Retail Sales Forecast: A Cross Sectional Approach for Retail Investment Strategy

By

Ai Kong

Bachelor of Commerce, 2003
University of British Columbia

Submitted to the Department of Architecture in Partial Fulfillment of
the Requirements for the Degree of

Master of Science in Real Estate Development

at the

Massachusetts Institute of Technology

September, 2008

©2008 Ai Kong
All rights reserved

The author hereby grants to MIT permission to reproduce and to distribute publicly paper and electronic copies of this thesis document in whole or in part in any medium now known or hereafter created.

Signature of Author_____

Ai Kong
Department of Architecture
July 31, 2008

Certified by_____

William C. Wheaton
Professor of Economics
Thesis Supervisor

Accepted by_____

Brian A. Ciochetti
Chairman, Interdepartmental Degree Program in
Real Estate Development

Retail Sales Forecast: A Cross Sectional Approach for Retail Investment Strategy

by

Ai Kong

Submitted to the Department of Architecture
on July 31, 2008 in Partial Fulfillment of the Requirements for the
Degree of Master of Science in Real Estate Development
at the Massachusetts Institute of Technology

ABSTRACT

The intent of this thesis is to identify the demand drivers for ten retail sub-categories in the US and develop an understanding of how to best use this information to make better retail real estate investment decisions. This cross sectional study analyzes sales per population, establishment per population, and sales per establishment based on six independent variables and the 2002 data set of 54 metropolitan statistical areas. The independent variables are population, employment per population, income per population, precipitation, temperature, and population growth.

The first portion of this thesis is to analyze the demand drivers for each retail category and the degree of effectiveness of each variable on retail sales performance. The regression results of this study have clearly demonstrated a measurable demand for each retail category given the nature of each product type.

The last aspect of this thesis is the development of an investment strategy that examines the predicted results versus the actual sales figures to see if a certain city is over saturated or under-supplied with retail establishments by category. By understanding what is the exact demand driver for each category, real estate investors are able to use this information efficiently to make informed investment decisions based on demand drivers as well as retail store supplies. This methodology provides a reasonable and well thought-out strategy to avoid unsuccessful investment outcomes.

Thesis Supervisor: William Wheaton
Title: Professor of Economics

ACKNOWLEDGMENTS

I would like to express my sincere gratitude to Professor William Wheaton for his patient guidance, thorough instruction and kind support over the thesis process.

I owe special thanks to all the faculty and administration members in the MSRED program at the MIT Center for Real Estate. I am grateful for all of the help and advice they have generously poured over me.

In addition, I would like to thank the dear friends in the class of 2008, who have made my experience at MIT exciting, exceptional and memorable. The bond we have built extends beyond time and geographical borders.

I also appreciate the assistance, support, and inspiration from all of my friends, without whom I would never been who I am today.

Last but not least, I am forever grateful to my parents, who have given me an overwhelming amount of love, unconditional support, and abundant encouragement. They have made my education at MIT possible and have taught me everything I need to know in life. My gratitude to them goes beyond what words can describe.

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION

Retail is one of the major real estate investment asset classes and is by far one of the most specialized asset types in real estate investments. Its complications not only lie in the property return analysis, but also in understanding industry trends, consumer behavior, population growth, demographics, tenant mix, and location. In order to successfully select the best retail locations for shopping center development and investment, it is crucial to master these factors that affect retail performance.

For the purpose of this study, we will only examine factors that affect retail demand. However, there are several macro factors that affect retail real estate investment as a whole that are worth mentioning. First of all, inflation affects the cost of land and buildings. Inflation also affects interest rates and hence the cash flows of geared property investors. Inflation induced costs can be compensated if rents and values are maintained in real terms. Secondly, interest rates affect business confidence and investment; therefore affect tenant demand. This in turn will affect the decision of new retail development and the profitability of existing properties. Lastly, growth in household disposable income can beneficially affect household spending, which affects retail sales and demand for, and returns from, retail property. In summary, the general economic conditions affect growth in employment levels, business profitability and investment, and household disposable income - all of which affect the tenant demand for retail properties.

Aside from all of the general economic factors, retail demand is one of the most important value drivers for retail investments. To better predict retail real estate investment performance, it is important to understand what drives retail demand. One of the major determinates are the trends in the level and type of household and small business consumption expenditure. This can be influenced by growth in real household income. Economic growth has an influence on household incomes and on the level of unemployment, all of which affect retail spending. One of the major determinates of retail demand are the change in the shopping preferences and patterns of consumer spending. This can influence demand for different types of properties. Increases in internet sales may cause a decline in demand from some types of retailers, most notably in the sales of products such as book, music, electronics stores. Since the inception of online business, online auction houses, such as Amazon.com and e-bay, along with excess inventory liquidators

there has been increased competition among retailers, which presents challenges for retail space demand and real estate investment.

Given these trends in consumer spending behavior and industry evolvement, this study attempts to focus on very basic factors to explain the demand determinates that affect different retail categories. The study analyzes these factors across approximately 54 markets in the US during the year of 2002. The 2002 data has been chosen due to limitations of the current data and that it is latest data provided by the US Economic Census. This study will take an unusual approach of a cross sectional approach instead of the popular time series analysis to answer the following question: should certain retail investment be made in a metropolitan statistical area (MSA) that is not growing in population but is growing in wealth or in a MSA that is growing in population but not getting richer. This study attempts to develop a forecast model to measure the changes in retail sales given demographic changes in different cities. The goal is to understand in depth how population, income, employment, temperature, precipitation, and population growth determine the demand in a particular retail sector for a metropolitan statistical area. By recognizing the factors that affect retails sales figures, we will be able to identify cities in which certain retail sectors are under invested and thus will be able to provide a successful retail mix given current demographic factors. The detailed study of retail establishments within a particular neighborhood will not be examined due to the macro nature of the data analysis.

We will examine 54 MSA's in the US and focusing on the following retail sectors:

- Furniture Stores
- Electronics Stores
- Building Materials
- Food and Beverage Stores
- Health and Personal Care Stores
- Clothing and Clothing Accessories Stores
- Sporting Goods, Hobby, and Musical Instrument Stores
- Book, Periodical, and Music Stores
- General Merchandise Stores
- Accommodations
- Restaurants and Eateries

CHAPTER TWO: LITERTURE REVIEWS

To date the world of retail research spreads over a span of issues from retail space to retail rents, and to shopping center investments. Many of the researches focus on retail sales. The articles reviewed for this thesis are closely related to retail sales forecast and other factors that affect retail sales, such as weather and consumer sentiment.

The study done by Russell J. Lundholm and Sarah E. McVay (2004) used a few years of firm-specific, publicly available information to forecast retail sales growth for a typical firm in a typical year.[1] Their study presents a sales forecasting model and tests the model on a sample of 104 firms in the retail industry that have a store forecast in 2001. The model distinguishes between sales growth due to an increase in the number of sales-generating units (e.g. opening new stores) and growth due to an increase in the sales rate at existing units (e.g. the comparable store growth rate). The model accommodates for different trends in the sales rates, allowing new stores to earn more or less than existing stores, perhaps because new stores are different sizes than existing stores or may take either a long time to reach maturity or alternatively enjoy an early "fad" status. They showed how to use the historical series of sales, stores and comparable store growth rates to estimate the sales rates on new stores and on existing stores. My study differs from their study in that it covers the macro retail sales forecast for each distinctive retail categories for every city instead of sales forecast for a specific retail firm.

A research paper written by John D. Benjamin, G. Donald Jud, and Daniel T. Winkle (1998), developed a simultaneous model of retail space demand and supply that includes vacancy rate.[2] It is a time series study that employed MSA data from twenty metropolitan markets for the period 1986–95. Their empirical results reveal inelastic price demand and supply elasticity for

---

[1] Lundholm, Russell J. and McVay, Sarah E., *Forecasting Sales: A Model and Some Evidence from the Retail Industry,* 2004

[2] John Benjamin & G. Donald Jud & Daniel T. Winkler, *A Simultaneous Model and Empirical Test of the Demand and Supply of Retail Space*, 1998

retail space. Because demand and supply are price inelastic, shifts in demand (supply) are found to result in relatively large changes in rent and relatively small changes in quantity demanded (supplied). Rental prices are largely explained by the previous year's rental price and the current year's vacancy rate, with higher vacancy rates resulting in lower rental prices. In addition to the effects of price, they found that the demand for space is strongly influenced by the real level of retail spending; in particular, space demand seems to rise slightly less than in proportion to increases in real retail sales. On the supply side, the supply of space is negatively affected by more stringent land-use regulation and less land availability, while capital costs, as measured by interest rates, do not appear to have a significant impact on supply. My study also uses MSA data but does not take the supply factor in consideration and is a cross sectional study on different retail sectors rather than just the general retail market.

While the retail sales researches tend to focus on sales forecast, there are other factors that affect retail sales, such as weather. The study done by Martha Starr-MaCluer (2000) examines closely the effect of weather on consumer spending as she presented a model in which weather affects retail sales.[3] Using monthly data on retail sales and weather data in this time series study, she found that unusual weather has a modest but significant role in explaining monthly retail sales fluctuations. The monthly sales data show considerable evidence of weather related dips followed by swings. The findings are consistent with the theory that weather affects the productivity of time in non-market activities, shifting demands for goods. My study also examines the effect of weather in forecasting retail sales, in particular temperature and precipitation. However it is part of the six independent variables in the forecasting equation holding population, employment per population, income per population and population growth constant.

[3] Martha Starr-McCluer, *The effects of weather on retail sales*, 2000

Another study done by Christopher D. Carroll, Jeffrey C. Fuhrer and David W. Wilcox (1994) was a study on whether consumer sentiment can forecast household spending.[4] Their study is macro in nature, covering the real personal consumption expenditures over the post -1954 period for the entire US. The time series model they developed shows that the lagged consumer sentiment has some explanatory power for current changes in household spending. Through numerous models and tests, they have concluded that in contrast with the simple precautionary-saving model, consumption might fall for an extended period before beginning to rise again. This is influenced by the consumer sentiment. Furthermore, in contrast with the habit-formation model, it is no longer clear that all relevant information about the expected current growth rate of consumption should be contained in the lagged growth rate of consumption. In particular, lagged sentiment might provide incremental information about current consumption growth. My study will not examine the factors of consumer sentiment; nonetheless it is an interesting factor in predicting retail sales.

The literature reviews give us an overview of the type of factors that affects retail sales. The goal of this thesis is to encompass all the major factors such as demographics and weather information in order to create a model that forecasts retail sales in US cities from the data points collected for major US MSA's instead of a sample dataset from one city. This study results in a broader perspective in forecasting retail sales rather than just one aspect of sales forecast. The study helps investors to understand the basic factors that affect different retail categories and the demand for each category, which when calculated correctly can be used to plan successful shopping center development and investment with the right tenant mix.

