THE IMPACT of E-COMMERCE TAX POLICY on STATE and LOCAL GOVERNMENT REVENUE

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ABSTRACT

Efforts have been made to impose sales tax on all items purchased online in order to decrease losses of revenue within the states. Currently, many states are not collecting taxes on online transactions. This has sparked debate in Congress, state, and local governments as to whether taxes should be imposed on online transactions as well as who should standardize online taxing: individual states or the local governments. The outcome of this research shows that the estimated revenue losses of $13.3 Billion in 2001 will rise to $62.1 Billions by 2011. Losses from e-commerce revenues have been found to have a significant impact on state economies.

Keywords: Revenue loss, sales tax, linear regression, e-commerce

INTRODUCTION

Dave Chaffey, e-commerce consultant and specialist, defines e-commerce as all electronically mediated information exchanges between an organization and its customers (Chaffey, 2004). Generally, e-commerce is the distribution, buying, selling, marketing and servicing of products or services over electronic systems such as the Internet and other computing devices. It continues to redesign the economic market for many years and changes the way consumers, suppliers, and businesses interact and work internally. There are three categories of e-commerce: business-to-business (B2B), business-to-consumer (B2C) and consumer-to-consumer (C2C). E-commerce primarily produces more profit on business-to-business

transactions (a business that sells and buys from another business) and business-to-consumer transactions (consumers buying goods/services from around the world). Such transactions are tax-free unless the retailer has a store in the consumer's state. The publication *Report on E-commerce: The Policy Requirements* states that the US currently accounts for about 80 % of global e-commerce. Recent figures suggest that 37 % of the US population have Internet access at home or at work, 61 % of US businesses have Internet access. The proportion of US companies that sell their products over the Internet was forecast to jump from 24 % in 1998 to 56% by 2000. (Fortfás, 2000)

If states and local governments are to grow financially, they need to create a revenue-based program that would allow them to generate the funds necessary to meet their future responsibilities. State and local governments need to implement a uniform sales tax system. Currently, 38 of the 45 sales-tax-states are involved in the Streamlined Sales Tax Project (SSTP). This project is simply an effort created by state governments with input from local governments and the private sector to simplify and modernize sales tax collection and administration. (McLure, 2000).

Failure to collect taxes has a number of potentially important implications. Firms have a desire to locate production and sales activity to avoid tax collection responsibility, thereby imposing economic efficiency losses on the overall economy. The sales tax becomes more regressive as those who are able to purchase offline are more likely to pay sales taxes than those who purchase online more frequently. Furthermore, state and local government tax revenues are reduced. A rapid escalation in electronic transactions has exaggerated state and local government's problems in successfully collecting sales taxes; because e-commerce has become a growing issue in the current years, state and local governments lose billions of dollars on online transactions. The sale transactions carried out online are immediate because e-commerce involves many computers communicating at rapid speeds. They are also unidentifiable because the Internet does not require users to reveal their location or correct identity. This absence of the actual physical presence of the seller, buyer, and goods make tax enforcement impossible.

LITERATURE REVIEW

Alison Shelton, an economic researcher from the American Association of Retired Persons Public Policy Institute, argues that sales tax provides about 25 percent, on average, of state and local tax revenues. These taxes go uncollected on many Internet sales. This is because the Supreme Court has placed limits on the states' abilities to require certain out-of-state merchants to collect the tax. Moreover, consumers have failed to carry out their legal responsibilities to submit the sales tax to their home states. Thus under the existing laws related to sales tax, identical products may be taxed differently depending on whether they are purchased over the Internet, through a catalogue, or in a traditional "mortar-and-bricks" store. Traditional retailers accuse that this situation confers a price advantage on catalogue and Internet retailers. (Shelton, 2001)

The sales tax base for state and local governments is shrinking because of the expanded use of services not subject to sales tax and legislatively granted exemptions. These services include purchases made through the Internet, telephone, and catalogs (Bruce, 2001). E-commerce is merely one of the casual factors in the reduction.

