

**AN ANALYSIS OF THE COSTS AND BENEFITS
OF A SALES TAX HOLIDAY IN FLORIDA**

Submitted to:

The Florida Retail Foundation

Submitted By:

The Washington Economics Group, Inc.

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I. EXECUTIVE SUMMARY

- ❑ The objective of this study is to analyze the empirical relationship between the Back to School Sales Tax Holiday and the level of economic activity in the State of Florida. This study finds that the sales tax holiday has a positive economic impact, increasing gross sales by about 8 percent for the month in which it is held. Had this holiday been in effect in 2009, it would have represented an increase in economic activity of approximately \$1.7 billion, boosting Florida's Gross Domestic Product by close to \$1 billion for the year.
- ❑ The impact of the sales tax holiday is widely distributed throughout the state, with counties' benefits being directly proportional to the size of their school-age population. County-level sales increases ranged from just over 5 percent for smaller rural counties to about 9 percent for the larger urban counties.
- ❑ Additional impacts of a Back to School Sales Tax Holiday in Florida for 2009 would have included:
 - The generation of 21,896 full-time equivalent jobs – 71 percent in retailing and the rest distributed over the economy as a whole.
 - An additional \$628 million in labor income – about 60 percent in retailing and the rest distributed over the economy as a whole.
 - A net *increase* in state and local taxes of \$118 million as a result of increased economic activity.
- ❑ The increase in economic activity due to the sales tax holiday stimulus creates the need for additional labor. Due to the temporary nature of this stimulus, increased labor needs are filled mostly through temporary help and overtime work for existing employees. Nevertheless, the enhanced need for additional labor is estimated to have generated the equivalent of 21,896 full-time, year-round jobs.
- ❑ The additional labor income generated by the increased economic activity is an injection of **new** purchasing power in the economy, resulting in additional rounds of spending on goods and services throughout the following months.
- ❑ **In essence, the sales tax holiday would have provided a significant boost to employment levels at a time of deep economic recession in 2009.**

- ❑ Our estimate of positive fiscal impacts are in contrast to the state’s Revenue Estimating Conference which concluded that re-instituting the Back to School Sales Tax Holiday in Florida would have resulted in a loss of tax revenue estimated between \$24 million and \$44 million, depending of the length of the tax holiday¹. An analysis of the Revenue Estimating Conference methodology reveals that it does not include into their estimates the direct or indirect spending effects stemming from the sales tax holiday.
- ❑ The sales tax holiday directly increases sales of items that remain taxable by significantly increasing shopping traffic to retail establishments. Indirectly, the sales tax holiday increases state and local taxes because it increases labor income by \$628 million, a large portion of this income is, in turn, spent generating additional sales and excise taxes.
- ❑ The positive economic benefits from the sales tax holiday are summarized below:

Table ES-1. Summary of Economic Impacts Created by the Back to School Sales Tax Holiday in Florida-2009 (\$ in Thousands)				
<i>Economic Impact</i>	<i>Direct</i>	<i>Indirect</i>	<i>Induced</i>	<i>Total</i>
Employment (Jobs)*	15,588	2,638	3,670	21,896
Labor Income	\$375,482	\$117,694	\$135,532	\$628,708
Gross Domestic Product	\$528,637	\$190,183	\$252,026	\$970,846
Economic Output	\$926,271	\$325,826	\$413,155	\$1,665,251

Source: The Washington Economics Group, Inc.
 * Full-time Equivalent Jobs

¹ HB 815, the House version of the tax holiday bill specified 7 days, SB 396 the Senate version specified 11 days.

II. ECONOMIC IMPACTS OF THE BACK TO SCHOOL SALES TAX HOLIDAY IN FLORIDA

A. Background

The objective of this study is to analyze the empirical relationship between the Back to School Sales Tax Holiday and the level of economic activity in the State of Florida.

Between 1998 and 2007 the Legislature enacted eight Back to School Sales Tax Holidays (STH). STHs are temporary exemptions from the state and the county discretionary taxes and surtaxes². Depending on the county, these taxes vary from 6 percent to 7.5 percent. Faced with a dismal tax revenue picture, the Legislature did not enact sales tax holidays in 2008 nor 2009. Table 1 below summarizes the history of the STH.

Dates	Length	Clothing/ Footwear	Wallets/ Bags	Books	School Supplies
August 15-21, 1998	7 days	\$50 or less	N/A	N/A	N/A
July 31-August 8, 1999	9 days	\$100 or less	\$100 or less	N/A	N/A
July 29-August 6, 2000	9 days	\$50 or less	\$100 or less	N/A	N/A
July 28-August 5, 2001	9 days	\$50 or less	\$50 or less	N/A	\$10 or less
July 24-August 1, 2004	9 days	\$50 or less	\$50 or less	\$50 or less	\$10 or less
July 23-31, 2005	9 days	\$50 or less	\$50 or less	\$50 or less	\$10 or less
July 22-30, 2006	9 days	\$50 or less	\$50 or less	\$50 or less	\$10 or less
August 4-13, 2007	10 days	\$50 or less	\$50 or less	\$50 or less	\$10 or less

Source: Florida House of Representatives; h0893a.SLC.doc; 4/2/2008

The Back to School Sales Tax Holiday is enormously popular among taxpayers and retailers. It is typically justified as a much-needed tax relief to families struggling to outfit their children for the new school year. It also provides an economic stimulus in an otherwise slow sales season to retailers.³

Sales tax holidays are controversial, and there is a scarcity of literature documenting its economic impacts, partly due to their recent inception. A scan of the literature reveals that while most of what is written is editorial opinion or anecdotal narrative, there is a small body of serious analysis. This body of analysis will be summarized in this study. This study also proposes a model to empirically quantify the economic effects of the Back to School Sales

² Florida House of Representatives Staff Analysis; Bill CS/HB 893; 4/2/2008

³ J.W. Mogab, M.J. Pisani; "Shoppers' Perceptions of the State Sales Tax Holiday: A Case Study," *American Journal of Business*, Fall 2007.

