ABSTRACT

GAO, JUNLIN. Holiday Effects on Retail Consumptions in the U.S. Economy. (Under the direction of Michael L. Walden.)

Retail consumption during holiday periods is an interesting topic in the field of consumer economics, but little previous research has touched upon the issue. This thesis estimates retail sales consumption during holiday periods, focusing on the effects of public holidays are measured by consumption across different household retail sales categories. Holidays are considered a seasonal factor, and are measured by the days people do not work including federal holidays. Holidays are found to affect the consumption of different retail categories in different ways.

Holiday Effects on Retail Consumptions in the U.S. Economy

by
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DEDICATION

To My Dearest Parents---- Thanks for supporting me all these years!

To My Grandparents---- Miss you guys so much!

BIOGRAPHY

Junlin Gao was born in Shanghai, China in March 1987. She majored in International Finance in Fudan University since fall 2004, and recieved the Bachelor's degree in Economics in 2008. After graduation, she joined North Carolina State University for the Masters level study in Economics, and a Minor in Statistics. She currently lives in Raleigh and loves everything about the city.

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I. Introduction

"Holidays are days on which custom or the law dictate a halting of general business activity to commemorate or celebrate a particular event" (*American Heritage Dictionary, 2001*). By reading the definition, it could be found that holidays are considered as commercial activities as well as a custom. Generally there are ten annual federal holidays and some common public holidays, such as the Easter Holiday in the United States, during which people usually take advantage of the days-off to visit their family and to involve in leisure activities and tourism. Consumption during these holidays and important festivals has a great impact on the country's economy. The "holiday-economy" is constituted by two primary parts: spending on performing the traditional celebration customs, and expenditures on leisure and vacation from holiday days-off. Retailers in corresponding industries may want to get their products ready in quantities and varieties before holiday and festival periods for profit proliferation, and those not closely related with holidays might plan to clear their inventory earlier.

This thesis discusses the contributions to the nation's economy that retail sales consumption makes during holiday periods. The research focuses on the effect of the holidays in a month on the consumption in different categories of retail sales. Empirical models are built to clarify the connections between the total amount as well as the duration of public holidays, and the distribution of consumption relating to these holidays in the US economy. Problems to be solved in the research include judging the categories of consumption highly related to holidays, and the proper holiday variables and other relevant independent variables that contribute the most in explaining the issue as well. The purpose of

determining the proper holiday variables was to better measure holidays, so that a more accurate effect on different consumption categories could be determined. The models focus on the quantities consumed in retail sales categories.

In part II some previous holiday and consumption related research is discussed. Although household consumption is a significant part in microeconomics research, few studies have analyzed the effects on consumption during holidays. Part III introduces the data, research methods and empirical models involved in the research. Regressions applying the empirical models to the data were then run and the results are discussed in part IV. Finally, the conclusions and suggestions for future applications are presented in part V.

II. Literature Reviews

Public holidays and festivals have mostly been studied as sociological events focusing on various aspects of their origins, traditions and government settings rather than economic events. In most cases, sociologists consider holidays and festivals as public ritual *(Etzioni, 2000)* or simply as an expression of culture *(Santino, 1996)*. The role of holidays was studied as relating to communities and social customs.

Although consumption is a well-studied topic in economics, little previous research has focused on the impact of holiday consumption on the US economy. Joachim Merz and Lars Osberg, two German economists, carried out a survey about the utility of leisure and people's satisfaction with the total number of holidays *(Merz and Osberg, 2006)*. They reported that public holidays were beneficial in allowing people to arrange their time more

freely. It was also suggested that more public holidays were welcomed so that additional social benefits could be derived from the resulting time away from work.

As Thanksgiving Day is generally regarded as the opening of most important holiday season *(Myers, 1972)*, the behavior of US consumers during the Thanksgiving Holiday has been studied *(Wallendorf and Arnould, 1991)*. The database included in-depth interviews and observations among the general public in the Thanksgiving holiday period. The culture, ritual and psychology factors which contribute to the nature of Thanksgiving Day consumption were explored. Economic findings included that consumers tended to associate their satisfaction from consumption with both non-commoditized actions and material surplus. Rather than reconstruct celebrating traditions, ritual preparers delivered the message of familial solidarity and productive potentiality by choosing commodity products.

Other research emphasized tourism consumption. The money aspect of tourism consumption in the British economy was explored *(Desforges, 2001)*. Taking travelling to Peru as an example, the author investigated the meaning and role of income to long-term tourists relating to travel destinations. The importance of income emerged in the tourists' decision-making. Tourist advertising and promotions were also studied in tourism industries. Hummon showed that ritual and cultural factors were great promotional tools for attracting tourists *(Hummon, 1988)*. The tourist industry is an indispensible part of holiday consumption research as the public would always like to go on excursions or vacations during holiday periods when they had extra days off from work. However, tourism was not the entire concept of 'holiday-economy', for a single industry cannot represent retail consumption.

To sum up, the studies cited above did not have strong empirical evidence about the impact of holidays on the country's economy. Most of the previous research was somewhat superficial when it came to economic analyses as related to the holiday-economy. This thesis, in contrast, focuses on the effect of types and duration of holidays on the structure as well as amount of consumption and studies how holidays affect retail sales in the nation's economy.

III. Empirical Models

1. Variables

(1). Consumption variables

The monthly retail and food service sales in the US, 1992 to 2009, adjusted by CPI, but not by seasonal factors, are used. The resulting variable is a measure of the quantity of consumption. The reason why seasonal adjustments have not been conducted is that holidays are an important seasonal factor as well as the major object of study in this research; otherwise the accuracy of the analytical results would be affected. Consumption demand is affected by people's income and their leisure time to spend money. With more holidays, people would have more leisure time available to spend on consumption, but the income of hourly or daily paid labors would be reduced. The influences of income effects and substitution effects will be discussed later.

The data are adjusted into per capita consumption by categories using the monthly population provided by BEA (US Bureau of Economic Analyses). The retail consumption categories investigated are:

Monthly Spending on Motor Vehicle and Parts Dealers (category simplified as *Vehicle* below),

Monthly Spending on Building Material and Garden Equipments and Supplies Dealers (category simplified as *Building* below),

Monthly Spending on Furniture and Home Furnishings Stores (category simplified as *Equipment* below),

Monthly Spending on Gasoline stations (category simplified as *Gasoline* below),

Monthly Spending on Electronics and Appliance Stores (category simplified as *Equipment* below),

Monthly Spending on Clothing and Clothing Accessory Stores (category simplified as *Clothing* below),

Monthly Spending on Sporting Goods, Hobby, Book, and Music Stores (category simplified as *Leisure* below),

Monthly Spending on General Merchandise Stores (category simplified as *Merchandise* below),

Monthly Spending on Miscellaneous Store Retailers (category simplified as *Miscellaneous* below),

Monthly Spending on Non-Store Retailers (category simplified as *Nonstore* below),

Monthly Spending on Health and Personal Care Stores (category simplified as *Health* below),

Monthly Spending on Food and Beverage Stores (category simplified as *Food* below),

Monthly Spending on Food Services and Drinking Places (category simplified as *Restaurants* below).

Prices of the corresponding consumption categories are taken as price indices, from the US Bureau of Labor Statistics. However, some of the household consumption categories do not correspond to those above, and the three categories of "Merchandise", "Building" and "Nonstore" are therefore omitted. The spending categories of "Furniture and home furnishings stores" and "Electronics and appliance stores" are collectively called "Furnishings and durable household equipment" in the price indices. So the two retail consumption categories were tested together by obtaining the quantity indices from the summation of dollars spent in both Furniture and Electronics. The name of the combined two categories is simplified as "*Equipment*" below. The categories of total spending and price indices are matched in Table 1.

