

Evaluation of the impact of non-smoking legislation on gross collections of NC bars and restaurants: comparison of pre and post- implementation of legislation.

An update one-year post-implementation

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Background

On 02 January 2010, North Carolina (NC) implemented legislation that bans smoking in restaurants and bars in all 100 NC counties. The objective of this study was to evaluate the impact of this legislation on restaurant and bar income. This report presents the pre- and post- implementation analysis.

Many other researchers have evaluated the effects of non-smoking legislation on restaurants, bars, and gaming facilities. Glantz and Smithⁱ looked at the relationship between implementation of a smoking ordinance on restaurant sales in 15 communities in California and Colorado. Restaurant and total retail sales tax data were analyzed. Multivariate analysis was used to account for differences in retail sales tax rates, timing of ordinance implementation, and changes in population. Glantz and Smith did not find any significant effect on businesses. The impact of Florida's smoke-free workplace law on hotels, restaurants, and tourism was evaluated in 2002 by Dai et alⁱⁱ. They compared data on gross sales for 4-years pre- and post-implementation, and found no significant changes. Sciacca and Ratliffⁱⁱⁱ evaluated the impact of restaurant smoke-free legislation on restaurant sales in Flagstaff, Arizona. Data for 3.5 years pre- and 1.5 years post- implementation were evaluated and compared to other cities, counties, and to the state as a whole. They concluded that the non-smoking ordinance did not affect restaurant sales.

Our study is based on these past studies, and was undertaken to evaluate the impact of North Carolina's smoke-free restaurant and bar law on restaurant and bar income. Our hypothesis was that this law would not have a negative effect on restaurant and bar income.

Methodology

Data on restaurant and bar gross collections were acquired from the NC Department of Revenue website (<http://www.dornc.com/publications/monthlysales.html>) for July 1999-December 2010. Total retail sales and use gross collections also were acquired from this website for December 2001-December 2010. Data on total retail sales and use gross collection were not available prior to December 2001. Monthly county and city-level data on restaurant and bar gross collections were not available. Therefore, this analysis evaluates only the average impact across all NC counties.

Because the time period used for pre-implementation analysis was 10 years, changes in the population and economic conditions needed to be considered. Per Daiⁱⁱ and Glantzⁱ, these changes were accounted for by calculating the fraction of total collections represented by restaurants and bars. Since the smoking ordinance that will go into effect on 02 January 2010 affects only restaurants and bars, this fraction would be expected to

drop if the ordinance were to adversely impact restaurants and bars. Fractal gross collections were computed as:

$$100 * GC / TRSUGC$$

where GC = Gross Collections (for Bar, Restaurant, or Bar & Restaurant) and TRSUGC = Total Retail Sales and Use Gross Collections.

To account for seasonal variations in collections, gross collections and fractional values were trended by month for 10 years. Gross collections and fractional values were averaged across years by month to compare the pre-post implementation values (Tables 2 and 3). Graphs of gross collections and fractional values by month and year, as well as average gross collections and fractional values by month across years are presented as Figures 1 and 2.

Since all NC counties were impacted by the law at the same time and the analysis was performed on a statewide basis comparing the whole state pre-implementation to post-implementation, the multivariate analysis techniques used by Glantz and Smith¹ were not required for this evaluation.

Results and Discussion

Fractional and average gross collection data for the 10 years pre-implementation and one year post-implementation of the non-smoking legislation are shown in Table 1. All gross collections values are rounded to the nearest dollar and presented in Figure 1. Fractional values are expressed as a percentage, and then rounded to the first decimal place. Fractional values are calculated only for Dec 2001-Dec 2010, since the total retail sales value (the denominator of the fractional value) is not available prior to Dec 2001. When these fractional values were graphed (Figure 2), it was noted that fractional retail gross collections increased over the years between 2001 and 2010 for restaurants, bars, and restaurants and bars.