Tax Holiday. Finally, it discusses the findings and implications from the estimation of the empirical model.

B. Sales Tax Holidays – The Existing Evidence

Beyond the opinions expressed in countless editorial pieces, the analytical evidence so far documents the following:

- That a lower local sales tax, relative to surrounding communities, tends to be associated with increased consumer spending.⁴ This finding is consistent with economic theory – a lower price increases the quantity demand for a product.
- That the benefits of sales tax holidays tend to be shared by both consumers and retailers. About 80 percent of the tax relief remains with shoppers while only about 20 percent is shared with retailers.⁵ This finding is also consistent with economic theory. In a highly competitive sector such as retailing, most of the effect of a policy change on the final price of a product is passed on to the consumer.
- That while consumers as a group benefit, the benefits of the sales tax holiday may be unevenly distributed, with middle class consumers, families, females and Hispanics benefiting the most.^{6,7}
- That the sales tax holiday is very popular among shoppers.⁸ “This is largely consistent with the conventional wisdom expressed in the general media.”⁹
- That the reduction in the overall price shoppers pay solicits greater amounts of goods purchased, tax exempt and non-exempt, during the sales tax holiday event – what is expected when utilizing microeconomic consumer behavior theory.¹⁰
- Sales tax holidays increase store traffic. Most shoppers view the tax break as an important incentive to shop. A mall intercept survey of shoppers during a Back to School Sales Tax Holiday in Texas revealed that 80 percent of shoppers said that the tax holiday was very important in their decision to shop.¹¹
- Consumer response goes beyond what could be expected by the price discounts alone, according to Professor Peter Goldberg of New York University Stern

⁴ Luna, L. 2004, “Local Sales Tax Competition and the Effects on County Governments’ Tax Rates and Tax Bases,” *The Journal of The American Taxation Association* 26(1):43-61.

⁵ Harper, R.K, R.R. Hawkins, G.S. Martin, and R. Sjolander. 2003, Price effects around a sales tax holiday: An exploratory study, *Public Budgeting and Finance* 23(4):108-113.

⁶ Brunori, D. 1999, Sales tax holidays – Real relief or political gimmicks. *State Tax Notes*, (December 6):1521-1523.

⁷ J.W. Mogab, M.J. Pisani, “Shoppers’ Perceptions of the State Sales Tax Holiday: A Case Study,” *American Journal of Business*; Fall 2007:

⁸ Kathy Lhor (2009), Some States Cancel Sales Tax Holidays, NPR August 3, 2009.

⁹ J.W. Mogab, M.J. Pisani, op.cit.

¹⁰ Ibid.

¹¹ Ibid.

- School of Business. Consumers respond favorably because it “becomes a social thing and community activity, something to talk about at work, with friends and family.”¹²
- Retailers often respond to the sales tax break by adding additional discounts and discounting non-exempt merchandise to take advantage of the increased customer traffic. This is consistent with economic theory that predicts that in expectation of increased traffic, retailers compete with each other to capture the consumer dollar.¹³
- The benefits to retailers are not evenly distributed. Retailers located in shopping destinations benefit the most from increased traffic. Also, for some retailers, retrofitting their cash registers and accounting systems may represent a cost that they are not willing to bear. To the extent that retailers become more automated, these inconveniences will be minimized.

C. Quantifying the Economic Impacts of the Back to School Sales Tax Holiday on Economic Activity – The Florida Evidence

While the existing evidence, and common sense, suggests that sales tax holidays provide stimulus to the economy, the size of such stimulus and its impacts on the economy and the fiscal health of the state have not been quantified.

So far, the only economic analyses of the impacts of the Back to School Sales Tax Holidays are, methodologically, quite crude. They assume static consumer and retailer behavior with no spillover effects. These analyses are what legislators are often presented when discussing the possibility of enacting sales tax holiday legislation.

The Econometric Model

A major objective of this study is to posit an empirical model that uses econometric estimation and input-output modeling to quantify the effects of the sales tax holidays. The econometric model will estimate the marginal effect of the tax holiday on overall sales. This marginal effect is then used as the input for the input-output analysis, which in turn will produce estimates of the effects on economic activity, employment and tax revenues.

The econometric model is based on monthly county-level gross and taxable sales data collected by the Florida Department of Revenue by type of store.

Gross sales were measured using monthly gross sales data reported to the Florida Department of Revenue. These data are reported by Kind Code which is a code that captures the main line of business of the reporting establishment. For the purposes of this study, only codes that

¹² As quoted in J.W. Mogab, M.J. Pisani, op.cit.

¹³ DeGross, R. 2002, Shoppers take a break from sales tax, *Shopping Center World* 31(5):32-33.

are likely to be directly impacted by the sales tax holiday were considered. For example, the Kind Codes referring to “Industrial Machinery” or “Feed and Seed Stores, Retail Nurseries”, or “Automobile Dealers” were not considered. On the other hand, Kind Codes such as “General Merchandise” or “Bookstores” or “Apparel & Accessory Stores” were considered. Thus, gross sales as reported in Table 5, refer to gross sales for establishments that are directly or partially affected by the sales tax holiday.

For example, according to Florida Department of Revenue figures, total gross sales reported in August of 2008 were \$56,335.7 billion while gross sales of items directly impacted by the tax holiday amounted to \$11,421 billion. Overall, directly impacted gross sales were about 27 percent of total gross sales, and directly impacted taxable sales were about 31 percent of total taxable sales.