Table 1 Retail Consumption Categories and Corresponding Retail Consumption Price Index Categories Matching Table

Simplified Category Names	Retail Consumption Categories	Retail Consumption Price Index Categories
Vehicle	Motor vehicle and parts dealers	Motor vehicles and parts
Equipment	Furniture and home furnishings stores	Furnishings and durable household equipment
	Electronics and appliance stores	
Food	Food and beverage stores	Food and beverages purchased for off-premises consumption
Health	Health and personal care stores	Health care
Gasoline	Gasoline stations	Gasoline and other energy goods
Clothing	Clothing and clothing access. stores	Clothing and footwear
Leisure	Sporting goods, hobby, book, and music stores	Recreation services
Miscellaneous	Miscellaneous store retailers	Other services
Restaurants	Food services and drinking places	Food services and accommodations

These price indices are only available quarterly from BEA, so they are linearly interpolated into monthly values using the following method. The published data are applied to the

middle months of each quarter, and the estimated monthly values of the other two months in the quarter are evaluated. The price indices in the last month of the quarter and the first month of the next quarter are calculated as the one-third and two-thirds average between the value of the quarter and that of its next quarter respectively. For instance, the price index value of Vehicle available for 1992-Quarter I was 87.502 *(Source: Price Indexes for Personal Consumption Expenditures by Major Type of Product, US Bureau of Economic Analysis)* and that for 1992-Quarter II was 88.183. So the price index value of Vehicle in February 1992 is evaluated as 87.502 and that in May 1992 is evaluated as 88.183. Its value in March 1992, however, is calculated by $87.502+\frac{1}{3} * (88.183-87.502) = 87.729$, while the value in April 1992 is calculated by $87.502+\frac{2}{3} * (88.183-87.502) = 87.956$. All other price indices and per capita income values were obtained by the same manner.

All the prices indices are adjusted by the overall CPI (Consumption Price Index) to form real price indices. Since the latest data available of categorical prices are July 2008, only the data from January 1992 to July 2008 are used in the studies of empirical models. The quantity values of each category, which are used as the dependent variables in the analyses, are given by dividing the spending amounts by the real price indices.

(2). Holiday variables

Two major sources are used for the holiday measures. One is based on important festivals or cultural events that most of the general public celebrated. For instance the Christmas holiday was set up originally to celebrate the Nativity in the western countries, the

New Year's Day holiday was created as the beginning of Gregorian calendar years, and the Thanksgiving holiday was marked for expressing people's thanks for food and well-being. Other holiday such as the Valentine's Day was celebrated in tribute to St. Valentine the Catholic bishop, Easter Day came from the Crucifixion of Jesus Christ, and the ancient religion of the Celtics could be found for the origination of Halloween. A more common source is some significant days that the government made in memory of some great people or great events. The Labor Day holiday was instituted in respect of the working people. The remaining federal holidays were all established by the similar source. The Martin Luther King, Jr. Day holiday came from the civil right leader's birthday while President's Day celebrates President Washington's and Lincoln's birthdays. The US Congress also established the Memorial Day holiday in memory of the Civil War soldiers, the Independence Day holiday in celebrating the issuance of the Declaration of Independence, the Columbus Day holiday to commemorate the discovery of the Americas, and Veterans Day in honor of all veterans.

Public holidays in the US are referred as the ten annual Federal Holidays plus Inauguration Day once every four years. The number of holidays is simply counted as "1" if there is one holiday in that month. The federal holidays are:

New Year's Day----January 1st,

Martin Luther King, Jr. Day----Third Monday in January,

Washington's Birthday----Third Monday in February,

Memorial Day----Last Monday in May,

Independence Day----July 4th,

Labor Day----First Monday in September,

Columbus Day----Second Monday in October,

Veterans Day----November 11th,

Thanksgiving Day----Fourth Thursday in November,

Christmas Day----December 25th,

Inauguration Day----January 20, the first January 20 following a Presidential election.

However, it may not be precise enough to simply use one full day when calculating the number of each holiday. For example, Thanksgiving Day is definitely a holiday where people do not go to work, but it is not easy to judge whether the day after Thanksgiving (often referred as "Black Friday") should also be regarded as a holiday, as some people work on that day but others do not. In order to make the number of holidays in each month more accurate, the idea of Weighted Holidays is introduced. Meanwhile, for better distinguishing the two holiday measurements, the federal-holiday-only based measurement is labeled as Unweighted Holidays.

Table 2 Original Weighted Public Holiday Data, 2005 to 2009

Holidays	Offices Closed (%)						Offices Close Early (%)					Total Average
	2005	2006	2007	2008	2009	average	2006	2007	2008	2009	average	
New Years Day	95.80	97.30	96.00	98.00	97.00	96.82	----	1.00	----	----	1.00	0.9732
Day after New Year's Day	----	----	4.00	----	12.00	8.00	----	11.00	----	2.00	6.50	0.1125
Martin Luther King Day	27.00	26.90	----	36.00	36.00	31.48	----	----	----	----	0.00	0.31475
President's Day	29.60	27.30	----	35.00	33.00	31.23	----	----	----	----	0.00	0.31225
Good Friday	31.20	22.80	----	27.00	26.00	26.75	----	----	7.00	7.00	7.00	0.3025
Easter Monday	----	----	----	5.00	7.00	6.00	----	----	1.00	----	1.00	0.065
Memorial Day	94.90	87.00	----	96.00	95.00	93.23	----	----	----	----	0.00	0.93225
Independence Day	94.50	96.80	92.00	97.00	66.00	89.26	0.20	1.00	1.00	12.00	3.55	0.91035
Day before/after Independence Day	----	22.10	----	7.00	6.00	11.70	9.30	----	11.00	----	10.15	0.16775
Labor Day	94.50	86.60	----	96.00	95.00	93.03	----	----	----	----	0.00	0.93025
Columbus Day	9.60	8.50	----	15.00	13.00	11.53	----	----	----	----	0.00	0.11525
Veterans Day	15.40	13.90	----	19.00	18.00	16.58	----	----	----	----	0.00	0.16575
Day before Thanksgiving	----	----	----	3.00	5.00	4.00	----	----	17.00	16.00	16.50	0.1225
Thanksgiving Day	99.00	92.90	93.00	98.00	97.00	95.98	3.00	3.00	----	----	3.00	0.9748
Day after Thanksgiving	73.60	75.70	72.00	74.00	72.00	73.46	1.00	3.00	1.00	1.00	1.50	0.7421
Day before Christmas	38.60	16.20	48.00	34.00	42.00	35.76	24.10	28.00	34.00	33.00	29.78	0.50648
Christmas Day	96.10	97.30	97.00	99.00	98.00	97.48	0.90	1.00	----	----	0.95	0.97955
Day before New Year's Day	----	35.30	10.50	20.00	21.00	21.70	0.60	4.50	25.00	25.00	13.78	0.28588
Last week of the year	----	13.80	27.00	18.50	16.00	18.83	17.20	26.00	1.00	----	14.73	0.26192

Source: Society for Human Resource Management

Table 3 Calculated Results of Monthly Weighted Holidays

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.40045	0.56225	0	0.3675	1.18225	0.25	1.0781	0	0.93025	0.36525	2.00515	2.55765

The basic conception of Weighted Holidays is the average percentage of businesses closed due to holidays in a month. The surveys of Holidays Organizations Plan from 2005 to 2009 *(Source: Society for Human Resource Management)* are used to measure the length of days-off of each holiday every year. The public days-off data are presented in Table 2. The summation of the average percentage of the offices closed down, together with $\frac{1}{2}$ of the average percentage of the offices closing early during the corresponding month from 2005 to 2009, is regarded as the number of holidays, where the latter was calculated as half-day holiday for the employees. For instance, there were 89.26% of the offices closed on *Independence Day* and 11.7% closed on *the Day Before or After Independence Day* on average in Table 2, while 3.55% and 10.15% of the offices closed early on average during the two days respectively. This calculation is thus: 0.8926+0.117+ (0.0355+0.1015)* $\frac{1}{2}$ =1.0781 weighted days-off considered for the Independence Day holiday. It should be indicated that Inauguration Day is not considered as a holiday in the Weighted Holidays Measurement as generally only some offices in the Metropolitan Washington DC area close every four years. The percentage should not affect the nationwide statistics. In addition, the important festivals like Valentine's Day, Mother's Day, Father's Day and Halloween are also computed as quarter-day holidays since people regard them as important days and usually celebrate by taking some time away from work[1]. The summation of the total weighted holiday days-off in one month is counted as the number of days of holidays in that month. It

[1] Referring to *Facts for Features and Special Editions, U.S. Census Bureau*, in addition to the surveyed public holidays and days-off mentioned, the four festivals were also considered special conditions every year that the public commonly celebrate.

should also be noted that the number of offices closed or closed early in the Day Before/after Independence Day, the Day before Christmas and the Day before New Year's Day is biased every year depending on whether the holiday falls in weekend in that year. As long as the available survey data only record those in the recent five years, the numbers of monthly holidays were regarded the same every year from 1992 to 2008 for better expression, except for the Easter holiday, where the cases in which this holiday fell in March were distinguished. [2]The final days of holidays calculated every month in a year are listed as Table 3, assuming Easter Holidays fall in April.

