

**The Impact of Tobacco Legislation on Economic Activity
in the City of Grand Forks, North Dakota**

Final Report

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The views expressed in this report represent those of the author and do not necessarily reflect the positions of the University of North Dakota or the State of North Dakota.

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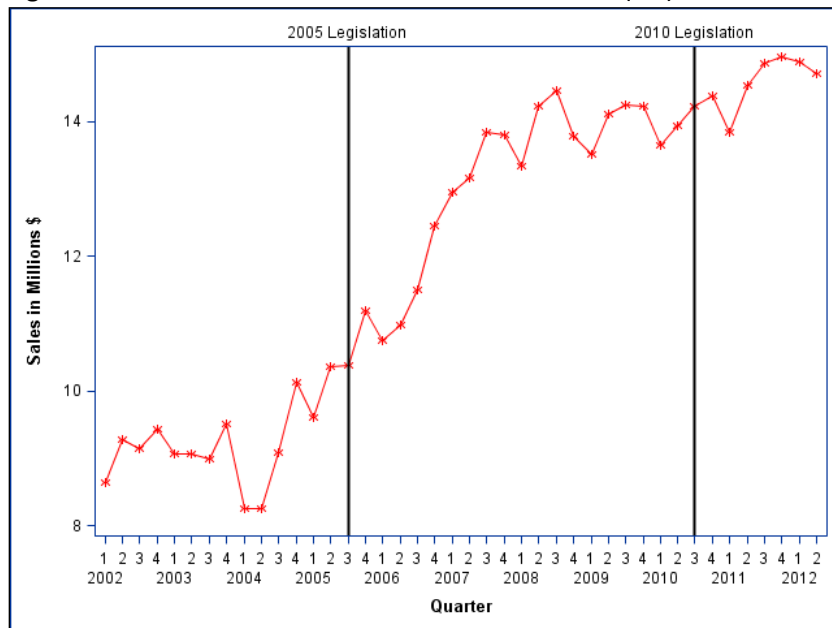
Executive Summary

Purpose and Methodology

In August of 2005, the state of North Dakota implemented legislation prohibiting smoking in most public workplaces, exempting bars, truck stops, and casinos. The perception by businesses at the time was that the legislation would reduce the sales by restaurants from the loss of customers who smoked and would now stay home. More recently, in August of 2010 the city of Grand Forks, North Dakota extended the legislation to prohibit smoking in these formerly exempted workplaces. Again the concern was that the change in legislation would negatively impact sales of these affected businesses.

The question of interest here is to determine what if any economic impact did the 2005 and 2010 smoke-free laws have on the sales of restaurants and bars located in the city of Grand Forks. Figure A displays quarterly restaurant sales between 2002 and 2012 (Q2). From the figure below one can see that restaurant sales have steadily increased over the period 2004 (Q2) through 2012.

Figure A: Grand Forks Restaurant Sales: 2002-2012 (Q2)

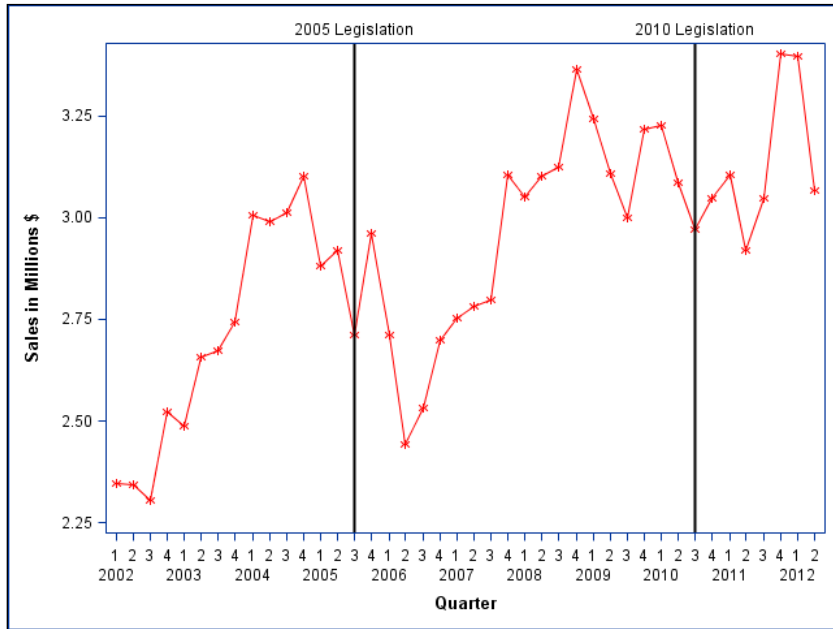


By simply looking at this data series, one might be led to believe that the 2005 legislation, which was implemented in the third quarter, contributed to the subsequent increase of revenues by Grand Forks restaurants. In the year that followed implementation, revenues rose by 10%. Similarly, if we examine Figure B, which depicts alcohol sales by Grand Forks bars, one might conclude the 2010 smoke-free legislation that applied to bars led to lower sales. Sales declined by 4% from \$12,526,100 to \$12,039,946 in the year after bars became smoke-free.

These conclusions though fail to account for factors other than the changes in legislation, which may impact sales. Comparing Figures A and B one finds that sales by restaurants have trended upward for most of the period examined, whereas alcohol sales have followed a cycle of up and down periods over time. Peaks in the cycle of alcohol sales occurred in 2004 (Q4), 2008 (Q4), and 2011 (Q4). It is important

to control for the effects of other factors, such as cycles, that may affect sales in order to isolate the impacts of the changes in legislation.

