The Economic Impact of Smoking Bans in Ottawa, London, Kingston, and Kitchener, Ontario

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Executive Summary and Conclusion

Smoking bans have been imposed upon numerous jurisdictions in Ontario over the past several years. This study analyzes the impact of these bans on sales and tax receipts at bars and pubs in Ottawa, London, Kingston, and Kitchener. The analysis for Ottawa is based on separate calculations for the main downtown area, the remaining downtown area, the West side residential area, and the East side residential area.

The results are striking. After the imposition of the smoking ban, sales at bars and pubs were 23.5% lower in Ottawa, 18.7% lower in London, 24.3% lower in Kingston, and 20.4% lower in Kitchener, than would have been the case with no smoking ban.

Statistical analysis was used to determine the economic impact of the smoking bans and generate these results. In all cases, the ratio of sales or tax receipts at bars and pubs to total retail sales in the area are a function of the smoking ban, various economic variables, and seasonal dummy variables. Data for bar and pub sales and tax receipts for these regions were obtained from the Ministry of Finance under a Freedom of Information request, as discussed below.

The economic variables that were significant include the value of the Canadian dollar relative to the U.S. dollar, the index of industrial production, and the rate of unemployment. These data were obtained from Statistics Canada and other standard sources.

Over the past decade, anti-smoking activists have prepared a series of papers purporting to show that smoking bans have no negative impact on sales at eating and drinking establishments. These papers are seriously flawed by several errors, which have been corrected in this study. Some papers measured the impact of the ban only in the month in which it was imposed; we show that the effect is phased in gradually over several months. Other papers failed to treat different types of restaurants separately and have not separated bar and pub sales; we were able to accomplish this through the FOI request. Still other papers either ignored economic variables completely or used simplistic trends; we have used a variety of economic variables and included them with the proper lag structures. As a result, our findings are statistically accurate and econometrically robust. Smoking bans materially reduce sales at bars and pubs.

1. Overview and Methodology

Smoking bans in restaurants, bars, and pubs have now been implemented in hundreds of jurisdictions in Canada and the United States. For many of these jurisdictions, studies have been undertaken to determine the economic impact of these bans – in particular, how sales have been affected. At least so far, the results have generated far more heat than light. Restaurant and bar owners are convinced that their business has suffered, while anti-smoking activists claim to be just as convinced that restaurant and bar sales have not been hurt. Even with increasingly sophisticated methodologies, it was previously not possible to reach a consensus view.

In sifting through the welter of studies, several tenets have emerged that would serve to eliminate bias in either direction. These include the following:

1. Studies should be based on statistical regression models, not surveys. Surveys can be biased depending on who is asking the question, how it is asked, and who is being questioned. For example, restaurant and bar owners who have suffered a loss of business might be much more eager to release this information to a survey-taker, while those who had no loss or even a gain in business might decline to participate in the survey. Survey participants might give one answer to someone from an anti-smoking organization and a different answer to someone from a pro-smoking organizations; government surveys presumably do not suffer from this type of bias. For these reasons, data should be taken from official government records rather than collected from survey participants.

2. Changes in sales after the imposition of a smoking ban often explain very little and cannot be used as a basis for rigorous analysis. The question is not whether sales rose or fell after the imposition of a smoking ban, but whether they rose or fell relative to what would have otherwise occurred. Thus, for example, sales might rise after the imposition of a smoking ban because the economy was moving from recession to boom; or alternatively, they might fall because of an economic downturn. The only reasonable test is to compare changes in restaurant and bar sales with changes in total retail sales, taking into account changes in the overall economic environment. That can best be accomplished using multiple regression analysis.

3. Not all smoking bans are created equal. For example, a partial smoking ban in restaurants in warm-weather climates that still permits smoking at patio tables would be expected to have a far smaller impact than a total smoking ban for all tables and seats in the establishment. Failure to distinguish among different types of smoking bans often vitiates any meaningful comparison.

4. Most other studies have assumed that the impact of a smoking ban is immediate. In some jurisdictions, that might indeed be the case. In general, however, it is more likely that the impact of the smoking ban occurs over several months, as customers decide not to patronize eating and drinking establishments where they are no longer permitted to smoke. Indeed, the negative impact of a smoking ban might be spread out over several months or even quarters as eating and drinking establishments are forced out of business and others do not reopen, hence reducing the choice for patrons. At a minimum, that assumption should be systematically tested.

5. Different types of eating and drinking establishments respond differently to smoking bans. In general, it has been found that “neighborhood eateries” are more likely to suffer a loss in sales than upscale “event style” restaurants. Also, and of particular importance to this study, bar and pub sales are more severely impacted by a smoking ban than restaurant sales. Previous studies failed to make this distinction.

All these points are specifically addressed in this study. The econometric approach has been used throughout. All equations are estimated using the ratio of sales (or taxes) to total retail sales in that jurisdiction. Overall economic indicators that are used where appropriate include the value of the Canadian dollar, the index of industrial production, and the unemployment rate. In all jurisdictions considered in this study, a total smoking ban was imposed. Most of the time, the impact of the smoking ban was phased in over several months, and the economic variables also occurred with both lagged and unlagged values.

Most of the studies purporting to estimate the economic impact of smoking bans on restaurant and bar sales have been undertaken for the U.S. However, KPMG of Canada recently undertook a study to estimate the impact of the Ottawa smoking ban. They were unable to find any impact one way or the other. According to their report, “It is very difficult to isolate any effect the smoke free by law may have had on restaurant and bar sales”. Instead, they point out, declines may have been due to the decline in tourism after 9/11, the recession, the massive layoffs of high-tech workers in the West End, or other economic factors.

Taken together with other anti-smoking studies from the U.S., these represent almost a classic case of disinformation. When the economy is booming, and hence sales at bars and restaurants do not materially decline, then the smoking ban must have no effect – leaving aside what one might have thought would be the obvious fact that sales grew much less rapidly than would have otherwise been the case. However, when the economy is declining and sales at eating and drinking establishments decline at double digit rates, why then of course it must have been the economy; the smoking ban could not possibly have been the reason.

One often sees the distortion of facts where “politically correct” causes are concerned, but unlike complicated issues where a plethora of complicated forces may influence the results, there are no great mysteries here. The correct method of approach is to compare sales at bars and pubs (or restaurants, or whatever specific type of retail establishment is being studied) to total retail sales, and then determine whether this ratio is rising, stable, or decreasing **taking into account other changes in the overall economic environment**. Of course sales would rise in booms and fall in recessions, other factors being equal. The methodology of any competent study should measure the behavior of the ratio of sales to relevant economic conditions. It is never sufficient simply to look at sales and say they went up or down without considering these other factors.

2. Brief Discussion of Data and Statistical Methodology

It has long been claimed by those in the restaurant, bar, and pub business that smoking bans have a greater negative impact on sales in bars and pubs than is the case for restaurants per se. There are two major reasons for this. First, many other studies that have been undertaken to measure the economic impact of smoking bans, "restaurants" includes fast food chains, where relatively few people eat on premises but overall sales receipts are fairly large. Second, and more relevant to this particular study, restaurants, bars, and pubs have all been combined in a single category. For this study, data were obtained from the Ministry of Finance under the Freedom of Information Act for sales and tax receipts at bars and pubs separately; previous studies failed to make this distinction. The results show significant negative impacts of smoking bans on bar and pub sales for several jurisdictions within Ontario.

Specifically, we requested monthly data for sales and retail sales tax for 100 food service and drinking establishments for the City of Ottawa. This list of establishments was prepared by Geospace Research Associates (GRA), which provides the Ontario Ministry of Finance with the postal codes and street addresses of the selected establishments in Ottawa. Four separate geographical regions of Ottawa were chosen, as discussed below, all of which contained more than 10 establishments in order to insure confidentiality of data. The establishments selected all met the following criteria:

- Located in an Urban Forward Sortation Area as defined by the Canada Post Corporation.

- In business continuously at the same address since January 2000.

- Identified in city business directories or telephone directories from 2000 through 2004 as pubs, bars, taverns, lounges, roadhouses, nightclubs, or billiard halls.

- Not a national chain establishment.

- Not identified solely as a restaurant, grill, or café.

- Not a private, recreational, or service club.

- Not a Canadian legion.

- Not a sports, educational, cultural, or other institutional facility.

- Not a bingo or other gaming establishment.

- Not located in a hotel or motel.

One additional criterion was used for selection: establishments were on the Fall 2001 Brewer's Retail List of the top beer accounts in the Ottawa area. This was simply used as an additional check; all the 100 establishments chosen based on the above criteria were on the Brewer's Retail List of 300 licensees.

We requested data on both sales and tax receipts at bars and pubs. One would ordinarily expect that the tax rate – tax receipts divided by sales – would be relatively constant, showing only small fluctuations due to differences of timing and possible lags in the reporting or collection of receipts, in which case a dip one month would be followed by a surge the next month. However, that was not the case. As can be seen from the detailed data shown in Appendix A, which lists all the data used in the regression equations, the ratio of taxes to sales rate would sometimes dip suddenly, falling from (say) 8% to 5% in any given month, and then returning to 8% the following month. Ministry of Finance personnel were unable to supply any reason for these data anomalies.

Since no apparent reason for these discrepancies is readily available, we have reported the results of our regression equations for both sales and tax receipts data at bars and pubs. In most cases, the measured economic effect of the smoking ban is larger for the sales data than the tax receipts data.

The Ministry of Finance was able to supply comparable data only for the period from January 2000 through December 2003. Data for 2004 were not yet available, and the figures for 1999 and earlier years were on a completely different basis and often varied by an order of magnitude. For this reason, our study has been restricted to the four year period 2000-2003, although we would have preferred to include earlier years in our sample period. Also, since London and Kingston imposed smoking bans in mid-2003, it is quite possible that the phase-in effect extended into 2004; this hypothesis can be tested as soon as further data are available.

A variety of economic data are used in these equations. Standard sources were used for macroeconomic data: the value of the Canadian dollar relative to the U.S. dollar, the index of industrial production, and the overall unemployment rate. The patterns of these variables over the sample period are shown in Figures 1-3. These graphs show the time series for these three variables from 1999 through 2003, since some of these variables are lagged in the regression equations).

Figure 1. Index of Unemployment Rate

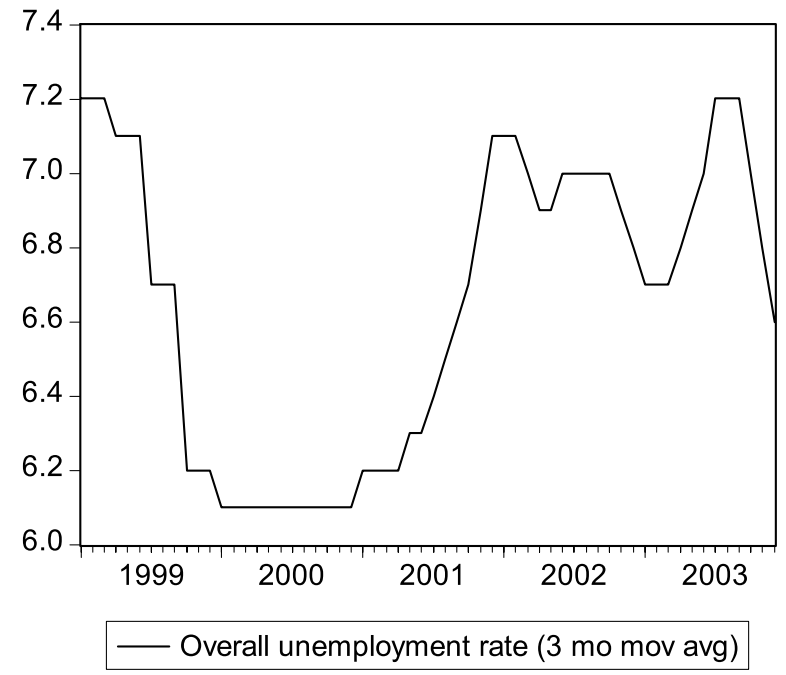
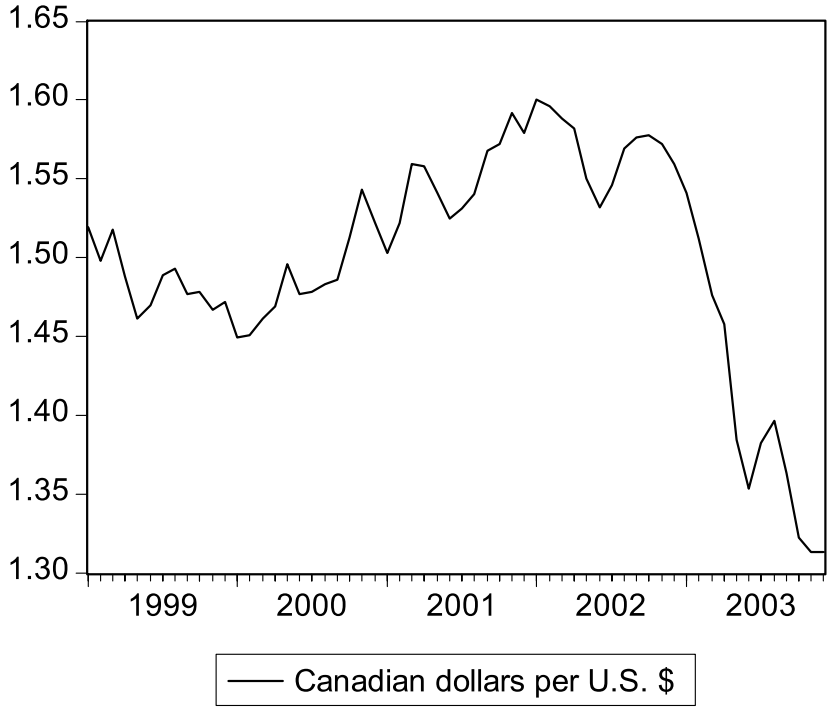


Figure 2. Index of Industrial Production

Figure 3. Value of Canadian Dollar



We also sought to obtain monthly data for total retail sales and disposable income by municipality. However, while monthly sales data were available for the province of Ontario, we were informed they were not available for individual municipalities. Hence the monthly figures for retail sales for the areas analyzed in this study were based on a combination of (a) monthly fluctuations in retail sales in Ontario, and (b) annual changes in sales for the individual areas. Similar methodology was tried for disposable income, but since the results did not provide additional information, that variable was not used in the actual regression equations.

Standard multivariate regression equations using ordinary least squares were used to calculate these results. In general, researchers run the risk that the significance levels of these results might be inflated if problems of autocorrelation and heteroscedasticity are present, and the coefficients themselves might be biased if problems of multicollinearity are present. Originally we had planned to recalculate the regression with the standard autocorrelation adjustment, but the Durbin-Watson statistic indicated that little or no autocorrelation was present in the residuals; in the few cases where it was, the results were virtually unchanged with this adjustment. Multicollinearity was generally absent because ratios were used; and most of the economic variables, such as the value of the Canadian dollar and the rate of unemployment, are also trendless. In some cases, percentage changes of the independent variables were used in order to avoid any distortions that might occur because of multicollinearity.

The issues of heteroscedasticity sometimes arose because of outlying observations for a few of the data series. There is no one particular “best” method of

treating this problem; instead, the following choices are available: omit these outliers from the sample period, use dummy variables for these outliers, or calculate the regressions for all data points without dummy variables.

No method is without its drawbacks. If dummy variables are used, the goodness-of-fit statistics are generally overstated, so some of the parameters might appear to be significant when in fact they are not. If the outliers are omitted, the resulting equations may be questioned on the grounds that the judgment of the researcher may have been skewed in the direction of excluding those points that reduced the significance levels that were being sought. Running the regressions with all observations and no dummy variable expunges the possibility of that source of bias.

In general, the question of which methodology is preferred depends on whether there is any significant partial correlation between the smoking ban dummy variables and the outlying observations. If there is not, then the elasticity estimates determined in the regression equations will not be significantly affected by the choice of equation to be estimated. We did indeed find this to be the case.

Besides calculating the partial correlation matrix, we estimated these equations in all three different ways. In virtually all cases the estimates of the elasticities were not significantly different, so those alternative regression equations are not included in the report, although they are available for inspection by interested parties.

3. Types of Regression Equations Estimated and Summary Results

In this study, the economic impact of smoking bans is examined for the following regions. The date on which the smoking ban was originally implemented is also given for each region.

Table 1. Date of Smoking Bans for Individual Regions

Region Analyzed	Date Smoking Ban Implemented
Main downtown section of Ottawa (Section A)	September 1, 2001 *
Other downtown areas of Ottawa (Section B)	September 1, 2001 *
Residential Ottawa west of the Rideau River (Section C)	September 1, 2001 *
Residential Ottawa east of the Rideau River (Section D)	September 1, 2001 *
London	July 1, 2003
Kingston	May 1, 2003
Kitchener	January 1, 2000

* Ban imposed the previous month but not enforced until September

The basic regression model used for each jurisdiction or location is discussed next. The dependent variable in each equation is given in ratio form, which is:

$$\text{Ratio} = \frac{\text{Sales (or tax receipts) at bars and pubs}}{\text{Total retail sales}}$$

As noted above, the reason for estimating the impact with both sales and tax receipts data is that the two series do not always agree, and hence estimating separate regression equations reduces the probability that the results are due to erratic data points alone.

These ratios were then estimated as a function of the smoking ban dummy variable, seasonal dummy variables, value of the Canadian dollar, index of industrial production, unemployment rate, and the general trend of retail sales in that jurisdiction.

Four regression equations were estimated for each of the seven regions listed above. These four types of equations are as follows:

1. The ratio of tax receipts as a function of the smoking ban dummy variable and seasonal factors, but no economic terms.

2. The ratio of tax receipts as a function of the smoking ban dummy variable, seasonal factors, and some or all of the economic terms listed above.

3. The ratio of sales receipts as a function of the smoking ban dummy variable and seasonal factors, but no economic terms.

4. The ratio of sales receipts as a function of the smoking ban dummy variable, seasonal factors, and some or all of the economic terms listed above.

As noted above, our original plan also called for reestimating equations where the residuals were serially correlated, using the standard autocorrelation adjustment to insure that the t-ratios were not overstated. However, in virtually all cases with economic variables, there was no significant autocorrelation, so these results are not repeated in the study, as they are virtually identical with the included regressions.

In a few cases, either the tax or sales data had a few outlying observations that were statistically outside the range of the other data in that time series (more than 3 standard errors). We reestimated these equations (a) by omitting these data points, and (b) by using dummy variables for these outliers. However, there was hardly any difference in the results, so rather than argue over the issue of whether we engaged in “data mining” by adding dummy variables or omitting observations, we decided not to engage in “fine tuning” of the results. Because these equations showed no significant differences in the key smoking ban parameters, they are not reproduced here; in most cases, adding dummy variables increased the estimated impact of the smoking ban as well as increasing the significance of all the variables in the equations.

We emphasized in the previous section that a properly structured regression equation always includes the relevant economic variables. However, in several previous studies purporting to analyze the economic impact of smoking bans, researchers have presented graphs showing, at least based on visual inspection, that there is “no

economic impact" from the imposition of the ban. This "evidence" is then used to justify their shoddy econometric analysis.

Obviously there is a great deal more to this study than simply calculating the tax or sales ratios before and after the smoking ban. On the other hand, one could conceivably be justified in arguing that if there did not appear to be any negative impact from the raw data, the econometric results showing a significant effect might have been manufactured by our econometric techniques.

However, the economic impact of the smoking ban was so strong that in most cases, a significant decline can be seen in the sales and tax receipts data even when economic variables are not included. Even the raw data shows a significant drop shortly after the imposition of the ban (including time for the phase-in), with no significant recovery in later months or quarters. Hence we have also included separate regressions that contain only the seasonal dummy variables and the smoking ban variable to show the power of this bivariate relationship.

The economic variables must be included in any appropriate study, though, because the issue being examined is not only how much bar and pub sales declined after the smoking ban, but how much they declined **relative to what would have otherwise happened**. The appropriate variables are those factors that affect bar and pub sales, and restaurant sales generally, compared to overall retail sales. In this regard, other studies on sales at eating and drinking establishments that do not specifically address the issue of smoking bans have found that:

1. Over longer periods of time, where as total retail sales and disposable income grow at about the same rate, sales at eating and drinking establishments have an income elasticity greater than unity. This means they rise more than proportionately during times of economic prosperity, and rise less than proportionately (or actually decline) during periods of slack growth or actual recession.