Average values for each fraction by month are shown in Table 2. The average fractional bar to total-retail gross collections is 0.407 +/- 0.058 pre-implementation, and 0.493 +/- 0.026 post-implementation. There is a significant difference between these means ($p < 0.0001$). The average fractional restaurant to total-retail gross collections is 11.0 +/- 1.4 pre-implementation, and 12.6 +/- 0.6 post-implementation. There is a significant difference between these means ($p < 0.0001$). The average fractional bar and restaurant to total-retail gross collections is 11.4 +/- 1.4 pre-implementation, and 13.1 +/- 0.6 post-implementation. There is a significant difference between these means ($p < 0.0001$).

Additionally, the average gross collection values by month for pre-implementation years and post-implementation year are provided in Table 3 for reference. These fractal and average values by month demonstrate that, even with seasonal variation, post-implementation values are consistently higher than pre-implementation values.

Based on these results, it can be concluded that there is no statistically significant evidence that the North Carolina smoke-free restaurants and bars law had a negative impact on restaurants' or bars income. On the contrary, the results show a positive impact of the law. North Carolina's experience suggests that smoke-free laws in North Carolina and elsewhere will not hurt economic productivity in the restaurant and bar industries.

Tables

Table 1: Restaurant, Bar Gross Collections, Total Retail Gross, and Fractal Retail Collections

Month/Year	Bar Gross Collections	Restaurant Gross Collections	Total Retail Sales Use Gross Collections	Fractional Bar to Total Retail	Fractional Restaurant to Total Retail	Fractional Bar/Restaurant to Total Retail
Dec-2010	2112881	54857843	443546429	0.5	12.4	12.8
Nov-2010	2337053	58471221	437312448	0.5	13.4	13.9
Oct-2010	2368831	58143372	455048143	0.5	12.8	13.3
Sep-2010	2345259	59748951	455930549	0.5	13.1	13.6
Aug-2010	2384997	60845272	475184249	0.5	12.8	13.3
Jul-2010	2354080	60354609	487509338	0.5	12.4	12.9
Jun-2010	2310454	57888256	446379128	0.5	13.0	13.5
May-2010	2260226	59176545	471242645	0.5	12.6	13.0
Apr-2010	2186687	56536460	450332090	0.5	12.6	13.0
Mar-2010	1958837	53597514	410774633	0.5	13.0	13.5
Feb-2010	1731710	47962205	393488038	0.4	12.2	12.6
Jan-2010	2466942	55100333	506081462	0.5	10.9	11.4
Dec-2009	1972297	51626843	412717212	0.5	12.5	13.0
Nov-2009	2128155	55951685	451659637	0.5	12.4	12.9
Oct-2009	1866551	49679960	443546429	0.4	11.4	11.9
Sep-2009	1805711	45281204	343301403	0.5	13.2	13.7
Aug-2009	1762448	47555860	355807168	0.5	13.4	13.9
Jul-2009	1939596	47546616	375909228	0.5	12.6	13.2
Jun-2009	1809856	47322770	353372725	0.5	13.4	13.9
May-2009	1543012	43765847	345692241	0.4	12.7	13.1
Apr-2009	1621501	44671375	354041681	0.5	12.6	13.1
Mar-2009	1542970	43831287	348393342	0.4	12.6	13.0
Feb-2009	1352014	40280042	283187898	0.5	14.2	14.7
Jan-2009	1866569	45505885	371662917	0.5	12.2	12.7
Dec-2008	1593448	41058846	407227778	0.4	10.1	10.5
Nov-2008	1699109	45375710	368631941	0.5	12.3	12.8
Oct-2008	1572577	38364272	356850856	0.4	10.8	11.2
Sep-2008	1875449	44775143	373990166	0.5	12.0	12.5
Aug-2008	1689611	45063068	375640931	0.4	12.0	12.4
Jul-2008	1776643	45549784	378228531	0.5	12.0	12.5
Jun-2008	1668814	43515398	393936425	0.4	11.0	11.5
May-2008	1613658	41965388	355284151	0.5	11.8	12.3
Apr-2008	1659740	44049368	351542730	0.5	12.5	13.0
Mar-2008	1547966	41267300	376343686	0.4	11.0	11.4
Feb-2008	1350159	39679247	288146445	0.5	13.8	14.2
Jan-2008	1953473	43463745	449442480	0.4	9.7	10.1
Dec-2007	1550862	43532550	350188780	0.4	12.4	12.9
Nov-2007	1550902	42343948	596814710	0.3	7.1	7.4
Oct-2007	1650588	39775575	271955374	0.6	14.6	15.2
Sep-2007	1551610	45695970	356644583	0.4	12.8	13.2
Aug-2007	1691135	42337936	406498289	0.4	10.4	10.8
Jul-2007	1851596	44358608	406156909	0.5	10.9	11.4