In particular we assume that level of sales for a specific type of store in a given county during a particular month is related to:

1. The size of the economy of the county,
2. The size of the population of the county,
3. The historic volume of sales for the type of store in the county,
4. The month of the year,
5. Other factors specific to the county,
6. The size of the school-age population during a back to school month, and
7. Whether there is a sales tax holiday in the month.

A-priori it would be expected that more affluent, higher population counties with historically higher sales volumes by type of store would have higher future sales levels. Also, we would expect some months to have higher sales levels simply because of the nature of the month. December, for example, has sales that are higher than any other month.

There are factors which may be specific to a particular county that influence sales levels. For example, urban counties may, by way of attracting customers from surrounding rural counties, have higher sales levels. Counties with high tourism or those that are international shopping destinations may experience higher sales.

Finally, for the purposes of this study we wanted to assess the impact of the Back to School Sales Tax Holiday, which is surely dependent on the size of the school-age population.

The results of the estimation of the econometric model are in keeping with economic theory expectations: larger income, population and historic sales levels are associated with current and future sales levels, and the sales tax holiday is associated with a larger sales volume. The

increase in sales levels is directly proportional to the size of the school age population. The technical details of the estimation of the model and the underlying data are presented in Appendix 1. Table 2 below shows the marginal effects of the included variables on sales levels.

Table 2. Marginal Effects of Selected Variables on Sales – Statewide	
Variable	Marginal Effect
Income per capita – long-run adjusted	0.437
Population – long-run adjusted	0.678
Back to School Sales Tax Holiday ¹	0.105
Total statewide estimated impact of a 2009 Back to School Sales Tax Holiday²	\$926,270,670
Notes:	
¹ Refer to Table 5, Average Impact on page 10. ² See Appendix I for explanation, page 12.	
Source: The Washington Economics Group, Inc.	

The marginal effects in Table 2 show that a 1-percent change in income per capita increases sales by .437 percent, a 1-percent increase in population increases sales by .678 percent and having a Back to School Sales Tax Holiday increases sales, statewide, by .105 percent for the month when the holiday occurs. These effects direct and are exclusive to stores that are likely to be directly or partially impacted by the tax holiday – for example, general merchandise stores or bookstores, but not car dealers or seed and feed stores.

The effects of income per capita and population are long-run effects. These variables grow gradually over time. The coefficients shown demonstrate the long-run adjusted effects. In contrast, the effect of the tax holiday is a short-run effect. It happens once during the year, and the economy quickly adjusts. The impact is immediate.

In addition to the direct effects, there are indirect effects that are the result of increased economic activity such as increased employment, which leads to increased sales of all items and increases in tax revenues. These effects are discussed in the following section.

Estimating the Economic Impacts through Input-Output Models

Input-output models are statistical models that quantify relationships among economic sectors or industries. These models use the historical relationships of economic interaction among industries to forecast the associated distribution of jobs and wages.

For example, when consumers spend money on apparel, the model identifies the sectors that are directly impacted such as retail, apparel distribution and apparel manufacturing. These are called *direct effects*. Apparel distribution and manufacturing in turn consume other inputs such as fuel, transportation, stock and textiles. These are called *indirect effects*.

Finally, as workers in the directly and indirectly impacted sectors spend their earnings, they create demand for other goods. These last are called *induced* effects.

It is apparent that the Back to School Tax Holiday creates *direct*, *indirect* and *induced* effects. Not all of these effects remain in the state however. To the extent that the economy of Florida is integrated nationally and internationally, some of these effects spillover to other states and overseas. Likewise, spending stimulus happening in other economies would have effects in Florida.

To measure the *direct*, *indirect* and *induced* effects of a Back to School Sales Tax Holiday we used an input-output model called IMPLAN. IMPLAN is an input-output model that has been developed by the U.S. Government. The basic input to the model is the estimated increase in consumer spending produced by the Back to School Sales Tax Holiday. This *direct* impact has been estimated by our econometric model at \$926,271 million for the month in which the holiday is held.

Table 3 below shows the economic impacts of the Back to School Sales Tax Holiday. The total number of jobs – hourly equivalent full-time positions, is 21,896. In addition to 15,588 *direct* jobs, *indirect* and *induced* impacts add another 2,638 and 3,670 respectively adding up another 6,308 jobs. *Indirect* jobs are in industries that are part of the supply chain for the retailing sector and are impacted by the sales tax holiday “downstream.” *Induced* jobs are spread throughout the entire economy as a “second” generation effect that comes from the spending of the *direct* and *indirect* wages by the workers that earn them – these are what economists refer to as “multiplier” effects.

The Back to School Sales Tax Holiday creates an additional \$628.7 million in wages, of which \$375.5 million are paid directly in retailing, \$117.7 million are paid in the retailing supply chain, and \$135.5 million are *induced* wages that are spread throughout the entire economy.

Table 3. Economic Impacts Created by a Back to School Sales Tax Holiday in Florida - 2009				
(\$ in Thousands)				
<i>Economic Impact</i>	<i>Direct</i>	<i>Indirect</i>	<i>Induced</i>	<i>Total</i>
Employment (Jobs)	15,588	2,638	3,670	21,896
Labor Income	\$375,482	\$117,694	\$135,532	\$628,708
Florida Gross Domestic Product	\$528,637	\$190,183	\$252,026	\$970,846
Economic Output	\$926,271	\$325,826	\$413,155	\$1,665,251

Source: The Washington Economics Group, Inc.

The increase to Florida’s Gross Domestic Product is somewhat larger than the direct economic output (\$970 million vs. \$926 million.) However, the total economic output is substantially larger at about \$1.7 billion.

Table 4 below shows the increased level of how economic activity brings increases in tax collections. The total fiscal impact of the sales tax holiday, as estimated by IMPLAN, would be \$287.3 million. This is in sharp contrast to the static fiscal impact analyses that legislators usually rely on to enact policy decisions.