A 1992 U.S. Supreme Court decision stated that states can only require sellers that have a physical presence or "nexus" in the same state as the consumer to collect sales taxes. It was further stated that with a rough patchwork of nearly 7,500 taxing jurisdictions across the country, it is too complex and burdensome for online retailers to charge and collect sales taxes. In order to collect the taxes, the court ruled, states would need to first simplify the existing system (Mark, 2002).

Many states rely on sales tax revenue and are afraid that with the growth of Internet Commerce, they stand to lose billions of dollars in revenue on the state and local level. In a recent Congressional Research Service (CRS) Report for Congress, the U.S. Supreme Court sees the enforcing and collection of taxes by state and local governments as too much of a burden, not worth the bother. "Based on CRS calculations of state and local sales tax revenue as a portion of total tax revenue, Washington, Tennessee and Arizona are the states and local jurisdictions most reliant on the sales tax. In those states over 40% of total tax revenue is derived from the sales tax." (Maguire, 2005)

In an article titled, *Don't Tax Internet Purchases*, it was noted: If one state or city imposes a sales tax rate that is too high in relation to public services those taxes help finance, its tax base will shrink as businesses and consumers move to other jurisdictions with lower taxes and better roads and schools. This places local retailers at a competitive disadvantage. Mail-order businesses and e-tailers also have a disadvantage of their own in the form of the shipping and handling charges their customers must pay. (Shughart, 2000)

Based on information on ThisNation.com, most state and local government tax systems and budget plans would be seriously disrupted if sales tax revenue disappears altogether. This could yield a fiscal crisis causing state and local governments to either raise revenue in other ways such as increasing income or property taxes or reducing public services. It goes on to state that taxing Internet purchases is further complicated because most purchases are made across state borders. In such cases where should the tax be collected? If the tax is collected at the point of sale, people would migrate to online stores within tax-free states.

Former congressman Jack Kemp in an article, Cal-Tax Digest states that he believes the "Internet is a driving force in the American and World economies. The current federal tax code is a confusing and corrupting burden on our economy. Certain factions are seeking to impose a new national framework of Internet taxation that may contain the same flaws as the current federal code and that may be unconstitutional." (Kemp, 2000)

OBJECTIVE

The objective of this project is to gather and investigate e-commerce revenue losses, examine the trend of e-commerce revenue losses from data collected to forecast future revenue loss estimates, and recommend ways to minimize the ever-growing phenomenon of e-commerce revenue losses. The given data applied in the linear regression equation estimates the revenue losses

HYPOTHESES

Given the revenue losses from the University of Tennessee 2001 through 2007 reports, the following null and alternative hypothesis were made:

H_0: The estimated revenue losses for 2008 to 2011 will not increase.

H_a: The estimated revenue losses for 2008 to 2011 will increase.

METHODOLOGY

To estimate the amount of revenue losses, Microsoft Excel was used to apply the linear regression equation mathematically. The process of estimating the future values of E-Commerce revenues involved two steps. The first step was to determine the regression line, which is a mathematical equation. The second step was to use the mathematical equation to estimate revenue losses. The equation expresses the functional relationship between two variables. In estimating Y values from x values, the value of Y is a function of x and uses the slope-intercept form of the equation for a straight line. The equation for a straight line used in estimation is:

$Y = a + bx$ (1)

Where, Y = estimated revenue losses; a = Y intercept; b = slope of the line; x = Time in years.

The slope of a line is defined as the amount of change in Y that corresponds to a change of 1 unit in x. The slope of a line can be positive or negative and can be less than or greater than 1. The intercept of the line is defined as the value of Y where x equals 0 (Jurs, 1998).

A Linear Regression (LR) line is a trend line that is drawn mathematically so that it represents the 'best fit' for the data points it passes through. The formula uses the least square method to determine the line's placement. This minimizes the distances between the data points and the trend line (Arrington, 2006).