One final alternation is made to both the Weighted Holidays and Unweighted Holidays. A new variable, "Total Unweighted Holidays", is composed of the number of Saturdays and Sundays in a calendar month plus the number Unweighted Holidays in the corresponding month. In like manner, the "Total Weighted Holidays" variable is the total number of weighted holidays every month from 1992 to 2008, plus the number of Saturdays and Sundays. There are consequently four holiday measures: Unweighted Holidays, Weighted Holidays, Total Unweighted Holidays, and Total Weighted Holidays.

2. Models

Simple Basic Model: $\mathbf{Q= \beta_0+\beta_1 H +\beta_2 P +\beta_3 I +\varepsilon}$, where the dependent variable is quantities by retail expenditure categories, and the independent variables are the holiday variable (H), the real own price index of the category (P) and per capita income (I). Same as the price indices, the Per Capita Income data are also available only by quarter from BEA. Thus

[2] The Easter Days in years 1997, 2002, 2005 and 2008 were fallen in March in the 17 years period researched.

adjustments with the same method as used with price indices were made, and per capita income is changed into monthly data. The model is set up under the basic economic theory that the quantity consumed is related to the own price and consumer income, with the holiday factor also considered. By using different holiday variables, the four models are established as below:

Model 1 $Q= \beta_0 + \beta_1$ (Unweighted Holidays) $+ \beta_2 P + \beta_3 I + \varepsilon$

Model 2 $Q= \beta_0 + \beta_1$ (Weighted Holidays) $+ \beta_2 P + \beta_3 I + \varepsilon$

Model 3 $Q= \beta_0 + \beta_1$ (Total Unweighted Holidays) $+ \beta_2 P + \beta_3 I + \varepsilon$

Model 4 $Q= \beta_0 + \beta_1$ (Total Weighted Holidays) $+ \beta_2 P + \beta_3 I + \varepsilon$

Full Basic Model:

$$\mathbf{Q= \beta_0 + \beta_1 H + \theta_1 P_1 + \theta_2 P_2 + \theta_3 P_3 + \theta_4 P_4 + \theta_5 P_5 + \theta_6 P_6 + \theta_7 P_7 + \theta_8 P_8 + \theta_9 P_9 + \beta_3 I + \varepsilon}$$

The full model expands the simple model by adding the real price index of all the other categories to the model as independent variables. Similar to the simple model, the four models are established as below by using different holiday variables:

Model 5 $Q= \beta_0 + \beta_1$ (Unweighted Holidays) $+\theta_1 P_1 + \theta_2 P_2 + \theta_3 P_3 + \theta_4 P_4 + \theta_5 P_5 + \theta_6 P_6 + \theta_7 P_7 + \theta_8 P_8 + \theta_9 P_9 + \beta_3 I + \varepsilon$

Model 6 $Q= \beta_0 + \beta_1$ (Weighted Holidays) $+\theta_1 P_1 + \theta_2 P_2 + \theta_3 P_3 + \theta_4 P_4 + \theta_5 P_5 + \theta_6 P_6 + \theta_7 P_7 + \theta_8 P_8 + \theta_9 P_9 + \beta_3 I + \varepsilon$

Model 7 $Q= \beta_0 + \beta_1$ (Total Unweighted Holidays) $+\theta_1 P_1 + \theta_2 P_2 + \theta_3 P_3 + \theta_4 P_4 + \theta_5 P_5 + \theta_6 P_6 + \theta_7 P_7 + \theta_8 P_8 + \theta_9 P_9 + \beta_3 I + \varepsilon$

Model 8 $Q= \beta_0+ \beta_1$ (Total Weighted Holidays) $+\theta_1P_1+ \theta_2P_2+ \theta_3P_3 + \theta_4P_4+ \theta_5P_5+ \theta_6P_6+ \theta_7P_7+ \theta_8P_8+ \theta_9P_9+ \beta_3 I + \varepsilon$

The regression results for Models 1 and 2 are in Table 4 and those for Models 3 and 4 are in Table 5. The statistically significant effects of holidays on each consumption category, both at the 5% and the 10% level, are summarized in Table 6. Since the consumption quantities are obtained from dollars of expenditures divided by corresponding price indices, which means the same price indices appear in both side of the model, tests and adjustments should also be conducted. By adjusting the dependent variable into Log(Q), which tests the change of percentage in quantities affected by number of holidays, price and income, the testing results using Models 1 to 4 are collected in the appendix as Table 8 and Table 9. After checking the corresponding coefficients, it could be found that the results in Tables 4 and 5 are similar to those in Tables 8 and 9 respectively, both in signs and significance. This indicates that there are not serious problems of correlations between quantity variable and price variable.

Regressions for the full model are also run and analyzed and are given in the appendix as Tables 10 to 13, and the summary for the results of the holiday measures are in Table 7. The coefficients which are statistically significant at the level 5% are marked by a bold format, and those statistically significant at the level 10% are marked by an italic format. The coefficients and standard errors by categories are arranged in the tables by rows. The adjusted R-squared ($\overline{R}^2$) of each regression are also presented.

IV. Empirical Results and Discussions

1. Regression Results

Looking first at the results for a category's own price and income in Tables 4 and 5, the findings conform fairly closely to economic theory. The statistically significant and negative coefficients for own price, by model, are:

4 out of 9 in Model 1,

6 out of 9 in Model 2,

4 out of 9 in Model 3,

Table 4 Regression Results of Model 1 and Model 2

Categories	Holidays (Unweighted)	Price	Income	$\overline{R}^2$	Holidays (Weighted)	Price	Income	$\overline{R}^2$
Vehicle	**-0.2673** (0.024)	**-1.3454** (0.678)	**0.0556** (0.003)	0.9460	**-0.1954** (0.024)	*-1.3147* (0.753)	**0.0559** (0.003)	0.9335
Equipments	**0.0156** (0.007)	-0.4565 (0.288)	**0.0041** (0.002)	0.7245	**0.0569** (0.005)	**-0.5875** (0.22)	**0.0034** (0.001)	0.8404
Food	-0.0079 (0.008)	1.0535 (1.313)	**-0.0023** (0.001)	0.2676	**0.0443** (0.006)	-0.8696 (1.173)	**-0.0033** (0.001)	0.4202
Health	-0.0028 (0.003)	-0.4803 (0.426)	**0.0049** (0.000)	0.8392	**0.0199** (0.003)	**-1.0699** (0.377)	**0.0052** (0.000)	0.8757
Gasoline	**-0.0455** (0.008)	**-1.0464** (0.086)	**0.0043** (0.001)	0.4792	**-0.0251** (0.008)	**-1.0470** (0.090)	**0.0043** (0.001)	0.4229
Clothing	0.0002 (0.012)	-0.0252 (0.487)	0.0058 (0.004)	0.3842	**0.0910** (0.009)	-0.1585 (0.388)	0.0048 (0.003)	0.6081
Leisure	*0.0095* (0.005)	0.0431 (0.407)	0.0024 (0.003)	0.2697	**0.0484** (0.004)	-0.2230 (0.297)	0.0005 (0.002)	0.6113
Miscellaneous	0.0000 (0.005)	**-1.3285** (0.596)	**0.0005** (0.000)	0.0150	**0.0272** (0.004)	**-1.8462** (0.540)	**0.0006** (0.000)	0.1975
Restaurants	**-0.0385** (0.004)	**-1.5171** (0.647)	**0.0045** (0.000)	0.7463	**-0.0134** (0.005)	**-2.0401** (0.753)	**0.0045** (0.000)	0.6585

***Bold**= statistic significance at 5%
Italic= statistic significance at 10%

6 out of 9 in Model 4.

There are no statistically significant positive results for own price.

For per capita income, the coefficients are positive and statistically significant for the following number of categories in each model:

6 out of 9 in Model 1,

6 out of 9 in Model 2,

6 out of 9 in Model 3,

6 out of 9 in Model 4.