Month/Year	Bar Gross Collections	Restaurant Gross Collections	Total Retail Sales Use Gross Collections	Fractional Bar to Total Retail	Fractional Restaurant to Total Retail	Fractional Bar/Restaurant to Total Retail
Jun-2007	1553188	42034624	392974147	0.4	10.7	11.1
May-2007	1469724	41923472	357456515	0.4	11.7	12.1
Apr-2007	1687002	41106086	422767041	0.4	9.7	10.1
Mar-2007	1381107	40696736	328595807	0.4	12.4	12.8
Feb-2007	1336378	36913828	311200994	0.4	11.9	12.3
Jan-2007	1950831	43306052	443588186	0.4	9.8	10.2
Dec-2006	1495926	38790468	385239532	0.4	10.1	10.5
Nov-2006	1536865	43459922	370416408	0.4	11.7	12.1
Oct-2006	1678261	40093420	438118047	0.4	9.2	9.5
Sep-2006	1568528	42745187	390545933	0.4	10.9	11.3
Aug-2006	1642366	43329290	359304723	0.5	12.1	12.5
Jul-2006	1662066	45326734	400235341	0.4	11.3	11.7
Jun-2006	1561235	41630772	433653619	0.4	9.6	10.0
May-2006	1622652	41064793	357585442	0.5	11.5	11.9
Apr-2006	1460068	40380146	408872548	0.4	9.9	10.2
Mar-2006	1439644	38033934	363640144	0.4	10.5	10.9
Feb-2006	1267914	37584457	343619792	0.4	10.9	11.3
Jan-2006	1830943	42345399	340443887	0.5	12.4	13.0
Dec-2005	1432253	34768702	442451976	0.3	7.9	8.2
Nov-2005	1524323	40370609	374882059	0.4	10.8	11.2
Oct-2005	1401653	36684848	391585569	0.4	9.4	9.7
Sep-2005	1369757	39457485	370310762	0.4	10.7	11.0
Aug-2005	1638699	42097944	357691937	0.5	11.8	12.2
Jul-2005	1568149	40035745	375848113	0.4	10.7	11.1
Jun-2005	1425508	40270145	361319817	0.4	11.1	11.5
May-2005	1448117	38387792	366563809	0.4	10.5	10.9
Apr-2005	1448038	37885501	370511108	0.4	10.2	10.6
Mar-2005	1257553	35325629	318683416	0.4	11.1	11.5
Feb-2005	1246240	32691191	303063138	0.4	10.8	11.2
Jan-2005	1631058	38006579	366770744	0.4	10.4	10.8
Dec-2004	1322243	33347979	367252765	0.4	9.1	9.4
Nov-2004	1447649	37487132	350324150	0.4	10.7	11.1
Oct-2004	1450437	33824418	361755333	0.4	9.4	9.8
Sep-2004	1272863	37162227	332847021	0.4	11.2	11.5
Aug-2004	1404222	40329493	344055522	0.4	11.7	12.1
Jul-2004	1414080	35914924	338406904	0.4	10.6	11.0
Jun-2004	1322737	36762874	325000867	0.4	11.3	11.7
May-2004	1174656	33402191	322446857	0.4	10.4	10.7
Apr-2004	1306226	35685828	345189588	0.4	10.3	10.7
Mar-2004	1058981	33752467	294645823	0.4	11.5	11.8
Feb-2004	1154835	30749256	289729790	0.4	10.6	11.0
Jan-2004	1345168	34219979	345714913	0.4	9.9	10.3
Dec-2003	1132520	33963329	345740197	0.3	9.8	10.2
Nov-2003	1235765	33793511	327360915	0.4	10.3	10.7
Oct-2003	1271793	33252777	326930797	0.4	10.2	10.6
Sep-2003	1202966	35849026	310024450	0.4	11.6	12.0
Aug-2003	1248978	34998369	326250263	0.4	10.7	11.1
Jul-2003	1297731	34787132	377338146	0.3	9.2	9.6
Jun-2003	1245684	34295416	327501198	0.4	10.5	10.9
May-2003	1126403	33545090	293398339	0.4	11.4	11.8

