB72 | 0.022 | 0.147 | baseball franchise during 1972 baseball strike |
| BB81 | 0.023 | 0.150 | baseball franchise during 1981 baseball strike |
| BB94 | 0.024 | 0.153 | baseball franchise during 1994 baseball strike |
| FB82 | 0.026 | 0.159 | football franchise during 1982 football strike |
| FB87 | 0.026 | 0.159 | football franchise during 1987 football strike |

**Table 2**

**Base Model**

**Dependent Variable: Real Per-Capita Personal Income**

| | Random Effects | | Fixed Effects | |
|---|---|---|---|---|
| Variable | Coefficient | t-Stat. | Coefficient | t-Stat. |
| Constant | 919.8 | 6.63 | | |
| $RPCPI_{-1}$ | 0.92 | 73.22 | 0.77 | 34.96 |
| DPOP | 1352.50 | 1.68 | 3691.60 | 3.39 |
| BBCAP | 15.38 | 2.41 | 9.75 | 0.65 |
| FBCAP | -4.41 | -0.74 | -10.43 | -1.46 |
| BACAP | 1.37 | 0.12 | 0.47 | 0.04 |
| BBCAP2 | -0.10 | -2.39 | -0.99 | -0.81 |
| FBCAP2 | 0.02 | 0.61 | 0.05 | 1.23 |
| BACAP2 | -0.01 | -0.05 | -0.002 | -.01 |
| BACO | -34.69 | -1.21 | -33.85 | -1.02 |
| FBCO | 59.42 | 1.88 | 51.67 | 1.34 |
| BBFBC | -44.78 | -1.34 | 22.68 | 0.51 |
| BBCO | -2.58 | -0.05 | -92.02 | -1.59 |
| BAFR | -67.05 | -0.57 | -35.19 | -0.25 |
| FBFR | 157.98 | 0.67 | 310.40 | 1.04 |
| BBFR | -332.30 | -1.46 | -6.18 | -0.01 |
| BBE | 25.59 | 0.67 | -8.12 | -0.17 |
| BAE | 57.01 | 1.86 | 75.62 | 2.21 |
| FBE | 21.87 | 0.64 | 91.42 | 2.07 |
| BBD | 51.47 | 0.98 | -91.36 | -1.23 |
| BAD | -33.96 | -1.09 | 1.32 | 0.04 |
| FBD | 52.14 | 1.08 | -7.93 | -0.14 |
| R Squared | .992 | | .993 | |
| N | 999 | | 999 | |

**Table 3: Strike Effects**

**Dependent Variable: Real Per-Capita Personal Income**

| | Strike Effects Constant By Sport | | Strike Effects Vary by Sport and Year | |
|---|---|---|---|---|
| Variable | Coefficient | t-Stat. | Coefficient | t-Stat. |
| $RPCPI_{-1}$ | 0.769 | 34.98 | 0.776 | 34.81 |
| DPOP | 3800.38 | 3.48 | 3771.17 | 3.45 |
| BBCAP | 10.70 | 0.71 | 9.19 | 0.61 |
| FBCAP | -10.65 | -1.49 | -10.75 | -1.51 |
| BACAP | 1.04 | 0.08 | 1.35 | 0.10 |
| $BBCAP^2$ | -0.11 | -0.71 | -0.09 | -0.77 |
| $FBCAP^2$ | 0.05 | 1.26 | 0.53 | 1.27 |
| $BACAP^2$ | -0.01 | -0.05 | -0.02 | -0.09 |
| BAFR | -44.03 | -0.32 | -45.95 | -0.32 |
| FBFR | 316.53 | 1.06 | 314.47 | 1.05 |
| BBFR | -36.01 | -0.07 | 7.55 | 0.05 |
| BBCO | -98.35 | -1.69 | -88.01 | -1.52 |
| FBCO | 49.36 | 1.27 | 52.12 | 1.34 |
| BBFBC | 22.65 | 0.51 | 25.14 | 0.56 |
| BACO | -35.39 | -1.06 | -37.60 | -1.12 |
| BBE | -12.01 | -0.25 | -9.12 | -0.19 |
| FBE | 90.45 | 2.04 | 94.84 | 2.13 |
| BAE | 76.06 | 2.22 | 77.78 | 2.26 |
| BBD | -89.28 | -1.20 | -86.60 | -1.16 |
| FBD | -5.58 | -0.09 | -14.59 | -0.24 |
| BAD | -0.02 | -0.003 | 1.99 | 0.05 |
| BBST | 53.96 | 1.31 | - | - |
| FBST | 23.48 | 0.40 | - | - |
| BB72 | - | - | 70.21 | 0.90 |
| BB81 | - | - | 66.93 | 0.88 |
| BB94 | - | - | -80.93 | -1.02 |
| FB82 | - | - | 96.11 | 1.20 |
| FB87 | - | - | -55.15 | -0.68 |
| $R^2$ | | 0.991 | | 0.992 |
| $\overline{R}^2$ | | 0.990 | | 0.991 |

SMSA specific effects included but not reported.