Table 5 Regression Results of Model 3 and Model 4

Categories	Total Holidays (Unweighted)	Price	Income	$\overline{R}^2$	Total Holidays (Weighted)	Price	Income	$\overline{R}^2$
Vehicle	**-0.1297** (0.017)	*-1.4625* (0.771)	**0.0552** (0.003)	0.9301	**-0.1018** (0.017)	*-1.4447* (0.802)	**0.0553** (0.003)	0.9244
Equipment	**0.0088** (0.004)	-0.4478 (0.289)	**0.0042** (0.002)	0.7226	**0.0274** (0.004)	**-0.5206** (0.257)	**0.0038** (0.002)	0.7808
Food	0.0061 (0.005)	0.6339 (1.299)	**-0.0025** (0.001)	0.2693	**0.0276** (0.004)	-0.2071 (1.178)	**-0.0030** (0.001)	0.4020
Health	-0.0021 (0.002)	-0.4927 (0.423)	**0.0049** (0.000)	0.8394	**0.0080** (0.002)	*-0.7551* (0.407)	**0.0050** (0.000)	0.8521
Gasoline	**-0.0146** (0.005)	**-1.0483** (0.091)	**0.0043** (0.001)	0.4118	-0.0072 (0.005)	**-1.0478** (0.092)	**0.0043** (0.001)	0.3961
Clothing	0.0074 (0.008)	-0.0383 (0.486)	0.0057 (0.006)	0.3870	**0.0474** (0.006)	-0.1124 (0.430)	0.0051 (0.003)	0.5191
Leisure	*0.0067* (0.004)	0.0461 (0.406)	0.0024 (0.003)	0.2716	**0.0240** (0.003)	-0.1041 (0.352)	0.0013 (0.003)	0.4523
Miscellaneous	-0.0008 (0.003)	**-1.3167** (0.593)	**0.0005** (0.000)	0.0153	**0.0114** (0.003)	**-1.5432** (0.572)	**0.0006** (0.000)	0.0868
Restaurants	**-0.0074** (0.003)	**-2.2465** (0.752)	**0.0046** (0.000)	0.6526	0.0017 (0.003)	**-2.4552** (0.762)	**0.0046** (0.000)	0.6439

*__Bold__= statistic significance at 5%
Italic= statistic significance at 10%

There is one statistically significant negative result for per capita income---- for food---- suggesting food as a category may be an inferior good. Since the coefficient of price regarding Food in Models 1 and 3 are positive, it is necessary to check the collinearity of the price and income of the category of food. The result is illustrated in Figure 1, take Model 1 for example. All the VIF values are smaller than 6 and there could be considered as only minor collinearity problem in this model. Moreover, as long as the research focuses mainly on the effects and measurements of holidays, some minor collinearity problems in the assisting variables will not affect the research too much.

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: food_Q food_Q

Number of Observations Read	222
Number of Observations Used	199
Number of Observations with Missing Values	23

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.39011	0.13004	25.11	<.0001
Error	195	1.00977	0.00518		
Corrected Total	198	1.39988			

Root MSE	0.07196	R-Square	0.2787
Dependent Mean	1.49728	Adj R-Sq	0.2676
Coeff Var	4.80607		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance	Variance Inflation
Intercept	Intercept	1	1.28289	0.79008	1.62	0.1060	.	0
UH	UH	1	-0.00786	0.00753	-1.04	0.2982	0.96916	1.03182
Food_p	Food_p	1	1.05345	1.31328	0.80	0.4234	0.17517	5.70867
income	income	1	-0.00227	0.00078917	-2.88	0.0044	0.17625	5.67386

Figure 1 Collinearity Test Result Regarding Retail Sales in Food Industry for Model 1[3]

[3] *Note*: UH denote for Unweighted Holidays, Food_p denote for the real price indices of Food consumption

Now look at the results for the holiday measures. There are several statistically significant parameter estimates in Tables 4 and 5. To better compare the result, they are summarized in Table 6, which gives the number of statistically significant estimates (including 5% and 10% levels of significance) for each of the categories across Models 1, 2, 3 and 4. The regression results of Model 2, which were collected in the right half of Table 4, were great illustrations of the holiday effects on retail consumptions. All the β_1 coefficients were statistically significant at 5% level, among which the quantities consummated in Vehicle, Gasoline and Restaurants had negative connections with the days of weighted holidays in a month. Coincidently, the β_1 coefficients of the three categories in the left part of Table 4, which used Unweighted Holiday variables, were also negative.

Table 6 Summarized Holiday Effects on Retail Sales

Categories	Unweighted Holiday (Model 1)	Weighted Holiday (Model 2)	Unweighted Total Holiday (Model 3)	Weighted Total Holiday (Model 4)
Vehicles	-	-	-	-
Equipment	+	+	+	+
Food		+		+
Health		+		+
Gasoline	-	-	-	
Clothing		+		+
Leisure	+	+	+	+
Miscellaneous		+		+
Restaurants	-	-	-	

*Summarized holiday coefficients collected are statistically significant either at 5% or 10% level

Models 2 and 4, using weighted holiday variables, give the best results. In six of the nine retail sales categories, the holiday measure is statistically significant and positively related to consumption. Looking across the models, a positive impact of holidays is

consistently found for all models for Equipment consumption and Leisure consumption. In contrast, holidays have a negative impact on Vehicle consumption in all four models and a negative impact in Restaurant consumption and Gasoline consumption in three of the four models.

The minus sign of coefficients in Restaurants probably indicates that the effects of less business dining, restaurants closing down, and more time cooking at home due to holidays had counteracted big dinners out and drinking; and in traditional festivals as Thanksgiving and Christmas, most people eat dinner at home with the whole family. The decreased sales quantities in Vehicle might simply be explained by most car dealers being closed during holidays. Yet when it comes to Gasoline, it is notable that the vast majority of business operating buses and trucks are reduced during holidays[4]. Family trips instead of single commuters also helped to reduce the gasoline demand.

The summary of the results for the holiday measures by using the Full Model, i.e. Models 5 to 8, are collected in Table 7. The detailed results are in the Appendix, since there are serious multicollinearity problems between the price indices. The problems will be explained later in the thesis. Comparing Table 7 with Table 6, we find that almost all the statistically significant holiday parameters have the same sign, especially when using weighted holiday variables in the models. The differences are only that fewer statistically significant holiday parameters appear in Table 7, and more negatively significant signs appear in the Unweighted Holiday column. The results in Table 7, therefore, support the findings in Table 6.

[4] According to Highway Statistics, *U.S. Department of Transportation*, Single-unit 2-axle 6-tire or more and combination trucks contribute more than 21% of the total fuel consumed.

Table 7 Summarized Holiday Effects on Retail Sales (Full model)

Categories	Unweighted Holiday (Model 5)	Weighted Holiday (Model 6)	Unweighted Total Holiday (Model 7)	Weighted Total Holiday (Model 8)
Vehicles	-	-	-	-
Equipment		+		+
Food		+		+
Health	-	+	-	+
Gasoline	-			
Clothing		+		+
Leisure		+		+
Miscellaneous	-	+		+
Restaurants	-	-	-	

*Summarized holiday coefficients collected are statistically significant either at 5% or 10% level

It is notable that the measurement of the total holiday variables, i.e. Total Weighted Holidays and Total Unweighted Holidays, are based on the summation of the total number of weekends in a month as well as the total number of public holidays. The total number of Saturdays and Sundays in a month keep constant at 8, 9 or 10 while the total number of holidays usually falls between 0 and 2, no matter measured as weighted or unweighted. Therefore, adding the number of weekends in a month onto the number of holidays equals to adding a large constant to the previous two holiday variables. As a consequence, the regression results on all categories towards the two total holiday variables are not as sensitive as the other two, and that's why the regression results using Models 1 and 2 have more statistically significant items regarding the holiday variables than those using Models 3 and 4 do respectively, according to Table 6. It is suggested that in order to measure the total holiday effects including weekends on different categories, a more effective measuring system should be developed.

