

**A Study of the Fort Wayne (IN)
Restaurant Smoking Ban:**

Has It Impacted the Restaurant Business?

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Abstract (May 2001)

In January 1999, the city of Fort Wayne, Indiana implemented a ban on smoking in restaurants except in completely enclosed areas. Taverns and bowling alleys were exempt from the ordinance.

This study examines the purely empirical question of whether the ban has had either a positive or negative effect on the volume of restaurant business.

Since 1986, Allen County (which contains Fort Wayne) has had a local food and beverage tax. As is generally found in the case of selective sales taxes, changes in Allen County Personal Income alone explained most of the variation (over 96%) of changes in food and beverage tax collections. The recession years of 1991 and 1992 were found to have had a close to significant negative impact on restaurant sales beyond the effect on personal income, almost certainly due to a negative psychological impact of “being in a recession”.

For purposes of this study, the most important finding is that the variables representing the presence or absence of the smoking ban were not significant. That is, it was not possible to say with any degree of statistical confidence that the smoking ban has had any impact on restaurant sales. This does not mean that a given restaurant with a given clientele might not have seen some loss of business, only that the restaurant business as a whole cannot be shown to have been affected.

We also conducted two other activities in conjunction with this study. We visited a randomly selected group of Fort Wayne restaurants to check on compliance with the ban. We observed no violations. We also conducted a telephone poll of Fort Wayne residents asking if the smoking ban had had any impact on the frequency with which the respondent chose to dine out. Almost 70% said it had had no impact, with the remainder split about evenly between those who said they were somewhat less or somewhat more likely to dine out. This is consistent with the results of the statistical analysis.

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INTRODUCTION

In June of 1998, the city of Fort Wayne, IN passed a ban on smoking in restaurants effective January 1999. Taverns and bowling alleys were exempt.

Local ordinances requiring restaurants to be smoke-free have spread rapidly. Over 230 U. S. municipalities have either restaurant or restaurant-and-bar smoking bans. Additionally, the states of California, Maine, Maryland, Vermont and Utah have smoke free restaurant laws. Several Canadian jurisdictions also have restaurant smoking bans.

These laws are always accompanied by great controversy. Anti-smoking and health groups favor these ordinances. They argue that even a patron in a non-smoking section is subject to the irritation and health hazards of secondhand smoke, and that prohibiting smoking in restaurants is a perfectly legitimate public policy concern.

Opponents, principally restaurateurs, almost always vehemently disagree. They argue that if enough people want smoke-free restaurants such restaurants would spring up of their own accord, and that a smoking ban is an unwarranted intrusion in how they manage their business.

Most important for purposes of this study, restaurateurs also normally claim that a smoking ban hurts the restaurant business in general by driving away smokers.

This last claim is subject to rigorous analysis. It should be an empirically verifiable fact that smoking bans either do, or do not, harm the overall level of restaurant business in a jurisdiction where it is imposed, or conceivably even increase overall restaurant business.

The overall impact of a smoking ban on restaurant business is not something that can be determined *a priori*. It is perfectly possible that there are potential restaurant patrons who are allergic to, or offended by, secondhand smoke. These persons may be more likely to dine out in a smoke-free restaurant. It is also perfectly possible that there are confirmed smokers who are less likely to dine out if a smoking ban is imposed. We do not know without looking at hard historical data whether either of these effects is present, or if they are both present but one overpowers the other, or if they are both present but cancel each other.

This study presents an analysis of the Fort Wayne smoking ban experience by subjecting available data to several different statistical and survey techniques. *We will find no statistically significant impact on restaurant business in Allen County, Indiana (the county containing Fort Wayne).*

(2)

This finding of the study does not settle the philosophical dispute over the public policy desirability of restaurant smoking bans. One could still argue the philosophical undesirability of smoking bans as being overly intrusive of an owner's right to manage his or her own business. Also, this finding does not say that a given restaurant with a particular clientele (e. g. a large proportion of smokers) could not be adversely affected.

The finding does say that as an empirically testable proposition the smoking ban has not adversely affected restaurant business overall in Allen County.

THE DEBATE TO DATE

The potential economic effect of restaurant smoking bans has generated a considerable number of articles and studies. Many of these, however, are anecdotal ("My restaurant business is down" or "My restaurant business is up") or are based on survey data. (1) While studies using such methodologies are interesting, they are not dispositive of the question.

Studies using various types of statistical techniques are more scarce. In terms of numbers of studies, they tend to find restaurant smoking bans have little or no impact on restaurant sales. (2) Critics of these studies claim that they tend to be published in public health journals which may have a bias in favor of smoking bans.