Month/Year	Bar Gross Collections	Restaurant Gross Collections	Total Retail Sales Use Gross Collections	Fractional Bar to Total Retail	Fractional Restaurant to Total Retail	Fractional Bar/Restaurant to Total Retail
Apr-2003	1113119	32340876	306723461	0.4	10.5	10.9
Mar-2003	977038	30419510	270967125	0.4	11.2	11.6
Feb-2003	1032689	32054665	250429969	0.4	12.8	13.2
Jan-2003	1179819	28944264	344435771	0.3	8.4	8.7
Dec-2002	1002031	30637674	299051752	0.3	10.2	10.6
Nov-2002	1055647	32174586	301656185	0.3	10.7	11.0
Oct-2002	1060340	31478432	302548857	0.4	10.4	10.8
Sep-2002	1119807	33188756	298352277	0.4	11.1	11.5
Aug-2002	1096489	32750409	304587141	0.4	10.8	11.1
Jul-2002	1221791	33597755	323422997	0.4	10.4	10.8
Jun-2002	1136694	34599852	344965730	0.3	10.0	10.4
May-2002	1046517	30892690	359119232	0.3	8.6	8.9
Apr-2002	1382272	32877887	357920426	0.4	9.2	9.6
Mar-2002	930699	29686708	315564667	0.3	9.4	9.7
Feb-2002	929033	26999676	319161600	0.3	8.5	8.8
Jan-2002	1195940	27858604	316182576	0.4	8.8	9.2
Dec-2001	888920	26858935	307109663	0.3	8.7	9.0
Nov-2001	932891	29552312				
Oct-2001	952240	26307137				
Sep-2001	917074	27949013				
Aug-2001	903868	28341980				
Jul-2001	948602	28850594				
Jun-2001	907348	27432816				
May-2001	873748	26316318				
Apr-2001	882568	27698250				
Mar-2001	811921	24599981				
Feb-2001	781820	24098642				
Jan-2001	885233	26286883				
Dec-2000	754560	23969367				
Nov-2000	880858	26761239				
Oct-2000	855845	26048934				
Sep-2000	911025	27134772				
Aug-2000	901176	27272770				
Jul-2000	936530	27437378				
Jun-2000	861908	26838728				
May-2000	862451	26708607				
Apr-2000	859267	25382836				
Mar-2000	779636	24361826				
Feb-2000	796717	23325130				
Jan-2000	778438	23170570				
Dec-1999	784043	23303748				
Nov-1999	794413	24937949				
Oct-1999	825625	24425567				
Sep-1999	806678	24485886				
Aug-1999	967998	26728038				
Jul-1999	854098	25056171				

Table 2: Average fractional values by month

Pre-implementation

Month	Average Fractional Bar to Total Retail Sales		Average Fractional Restaurant to Total Retail Sales		Average Fractional Bar & Restaurant to Total Retail Sales	
	Mean	Std dev	Mean	Std dev	Mean	Std dev
January	0.434	0.064	10.2	1.4	10.6	1.5
February	0.407	0.059	11.7	1.9	12.1	1.9
March	0.385	0.046	11.2	1.0	11.6	1.0
April	0.401	0.042	10.6	1.3	11.0	1.3
May	0.400	0.055	11.1	1.2	11.5	1.3
June	0.400	0.054	11.0	1.1	11.4	1.2
July	0.427	0.054	11.0	1.0	11.4	1.1
August	0.428	0.045	11.6	1.0	12.0	1.0
September	0.422	0.060	11.7	0.9	12.1	1.0
October	0.420	0.082	10.7	1.8	11.1	1.9
November	0.394	0.067	10.8	1.7	11.2	1.7
December	0.371	0.061	10.1	1.5	10.5	1.6

Post-implementation (Average not relevant, since only one value exists for each month.)