The total fiscal impact is divided among the federal, state and local governments. Because a large portion of the increased economic activity is reflected in labor earnings there is a significant increase in labor and household taxes at the federal level (FICA and income taxes mainly). Federal corporate and indirect business taxes also rise. These are mainly corporate profit taxes, use and excise taxes.

At the state and local level, increases in labor taxes are relatively small compared to the federal portion. These taxes would include unemployment and workers compensation. Household and corporate taxes are also relatively minor. However, there are substantial indirect business taxes accruing to the state and local governments. These are mainly sales, excise, and use taxes.

<i>Taxes Paid By</i>	<i>Federal</i>	<i>State/ Local</i>	<i>Total</i>
Labor	\$69,881.8	\$1,285.3	\$71,167.1
Capital	\$1,241.5	\$0.0	\$1,241.5
Households	\$66,191.4	\$4,047.8	\$70,239.2
Corporations	\$15,120.6	\$5,530.8	\$20,651.4
Indirect Business Taxes	\$16,838.6	\$107,159.9*	\$123,998.5
Total:	\$169,273.9	\$118,023.8	\$287,297.7
*Adjusted by \$44 million to reflect tax exemption of otherwise taxable items during the STH. Source: The Washington Economics Group, Inc.			

It is important to note that the model predicts that a sales tax holiday *increases state and local revenues by \$118 million*. The static model used by the Revenue Estimating Conference had predicted a \$44 million *loss* of tax revenue.¹⁴

County-Level Sales Impacts

The econometric model specification allows us to project the impact on sales at the county level. The level of sales in this model is a function of the size of the school-age population. Table 5 on the next page, shows the projected impact on gross sales of consumer items in a Back to School Tax Holiday for 2009.

¹⁴ Office of Economic & Demographic Research (EDR), The Revenue Estimating Conference: Sales Tax Holiday, Bill HB 815, Analysis date: February 27, 2009.

Table 5. Projected Impact of Back To School Sales Tax Holiday in Florida-2009

County	Population	School-Age Population	Gross Sales	Average Impact	County	Population	School-Age Population	Gross Sales	Average Impact
Alachua	252,388	48,860	\$240,013,934	\$18,139,533	Lee	623,725	103,851	\$286,355,438	\$23,153,265
Baker	25,890	5,597	\$3,956,934	\$239,038	Leon	274,892	56,713	\$126,292,062	\$9,676,537
Bay	169,307	30,993	\$69,820,626	\$5,054,358	Levy	40,817	7,710	\$8,328,776	\$521,814
Bradford	29,059	4,867	\$4,416,360	\$262,471	Liberty	8,158	1,438	\$1,090,808	\$55,519
Brevard	556,213	97,087	\$220,152,607	\$17,696,646	Madison	20,152	3,729	\$1,525,311	\$87,808
Broward	1,758,494	344,479	\$1,307,835,348	\$116,722,368	Manatee	317,699	54,111	\$108,378,082	\$8,268,332
Calhoun	14,310	2,639	\$1,863,170	\$102,748	Marion	329,418	56,670	\$131,121,996	\$10,045,912
Charlotte	165,781	21,669	\$38,588,597	\$2,696,782	Martin	143,868	21,732	\$76,620,772	\$5,356,235
Citrus	142,043	19,383	\$46,137,828	\$3,188,357	Miami-Dade	2,477,289	495,871	\$2,070,541,399	\$190,072,590
Clay	185,168	42,296	\$40,089,583	\$2,989,365	Monroe	76,081	10,932	\$35,514,252	\$2,311,841
Collier	332,854	55,282	\$182,904,551	\$13,981,483	Nassau	71,915	13,593	\$27,874,260	\$1,857,016
Columbia	66,121	12,846	\$42,112,552	\$2,788,925	Okaloosa	197,597	37,963	\$98,822,922	\$7,294,176
DeSoto	34,487	6,169	\$112,275,199	\$6,859,009	Okeechobee	40,003	8,441	\$10,491,427	\$663,960
Dixie	15,963	2,773	\$3,668,183	\$203,561	Orange	1,114,979	238,156	\$943,291,609	\$81,750,149
Duval	904,971	184,578	\$740,930,652	\$62,890,781	Osceola	273,709	63,623	\$79,886,139	\$6,185,193
Escambia	313,480	63,051	\$182,696,188	\$14,133,723	Palm Beach	1,294,654	232,894	\$656,235,244	\$56,769,842
Flagler	95,512	15,010	\$20,033,542	\$1,348,564	Pasco	438,668	78,245	\$213,355,755	\$16,828,051
Franklin	12,331	1,833	\$3,364,559	\$176,962	Pinellas	938,461	148,551	\$592,434,618	\$49,385,815
Gadsden	50,611	10,050	\$8,691,304	\$560,653	Polk	585,733	116,436	\$256,240,841	\$20,923,520
Gilchrist	17,256	3,378	\$1,133,811	\$64,486	Putnam	74,989	14,814	\$21,350,943	\$1,435,281
Glades	11,323	1,993	\$2,038,021	\$108,386	St. Johns	181,180	33,921	\$33,088,215	\$2,416,185
Gulf	16,923	2,608	\$1,123,222	\$61,849	St. Lucie	276,585	51,473	\$204,489,617	\$15,529,287
Hamilton	14,779	2,655	\$1,634,342	\$90,198	Santa Rosa	144,136	29,674	\$248,213,790	\$17,892,785
Hardee	27,909	5,925	\$5,141,685	\$312,658	Sarasota	393,608	54,125	\$56,946,223	\$4,344,619
Hendry	41,216	9,793	\$54,170,649	\$3,484,579	Seminole	426,413	85,765	\$71,508,132	\$5,686,009
Hernando	164,907	26,583	\$40,166,933	\$2,864,553	Sumter	93,034	12,224	\$38,054,956	\$2,506,988
Highlands	100,207	15,686	\$33,528,175	\$2,267,298	Suwannee	40,927	7,092	\$21,584,347	\$1,339,677
Hillsborough	1,200,541	252,005	\$843,836,873	\$73,464,801	Taylor	23,199	4,143	\$2,304,558	\$134,365
Holmes	19,757	3,736	\$4,034,502	\$232,308	Union	15,974	2,784	\$1,162,530	\$64,545
Indian River	141,667	22,348	\$42,314,123	\$2,966,281	Volusia	510,750	87,793	\$198,997,390	\$15,855,945
Jackson	52,639	8,813	\$22,443,674	\$1,427,146	Wakulla	30,717	5,707	\$2,930,588	\$177,436
Jefferson	14,553	2,370	\$2,474,778	\$134,614	Walton	57,784	9,737	\$17,553,815	\$1,128,461
Lafayette	8,287	1,299	\$9,778,531	\$490,740	Washington	24,779	4,547	\$1,391,542	\$82,039
Lake	288,379	47,908	\$112,199,475	\$8,464,246	Florida	18,807,219	3,531,020	\$11,089,548,849	\$926,270,670