One notable exception is a 1996 study by Evans which claims the New York City restaurant smoking ban significantly reduced restaurant revenues. (3) Critics of such studies note that they are often funded by restaurant groups and are thus suspect.

METHODOLOGY AND FINDINGS

Since 1986, Allen County has imposed a 1% food and beverage tax. Food prepared off-premise from the place of sale is exempt. The Allen County food and beverage tax is thus a type of selective sales tax applying to food and beverage sales in restaurants. As such, it is a perfect proxy for total restaurant food and beverage sales in Allen County (multiply tax collections by 100).

The Fort Wayne smoking ban applied only to the city of Fort Wayne. We would have preferred food and beverage tax data specific to Fort Wayne only. State data (the State of Indiana is the collection agent for the tax) did not permit this. (4) We attempted to sort Allen County collections by ZIP codes totally or primarily within the city of Fort Wayne. Too many taxpayer remittance forms, accompanying the collection checks, had ZIP codes omitted by the taxpayer to have any confidence in the remaining numbers. Fully one-third of food and beverage tax collections could not be assigned a ZIP code location. However, the city of Fort Wayne comprises a large enough share of the total Allen County population (about 60%) that using Allen County numbers is likely a reliable indicator of collections within Fort Wayne. The State of Indiana operates on a fiscal year

(July 1-June 30) and reports Allen County food and beverage tax collections on a fiscal year basis. Collection data are available for fourteen years (FY 1987-FY 2000). This makes analysis of any economic impact of the Fort Wayne restaurant smoking ban amenable to a statistical analysis called multiple regression. Multiple regression in this case is simply explaining a time series of the thing one is trying to explain (Allen County Food and Beverage tax collections from FY1987 to FY2000) by associating it with other variables which might reasonably cause changes in collections. One or more of these is the presence or absence of the restaurant smoking ban. Multiple regression can also determine which variables, if any, *cannot* be said to affect food and beverage tax collections.

First on the list of these explanatory variables is Allen County Personal Income. General and specific sales taxes are always strongly and positively associated with the corresponding personal income (i.e. more income, more sales). The State of Indiana, for example, has always used forecasted Indiana Personal Income as its predictor of State Sales Tax collections. Unsurprisingly, this proved to be the case with the Allen county Food and Beverage tax. Table 1 gives values for food and beverage tax collections and Allen County Personal Income. Figure 1 shows the relationship. Allen County Personal Income alone explains over 96% of the change in food and beverage tax collections.

TABLE 1
ALLEN COUNTY FOOD AND BEVERAGE TAX COLLECTIONS AND
ALLEN COUNTY PERSONAL INCOME FISCAL YEARS 1987-2000

FISCAL YEAR	TAX COLLECTIONS*	PERSONAL INCOME** (Leading Calendar Year, \$1000s)
1987	\$1,915,488	\$4,503,000
1988	\$2,438,577	\$4,860,000
1989	\$2,674,279	\$5,327,000
1990	\$2,794,611	\$5,756,000
1991	\$2,741,774	\$6,035,000
1992	\$2,799,204	\$6,116,000
1993	\$3,233,004	\$6,630,000
1994	\$3,231,097	\$6,919,000
1995	\$3,415,544	\$7,368,000
1996	\$3,571,422	\$7,782,000
1997	\$3,669,082	\$7,964,000
1998	\$3,956,676	\$8,418,000
1999	\$3,854,917	\$8,852,000
2000	\$4,388,420	\$9,259,000

Sources: *Indiana Legislative Services Agency, Fiscal Analysis Division.