The first step was to calculate the value of *b* by using the formula below:

$$b = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sum (x-\bar{x})^2} \qquad (2)$$

After *b* was calculated, the next step was to calculate *a* by using:

$$a = \bar{y} - b\bar{x} \qquad (3)$$

After both *a* and *b* were calculated, they were then substituted into the Y formula to estimate the revenue losses for years 2008 up to 2011.

DATA COLLECTION

Given the availability of data, the use of information from the University of Tennessee research estimates shows how much revenue the U.S. would lose in the next 4 years.

Year	Revenue Losses(Billions of Dollars)
2001	13.3
2002	18.9
2003	26.2
2004	35.4
2005	41.3
2006	45.2
2007	48.2

Table 1: Yearly Revenue Loss from University of Tennessee

This report estimated that in 2001, e-commerce was likely to cause total state and local government revenue losses of $13.3 billion. By 2006, the losses would more than triple to $45.2 billion and in 2011 the losses would be $54.8 billion. Measuring the states' e-commerce revenue losses against their total state tax revenues also shows significant impact. A final measurement of the impact of e-commerce losses is the resulting increase in the sales tax rate necessary to replace the lost revenue. In 2011, rates would have to rise between 0.83 and 1.72 percentage points to replace the total e-commerce losses. (Bruce & Fox, 2004)

METHOD OF ANALYSIS

The data collected for 6 consultative years were analyzed accordingly by means of the quantitative technique using the linear regression equation. Microsoft Excel also allows the user to predict the average value for y for a specified value of x in a number of approaches. In this approach, the user enters the regression formula in a worksheet cell and inserts the value or cell location of the value for the independent variable, x, into the formula. The cell would then display the predicted y value. Formulas were used to compute and estimate revenue loss for the following years: 2008 through 2011. Based on the data from 2001 to 2007, the estimated revenue losses for 2008 were calculated. After that 2008 estimate was calculated, the process was repeated to estimate the number of revenue loss for 2009-2011.

By using the Forecast function, results of the estimates from 2008 to 2011 were as follows: 2008, 51.8 billion dollars; 2009, 55.2 billion dollars; 2010, 58.7 billion dollars; 2011, 62.1 billions dollars as shown in Table 2. The estimated results are higher than the University of Tennessee research estimates. Once a good fitting relationship was found, it was used to predict the average value for y for a specified value of x.

Year	*Projected Revenue Loss*
2008	51.8
2009	55.2
2010	58.7
2011	62.1

Table 2: Forecast Revenue Loss in Output View using the Forecast Function

Estimated for 2008 through 2011 were generated through the linear regression method using Microsoft Excel. Another function called Trend was also used in these estimates. The Trend function is similar to Forecast. A linear relationship is assumed between the x and y data sets. However, TREND is an array function and returns an array of unknown y values. The first two arguments to TREND are the Known x and y data sets. The third argument is the array of x values for which we wish to predict the corresponding Y data. Where x values are the years and y values are the billions of dollars. The general format for this function is:

=TREND (range of y values, range of x values, range of x values to be used for predicting).

The trend is the long-run shift or movement in the time series observable over several periods of time (Anderson et al, 1996). The TREND function allowed the user to select the range of values from Table 3.

TREND Function	
Year	**Given Revenue Losses (Billions of Dollars)**
2001	13.3
2002	18.9
2003	26.2
2004	35.4
2005	41.3
2006	45.2
2007	48.2
Year	**Estimated Revenue Loss**
2008	=TREND(D20:D22,C20:C22,C26,1)
2009	=TREND(D20:D26,C20:C26,C27)
2010	=TREND(D20:D27,C20:C27,C28)
2011	=TREND(D20:D28,C20:C28,C29,1)

Table 3: Estimated Revenue Loss in Formula View using TREND Function

The second and subsequent estimated y values were subsequently computed as shown in Table 4.