This result had important ramifications during the extended period of prosperity during the 1990s, when many economic studies claimed to show that smoking bans had no negative impact – although in fact sales did in fact grow much less rapidly because of the smoking ban than would otherwise have been the case. In the current study, that variable was significant for parts of Ottawa, and for Kingston.

2. During different phases of the business cycle, sales of eating and drinking establishments rise faster during booms and slower during recessions relative to overall retail sales. For this reason, the index of industrial production and the rate of unemployment are included in some of these regression equations where appropriate.

3. Relative to total retail sales, a disproportionate amount of business at eating and drinking establishments stems from tourism. The value of the Canadian dollar relative to the U.S. dollar is used to measure the relative prices on different sides of the border. As fewer Canadian dollars are needed to buy one U.S. dollar, Canada becomes somewhat less attractive to U.S. tourists; or to look at it from the other side of the border, when the U.S. dollar falls in value, tourists are less likely to travel abroad because it is more expensive. Thus the series used in these equations (number of Canadian $ per U.S. $) is positively correlated with bar and pub sales in areas where tourism is relatively important. That is the case for Ottawa; if subsequent studies were taken to estimate the

impact of a possible smoking ban in Toronto, the value of the dollar would also be expected to be significant for that city.

All of the coefficients of the estimated equations – 4 regressions for each of the 7 regions listed in Table 1 – are presented in this report. Each set of regression equations has been calculated using the data for bar and pub sales and tax receipts separately; and with and without economic terms. Clearly the preferred equations include economic terms, but the other results are also included to show that even without these terms, the decline in sales following the imposition of the smoking ban is clear.

The results for sales and tax data ought to be the same, assuming the tax rate did not change during the sample period, but the monthly data are sometimes erratic. For this reason we have calculated regression for both sets of data in order to minimize the probability that the results are due only to the erratic nature of the data.

The presentation proceeds as follows. Table 1 provides the summary results of the coefficients for the smoking ban terms, listed in terms of elasticities – the percentage decline in tax or sales receipts that occurred shortly after the smoking ban was imposed. Table 2 summarizes the range of economic variables included in the regression equations. As would be expected, the value of the Canadian dollar is more important for Ottawa, whereas unemployment and production are more important for London, Kingston, and Kitchener, although some cyclical variables are also important in parts of Ottawa. The individual regression equations are discussed in Sections 4-10; the actual data used in the regressions is supplied in Appendix A; and the regression equations, coefficients, and t-ratios for all terms are given in Appendix B.

Table 1. Drop in Tax Receipts and Sales Caused by Smoking Ban

	Percentage Drop After Smoking Ban Imposed			
	Tax Receipts No Economic Variables	Tax Receipts Yes Economic Variables	Bar, Pub Sales No Economic Variables	Bar, Pub Sales Yes Economic Variables
Main Downtown Ottawa	6.1	13.3	2.7	32.0
Other Downtown Ottawa	11.3	11.9	13.5	16.5
West side residential Ottawa	27.8	25.7	30.6	26.8
East side residential Ottawa	14.8	17.0	9.2	18.8
London	12.3	10.0	16.3	18.7
Kingston	12.9	12.3	12.7	24.3
Kitchener	7.3	9.5	15.6	20.4
Average	13.2	14.2	14.4	22.5
Ottawa	15.0	17.0	14.0	23.5
Other cities	10.8	10.6	14.9	21.1

The decline in sales following the imposition of a smoking ban was 23.5% lower for Ottawa and 22.5% lower for all cities included in this study than would have otherwise been the case. The decline in tax receipts following the imposition of a smoking ban was 17.0% in Ottawa and 14.2% in all cities compared to what would have otherwise occurred. The regression equations also show that even without any economic variables, bar and pub sales declined an average of 14.4% after the imposition of the smoking ban, hence thoroughly discrediting that claim that smoking bans do not harm sales at bars and pubs; tax receipts declined an average of 13.2% without including the effects of any economic variables. This leads us to assume that the tax receipts are based on average or expected sales and hence do not closely reflect actual changes in sales in any given month.

Table 1 also shows that Including the economic variables in the sales equations boosts the calculation of the average loss by about 8 percentage points. Table 2 indicates which economic variables are used in each of the individual regression equations.

Table 2. Checklist of Economic Variables Used in the Regression Equations

	Value of Canadian Dollar	Index of Industrial Production	Unemployment Rate	Retail Sales Trend
Main Downtown Ottawa	xx			x
Other Downtown Ottawa	xx	x		
West side residential Ottawa	xx	xx		
East side residential Ottawa	xx			x
London		x	xx	
Kingston		xx	x	x
Kitchener		xx		

Number of x's indicates whether the term appears in one or both regressions containing economic variables

One would expect the value of the Canadian dollar to be relatively more important in Ottawa, and less important in smaller cities less likely to attract tourists. Conversely, cyclical variables such as industrial production and the unemployment rate should be less important in Ottawa. These patterns are indeed borne out by the actual regression results.

We now turn to the actual regression equations, which are organized by region. All the equations for any given region are listed together, and are described in Sections 4-10 of this report. This way, the similarities and differences for the alternative specifications can be more easily compared . Summary information is presented in

both graphical and tabular form. The actual data used in each regression is given in Appendix A, which also includes a more detailed discussion of some of the issues associated with individual data series. Appendix B provides the actual equation statistics for all terms including seasonal dummy variables in the EViews format.

As will be seen, many series are dominated by seasonal fluctuations. Thus in order to present the essence of the results, we also show the deseasonalized data for the ratios of tax receipts to total retail sales and bar and pub sales to total retail sales, with a vertical line indicating the date the smoking ban was imposed. We then show graphs of the actual and simulated values of the regression equations for tax receipts and sales including economic variables. The graphs are accompanied by a discussion of the structure of the equation and the individual terms included.

4. Regression Equations and Results for the Main Downtown Section of Ottawa (Ottawa A)

The summary statistics for the five equations for the main downtown region of Ottawa are shown in Table 4. As noted above, complete statistical information for these equations is given in Appendix B.

Region A in Ottawa covers 18 establishments in the Lowertown, Byward Market, Rideau Street, and Sandy Hill areas. There were a total of 109 licensees doing business in this Forward Sortation Area (KIN) in 2003, representing approximately 15% of the total number of establishments selling alcoholic beverages in Ottawa. Region A has the second highest concentration of food service and drinking place enterprises in Ottawa.

Table 4. Key parameters in regression equations for the main downtown section of Ottawa

Ottawa Main Downtown (Ottawa A)

Dependent Variable	Effect of Smoking Ban	Value of Canadian Dollar		Unempl Rate	Retail Sales Trend	Adjusted R-Square D-W stat
TAXES						
Coeff	-0.0686					0.932
T-statistic	4.2					1.37
Elas, %	**6.1**					
Form	Distr Lag					
Lag if any	0-6 mos					
			(Can $)			
Coeff	-0.1496	0.623	0.0101	-0.155	0.00185	0.952
T-statistic	3.8	1.8	3.3	1.7	2.2	1.86
Elas, %	**13.3**					
Form	Distr Lag	Mov Avg	% Chg	Change	Mov Avg	
Lag if any	0-6 mos	6,6	3,3		7,5	

SALES				
Coeff	-0.377			0.407
T-statistic	0.4			1.78
Elas, %	**2.7**			
Form	Distr Lag			
Lag if any	0-6 mos			
Coeff	-4.549	58.38		0.449
T-statistic	2.1	2.1		1.99
Elas, %	**32.0**			
Form	Distr Lag	Mov Avg		
Lag if any	0-6 mos	6,12		

The naïve model – equations with only seasonal dummy variables and the smoking ban variable -- show only a very slight imposition of the smoking ban in downtown Ottawa, having reduced tax receipts by 6.1% and sales by only 2.7%. As will soon become obvious, those estimates are grossly understated. Nonetheless, we mention them because they provide a useful insight into the underlying rationale behind these regressions. Anti-smoking activists have often used the naïve model as "evidence" that smoking bans have little or no actual effect, whereas the underlying economic data clearly show that the impact was at least 13% and as high as 32%. In general, the more rapid growth of the main downtown area of Ottawa, and the relatively low value of the Canadian dollar during most of this period, attracted both domestic trade and foreign tourists. In the absence of the smoking ban, then, growth in bar and pub sales in the main downtown region of Ottawa would have risen much more rapidly than was actually the case.

In all of the regression equations for Ottawa, the smoking ban dummy variable enters the equation with a distributed lag over a six-month period; the weights are greatest in the current month, and then decline linearly over the previous six months. In fact the optimal goodness-of-fit statistics and highest elasticities for the smoking ban variable were obtained by using a variety of different lag structures, but the difference were fairly small. In order to avoid any criticism about "curve fitting" this variable, we have used the same lag structure for all 16 of the Ottawa equations.

The key economic variables in the equation are the value of the Canadian dollar and the overall trend in Ottawa retail sales. Note in particular that the value of the dollar has a longer lag structure than the other variables; this result occurs only for the main downtown section of Ottawa. Many groups that plan conventions and meetings based on relative costs make their decisions based on exchange rates the previous year; whereas outside the main downtown area, decisions by individual tourists are more likely to be based on the value of the exchange rate over the last few months. In the tax receipts equations, the value of the dollar appears with both a short and a long lag, representing both of these phenomena.

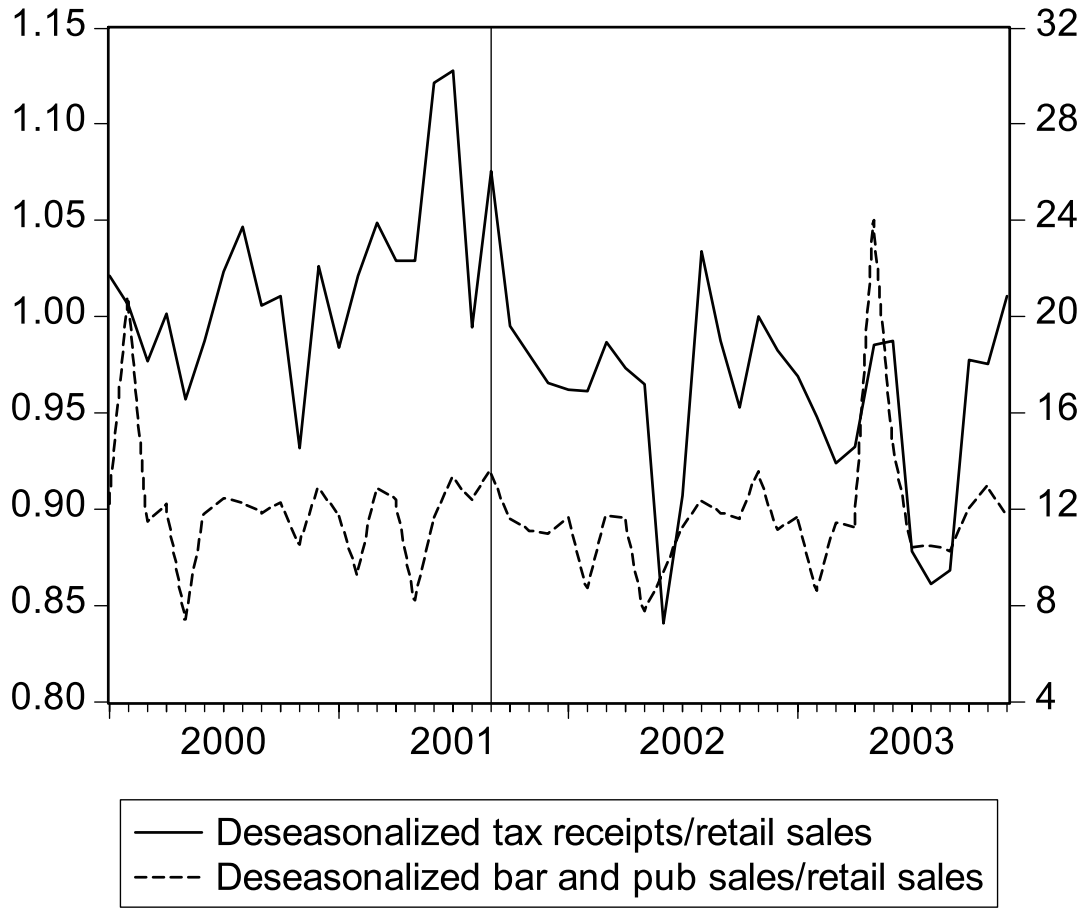
The difference in the estimates between the regressions with tax receipts and the regressions with bar and pub sales for this region of Ottawa are much larger than for any other region. Both series exhibit a strong seasonal pattern, as shown in Figures 4.2 and 4.3, but in addition, the figure for sales has a one-month spike in May, 2003. We

reestimated the regression (a) omitting this observation, and (b) treating it with a dummy variable. In both cases the key parameter for the purposes of this study, namely the impact of the smoking ban, was virtually unchanged. In the end we decided to accept the data at face value rather than “fine-tuning” the results by experimenting with a large variety of dummy variables.

The regressions for each region are accompanied by three graphs. The first graph shows the deseasonalized data for the sample period, with the date of the smoking ban denoted by a vertical line. We have chosen this approach because in many areas – especially in the main downtown section of Ottawa – the seasonal factors dominate, making it more difficult to see the overall impact of the smoking ban. These graphs are then followed by the actual and simulated values for the actual ratios of tax receipts and bar and pub sales relative to total retail sales in each region.

The data show a strong seasonal pattern, reflecting the fact that this area of Ottawa is the premier tourist and entertainment zone in the National Capital Region. Sales gradually tended higher over the 2000-2003 sample period; in particular, the 9-11 terrorist attacks in New York City and the alleged effect of the high-tech slowdown on sales in the Byward Market area are not apparent in these data. Similarly, the SARS scare did not seem to have any measurable negative impact on sales.

Figure 4.1. Deseasonalized ratios of bar and pub sales and tax receipts relative to total retail sales for the main downtown section of Ottawa



In all of these graphs, the tax receipts and bar and pub sales figures have been multiplied by 1000 so the coefficients in the equations do not have so many zeros. Hence bar and pub sales account for about 1% (0.01) of total retail sales, as opposed to the 12 shown in the graph. The tax rate is about 8%, so tax receipts divided by retail sales would be about 0.1% (0.001) compared to the 1.00 figure shown in the graph. Similar comments apply to all the other graphs in this report.

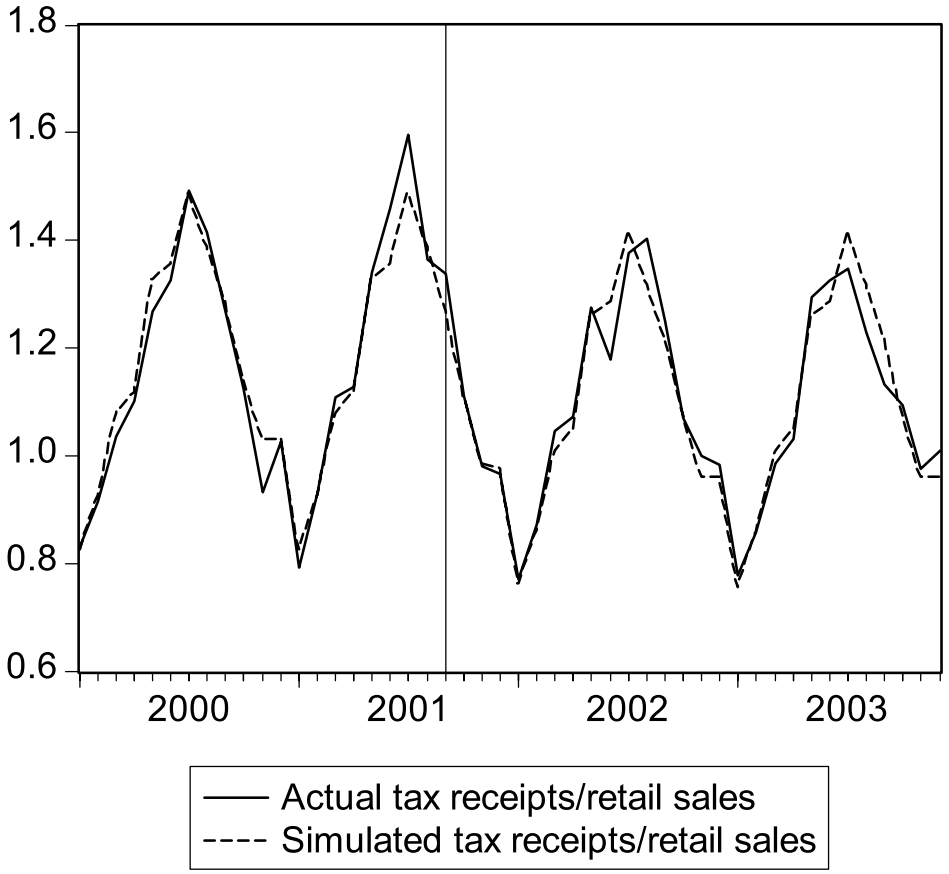
The decline in tax receipts after the phase-in period for the smoking ban can be seen on this graph; if the odd fluctuation that accounts for a sharp drop in June 2002 and the equally sharp rebound are ironed out, the downward trend is seen to continue for most of the sample period until a slight improvement occurs in late 2003, following a pickup in the overall economy.

The decline in sales revenues is more difficult to observe visually because of the surge in May 2003, but excluding that, it is clear that revenues declined in late 2001 and early 2002 before improved economic circumstances generated a recovery.

Both series appear to have one major glitch in the data; the tax data in June 2002 and the sales data in May 2003. As noted elsewhere in this report, the elasticity of the smoking ban impact is virtually unchanged if these variables are omitted or treated with dummy variables.

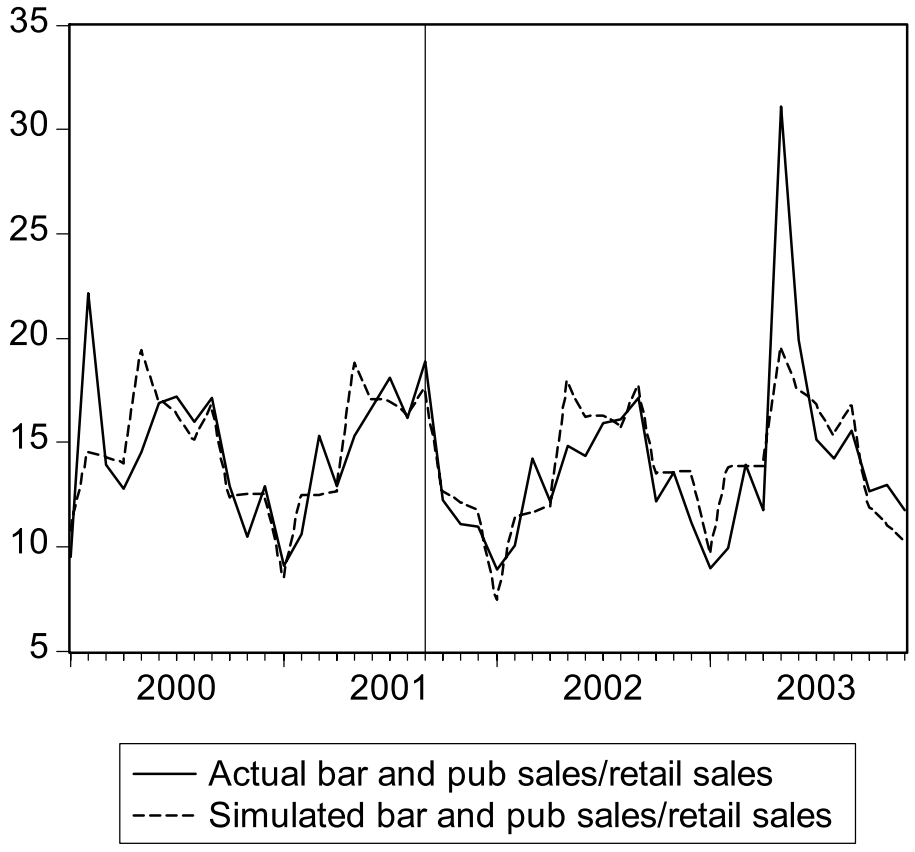
Figure 4.2 shows the actual and simulated ratio of tax receipts at bars and pubs to total retail sales in the main downtown section of Ottawa. It is readily observed that the seasonal pattern dominates. However, it can also be noted that the peaks in the summer months of 2002 and 2003 are well below those in 2000 and 2001 in spite of an improving economy and the favorable impact of the (lagged) relatively weak Canadian dollar.