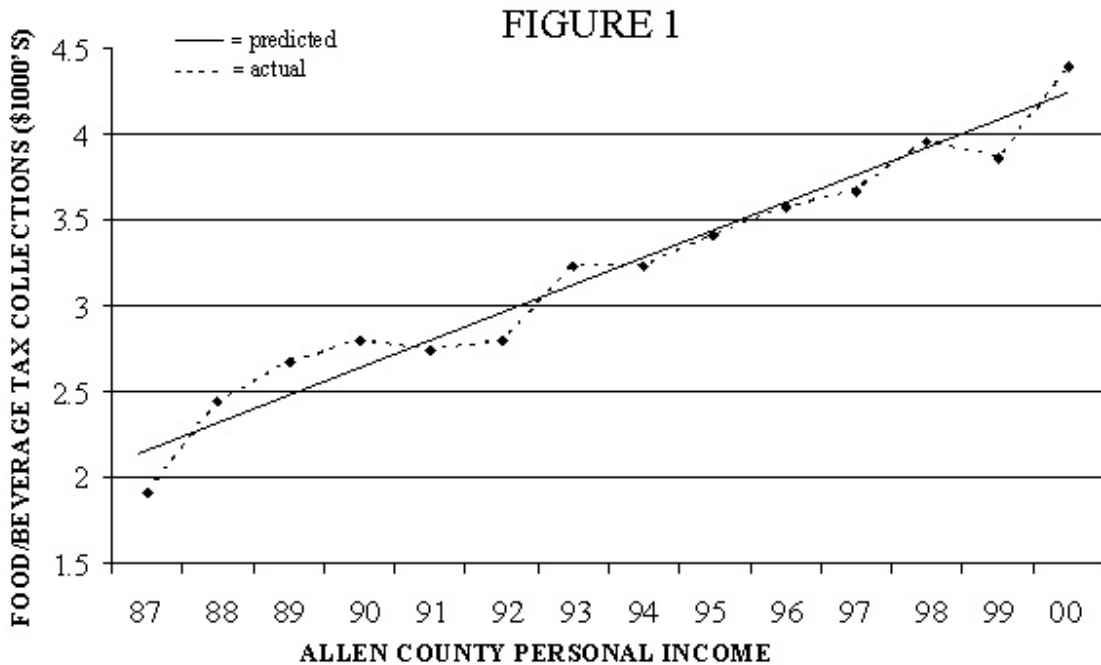
**U. S. Department of Commerce, Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, web site.

(4)

Fitting these data to a standard univariate (single-variable) linear regression equation of the form $Y=a + bX$, where Y is food and beverage tax collections (in \$1000's) and X is Allen County Personal Income (in \$1,000,000's) yields the following:

$$\text{Tax Collections} = 165.75 + 0.442 \times \text{Personal Income}$$

The statistical properties of this equation are impressive. R-Square=0.964. This means 96.4% of the change in tax collections can be explained by changes in personal income alone. The “t” statistic for Personal Income is 18.00. “t” is a measure of how confident we can be that changes in Personal Income are positively associated with changes in Tax Collections. Generally, a “t” of about plus or minus 2 (plus being positively associated, negative being negatively associated) means we can be 95% confident (the generally accepted probability level that makes a variable “statistically significant”) that the “explaining” variable is associated with the thing being explained. A “t” of 18.00 in this case means there are less than 5 chances in ten *billion* that Food and Beverage Tax collections are not positively associated with Allen County Personal Income. This is depicted graphically in Figure 1.



(5)

Figure 1 gives clues as to how the basic relationship between tax collections and personal income might be modified to make the relationship more precise.

FY1987 shows actual collections well below predicted. This is unsurprising. FY1987 was the first year of the Allen County Food and Beverage tax. New taxes more often than not do not work “well” in their first year of operation. Taxpayers are not yet familiar with the tax. Enforcement mechanisms are still gearing up. First year tax collections are seldom up to where their long-term trend line will eventually be. Indiana has had prior experience with this phenomenon. In 1963, the state legislature enacted brand new sales and adjusted gross income taxes. Year 1964 collections for both taxes were well below what Indiana Personal Income would predict.

Collections for the “recession” years of 1991 and 1992 are below trend. This is also unsurprising. Collections of various types of sales taxes often fall below what the impact of the recession on personal income would predict. There is a psychological effect of “being in a recession” with print and electronic media trumpeting that “times aren’t so good” which causes consumers of semi-discretionary goods (this would include restaurant meals) to retrench.

Finally, and most important for this study, food and beverage tax collections for FY1999 (the first year of the restaurant smoking ban) were below levels predicted by Allen County Personal Income but above those levels for FY2000 (see Figure 1).

The question is not whether there is some deviation from a perfect one-for-one relationship between personal income and tax collections. There will *always* be some deviation between “predicted” and “actual” except in the astronomically unlikely event that those who patronize Allen County restaurants spend *exactly* the same share of increases in personal income on restaurant meals year after year. For example, one person’s decision to patronize a McDonald’s one less (more) time because of the death of a friend or a rained out Little League game would upset the “perfect” relationship.

The question to be answered, and the question of interest in this study, is whether these particular residuals are *statistically significant*. In other words, how confident can we be that these deviations from “predicted” tax collections are not due to random chance events?

To answer this question we add *dummy variables* as part of the regression. A dummy variable simply represents the presence or absence of a condition (“1” if present, “0” if not present). Use of dummy variables is a well-established statistical method.