[4] Carroll, Christopher D & Fuhrer, Jeffrey C & Wilcox, David W, *Does Consumer Sentiment Forecast Household Spending? If So, Why?*, 1994

CHAPTER THREE: DATA AND METHODOLOGY

3.1 Introduction

This thesis studies the changes in retail sales per population, retail establishment per population, and sales per establishment based on the six independent variables. These variables are population, employment per capita, income per capita, average monthly precipitation, January temperature, and population growth. Since it is a cross sectional analysis, the data used are not in a form of time series, but rather recorded retail data in 2002 across all 54 US major metropolitan markets. Keep in mind that the retail industry is not stagnant in that consumer behavior and demand changes due to economic conditions and technological development. Each retail sub-sector will go through a life cycle from growth to mature and to decline. Therefore the 2002 data may only paint a picture of consumer demand in a certain retail category at that point in time. The change in life cycle in a certain retail category may not be reflected in this study and that the life cycle may have reached the mature stage for some industries and perhaps are not far from declining in the near future.

3.2 Data Source

Torto Wheaton Research - Torto Wheaton Research provided the framework for the 54 metropolitan statistical areas in the US. The Torto Wheaton data also included the 2002 total employment, personal income, and population for each of the 54 metropolitan statistical areas.

US Economic Census - *Economic* Census provided complete information on the 2002 total sales and number of establishments for the total retail sector and each of the retail sub-sectors. Each individual retail category is listed as follows:

- Furniture
- Electronics
- Building Materials
- Food and Beverages
- Health & Personal Care
- Clothing and Clothing Accessories

- Sporting Goods, Books, and Music
- General Merchandise
- Accommodation
- Restaurants and Eateries

National Weather Service – National Weather Service provided the historical average January temperature and monthly average of precipitations for approximately the past 100 years.

US Census – US Census provided the population records for each of the 54 MSA's between 1990 and 2000. We were able to infer the population growth for the past 10 years using this data

3.3 Methodology

The study adopts a model that utilizes the cross sectional data to predict the sales and the number of establishments given the different predictor variables. The regression model developed in this study summarizes the relationship among variables together with measures of variation from the mathematical curve. We ran a total of 33 regressions for total retail and each of the sub-categories to provide predictability for the independent variables. The equations utilized in the analysis are as follows.

$$Y_{sales/pop} = \beta_0 + \beta_{pop}\, x_{pop} + \beta_{emp/p}\, x_{emp/p} + \beta_{inc/p}\, x_{inc/p} + \beta_{prec}\, x_{prec} + \beta_{jan\ temp}\, x_{jan\ temp} + \beta_{pop\ g}\, x_{pop\ g} + e$$

$$Y_{est/pop} = \beta_0 + \beta_{pop}\, x_{pop} + \beta_{emp/p}\, x_{emp/p} + \beta_{inc/p}\, x_{inc/p} + \beta_{prec}\, x_{prec} + \beta_{jan\ temp}\, x_{jan\ temp} + \beta_{pop\ g}\, x_{pop\ g} + e$$

$$Y_{sales/est} = \beta_0 + \beta_{pop}\, x_{pop} + \beta_{emp/p}\, x_{emp/p} + \beta_{inc/p}\, x_{inc/p} + \beta_{prec}\, x_{prec} + \beta_{jan\ temp}\, x_{jan\ temp} + \beta_{pop\ g}\, x_{pop\ g} + e$$

Where the independent variables are shown as below:

Pop = total population in the MSA in 2002

Emp/p = employment per capita in the MSA in 2002

Inc/p = income per capital in the MSA in 2002

Prec = average monthly precipitation approximately over the past 100 years

Jan temp = average January temperature approximately over the past 100 years

Pop g = population growth over 10 years from 1990 to 2000 in the MSA

Dependent variables are as follows:

Sales/pop = retail sales revenue per capita in the MSA in 2002

Est/pop = retail establishment per capita in the MSA in 2002

Sales/est = retail sales per establishment in the MSA in 2002

A simple way to improve the first regression set is to measure the percentage change of these variables by taking the natural logarithm of the variables. An additional 33 regressions were calculated to predict better results for these variables. This study has transformed the data using natural logarithms, providing a powerful method for turning marginally useful regression models into quite valuable models in which the assumptions are much more credible and hence the predictions are much more reliable. By applying the logarithm transformation, the method stabilized variability when the standard deviation of the data is proportional to the mean of the response; therefore it measures the percentage change of the data points. After taking the natural log of these variables, the regression analyses yielded much better results. The analysis in this thesis is based on the results of the logged regression findings. The equations for the regression analysis are shown below.

$$\log (Y_{sales/pop}) = \beta_0 + \log (\beta_{pop}\, x_{pop}) + \log (\beta_{emp/p}\, x_{emp/p}) + \log (\beta_{inc/p}\, x_{inc/p}) + \log (\beta_{prec}\, x_{prec}) + \log (\beta_{jan\ temp}\, x_{jan\ temp}) + \log(\beta_{pop\ g}\, x_{pop\ g}) + e$$

$$\log (Y_{est/pop}) = \beta_0 + \log (\beta_{pop}\, x_{pop}) + \log (\beta_{emp/p}\, x_{emp/p}) + \log (\beta_{inc/p}\, x_{inc/p}) + \log (\beta_{prec}\, x_{prec}) + \log (\beta_{jan\ temp}\, x_{jan\ temp}) + \log(\beta_{pop\ g}\, x_{pop\ g}) + e$$

$$\log (Y_{sales/est}) = \beta_0 + \log (\beta_{pop}\, x_{pop}) + \log (\beta_{emp/p}\, x_{emp/p}) + \log (\beta_{inc/p}\, x_{inc/p}) + \log (\beta_{prec}\, x_{prec}) + \log (\beta_{jan\ temp}\, x_{jan\ temp}) + \log(\beta_{pop\ g}\, x_{pop\ g}) + e$$

CHAPTER FOUR: RESULTS

4.1 Results by Retail Category

4.1.1 Total

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.70375944
R Square	0.495277349
Adjusted R Square	0.427980996
Standard Error	0.105935397
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.495553311	0.082592218	7.359646159	1.6038E-05
Residual	45	0.505003875	0.011222308		
Total	51	1.000557186			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.15157184	0.501164822	16.26525144	1.82409E-20	7.142174118	9.160969563
Population	-0.053367549	0.023087076	-2.311576785	0.025436046	-0.099867305	-0.006867793
Employment/Pop	0.206080101	0.149570689	1.377810739	0.175075339	-0.095170717	0.507330919
Income/Pop	0.339097719	0.112150664	3.02359082	0.004115359	0.113214696	0.564980743
Precipitation	0.067679691	0.027851166	2.430048764	0.019148644	0.011584566	0.123774815
Jan Temp	0.106239707	0.06025177	1.763262858	0.084645667	-0.015113581	0.227592995
Pop Growth	0.233411481	0.091927961	2.53906948	0.014641485	0.04825907	0.418563892

Establishment/Population (Logs)

Regression Statistics	
Multiple R	0.772604877
R Square	0.596918295
Adjusted R Square	0.543174068
Standard Error	0.099938421
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.665578499	0.11092975	11.10664951	1.43647E-07
Residual	45	0.449445959	0.009987688		
Total	51	1.115024458			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-6.403409507	0.472794008	-13.54376198	1.7519E-17	-7.35566548	-5.451153535
Population	-0.052427873	0.021780122	-2.407143157	0.020242049	-0.096295289	-0.008560456
Employment/Pop	0.104606848	0.14110353	0.741348202	0.462333848	-0.179590237	0.388803933
Income/Pop	0.184107655	0.105801844	1.740117641	0.088673945	-0.028988188	0.397203497
Precipitation	0.155706461	0.026274518	5.926139543	4.01865E-07	0.102786867	0.208626055
Jan Temp	0.108368894	0.056840932	1.906529158	0.062979254	-0.006114615	0.222852403
Pop Growth	0.022444857	0.086723943	0.258808077	0.796963526	-0.152226122	0.197115836

Retail is the second-largest industry in the United States both in number of establishments and number of employees. The U.S. retail industry generates $4.2 trillion in retail sales annually including food service sales, approximately $11,993 per capita. The retail sector is also one of the largest worldwide.[5]

Retailers sell goods and products to consumers. There are many different kinds of retailers, including department stores, specialty stores, discounters, catalogs, internet sites, independent stores, chain restaurants and grocery stores. Retail trade accounts for about 12.4 percent of all business establishments in the United States. The retail industry is also one of the biggest employers in the country, which accounts for about 11.6 percent of U.S. employment in 2005.[6]

As we can see, the retail industry is a significant part of our economy. An understanding of the factors that affect demand can greatly benefit retail real estate investment selections. The regression result in sales per populations shows an adjusted R square of 0.43, meaning that 43% of the results can be explained by its independent variables. The result proves that population, income per population, employment per population, temperature, precipitation and population growth all have significant effect on sales per population for the national retail industry. However the result we see in this section from each factor is a mixed result of the total national retail category, not an individual retail sector result.

In general, it shows that as precipitation increases, the retail sales per population also increase, mainly due to demand from furniture and building materials sales. As a city gets larger, its sales per population slightly decrease as a result of economy of scale. The result also shows that warmer places also increase the retail sales because a 1% increase in temperature results in a 0.11% increase in sales per population. The strongest factors that affect total retail sales are employment per population, income per population and population growth. A 1% increase in these factors will increase the total retail sales per population by 0.27%, 0.34%, and 0.23% respectively; showing that as population grows there is more demand for retail. The bigger the

[5] IBISWorld Industry Report, 2008

[6] IBISWorld Industry Report, 2008

city gets, the more labor participation and higher disposable income there will be. This agglomeration effect explains the increase in total retail sales.

4.1.2 Furniture

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.751947272
R Square	0.5654247
Adjusted R Square	0.507481326
Standard Error	0.168510722
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.662560014	0.277093336	9.758228889	7.05943E-07
Residual	45	1.277813858	0.028395864		
Total	51	2.940373872			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2.207026896	0.797199505	2.768474995	0.008149363	0.60138474	3.812669052
Population	-0.043028352	0.036724456	-1.17165389	0.247502334	-0.116995201	0.030938497
Employment/Pop	0.004529087	0.237921086	0.019036089	0.984896471	-0.474668559	0.483726733
Income/Pop	0.932555213	0.178397306	5.227406357	4.29886E-06	0.573244609	1.291865816
Precipitation	0.113225157	0.044302662	2.555719067	0.01404532	0.02399502	0.202455294
Jan Temp	0.136530301	0.095842084	1.424533941	0.161190452	-0.056505556	0.329566159
Pop Growth	0.463569421	0.146229189	3.170156554	0.002740804	0.169048729	0.758090113

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.722075236
R Square	0.521392647
Adjusted R Square	0.457578333
Standard Error	0.154055093
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.163456553	0.193909426	8.170465463	5.33231E-06
Residual	45	1.067983726	0.023732972		
Total	51	2.23144028			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-11.09618062	0.728812044	-15.22502367	2.28122E-19	-12.56408337	-9.628277879
Population	-0.055664254	0.033574063	-1.657954092	0.104282728	-0.123285885	0.011957376
Employment/Pop	0.022381814	0.217511115	0.102899635	0.918499828	-0.415708041	0.46047167
Income/Pop	0.606799145	0.16309356	3.720558581	0.000549777	0.278311867	0.935286423
Precipitation	0.158695297	0.040502174	3.91819204	0.000300587	0.077119734	0.24027086
Jan Temp	0.196342845	0.087620307	2.240837233	0.030017234	0.019866497	0.372819194
Pop Growth	0.322814829	0.133684973	2.414742831	0.019873188	0.053559484	0.592070174

The furniture industry is part of the Retail Trade Sector in the US. Operators in this industry retail a broad range of home furniture goods including dining rooms, master bedrooms, leather upholstery, desk/home office goods, lamps, recliners, rugs, and outdoor furniture. The majority of goods supplied by this industry are purchased by consumers aged 35-44 who are part of the replacement market for furniture.[7] The industry is comprised of establishments primarily engaged in retailing new furniture, such as household furniture, outdoor furniture, office furniture, and furniture sold in combination with major appliances, home electronics, home furnishings, and floor coverings.