Figure 4.2 Actual and Simulated Ratio of Tax Receipts to Retail Sales for the main downtown section of Ottawa



To a certain extent, the data points in Figure 4.3 are dominated by the one surge in sales in May 2003. If that point is ignored, the general decline in sales receipts after the imposition of the smoking ban can be observed. Note in particular that sales fell sharply in the months after the imposition of the ban, although part of that reflects seasonal factors. After that, sales rose again, although they did not return to previous peaks except for May 2003. In this regard, though, it is important to note that sales would have picked up much more rapidly if the smoking ban had not been imposed because of the recovery of the economy and the favorable impact of the Canadian dollar. That provides convincing evidence of the importance of including economic variables in the equation.

Figure 4.3 Actual and Simulated Ratio of Bar and Pub Sales to Retail Sales for the main downtown section of Ottawa



5. Regression Equations and Results for the Other Downtown Section of Ottawa (Ottawa B)

The results for the tax and sales regression equations for the remaining downtown section of Ottawa are more consistent than for the main downtown section. Based on the sales receipts data, the smoking ban reduced activity by 17%, and based on the tax receipts data, the ban reduced activity by 12%.

The area covered in Region B includes the entire central business district (CBD) west of the Rideau Canal, the Centretown residential area, the Dalhousie residential area, and the Glebe and Old Ottawa South residential communities. Embedded within this largely residential central city area (excluding the eastern two-thirds of the Central Business District) are a number of the city's major retail and commercial corridors: Preston Street, Somerset Street, Bank Street, Elgin Street, Gladstone Avenue, and to a certain degree, Bronson Avenue.

The downtown worker population of the CBD is largely located west of the Rideau Canal in the Ottawa B area; the 2001 Census figure given is 68,000. By comparison, the residential population of Ottawa B was 44,000. With the exception of the CBD adjacent to the Parliamentary Precinct north of Wellington Street, this area of the city does not have the tourist draw of the Market Area in Ottawa A. Without that attraction, sales of food service and drinking place establishments is largely dependent on local residents and the downtown worker population. Ottawa B contains 175, or 24%, of the city's licensed establishments; while that is a higher number of businesses than in Ottawa A, it is spread out over an area nearly four times as large.

The summary statistics are given in Table 5.

Table 5. Key parameters in regression equations for the other downtown sections of Ottawa

Ottawa Other Downtown (Ottawa B)

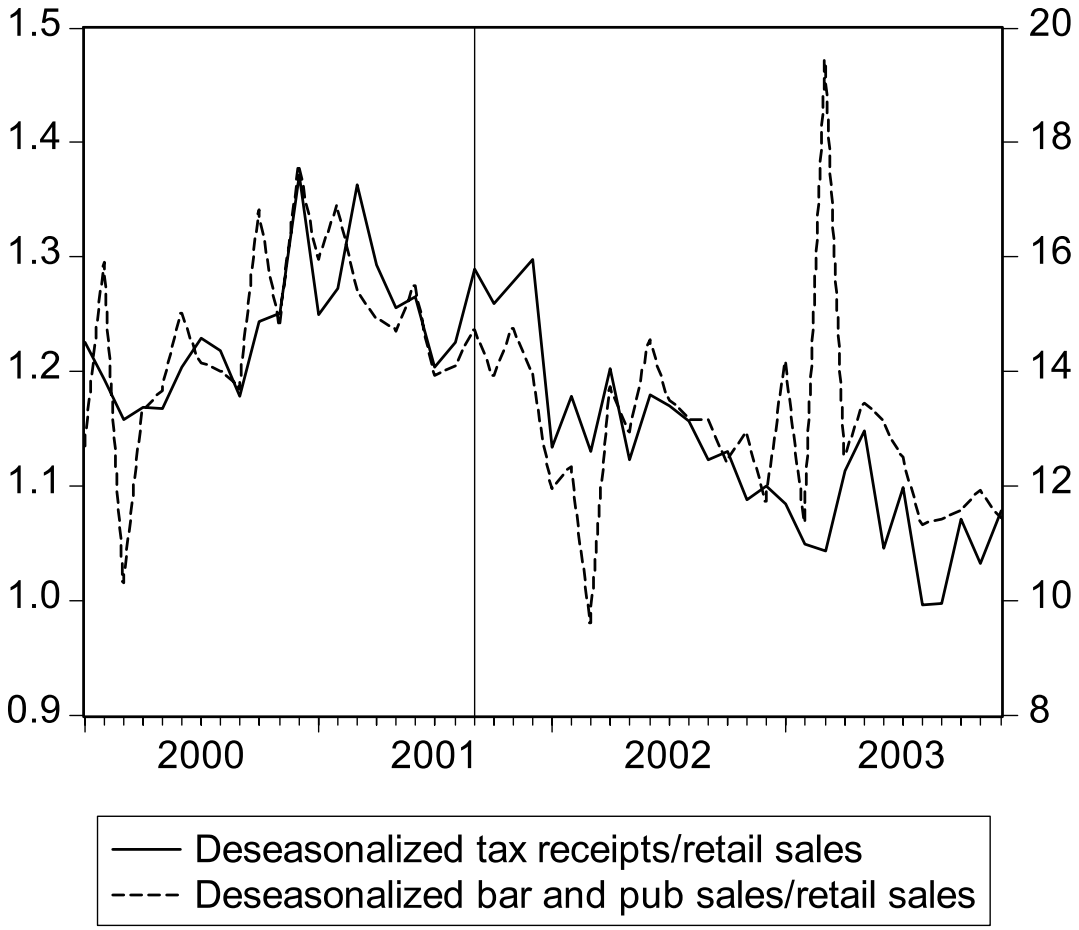
Dependent Variable	Effect of Smoking Ban	Value of Canadian Dollar	Industrial Production	Unempl Rate	Retail Sales Trend	Adjusted R-Square D-W stat
TAXES						
Coeff	-0.134					0.599
T-statistic	6.5					0.78
Elas, %	**11.3**					
Form	Dist Lag					
Lag if any	0-6 mos					
Coeff	-0.141	0.614				0.754
T-statistic	8.7	5.2				1.20
Elas, %	**11.9**					
Form	Dist Lag	Mov avg				
Lag if any	0-6 mos	1,3				
SALES						
Coeff	-1.910					0.344
T-statistic	3.6					1.96
Elas, %	**13.5**					
Form	Dist Lag					
Lag if any	0-6 mos					
Coeff	-2.343	5.84	0.383			0.428
T-statistic	2.3	1.9	2.4			2.38
Elas, %	**16.5**					
Form	Dist Lag		Mov Avg			
Lag if any	0-6 mos		6			

There are several reasons why the decline in sales caused by the smoking ban is more severe than in Ottawa A. First, as already noted, there is far less tourist trade, so the region did not benefit as much from the relatively inexpensive Canadian dollar during much of this period. Second, outdoor patios – where smoking is allowed – are far less prevalent in Region B than in Region A. Third, because of the greater importance of local business relative to tourism, cyclical variables are more important. In particular, the index of industrial production enters the equation, with a moving average over the past 6 months. The value of the Canadian dollar enters with a shorter lag, suggesting that

tourism in this section of the city reacts with a shorter lag, indicating more short-term and casual tourists and fewer major meetings planned a year or more in advance.

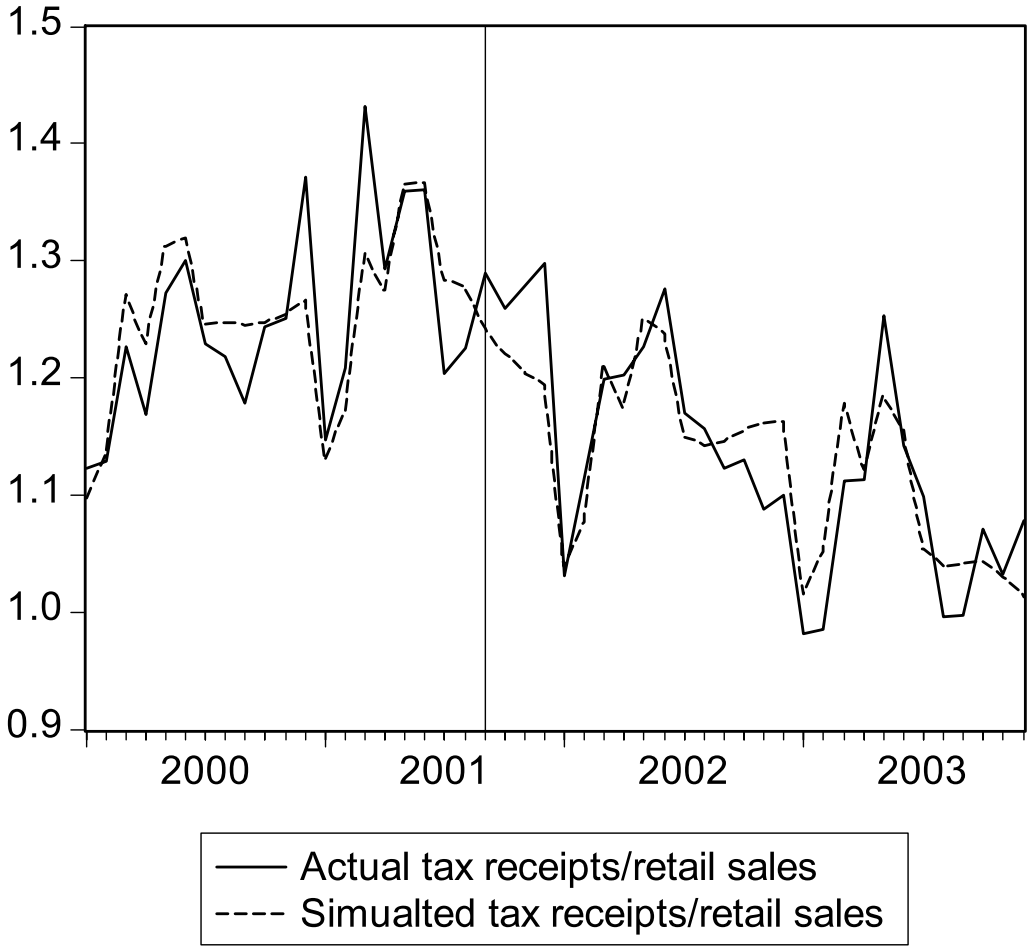
Unlike the main downtown section, the drop in taxes and sales after the smoking ban can easily be seen from the raw data. In fact, the elasticities for the tax receipts data without any economic terms are almost identical. These data are shown in Figure 5.1.

Figure 5.1. Deseasonalized ratios of bar and pub sales and tax receipts relative to total retail sales for the other downtown section of Ottawa



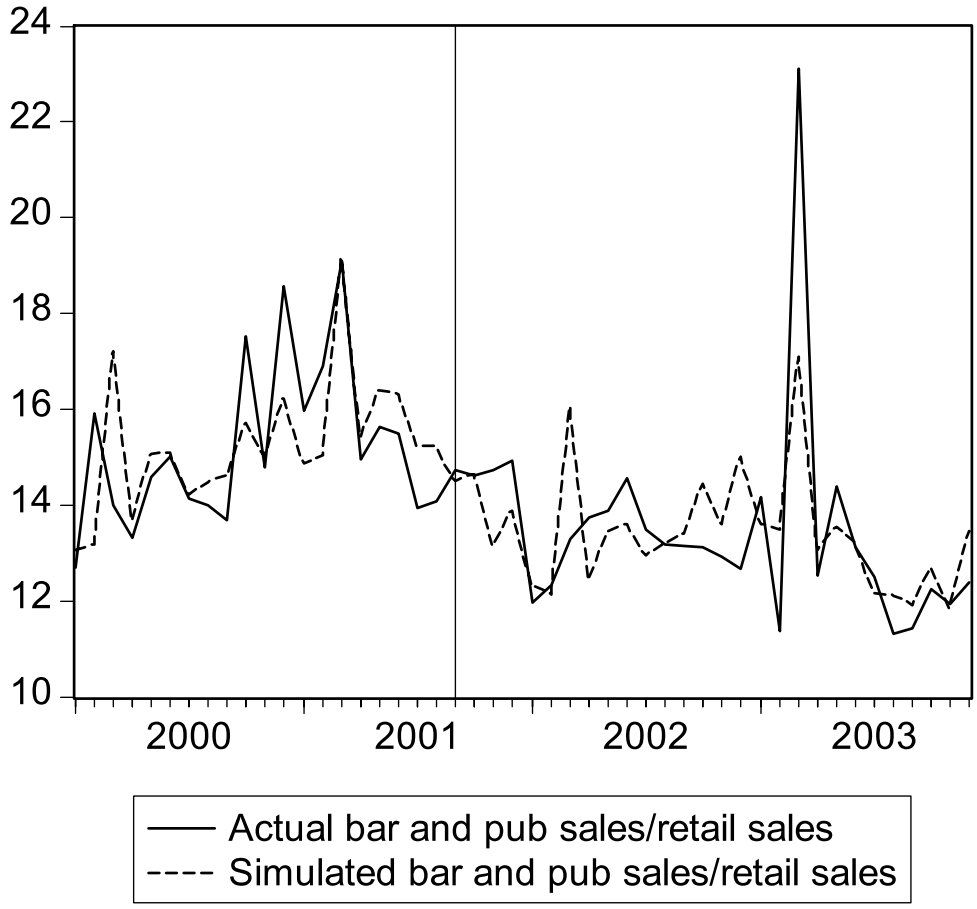
Here again the sales data spike in early 2003, although in this case it is March rather than May. Except for this one anomaly, the data tell a fairly compelling story: taxes and sales generally rose until the imposition of the ban, and then, after a brief adjustment period, start falling sharply at the beginning of 2002 and never recovered.

Figure 5.2 Actual and Simulated Ratio of Tax Receipts to Retail Sales for the other downtown section of Ottawa



Except for the spike in sales in March 2003, the sales data show a very strong reversal of the trend after the imposition of the smoking ban. Sales rose steadily in 2000 and continued to increase in 2001, although at a slower rate, in spite of the recession. However, after showing little change in the last four months of 2001, sales then declined sharply in 2002 and continued to move lower, representing the phase-in effect of the smoking ban. Except for the one spike, sales then continued to move lower in 2003.

Figure 5.3 Actual and Simulated Ratio of Bar and Pub Sales to Retail Sales for the other downtown section of Ottawa



6. Regression Equations and Results for the residential section of Ottawa west of the Rideau River (Ottawa C)

The negative economic impact of the smoking ban is strongest for this section of Ottawa; in fact, the decline is so sharp it was due to economic variables as well as the imposition of the ban. In particular, the elasticities for the smoking ban parameter actually decline slightly when the economic terms are added; this is the only area where that occurs. We also used regression estimated to determine whether the decline was due to a downward trend in addition to the economic parameters, but it was not significant.

The Ottawa C region encompasses all of urban Ottawa west of the Rideau River except for the areas already discussed in regions A and B. This area includes old Ottawa's west end, the former City of Nepean, the former City of Kanata, and the former Townships of Rideau, West Carleton, and Goulbourn. In this area, 31 establishments were selected, of which 24 are located in old Ottawa and former Nepean. Since this area includes the vast majority of the high-tech establishments in Ottawa, sales declined rapidly as employment in this sector diminished sharply.

Indeed, of the six establishments in the survey sample located close to the high tech nodes in the west end, three were out of business by the end of 2004. The combined impact of the smoking ban and drop in employment in the information technology sector drove these firms out of business.

Table 6. Key parameters in regression equations for the residential section of Ottawa West of the Rideau River

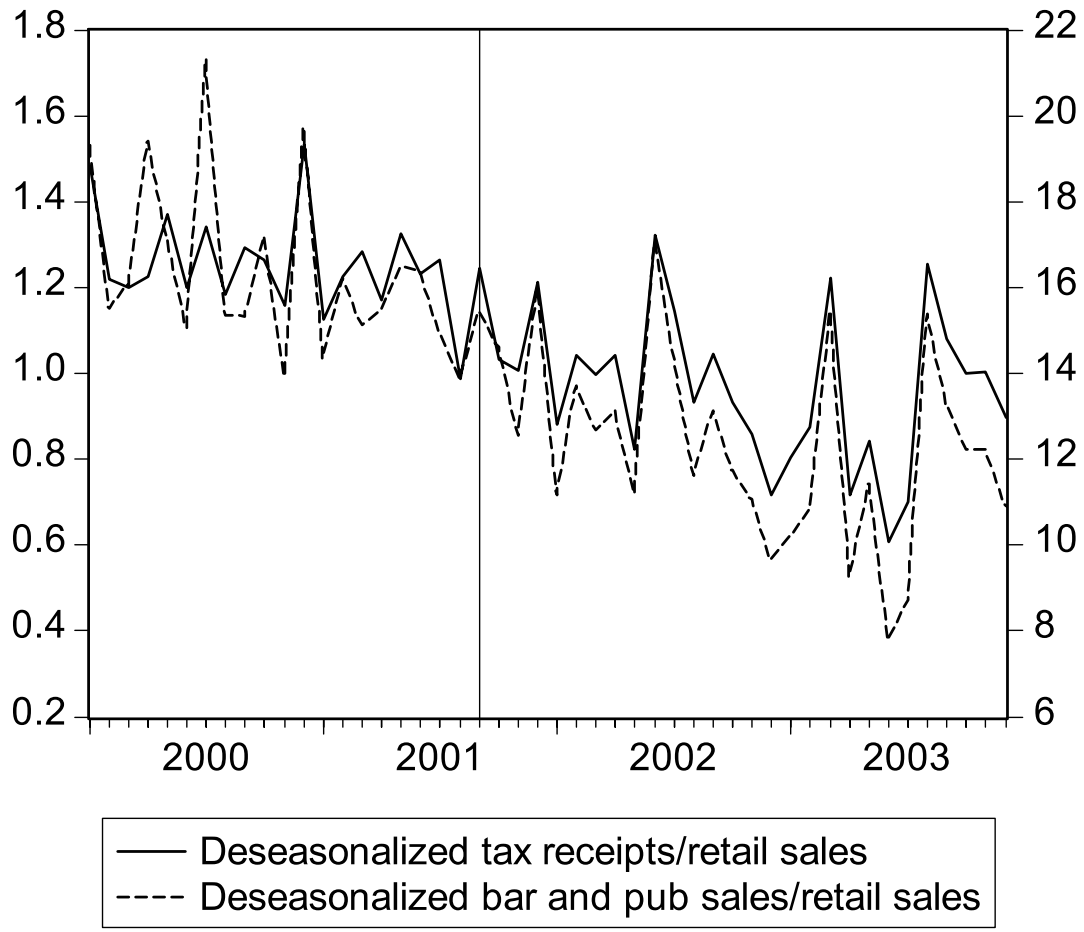
Residential Ottawa West of Rideau River (Ottawa C)

Dependent Variable	Effect of Smoking Ban	Value of Canadian Dollar	Industrial Production	Unempl Rate	Retail Sales Trend	Adjusted R-Square D-W stat
TAXES						
Coeff	-0.309					0.522
T-statistic	6.3					1.96
Elas, %	**27.8**					
Form	Dist Lag					
Lag if any	0-6 mos					
Coeff	-0.286	0.0297	0.0292			0.580
T-statistic	5.7	1.7	1.8			2.26
Elas, %	**25.7**					
Form	Dist Lag	% Chg	% chg			
Lag if any	0-6 mos	1,1	3			

SALES				
Coeff	-4.347			0.483
T-statistic	6.2			2.32
Elas, %	**30.6**			
Form	Dist Lag			
Lag if any	0-6 mos			
Coeff	-3.805	0.469	0.232	0.529
T-statistic	5.3	2.1	1.5	2.47
Elas, %	**26.8**			
Form	Dist Lag			
Lag if any	0-6 mos			

The economic impact of the smoking ban has been greater for this section of Ottawa than elsewhere in the city, with the elasticity estimates ranging from 25.7% to 30.6%. The decline in tax receipts and bar and pub sales is clearly shown in Figure 6.1. It is worth mentioning that this is the only section of Ottawa where the tax and sales data do not show any monthly glitches. While this does not prove anything, it is nonetheless noteworthy that in the one area where the data are most likely to be accurate, the results show the biggest negative impact of the smoking ban.