Year	*Projected Revenue Loss*
2008	51.8
2009	55.2
2010	58.7
2011	62.1

Table 4: Forecast Revenue Loss in Output View using the Trend Function

The TRENDLINE method was also used to obtain the regression analysis as demonstrated. Another way to find the estimate values was through the REGRESSION analysis.

FINDINGS/ANALYSIS OF OUTCOMES

Given the data published by the University of Tennessee from 2001 to 2007, the Excel Workbook was made to test null and alternative hypotenuses. Figure 1 was created to show the trend line in the first approach in estimating the revenue losses using the data.

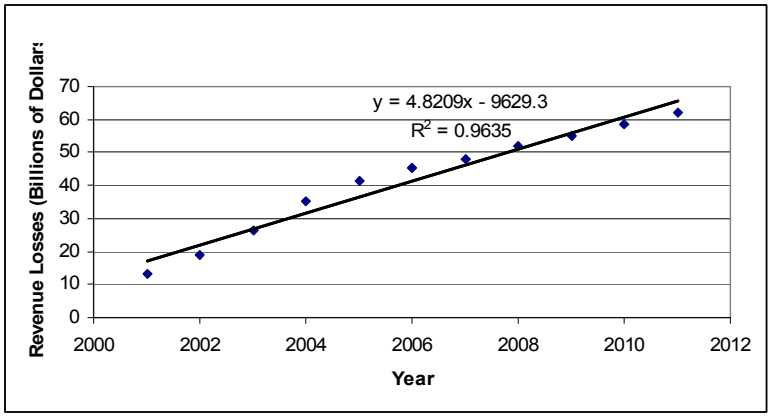

Figure 1: Forecasted Revenue Losses Trend Line

First of all, Figure 1, the increasing trend line showed the best relationship for this data as the equation y = 4.8209x – 9629.3, where x, is the year in number of revenue loss and y is the number of revenue loss. Secondly, the coefficient of determination is R^2= 0.9635, which indicates that the equation fits the data very well. Therefore, R^2 is a good single measure of the strength of the relationship.

In the second approach for estimation, the statistical function called TREND was used to generate forecast values. The values generated by Excel's TREND function yielded the same results for the first approach. The statistical function is an alternative method to estimate revenue loss values for as many years needed.

In the third approach for estimating revenue losses, using the Regression Analysis Tool, output is generated by Excel as shown in Table 5.

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.981588							
R Square	0.963515							
Adjusted R Square	0.959461							
Standard Error	3.279668							
Observations	11							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	2556.528091	2556.528091	237.679	8.88919E-08			
Residual	9	96.806	10.75622222					
Total	10	2653.334091						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-9629.25	627.2851534	-15.35067851	9.2E-08	-11048.27033	-8210.235	-11048.27	-8210.2351
Year	4.820909	0.312704075	15.41684129	8.9E-08	4.11352333	5.528295	4.11352333	5.5282949
RESIDUAL OUTPUT					PROBABILITY OUTPUT			

Observation	*Predicted Y*	*Residuals*	*Standard Residuals*		*Percentile*	*Y*		
1	17.38636	-4.08636364	-1.313366314		4.545454545	13.3		
2	22.20727	-3.30727273	-1.062964772		13.63636364	18.9		
3	27.02818	-0.82818182	-0.266179469		22.72727273	26.2		
4	31.84909	3.550909091	1.141270039		31.81818182	35.4		
5	36.67	4.63	1.488092244		40.90909091	41.3		
6	41.49091	3.709090909	1.192110025		50	45.2		
7	46.31182	1.888181818	0.606865814		59.09090909	48.2		
8	51.13273	0.667272727	0.214462931		68.18181818	51.8		
9	55.95364	-0.70363636	-0.226150284		77.27272727	55.25		
10	60.77455	-2.07454545	-0.666763499		86.36363636	58.7		
11	65.59545	-3.44545455	-1.107376714		95.45454545	62.15		