The t statistics are significant for income, precipitation, and population growth, which mean that the demand for furniture is driven by these factors. A 1% increase in income per population will result in a 0.93% increase in furniture sales, showing that furniture is an inelastic normal good, but relatively close to luxury goods because consumers are quite price conscious for goods that often are priced higher than the average discretionary item. As the level of disposable income increases, its overall household expenditure increases and more specifically, the level of income which may be allocated to the purchase of furniture products. This is why people are able to purchase the big ticket items such as furniture to make their home more comfortable and stylish. One the other hand, during periods of low disposable income, households may opt to refrain from purchasing big ticket items such as furniture and re-directing the available income towards more necessary expenses, such as food and general merchandise.

In addition to income per population, a 1% increase in population growth will result in a 0.46% increase in furniture sales, which is the highest amongst all retail categories. This sends a clear message that as people migrate into a new city, they need to relocate into new homes, which creates a higher demand for furniture compared to other retail items. A city that has higher population growth often is reflected in higher residential construction activity, which positively influences the furniture industry. An increase in new home construction and remodeling activities will facilitate spending for new furniture. Furthermore, because furniture is a durable good, which does not quickly wear out and can last a long time, there will be a big increase when

[7] IBISWorld Industry Report, 2008

there is population growth, otherwise, sales in furniture will not increase as significant as the 0.46%.

Lastly, a 1% increase in precipitation will result in a 0.11% increase in furniture sales, which is considered sizeable compared to other retail categories. Houses are much more prone to remodeling or renovations in cities that have higher precipitation due to possible damages from the wet weather. The demand for furniture increases as a result of renovation activities. Furthermore, when a city rains or snows often, people may prefer indoor activities; therefore decorating their homes and to make it more enjoyable to stay in.

4.1.3 Electronics

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.652936513
R Square	0.42632609
Adjusted R Square	0.349836236
Standard Error	0.203543563
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.385492159	0.23091536	5.573629239	0.000217864
Residual	45	1.864349196	0.041429982		
Total	51	3.249841355			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2.350445218	0.962934736	2.440918506	0.01864868	0.410995186	4.28989525
Population	0.012375238	0.044359353	0.27897697	0.781540621	-0.076969082	0.101719558
Employment/Pop	0.341244861	0.28738412	1.187417246	0.241293292	-0.237576445	0.920066167
Income/Pop	0.826730806	0.215485536	3.836595346	0.000386278	0.392720676	1.260740937
Precipitation	-0.040136566	0.053513043	-0.750033331	0.457138309	-0.147917363	0.067644231
Jan Temp	0.205151814	0.115767347	1.772104306	0.083147792	-0.028015582	0.43831921
Pop Growth	-0.06264734	0.17662977	-0.354681663	0.724484945	-0.418397944	0.293103263

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.604565889
R Square	0.365499914
Adjusted R Square	0.280899903
Standard Error	0.135440965
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.47551934	0.079253223	4.320329375	0.001597641
Residual	45	0.82549147	0.018344255		
Total	51	1.30101081			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-10.65463611	0.640751333	-16.62834793	7.7593E-21	-11.94517548	-9.36409673
Population	0.010611238	0.029517385	0.359491138	0.720909245	-0.048839823	0.0700623
Employment/Pop	0.223348154	0.191229739	1.167957218	0.248975013	-0.161808295	0.608504603
Income/Pop	0.334948989	0.143387334	2.335973335	0.024007495	0.046152086	0.623745892
Precipitation	0.064899608	0.035608388	1.822593241	0.075013565	-0.006819365	0.13661858
Jan Temp	0.187723437	0.077033343	2.436911469	0.018831597	0.032570327	0.342876548
Pop Growth	0.092330526	0.11753212	0.785576965	0.436232262	-0.144391304	0.329052356

The electronics industry comprises establishments primarily engaged in retailing one of the following: (1) retailing an array of new household-type appliances and consumer-type electronic products, such as radios, televisions and computers; (2) specializing in retailing a single line of consumer-type electronic products; and (3) retailing these new products in combination with repairs.[8] Electronics store data include those retailers who operate primarily as appliance, television and other electronics stores, computer and software stores, and camera and photographic supply stores. Technological innovation and the need to replace and upgrade appliances, televisions and consumer electronics is one of the key factors driving demand. As such the inability to stock the most recently available merchandise will almost certainly ensure lost demand and hence lost sales for retailers. Given the growth in online shopping, it is much more difficult for the stores to retain existing market share and revenue. However the 2002 data will give a point in time demand during this period, excluding online shopping.

The major demand driver in this industry is income per population. As the data shows, a 1% increase in income per population results in a 0.83% increase in electronics sales, showing that electronics are inelastic normal goods. The level of income at the disposal of a household unit determines its overall expenditure on appliance, television and other electrical goods. Changes in the level of real household disposable income will also affect the quality of merchandise purchased. For example, while a number of products retailed in this industry are small ticket items, such as toasters and microwave ovens, bigger ticket items such as plasma TV require a substantially larger portion of disposable income. Therefore the level of disposable income plays an important demand driver in this industry. A contraction in income may result in consumers acquiring cheaper priced and lower quality goods. The electronics are also durable goods, which mean that the increase in income does not increase the electronics sales as much because most of these products generally have long inter-purchase times.

.

[8] IBISWorld Industry Report, 2008

4.1.4 Building Materials

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.532257596
R Square	0.283298149
Adjusted R Square	0.187737902
Standard Error	0.183146347
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.59664258	0.09944043	2.964602523	0.0158989
Residual	45	1.509416292	0.033542584		
Total	51	2.106058872			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	6.345283121	0.866438497	7.323408579	3.38547E-09	4.600186484	8.090379759
Population	-0.098079655	0.039914077	-2.457269752	0.017918799	-0.17847073	-0.01768858
Employment/Pop	-0.131340683	0.258585194	-0.507920353	0.613989959	-0.652157975	0.38947661
Income/Pop	0.416867103	0.193891608	2.150000751	0.036966185	0.026349375	0.80738483
Precipitation	0.084644098	0.048150471	1.757908002	0.085563784	-0.012335924	0.18162412
Jan Temp	-0.153520678	0.104166235	-1.473804614	0.147495755	-0.363322236	0.05628088
Pop Growth	0.202089112	0.1589296	1.27156371	0.210061088	-0.11801152	0.522189744

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.802109336
R Square	0.643379386
Adjusted R Square	0.595829971
Standard Error	0.141340429
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.621832596	0.270305433	13.53075289	1.05013E-08
Residual	45	0.898970262	0.019977117		
Total	51	2.520802858			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-6.169282005	0.668660835	-9.226324742	6.08797E-12	-7.516034	-4.822530009
Population	-0.145829321	0.030803087	-4.73424374	2.21629E-05	-0.20786992	-0.083788722
Employment/Pop	0.052416175	0.199559221	0.262659749	0.794011652	-0.349516711	0.454349061
Income/Pop	-0.06059632	0.149632922	-0.404966495	0.687420877	-0.361972483	0.240779843
Precipitation	0.200749054	0.037159399	5.402376221	2.38399E-06	0.125906186	0.275591923
Jan Temp	-0.264536047	0.08038872	-3.29071102	0.001947955	-0.426447233	-0.10262486
Pop Growth	0.047880465	0.12265152	0.390378082	0.698098888	-0.199152367	0.294913298

The building materials industry comprises a broad range of home repair and maintenance goods including hardware, tools, equipment, plumbing and electrical goods, lumber and structural material. The types of stores included in the building materials category are home centers, paint

and wallpaper stores, hardware stores, outdoor power and equipment stores, and nursery, garden and farm supply stores.

The regression results show several demand drivers for the building materials industry. It is mostly affected by population, income per population, precipitation, and population growth. The population size indicates the size of the city. There is a much denser population in large cities, living in apartments and condominiums, than suburban populations, living in detached single family homes. As a result, there is a decrease in building material sales per population because most apartment and condo occupiers are less likely to have the opportunity to do major remodel or renovations. Whereas people who own single family homes can easily engage in remodeling activities to improve their homes, therefore, the demand for home improvement and renovation equipments and supplies at the retail level will be higher.

The level of income will determine the overall household expenditure and more specifically, the level of income which may be allocated to the purchase of home center products and reinvestment in homes through remodeling activities. A 1% increase in income per population can increase building materials sales by 0.42% showing building materials as an inelastic normal good. During periods of low disposable income, households may opt to refrain from undertaking repairs and alterations to their homes and re-directing the available income towards more necessary expenses, such as food and general merchandise.

Surprisingly, precipitation also plays a relative important role as a demand driver for building materials industry. It is likely that homes in a rainy city will need to be carefully maintained so that the homes will be free of precipitation related problems, such as mold caused by moisture. Therefore high precipitation increases building materials sales. However, warm weather will negatively affect building materials sales. A 1% increase in the temperature will result in a negative 0.15% decrease in building materials sales because the homes will need fewer materials such as insulation.

Lastly, the population growth also positively affects building material sales. Similarly to furniture, as more people migrate into a city, they will need to either rent or purchase homes; therefore, an increase in home improvement activities and housing construction can promote

demand for products sold in this industry. Building materials are also durable goods, so there will not be any large sales increases if the city stops growing.