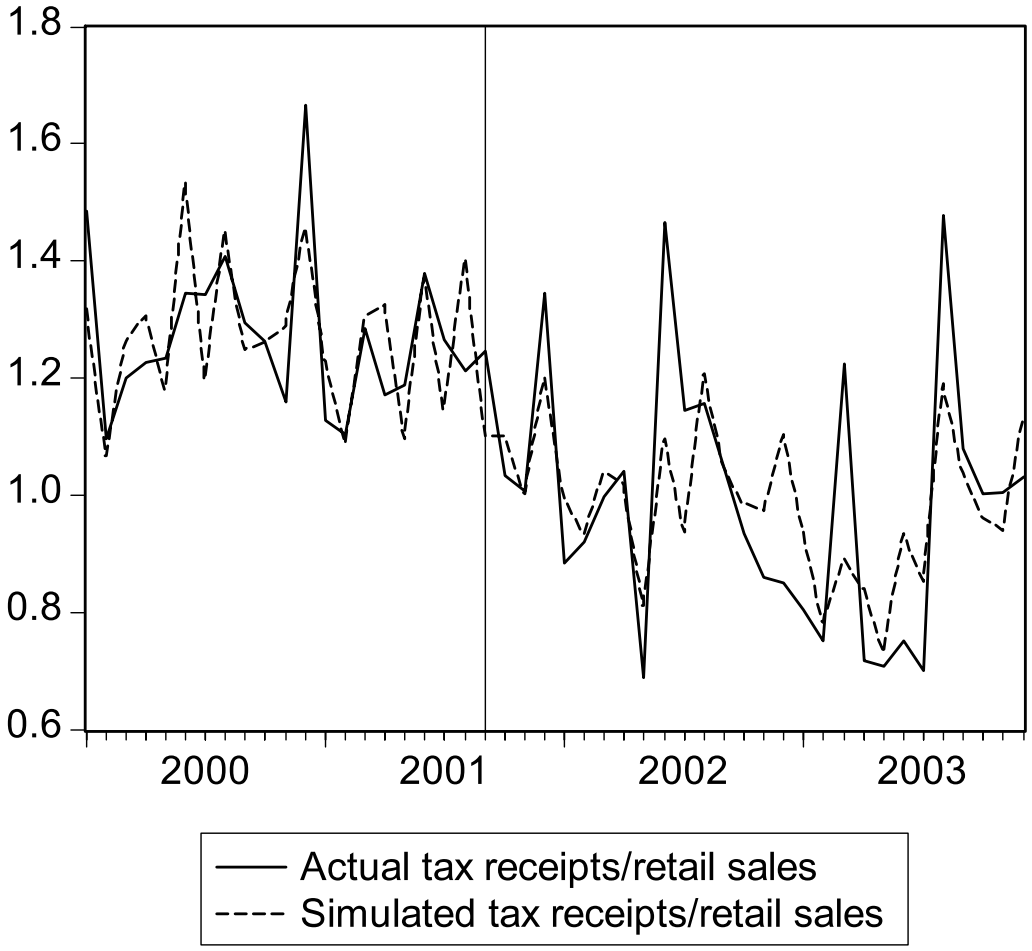
Figure 6.1. Deseasonalized ratios of bar and pub sales and tax receipts relative to total retail sales for the western residential section of Ottawa



The data are still not without their monthly wiggles, but both sales and taxes move together in almost all cases. Here again there is a spike in March 2003, but this time both taxes and sales rise, so it is probably not the result of a data fluke.

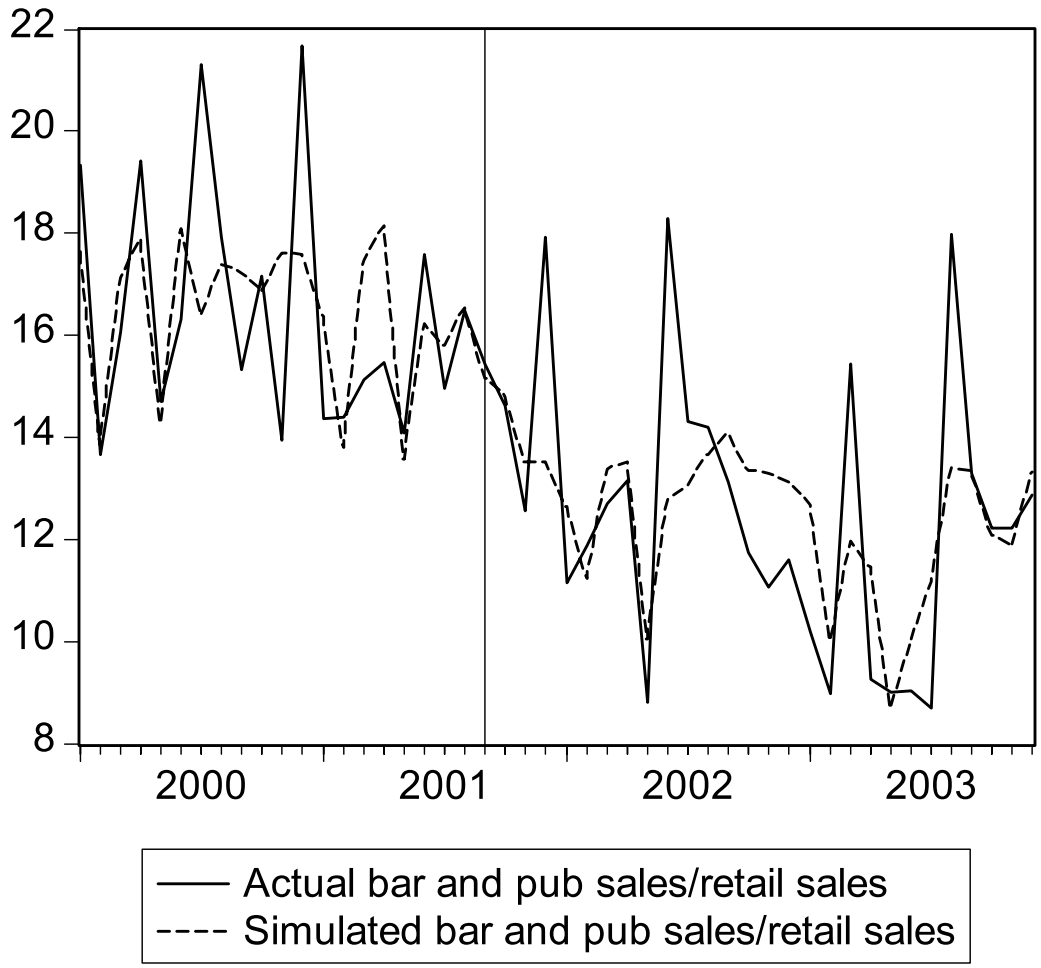
The sharp downward trend after the imposition of the ban is unmistakable, with little sign of a turnaround until the latter half of 2003. After the smoking ban was imposed, both sales and tax receipts fell very rapidly, but it does appear that sales fell somewhat faster than tax receipts.

Figure 6.2 Actual and Simulated Ratio of Tax Receipts to Retail Sales for the western residential section of Ottawa



The key economic variables in this equation are the value of the Canadian dollar, with a short lag of 1 to 2 months, and the index of industrial production, with a lag of 0 to 3 months. Percentage changes are used for both these variables. It would appear that the adjustment effect of the smoking ban lasted well into 2002 before tax receipts stabilized ; they then moved lower again in late 2002 and early 2003.

Figure 6.3 Actual and Simulated Ratio of Bar and Pub Sales to Retail Sales for the western residential section of Ottawa



The key economic variables in these equations, as is the case for other sections of Ottawa, are the value of the Canadian dollar and the index of industrial production, both with short lags. In spite of the somewhat erratic monthly shifts, the downward pattern starting in 2002 is unmistakable.

7. Regression Equations and Results for the residential section of Ottawa east of the Rideau River (Ottawa D)

The results for this section of Ottawa show almost identical parameter estimates for the tax and sales equations. The tax receipts equation shows a 17% drop after the imposition of the smoking ban, while the sales equation shows a 19% drop. The sales equation also indicates that the decline in sales would have been even more severe if it were not for the pickup of economic activity in 2003.

The area of Ottawa D encompasses all the urban areas of Ottawa east of the Rideau River. It includes old Ottawa's east end, the former City of Gloucester, the former Village of Rockliffe Park, and the former Townships of Cumberland and Osgoode. Of the 25 business establishments selected, 19 are either in old Ottawa or former Gloucester. The east end has a significant advantage relative to other growth areas of the city because a significant amount of retail and commercial infrastructure is already in place.

Table 7. Key parameters in regression equations for the residential section of Ottawa East of the Rideau River

Residential Ottawa East of Rideau River (Ottawa D)

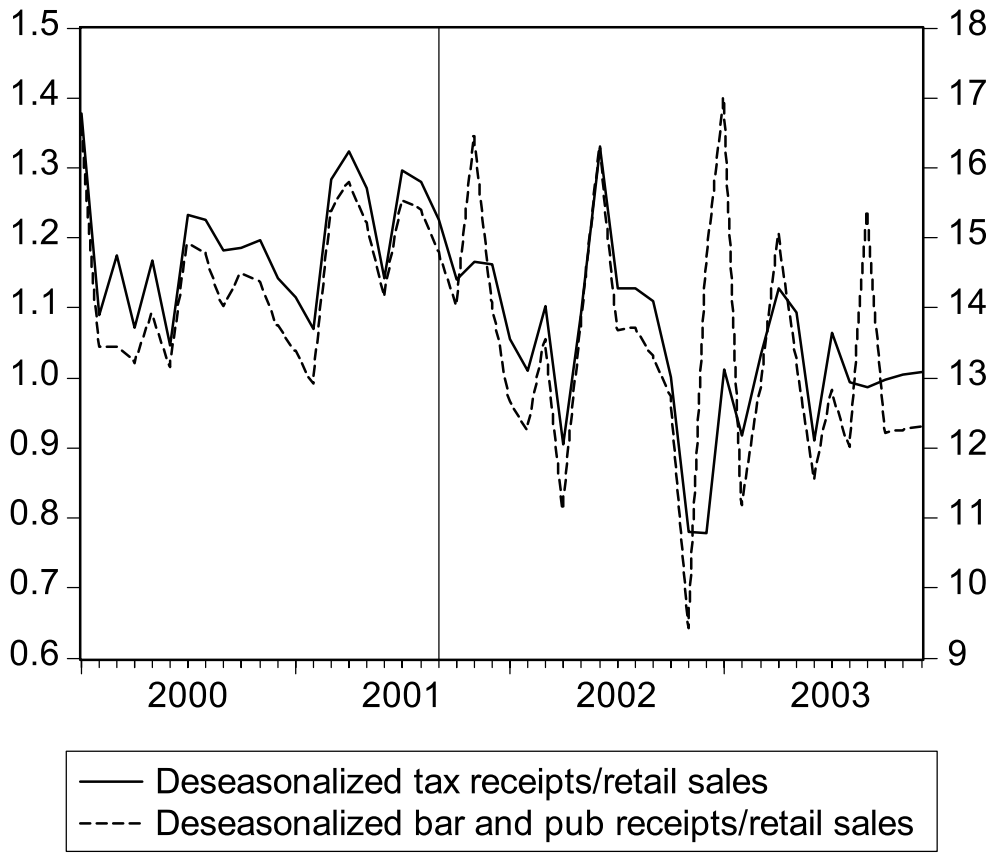
Dependent Variable	Effect of Smoking Ban	Value of Canadian Dollar	Industrial Production	Unempl Rate	Retail Sales Trend	Dummy Vbl for Spring	Adjusted R-Square D-W stat
TAXES							
Coeff	-0.169						0.283
T-statistic	3.7						2.18
Elas, %	**14.8**						
Form	Dist Lag						
Lag if any	0-6 mos						
Coeff	-0.195	0.608				0.312	0.680
T-statistic	5.9	2.2				7.3	1.40
Elas, %	**17.0**						
Form	Dist Lag						
Lag if any	0-6 mos	5					
SALES							
Coeff	-1.297						0.152
T-statistic	2.2						2.39
Elas, %	**9.2**						
Form	Dist Lag						

Lag if any	0-6 mos					
Coeff	-2.670	9.749		0.0613	3.61	0.530
T-statistic	3.0	2.4		1.4	6.0	2.03
Elas, %	**18.8**					
Form	Dist Lag					
Lag if any	0-6 mos	5		6		

A word about the seasonal adjustment procedures is appropriate at this point. Throughout this study, we have included seasonal dummy variables in all the regression equations. The alternative would have been to use some standard algorithm such as Census X-12 to adjust the data, but that choice is not available because X-12 operates on a minimum of 5 years data, with 8 years preferred. Hence the regression approach is utilized. In general, the seasonal factors obtained are reasonably stable with the exception of this particular section of Ottawa, where the seasonals for March and April flip-flop; in two of the four years the seasonals are high in March and low in April, whereas in the other two years the reverse occurs. There is some evidence of this pattern occurring in other Ottawa regions but it is not significant.

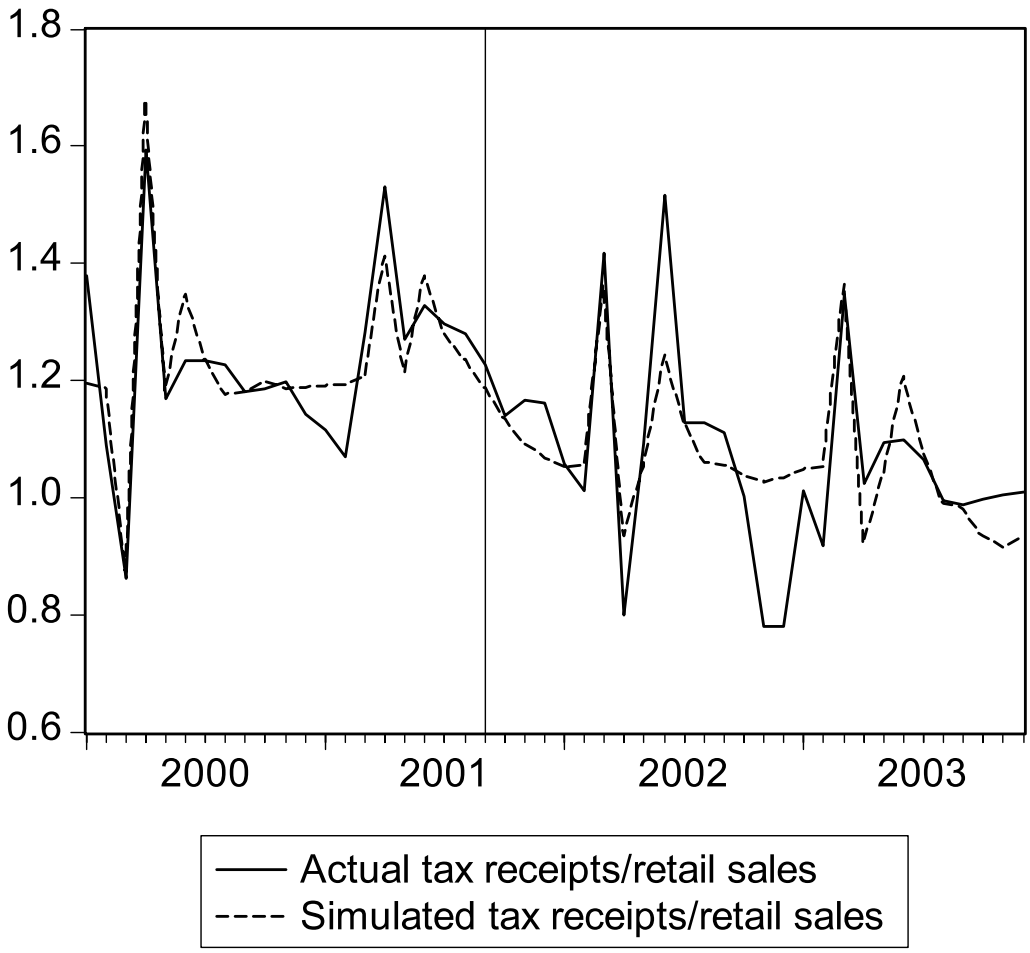
This pattern appears to be tied to when Easter occurs, a factor that would be captured in the X-12 program. To handle this difficulty, we have added an additional “spring” seasonal dummy variable to measure this effect. Here again, we note that running the regressions without this term does not have any major impact on the coefficients for the smoking ban; but without it, the net effect is that the adjusted R-square falls to about 0.1 and none of the economic terms is significant.

Figure 7.1. Deseasonalized ratios of bar and pub sales and tax receipts relative to total retail sales for the eastern residential section of Ottawa



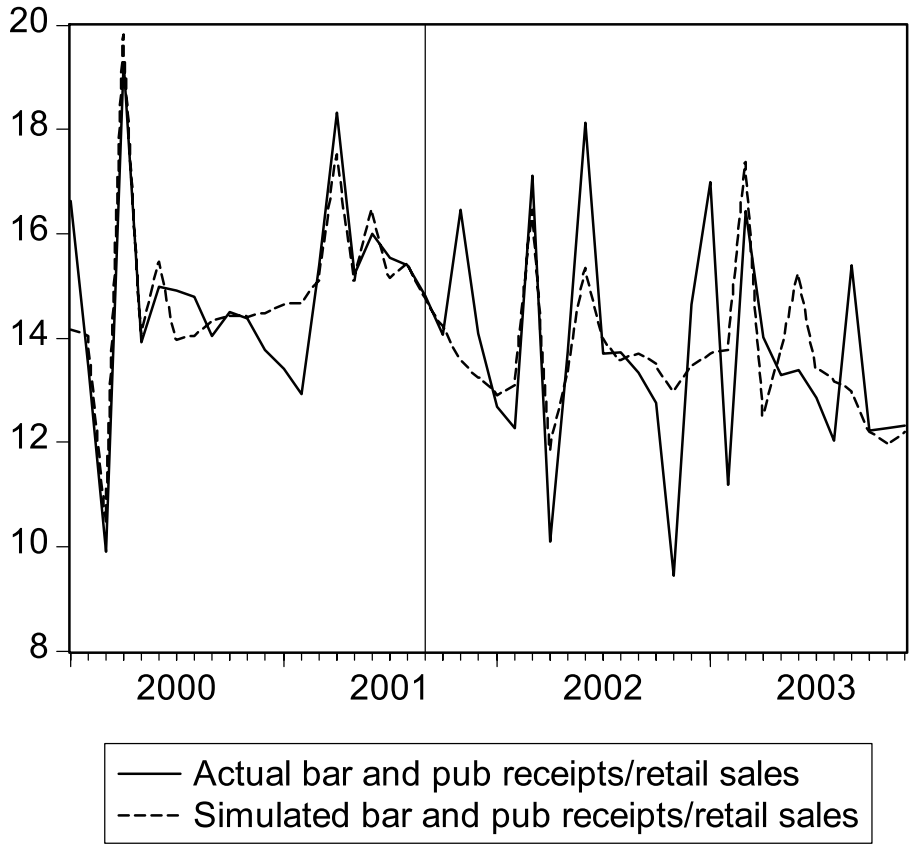
These data show that both tax receipts and bar and pub sales declined sharply after the imposition of the smoking ban. They then spiked back up again in June 2002 but then fell quickly again. Finally, they rose in 2003 along with the overall improvement in the economy.

Figure 7.2 Actual and Simulated Ratio of Tax Receipts to Retail Sales for the eastern residential section of Ottawa



In this equation, the key economic variable is the value of the Canadian dollar. None of the cyclical variables was significant, but that may reflect the fact that that data appear to be dominated by the spring seasonal dummy effect.

Figure 7.3 Actual and Simulated Ratio of Bar and Pub Receipts to Retail Sales for the eastern residential section of Ottawa



In this regression, the value of the Canadian dollar remains significant, as is the case for all other regions in Ottawa. Cyclical variables were not found to be significant, but the general upward trend of retail sales in the region was marginally significant in this equation. The same term had a t-ratio of less than unity in the tax receipts equation and hence was not included.

8. Regression Equations and Results for London, Ontario

The equations for the remaining three cities in this study – London, Kingston, and Kitchener – are slightly different than the equations for Ottawa, primarily because of data limitations. We have shown that the lag for the smoking ban variable in the Ottawa equations was six months, and have indicated in several cases that it may have taken even longer to be fully phased in for certain areas of Ottawa. We were able to perform an in-depth econometric analysis for that city because the smoking ban became effective in September, 2001, thus providing a reasonable number of observations both before and after the ban started.

On the other hand, the bans for London and Kingston did not go into effect until July and May 2003 respectively, hence sharply reducing the number of months during which the ban had its full economic impact. At the other end of the spectrum, the smoking ban for Kitchener went into effect on January 1, 2000, which is the beginning month of the sample. In other words, the ban was in effect during the entire sample period. That is why we tried to get data for 1999, but it was not available in a comparable form from the Ministry of Finance.