According to the agreed results in Table 6, it is necessary to find out the size of holiday impacts on certain categories. Take the results of running Model 2 for example, since it expressed the most significant and effective impacts on the consumption during holidays. As is shown in Table 4, with the increase of one percentage of the institutions closed due to public holiday, the quantities of consumption on Vehicle would decline about 1954[5] national wide, while the sales turnover of Vehicle would decline about 4.46%[6], in condition that the price of Vehicles and per capita income hold constant. The sizes of holiday impacts on other categories are as follows:

With the increase of one percentage of the institutions closed due to public holiday, the quantities of consumption on Equipment and Leisure would increase about 569 and 484 national wide, whereas those on Gasoline and Restaurants would reduce about 251 and 134 respectively. Meanwhile, the sales turnover of Equipment and Leisure would raise about 1.4% and 1.09% and those of Gasoline and Restaurants would decline about 0.39% and 0.26%, in condition that all the prices and per capita income hold constant. The holidays have the greatest impact on the consumption of Vehicle.

Since Models 1 to 4 are quite well fitted as measured by the adjusted R-squared and the standard errors, no further adjustments in the models, such as logistic regressions, are considered necessary. The lowest $\overline{R}^2$ is for the price indices of the Miscellaneous category,

[5] Units of dollars of consumption and per-capita income changed in calculation.
[6] July 2008 CPI (219.964) and prices used.
The total dollars of consumption affected are expressed in percentage since prices are gathered and calculated as index.

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: vehicle_Q vehicle_Q

Number of Observations Read	222
Number of Observations Used	199
Number of Observations with Missing Values	23

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	179.19592	59.73197	928.20	<.0001
Error	195	12.54877	0.06435		
Corrected Total	198	191.74469			

Root MSE	0.25368	R-Square	0.9346
Dependent Mean	3.07282	Adj R-Sq	0.9335
Coeff Var	8.25556		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance	Variance Inflation
Intercept	Intercept	1	-4.07807	0.87265	-4.67	<.0001	.	0
WH	WH	1	-0.19542	0.02373	-8.23	<.0001	0.99689	1.00312
Vehicle_p	Vehicle_p	1	-1.31465	0.75268	-1.75	0.0823	0.14055	7.11468
income	income	1	0.05586	0.00312	17.93	<.0001	0.14057	7.11388

Figure 2 Multicollinearity Test Result Regarding Retail Sales in Vehicle Industry for Model 2[7]

which makes sense given its mixed composition. The multicollinearity problem is checked by examining the highest adjusted R-squared. The highest $\overline{R}^2$ appeared in the model studying the Vehicle data, which was 0.9335 using the Weighted Holiday variable. According to the SAS analysis of the results shown in Figure 2, the VIF (Variance Inflation) value of both the price and income variables are just around 7, whereas that of the holiday variable is just about 1. Even lower VIF values result when testing the models with other categories. Since it is not that low in a simple model with two continuous predictors and one proportion variable, the autocorrelation of residuals are tested. The Durbin-Watson test result using the same Vehicle example with Weighted Holidays is shown in Figure 3. The C-value of the holiday

[7] *Note*: WH denote for Weighted Holidays, Vehicle_p denote for the real price indices of Vehicle consumption

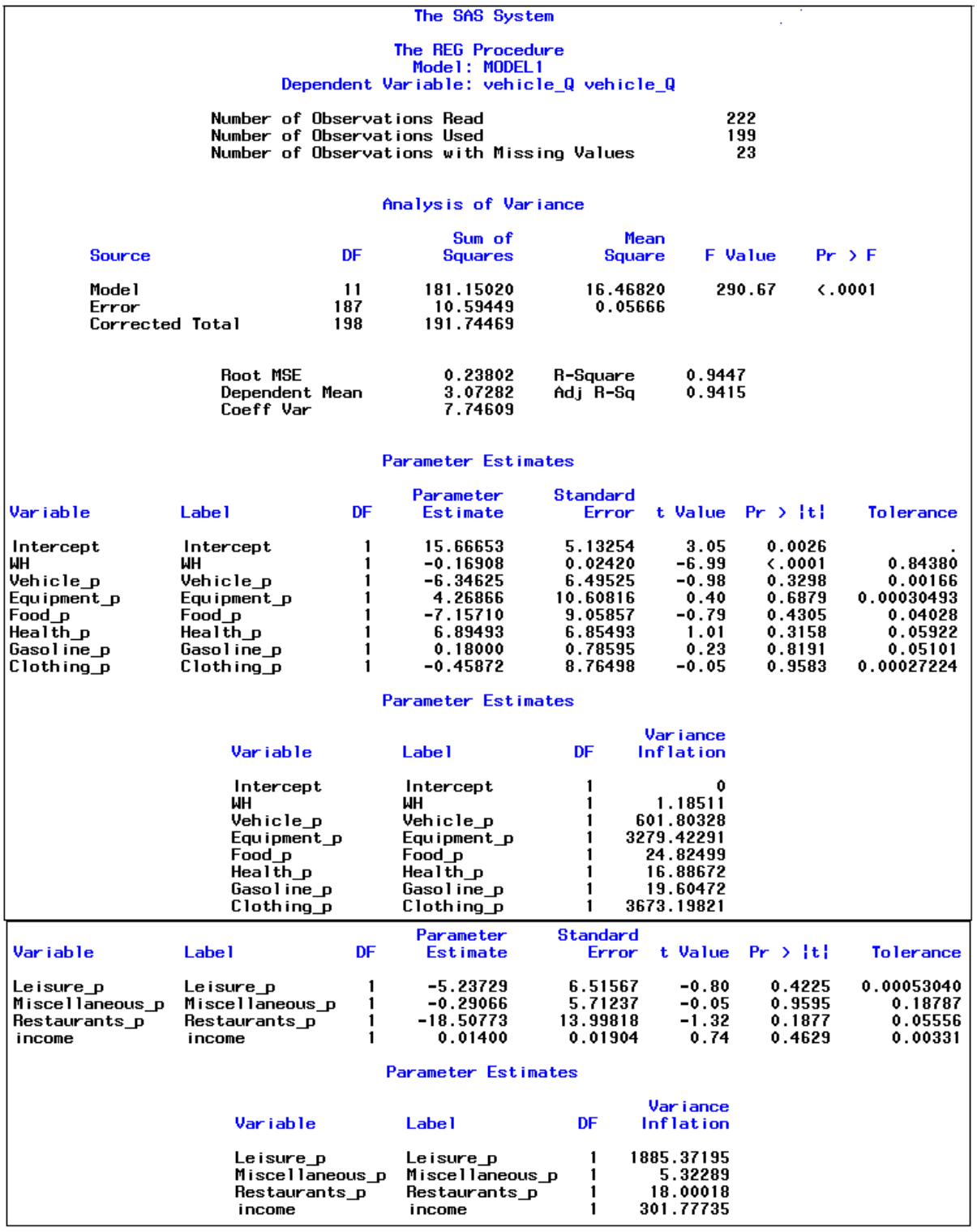
variable is good but those for all the others are high. However, as long as the research focuses mainly on the effects and measurements of holidays, some minor collinearity problems in the assisting variables will not affect the research too much.

The SAS System

Dependent	Label1	c Value1
vehicle_Q	1st Order Autocorrelation	0.949
WH	1st Order Autocorrelation	0.275
Vehicle_p	1st Order Autocorrelation	0.986
income	1st Order Autocorrelation	0.989

Figure 3 Durbin-Watson Test Result Regarding Retail Sales in Vehicle Industry for Model 2

Beyond the Simple Model, will there be some more informative models in explaining the relationships between holidays and consumptions? The Full Model expands the Simple Model in which the adjusted price indexes of all other categories available are also included as independent variables. Before running Ordinary Least Square regressions, the multicollinearity test between the price variables are conducted. The test result is shown in Figure 4. It is found that the VIF value of each price variable is quite large, except for that of the price of Miscellaneous which is about 5.32289. Yet adding the price of Miscellaneous alone into the Simple Models as an additional independent variable does not make logical sense. Therefore, owing to the high multicollinearity of the prices of each different category, Simple Models are representative and persuasive enough that it is not necessary to run the Full Model.