4.1.5 Food and Beverages

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.738339361
R Square	0.545145011
Adjusted R Square	0.48449768
Standard Error	0.130768625
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.922271324	0.153711887	8.988771561	1.84138E-06
Residual	45	0.769519493	0.017100433		
Total	51	1.691790817			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	4.093536589	0.618647178	6.616916287	3.77731E-08	2.847517265	5.339555913
Population	-0.057657275	0.028499116	-2.023125019	0.049025103	-0.115057439	-0.000257111
Employment/Pop	-0.261447558	0.18463284	-1.416040387	0.16364854	-0.633317171	0.110422055
Income/Pop	0.8845301	0.138440866	6.389226848	8.23929E-08	0.605695894	1.163364306
Precipitation	0.038294321	0.034379997	1.113854696	0.271255717	-0.030950544	0.107539186
Jan Temp	0.098791468	0.074375905	1.328272476	0.190785651	-0.051009288	0.248592224
Pop Growth	0.095269699	0.113477585	0.839546407	0.40560099	-0.13328588	0.323825279

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.725578342
R Square	0.52646393
Adjusted R Square	0.463325787
Standard Error	0.208734504
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	2.179799547	0.363299924	8.338286616	4.27122E-06
Residual	45	1.960654191	0.043570093		
Total	51	4.140453738			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-10.95468097	0.987492315	-11.09343414	1.8254E-14	-12.9435925	-8.965769434
Population	-0.037518582	0.045490643	-0.824753819	0.413861958	-0.129141437	0.054104273
Employment/Pop	-0.847332523	0.294713234	-2.875108494	0.006148846	-1.440915421	-0.253749625
Income/Pop	0.902618557	0.220981031	4.084597448	0.000179097	0.457539932	1.347697183
Precipitation	0.196448228	0.054877778	3.5797409	0.000838492	0.085918713	0.306977742
Jan Temp	-0.096815888	0.118719744	-0.815499466	0.41908204	-0.335929717	0.142297941
Pop Growth	-0.193200975	0.181134332	-1.066617094	0.291834001	-0.558024232	0.171622282

The food and beverage industry comprises establishments generally known as supermarkets and grocery stores primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. The types of stores included in the food and beverage category are supermarkets and other grocery stores, convenience stores, meat markets, fish and seafood markets, fruit and vegetable markets, other specialty food stores, and liquor stores. No matter how much the economic condition fluctuates, the food and beverage industry remains a necessity and should expect a relatively stable demand. However, according to this study, the factors that affect demand the most are employment per population, population, and income per capita.

A 1% increase in employment per population decreases the food and beverage sales by 0.26%. It shows that when people are employed, they have less time to cook at home and shop at grocery stores and various markets. People also have higher disposable income, which gives them the freedom to buy convenience by eating out.

The significant t statistic shows that larger population will decrease food and beverage sales. Perhaps large cities tend to have a higher employment and more choices for restaurants, which make eating out on a lower budget relatively cheap and convenient.

But for people who purchase groceries and food items regularly, Income per capita is one of the most significant variables in affecting the food and beverage industry. The level of real disposable income determines the quantity and quality of purchases. A 1% increase in income per capita increases food and beverage sales by 0.88% showing that food and beverage are inelastic necessities. People with relatively low levels of disposable income purchase essential foods, perhaps lower priced brands or private label items with low quality while people with higher levels of income are able to vary the quality of goods they purchase, including some of the premium brands or organic items.

4.1.6 Health and Personal Care

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.554406088
R Square	0.30736611
Adjusted R Square	0.215014925
Standard Error	0.260560809
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.355760409	0.225960068	3.328231354	0.008480629
Residual	45	3.055137094	0.067891935		
Total	51	4.410897503			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	3.872462002	1.232674963	3.141511037	0.002969692	1.389727289	6.355196716
Population	-0.061607392	0.056785431	-1.084915449	0.283737353	-0.175979117	0.052764333
Employment/Pop	-0.42930573	0.36788704	-1.166949859	0.24937742	-1.170268232	0.311656773
Income/Pop	0.614568278	0.275848005	2.227923594	0.030928555	0.058981901	1.170154655
Precipitation	0.16020575	0.068503281	2.338658065	0.023854764	0.022233066	0.298178435
Jan Temp	0.114328551	0.148196451	0.771466192	0.44446299	-0.184154409	0.412811512
Pop Growth	-0.281572078	0.226107842	-1.24529992	0.219467187	-0.736976629	0.173832474

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.655153814
R Square	0.42922652
Adjusted R Square	0.353123389
Standard Error	0.17832464
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.076113272	0.179352212	5.640063898	0.000196773
Residual	45	1.430985479	0.031799677		
Total	51	2.50709875			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-10.06453084	0.843627711	-11.93006193	1.56138E-15	-11.7636842	-8.365377482
Population	0.000862069	0.038863257	0.022182103	0.982400764	-0.077412545	0.079136682
Employment/Pop	-0.055232749	0.251777404	-0.219371351	0.82735282	-0.562338449	0.451872951
Income/Pop	0.231519344	0.18878701	1.226352085	0.226444776	-0.148717197	0.611755884
Precipitation	0.21638992	0.04688281	4.615549272	3.2692E-05	0.121963097	0.310816742
Jan Temp	0.202666962	0.101423843	1.99821812	0.051757445	-0.001611136	0.40694506
Pop Growth	-0.035790862	0.15474545	-0.231288621	0.818139041	-0.347464182	0.275882459

Health and personal care industry comprises establishments known as pharmacies and drug stores engaged in retailing prescription or non-prescription drugs and medicines. The Pharmacy and Drug Store industry in the US retails a range of prescription and over the counter medicines, health and beauty items including vitamin supplements, cosmetics and toiletries as well as offering photo processing services. The types of stores included in this study are pharmacies and drug stores, cosmetics and beauty supply stores, and optical goods stores.

Health and personal care stores provide necessity goods. The sales are shown to be affected by income and precipitation in our study, but the percentage increase or decrease is not as drastic as other retail categories.

A 1% increase in income per population can increase sales by 0.61%, indicating health and personal care goods are relatively inelastic necessity goods. Although medication purchases are dependent on the frequency of illnesses, some medication can be sensitive to the level of a households' income, especially in the case of non-critical drugs and herbal/botanical products.

Precipitation also affects the sales in health and personal care industry. A 1% increase in precipitation increases sales by a slight 0.16% suggesting that people may get ill more often in rainy weather. When people's health conditions worsen, drug store demand increases. In the US, there has been a rise in illnesses related to obesity, such as heart disease and diabetes, which has led to a rise in demand for drugs treating those conditions.

In addition to the variables measured in our study, a number of other variables that actually served to influence the performance of this industry include rising medication prices, the aging population phenomena, rising competitive pressures from generic items, changes in government policies on health care and new product introductions.

4.1.7 Clothing and Clothing Accessories

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.763425982
R Square	0.58281923
Adjusted R Square	0.527195128
Standard Error	0.210202065
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	2.777768598	0.462961433	10.47781811	2.97837E-07
Residual	45	1.988320875	0.044184908		
Total	51	4.766089473			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.793327618	0.994435134	0.797767085	0.429195477	-1.209567469	2.796222704
Population	0.047544638	0.045810477	1.037855116	0.304882332	-0.044722395	0.139811671
Employment/Pop	0.428192882	0.296785291	1.442769891	0.156010314	-0.169563353	1.025949118
Income/Pop	1.049784584	0.222534695	4.717397359	2.34237E-05	0.60157672	1.497992449
Precipitation	0.053362699	0.055263611	0.965602832	0.339403836	-0.057943922	0.16466932
Jan Temp	0.48184261	0.119554434	4.030319873	0.000212241	0.241047631	0.72263759
Pop Growth	0.138922738	0.182407844	0.761605066	0.450268915	-0.228465503	0.506310978

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.663413147
R Square	0.440117003
Adjusted R Square	0.365465937
Standard Error	0.198235704
Observations	52

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.390103502	0.231683917	5.895655959	0.000133466
Residual	45	1.768382744	0.039297394		
Total	51	3.158486246			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-10.54227105	0.937824033	-11.24120376	1.1746E-14	-12.43114553	-8.653396566
Population	-0.00376714	0.043202583	-0.087197101	0.930901709	-0.090781605	0.083247325
Employment/Pop	0.372913394	0.279889929	1.332357315	0.189450909	-0.190813836	0.936640624
Income/Pop	0.402678353	0.209866263	1.918737898	0.061374123	-0.020013981	0.825370686
Precipitation	0.136826599	0.05211757	2.625344958	0.01178477	0.03185643	0.241796767
Jan Temp	0.456591285	0.112748451	4.049645741	0.000199809	0.229504257	0.683678313
Pop Growth	-0.084843426	0.172023749	-0.493207632	0.624264286	-0.431317026	0.261630175

The clothing industry is highly fragmented. It comprises establishments primarily engaged in retailing a wide range of clothing related establishment. The types of stores included in the clothing category are men women children and family clothing stores, clothing accessories stores, jewelry stores, and luggage and leather goods stores. Even though there is a wide range of demand drivers for clothing such as changes in fashion style and seasonality, our study has shown that income per capita and temperature are the two highly influential factors.

There is a positive correlation between increased real disposable income and increased clothing sales. A 1% increase in income per population increases clothing sales by 1.05%, indicating that clothing is an elastic luxury good. One of the important issues to identify in the clothing industry is brand recognition. Since a large number of brands are considered high-end fashion and are very expensive, these stores such as Louis Vuitton or Gucci are clearly luxury items and might affect the sales in the clothing industry more when there is a higher disposable income. Whereas the no name brands might not have as much effect on sales as the luxury brand when disposable income increases. Moreover, clothing is a non-durable good, which can quickly wear out or have a lifespan of less than 3 years; therefore, more disposable income enables people to follow the latest fashion trends and increase clothing purchases.

Temperature also positively affects clothing sales. A 1% increase in temperature increases clothing sales by 0.48%, which is quite high among other retail categories. People would like to dress up and show off their fashionable styles in warmer weather where they can wear few layers and have to change often. Whereas if the weather is cold, people tend to bundle up and to not care what they are wearing underneath the thick wool jacket.

4.1.8 Sporting Goods, Books, and Music

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.802572324
R Square	0.644122336
Adjusted R Square	0.595593563
Standard Error	0.143524301
Observations	51

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.640480934	0.273413489	13.27299876	1.61547E-08
Residual	44	0.906365904	0.020599225		
Total	50	2.546846837			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	3.795167776	0.687024394	5.524065535	1.68054E-06	2.410561141	5.179774411
Population	-0.034966228	0.031796488	-1.099688359	0.27744845	-0.099047836	0.029115381
Employment/Pop	0.625261081	0.202730234	3.084202429	0.003520251	0.216685156	1.033837006
Income/Pop	0.705468052	0.15194774	4.642833448	3.10604E-05	0.399237514	1.01169859
Precipitation	-0.027673865	0.038300004	-0.722555148	0.47377643	-0.104862447	0.049514718
Jan Temp	0.040658395	0.082868624	0.490636781	0.626121431	-0.126352336	0.207669126
Pop Growth	-0.021012382	0.124598592	-0.168640609	0.866852192	-0.272124336	0.230099571

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.744874278
R Square	0.55483769
Adjusted R Square	0.494133738
Standard Error	0.128435611
Observations	51

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.904630357	0.150771726	9.14005887	1.68609E-06
Residual	44	0.725811075	0.016495706		
Total	50	1.630441432			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-9.502989403	0.614797614	-15.45710196	2.14793E-19	-10.74203253	-8.263946273
Population	-0.024739483	0.028453728	-0.86946371	0.389311977	-0.082084201	0.032605234
Employment/Pop	0.521906712	0.181417233	2.876830963	0.006173365	0.156284317	0.887529106
Income/Pop	0.401338977	0.135973495	2.95159712	0.005053358	0.127302414	0.675375541
Precipitation	0.014446972	0.034273529	0.421519829	0.675427775	-0.054626785	0.08352073
Jan Temp	0.054044884	0.074156657	0.728793425	0.469989546	-0.095408032	0.2034978
Pop Growth	-0.129129992	0.111499559	-1.1581211	0.253062337	-0.353842581	0.095582596

The sporting goods, books, and music industry in this study include the sporting goods stores, hobby toy and game stores, sewing needlework and piece goods stores, musical instrument and supplies stores, book stores and news dealers, and prerecorded tape CD and record stores. Not only is this industry affected by income and employment as shown in our study, but is also heavily influenced by current trend and consumer preference which are not examined in this study.