Source: The Washington Economics Group, Inc.

III. CONCLUSION

This study, utilizing professionally accepted and widely used methodology, finds that the Back to School Sales Tax Holiday provides a significant economic stimulus to the State of Florida. It is also extremely popular with taxpayers, particularly middle-income families, facing the economic challenge of raising children at a time of significant economic distress. The tax holiday distributes most of its benefits on consumers directly and provides support to the large retail sector of Florida. This large sector has a significant *direct* impact on the rest of the state economy. Thus, consumer expenditures get **widely** distributed among all sectors of the economy, supporting the generation of jobs, labor income and fiscal revenues.

The Back to School Sales Tax Holiday also generates more labor and fiscal income than it costs the state. From a fiscal perspective, it is a positive net gain to the General Revenue of Florida. Indeed, this study suggests that a Back to School Sales Tax Holiday would generate \$1.7 billion in economic activity, of which close to \$1 billion stays in the Florida economy. Furthermore, this increase in economic activity creates \$118 million in state and local taxes, significantly **beyond the \$44 million lost by the state to tax holiday exemptions.**

**APPENDIX I:
ECONOMETRIC ESTIMATION DETAILS**

ENGEL CURVE ANALYSIS

Following on standard economic theory, we modeled the demand for consumer goods using **Engel Curve Analysis**. In economics, an **Engel Curve** shows how the quantity demanded of a good or service changes as the income level changes, holding all other factors constant. The effect of demand factors other than income, shift the Engel Curve.

Unlike a demand curve, which is downward slopping – as prices go up demand goes down, an Engel curve is upward slopping – as income goes up demand increases. In a demand curve income is considered a demand shifter, in an Engel curve price is the demand shifter.

In particular, we hypothesized that aggregate sales at the Kind Code level are a function of income and that population, month of the year, consumer tastes and preferences, and prices are shifters, increasing or decreasing demand.

To estimate the impact of the Back to School Sales Tax Holiday on sales, we hypothesized that the sales tax holiday acts as a temporary decrease in the prices of those items that become tax exempt and that the size of the benefit interacts with the number of school-age children. Economic theory predicts that a price decrease for some goods will increase the demand for such goods and other goods because to an extent, the price decrease is akin to an increase in this income.

The model was empirically estimated using a double log specification, with the logarithm of aggregate sales by month at the county level for each Kind Code as the dependent variable and the following as the explanatory variables:

1. Lagged logarithm of aggregate sales the Kind Code.
2. The logarithm of total sales per capita for the county and month.
3. The logarithm of population for the county for the year.
4. The interaction of the logarithm of whether the month was a holiday month and school-age population for the county and year.
5. A set of variables for the months of the year.

In addition to the variables listed above, we tried a fixed effects model using a set of variables for the counties (dummy variables). However these were highly correlated with our population variable creation a multicollinearity issue. For this reason, county intercepts were not estimated.

Since the model uses a lagged dependent variable there is the possibility of serial correlation, leading to biased and inefficient estimates. Usually, models using lagged dependent variables will produce estimates that are biased downwards. Also, if serial correlation is present the estimation results can be inefficient, this means that estimates standard errors are biased

downwards, which can lead to the incorrect conclusion that the estimation result is significant when in fact it may not be.

The model was first estimated using Ordinary Least Squares. It is known that when the model includes a lag of the independent variable, the Durbin-Watson Statistic (D-W)¹⁵ will be biased toward 2, suggesting that there is no serial autocorrelation, when in fact, it may be present. Therefore, the standard D-W is not a useful test for autocorrelation for this type of model. Instead, we used a couple of alternatives, the Breusch-Godfrey Lagrange Multiplier test and the alternative Durbin “h” statistic. Applying both tests yielded results suggestive of no serial correlation.

Nonetheless, an alternative Feasible Generalized Least Squares (FGLS) model using the Cochrane-Orcutt 2-step algorithm was estimated. FGLS are known to be asymptotically unbiased and efficient. The results of the OLS and FGLS estimations are listed in Table 6 and 7 respectively¹⁶. An inspection of Tables 6 and 7 reveals that the differences in the estimates are within the margin of error and provide evidence of the robustness of the parameter estimates.