Figure B: Grand Forks Alcohol Sales: 2002-2012 (Q2)



In particular, our analysis of sales controls for the effects of annual and quarterly time trends, the impact of the overall Grand Forks’ macroeconomy, weather, the US-Canada exchange rate, and the autoregressive nature of the time series, when considering the effects of the legislation.

Findings

Our study’s findings show when one controls for outside factors, the passage of these two pieces of legislation had no effect on aggregate sales of restaurants, bars, or truck stops in Grand Forks.

- The 2005 statewide smoke-free ordinance prohibiting smoking in restaurants had no impact on sales at restaurants. It also had no impact on sales at bars and truck stops and bar’s alcohol sales. Restaurants were not hurt by the implementation of the 2005 law and bars did not benefit.
- The 2010 citywide smoke-free ordinance prohibiting smoking in bars and truck stops had no impact on alcohol sales at bars or on sales of truck stops and bars. It also had no impact on restaurant sales in general, or their alcohol sales. Bars and truck stops were not hurt by the implementation of the 2010 law and restaurants did not benefit.

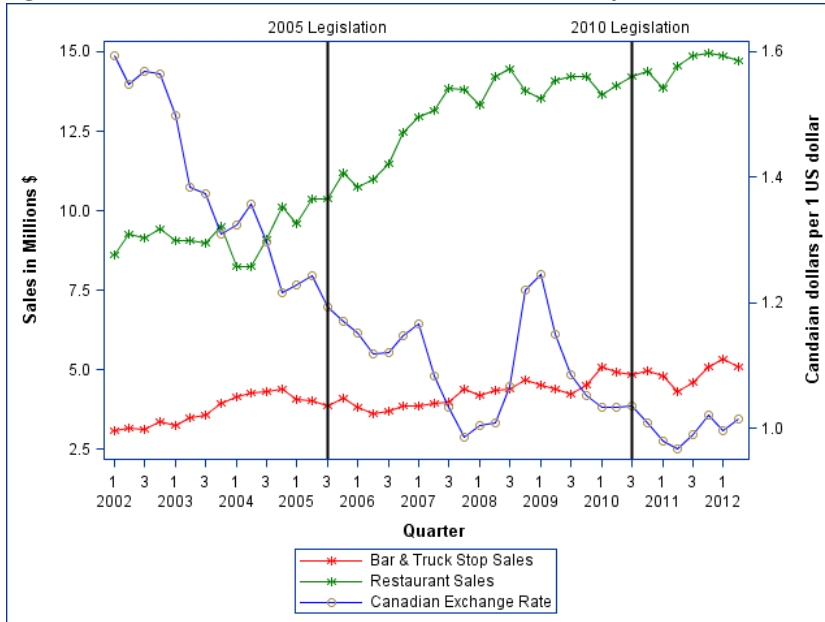
For the period examined 2002-2012 (Q2) there were several important trends identified from statistical analysis of the sales data for Grand Forks.

- Bar sales are more cyclical than restaurant sales.
- Sales at restaurants grew on average 1.4% a quarter or 5.6% annually.
- Total sales at bars and truck stops grew on average 1.2% a quarter or 4.8% annually.
- Alcohol sales showed no growth among restaurants, but grew for bars at a rate of .76% a quarter or 3.04% annually.

- Restaurant sales strengthen with each quarter, i.e. second quarter sales are stronger than first, third are stronger than second, and the fourth quarter is stronger than the third.
- Alcohol sales at bars are weakest in the second and third quarters.

The analysis also revealed visitors from Canada influenced restaurant sales in Grand Forks. The weakening of the US dollar relative to the Canadian dollar during the period examined has positively impacted restaurant sales in Grand Forks. The decline in the exchange rate from 1.6 Canadian dollars per US dollar to par value of the currencies has led to a 15% increase in sales by restaurants. Figure C highlights the exchange rate and sales revenues over time.

Figure C: Grand Forks Restaurant & Bar/Truck Stop Sales with Exchange Rate



The other factors examined, such as deviations in weather patterns and the overall macro-economy in Grand Forks, were found not to have an impact on total sales by restaurants, bars, and truck stops.

Based on the data examined, there is no statistical evidence to suggest that either the 2005 or 2010 ordinances had any effect on the sales by restaurants, bars, and truck stops in Grand Forks, North Dakota. The findings though do not rule out the possibility that individual establishments were adversely or positively impacted by the passage of smoke-free laws, as the available data is aggregated by industry.

The Impact of Tobacco Legislation on Economic Activity in the City of Grand Forks, ND

Abstract:

In August of 2005, the state of North Dakota prohibited smoking in most public workplaces, exempting bars, truck stops, and casinos. The perception by businesses at the time was that the legislation would reduce the sales of restaurants from the loss of customers who smoked and would now stay home.

More recently, in August of 2010, the city of Grand Forks extended the legislation to prohibit smoking in these formerly exempted workplaces. Again, the concern was the law would negatively impact sales by these affected businesses. This study evaluates whether the sales revenues of restaurants, bars, and truck stops in Grand Forks were impacted by the changes in tobacco control laws. The analysis controls for time trends and variation over time in the macro-economy, exchange rates, and weather patterns, which may influence sales. The findings indicate that sales of restaurants, bars, and truck stops were not impacted by either law prohibiting smoking.

Introduction

North Dakota Senate Bill 2300 went into effect August 1, 2005, prohibiting smoking in most public workplaces across the state. Bars, truck stops, and casinos were notably exempt from the statewide legislation. Opponents of the legislation believed this imposed constraint would negatively impact revenues of businesses frequented by smokers and in particular restaurants. An owner of a downtown Grand Forks bar told the *Grand Forks Herald* in a July 26, 2006 article the law had helped to draw “clients out of nonsmoking restaurants and into his establishment.”