Sporting goods, books, and music sales increase as employment per population increase because people are aware of their need for leisure time outside of work. More people are conscious of the importance of having a healthy life style. This leads to higher sport participation rates and other hobbies. An increase in the rate of sports participation indicates a change in people's leisure time consumption preferences towards sport and leads to an increase in demand for sporting goods. Leisure time is also associated with books, music and other hobbies.

The level of household income determines the quantity, quality purchase of sporting goods, books, and music. A 1% increase in income per capital will lead to a 0.71% increase in sales from this category, showing these leisure items are inelastic normal goods. For example, people with higher levels of income can afford new books whereas people with lower disposable income can only buy second hand books, none the less, still generating demand for book purchases because it is a necessity good. Overall, higher disposable income will increase demand for these leisure goods consumptions.

4.1.9 General Merchandise

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.503477789
R Square	0.253489885
Adjusted R Square	0.151693051
Standard Error	0.196592731
Observations	51

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.577447527	0.096241255	2.490154897	0.036759033
Residual	44	1.700542888	0.038648702		
Total	50	2.277990415			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	9.125328532	0.930093605	9.811193718	1.19873E-12	7.250848109	10.99980895
Population	-0.08068442	0.04299257	-1.876706126	0.067199787	-0.167330249	0.005961409
Employment/Pop	0.566448853	0.278136485	2.036585933	0.047736929	0.00590162	1.126996085
Income/Pop	-0.364682677	0.209844148	-1.73787394	0.089228181	-0.787595753	0.0582304
Precipitation	0.01823802	0.055845126	0.326582132	0.745532409	-0.094310431	0.130786472
Jan Temp	0.113273913	0.113160348	1.001003577	0.322298514	-0.114785774	0.3413336
Pop Growth	0.166723589	0.213483182	0.78096826	0.439002952	-0.263523478	0.596970657

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.802423886
R Square	0.643884093
Adjusted R Square	0.595322832
Standard Error	0.210638173
Observations	51

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	3.529743593	0.588290599	13.25921303	1.6383E-08
Residual	44	1.952211364	0.04436844		
Total	50	5.481954957			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-4.760224998	0.996543548	-4.776735555	2.00821E-05	-6.768626477	-2.751823519
Population	-0.004032563	0.046064147	-0.087542333	0.930637648	-0.096868748	0.088803622
Employment/Pop	0.451261646	0.298007769	1.514261349	0.137110611	-0.149333526	1.051856817
Income/Pop	-1.19058118	0.224836329	-5.295323863	3.61536E-06	-1.643709011	-0.737453349
Precipitation	0.39618905	0.059834945	6.621365638	4.11227E-08	0.275599646	0.516778453
Jan Temp	-0.054426762	0.121245016	-0.448898959	0.655707745	-0.298780027	0.189926504
Pop Growth	-0.279505017	0.228735352	-1.221958102	0.228229704	-0.740490811	0.181480778

The general merchandise industry comprises establishments generally known as warehouse clubs, superstores or supercenters primarily engaged in retailing a general line of groceries combined with general lines of new merchandise such as apparel, furniture and appliances. The types of stores included in the general merchandising category are department stores and warehouse clubs and supercenters. General merchandise stores are different in that it encompasses all the retail categories items in one store. Often the quality of the items suffers because it is not specialized. The demand driver for general merchandise comes from all of the other retail categories, such as clothing, furniture, household appliances, garden tools, food and beverages, and sporting goods and toys etc. Therefore, the result from general merchandise mixes demand drivers from all of the above retail sub-categories.

In our study, we have found that population negatively affects general merchandise sales. It is very difficult to locate large discount warehouse plus parking in urban infill locations due to land constraints and high land cost. That is why most discount clubs and super centers are located in suburban areas where general merchandise stores can find plenty of land at a cheaper cost. As a result, the sales of general merchandise decrease as the city gets larger because there is less demand for these types of stores.

Higher employment will positively affect the sales for general merchandise because there is a higher labor force participation, which increases the general demand for all of the retail goods in a general merchandising store. However, contrary to most of the retail categories, general merchandise sales decreases as income per population increase. A 1% increase in income per population results in a sales decrease of 0.36%, indicating that general merchandise products are inferior goods. As people get wealthier, they tend to stay away from discount clubs and supercenters but purchase higher quality items from specialized stores.

4.1.10 Accommodation

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.720278748
R Square	0.518801474
Adjusted R Square	0.451657494
Standard Error	0.425981957
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	8.412552325	1.402092054	7.726701209	1.14263E-05
Residual	43	7.802807006	0.181460628		
Total	49	16.21535933			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2.909829114	2.040375993	1.426123971	0.161052705	-1.204978409	7.024636638
Population	0.155496913	0.093157863	1.669176475	0.102348345	-0.032373693	0.343367518
Employment/Pop	2.986834804	0.60367821	4.94772671	1.20106E-05	1.769402503	4.204267104
Income/Pop	-0.291711419	0.457944059	-0.637002301	0.527500382	-1.215242996	0.631820157
Precipitation	-0.131662071	0.121051404	-1.087654231	0.282806857	-0.375785325	0.112461183
Jan Temp	1.343247959	0.24612668	5.457547147	2.23562E-06	0.846886545	1.839609373
Pop Growth	-0.254343238	0.464410496	-0.547669014	0.586750952	-1.190915619	0.682229142

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.689639574
R Square	0.475602741
Adjusted R Square	0.402431031
Standard Error	0.250957929
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	2.456146312	0.409357719	6.499817185	6.19197E-05
Residual	43	2.708134922	0.062979882		
Total	49	5.164281234			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-8.334921081	1.202042771	-6.933963814	1.60378E-08	-10.7590697	-5.910772465
Population	-0.11213809	0.054881912	-2.043261367	0.047185145	-0.222817937	-0.001458243
Employment/Pop	1.027087803	0.355643779	2.887967861	0.006047467	0.309864261	1.744311345
Income/Pop	-0.311478807	0.2697877	-1.154533017	0.254657844	-0.855557182	0.232599569
Precipitation	-0.037157392	0.07131478	-0.521033532	0.605016481	-0.180977253	0.10666247
Jan Temp	0.550757262	0.145000136	3.798322385	0.000452865	0.25833682	0.843177704
Pop Growth	0.443261534	0.273597259	1.620124175	0.112517325	-0.108499546	0.995022613

The accommodation industry comprises establishments primarily engaged in providing short-term lodging in facilities known as hotels, motor hotels, resort hotels, and motels. The establishments in this industry may offer services, such as food and beverage services, recreational services, conference rooms and convention services, laundry services, parking, and other services. The accommodation category for this study includes data from hotels and motels, casino hotels, RVs, rooming and boarding houses, and other traveler accommodations.

According to IBISWorld industry report, about 56% of all domestic overnight trips involve the use of hotel, motel or bed and breakfast accommodation. Overall, in the domestic market, 75% of trips are undertaken for leisure purposes and 14% for business purposes. The remaining 8% are combined business and pleasure trips.[9] In general, hotels, particularly major chains and those located in major cities tend to have a greater degree of business and international visitor guests, while motels tend to cater for more of the domestic leisure traveler market. This aligns with the finding in our study that the accommodations are mostly affected by population, employment per population, and temperature.

Large population represents a larger city that attracts more visitors for leisure, business, or various other purposes. This is why a 1% increase of population will result a revenue increase of 0.16%.

Higher employment per population generates highest accommodation revenue increase among all of the retail categories. A 1% increase in employment will generate 3% increase in accommodation revenue. This demonstrates that large employment centers attract more businesses travelers and visitors which drive up the demand for accommodation.

Higher temperatures has a coefficient of 1.34 which shows that accommodation revenue for warm weather destinations are quite elastic, which proves that people are naturally attracted to warmer places for vacation and tourism visits.

[9] IBISWorld Industry Report, 2008

4.1.11 Restaurants and Eateries

Sales/Population (Logs)

Regression Statistics	
Multiple R	0.776995038
R Square	0.603721289
Adjusted R Square	0.548426585
Standard Error	0.124075215
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.008496235	0.168082706	10.918248	2.32383E-07
Residual	43	0.661970341	0.015394659		
Total	49	1.670466576			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	5.474793401	0.594297685	9.212207185	9.80292E-12	4.276278719	6.673308083
Population	0.017036562	0.027133971	0.627868386	0.533410674	-0.037684267	0.071757391
Employment/Pop	0.854817679	0.175832574	4.861543344	1.59097E-05	0.500217742	1.209417615
Income/Pop	0.275613965	0.133384776	2.066307522	0.044856286	0.006618113	0.544609817
Precipitation	-0.018024989	0.035258486	-0.511224128	0.611809274	-0.089130454	0.053080477
Jan Temp	0.302984176	0.071689001	4.226369082	0.000121384	0.158409627	0.447558725
Pop Growth	0.031563165	0.135268246	0.23333758	0.816606533	-0.241231065	0.304357395

Establishments/Population (Logs)

Regression Statistics	
Multiple R	0.732353688
R Square	0.536341924
Adjusted R Square	0.471645448
Standard Error	0.113022855
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.635396645	0.105899441	8.290125815	5.46573E-06
Residual	43	0.549289125	0.012774166		
Total	49	1.184685769			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-8.109419449	0.54135889	-14.97974745	1.13442E-18	-9.201172949	-7.017665949
Population	-0.023876255	0.024716933	-0.965987775	0.339452049	-0.073722667	0.025970157
Employment/Pop	0.294456184	0.160169776	1.838400424	0.072917163	-0.028556732	0.617469099
Income/Pop	0.501101197	0.121503139	4.124183151	0.000166965	0.256066934	0.746135461
Precipitation	-0.00892103	0.032117734	-0.277760255	0.782527563	-0.073692569	0.055850509
Jan Temp	0.104626116	0.065303094	1.60216169	0.116441553	-0.027070035	0.236322267
Pop Growth	-0.108714105	0.123218834	-0.882284809	0.382528526	-0.357208395	0.139780185

The restaurant industry comprises establishments primarily engaged in providing food services to patrons who order and are served and pay after eating. These establishments may provide this type of food service to patrons in combination with selling alcoholic beverages, providing takeout services or presenting live non-theatrical entertainment. The restaurant category includes data from full service restaurants, limited service eating places, food service contractors, caters, mobile food services, and drinking places.

In this study, the restaurant industry is dependent on changes in employment per population, income per capital, and temperature. The industry is currently being adversely impacted by high gas and commodity prices, which has affected growth in household disposable income.