Month	Fractional Bar to Total Retail Sales	Fractional Restaurant to Total Retail Sales	Fractional Bar & Restaurant to Total Retail Sales
January	0.487	10.9	11.4
February	0.440	12.2	12.6
March	0.477	13.0	13.5
April	0.486	12.6	13.0
May	0.480	12.6	13.0
June	0.518	13.0	13.5
July	0.483	12.4	12.9
August	0.502	12.8	13.3
September	0.514	13.1	13.6
October	0.521	12.8	13.3
November	0.534	13.4	13.9
December	0.476	12.4	12.8

Table 3: Average gross values by month

Pre-implementation

Month	Average Gross Bar Collections		Average Gross Restaurant Collections		Average Gross Bar & Restaurant Collection	
	Mean	Std dev	Mean	Std dev	Mean	Std dev
January	1461747	443829	35310796	8280911	36772544	8717391
February	1124780	224943	32437614	6197490	33562394	6413438
March	1172751	297070	34197538	6869371	35370289	7159280
April	1341980	302340	36207815	6610134	37549796	6898568
May	1278094	296409	35797219	6505448	37075313	6795191
June	1349297	315526	37470339	6767548	38819637	7080762
July	1406444	386322	37132858	7968665	38539302	8349968
August	1358817	345486	37345923	7602039	38704741	7941863
September	1309224	361960	36702243	7710026	38011467	8059066
October	1325992	358926	34539577	7486105	35865568	7832268
November	1344234	405547	37473509	9209228	38817744	9611318
December	1266282	386579	34714404	8643366	35980686	9020238

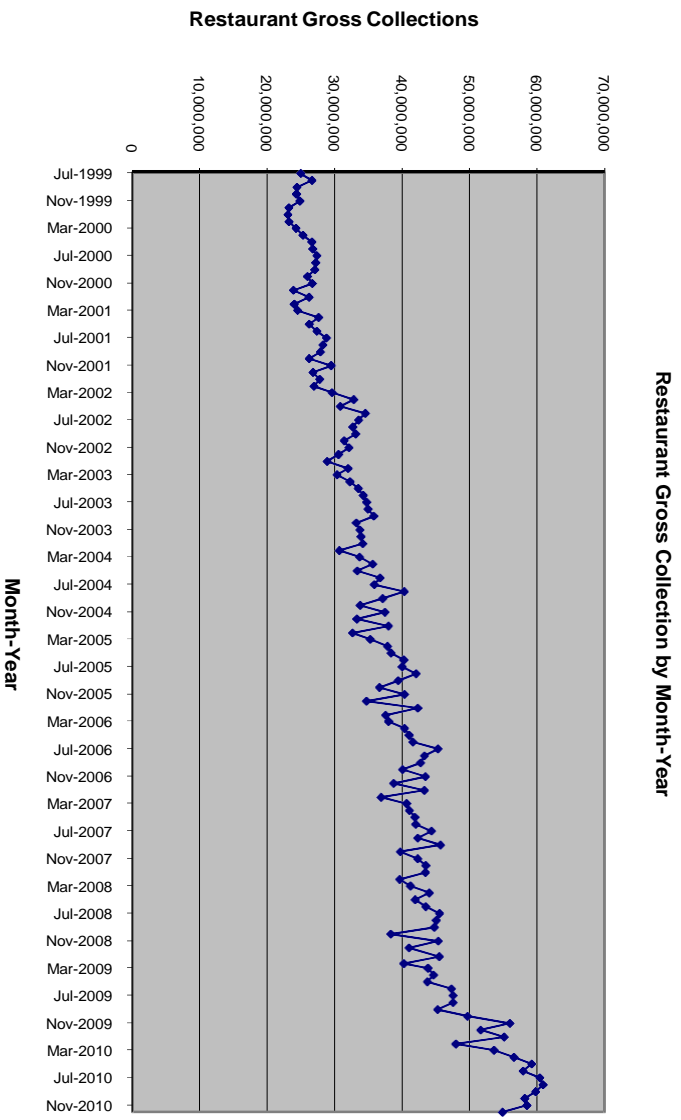
Post-implementation (Average not relevant, since only one value exists for each month.)