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.268	.047		5.767	.000
Lagged sales ¹	.826	.002	.826	417.592	.000
Real income per capita ²	.076	.009	.017	8.648	.000
Population ¹	.118	.003	.072	34.753	.000
County school-age population interaction with state tax holiday	.007	.002	.007	3.463	.001
January	-.841	.018	-.115	-46.788	.000
February	-.486	.018	-.066	-27.052	.000
March	-.288	.018	-.039	-16.059	.000
April	-.660	.018	-.090	-36.735	.000
May	-.504	.018	-.069	-28.059	.000
June	-.378	.019	-.048	-19.432	.000
July	-.681	.019	-.087	-35.139	.000
August	-.532	.019	-.068	-28.700	.000
September	-.393	.019	-.050	-21.216	.000
October	-.597	.019	-.077	-32.212	.000
November	-.520	.019	-.067	-28.019	.000
R Square	0.754799089				
Durbin-Watson	1.90183499				
Notes:					
¹ The logarithm of the variable was used for estimation					
² The logarithm of aggregated sales for all Kind codes at the county level divided by county population was used as proxy.					
Binary variables were used to denote each of the months. Also a binary was used when the month was a back to school sales tax holiday month.					
Source: The Washington Economics Group, Inc.					

¹⁵Green, William H. 2003. *Econometric Analysis*, 5th Edition, Prentice Hall.

¹⁶ Much of this discussion is based on Veerbek Marno (2008) “A Guide to Modern Econometrics”, 3rd Ed. John Wiley and Sons.

Table 7. Regression results – FGLS using Cochrane-Orcutt.					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.567	.047		119.395	.000
Lagged sales ¹	.860	.002	.826	417.005	.000
Real income per capita ²	.076	.009	.016	8.253	.000
Population ¹	.123	.004	.072	34.660	.000
County school-age population interaction with state tax holiday	.008	.002	.008	4.227	.000
January	-.886	.019	-.116	-47.284	.000
February	-.509	.019	-.067	-27.222	.000
March	-.299	.019	-.039	-15.992	.000
April	-.683	.019	-.089	-36.460	.000
May	-.517	.019	-.068	-27.605	.000
June	-.400	.020	-.049	-19.711	.000
July	-.715	.020	-.088	-35.360	.000
August	-.552	.019	-.068	-28.586	.000
September	-.409	.019	-.050	-21.154	.000
October	-.625	.019	-.077	-32.326	.000
November	-.547	.019	-.067	-28.294	.000
R Square	0.752				
Durbin-Watson	1.946				
Source: The Washington Economics Group, Inc.					

**APPENDIX II:
DATA SOURCES**

The main data set for this project are the Validated Florida Sales Tax Return Receipts Monthly Statistics by Business by County posted by the Florida Department of Revenue. The data contain monthly totals for gross sales and taxable sales by county and by Kind Code from January 2002 to June 2009 (90 months). Florida has 67 counties, and there are 85 Kind Codes. There are 512,550 different potential combinations possible (90 x 67 x 85); however, there are values for only 288,225 combinations. This reduction in the number of observations is due, in part, to the requirement that at least four businesses must report the combination (of month, year, county, and Kind Code) in order for the combination to be provided to the public.

Kind Codes

Currently, there are 85 kind codes in use. These kind codes are as follows: Food & Beverage Stores; Meat Markets, Poultry; Seafood Dealers; Vegetable & Fruit Markets, Fruit Juice Stands; Bakeries; Eating & Drinking Places (not restaurants); Candy, Nut, Confectionary & Dairy Product Stores; Restaurants, Lunchrooms, Catering Services; Drinking Places (Alcoholic beverages served on premises); Apparel & Accessory Stores; Shoe Stores; Feed & Seed Stores, Retail Nurseries; Paint, Wallpaper & Hardware Dealers; Farm Implements & Equipment Suppliers; General Miscellaneous Merchandise Stores; Used Merchandise Stores, Second-Hand Stores, Antique Shops; Sewing, Needlework & Piece Goods Stores; Automotive Dealers (Sale & Lease), Tag Agencies & Tax Collectors; Automotive Accessories & Parts; Gasoline Service Stations; Automobile Repair & Services; Aircraft Dealers; Boat Dealers; Home Furniture, Furnishings & Equipment; Household Appliances & Accessories; Store & Office Equipment, Office Supplies; Radio, Television, Consumer Electronics, Computers, Music Stores; Building Contractors; Heating & Air Conditioning; Electrical, Plumbing, Well Drilling, Pipes; Decorating, Painting, Papering, Drapery Installation; Roofing & Sheet Metal; Lumber and Other Building Materials Dealers; Hotel/Motel Accommodations, Rooming Houses, Camps & Other Lodging Places; Barber Shops, Beauty Shops & Personal Appearance Services; Book Stores; Tobacco Stores & Stands; Florists; Fuel Dealers, LP Gas Dealers; Funeral Directors, Crematories & Monuments; Scrap Metal, Junk Yards, Salvaged Material; Itinerant Vendors, Peddlers, Direct Selling Establishments; Laundry, Garment, Linen & Other Cleaning Services; Machine Shops, Foundries, Iron Work; Horse, Cattle & Pet Dealers; Camera & Photographic Supply Stores; Shoe Repair Shops, Shoe-shine Parlors & Hat Cleaning Shops; Storage & Warehousing; Gifts, Cards, Novelty, Hobby, Crafts & Toy Stores; Newsstands & News Dealers; Social, Fraternal, Commercial Clubs & Associations (All Dues); Industrial Machinery; Admissions, Amusement & Recreation Services; Holiday Season Vendors; Rental of Tangible Personal Property; Fabrication & Sales of Cabinets, Windows, Doors, Awnings, Septic Tanks, Neon Signs, Plastic, etc.; Manufacturing; Bottlers; Pawn Shops; Communication, Telephone, Telegraph, Radio & Television Stations; Transportation,

Railroads, Airlines, Bus, Trucking Lines; Graphic Arts, Printing, Publishing, Engraving, Binding, Blueprinting; Insurance, Banking, Savings & Loans, Research Information Services, Income Tax Reports; Sanitary & Industrial Supplies; Packaging Materials, Paper, Box, Bag Dealers; Repair of Tangible Personal Property; Advertising; Mining, Drilling, Top Soil, Clay, Sand, Fill Dirt; Nurseries, Landscapes, Tree Experts; Vending Machine Operators; Importing & Exporting; Medical, Dental, Surgical, Optical & Related Professional Services; Wholesale Dealers; Schools, Colleges & Educational Services; Lease or Rental of Commercial Real Property; Privately Owned Parking Lots, Boat Docks & Aircraft Hangars; Utilities, Electric, Gas, Water, Sewer; Exempt Facilities; Flea Market Management & Space Providers; Other Professional Services; Taxable Services (per Chapter 212, F.S.); Veterinary Services; Commercial Fishing; Miscellaneous; and Other for kind codes that have fewer than 4 businesses reporting.