In order to finesse these difficulties, we have introduced another form of the smoking ban variable, which is the first difference of that term. This term appears in the sales equation for London, and both the sales and tax equations for Kingston and Kitchener. In all cases, the lag is seen to be 4 to 6 months, the same length that we found for Ottawa.

Table 8 shows the key parameters for the London equations. The tax receipts equations show a decline of about 10% when the smoking ban was implemented; in this case there is no lagged effect, although we caution that the short time span means that with 2004 data, a lag might be apparent. The sales data also shows no lag for the level of the smoking ban term, but it also appears with the change over the past six months – in this case, that would mean during the second half of 2003. We reiterate our position that when 2004 data become available, we will probably find that the effect of the smoking ban in London has a distributed lag effect over a six-month period, just as we found for Ottawa. In the absence of firm data, that result must necessarily remain somewhat speculative. In any case, when combining the level and first difference of the smoking ban term, it is seen that the overall effect of the smoking ban in London was to reduce sales by 16.3% during the second half of 2003.

Table 8. Key parameters in regression equations for London

Equations for London

Dependent Variable	Effect of Smoking Ban	Intro to Smoking Ban	Value of Canadian Dollar	Industrial Production	Unempl Rate	Retail Sales Trend	Adjusted R-Square D-W stat
TAXES							
Coeff	-0.102						0.623
T-statistic	5.2						1.30
Elas, %	**12.3**						
Form							
Lag if any							
Coeff	-0.083				-0.057		0.707
T-statistic	4.5				3.5		1.76
Elas, %	**10.0**						
Form					Mov Avg		
Lag if any					6,6		
SALES							
Coeff	-1.009	-0.538					0.461
T-statistic	2.5	0.8					1.87
Elas, %	**10.6**	**5.7**					
Form		Diff					
Lag if any		4,2					
Coeff	0.809	-0.972		15.87	-0.556		0.515
T-statistic	2.0	1.4		1.7	1.9		1.98
Elas, %	**8.5**	**10.2**					
Form		Diff		% Chg	Mov Avg		
Lag if any		4,2		1,2	6,6		

We now turn to the graphical representation for the London results. Although the monthly figures are extremely jagged, It can be seen that sales and tax receipts started to decline in 2001 and continued lower in 2002 – except for the one-month spike in sales in November 2002. That can be attributed to the lagged effect of the drop in industrial production and the rise in unemployment. When the economy started to improve – taking into account the lags associated with these variables – sales then started to improve in early 2003, but then dropped sharply in July, the month the smoking ban was imposed. They then headed lower for the rest of the year.

Figure 8.1. Deseasonalized ratios of bar and pub sales and tax receipts relative to total retail sales for London

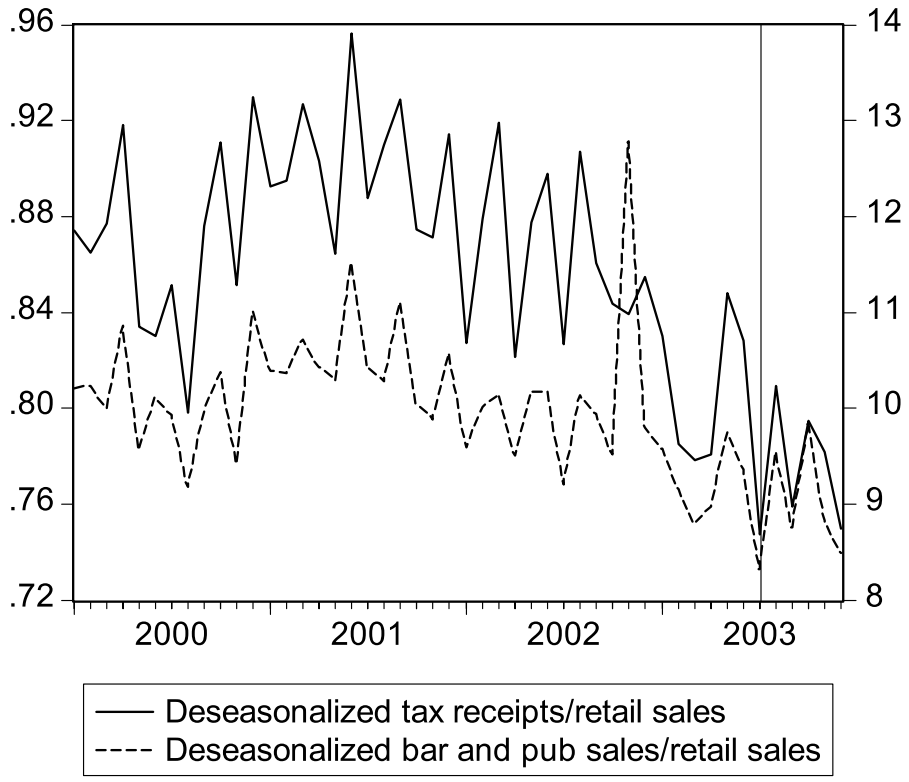
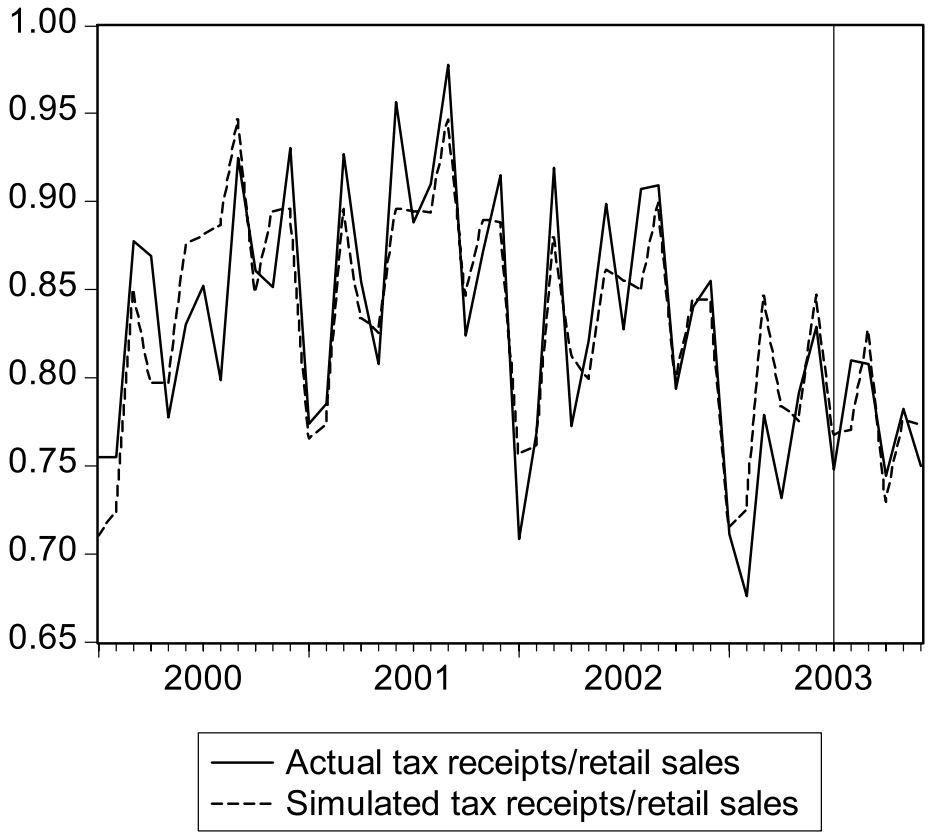
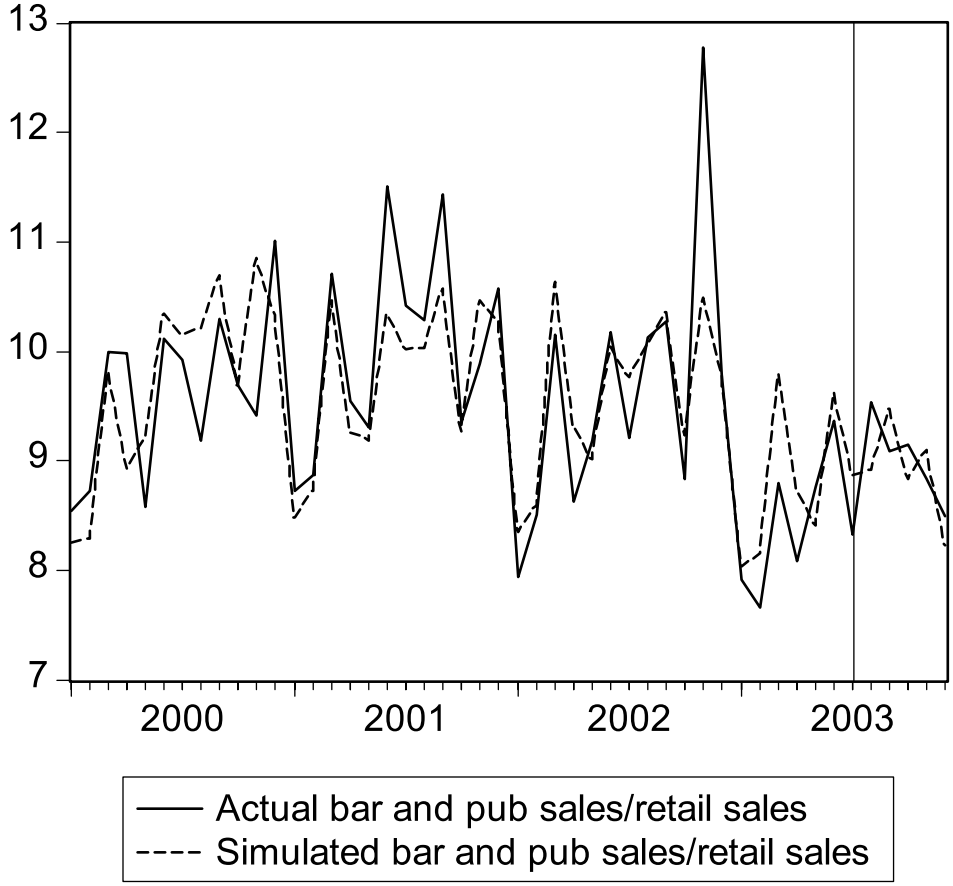


Figure 8.2 Actual and Simulated Ratio of Tax Receipts to Retail Sales for London



The key economic variable in this regression equation is the unemployment rate, with a moving average lagged 6 to 12 months. That accounts for the drop in sales in late 2001 and early 2002. Unlike Ottawa, the value of the Canadian dollar is not significant in any of the equations for London, Kingston, or Kitchener, nor would we expect it to be, given the minimal influx of tourists to these cities.

Figure 8.3 Actual and Simulated Ratio of Bar and Pub Sales to Retail Sales for London



The lagged value of the unemployment rate, using the same lags as were included in the tax receipts equation, remains the key economic variable in this equation. In addition, the percentage change in the index of industrial production is included with a shorter lag. This equation contains both the level of the smoking ban dummy variable and its change over the previous six months. As can be seen, sales dropped off fairly sharply near the end of the year after an initial rebound in August. It is likely that a distributed lag treatment of the smoking ban dummy variable, similar to the one used for Ottawa, would be significant if 2004 data were available.

9. Regression Equations and Results for Kingston, Ontario

The econometric situation for Kingston is similar to that for London in the sense that the smoking ban went into effect in mid-2003, although in this case the ban became operative in May rather than July. Hence we use the same dual structure for the smoking dummy variable: the level, and its first difference.

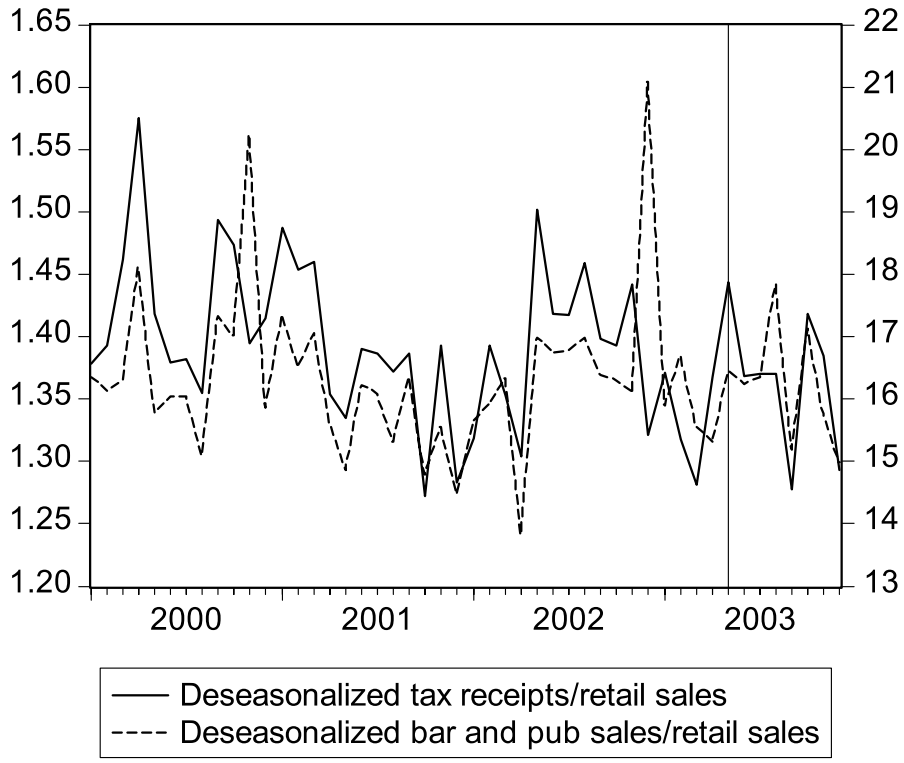
The results of these combined terms are quite robust; although the significance level of the separate terms appears to be marginal, the significance level of the combined terms (not shown separately) is much higher. The elasticity of the smoking ban dummy variable in the sales equation is 24.3%; the elasticity for the tax receipts equation is about half as much, or 12.3%.

Table 9. Key parameters in regression equations for Kingston

Equations for Kingston

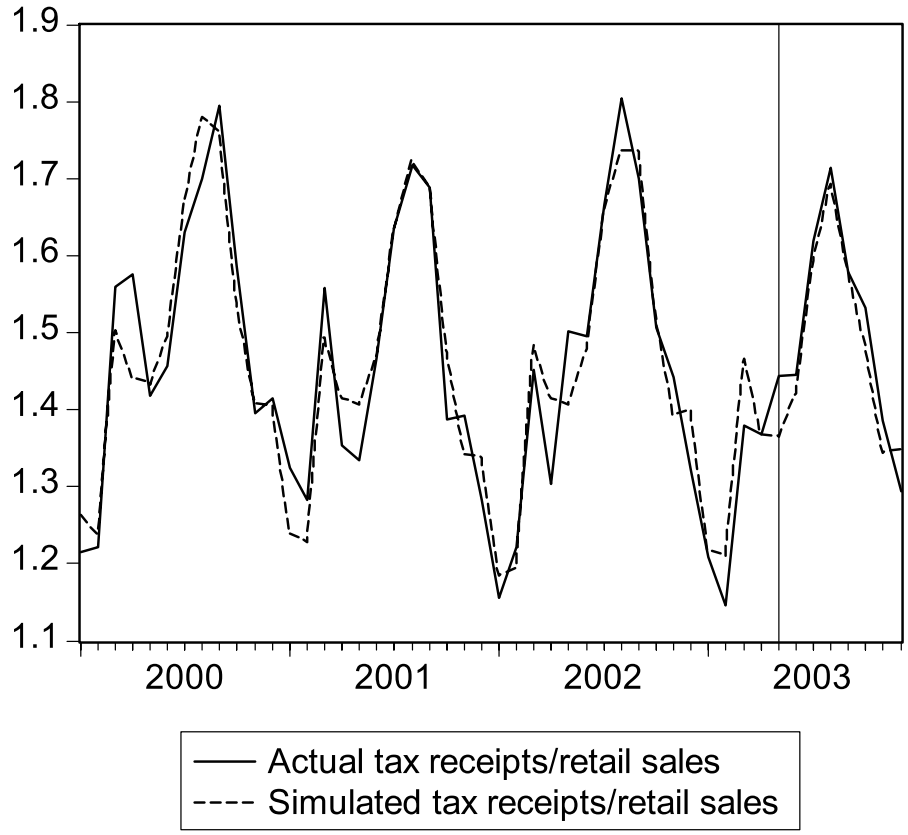
Dependent Variable	Effect of Smoking Ban	Intro of Smoking Ban	Value of Canadian Dollar	Industrial Production	Unempl Rate	Retail Sales Trend	Adjusted R-Square D-W stat
TAXES							
Coeff	-0.050	-0.135					0.841
T-statistic	1.0	1.7					1.38
Elas, %	**3.7**	**9.2**					
Form	Mov Avg	Difference					
Lag if any	4,4	4					
Coeff	-0.072	-0.107		0.991	-0.133		0.864
T-statistic	1.4	1.4		2.1	1.3		1.82
Elas, %	**4.9**	**7.4**					
Form	Mov Avg	Difference		% Chg			
Lag if any	4,4	4		0,6			
SALES							
Coeff	-1.040	-1.229					0.667
T-statistic	1.0	0.8					1.98
Elas, %	**5.8**	**6.9**					
Form	Mov Avg	Difference					
Lag if any	4,4	4					
Coeff	-2.486	-1.826		41.03	-3.923	0.0452	0.710
T-statistic	1.9	1.2		1.9	1.4	1.4	2.45
Elas, %	**14.0**	**10.3**					
Form	Mov Avg	Difference		% Chg	Difference	Mov Avg	
Lag if any	4,4	4		0.2 & 6,6		1,6	

Figure 9.1. Deseasonalized ratios of bar and pub sales and tax receipts relative to total retail sales for Kingston



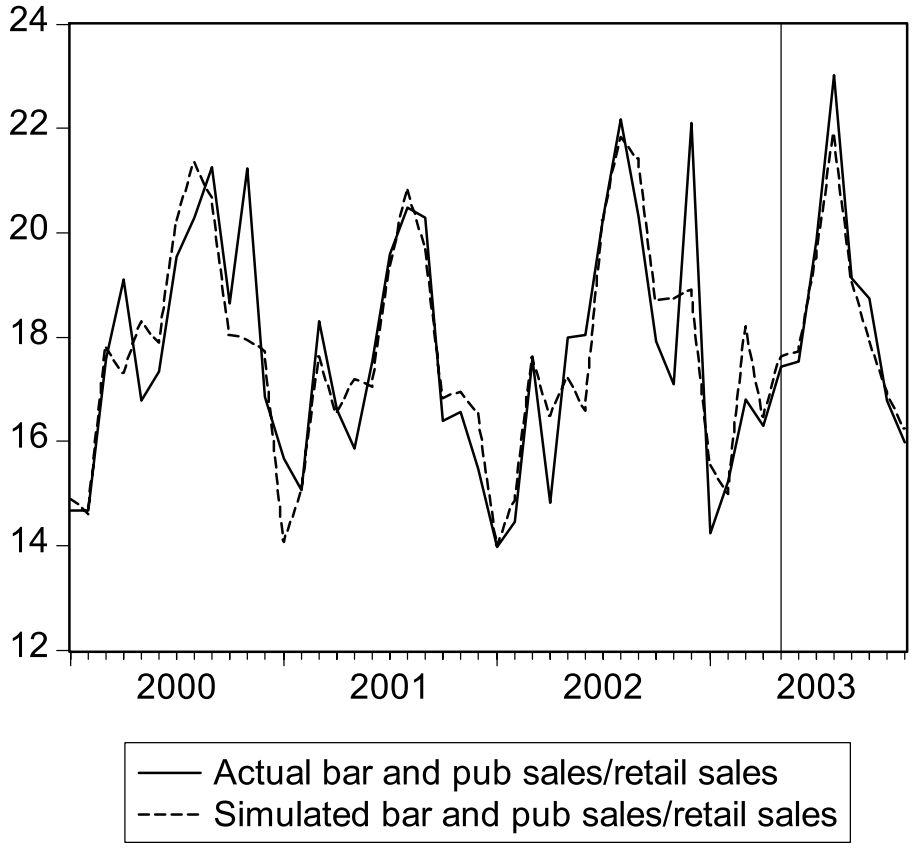
Until the imposition of the smoking ban, both the bar and pub sales and tax receipts followed the usual cyclical patterns during this period; higher in 2000, lower in 2001 and early 2002, and then a gradual recovery in late 2002 and early 2003. However, the gains came to an abrupt halt once the smoking ban was passed, and declined during the remainder of 2003.