The Grand Forks City Council in April of 2010 voted to extend the smoke-free environment to include the previously exempted workplaces as of August 15, 2010. Again, the fear from the affected businesses was that revenues would be negatively impacted. A representative from the Coin and Tavern Association, noted to the *Grand Forks Herald* he knew of 12 Fargo, North Dakota bars where revenues on average had dropped by 5.3% and of 7 West Fargo, North Dakota bars where revenues dropped by 11% in the year after similar legislation was passed in the two cities.²

Proponents for smoke-free workplaces suggest revenues may in fact increase from passage of smoke-free ordinances, as customers who do not smoke are drawn to a smoke-free environment. A number of empirical studies have examined the impact of smoke-free legislation on the hospitality industry. Scollo and Lal (2003) in a comprehensive review of 97 such studies, find the vast majority report either no impact or a positive impact of smoke-free restaurant and bar laws on sales or employment. Such a result suggests to policymakers that protecting employees and customers from the negative effects of secondhand smoke does not necessarily hurt businesses, such as bars and restaurants across the board. Recent research by Pakko (2008a, 2008b) though found smoke-free laws can be shown to have a negative impact on sales of businesses frequented by smokers, such as

² Tran, Tu-Uyen, “No Butts About It,” *Grand Forks Herald*, April 6, 2010. Fargo and West Fargo are approximately 70 miles to the south of Grand Forks.

restaurants, bars, and casinos. Pakko (2008a) examined a citywide smoking ordinance adopted by the city of Columbia, Missouri and implemented in January of 2007. His findings indicate sales by bars and restaurants in Columbia declined on average by 5 percent, as a direct result of the law.³

The question of interest in this study is to determine what if any economic impact did passage of the 2005 statewide law, which prohibited smoking in restaurants and the 2010 citywide law, which prohibited smoking in bars and truck stops, have on the sales of these businesses in Grand Forks, North Dakota. Based on the data analyzed here, there is no evidence in this study to suggest that sales of restaurants, bars, or truck stops in Grand Forks, North Dakota were impacted by the two pieces of legislation. Restaurants were not hurt by the implementation of the 2005 law and bars did not benefit. Furthermore, bars and truck stops were not hurt by the implementation of the 2010 law and restaurants did not benefit.

Sales Data

Quarterly sales data for various industries in the city of Grand Forks were obtained from the North Dakota Office of State Tax Commissioner for the period 2002-2012 (Q2). Data prior to 2002 is not available as a different system to classify industries was used and not collected electronically. Data for the most recent quarter is collected and released by the State with a lag of at least one to two quarters. For privacy reasons, sales data is not publicly available for individual firms, or industries with only a few firms. The sales data provided by the State, included aggregated data for restaurants (NAICS sector 722110), bars (722410), and truck stops (447190), and all industries combined.⁴

Figure 1 depicts restaurant sales over the period 2002 – 2012 (Q2). The figure also contains a seasonally adjusted version of the data series, where the data is adjusted using the Census Bureau's X12 ARIMA procedure. Restaurant sales trended upward during this period, with particularly strong growth

³ Pakko's (2008) negative findings were unique in that they were not sponsored directly by the tobacco industry. Scollo and Lal (2003) found that 94% of the studies sponsored by the tobacco industry found a negative effect of smoking restrictions, relative to the 0% found by non-industry supported studies.

⁴ The state was unable to provide data for casinos (NAICS sector 713210).

from 2004 (Q2) through 2008 (Q3). Sales by bars and truck stops in Grand Forks were more cyclical as evident in Figure 2, with sales peaking in 2004 (Q2), 2008 (Q4), and 2010 (Q2). Sales dropped substantially between 2004 (Q2) and 2006 (Q2), which coincides with the same period of time sales at restaurants began to accelerate. One might be concerned these fluctuations were tied to changes in gasoline prices, which could result in lower revenues at truck stops depending on the elasticity of demand for gas. The data though reveals in Figure 3 that alcohol sales of bars also dropped substantially during this period, whereas alcohol revenues of restaurants grew consistently between 2004 (Q2) and 2008 and have remained consistent ever since (Figure 4). Peaks in the cycle of bar alcohol sales occurred in 2004 (Q4), 2008 (Q4), and 2011 (Q4). The key point from these figures is that revenues of bars are much more cyclical than those of restaurants in Grand Forks.

In general, total sales of all industries in Grand Forks have trended upward over the last decade, as seen in Figure 5. The notable exceptions are the first three quarters of 2006 and all of 2008. The value of total sales reflects the macro-economy of Grand Forks, which for most of the period analyzed has been strong.

Simple analysis of sales figures, might lead one to believe that restaurants benefited by the statewide smoking restrictions that went into effect in 2005 (Q3) as sales steadily rose in the periods that followed. One might also similarly conclude that bars were hurt by the restrictions as alcohol sales fell after the citywide prohibition on smoking went into effect in 2010 (Q3). One must remember other factors, which impact quarterly sales revenues, also changed during the period and need to be controlled. For example, in Grand Forks, alcohol sales by bars declined from \$3,122,662 in 2008 (Q3) to \$2,998,261 in 2009(Q3), which is approximately 4%. Interestingly this is the same time period in which a smoke-free law went into effect for bars in Fargo, and in which sales were noted by a representative of the Coin and Tavern Association to have dropped by 5.3%. Alcohol sales of bars declined in Grand Forks during the same period, despite there being no law affecting bars in Grand Forks. One must adequately

control for other factors, such as trends, to truly determine whether the change in laws have had any economic impact on businesses. Otherwise, one might be lead to incorrect conclusions.

Data Analysis

Regression analysis is used here to control for the effects of factors other than the smoke-free laws, which may affect quarterly sales. The general framework of the model used here is similar to Pakko (2008a). The dependent variables, i.e. the variables we seek to explain are the natural log of sales by restaurants, the natural log of sales by bars and truck stops, and the natural log of alcohol sales by bars.