In this case, we add one variable (X2) with a value of “1” for FY1987 and “0” for all other years (first year of the tax), a second variable (X3) with a value of “1” for FY1991 and FY1992 (recession years) and “0” for all other years, and a third variable

(6)

(X4) with a value of “1” in FY1999 and FY2000 (a restaurant smoking ban was present during all or part of those years) and “0” for all other years. X1 remains Allen County Personal Income. We are most interested in whether “X4” (the smoking ban) is significantly different from zero.

It is important to point out to the reader than “significantly different” does not mean “a lot”. It means, instead, “how confident can we be that it is *not* zero, or even positive”.

We now fit a multiple regression (more than one variable) equation of the form:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Where Y is again tax collections, a is a constant, X1 is Allen County Personal Income, and X2, X3, and X4 are dummy variables for “first year”, “recession year” and “smoking ban in place” respectively.

The fitted equation is:

$$\text{Tax collections} = 463.2 + 0.4067 \times \text{personal income} - 379.5 \text{ (if “year one”)} \\ - 162.5 \text{ (if “recession year”)} - 24.4 \text{ (if “smoking ban year”)}$$

This equation explains 99.2% (R-square=0.992) of the variation in food and beverage tax collections. This is an improvement over the 96.4% explained by Allen County Personal Income alone.

What remains critical are the “t” statistics for the dummy variables. Do they indicate we can be confident that the coefficients for X2, X3 and X4 are not zero or possibly even positive (in other words, that the tax being in its first year of operation, that being in a recession, or the presence of a smoking ban might actually have *increased* tax collections—i. e. restaurant business in Allen County)?

In the case of “first year”, the answer is “yes” (t=-3.097). We can be 98.7% confident that the tax simply being in its first year of operation cut tax collections.

In the case of “recession year”, the answer is “probably not” (t=-2.032). We can only be 92.7% certain that being in a recession cuts tax collections beyond the recession’s impact on personal income. This is close to the 95% confidence level required to deem a variable “significant”, but it does not quite achieve it. (A few statisticians will occasionally accept a 90% confidence level as “significant”, but this is uncommon and is somewhat frowned upon).

(7)

In the case of X4, the variable representing the existence of a restaurant smoking ban, the answer is a flat “no” (t=-0.243). (5) The existence of a restaurant smoking ban cannot be said to have had any impact on Allen County restaurant sales. A “t” this small says that the impact of the smoking ban could have been anywhere from a 200-plus thousand dollar cut in tax collections to a 200-plus *increase* in tax collections (95% confidence level). Statistically, it has had no impact whatsoever. There is less than one chance in five that the smoking ban reduced tax collections (and restaurant business). There is almost an equal chance that the smoking ban increased restaurant business overall.

The numbers do not bear out the hypothesis that the smoking ban can be said to have harmed restaurant sales in Allen County.

OTHER ACTIVITIES UNDERTAKEN

Compliance Check

In March 2001 a court ruled that the restaurant smoking ban was unenforceable because it fined customers and was in conflict with state law. (6) The ordinance is therefore temporarily in limbo. The Fort Wayne City Council is pondering whether to instead impose a fine upon the restaurant owner for violations. The ordinance is still on the books and it is still unlawful to smoke in a Fort Wayne restaurant.

To get some idea of what effect this court decision may have had on compliance, Hudson Institute staff visited a sample of twenty-eight Fort Wayne eating establishments on the afternoon and evening of May 16 and 17.

We observed no violations of the smoking ban ordinance. This is hardly “proof” that the court case has had no impact on compliance, but it may be a qualitative indication that compliance is still generally intact.

Telephone Survey

Hudson Institute staff contacted 250 Allen County residents by telephone during the period May 21-24. The respondents were first asked if they were aware of the restaurant smoking ban in Fort Wayne restaurants. Two hundred thirty eight said that they were. Those who were aware were then asked whether the smoking ban made them less likely to visit a Fort Wayne restaurant, more likely, or if it made no difference. One hundred sixty four (69%) said it made no difference, thirty nine (16%) said the ban made it less likely, and thirty five (15%) said the ban made it more likely. (Exact totals do not add to 100% due to rounding).

(8)

This survey finding is completely consistent with the statistical finding that the smoking ban has had no impact on restaurant sales. “More likely” and “less likely” roughly cancel each other, and the large majority do not care one way or the other.

CONCLUSION

Fort Wayne’s ban on smoking in restaurants has had no numerically verifiable impact on the volume of restaurant business in Allen County.