Figure 9.2 Actual and Simulated Ratio of Tax Receipts to Retail Sales for Kingston



It is clear that the seasonal factors dominate the data for Kingston tax receipts; to a lesser extent, that is also true for the sales data. In this regression, it is obvious that the peak values in the summer of 2003 are well below those in previous years. The key economic variable in this equation is the change in the index of industrial production over the past six months.

Figure 9.3 Actual and Simulated Ratio of Bar and Pub Sales to Retail Sales for Kingston



This graph looks somewhat unusual because at first glance it appears that sales at pubs and bars rose for a few months after the smoking ban before declining sharply. For the most part that is due to the seasonal factors; a similar pattern can be observed in 2000, 2001, and 2002. It is situations of this sort that show why we start each section off with a graph of the deseasonalized data. Referring back to Figure 9.1, it can be seen that while there is a slight spike in sales in August, most of the observations after May are below their 2002 levels.

The key economic variables in this equation, in addition to the change in industrial production, is the upward trend of overall retail sales in Kingston, used with a six-month moving average. As the economy improves, it is likely that bar and pub sales would rise more rapidly than overall retail sales in the absence of a smoking ban, so the fact that the observed decline is not even larger represents the overall improvement of the Kingston economy.

10. Regression Equations and Results for Kitchener, Ontario

From an econometric viewpoint, the Kitchener results pose the opposite problem as those in London and Kingston. Instead of the smoking ban appearing very late in the sample period, the Kitchener ban went into effect in the first month of the sample period, so from an econometric viewpoint it was active for all 48 observations. In such a case it would be econometrically impossible to determine the value of the parameter. For that reason, a different approach was used, which was to insert the first difference of that variable over a six-month period. Hence we are in effect stating that tax receipts and bar and pub sales dropped significantly during the first six months of the ban.

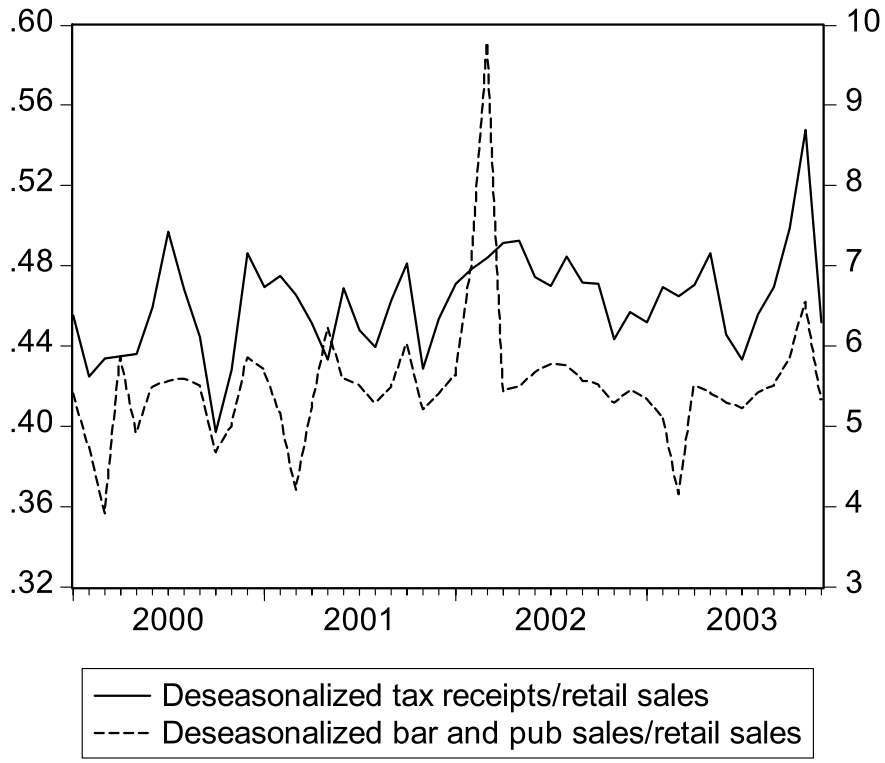
Table 10. Key parameters in regression equations for Kitchener

Equations for Kitchener

Dependent Variable	Intro of Smoking Ban	Value of Canadian Dollar	Industrial Production	Unempl Rate	Retail Sales Trend	Adjusted R-Square D-W stat
TAXES						
Coeff	-0.028					0.584
T-statistic	2.2					1.33
Elas, %	**7.3**					
Form	Difference					
Lag if any	0,6					
Coeff	-0.037		0.0082			0.659
T-statistic	3.1		3.0			1.63
Elas, %	**9.5**					
Form	Difference		% Chg			
Lag if any	0,6		0,6			
SALES						
Coeff	-0.752					0.223
T-statistic	1.9					1.62
Elas, %	**15.6**					
Form	Difference					
Lag if any	0,6					
Coeff	-0.987		0.261			0.340
T-statistic	2.7		2.9			1.83
Elas, %	**20.4**					
Form	Difference		% Chg			
Lag if any	0,6		0,3			

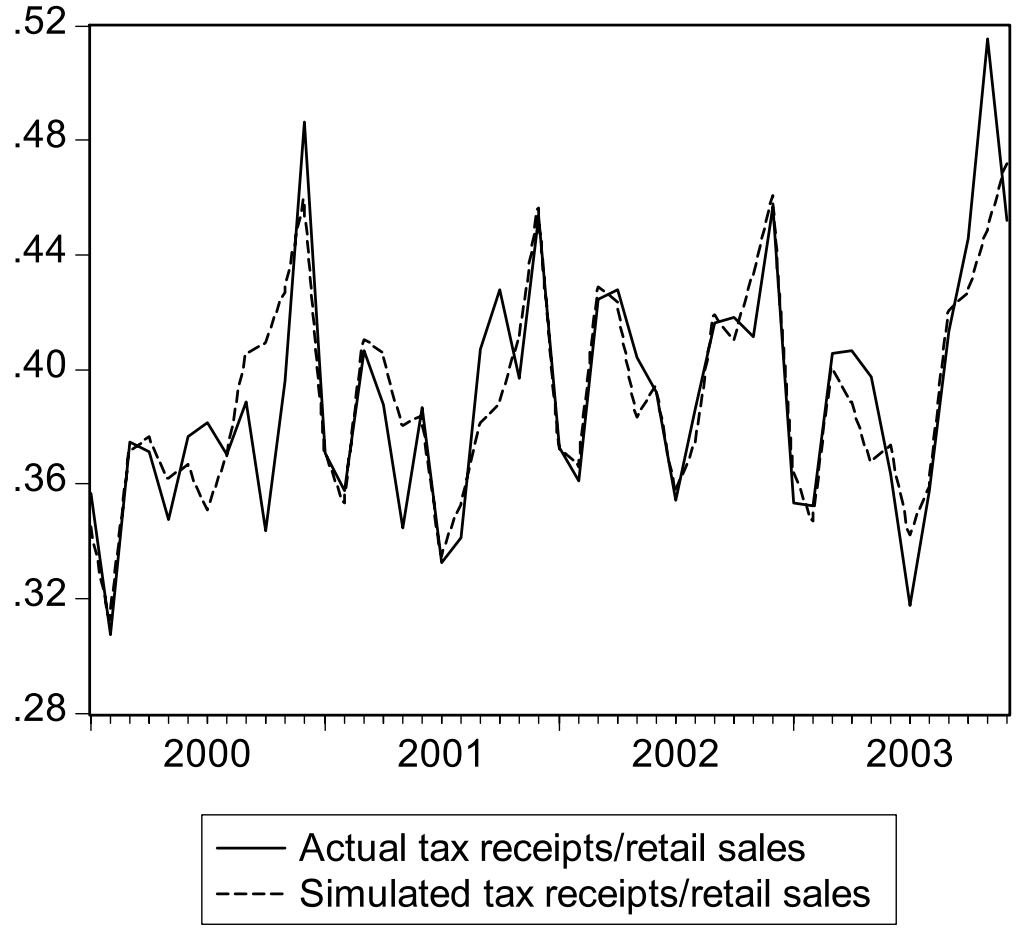
The results in Table 10 using this approach indicate that was indeed the case for sales, with a reduction of 20.4%; here again, the value obtained from the tax receipts data are far smaller, being estimated at 9.5%. Since the imposition of the smoking ban is coincident with the beginning of the sample period, the three graphs in this section have no vertical line indicating the date at which the ban became effective; otherwise they are directly comparable with the graphs in the previous sections of this report.

Figure 10.1. Deseasonalized ratios of bar and pub sales and tax receipts relative to total retail sales for Kitchener



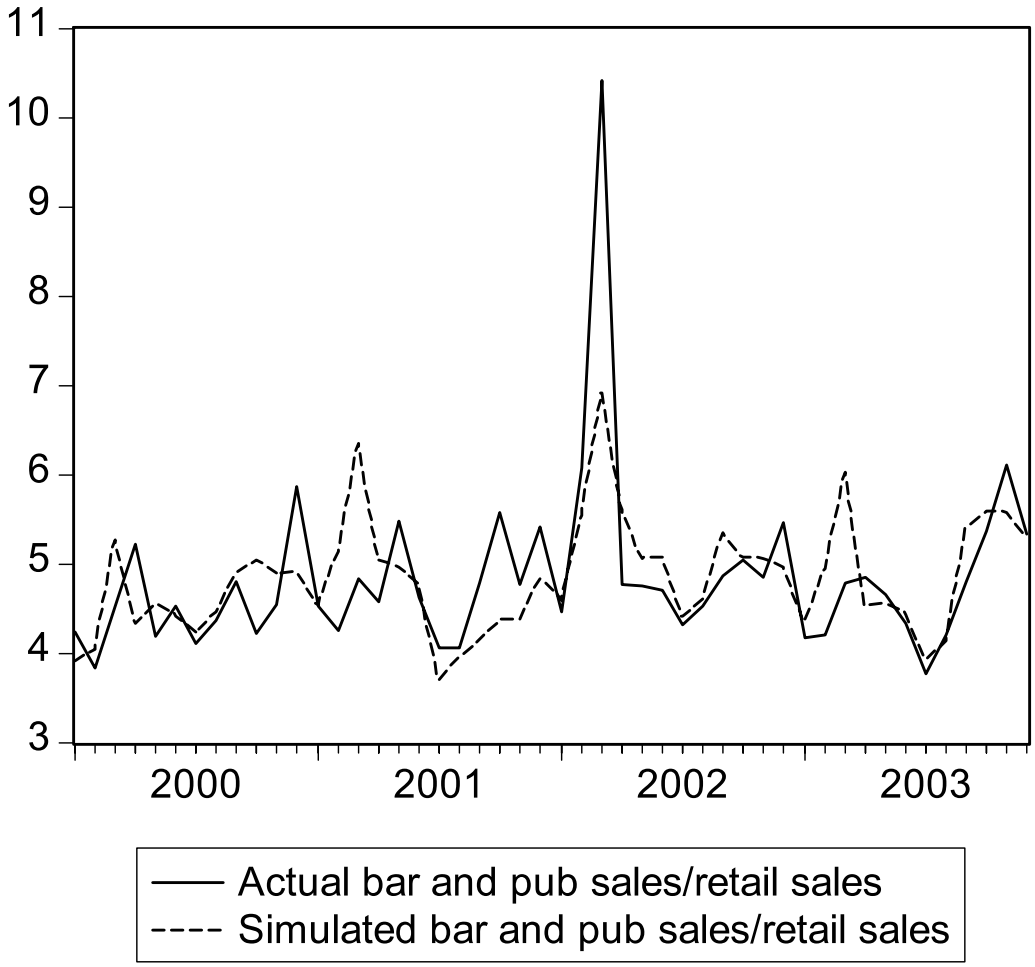
The main point to observe in this graph is the fairly sharp decline in tax receipts and bar and pub sales early in 2000, just after the ban was imposed. The pickup later in the year represents the strong economy in 2000, just as the gradual decline 2001 and 2002 (except for yet another spike in the sales data) reflects the slowdown in economic activity, followed by an improvement in 2003.

Figure 10.2 Actual and Simulated Ratio of Tax Receipts to Retail Sales for Kitchener



In both the tax receipts and bar and pub sales equations, the key economic variable is the percentage change in the index of industrial production. Both data series appear to have unusual patterns; the tax data drops very sharply in mid-2003 and then rebounds quickly, while the sales data has a spike in March 2002. Both series, however, do show a significant rebound in the latter half of 2003, representing the improved economy – and indicating what might have happened in London and Kingston had a smoking ban not been imposed during that period.

Figure 10.3 Actual and Simulated Ratio of Bar and Pub Sales to Retail Sales for Kitchener



Appendix A. Actual data used in all regression equations.

All the data used in the actual regression equations is provided in this appendix except for the dummy variables, which are either 0 or 1, and the seasonal dummy variables

A brief comment about the data for total retail sales in each of the regions is in order. As noted in the body of the report, only annual data were available from the Ministry of Finance for these various municipalities, but even those were not available for 2003. Hence a two-step procedure was necessary to generate monthly series. First, data for monthly total retail sales for Ontario was obtained from Statistics Canada for 1999 through 2003. Second, the Ministry of Finance provided annual data on sales, income, and employment for Ottawa, London, Kingston, Kitchener, and the province of Ontario on an annual basis from 1999 through 2002. We then generated the 2003 annual figures using the change in employment by metropolitan areas taken from the Table 9.10 of the Market Research Handbook. These figures were compared to the changes in employment in 1999-2002 for the various locations, and were adjusted where appropriate by changes in sales and income. Since these variables are used in the equations to measure the overall trend in retail sales in a given location, monthly changes are not as critical as they would be for other variables.

The data are now given in separate spreadsheets for (a) each of the 7 regions, and (b) the overall economic data. All series are given for 2000-2003 except for the economic data, which are given for 1999-2003 because of the frequent use of lags.

Data for Main Downtown Ottawa (Ottawa A)

	Tax Receipts	Bar & Pub Sales	Tot Ret Sales (/1000)
2000.01	204590.8	2341920	246497.4
2000.02	225363.5	5448428	246204.1
2000.03	261213.9	3511965	251900.7
2000.04	272462.7	3155286	247480
2000.05	318676.1	3650663	251586.7
2000.06	336100.3	4284911	253540.9
2000.07	382595	4405516	256478.3
2000.08	362837	4101538	256355.3
2000.09	330957.7	4469054	260834.8
2000.10	291606.4	3334151	258947.7
2000.11	240772.7	2713435	258458
2000.12	264534.6	3327634	257879.7
2001.01	206085	2362326	259941.7
2001.02	240312.5	2737485	258224.1
2001.03	286126.6	3950702	258045.3
2001.04	297178.7	3400895	263433.8
2001.05	352770.5	4031470	263468.6

2001.06	383157.6	4381321	262570
2001.07	413681.8	4692866	259147.2
2001.08	356729.6	4230751	261613.2
2001.09	343516.4	4849515	256641.2
2001.10	291359.3	3204306	262350.6
2001.11	262964.2	2971066	268256.5
2001.12	264318.6	3004180	273943.1
2002.01	216790.3	2507614	281365.1
2002.02	237061.6	2739799	272347.7
2002.03	290112.6	3935318	277187.6
2002.04	299996.4	3394375	279655.2
2002.05	345212.1	4011420	270755.9
2002.06	330076.7	4021986	280096.2
2002.07	385539.6	4468946	280297.9
2002.08	393636.2	4511775	280628.3
2002.09	350518.1	4799950	280341.7
2002.10	304944.2	3479266	285302.5
2002.11	284234.1	3854906	284393.3
2002.12	281469	3195704	286608.9
2003.01	223840.1	2583858	287684.2
2003.02	248935.6	2881392	290351.1
2003.03	285291.5	4027002	289872.9
2003.04	297618.2	3385920	288587.6
2003.05	375844.1	9030592	290170.7
2003.06	383523.8	5759135	289420.7
2003.07	397591	4473046	295306.7
2003.08	366611.7	4247014	298066.3
2003.09	335812.8	4615943	296774.6
2003.10	322515.4	3726830	294914.2
2003.11	285263.9	3784025	292550.9
2003.12	291300.4	3387415	288323.9

Data for Other Downtown Ottawa (Ottawa B)

	Tax Receipts	Bar & Pub Sales	Tot Ret Sales (/1000)
2000.01	280777.2	3177224	250122.4
2000.02	281891.3	3972195	249824.8
2000.03	313460.2	3574342	255605.1
2000.04	293421.7	3342113	251119.4
2000.05	324703.6	3724909	255286.5
2000.06	334574.1	3860653	257269.5
2000.07	319824	3679888	260250.1
2000.08	317018.1	3643874	260125.2
2000.09	311917.4	3624777	264670.6
2000.10	326667.8	4601953	262755.8
2000.11	327874.2	3877691	262258.8

2000.12	358721.6	4856446	261672.1
2001.01	302386.5	4208729	263764.3
2001.02	316648.5	4430541	262021.5
2001.03	374866.7	5002280	261840.1
2001.04	345544.1	3995099	267307.8
2001.05	363451.3	4178335	267343.2
2001.06	362612.9	4128476	266431.3
2001.07	316512.1	3663824	262958.2
2001.08	325192.9	3740881	265460.5
2001.09	335633.4	3837269	260415.4
2001.10	335217	3891377	266208.7
2001.11	347911.8	4012792	272201.4
2001.12	360863.1	4152110	277971.7
2002.01	294337.2	3412153	285502.8
2002.02	307856.1	3408846	276352.8
2002.03	337170.7	3740522	281263.9
2002.04	341057.2	3898261	283767.8
2002.05	336981.6	3811945	274737.6
2002.06	362571.7	4137056	284215.2
2002.07	332601.8	3839075	284420
2002.08	329190.8	3748228	284755.2
2002.09	319319.3	3740847	284464.3
2002.10	327256.7	3794098	289498.2
2002.11	313751.1	3731057	288575.6
2002.12	319939.1	3686532	290823.7
2003.01	286503	4137505	291914.9
2003.02	290216.5	3350805	294621
2003.03	326864.4	6801727	294135.7
2003.04	326000.8	3668666	292831.5
2003.05	368868	4236235	294437.9
2003.06	335465.7	3851330	293676.9
2003.07	329119.9	3745175	299649.4
2003.08	301167.1	3424361	302449.6
2003.09	300227.5	3438056	301138.9
2003.10	320487.4	3666949	299251.1
2003.11	306471.9	3539092	296853.2
2003.12	315569.9	3626530	292564

Data for West side residential Ottawa
(Ottawa C)

	Tax Receipts	Bar & Pub Sales	Tot Ret Sales (/1000)
2000.01	278405.1	3624653	187591.8
2000.02	205520.3	2559039	187368.6
2000.03	230197.9	3078013	191703.8
2000.04	230885.4	3656827	188339.6
2000.05	236158.4	2816093	191464.9
2000.06	259618.6	3148615	192952.1

2000.07	261832.8	4159764	195187.6
2000.08	274506.5	3496535	195093.9
2000.09	256946.7	3041560	198503
2000.10	248946.2	3383703	197066.8
2000.11	227852.6	2743578	196694.1
2000.12	327003.4	4252974	196254.1
2001.01	222974.5	2840036	197823.2
2001.02	216638.4	2826941	196516.1
2001.03	252069.5	2968456	196380.1
2001.04	234940.8	3102700	200480.9
2001.05	238224.5	2823531	200507.4
2001.06	275315.6	3515239	199823.5
2001.07	249635.5	2951797	197218.6
2001.08	241152.9	3278850	199095.3
2001.09	243225	3017794	195311.5
2001.10	206452	2917869	199656.5
2001.11	205660.8	2563437	204151.1
2001.12	280431.9	3733378	208478.8
2002.01	189055.9	2389745	214127.1
2002.02	190863.3	2461177	207264.6
2002.03	210540.7	2676830	210947.9
2002.04	221664.4	2797241	212825.8
2002.05	141816.5	1812505	206053.2
2002.06	312351.2	3899683	213161.4
2002.07	244117.1	3051373	213315
2002.08	247103.9	3032759	213566.4
2002.09	223086.3	2798297	213348.3
2002.10	202855.3	2548620	217123.6
2002.11	185909.2	2392675	216431.7
2002.12	185519.4	2531487	218117.8
2003.01	175854.4	2232578	218936.2
2003.02	165957.8	1980105	220965.8
2003.03	269811.5	3406227	220601.8
2003.04	157235.9	2031575	219623.6
2003.05	156205.3	1989406	220828.4
2003.06	165323.1	1987964	220257.7
2003.07	157623.6	1955885	224737.1
2003.08	335092.7	4077427	226837.2
2003.09	244034.5	3000219	225854.2
2003.10	224870.9	2742697	224438.3
2003.11	223389.2	2721135	222639.9
2003.12	226357.3	2824412	219423