The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: vehicle_Q vehicle_Q

Number of Observations Read	222
Number of Observations Used	199
Number of Observations with Missing Values	23

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	181.15020	16.46820	290.67	<.0001
Error	187	10.59449	0.05666		
Corrected Total	198	191.74469			

Root MSE	0.23802	R-Square	0.9447
Dependent Mean	3.07282	Adj R-Sq	0.9415
Coeff Var	7.74609		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance
Intercept	Intercept	1	15.66653	5.13254	3.05	0.0026	.
WH	WH	1	-0.16908	0.02420	-6.99	<.0001	0.84380
Vehicle_p	Vehicle_p	1	-6.34625	6.49525	-0.98	0.3298	0.00166
Equipment_p	Equipment_p	1	4.26866	10.60816	0.40	0.6879	0.00030493
Food_p	Food_p	1	-7.15710	9.05857	-0.79	0.4305	0.04028
Health_p	Health_p	1	6.89493	6.85493	1.01	0.3158	0.05922
Gasoline_p	Gasoline_p	1	0.18000	0.78595	0.23	0.8191	0.05101
Clothing_p	Clothing_p	1	-0.45872	8.76498	-0.05	0.9583	0.00027224

Parameter Estimates

Variable	Label	DF	Variance Inflation
Intercept	Intercept	1	0
WH	WH	1	1.18511
Vehicle_p	Vehicle_p	1	601.80328
Equipment_p	Equipment_p	1	3279.42291
Food_p	Food_p	1	24.82499
Health_p	Health_p	1	16.88672
Gasoline_p	Gasoline_p	1	19.60472
Clothing_p	Clothing_p	1	3673.19821

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance
Leisure_p	Leisure_p	1	-5.23729	6.51567	-0.80	0.4225	0.00053040
Miscellaneous_p	Miscellaneous_p	1	-0.29066	5.71237	-0.05	0.9595	0.18787
Restaurants_p	Restaurants_p	1	-18.50773	13.99818	-1.32	0.1877	0.05556
income	income	1	0.01400	0.01904	0.74	0.4629	0.00331

Parameter Estimates

Variable	Label	DF	Variance Inflation
Leisure_p	Leisure_p	1	1885.37195
Miscellaneous_p	Miscellaneous_p	1	5.32289
Restaurants_p	Restaurants_p	1	18.00018
income	income	1	301.77735

Figure 4 Multicollinearity Test Result for Full Model

2. Discussion

The empirical research results do not vary too much with different models and measurements; instead they are complementary for each other. For the purpose of discovering the best conclusion of holiday effects on consumption, the regression results of all the four models need to be assembled together.

The four different holiday measurements should be compared before an accurate conclusion of holiday impacts on consumption is drawn. The weighted holiday measurement is introduced in the thesis based on the actual days people do not go to work instead of federally established holidays. The unweighted holiday measurement is simpler but not considered as accurate as the weighted measurement in evaluating holiday importance, according to Table 6. Comparing the results of Model 2 and Model 4, 5 out of 9 of the holiday coefficients are statistically significant when using Models 1 and 3. By checking the regression results in Tables 3 and 4, the coefficients of weighted holidays have smaller standard errors. Moreover, when comparing the coefficients and standard errors in the price columns in the same table, the corresponding items vary greatly. Even the β_2 coefficients of Food and Leisure are negative using Models 1 or 3, which violated basic economic theory. The values of adjusted R-squared are generally higher when using Model 2 or Model 4, while those of Model 2 are highest. With the data of prices and income remaining the same in all the models conducted, the only factor that affects the model's fit is the way of measuring holiday variables. In conclusion, it is Model 2 which gains better fitting results, followed by Model 4, then Model 1, and finally Model 3. From all the evidence above, it is clear that the Weighted Holiday measurement is better in studying the holiday impacts on retail

consumption. Moreover, weekends do not stimulate household consumption so much as holidays do. It is believed that a better way to express the total holiday variables needs to be discussed.

By studying the statistically significant coefficients of weighted holiday variables, it could be found that within the same month, the duration of holidays has a positive relationship with the quantities consumed in such retail categories as Equipment, Food, Health, Clothing and Leisure. In contrast, the total number of holidays in a month is negatively related to the sales in Vehicle, Gasoline and Restaurants in general. Nevertheless, the consumption of Clothing and Leisure do not relate closely with their price and consumers' income, for the coefficients of price indices and income regarding Clothing and Leisure are always not significant. The most powerful counter-examples come from the β_3 coefficients of Food, for Food might be inferior good according to the Engle's Law. Generally the quantity of consumption in a certain category has a positive relationship with per capita income, but is negatively associated with its price. Consequently, retailers in the related industries may take action to become prepared early in inventories and promotion tools for coming holidays. Retailers in such categories as Clothing, Leisure and Equipment might always want to increase inventories and extend business hours during the holidays.

In addition to indicating the significance of holidays in certain household consumption categories, the thesis also suggested public holiday as an important seasonal factor. The monthly spending of retail consumption data are not seasonally adjusted since consumption demand is generally related to people's income and their leisure time to spend money. The latter element, if not both, depend largely on the number of days people do not go to work.

And interestingly, the empirical results implied that the substitution effect vastly outweighed the income effect with respect to holidays. Thus, considering holiday factor as an additional seasonal measurement can lead to better ways of seasonal adjustment.

V. Conclusions

This research offers an estimate of how the quantities of retail sales change in nine household consumption categories due to different public holidays. Two major methods of determining days of holidays in a month were used. With the regression results listed in the tables, the Weighted Holiday measurement seems most appropriate. The measurement of a "holiday" is based on surveying the average percentage of businesses closing during holiday periods. By introducing other holiday variables, such as Total Weighted Holidays, the topic was analyzed in different ways and the results were recorded accordingly.

Within the same month, the number of holidays shares a positive relationship with the quantities of consumption in such retail categories as Equipment, Food, Health, Clothing, Leisure, and has a negative impact on Vehicle, Gasoline and Restaurants consumption. The more holidays in a month, the greater the holiday impact on retail consumption. Preliminary conclusions could be drawn as follows:

1. Gasoline and Restaurant spending decreases with more holidays in a month, as people tend to stay home, and commercial activity is suspended during holidays.

2. People don't shop for vehicles during holidays, or car dealers close during holidays.

3. People do spend more on leisure activity, furnishing and electronic equipments and clothing during holidays.

Recognizing limitations on available public data, further studies might be still valuable to retailers in various kinds of industries. The monthly data studied could only conclude a global tendency of holiday impactions. Daily consumption data during each holiday period might be collected directly from retailers' statistics as well as merchandise stores. Besides, the amount of consumption in every subsection of each category could also be investigated. The detailed data might better explain the holiday and festival effects on retail consumption, thus becoming a more valuable reference for both the producers and the retailers for early preparation. Also to be included in future research is consumption during the yearly paid-off vacation periods.

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APPENDIX

I. Logistic Regression Results for Simple Models

Table 8 Logistic Regression Results for Model 1 and Model 2

Categories	Holidays (Unweighted)	Price	Income	$\overline{R}^2$	Holidays (Weighted)	Price	Income	$\overline{R}^2$
Vehicle	**-0.0391** (0.003)	**0.5782** (0.090)	**0.0113** (0.000)	0.9564	**-0.0293** (0.003)	**0.5839** (0.101)	**0.0113** (0.000)	0.9454
Equipments	**0.0121** (0.005)	0.0357 (0.233)	**0.0066** (0.001)	0.7803	**0.0448** (0.004)	-0.0682 (0.181)	**0.0060** (0.001)	0.8682
Food	-0.0023 (0.002)	0.2610 (0.378)	**-0.0007** (0.000)	0.2679	**0.0125** (0.002)	-0.2839 (0.340)	**-0.0010** (0.000)	0.4133
Health	-0.0024 (0.003)	*-0.6702* (0.356)	**0.0043** (0.000)	0.8440	**0.0160** (0.002)	**-1.1479** (0.319)	**0.0046** (0.000)	0.8768
Gasoline	**-0.0182** (0.003)	**-0.4142** (0.034)	**0.0017** (0.000)	0.4762	**-0.0098** (0.003)	**-0.4144** (0.036)	**0.0017** (0.000)	0.4178
Clothing	-0.0071 (0.009)	-0.2523 (0.383)	0.0039 (0.003)	0.4903	**0.0659** (0.007)	-0.3585 (0.319)	0.0031 (0.002)	0.6463
Leisure	*0.0182* (0.010)	-0.3412 (0.711)	0.0024 (0.005)	0.3979	**0.0838** (0.006)	-0.7934 (0.525)	-0.0009 (0.004)	0.6721
Miscellaneous	-0.0006 (0.007)	-2.1446 (0.785)	0.0010 (0.000)	0.0354	**0.0334** (0.005)	**-2.7874** (0.720)	**0.0011** (0.000)	0.1905
Restaurants	**-0.0164** (0.002)	**-0.7354** (0.277)	**0.0019** (0.000)	0.7429	**-0.0056** (0.002)	**-0.9627** (0.322)	**0.0019** (0.000)	0.6536