The baseline model specification includes a constant, a time trend, and quarterly dummies. Ignoring a common trend between observed and unobserved variables may lead to a spurious regression. For example, sales tend to grow over time as a result of inflation. If we ignore this trend, the estimated impact of smoke-free legislation, which occurs in later periods, will appear to increase sales by more than is true. The estimated coefficient of the time trend describes the quarterly growth rate of sales. Indicator variables are included for each quarter to control for seasonal variation of sales. An alternative is to use the seasonally adjusted data series and omit the quarterly trend variables.⁵

Each of the model specifications allows for a first order autoregressive (AR) process in the error term $e_t = \rho e_{t-1} + u_t$. Serial correlation is a common issue in time series analysis and failing to control for results in OLS (ordinary least squares) estimates where hypothesis tests of our coefficients are more likely to be rejected when in fact true, which means we are more likely to conclude there is a statistically significant effect, when there is none. The baseline model is of the form:

$$\ln(\text{sales})_t = \beta_0 + \beta_1 \text{Trend}_t + \beta_2 Q2_t + \beta_3 Q3_t + \beta_4 Q4_t + \gamma \text{SmokeFreeLaw}_t + e_t$$

Other factors though may impact sales, which if omitted may bias our estimates against observing an effect of the smoke-free legislation. Therefore, a number of other factors were added to the baseline model to test the robustness of the results. Sales of all industries, other than the industry examined,

⁵ Using seasonally adjusted data did not impact the findings reported below.

were used to control for the cyclical nature of Grand Forks' macro-economy. This allows the model to control for the fact that sales at restaurants or bars may be impacted by the upturn or downturn in the overall economy.⁶

Another factor that may impact sales of bars and restaurants is weather. Nice weather allows customers the opportunity to step outside and smoke if they choose. When the smoke-free ordinances for bars went into effect, bars were allowed to construct smoking shelters outside where smokers could get out of the elements to smoke.⁷ Two different variables were used to control for the effects of weather on sales; average temperature, and snowfall. Each of these variables represented the deviation from their trend for a given quarter. Data for each was obtained from the National Weather Service historical F6 climate data for the Grand Forks airport (GFK). Figures 6 and 7 display the deviations in weather trends for temperature and snowfall over the period 2002-2012 (Q2)

Perhaps unique to Grand Forks, relative to other communities like Columbia, Missouri, is the city's close proximity to Canada. A drive through the parking lot of one's favorite big box store on any given weekend in Grand Forks will reveal the substantial impact residents of Manitoba have on the local economy. This impact, in part, is driven by the variety of products available, but more importantly by the favorable exchange rate. Since 2002 the dollar has depreciated from 1.6 C\$/ \$ to trading at par in 2012. Chandra, Head, and Tappata (2010) have shown that a 1% increase in the value of the Canadian dollar results in a 1.61% increase in daytrips and a 1.76% increase in overnight trips by Canadians to the United States. We include the exchange rate to control for the effects on border crossings and thus sales.⁸ Figure 8 displays the exchange rate.

⁶ The US suffered 18 months of recession between December 2007 and June 2009.

⁷ Customers are not allowed to eat or drink in these shelters. Further they cannot be more than 50% enclosed.

⁸ Recent border crossing data by entry location is not publicly available.

Results

2005 Statewide Smoke-Free Restaurant Restriction

An indicator variable, referred to here as restaurant restriction, is used to measure the effect the 2005 statewide smoke-free workplace law had on sales. The restaurant restriction variable takes the value of one beginning 2005 (Q3) through 2012 (Q2). The coefficient of the indicator variable captures the percentage change in quarterly sales that resulted from the legislation being in effect.

The coefficients of the baseline model, found in column 1 of Table 1, indicate the restriction on smoking in restaurants did not have a statistically significant impact (p-value .89) on restaurant sales. This tells us the restriction on smoking in restaurants had no impact on restaurant sales. The time trend was statistically significant, with restaurant sales increasing by 1.4% each quarter. The seasonal variables were also significant, with restaurant sales strongest in the fourth quarter. Serial correlation was also evident. A separate analysis of alcohol sales by restaurants shows the restriction on smoking in restaurants also did not have an effect on their alcohol sales (column 2 of Table 1).

Table 2 contains the estimates of the baseline model, with added controls for the macro-economy, weather, and exchange rates. The results in each case show that the 2005 statewide smoking restrictions did not impact restaurant sales or restaurant alcohol sales. Of the added controls, only the exchange rate had a statistically significant effect, as a weaker US dollar results in higher restaurant sales. The decline in the US-Canada exchange rate from 1.6 C\$/\\$ in 2002 (Q1) to 1 C\$/\\$ during the period examined resulted in 15% higher sales for Grand Forks restaurants.

2010 Citywide Smoke-Free Bar and Truck Stop Restriction

An indicator variable, referred to here as bar restriction, is used to measure the effect of the 2010 citywide smoking restriction. The bar restriction variable takes the value of one beginning 2010 (3)

through 2012 (2). Our analysis uses 2 years (8 quarters) worth of sales observations after the restriction went into effect on bars, which allows us to account for more than temporary fluctuations.⁹

We examined the effects of the 2010 smoking restriction on sales of bars and truck stops, and on alcohol sales of bars. The coefficients of the baseline model, found in Table 3, indicate the restriction on smoking in bars and truck stops did not have an impact on sales (p-value .80). The time trend was statistically significant, with bar and truck stop sales increasing by 1.2% each quarter. The seasonal variables were not statistically significant, while serial correlation was evident. A separate analysis of alcohol sales by bars shows the smoking restriction in bars did not have an effect on their alcohol sales (column 2 of Table 4). Alcohol sales by bars increased throughout the period 2002-2012 at a rate of .7% per quarter, whereas alcohol sales by restaurants showed no significant trend (Table1).