The industry is sensitive to increase in disposable income, which is in turn affected by the employment growth. A 1% increase in income per population increases revenues by 0.28%, demonstrating that restaurant spending is inelastic because food is a necessity. The US Census Household Expenditure Data indicated that households with incomes of more than $50,000 account for about 70.0% of the total personal expenditure on food eaten away from the home. Of this group, those households in the highest income quintile provide about 30.0% of the total away from home food expenditure.

Contrary to the food and beverage category, higher employment per population increases restaurant sales by 0.85%. This shows that the factors driving higher income earners to spend in restaurants are the pressure of work and lack of time and, therefore, a search for convenience. In addition, higher employment also creates more business demand for the food catering and contract services; thus, increasing the revenue for the restaurant category.

Restaurant sales are also positively affected by temperature. People like outdoor activities and are much more lively and social in warmer weather than in colder weather. Perhaps people are likely to meet friends and enjoy dining together. The increase in revenue is due to changing social behaviors.

4.2 Results by Variable

The following section takes a different approach in that it ranks the degree of effectiveness for each of the retail sub-categories by each variable. It paints a clear picture of the demand drivers for each sub-category and helps us to understand how each retail category is affected by different variables. The ranking is by coefficient to see the percentage change in sales per population and establishment per population given a 1% change in each variable. The six variables are population, employment per population, income per population, precipitation, temperature, and population growth. This section only highlights retail categories that are significantly affected by each variable.

4.2.1 Population

Ranks	Sales/Pop	Coefficients	t Stat
Building Materials	Population	-0.09808	-2.45727
General Merch	Population	-0.08068	-1.87671
Health	Population	-0.06161	-1.08492
Food and Beverage	Population	-0.05766	-2.02313
Furniture	Population	-0.04303	-1.17165
Sporting books Music	Population	-0.03497	-1.09969
Electronics	Population	0.01238	0.27898
Restaurants	Population	0.01704	0.62787
Clothing	Population	0.04754	1.03786
Accommodation	Population	0.15550	1.66918

Ranks	Establishment /Pop	Coefficients	t Stat
Building Materials	Population	-0.14583	-4.73424
Accommodation	Population	-0.11214	-2.04326
Furniture	Population	-0.05566	-1.65795
Food and Beverage	Population	-0.03752	-0.82475
Sporting books Music	Population	-0.02474	-0.86946
Restaurants	Population	-0.02388	-0.96599
General Merch	Population	-0.00403	-0.08754
Clothing	Population	-0.00377	-0.08720
Health	Population	0.00086	0.02218
Electronics	Population	0.01061	0.35949

Sales per population

As shown in the table above, building materials are negatively affected by increase in population because larger cities have denser housing so that people do not improve apartments or condominiums as much as people living in single-family houses in the suburbs. There is less building material demand in large condensed cities.

General merchandise is ranked second after building materials. It will decrease as the city gets larger due to land use. Warehouse clubs and supercenters such as Costco or Sam's Club both require large acres of land for warehouse and parking, which is very hard to find in dense cities.

The food and beverage sales also are affected by population increase and will decrease slightly as population increases due to increased employment. A larger number of convenient eateries combined with busy working people will decrease demand for food and beverages sales which are mainly dominated by grocery stores.

Population affects accommodation the most because as the city size gets bigger; there will be an increase number of visitors traveling to the city for tourism, business and various other reasons.

Establishment per population

The t statistic for establishment per population is significant for building materials and accommodation. The same reasoning for sales per population applies to building materials. Even though there is a bigger demand for accommodations in large cities, the population denominator makes the accommodation establishment per population smaller. The rest of the categories have a t statistic smaller than 2, which means the results are insignificant and cannot be reasonably explained.

4.2.2 Employment per Population

Ranks	Sales/Pop	Coefficients	t Stat
Health	Employment/Pop	-0.42931	-1.16695
Food and Beverage	Employment/Pop	-0.26145	-1.41604
Building Materials	Employment/Pop	-0.13134	-0.50792
Furniture	Employment/Pop	0.00453	0.01904
Electronics	Employment/Pop	0.34124	1.18742
Clothing	Employment/Pop	0.42819	1.44277
General Merch	Employment/Pop	0.56645	2.03659
Sporting books Music	Employment/Pop	0.62526	3.08420
Restaurants	Employment/Pop	0.85482	4.86154
Accommodation	Employment/Pop	2.98683	4.94773

Ranks	Establishment /Pop	Coefficients	t Stat
Food and Beverage	Employment/Pop	-0.84733	-2.87511
Health	Employment/Pop	-0.05523	-0.21937
Furniture	Employment/Pop	0.02238	0.10290
Building Materials	Employment/Pop	0.05242	0.26266
Electronics	Employment/Pop	0.22335	1.16796
Restaurants	Employment/Pop	0.29446	1.83840
Clothing	Employment/Pop	0.37291	1.33236
General Merch	Employment/Pop	0.45126	1.51426
Sporting books Music	Employment/Pop	0.52191	2.87683
Accommodation	Employment/Pop	1.02709	2.88797

Sales per population

The ranking table shows that employment per population has a significant effect on the accommodation, restaurants, sporting goods, book, and music and general merchandise. Higher employment increases demand for accommodation due to business travels. Higher employment also increases demand for restaurant meals because people have less time to cook at home so they eat out more often while employed. Also higher employment also means higher business catering volumes to serve companies, which also drives demand for the restaurants categories. Higher employment will increase sporting goods, books, and music because people need leisure activities to relax from long working hours. Higher employment will also increase general merchandising sales

because there is a higher labor force participation to increase the general demand for all of the retail goods.

Establishment per population

Similar to sales per population, higher employment will drive more demand for restaurants and less for grocery stores, therefore there are less grocery establishments and more restaurants and catering services. Increased business travel and accommodation demand will also increase the establishment per population for hotel services.

4.2.3 Income per Population

Ranks	Sales/Pop	Coefficients	t Stat
General Merch	Income/Pop	-0.36468	-1.73787
Accommodation	Income/Pop	-0.29171	-0.63700
Restaurants	Income/Pop	0.27561	2.06631
Building Materials	Income/Pop	0.41687	2.15000
Health	Income/Pop	0.61457	2.22792
Sporting books Music	Income/Pop	0.70547	4.64283
Electronics	Income/Pop	0.82673	3.83660
Food and Beverage	Income/Pop	0.88453	6.38923
Furniture	Income/Pop	0.93256	5.22741
Clothing	Income/Pop	1.04978	4.71740

Ranks	Establishment /Pop	Coefficients	t Stat
General Merch	Income/Pop	-1.19058	-5.29532
Accommodation	Income/Pop	-0.31148	-1.15453
Building Materials	Income/Pop	-0.06060	-0.40497
Health	Income/Pop	0.23152	1.22635
Electronics	Income/Pop	0.33495	2.33597
Sporting books Music	Income/Pop	0.40134	2.95160
Clothing	Income/Pop	0.40268	1.91874
Restaurants	Income/Pop	0.50110	4.12418
Furniture	Income/Pop	0.60680	3.72056
Food and Beverage	Income/Pop	0.90262	4.08460

Sales per population

All of the results for income per population have a significant t statistic with the exception of accommodation because the demand in accommodation is not driven by local income, but income level from other cities. Disposable income plays an important role in every retail sub-category. The degree of changes in each category is driven by the nature of the goods. Luxury goods, clothing for example, has a coefficient greater than 1, indicating that clothing has a high elasticity of demand. A 1% increase in income per population will increase clothing sales by 1.05%, which is higher than any other category. But for general merchandise, it has a negative coefficient, meaning that this is an inferior good. An increase in income per population will lead to a fall in the quantity demanded for general discounted items and may lead to changes to luxury substitutes. The third type of goods is necessity goods, meaning that increases in income will lead to a rise in sales, but the increase will not be as much as the percentage increase in the income. The coefficients for necessity goods are between 0 and 1, which is virtually all of the retail

sub categories except for general merchandise and clothing. This ranking shows how much each retail sub-category will be affected by an increase in income per population. It appears that clothing will be the most affected item by changes in income.

Establishment per population

All of the results of establishment per population are significant with the exception of health stores, building materials, and accommodation. This shows that as demand for these categories increase, the number of stores increases respectively to capture sales growth and it follows the same logic as in the sales per population.

4.2.4 Precipitation

Ranks	Sales/Pop	Coefficients	t Stat
Accommodation	Precipitation	-0.13166	-1.08765
Electronics	Precipitation	-0.04014	-0.75003
Sporting books Music	Precipitation	-0.02767	-0.72256
Restaurants	Precipitation	-0.01802	-0.51122
General Merch	Precipitation	0.01824	0.32658
Food and Beverage	Precipitation	0.03829	1.11385
Clothing	Precipitation	0.05336	0.96560
Building Materials	Precipitation	0.08464	1.75791
Furniture	Precipitation	0.11323	2.55572
Health	Precipitation	0.16021	2.33866

Ranks	Establishment /Pop	Coefficients	t Stat
Accommodation	Precipitation	-0.03716	-0.52103
Restaurants	Precipitation	-0.00892	-0.27776
Sporting books Music	Precipitation	0.01445	0.42152
Electronics	Precipitation	0.06490	1.82259
Clothing	Precipitation	0.13683	2.62534
Furniture	Precipitation	0.15870	3.91819
Food and Beverage	Precipitation	0.19645	3.57974
Building Materials	Precipitation	0.20075	5.40238
Health	Precipitation	0.21639	4.61555
General Merch	Precipitation	0.39619	6.62137

Sales per population

The t statistics are only significant for building materials, furniture, and health stores and the rest are un-explanatory. Higher precipitation will drive more demand for building materials and furniture because people tend to improve their homes to make sure that less damages is done in wet weather. Also, it is natural that homeowners will purchase furniture as part of home improvement projects. Also, people retreat to their homes for indoor activities, so they want to improve their house to make it more comfortable during high precipitation seasons. Higher precipitation will also increase sales in health stores because people are likely to get ill more often.

Establishment per population

Establishment per population follows the sales per population ranking quite closely and most of the t statistics for retail sub-category establishments are significant, indicating that the precipitation affects the number of stores in the retail industry.