***Bold**= statistic significance at 5%
Italic= statistic significance at 10%

Table 9 Logistic Regression Results for Model 3 and Model 4

Categories	Total Holidays (Unweighted)	Price	Income	$\overline{R}^2$	Total Holidays (Weighted)	Price	Income	$\overline{R}^2$
Vehicle	**-0.0192** 0.002	**0.5614** 0.105	**0.0112** 0.000	0.9414	**-0.0154** 0.002	**0.5647** 0.109	**0.0112** 0.005	0.9363
Equipments	*0.0063* 0.004	0.0438 0.234	**0.0067** 0.001	0.7783	**0.0212** 0.003	-0.0138 0.211	**0.0063** 0.001	0.8210
Food	0.0018 0.001	0.1361 0.374	**-0.0007** 0.000	0.2697	**0.0079** 0.001	-0.1026 0.339	**-0.0009** 0.000	0.4096
Health	-0.0018 0.002	*-0.6813* 0.354	**0.0043** 0.000	0.8442	**0.0064** 0.002	**-0.8937** 0.342	**0.0044** 0.000	0.8555
Gasoline	**-0.0058** 0.002	**-0.4149** 0.036	**0.0017** 0.000	0.4073	-0.0027 0.002	**-0.4147** 0.037	**0.0017** 0.000	0.3915
Clothing	0.4891 0.006	0.0022 0.383	-0.2659 0.003	0.0038	**0.3414** 0.005	-0.3247 0.346	0.0034 0.003	0.5827
Leisure	*0.0121* 0.006	-0.3306 0.710	0.0025 0.005	0.3983	**0.0414** 0.005	-0.5858 0.620	0.0006 0.005	0.5420
Miscellaneous	0.7889 0.004	**0.0068** 0.781	**0.0051** 0.000	0.0357	**0.0141** 0.004	**-2.4180** 0.756	**0.0010** 0.000	0.0973
Restaurants	**-0.0032** 0.001	**-1.0460** 0.322	**0.0019** 0.000	0.6486	0.0007 0.001	**-1.1368** 0.326	**0.0020** 0.000	0.6397

***Bold**= statistic significance at 5%
Italic= statistic significance at 10%

II. Full Model Regression Results

Table 10 Regression Results of Model 5 (Full Model Regression with the Unweighted Holiday variable)

Categories	Holidays	Vehicle_p	Equip-ments_p	Food_p	Health_p	Gasoline_p	Clothing_p	Leisure_p	Miscell-aneous_p	Restau-rants_p	Income	$\overline{R}^2$
Vehicle_q	**-0.2443** (0.023)	-5.4475 (5.777)	3.6414 (9.436)	-7.6786 (8.047)	6.4313 (6.081)	0.2323 (0.695)	-0.3108 (7.796)	-5.5056 (5.793)	-0.3978 (5.074)	-14.8241 (12.460)	0.0121 (0.017)	0.9537
Equipments_q	0.0018 (0.006)	0.6880 (1.578)	3.1066 (2.577)	0.0376 (2.198)	**3.6462** (1.661)	**0.9013** (0.190)	-1.1261 (2.130)	-1.7781 (1.582)	0.3923 (1.386)	*6.2217* (3.403)	-0.0010 (0.005)	0.7817
Food_q	-0.0123 (0.008)	-0.5386 (1.924)	2.8784 (3.143)	-1.3069 (2.680)	1.0830 (2.025)	**0.6366** (0.232)	-0.8926 (2.597)	-0.4475 (1.929)	1.7456 (1.690)	2.1562 (4.150)	-0.0031 (0.006)	0.2967
Health_q	**-0.0079** (0.003)	0.3898 (0.778)	0.3844 (1.270)	-0.2085 (1.083)	-0.6035 (0.819)	0.0402 (0.094)	-0.3591 (1.050)	-0.5311 (0.780)	*1.1856* (0.683)	**3.7881** (1.677)	0.0010 (0.002)	0.8650
Gasoline_q	**-0.0275** (0.007)	**-5.5555** (1.695)	**7.4764** (2.769)	*-3.9847* (2.362)	*-3.2981* (1.785)	**-0.9174** (0.204)	**-5.1025** (2.288)	0.2238 (1.700)	-0.7822 (1.489)	-6.0306 (3.657)	**-0.0100** (0.005)	0.6557
Clothing_q	-0.0195 (0.012)	1.0656 (3.009)	3.2853 (4.914)	1.3830 (4.191)	4.6095 (3.167)	**1.0912** (0.362)	-1.0584 (4.061)	-2.0977 (3.017)	2.3596 (2.643)	7.2349 (6.490)	-0.0025 (0.009)	0.4399
Leisure_q	**-0.0003** (0.006)	1.0225 (1.372)	1.1485 (2.241)	1.6095 (1.911)	2.0855 (1.444)	**0.4436** (0.165)	-0.0705 (1.852)	-1.4265 (1.376)	1.4651 (1.205)	2.6495 (2.959)	**-0.0013** (0.004)	0.3465
Miscellaneous_q	*-0.0064* (0.004)	-0.2416 (0.951)	**4.3604** (1.554)	1.3482 (1.325)	1.5063 (1.001)	**0.4554** (0.115)	-1.0163 (1.284)	**-2.3151** (0.954)	-0.4848 (0.835)	0.5216 (2.052)	-0.0020 (0.003)	0.4807
Restaurants_q	**-0.0380** (0.004)	-0.7690 (1.117)	1.4997 (1.825)	-0.5362 (1.556)	*2.1306* (1.176)	0.1336 (0.135)	0.5479 (1.508)	-1.3315 (1.120)	-1.4073 (0.981)	-2.2402 (2.410)	0.0030 (0.003)	0.7524

***Bold**= statistic significance at 5%
Italic= statistic significance at 10%

Table 11 Regression Results of Model 6 (Full Model Regression with the Weighted Holiday variable)

Categories	Holidays	Vehicle_p	Equip-ments_p	Food_p	Health_p	Gasoline_p	Clothing_p	Leisure_p	Miscell-aneous_p	Restau-rants_p	Income	$\overline{R}^2$
Vehicle_q	**-0.1691** (0.024)	-6.3463 (6.495)	4.2687 (10.608)	-7.1571 (9.059)	6.8949 (6.855)	0.1800 (0.786)	-0.4587 (8.765)	-5.2373 (6.516)	-0.2907 (5.712)	-18.5077 (13.998)	0.0140 (0.019)	0.9415
Equipments_q	**0.0494** (0.005)	-0.1903 (1.245)	2.8776 (2.034)	-1.2233 (1.737)	2.2765 (1.314)	**0.6436** (0.151)	-1.2891 (1.680)	-1.0627 (1.249)	-0.5038 (1.095)	4.0508 (2.684)	0.0000 (0.004)	0.8641
Food_q	**0.0463** (0.006)	-1.5905 (1.712)	2.6549 (2.795)	-2.7102 (2.387)	-0.4475 (1.806)	0.3405 (0.207)	-1.0866 (2.310)	0.3819 (1.717)	0.7328 (1.505)	-0.5301 (3.689)	-0.0018 (0.005)	0.4436
Health_q	**0.0176** (0.003)	-0.0626 (0.711)	0.2972 (1.162)	-0.7933 (0.992)	*-1.2423* (0.751)	-0.0850 (0.086)	-0.4423 (0.960)	-0.1792 (0.714)	0.7606 (0.626)	*2.6177* (1.533)	0.0016 (0.002)	0.8871
Gasoline_q	-0.0034 (0.007)	**-5.9433** (1.767)	**7.4743** (2.886)	*-4.3334* (2.464)	**-3.6886** (1.865)	**-1.0069** (0.214)	**-5.1723** (2.384)	0.4864 (1.772)	-1.0603 (1.554)	**-7.1571** (3.808)	**-0.0094** (0.005)	0.6263
Clothing_q	**0.0861** (0.009)	-0.8360 (2.516)	2.8717 (4.109)	-1.1743 (3.508)	1.8218 (2.655)	0.5535 (0.304)	-1.4093 (3.395)	-0.5931 (2.524)	0.5172 (2.212)	2.3950 (5.422)	-0.0001 (0.007)	0.6086
Leisure_q	**0.0447** (0.004)	0.1967 (1.056)	0.9402 (1.724)	0.4388 (1.472)	0.8130 (1.114)	0.2031 (0.128)	-0.2235 (1.425)	-0.7577 (1.059)	0.6311 (0.928)	0.5965 (2.275)	-0.0003 (0.003)	0.6133
Miscellaneous_q	**0.0243** (0.003)	-0.7918 (0.832)	**4.2433** (1.359)	0.6137 (1.160)	0.7054 (0.878)	**0.3005** (0.101)	-1.1178 (1.123)	**-1.8812** (0.835)	-1.0147 (0.732)	-0.8831 (1.793)	-0.0013 (0.002)	0.6029
Restaurants_q	**-0.0106** (0.005)	-1.1979 (1.298)	1.5240 (2.120)	-0.8657 (1.810)	1.7564 (1.370)	0.0412 (0.157)	0.4713 (1.752)	-1.0555 (1.302)	-1.6831 (1.142)	-3.5313 (2.797)	0.0036 (0.004)	0.6658