When the other control variables are added to the baseline model, the smoking restriction on bars is never found to have an impact on either sales of bars and truck stops or alcohol sales by bars. The general macro-economy, weather, and exchange rate were each found not to have any effect on either measure of sales.

Additional Tests

After the 2005 statewide smoke-free workplace legislation went into effect, it was argued that bars, where smoking was still allowed, would gain at the expense of restaurants. Using data from 2002-2010 (Q2), we examine whether there was a positive impact on bar and truck stop sales or bar alcohol sales as a result of the restriction imposed on restaurants. In both cases the restriction did not affect bar and truck stop sales or bar alcohol sales. We also considered whether restaurants benefited when the citywide smoke-free restriction was extended to include bars. Again, restaurant sales and restaurant alcohol sales were not impacted by the restriction imposed in 2010 on bars. These results appear in Table 5.

⁹ Pakko (2008a) notably uses only 7 months worth of post intervention data in his analysis.

Discussion and Conclusion

The results of this study indicate that the smoke-free workplace laws that went into effect in Grand Forks, North Dakota in 2005 and 2010 did not have any effect on the aggregate sales of restaurants, bars, or truck stops. The results are unable to determine whether individual businesses benefited or were hurt by the legislation, given the availability and use of aggregate level data.

The statistical model predicts sales at restaurants in Grand Forks grow on average 5.6% a year, while sales at bars and truck stops grow on average 4.8% a year and alcohol sales grow at 3.04% a year. Restaurant sales strengthen with each quarter, i.e. second quarter sales are stronger than first, third are stronger than second, and the fourth quarter is stronger than the third, while alcohol sales at bars are weakest in the second and third quarters.

The results also show a weaker dollar has contributed to higher restaurant sales. Restaurant sales are 15% higher as a result of the change in the exchange rate over the period examined. The state of Grand Forks' macro-economy did not appear to affect sales. For the period examined (2002 – 2012), overall growth in Grand Forks' sales was strong. The strength of the local economy was evident during the most recent recession, in which Grand Forks' unemployment averaged only 4%. Weather also did not play a role in sales, which is not entirely surprising given quarterly averages were used. Weather temporarily influences sales, by shifting sales from one week to the next, without substantially influencing sales for a given quarter. Further, the quarterly deviations in weather trends observed were quite small.

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Table 1: Effects of 2005 Smoke-Free Legislation on Restaurant Sales

	Total Sales	Alcohol Sales
Restaurant Restriction	-0.0104 (0.0734)	0.1472 (0.1104)
Constant	15.9546* (0.1259)	14.2483* (0.3000)
Time Trend	0.0142* (0.0054)	0.0088 (0.0114)
Quarter 2	0.0186^ (0.0112)	-0.0048 (0.0269)
Quarter 3	0.0314* (0.0134)	-0.0048 (0.0269)
Quarter 4	0.0507* (0.0099)	0.0638* (0.0314)
AR(1) Coefficient	0.8594* (0.0802)	0.8501* (0.1025)
Log Likelihood	79.23	51.56

^ = pvalue < .1 * = p-value < .05

Table 2: Effects of 2005 Smoke-Free Legislation on Restaurant Sales with Additional Controls

	Macro-economy		Weather		Exchange Rate	
	Total Sales	Alcohol Sales	Total Sales	Alcohol Sales	Total Sales	Alcohol Sales
Restaurant Restriction	-0.0050 (0.0749)	0.1484 (0.1116)	-0.0070 (0.0792)	0.1576 (0.1087)	-0.0252 (0.0749)	0.1346 (0.1168)
Constant	10.6736 (6.2583)	12.9852 (14.9348)	15.9544* (0.1400)	14.2452* (0.3803)	16.3267* (0.2298)	14.5322* (0.6033)
Time Trend	0.0112* (0.0064)	0.0081 (0.0138)	0.0140* (0.0059)	0.0085 (0.0141)	0.0112* (0.0054)	0.0065 (0.0115)
Quarter 2	-0.0265 (0.0513)	-0.0156 (0.1202)	0.0185 (0.0124)	-0.0057 (0.0372)	0.0146 (0.0106)	-0.0079 (0.0289)
Quarter 3	-0.0237 (0.0636)	-0.0386 (0.1485)	0.0301* (0.0149)	-0.0292 (0.0411)	0.0285* (0.0135)	-0.0276 (0.0345)
Quarter 4	-0.0253 (0.0843)	0.0457 (0.2030)	0.0496* (0.0121)	0.0597^ (0.0352)	0.0492* (0.0097)	0.0627* (0.0319)
Non Restaurant Revenues	0.2804 (0.3317)	0.0671 (0.7918)				
Exchange Rate					-0.2454^ (0.1436)	-0.1873 (0.4242)
Snowfall			-0.0003 (0.0008)	-0.0017 (0.0019)		
Temperature			0.0025 (0.0027)	0.0044 (0.0076)		
AR(1) Coefficient	0.8643* (0.0819)	0.8507* (0.1019)	0.8690* (0.0849)	0.8559* (0.1235)	0.8729* (0.0895)	0.8596* (0.0995)
Log Likelihood	79.92	51.57	80.11	52.95	81.22	51.86