4.2.5 January Temperature

Ranks	Sales/Pop	Coefficients	t Stat
Building Materials	Jan Temp	-0.15352	-1.47380
Sporting books Music	Jan Temp	0.04066	0.49064
Food and Beverage	Jan Temp	0.09879	1.32827
General Merch	Jan Temp	0.11327	1.00100
Health	Jan Temp	0.11433	0.77147
Furniture	Jan Temp	0.13653	1.42453
Electronics	Jan Temp	0.20515	1.77210
Restaurants	Jan Temp	0.30298	4.22637
Clothing	Jan Temp	0.48184	4.03032
Accommodation	Jan Temp	1.34325	5.45755

Ranks	Establishment /Pop	Coefficients	t Stat
Building Materials	Jan Temp	-0.26454	-3.29071
Food and Beverage	Jan Temp	-0.09682	-0.81550
General Merch	Jan Temp	-0.05443	-0.44890
Sporting books Music	Jan Temp	0.05404	0.72879
Restaurants	Jan Temp	0.10463	1.60216
Electronics	Jan Temp	0.18772	2.43691
Furniture	Jan Temp	0.19634	2.24084
Health	Jan Temp	0.20267	1.99822
Clothing	Jan Temp	0.45659	4.04965
Accommodation	Jan Temp	0.55076	3.79832

Sales per population

Warm weather will induce higher sales per population increases in accommodations. Since the coefficient is positive and larger than one, it shows that the increase in accommodation sales is mostly caused by tourism. When a place is known for its nice weather, it is usually a very popular vacation destination. Warm weather also increases clothing sales because people tend to dress with few layers and show the fashion trend. Los Angeles and Miami for example both are known for their pleasant weather and are recognized as global fashion centers. Lastly, warm weather also creates a social and lively environment, which enables people to participate in more outdoor activities. Restaurant sales benefit from warm weather because people are busy socializing and enjoying outdoor act ivies, rather than staying at home to cook.

Establishment per population

Again, the establishment per population follows sales per population closely to meet the sales demand.

4.2.6 Population Growth

Ranks	Sales/Pop	Coefficients	t Stat
Health	Pop Growth	-0.28157	-1.24530
Accommodation	Pop Growth	-0.25434	-0.54767
Electronics	Pop Growth	-0.06265	-0.35468
Sporting books Music	Pop Growth	-0.02101	-0.16864
Restaurants	Pop Growth	0.03156	0.23334
Food and Beverage	Pop Growth	0.09527	0.83955
Clothing	Pop Growth	0.13892	0.76161
General Merch	Pop Growth	0.16672	0.78097
Building Materials	Pop Growth	0.20209	1.27156
Furniture	Pop Growth	0.46357	3.17016

Ranks	Establishment /Pop	Coefficients	t Stat
General Merch	Pop Growth	-0.27951	-1.22196
Food and Beverage	Pop Growth	-0.19320	-1.06662
Sporting books Music	Pop Growth	-0.12913	-1.15812
Restaurants	Pop Growth	-0.10871	-0.88228
Clothing	Pop Growth	-0.08484	-0.49321
Health	Pop Growth	-0.03579	-0.23129
Building Materials	Pop Growth	0.04788	0.39038
Electronics	Pop Growth	0.09233	0.78558
Furniture	Pop Growth	0.32281	2.41474
Accommodation	Pop Growth	0.44326	1.62012

Sales per population

Most of the t statistics are insignificant except for furniture and building materials. It clearly shows that population growth drives demand for home improvement and sales in furniture because the population growth will translate into housing activities. More people moving into the city will need new homes and furniture. As mentioned in the previous section, furniture and building materials are durable goods; hence, there is a large increase in furniture and building material sales as the population grows.

Establishment per population

The accommodation establishment increase as population grows indicates that a city gains more attraction to the area as it grows and that people want to visit before moving to the city.

CHAPTER FIVE: IMPLICATION – INVESTMENT STRATEGIES

5.1 Introduction

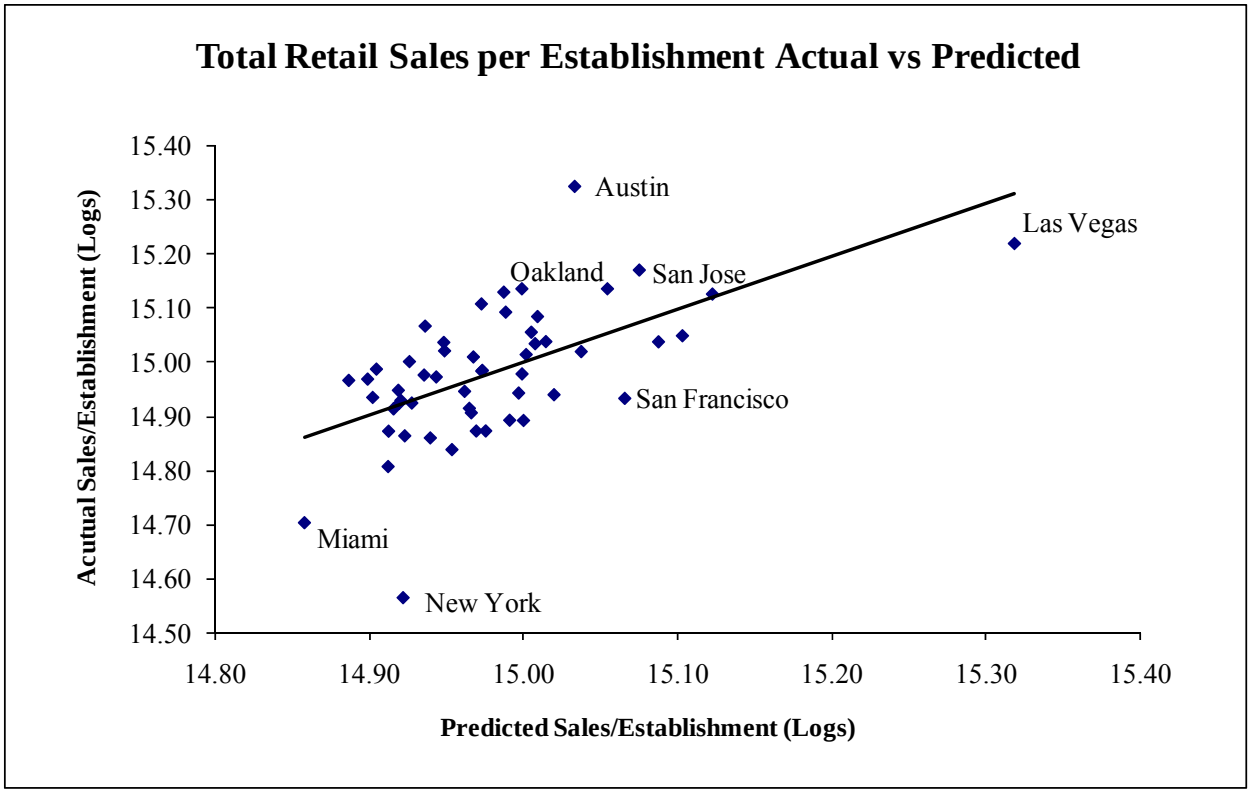
To quantify the retail demand theories we have developed thus far, we can use the regression results to predict future retail sales per establishment versus the actual retail sales per establishment for a particular city given variables of population, income, employment, precipitation, temperature, and population growth. The goal is to predict how profitable an establishment will be given the above independent variables. We will be graphing the predicated sales per establishment on x axis while the actual sales per establishment on the y axis for each of the 54 cities. In theory, if the projections are well predicted, the predicted sales per establishment and the actual sales per establishment for every city should fit closely to the trend line without too much variance and deviations. However, in reality there will be outliers or points above or below the trend line. These outliers have other unexplained factors that cause them to be far away from the trend line. For cities above the trend line, there is a much higher actual demand than predicted demand. The actual sales per establishment are higher than predicted indicating that there is room to open more stores and that the number of establishments is under-supplied given a stronger demand. On the other hand, the points below the line shows that there is an oversupply of the establishments because there are less sales per establishment than predicted sales amount given population, employment, income, temperature, precipitation, and population growth. This means that the growth in this particular retail sector in a particular city will remain stagnant.

This prediction is extremely useful for real estate investment strategies knowing where the sales demand is higher than the current establishment. It shows that there is room for establishment growth until the sales per establishment reaches equilibrium and has the minimum regression error from the trend line. By understanding the market demand drivers and the actual supply of establishments in each market, we can apply this method to any of the real estate investment decisions for guidance. This concept can be applied to smaller areas or even down to zip code level to estimate sales given the six variables. In addition, you can design your own tenant mix to have a desired investment outcome based on the six variables and an understanding of complimentary and competitive retail categories.

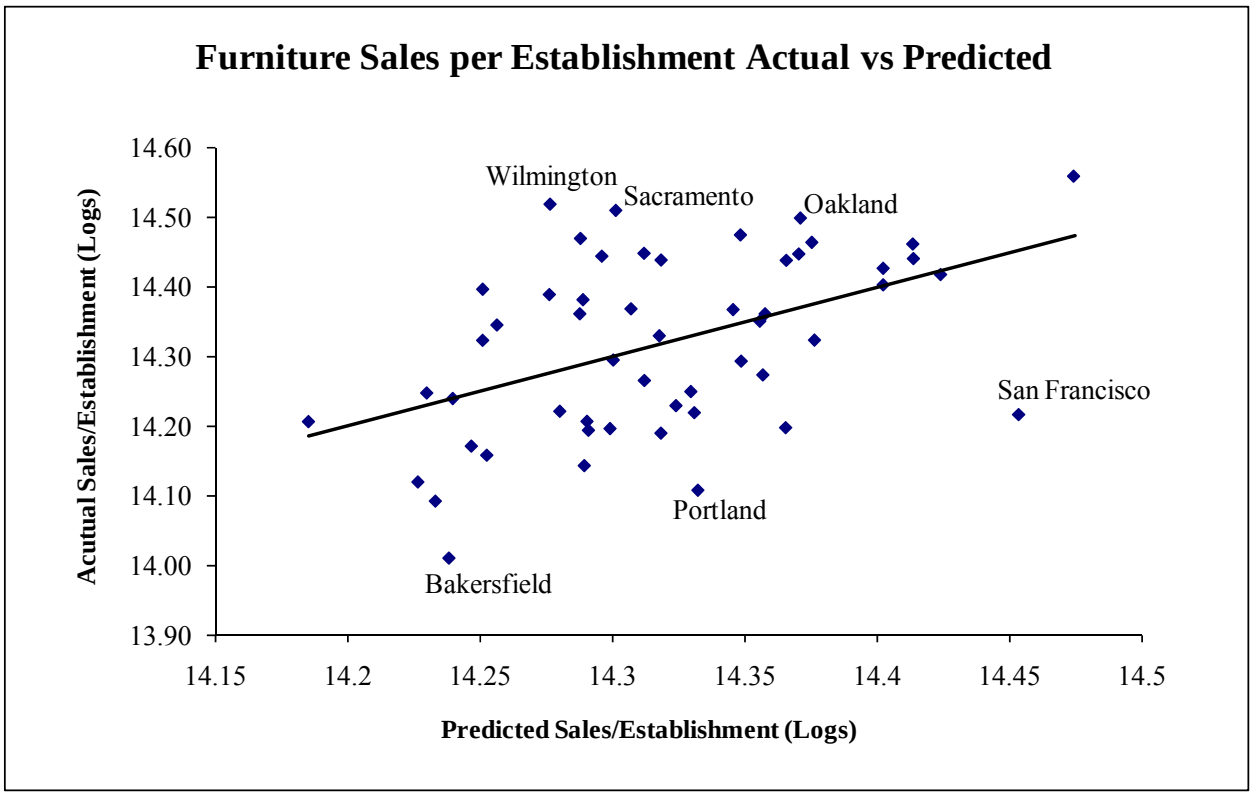
For example, if a city has a high food and beverage demand but is lacking a number of establishments, by mixing wine and liquor stores with a grocery store (assuming the grocery store does not have the ability to obtain alcohol license) there will be a successful market driven outcome with complimentary retail concepts.