Table 5: Results for Forecast Revenue Loss Using the Regression Analysis Tool

The numerical output of Table 5 is presented in four parts from top to bottom. The top result, labeled Regression Statistics, presented the values for the coefficient of correlation *r*, labeled as Multiple R. The coefficient of determination, r^2, labeled as Adjusted R Square the standard error of the estimates is labeled as Standard Error; and the sample size is labeled as Observations. The second result, found under the label ANOVA, provided an analysis of variance output for the regression. The third result presented the regression coefficients together with statistics for evaluating the significance of the coefficients, such as the t statistic values, p-values, and confidence intervals. Finally, the bottom result, labeled Residual Output, provided the predicted y values for each of the data points in the sample along with the residual and standardized residuals (Eldredge, 2005).

Statistical values were given for testing the significance of the relationship with the p-value approach. From the ANOVA table's output, the value for the F statistic was 237.679, with a corresponding Significance F value of 8.88919E-08. The Significance F was the p-value for the overall regression relationship categorized as "Very Highly Significant." Thus, rejecting the null hypothesis, concluding that it is a good relationship based on the given data.

In a simple linear regression analysis, the same conclusions can be reached based on the t statistic for the regression coefficient for revenue losses. The year coefficient was 4.820909 with a t statistical value of 15.41684129 and a corresponding p-value 8.9E-07.

For simple linear regression analysis, the p-values for this t statistic and for the prior F statistic will always be exactly the same. The relationship was statistically significant. The line fit plot of Figure 2 was similar to the scatter diagram of Figure 3. However, Figure 2, shown below, did not show a line of predicted y values. Instead, it showed the predicted y value for each of the x values of the input data.

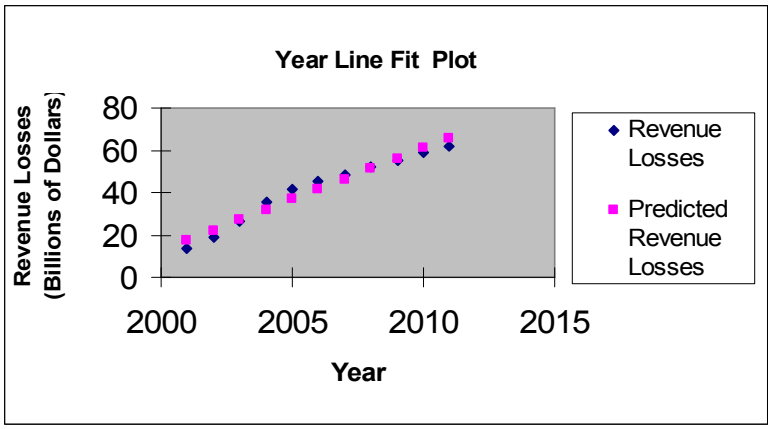

Figure 2: Year line Fit Plot

As in the simple linear regression with the regression analysis tool, the estimated average values for y were found by inserting the regression formula in a worksheet cell or by using the TREND function.

CONCLUSION AND RECOMMENDATION

Due to Internet's income generating potential, state and local policy-makers are hard-at-work on methods to end tax-free on-line purchases. They want to minimize the loss of tax revenue through remote sales of items via electronic means and are pushing for a variety of changes to current tax codes and collection mechanisms. The potential loss of tax base will impair the governments' ability to improve education, health, roads, public safety, creating dedicated local and state revenue source for youth programs, and many other essential services. Many benefits could be expected from e-commerce taxation. It would be essential in maintaining programs funded by the state and local governments. Moreover, strictly enforcing the sales tax is strongly suggested as a way to prevent those individuals and firms using internet. These are compelling reasons to set standards that would protect the states and local governments from tax-free internet sales.

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