***Bold**= statistic significance at 5%
Italic= statistic significance at 10%

Table 12 Regression Results of Model 7 (Full Model Regression with the Unweighted Total Holiday variable)

Categories	Holidays	Vehicle_p	Equip-ments_p	Food_p	Health_p	Gasoline_p	Clothing_p	Leisure_p	Miscell-aneous_p	Restau-rants_p	Income	$\overline{R}^2$
Vehicle_q	**-0.1132** (0.016)	-7.4918 (6.505)	3.3353 (10.638)	-9.5654 (9.067)	4.2693 (6.847)	-0.2906 (0.780)	-0.5223 (0.790)	-3.7507 (6.526)	-2.0661 (5.714)	-21.6419 (14.010)	0.0176 (0.019)	0.9412
Equipments_q	0.0030 (0.004)	0.6657 (1.574)	3.1117 (2.574)	0.0133 (2.194)	3.6208 (1.657)	**0.8969** (0.189)	-1.1343 (2.127)	-1.7714 (1.579)	0.3786 (1.383)	*6.1849* (3.390)	-0.0011 (0.005)	0.7823
Food_q	0.0048 (0.005)	-0.8239 (1.930)	2.8765 (3.156)	-1.5882 (2.690)	0.7724 (2.031)	**0.5698** (0.231)	-0.9508 (2.607)	-0.2632 (1.936)	1.5344 (1.695)	1.3866 (4.156)	-0.0028 (0.006)	0.2908
Health_q	**-0.0040** (0.002)	0.3300 (0.781)	0.3741 (1.278)	-0.2632 (1.089)	-0.6664 (0.822)	0.0247 (0.094)	-0.3643 (1.056)	-0.4778 (0.784)	1.1361 (0.686)	3.5827 (1.683)	0.0012 (0.002)	0.8634
Gasoline_q	-0.0057 (0.004)	**-5.9065** (1.758)	**7.4510** (2.875)	*-4.3206* (2.450)	**-3.6752** (1.850)	**-1.0030** (0.211)	**-5.1579** (2.375)	0.4848 (1.763)	-1.0542 (1.544)	-7.0802 (3.786)	*-0.0093* (0.005)	0.6291
Clothing_q	0.0002 (0.008)	0.7417 (3.026)	3.2728 (4.949)	1.0682 (4.218)	4.2591 (3.185)	**1.0138** (0.363)	-1.1172 (4.089)	-1.8730 (3.036)	2.1144 (2.658)	6.3149 (6.517)	-0.0020 (0.009)	0.4321
Leisure_q	0.0027 (0.035)	0.9708 (1.368)	1.1518 (2.237)	1.5570 (1.907)	2.0285 (1.440)	**0.4321** (0.164)	-0.0836 (1.849)	-1.3985 (1.373)	1.4289 (1.202)	2.5264 (2.947)	-0.0013 (0.004)	0.3486
Miscellaneous_q	-0.0035 (0.002)	-0.2863 (0.952)	**4.3517** (1.557)	1.3078 (1.327)	1.4595 (1.002)	**0.4437** (0.114)	-1.0195 (1.286)	**-2.2739** (0.955)	-0.5223 (0.836)	0.3639 (2.050)	-0.0018 (0.003)	0.4787
Restaurants_q	*-0.0060* (0.003)	-1.2881 (1.301)	1.4671 (2.128)	-1.0353 (1.814)	1.5717 (1.370)	0.0076 (0.156)	0.4624 (1.758)	-0.9528 (1.305)	-1.8071 (1.143)	-3.7709 (2.802)	0.0039 (0.004)	0.6633

***Bold**= statistic significance at 5%
Italic= statistic significance at 10%

Table 13 Regression Results of Model 8 (Full Model Regression with the Weighted Total Holiday variable)

Categories	Holidays	Vehicle_p	Equip-ments_p	Food_p	Health_p	Gasoline_p	Clothing_p	Leisure_p	Miscell-aneous_p	Restau-rants_p	Income	$\overline{R}^2$
Vehicle_q	**-0.0838** (0.016)	-7.8366 (6.816)	3.7085 (11.145)	-9.2353 (9.505)	4.5949 (7.182)	-0.2837 (0.819)	-0.6185 (9.209)	-3.7743 (6.838)	-1.9059 (5.990)	-22.9210 (14.675)	0.0178 (0.020)	0.9354
Equipments_q	**0.0222** (0.003)	0.2896 (1.422)	3.0476 (3.325)	-0.5519 (1.983)	**3.0172** (1.498)	**0.7913** (0.171)	-1.2310 (1.921)	-1.5193 (1.426)	0.0102 (1.250)	*5.4313* (3.061)	-0.0011 (0.004)	0.8224
Food_q	**0.2705** (0.004)	-1.2707 (1.741)	2.7958 (2.848)	-2.2687 (2.429)	0.0460 (1.835)	**0.4433** (0.209)	-1.0655 (2.353)	0.0391 (1.747)	1.0916 (1.531)	0.4975 (3.750)	-0.0028 (0.005)	0.4225
Health_q	**0.0064** (0.002)	0.1375 (0.765)	0.3618 (1.251)	-0.5121 (1.067)	-0.9335 (0.806)	-0.0244 (0.092)	-0.4142 (1.034)	-0.3609 (0.768)	0.9712 (0.672)	*3.1690* (1.647)	0.0012 (0.002)	0.8691
Gasoline_q	0.0032 (0.004)	**-6.0670** (1.763)	**7.4498** (2.883)	*-4.5105* (2.459)	**-3.8796** (1.858)	**-1.0418** (0.212)	**-5.1996** (2.382)	0.5770 (1.769)	-1.1813 (1.550)	*-7.4374* (3.796)	*-0.0093* (0.005)	0.6269
Clothing_q	**0.0422** (0.007)	-0.0680 (2.736)	3.1582 (4.473)	-0.1030 (3.815)	3.0070 (2.883)	**0.7921** (0.329)	-1.3256 (3.696)	-1.3440 (2.745)	1.3482 (2.404)	4.6607 (5.890)	-0.0020 (0.008)	0.5359
Leisure_q	**0.0207** (0.003)	0.6177 (1.214)	1.0921 (1.985)	1.0272 (1.693)	1.4627 (1.279)	**0.3330** (0.146)	-0.1743 (1.640)	-1.1621 (1.218)	1.0835 (1.067)	1.8182 (2.614)	-0.0013 (0.004)	0.4873
Miscellaneous_q	**0.0091** (0.002)	-0.5209 (0.916)	**4.3317** (1.498)	0.9942 (1.277)	1.1234 (0.965)	**0.3826** (0.110)	-1.0801 (1.238)	**-2.1283** (0.919)	-0.7291 (0.805)	-0.1334 (1.972)	-0.0018 (0.003)	0.5173
Restaurants_q	0.0037 (0.003)	-1.4638 (1.308)	1.4647 (2.139)	-1.2452 (1.824)	1.3458 (1.378)	-0.0351 (0.157)	0.4168 (1.767)	-0.8513 (1.312)	**-1.9474** (1.149)	-4.1603 (2.816)	0.0039 (0.004)	0.6599

***Bold**= statistic significance at 5%
Italic= statistic significance at 10%