Kind Codes are applied to the store, not the product. For example, a large grocery store might have a deli, a florist, a general merchandise section, and a book/magazine section. If the store is classified as a “food and beverage store,” then all sales from these individual sections would be included as “food and beverage store.” In other words, the sale of any particular item could be classified as being any of the Kind Codes, based on the store that sold the item. Businesses self report their kind code. These codes were developed by the State of Florida and are broader than either the North American Industry Classification System (NAICS) or the Standard Industrial Classification (SIC) codes.

Also note that actual total gross sales could be considerably higher than reported. Only businesses with taxable sales are required to report. Many businesses do not have taxable sales, and are exempt from reporting. For example, most grocery items are not taxed. If a store only sold these products, they would not have any taxable sales, and would be exempt from reporting.

The reporting month for the data is the month that the sales tax was submitted to the state. In Florida, there is a one-month lag between the time when a customer purchases an item (and pays the sales tax), and when the business remits the sales tax to the state. Therefore, the data for July is based on the business activity in June.

Data Methodology

Validated Florida Sales Tax Return Receipts Monthly Statistics by Business by County posted on the Florida Department of Revenue’s website. The data are provided in two-year periods beginning with 2002-2003. For each two-year period, there are three Excel spreadsheets; one contains the gross sales data; the second contains the taxable sales data; and the third contains data for sales taxes collected. This project used the gross sales data and the taxable sales data.

Each spreadsheet contains 68 worksheets, one for each of Florida's 67 counties and one statewide table. For this project, we used the 67 county-specific worksheets. Each worksheet contains header and footer information as well as the main data. The main data includes the Kind Codes with reportable data for the county and timeframe as the row headers and the month/year as the column headers. The numbers of included Kind Codes vary by county. In some cases for a particular county and period, a kind code is reportable for some months, but not for others. These cells are left blank.

For each worksheet, a county identifier field was added. The data for each worksheet is appended to create a single worksheet for each of the eight spreadsheets (4 two-year files for each gross sales and taxable sales). The files contain a county identifier, the Kind Code, and the column headers for each month and year. All superfluous materials are eliminated, including the county sum of all Kind Codes.

Each of these eight spreadsheets was split in to two worksheets, one for each year. The year identifier was added, and the gross sales files were appended so that the worksheet contained the year, county, and Kind Codes as the row header and the months as the column headers. The same was done for the taxable sales files. At this point, there are 25,733 records for each of the two files.

The two files are linked and verified. The first file has the year, county, and Kind Codes as the row header and the months for gross sales and the months for taxable sales as the column headers.

Finally, each month is extracted, given an identifier, and these records are appended. The second file contains 308,785 records with the month, year, county, and Kind Codes as the row header and gross sales and taxable sales as the column headers.

**APPENDIX III:
THE WASHINGTON ECONOMICS GROUP INC.
PROJECT TEAM AND QUALIFICATIONS**



J. ANTONIO VILLAMIL

Dean, School of Business, St. Thomas University of Florida
Principal Economic Advisor, The Washington Economics Group (WEG)

Tony Villamil has over thirty years of successful experience as a business economist, university educator and high-level policymaker at both federal and state governments. He has served as a Presidential appointee U.S. Undersecretary of Commerce for Economic Affairs, and is the founder of a successful economic consulting practice, The Washington Economics Group, Inc. (WEG). Since August 2008, Tony is the Dean and Research Professor of Economics at the School of Business of St. Thomas University of Miami, while continuing to serve as Principal Economic Advisor to the clients of WEG.

Tony is a member of the President's Advisory Committee on Trade Policy and Negotiations in Washington, D.C. He is the immediate past Chairman of the Governor's Council of Economic Advisors of Florida, and during 1999-2000, he directed the Tourism, Trade and Economic Development activities of the State in the Office of Governor Jeb Bush. Presently, he is on the Board of Directors of the Spanish Broadcasting System (NASDAQ), Mercantil Commercebank, N.A. and Enterprise Florida – the State's principal economic development organization.

Among other leadership positions, he served in 2008 as the economist of the Constitutionally mandated Tax and Budget Reform Commission of Florida (TBRC), and is currently Chairman of the Economic Roundtable of the Beacon Council – Miami-Dade County's official economic development organization. He is also a Senior Research Fellow of Florida TaxWatch, an established fiscal and policy research organization of the State. After winning the gubernatorial election in November 2006, then Governor-elect Charlie Crist appointed him as his Economic Advisor during the transition period.

Tony earned bachelor and advanced degrees in Economics from Louisiana State University (LSU), where he also completed coursework for the Ph.D. degree. In 1991, Florida International University (FIU) awarded him a doctoral degree in Economics (hc), for "distinguished contributions to the Nation in the field of economics." He speaks frequently to business, government and university audiences on economic topics, and was until the summer of 2008 a member of the Graduate Business Faculty of Florida International University (FIU).



HORACIO SOBERON-FERRER, PH.D.

Associate Consultant for Economic
The Washington Economics Group, Inc.