Data for Eastside Residential Ottawa
(Ottawa D)

	Tax Receipts	Bar & Pub Sales	Tot Ret Sales (/1000)

2000.01	205977.1	2484412	149529.7
2000.02	162786.2	2008086	149351.8
2000.03	131598.2	1511812	152807.4
2000.04	239090.5	2894150	150125.7
2000.05	178248	2123832	152616.9
2000.06	189824.8	2304988	153802.4
2000.07	191831.6	2320301	155584.3
2000.08	190583.5	2297550	155509.6
2000.09	186974.8	2221145	158227
2000.10	186295.8	2275779	157082.3
2000.11	187580.2	2253799	156785.2
2000.12	178683.7	2152439	156434.4
2001.01	175810.5	2112293	157685.2
2001.02	167539.7	2025870	156643.3
2001.03	200847.5	2409373	156534.9
2001.04	244650.1	2927736	159803.6
2001.05	203026.9	2432027	159824.7
2001.06	211693	2546030	159279.6
2001.07	203840.5	2440680	157203.3
2001.08	203067.2	2443529	158699.2
2001.09	190861.7	2304189	155683.1
2001.10	181456.4	2235932	159146.5
2001.11	189915.5	2676827	162729.1
2001.12	193164.8	2339391	166178.7
2002.01	180325.6	2163415	170681
2002.02	166960.7	2027761	165210.9
2002.03	238253.2	2876633	168146.9
2002.04	135784.9	1711716	169643.8
2002.05	179379.1	2257600	164245.3
2002.06	257726.4	3081669	169911.3
2002.07	191769	2327340	170033.7
2002.08	191951.5	2335394	170234.1
2002.09	188808.5	2266665	170060.2
2002.10	173309.2	2205347	173069.6
2002.11	134643.5	1626782	172518
2002.12	135516.6	2544833	173862
2003.01	176563.2	2965212	174514.3
2003.02	161735.1	1969581	176132.1
2003.03	236806.5	2889831	175842
2003.04	179036.6	2454204	175062.3
2003.05	192621.7	2338323	176022.7
2003.06	192809.8	2349273	175567.7
2003.07	190734.4	2300189	179138.2
2003.08	179879	2173511	180812.3
2003.09	177732	2771862	180028.7
2003.10	178528.9	2184385	178900.1
2003.11	178366.3	2176397	177466.6
2003.12	176562.2	2152631	174902.4

Data for London

	Tax Receipts	Bar & Pub Sales	Tot Ret Sales (/1000)
2000.01	257172.5	2911964	340746.4
2000.02	256929.9	2970647	340341
2000.03	305608.5	3480841	348215.7
2000.04	297315	3412795	342104.7
2000.05	270293.8	2981790	347781.6
2000.06	291125.8	3544810	350483.1
2000.07	302056.7	3518241	354543.6
2000.08	283003.1	3254102	354373.5
2000.09	333389.4	3711335	360565.7
2000.10	308045.4	3469037	357957.2
2000.11	304312.9	3364504	357280.1
2000.12	331688.2	3924458	356480.8
2001.01	277943.2	3136388	359331.1
2001.02	280284.7	3164274	356956.8
2001.03	330746.3	3821636	356709.7
2001.04	311017.4	3476384	364158.5
2001.05	294229.6	3389526	364206.6
2001.06	347215.2	4177644	362964.3
2001.07	318146.2	3731133	358232.9
2001.08	329207	3717974	361641.8
2001.09	346809.4	4057603	354768.8
2001.10	298929.2	3390249	362661.1
2001.11	323315.2	3665691	370825.2
2001.12	346414.1	4004644	378686
2002.01	275346.7	3086132	388945.9
2002.02	289571.7	3203523	376480.6
2002.03	352304.8	3889371	383171.2
2002.04	298556.7	3335752	386582.2
2002.05	307256.8	3435296	374280.2
2002.06	347890.7	3938855	387191.7
2002.07	320487.6	3566890	387470.7
2002.08	351951.8	3930619	387927.3
2002.09	352438.4	3980573	387531.1
2002.10	312914.5	3482016	394388.8
2002.11	330192.3	5024156	393132
2002.12	338806.7	3880142	396194.7
2003.01	282755.8	3146788	397681.1
2003.02	271102.5	3071930	401367.7
2003.03	312067.4	3524702	400706.6
2003.04	291819.6	3225503	398929.9
2003.05	317367	3513704	401118.3
2003.06	331568.9	3746703	400081.6
2003.07	305351.5	3396985	408218
2003.08	333667.4	3930338	412032.8

2003.09	331276.3	3726515	410247.2
2003.10	303392	3728760	407675.5
2003.11	316369.2	3571305	404408.6
2003.12	298995.9	3383640	398565.4

Data for Kingston

	Tax Receipts	Bar & Pub Sales	Tot Ret Sales (/1000)
2000.01	139080.1	1679726	114438.7
2000.02	139651.4	1677475	114283.2
2000.03	182355.5	2054300	116907.5
2000.04	180915.1	2193362	114836.4
2000.05	165522.5	1959626	116722.1
2000.06	171240.5	2038810	117608.8
2000.07	193945.9	2324465	118951.1
2000.08	201945.7	2411143	118873.9
2000.09	217079.3	2570703	120930.5
2000.10	190571.9	2236738	120035.2
2000.11	167058.4	2543202	119787.8
2000.12	169104.5	2014390	119499.5
2001.01	159478.4	1887611	120434.6
2001.02	153387.4	1801784	119618.5
2001.03	186171.9	2187391	119515.3
2001.04	165138.8	2024795	121990.3
2001.05	162843.3	1934039	121985.7
2001.06	178229.9	2129323	121549
2001.07	196143.8	2348095	119944.1
2001.08	207819.8	2480433	121064.9
2001.09	200529.1	2408489	118743.9
2001.10	168299.7	1990775	121364.9
2001.11	172797.4	2053638	124075.9
2001.12	162586.4	1961544	126684.6
2002.01	150327.8	1816573	130094.8
2002.02	153776.3	1821373	125904
2002.03	185917.6	2251930	128119.7
2002.04	168493.2	1914823	129238.3
2002.05	187935.1	2249003	125104.4
2002.06	193432.4	2332933	129398.1
2002.07	215716.6	2627066	129469.4
2002.08	233757.3	2872552	129599.9
2002.09	220102.8	2629461	129445.6
2002.10	198476.5	2358473	131713.8
2002.11	189337.2	2243056	131271.8
2002.12	174779	2921886	132272
2003.01	160347.7	1888558	132745.7
2003.02	153543.5	2040892	133953.5
2003.03	184348.7	2245935	133710.1

2003.04	181993.9	2168859	133094.6
2003.05	193215.1	2332887	133802
2003.06	192784	2338346	133433.6
2003.07	220397.5	2703499	136124
2003.08	235514.1	3162099	137372.8
2003.09	215982	2616031	136754.2
2003.10	208225.3	2546190	135873.8
2003.11	186656.5	2260539	134762.2
2003.12	171787.2	2123303	132792.4

Data for Kitchener

	Tax Receipts	Bar & Pub Sales	Tot Ret Sales (/1000)
2000.01	117329	1394102	328883.1
2000.02	100978.5	1258374	328409.8
2000.03	125887.8	1522269	335924.4
2000.04	122527.4	1719469	329946.7
2000.05	116540.2	1401005	335338.1
2000.06	127261.1	1530382	337858.4
2000.07	130228.7	1402402	341687.3
2000.08	126338.9	1487308	341438
2000.09	135043.2	1667454	347317.5
2000.10	118481.2	1451476	344718.6
2000.11	136141.7	1560637	343980.6
2000.12	166883.9	2010028	343125.3
2001.01	128196.4	1562703	345782.4
2001.02	122840.9	1459232	343411.8
2001.03	139402.5	1658516	343088.4
2001.04	135771	1603663	350165.2
2001.05	120574	1915082	350124
2001.06	134831.3	1612101	348842.6
2001.07	114383.6	1395393	344209.2
2001.08	118600.5	1411982	347397.8
2001.09	138651	1629390	340710.4
2001.10	148940.7	1938408	348202.9
2001.11	141208.1	1693865	355952.6
2001.12	164811.9	1964132	363407.4
2002.01	139030.3	1665015	373160
2002.02	130457.6	2195552	361110.4
2002.03	156000.9	3824984	367436
2002.04	158562.4	1767882	370614.3
2002.05	144950.5	1701640	358730.8
2002.06	145354.7	1744589	371013.3
2002.07	131526.6	1603761	371187.8
2002.08	143426.6	1680914	371532.4
2002.09	154395.6	1804932	371060.2
2002.10	157780.3	1905474	377532.1

2002.11	154765.7	1822564	376234.9
2002.12	173232.4	2067615	379071.3
2003.01	134415.9	1587734	380398.4
2003.02	135169.9	1611024	383828.9
2003.03	155324.9	1829488	383101
2003.04	155035.9	1847921	381307
2003.05	152390.5	1786615	383303
2003.06	138889.6	1655729	382216.8
2003.07	123803.5	1468641	389892.5
2003.08	140668.7	1651776	393437.7
2003.09	161955	1879023	391634.8
2003.10	173398.6	2085112	389082.5
2003.11	198937.1	2353561	385868.2
2003.12	171893.1	2028882	380197.9

Economic Data

	Value of U.S. $/ Canada $	Index of Industrial Production	Rate of Unemployment
1999.01	1.519	106.9	7.2
1999.02	1.498	106.7	7.2
1999.03	1.518	107.1	7.2
1999.04	1.488	107.3	7.1
1999.05	1.461	107.6	7.1
1999.06	1.470	108.7	7.1
1999.07	1.489	109.9	6.7
1999.08	1.493	111.0	6.7
1999.09	1.477	111.6	6.7
1999.10	1.478	111.2	6.2
1999.11	1.467	112.1	6.2
1999.12	1.472	112.8	6.2
2000.01	1.449	113.8	6.1
2000.02	1.451	112.6	6.1
2000.03	1.461	113.5	6.1
2000.04	1.469	115.6	6.1
2000.05	1.496	115.3	6.1
2000.06	1.477	115.6	6.1
2000.07	1.478	115.4	6.1
2000.08	1.483	116.0	6.1
2000.09	1.486	115.5	6.1
2000.10	1.513	116.0	6.1
2000.11	1.543	115.8	6.1
2000.12	1.522	115.5	6.1
2001.01	1.503	117.1	6.2
2001.02	1.522	116.8	6.2
2001.03	1.559	116.5	6.2
2001.04	1.558	117.7	6.2
2001.05	1.541	117.0	6.3

2001.06	1.525	115.8	6.3
2001.07	1.531	115.2	6.4
2001.08	1.540	115.3	6.5
2001.09	1.568	112.4	6.6
2001.10	1.572	112.8	6.7
2001.11	1.592	112.9	6.9
2001.12	1.579	112.0	7.1
2002.01	1.600	114.1	7.1
2002.02	1.596	115.6	7.1
2002.03	1.588	115.5	7.0
2002.04	1.582	117.1	6.9
2002.05	1.550	116.2	6.9
2002.06	1.532	116.2	7.0
2002.07	1.546	117.8	7.0
2002.08	1.569	117.5	7.0
2002.09	1.576	118.1	7.0
2002.10	1.578	118.5	7.0
2002.11	1.572	118.1	6.9
2002.12	1.559	118.3	6.8
2003.01	1.541	118.8	6.7
2003.02	1.512	118.2	6.7
2003.03	1.476	118.0	6.7
2003.04	1.458	117.0	6.8
2003.05	1.384	116.6	6.9
2003.06	1.353	115.8	7.0
2003.07	1.382	115.6	7.2
2003.08	1.396	115.8	7.2
2003.09	1.363	117.9	7.2
2003.10	1.322	118.6	7.0
2003.11	1.313	118.7	6.8
2003.12	1.313	119.7	6.6

Appendix B. Regression Equations

The nomenclature is similar for all equations. In general:

In the dependent variable, the numerator is either tax receipts or sales receipts from bars and pubs in the designated region. The denominator is retail sales (as discussed in Appendix A) for that region.

@SEAS are the seasonal dummy variables for months 1 through 12. In general, seasonal terms with t-ratios less than unity are omitted. DSPRING is the seasonal dummy variable for changing spring patterns used in Ottawa D.

The other “D” variables represent the imposition of the smoking ban. The variable is 1 during the period the ban was in effect and 0 before it became effective.

For the economic variables:

FXCAN is the number of Canadian dollars per U.S. dollar

CANXIP is the Canadian index of industrial production

UN is the Canadian unemployment rate

XXXSAL is total retail sales for the region, where XXX is the specific designation for the region. These are OTTA, OTTB, OTTC, OTTD for the four districts of Ottawa, and LOND, KING, and KITCH for London, Kingston, and Kitchener

In many cases the economic variables are lagged. For moving average percentage changes, the first number indicates the beginning lag, and the second variable is the length of lag. For example, @PCH(FXCAN(-3),3) indicates the percentage change in the values of the Canadian dollar from 3 months ago to 6 months ago.

In general, the smoking ban variables enters the equation through a distributed lag. The precise lag distribution is then given at the bottom of each table.

Equations for the Main Downtown Region of Ottawa (Region A)

1A. Tax Receipts, no economic variables

Dependent Variable: MAINOTTAWATAX/OTTASAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic
C	1.030	0.022	47.24
@SEAS(1)	-0.205	0.033	-6.26
@SEAS(2)	-0.103	0.033	-3.15
@SEAS(3)	0.048	0.033	1.47
@SEAS(4)	0.087	0.033	2.67
@SEAS(5)	0.298	0.033	9.11
@SEAS(6)	0.326	0.033	9.97
@SEAS(7)	0.457	0.033	13.96
@SEAS(8)	0.357	0.033	10.91
@SEAS(9)	0.256	0.033	7.83
@SEAS(10)	0.112	0.033	3.43
PDL01	-0.010	0.002	-4.22

R-squared	0.948	Mean dependent var	1.129
Adjusted R-squared	0.932	S.D. dependent var	0.204
Durbin-Watson stat	1.37		

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.0171	0.0041	-4.22
* .|	1	-0.0147	0.0035	-4.22
* .|	2	-0.0122	0.0029	-4.22
* .|	3	-0.0098	0.0023	-4.22
* .|	4	-0.0073	0.0017	-4.22
* .|	5	-0.0049	0.0012	-4.22
* .|	6	-0.0024	0.0006	-4.22
	Sum of Lags	-0.0686	0.0163	-4.22

1B. Tax Receipts, economic variables

Dependent Variable: MAINOTTAWATAX/OTTASAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic
C	-0.394	0.576	-0.68
@SEAS(1)	-0.206	0.029	-7.13
@SEAS(2)	-0.100	0.029	-3.51
@SEAS(3)	0.057	0.029	1.98

@SEAS(4)	0.110	0.029	3.74
@SEAS(5)	0.330	0.030	10.95
@SEAS(6)	0.346	0.030	11.59
@SEAS(7)	0.472	0.030	15.83
@SEAS(8)	0.375	0.031	12.22
@SEAS(9)	0.292	0.032	9.22
@SEAS(10)	0.133	0.030	4.42
@PCH(FXCAN(-3),3)	0.010	0.003	3.31
D(UN)	-0.155	0.089	-1.74
@MOVAV(OTTASAL(-7),5)	0.002	0.001	2.20
@MOVAV(FXCAN(-6),6)	0.623	0.343	1.81
PDL01	-0.021	0.006	-3.80

R-squared	0.967	Mean dependent var	1.129
Adjusted R-squared	0.952	S.D. dependent var	0.205
Durbin-Watson stat	1.86		

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.0374	0.0098	-3.80
* .|	1	-0.0320	0.0084	-3.80
* .|	2	-0.0267	0.0070	-3.80
* .|	3	-0.0214	0.0056	-3.80
* .|	4	-0.0160	0.0042	-3.80
* .|	5	-0.0107	0.0028	-3.80
* .|	6	-0.0053	0.0014	-3.80
	Sum of Lags	-0.1496	0.0394	-3.80

1C. Sales, no economic variables

Dependent Variable: MAINOTTAWABARPUBSAL/OTTASAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic
C	12.573	0.859	14.64
@SEAS(1)	-3.274	1.642	-1.99
@SEAS(3)	1.950	1.641	1.19
@SEAS(5)	6.552	1.641	3.99
@SEAS(6)	4.576	1.641	2.79
@SEAS(7)	4.209	1.641	2.57
@SEAS(8)	3.239	1.641	1.97
@SEAS(9)	4.815	1.639	2.94
PDL01	-0.054	0.130	-0.41

R-squared	0.508	Mean dependent var	14.208
Adjusted R-squared	0.407	S.D. dependent var	3.884
Durbin-Watson stat	1.78		

Lag Distribution of	i	Coefficient	Std. Error	T-Statistic

DOTTAWA		t		
* .|	0	-0.094	0.227	-0.41
* .|	1	-0.081	0.195	-0.41
* .|	2	-0.067	0.162	-0.41
* .|	3	-0.054	0.130	-0.41
* .|	4	-0.040	0.097	-0.41
* .|	5	-0.027	0.065	-0.41
* .|	6	-0.013	0.032	-0.41
	Sum of Lags	-0.377	0.908	-0.41

1D. Sales, economic variables

Dependent Variable: MAINOTTAWABARPUBSAL/OTTASAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	-73.465	40.806	-1.80	
@SEAS(1)	-3.959	1.569	-2.52	
@SEAS(5)	5.794	1.572	3.69	
@SEAS(6)	3.798	1.573	2.41	
@SEAS(7)	3.404	1.575	2.16	
@SEAS(8)	2.417	1.576	1.53	
@SEAS(9)	4.305	1.560	2.76	
@MOVAV(FXCAN(-6),12)	58.380	27.569	2.12	
PDL01	-0.650	0.305	-2.13	
R-squared	0.543	Mean dependent var		14.208
Adjusted R-squared	0.449	S.D. dependent var		3.884
Durbin-Watson stat	1.99			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-1.137	0.533	-2.13
* .|	1	-0.975	0.457	-2.13
* .|	2	-0.812	0.381	-2.13
* .|	3	-0.650	0.305	-2.13
* .|	4	-0.487	0.228	-2.13
* .|	5	-0.325	0.152	-2.13
* .|	6	-0.162	0.076	-2.13
	Sum of Lags	-4.549	2.132	-2.13

Remaining Downtown Region of Ottawa (Ottawa B)

2A. Tax Receipts, no economic variables

Dependent Variable: OTHDTWNTAX/OTTBSAL
Method: Least Squares

Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	1.251	0.017	71.59	
@SEAS(1)	-0.117	0.036	-3.22	
@SEAS(2)	-0.076	0.036	-2.09	
@SEAS(3)	0.058	0.036	1.60	
@SEAS(5)	0.094	0.036	2.59	
@SEAS(6)	0.086	0.036	2.37	
PDL01	-0.019	0.003	-6.51	
R-squared	0.650	Mean dependent var		1.182
Adjusted R-squared	0.599	S.D. dependent var		0.107
Durbin-Watson stat	0.78			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.0335	0.0051	-6.51
* .|	1	-0.0287	0.0044	-6.51
* .|	2	-0.0239	0.0037	-6.51
* .|	3	-0.0191	0.0029	-6.51
* .|	4	-0.0144	0.0022	-6.51
* .|	5	-0.0096	0.0015	-6.51
* .|	6	-0.0048	0.0007	-6.51
	Sum of Lags	-0.1340	0.0206	-6.51

2B. Tax Receipts, economic variables

Dependent Variable: OTHDTWNTAX/OTTBSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.336	0.177	1.90	
@SEAS(1)	-0.143	0.029	-4.95	
@SEAS(2)	-0.099	0.029	-3.45	
@SEAS(3)	0.040	0.029	1.38	
@SEAS(5)	0.079	0.029	2.77	
@SEAS(6)	0.077	0.028	2.70	
@MOVAV(FXCAN(-1),3)	0.614	0.119	5.18	
PDL01	-0.020	0.002	-8.74	
R-squared	0.790	Mean dependent var		1.182
Adjusted R-squared	0.754	S.D. dependent var		0.107
Durbin-Watson stat	1.20			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.0353	0.0040	-8.74
* .|	1	-0.0303	0.0035	-8.74
* .|	2	-0.0252	0.0029	-8.74
* .|	3	-0.0202	0.0023	-8.74
* .|	4	-0.0151	0.0017	-8.74
* .|	5	-0.0101	0.0012	-8.74
* .|	6	-0.0050	0.0006	-8.74
	Sum of Lags	-0.1414	0.0162	-8.74