Standard errors appear in parenthesis

^ = pvalue < .1 * = p-value < .05

Table 3: Effects of 2010 Smoke-Free Legislation on Bars and Truck Stops

	Bar & Truck Stop Total Sales	Bar Alcohol Sales
Bar Restriction	-0.0248 (0.0980)	-0.0482 (0.0983)
Constant	14.9962* (0.0581)	14.7270* (0.0496)
Time Trend	0.0115* (0.0028)	0.0076* (0.0030)
Quarter 2	-0.0205 (0.0127)	-0.0314* (0.0109)
Quarter 3	-0.0267 (0.0194)	-0.0405* (0.0168)
Quarter 4	0.0233 (0.0152)	0.0191 (0.0135)
AR(1) Coefficient	0.7872* (0.1028)	0.7684* (0.1310)
Log Likelihood	73.37	76.25

Standard errors appear in parenthesis

^ = pvalue < .1 * = p-value < .05

Table 4: Effects of 2010 Smoke-Free Legislation on Bars and Truck Stops with Additional Controls

	Macro-economy		Weather		Exchange Rate	
	Bar & Truck Stop Sales	Bar Alcohol Sales	Bar & Truck Stop Sales	Bar Alcohol Sales	Bar & Truck Stop Sales	Bar Alcohol Sales
Bar Restriction	-0.0242 (0.0978)	-0.0474 (0.0868)	-0.0214 (0.1006)	-0.0475 (0.1006)	-0.0224 (0.1032)	-0.0486 (0.1081)
Constant	13.6042* (6.8347)	11.2367 (7.3176)	14.9963* (0.0560)	14.7282* (0.0506)	15.0835* (0.3120)	14.7136* (0.2511)
Time Trend	0.0108* (0.0042)	0.0058 (0.0049)	0.0114* (0.0029)	0.0075* (0.0030)	0.0107* (0.0044)	0.0078^ (0.0042)
Quarter 2	-0.0321 (0.0563)	-0.0604 (0.0596)	-0.0204 (0.0126)	-0.0308 (0.0114)	-0.0213 (0.0130)	-0.0312* (0.0112)
Quarter 3	-0.0407 (0.0692)	-0.0758 (0.0718)	-0.0273 (0.0191)	-0.0398 (0.0165)	-0.0277 (0.0197)	-0.0404* (0.0176)
Quarter 4	0.0039 (0.0955)	-0.0296 (0.0980)	0.0231 (0.0159)	0.0207 (0.0163)	0.0228 (0.0153)	0.0192 (0.0138)
Non Bar/Truck Stop Revenues	0.0738 (0.3617)	0.1850 (0.3879)				
Exchange Rate					-0.0577* (0.2049)	0.0089 (0.1625)
Snowfall			0.0001 (0.0008)	0.0009 (0.0009)		
Temperature			0.0021 (0.0037)	0.0013 (0.0030)		
AR(1) Coefficient	0.7841* (0.1083)	0.7560* (0.1365)	0.7981* (0.1112)	0.7748* (0.1389)	0.7838* (0.1074)	0.7693* (0.1368)
Log Likelihood	73.41	76.49	73.69	76.78	73.45	76.25

Standard errors appear in parenthesis

^ = pvalue < .1 * = p-value < .05

Table 5: Additional Tests

	Bar & Truck Stop Sales	Bar Alcohol Sales	Restaurant Total Sales	Restaurant Alcohol Sales
Restaurant Restriction	-0.0758 (0.0603)	-0.0899 (0.0616)		
Bar Restriction			-0.0203 (0.1124)	0.0075 (0.4358)
Constant	14.9794* (0.0586)	14.7089* (0.0473)	15.9470* (0.1255)	14.2593* (0.4968)
Time Trend	0.0149 (0.0035)	0.0115* (0.0035)	0.0145* (0.0054)	0.0124 (0.0193)
Quarter 2	-0.0089 (0.0140)	-0.0217 (0.0135)	0.0183^ (0.0111)	-0.0083 (0.0271)
Quarter 3	-0.0168 (0.0206)	-0.0294 (0.0195)	0.0318* (0.0137)	-0.0183 (0.0361)
Quarter 4	0.0308^ (0.0161)	0.0271^ (0.0148)	0.0509* (0.0100)	0.0675* (0.0326)
AR(1) Coefficient	0.7802* (0.1180)	0.7431* (0.1825)	0.8376* (0.0904)	0.8834* (0.0946)
Log Likelihood	62.57	64.30	79.32	49.90

Standard errors appear in parenthesis

^ = pvalue < .1 * = p-value < .05

Figure 1: Grand Forks Restaurant Sales: 2002-2012(Q2)

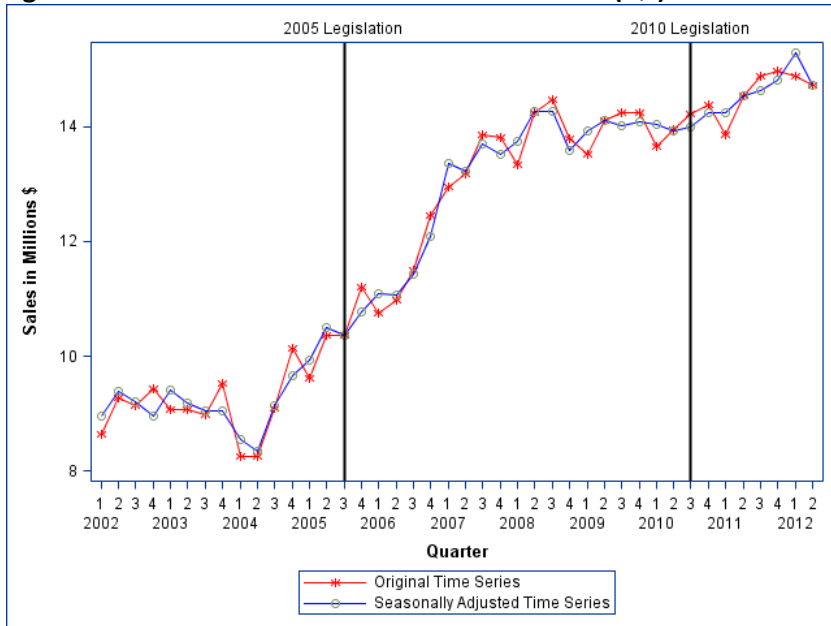


Figure 2: Grand Forks Bar and Truck Stop Sales: 2002-2012(Q2)