Month	Gross Bar Collections	Gross Restaurant Collections	Gross Bar & Restaurant Collection
January	2466942	55100333	57567275
February	1731710	47962205	49693915
March	1958837	53597514	55556351
April	2186687	56536460	58723146
May	2260226	59176545	61436772
June	2310454	57888256	60198710
July	2354080	60354609	62708689
August	2384998	60845272	63230269
September	2345259	59748951	62094210
October	2368831	58143372	60512203
November	2337053	58471221	60808275
December	2112881	54857843	56970724

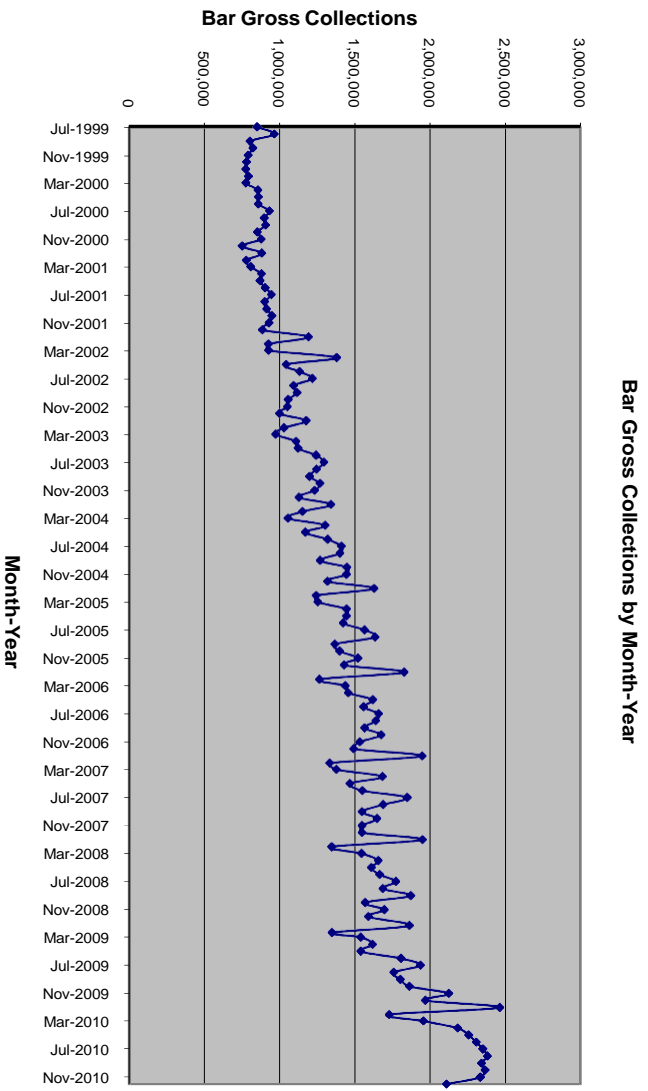
Graphs

Figure 1: Gross collections by month by year

Restaurant



Bar



Restaurant + Bar

Bar & Restaurant Gross Collections by Month-Year

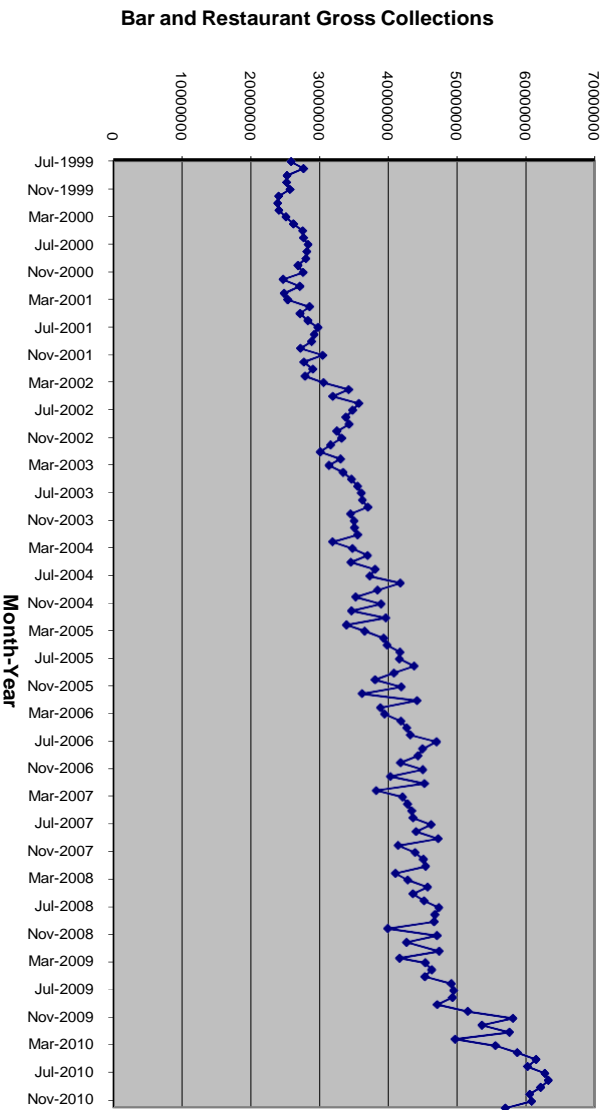
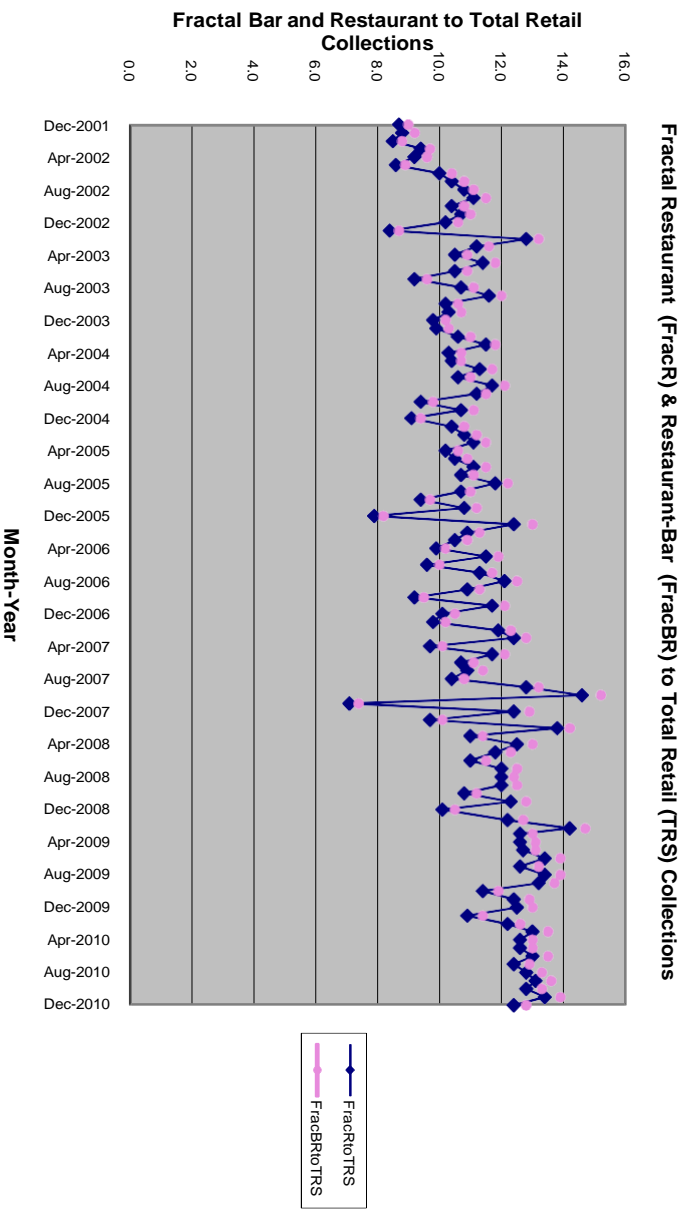
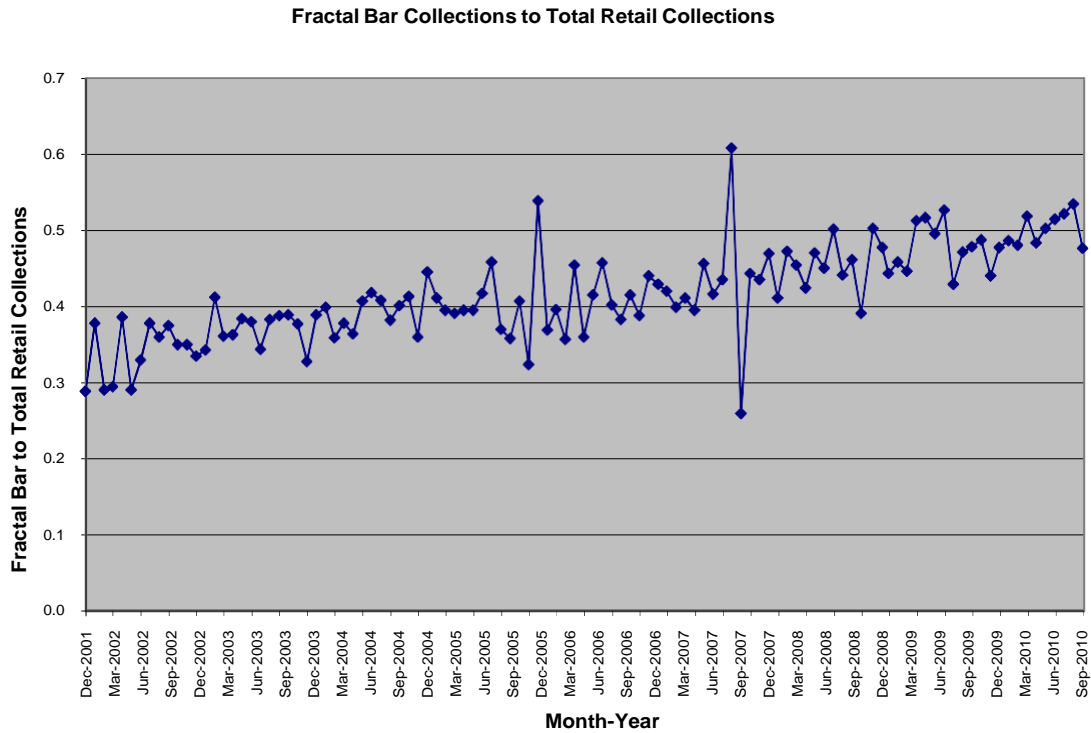


Figure 2: Fractional collections by month by year

Restaurant and Restaurant + Bar



Bar



References

ⁱ Glantz SA and Smith LRA. The Effect of Ordinances Requiring Smoke-Free Restaurants on Restaurant Sales. *American Journal of Public Health* 84 (7): 1081-1085, July 1994.

ⁱⁱ Dai C, Denslow D, Hyland A, Lotfinia B. *The Economic Impact of Florida's Smoke-free Workplace Law*. Bureau of Economic and Business Research, Warrington College of Business Administration, University of Florida, June 25, 2004.

ⁱⁱⁱ Sciacca J and Ratliff M. "Prohibiting Smoking in Restaurants: Effects on Restaurant Sales". *American Journal of Health Promotion* 12(3): 176-184, 1998.