2C. Sales, no economic variables

Dependent Variable: OTHDTWNBARPUBSAL/OTTBSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	14.572	0.432	33.71	
@SEAS(3)	3.761	0.933	4.03	
@SEAS(5)	1.003	0.933	1.08	
@SEAS(10)	0.977	0.934	1.05	
@SEAS(12)	1.400	0.937	1.49	
@SEAS(6)	0.926	0.933	0.99	
PDL01	-0.273	0.076	-3.60	
R-squared	0.427	Mean dependent var		14.210
Adjusted R-squared	0.344	S.D. dependent var		2.153
Durbin-Watson stat	1.96			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.478	0.133	-3.60
* .|	1	-0.409	0.114	-3.60
* .|	2	-0.341	0.095	-3.60
* .|	3	-0.273	0.076	-3.60
* .|	4	-0.205	0.057	-3.60
* .|	5	-0.136	0.038	-3.60
* .|	6	-0.068	0.019	-3.60
	Sum of Lags	-1.910	0.531	-3.60

2D. Sales, economic variables

Dependent Variable: OTHDTWNBARPUBSAL/OTTBSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic
C	-38.294	19.635	-1.95

@SEAS(3)	3.840	0.874	4.39
@SEAS(5)	1.008	0.872	1.16
@SEAS(6)	0.976	0.878	1.11
@SEAS(10)	0.928	0.873	1.06
@SEAS(12)	1.363	0.876	1.56
FXCAN	5.840	3.091	1.89
@MOVAV(CANXIP,6)	0.383	0.159	2.41
PDL01	-0.335	0.078	-4.30

R-squared	0.525	Mean dependent var	14.210
Adjusted R-squared	0.428	S.D. dependent var	2.153
Durbin-Watson stat	2.38		

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.586	0.136	-4.30
* .|	1	-0.502	0.117	-4.30
* .|	2	-0.418	0.097	-4.30
* .|	3	-0.335	0.078	-4.30
* .|	4	-0.251	0.058	-4.30
* .|	5	-0.167	0.039	-4.30
* .|	6	-0.084	0.019	-4.30
	Sum of Lags	-2.343	0.545	-4.30

3. Equations for part of residential Ottawa west of Rideau River (Ottawa C)

3A. Tax Receipts, no economic variables

Dependent Variable: OTTAWACTAX/OTTCSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	1.259	0.041	30.98	
@SEAS(2)	-0.139	0.086	-1.61	
@SEAS(5)	-0.150	0.086	-1.74	
@SEAS(12)	0.180	0.087	2.07	
@SEAS(6)	0.130	0.086	1.51	
@SEAS(8)	0.209	0.086	2.41	
PDL01	-0.044	0.007	-6.28	

R-squared	0.583	Mean dependent var	1.111
Adjusted R-squared	0.522	S.D. dependent var	0.234
Durbin-Watson stat	1.96		

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.077	0.012	-6.28
* .|	1	-0.066	0.011	-6.28
* .|	2	-0.055	0.009	-6.28
* .|	3	-0.044	0.007	-6.28
* .|	4	-0.033	0.005	-6.28
* .|	5	-0.022	0.004	-6.28

* .|	6	-0.011	0.002	-6.28
	Sum of Lags	-0.309	0.049	-6.28

3B. Tax receipts, economic variables

Dependent Variable: OTTAWACTAX/OTTCSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	1.240	0.039	32.02	
@SEAS(2)	-0.140	0.082	-1.70	
@SEAS(5)	-0.147	0.081	-1.82	
@PCH(FXCAN(-1),1)	2.965	1.722	1.72	
@SEAS(12)	0.156	0.083	1.88	
@SEAS(6)	0.185	0.085	2.19	
@SEAS(8)	0.193	0.084	2.30	
@PCH(CANXIP,3)	0.0292	0.0161	1.82	
PDL01	-0.041	0.007	-5.69	
R-squared	0.651	Mean dependent var		1.111
Adjusted R-squared	0.580	S.D. dependent var		0.234
Durbin-Watson stat	2.26			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.071	0.013	-5.69
* .|	1	-0.061	0.011	-5.69
* .|	2	-0.051	0.009	-5.69
* .|	3	-0.041	0.007	-5.69
* .|	4	-0.031	0.005	-5.69
* .|	5	-0.020	0.004	-5.69
* .|	6	-0.010	0.002	-5.69
	Sum of Lags	-0.286	0.050	-5.69

3C. Sales, no economic variables

Dependent Variable: OTTAWACBARPUBSAL/OTTCSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	17.031	0.537	31.72	
@SEAS(2)	-2.677	1.226	-2.18	
@SEAS(5)	-3.209	1.226	-2.62	
PDL01	-0.621	0.101	-6.15	
R-squared	0.516	Mean dependent var		14.186
Adjusted R-squared	0.483	S.D. dependent var		3.249
Durbin-Watson stat	2.324			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-1.087	0.177	-6.15
* .|	1	-0.931	0.151	-6.15
* .|	2	-0.776	0.126	-6.15
* .|	3	-0.621	0.101	-6.15
* .|	4	-0.466	0.076	-6.15
* .|	5	-0.310	0.050	-6.15
* .|	6	-0.155	0.025	-6.15
	Sum of Lags	-4.347	0.707	-6.15

3D. Sales, economic variables

Dependent Variable: OTTAWACBARPUBSAL/OTTCSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	16.664	0.535	31.14	
@SEAS(2)	-2.440	1.177	-2.07	
@SEAS(5)	-3.302	1.176	-2.81	
@PCH(FXCAN(-1),1)	0.469	0.228	2.06	
@PCH(CANXIP,6)	0.232	0.155	1.50	
PDL01	-0.544	0.102	-5.32	
R-squared	0.579	Mean dependent var		14.186
Adjusted R-squared	0.529	S.D. dependent var		3.249
Durbin-Watson stat	2.467			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.951	0.179	-5.32
* .|	1	-0.815	0.153	-5.32
* .|	2	-0.679	0.128	-5.32
* .|	3	-0.544	0.102	-5.32
* .|	4	-0.408	0.077	-5.32
* .|	5	-0.272	0.051	-5.32
* .|	6	-0.136	0.026	-5.32
	Sum of Lags	-3.805	0.715	-5.32

Equations for part of residential Ottawa east of Rideau River (Ottawa D)

4A. Tax Receipts, no economic variables

Dependent Variable: OTTAWADTAX/OTTDSAL
Method: Least Squares
Sample: 2000:01 2003:12

Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	1.197	0.036	33.09	
@SEAS(3)	0.115	0.081	1.43	
@SEAS(4)	0.125	0.081	1.55	
@SEAS(6)	0.182	0.081	2.27	
PDL01	-0.024	0.007	-3.66	
R-squared	0.344	Mean dependent var		1.140
Adjusted R-squared	0.283	S.D. dependent var		0.180
Durbin-Watson stat	2.18			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.042	0.012	-3.66
* .|	1	-0.036	0.010	-3.66
* .|	2	-0.030	0.008	-3.66
* .|	3	-0.024	0.007	-3.66
* .|	4	-0.018	0.005	-3.66
* .|	5	-0.012	0.003	-3.66
* .|	6	-0.006	0.002	-3.66
	Sum of Lags	-0.169	0.046	-3.66

4B. Tax Receipts, economic variables

Dependent Variable: OTTAWADTAX/OTTDSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.288	0.417	0.69	
@SEAS(4)	0.185	0.056	3.31	
@SEAS(6)	0.177	0.054	3.29	
@SEAS(7)	0.065	0.054	1.21	
DSPRING	0.312	0.043	7.32	
FXCAN(-5)	0.608	0.280	2.17	
PDL01	-0.028	0.005	-5.88	
R-squared	0.721	Mean dependent var		1.140
Adjusted R-squared	0.680	S.D. dependent var		0.180
Durbin-Watson stat	1.40			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.0487	0.0083	-5.88
* .|	1	-0.0417	0.0071	-5.88
* .|	2	-0.0348	0.0059	-5.88
* .|	3	-0.0278	0.0047	-5.88
* .|	4	-0.0209	0.0036	-5.88
* .|	5	-0.0139	0.0024	-5.88
* .|	6	-0.0070	0.0012	-5.88
	Sum of Lags	-0.1947	0.0331	-5.88

4C. Sales, no economic variables

Dependent Variable: OTTAWADBARPUBSAL/OTTDSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	14.774	0.453	32.64	
@SEAS(2)	-1.679	1.007	-1.67	
@SEAS(4)	1.301	1.007	1.29	
@SEAS(6)	1.496	1.007	1.49	
PDL01	-0.185	0.083	-2.24	
R-squared	0.224	Mean dependent var		14.165
Adjusted R-squared	0.152	S.D. dependent var		2.074
Durbin-Watson stat	2.39			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.324	0.145	-2.24
* .|	1	-0.278	0.124	-2.24
* .|	2	-0.232	0.103	-2.24
* .|	3	-0.185	0.083	-2.24
* .|	4	-0.139	0.062	-2.24
* .|	5	-0.093	0.041	-2.24
* .|	6	-0.046	0.021	-2.24
	Sum of Lags	-1.297	0.578	-2.24

4D. Sales, economic variables

Dependent Variable: OTTAWADSAL/OTTDSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.355	10.394	-0.90	
@SEAS(4)	2.210	0.776	2.85	
@SEAS(6)	1.575	0.750	2.10	
DSPRING	3.606	0.597	6.04	
FXCAN(-5)	9.749	4.137	2.36	
OTTDSAL(-6)/1000	0.061	0.043	1.42	
PDL01	-0.381	0.128	-2.98	
R-squared	0.590	Mean dependent var		14.165
Adjusted R-squared	0.530	S.D. dependent var		2.074
Durbin-Watson stat	2.02			

Lag Distribution of DOTTAWA	i	Coefficient	Std. Error	T-Statistic
* .|	0	-0.667	0.224	-2.98
* .|	1	-0.572	0.192	-2.98

* .|	2	-0.477	0.160	-2.98
* .|	3	-0.381	0.128	-2.98
* .|	4	-0.286	0.096	-2.98
* .|	5	-0.191	0.064	-2.98
* .|	6	-0.095	0.032	-2.98
	Sum of Lags	-2.670	0.896	-2.98

Equations for London

5A. Tax Receipts, no economic variables

Dependent Variable: LONDONTAX/LONDSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	0.874	0.009	92.14	
@SEAS(1)	-0.137	0.024	-5.76	
@SEAS(2)	-0.127	0.024	-5.36	
@SEAS(4)	-0.067	0.024	-2.81	
@SEAS(5)	-0.074	0.024	-3.13	
@SEAS(9)	0.057	0.024	2.41	
@SEAS(10)	-0.042	0.024	-1.80	
DLONDON	-0.102	0.020	-5.16	
R-squared	0.679	Mean dependent var		0.828
Adjusted R-squared	0.623	S.D. dependent var		0.071
Durbin-Watson stat	1.30			

5B. Tax receipts, economic variables

Dependent Variable: LONDONTAX/LONDSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	
C	1.241	0.104	11.88	
@SEAS(1)	-0.130	0.021	-6.20	
@SEAS(2)	-0.122	0.021	-5.79	
@SEAS(4)	-0.062	0.021	-2.95	
@SEAS(5)	-0.070	0.021	-3.34	
@SEAS(9)	0.054	0.021	2.59	
@SEAS(10)	-0.045	0.021	-2.18	
DLONDON	-0.083	0.018	-4.53	
@MOVAV(UN(-6),6)	-0.057	0.016	-3.53	
R-squared	0.757	Mean dependent var		0.828
Adjusted R-squared	0.707	S.D. dependent var		0.071
Durbin-Watson stat	1.76			

5C. Sales, no economic variables

Dependent Variable: LONDONSAL/LONDSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.207	0.155	65.98	
@SEAS(1)	-1.927	0.406	-4.74	
@SEAS(2)	-1.768	0.406	-4.35	
@SEAS(4)	-1.148	0.406	-2.83	
@SEAS(5)	-1.253	0.406	-3.08	
@SEAS(10)	-0.701	0.407	-1.72	
DLONDON	-1.009	0.407	-2.48	
D(DLONDON(-4),0,2)	-0.538	0.659	-0.82	
R-squared	0.541	Mean dependent var		9.492
Adjusted R-squared	0.461	S.D. dependent var		1.023
Durbin-Watson stat	1.87			

5D. Sales, economic variables

Dependent Variable: LONDONSAL/LONDSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.678	1.959	6.98	
@SEAS(1)	-1.729	0.395	-4.38	
@SEAS(2)	-1.744	0.406	-4.30	
@SEAS(4)	-0.952	0.394	-2.42	
@SEAS(5)	-1.220	0.402	-3.03	
@SEAS(9)	0.381	0.397	0.96	
@SEAS(10)	-0.589	0.396	-1.49	
@SEAS(11)	0.582	0.407	1.43	
@MOVAV(UN(-6),6)	-0.556	0.300	-1.85	
@PCH(CANXIP(-1),2)	15.874	9.584	1.66	
DLONDON	-0.809	0.408	-1.98	
D(DLONDON(-4),0,2)	-0.972	0.679	-1.43	
R-squared	0.629	Mean dependent var		9.492
Adjusted R-squared	0.515	S.D. dependent var		1.023
Durbin-Watson stat	1.98			

Equations for Kingston

6A. Tax Receipts, no economic variables

Dependent Variable: KINGSTONTAX/KINGSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.395	0.018	77.10	
@SEAS(1)	-0.169	0.039	-4.38	
@SEAS(2)	-0.177	0.039	-4.58	

@SEAS(3)	0.091	0.039	2.37	
@SEAS(6)	0.070	0.039	1.82	
@SEAS(7)	0.243	0.039	6.28	
@SEAS(8)	0.338	0.039	8.75	
@SEAS(9)	0.333	0.043	7.67	
@SEAS(10)	0.115	0.038	3.01	
@MOVAV(DKINGSTON(-4),4)	-0.050	0.055	-0.99	
D(DKINGSTON(-4))	-0.1352	0.080	-1.69	
R-squared	0.875	Mean dependent var		1.460
Adjusted R-squared	0.841	S.D. dependent var		0.171
Durbin-Watson stat	1.38			

6B. Tax Receipts, economic variables

Dependent Variable: KINGSTONTAX/KINGSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.607	0.166	9.66	
@SEAS(1)	-0.176	0.036	-4.92	
@SEAS(2)	-0.179	0.036	-5.01	
@SEAS(3)	0.083	0.036	2.32	
@SEAS(6)	0.068	0.036	1.89	
@SEAS(7)	0.252	0.036	7.03	
@SEAS(8)	0.346	0.036	9.65	
@SEAS(9)	0.338	0.040	8.42	
@SEAS(10)	0.132	0.036	3.67	
@PCH(CANXIP,6)	0.991	0.482	2.05	
UN	-0.033	0.025	-1.33	
@MOVAV(DKINGSTON(-4),4)	-0.072	0.053	-1.37	
D(DKINGSTON(-4))	-0.107	0.075	-1.43	
R-squared	0.899	Mean dependent var		460
Adjusted R-squared	0.864	S.D. dependent var		0.171
Durbin-Watson stat	1.82			

6C. Sales, no economic variables

Dependent Variable: KINGSTONSAL/KINGSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.700	0.287	61.63	
@SEAS(1)	-3.064	0.721	-4.25	
@SEAS(2)	-2.839	0.721	-3.94	
@SEAS(4)	-0.997	0.721	-1.38	
@SEAS(7)	2.117	0.721	2.94	

@SEAS(8)	3.789	0.721	5.25
@SEAS(9)	2.918	0.816	3.58
@MOVAV(DKINGSTON(-4),4)	-1.040	1.045	-0.99
D(DKINGSTON(-4))	-1.229	1.549	-0.79

R-squared	0.723	Mean dependent var	17.780
Adjusted R-squared	0.667	S.D. dependent var	2.291
Durbin-Watson stat	1.98		

6D. Sales, economic variables

Dependent Variable: KINGSTONSAL/KINGSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.992	4.009	2.99	
@SEAS(1)	-3.445	0.711	-4.84	
@SEAS(2)	-3.213	0.709	-4.53	
@SEAS(4)	-1.112	0.707	-1.57	
@SEAS(7)	2.321	0.686	3.38	
@SEAS(8)	3.762	0.681	5.52	
@SEAS(9)	3.069	0.770	3.99	
@MOVAV(KINGSAL(-1),6)/1000	0.045	0.032	1.41	
D(UN)	-3.923	2.810	-1.40	
@MOVAV(DKINGSTON(-4),4)	-2.486	1.318	-1.89	
D(DKINGSTON(-4))	-1.826	1.575	-1.16	
@PCH(CANXIP,2)	22.782	20.885	1.09	
@PCH(CANXIP(-6),6)	18.258	9.464	1.93	

R-squared	0.784	Mean dependent var	17.780
Adjusted R-squared	0.710	S.D. dependent var	2.291
Durbin-Watson stat	2.45		

Equations for Kitchener

7A. Tax Receipts, no economic variables

Dependent Variable: KITCHENERTAX/KITCHSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.462	0.014	34.11	
@SEAS(1)	-0.092	0.019	-4.72	
@SEAS(2)	-0.111	0.019	-5.69	
@SEAS(3)	-0.052	0.019	-2.70	
@SEAS(4)	-0.057	0.019	-2.92	

@SEAS(5)	-0.082	0.019	-4.21
@SEAS(6)	-0.076	0.019	-3.89
@SEAS(7)	-0.116	0.019	-6.05
@SEAS(8)	-0.098	0.019	-5.14
@SEAS(9)	-0.056	0.019	-2.92
@SEAS(10)	-0.053	0.019	-2.79
@SEAS(11)	-0.032	0.019	-1.69
D(DKIT,0,6)	-0.028	0.013	-2.22

R-squared	0.690	Mean dependent var	0.390
Adjusted R-squared	0.584	S.D. dependent var	0.042
Durbin-Watson stat	1.33		

7B. Tax Receipts, economic variables

Dependent Variable: KITCHENERTAX/KITCHSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.459	0.012	37.35	
@SEAS(1)	-0.097	0.018	-5.47	
@SEAS(2)	-0.113	0.018	-6.43	
@SEAS(3)	-0.057	0.018	-3.20	
@SEAS(4)	-0.058	0.018	-3.31	
@SEAS(5)	-0.080	0.018	-4.57	
@SEAS(6)	-0.070	0.018	-3.99	
@SEAS(7)	-0.107	0.018	-6.10	
@SEAS(8)	-0.095	0.017	-5.46	
@SEAS(9)	-0.054	0.017	-3.11	
@SEAS(10)	-0.054	0.017	-3.11	
@SEAS(11)	-0.031	0.017	-1.80	
@PCH(CANXIP,3)*100	0.0082	0.003	2.95	
D(DKIT,0,6)	-0.037	0.012	-3.10	

R-squared	0.753	Mean dependent var	0.390
Adjusted R-squared	0.659	S.D. dependent var	0.042
Durbin-Watson stat	1.63		

7C. Sales, no economic variables

Dependent Variable: KITCHENERSAL/KITCHSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.941	0.155	31.93	
@SEAS(3)	1.385	0.461	3.00	
@SEAS(7)	-0.880	0.462	-1.90	
@SEAS(8)	-0.655	0.462	-1.42	
D(DKIT,0,6)	-0.752	0.387	-1.94	

R-squared	0.289	Mean dependent var	4.835
Adjusted R-squared	0.223	S.D. dependent var	0.988
Durbin-Watson stat	1.62		

7D. Sales, economic variables

Dependent Variable: KITCHENERSAL/KITCHSAL
Method: Least Squares
Sample: 2000:01 2003:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.918	0.151	32.64	
@SEAS(1)	-0.633	0.432	-1.47	
@SEAS(3)	1.179	0.431	2.74	
@SEAS(7)	-0.670	0.437	-1.53	
@SEAS(8)	-0.605	0.429	-1.41	
D(DKIT,0,6)	-0.987	0.371	-2.66	
@PCH(CANXIP,3)*100	0.261	0.090	2.91	

R-squared	0.424	Mean dependent var	4.835
Adjusted R-squared	0.340	S.D. dependent var	0.988
Durbin-Watson stat	1.83		