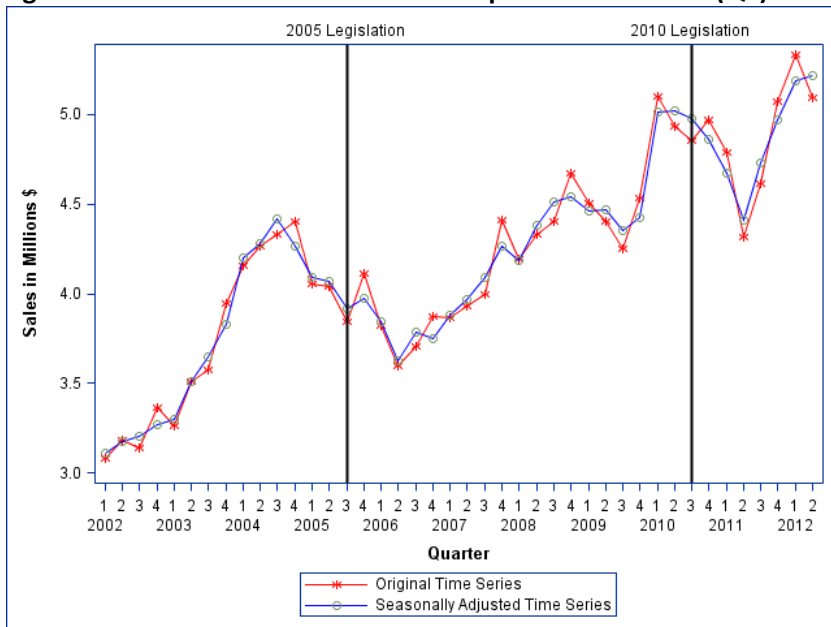


Figure 3: Grand Forks Bar Alcohol Sales: 2002-2012(Q2)

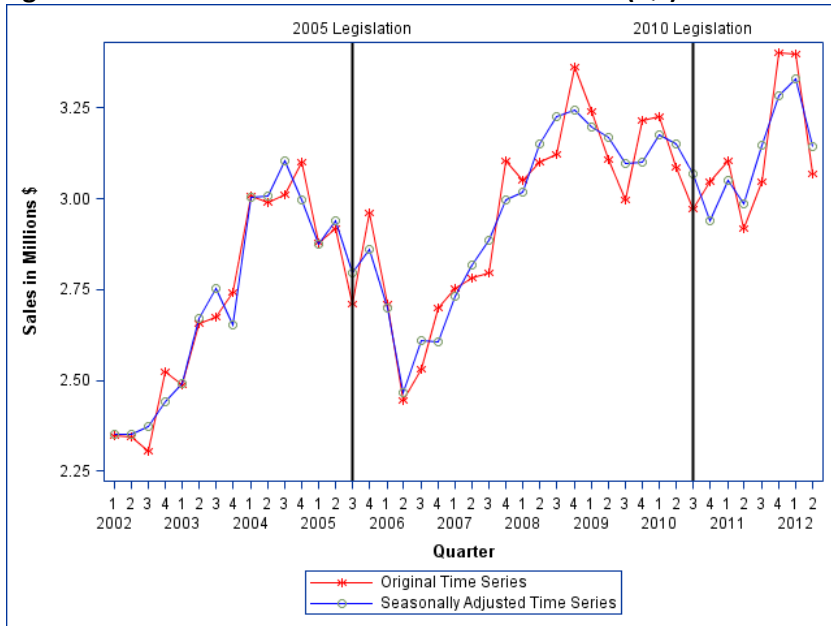


Figure 4: Grand Forks Restaurant Alcohol Sales: 2002-2012(Q2)

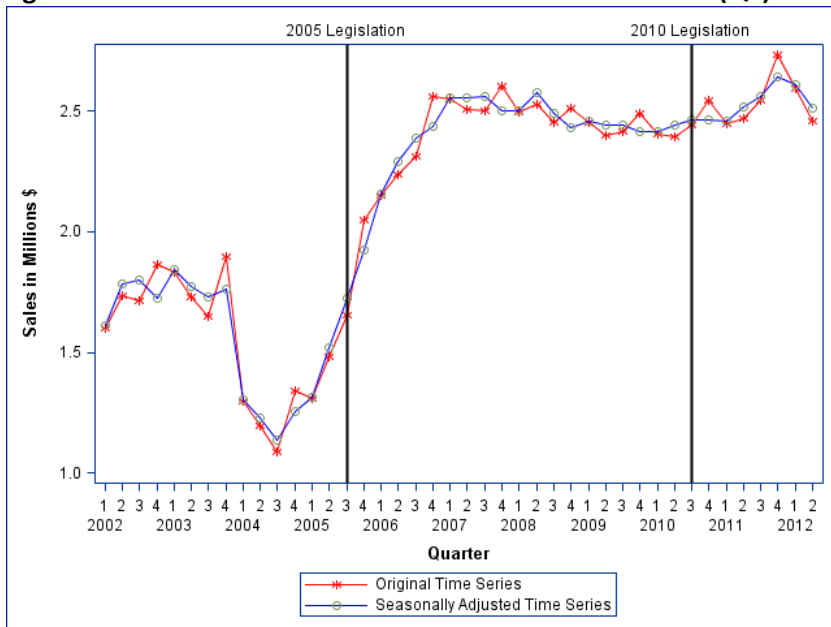


Figure 5: Grand Forks Sales: 2002-2012(Q2)