Horacio Soberon-Ferrer, Ph.D. has over twenty years of experience as a professional economist. His expertise is in applied microeconomics, consumer policy, demand forecasting, healthcare systems analysis and the economic of aging.

Dr. Soberon-Ferrer has held the positions of Director of Planning and Evaluation, Florida Department of Elder Affairs; Director of the State Infrastructure Bank at the Florida Department of Transportation and Senior Analyst for Forecasting and Environmental Scanning, AARP. He has also held full time faculty positions at the University of Florida and University of Maryland where he taught Consumer Economics, Public Policy Analysis, Finance, and Statistical Methods.

Horacio received his Ph.D. in Applied Economics from Clemson University specializing in quantitative policy analysis and consumer behavior. He also has a Licentiate degree in Actuarial Science and a M.S. in Management. He has published widely on the topics of consumer expenditures estimation, economics of energy demand and the economics of aging.



MARY SNOW
Manager of Client Services

Mary Snow is the Manager of Client Services at The Washington Economics Group, Inc. (WEG). She serves as WEG's client liaison, working with clients to facilitate their business interests and achieve their goals.

Prior to joining WEG, Mary was a governmental consultant for Robert M. Levy & Associates with offices in Miami and Tallahassee. She represented clients' interests at the local level and to the State Legislature.

Mary received her undergraduate degree in Political Science with a minor in Education from Florida State University. Mary is a resident of Coral Gables, Florida.



HAYDEE M. CARRION
Executive and Research Assistant

Haydee Carrion is Executive and Research Assistant of the firm, specializing in the preparation and design of reports and documents for clients. Significant experience in data computerization, research through the Internet and in Desktop Publishing.

Ms. Carrion has over twenty year of experience in administrative and office management activities, primarily in a research environment that requires independent judgment and the use of electronic research.

She received her A.A. and A.S., from Miami Dade College, in Business Administration and Office System Technologies, pursuing B.A. degree in Economics.

The Washington Economics Group, Inc. (WEG) has been successfully meeting client objectives since 1993 through economic consulting services for corporations, institutions and governments of the Americas. We have the expertise, high-level contacts, and business alliances to strengthen your competitive positioning in the growing marketplaces of Florida and Latin America.

Our roster of satisfied clients, over the past fourteen years, includes multinational corporations, financial institutions, public entities, and non-profit associations expanding their operations in the Americas.

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Comprehensive Corporate Expansion Services. Our seamless and customized service includes site selection analysis, development of incentive strategies and community and governmental relations.

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For a full description of WEG capabilities
and services, please visit our website at:
www.weg.com

Representative Client List

1993-2009

Multinational Corporations

- Lockheed Martin
- FedEx Latin America
- IBM
- Motorola
- SBC Communications
- Ameritech International
- Lucent Technologies
- MediaOne/AT&T
- Joseph E. Seagram & Sons, Inc. (Vivendi)
- Microsoft Latin America
- Carrier
- Medtronic
- Phelps Dodge
- Esso Inter-America
- Visa International
- MasterCard International
- Telefonica Data Systems
- Bureau Veritas (BIVAC)
- Merck Latin America
- DMJM & Harris
- DLA Piper
- Wilbur Smith Associates
- PBSJ

Florida-Based Corporations

- Sprint of Florida
- Florida Marlins
- Flo-Sun Sugar Corp.
- Farm Stores
- The BMI Companies
- Spillis Candela & Partners
- The Biltmore Hotel/Seaway
- Trammel Crow Company
- Advantage Capital
- WCI Development Companies
- Iberia Tiles
- Florida Hospital
- Mercy Hospital
- The St. Joe Companies
- Florida Power & Light (FPL)
- International Speedway Corporation

Latin America-Based Institutions

- Federation of Inter-American Financial Institutions (FIBAFIN)
- The Brunetta Group of Argentina
- Association of Peruvian Banks
- Peruvian Management Institute (IPAE)
- *Mercantil Servicios Financieros*, Venezuela
- Allied-Domecq, Mexico
- Fonalledas Enterprises

Financial Institutions

- International Bank of Miami
- Pan American Life
- ABN-AMRO Bank
- Barclays Bank
- Lazard Freres & Co.
- Banque Nationale de Paris
- HSBC/Marine Midland
- Fiduciary Trust International
- Sun Trust Corporation
- First Union National Bank (Wachovia)
- Union Planters Bank of Florida (Regions)
- Bank Atlantic Corp.
- Hemisphere National Bank
- BankUnited, FSB
- Mercantil Commercebank N.A.
- PointeBank, N.A.
- The Equitable/AXA Advisors

Public Institutions, Non-Profit Organizations & Universities

- Baptist Health Systems
- Jackson Health Systems
- Miami-Dade Expressway Authority
- Miami-Dade College
- Miami Museum of Science
- Zoological Society of Florida
- Florida International University
- University of Miami
- *Universidad Politécnic de Puerto Rico*
- *Sistema Universitario Ana G. Méndez (SUAGM)*
- Keiser University
- Full Sail Real World Education
- Florida Agricultural & Mechanical University (FAMU)
- Inter-American Development Bank (IDB)
- United Nations Economic Development Program (UNDP)
- Florida Ports Council
- Florida Retail Federation
- Florida Sports Foundation
- Florida Citrus Mutual
- Florida Nursing Homes Alliance
- Florida Bankers Association
- Florida Outdoor Advertising Association
- City of Plantation
- City of West Palm Beach
- Economic Development Commission of Lee County
- Economic Development Commission of Miami-Dade (Beacon Council)
- Economic Development Commission of Mid-Florida
- Jacksonville Chamber of Commerce
- SW Florida Regional Chamber of Commerce
- Enterprise Florida, Inc.
- The Beacon Council
- Visit Florida
- Louisiana Committee for Economic Development
- University of South Florida/*ENLACE*
- Space Florida
- State of Florida