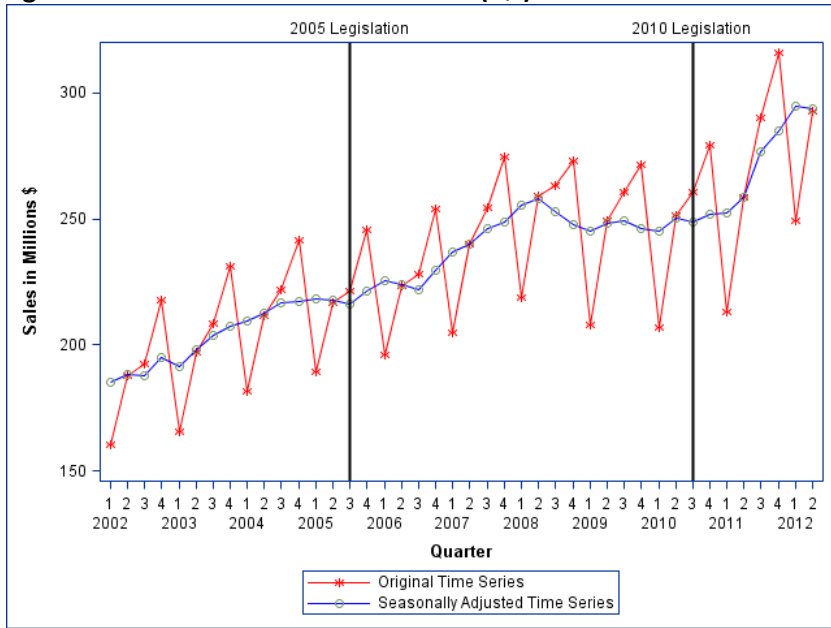


Figure 6: Grand Forks Average Temperature Deviation from Trend 2002-2012(Q2)

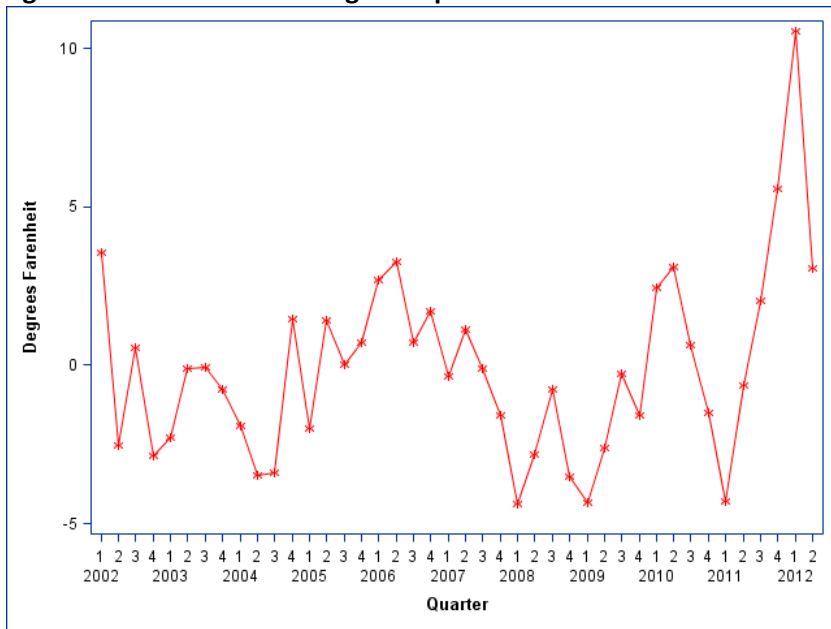


Figure 7: Grand Forks Average Snowfall Deviation from Trend 2002-2012(Q2)

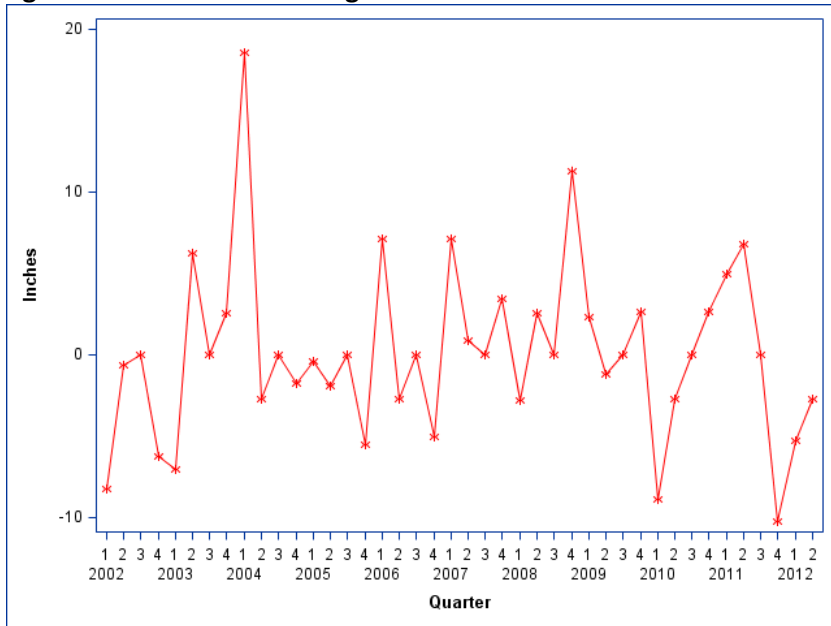


Figure 8: United States – Canada Exchange Rate 2002-2012(Q2)