For analysis purposes, the individual city is chosen at random depending on the distance from the trend line. The results are not black and white because the sales per establishment are simultaneously affected by multi-factors, which can create offsetting effects, but they do follow a general trend.

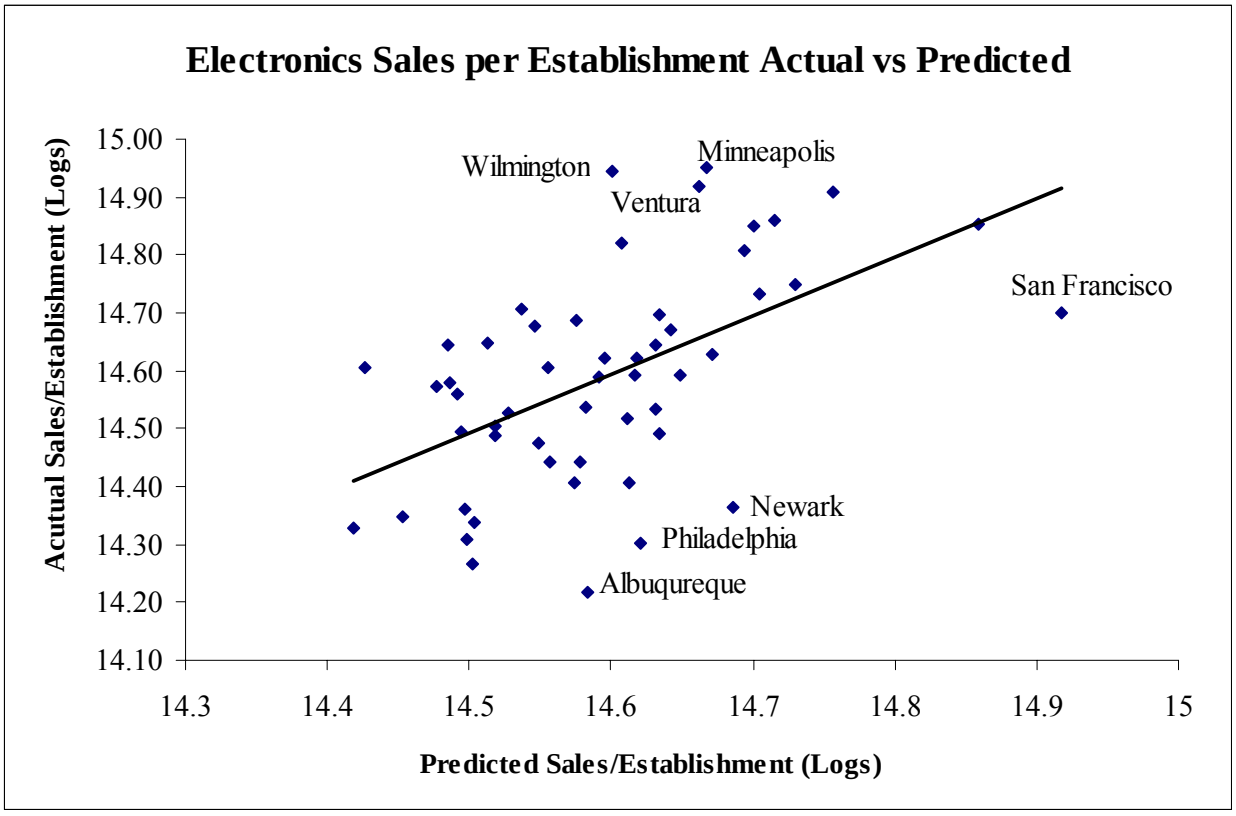
5.2 Plotted Results by Retail Category



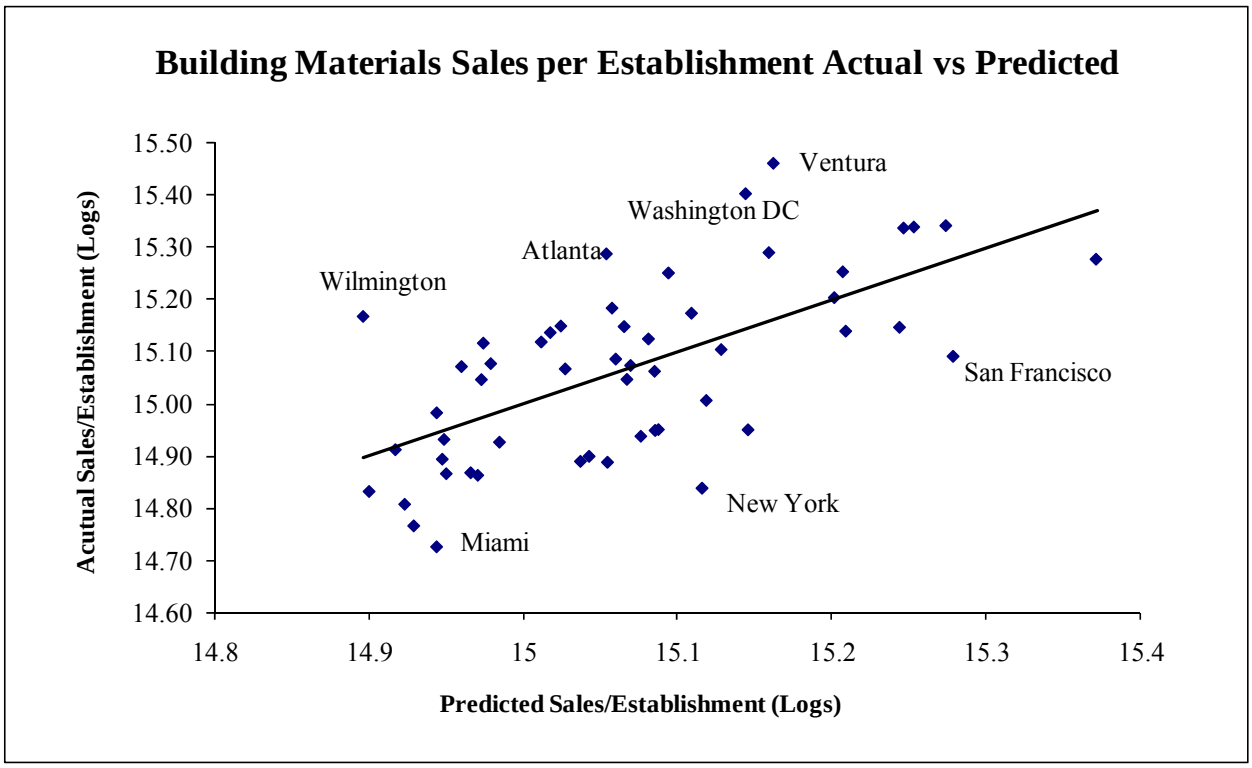
This graph shows that most of the cities are bunched along the trend line with exceptions of a few cities that has unexplained factors. The total retail stores appear to be under-supplied in Austin leaving more rooms for retail establishments. On the other hand, Miami and New York seem to be over-supplied with retail stores because the demand per each establishment is less than predicted value.



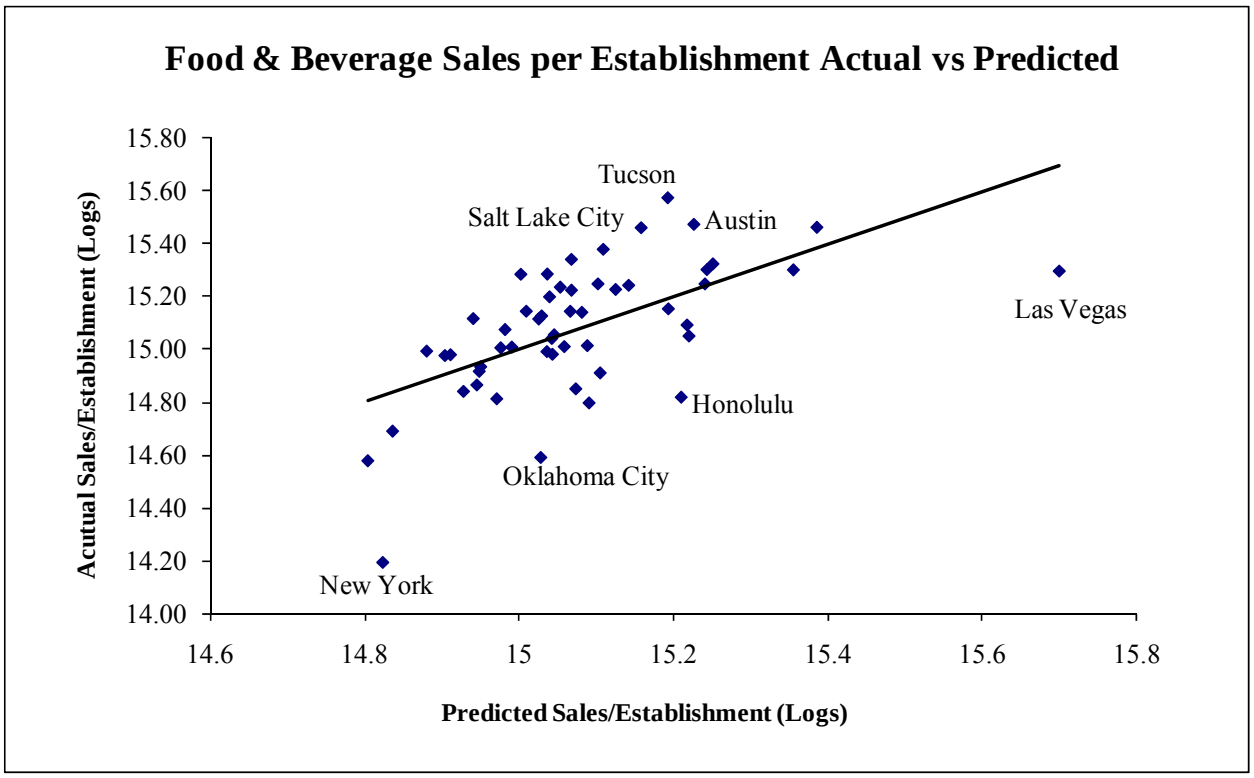
Furniture store sales are largely related to population growth, precipitation, and income. One possible hypothesis on why some of these cities are scattered far above the trend line is that these cities all have a relatively larger population growth rate, higher precipitation and income. The extreme outlier cities such as Wilmington, Sacramento, and Oakland have unexplained factors that demonstrate the demand for furniture is above the MSA average. Indeed, Sacramento and Oakland have undergone a significant population growth from 1990 to 2000 at 21.32% and 14.87% compared to the 54 MSA weighted average of 20.26%. Both Wilmington and Oakland had above average income per capita. This shows that cities that are wealthier and had more growth are likely to have under established furniture stores and that the proper identification of these targeted locations can increase sales until the number of establishment and sales go back to equilibrium.



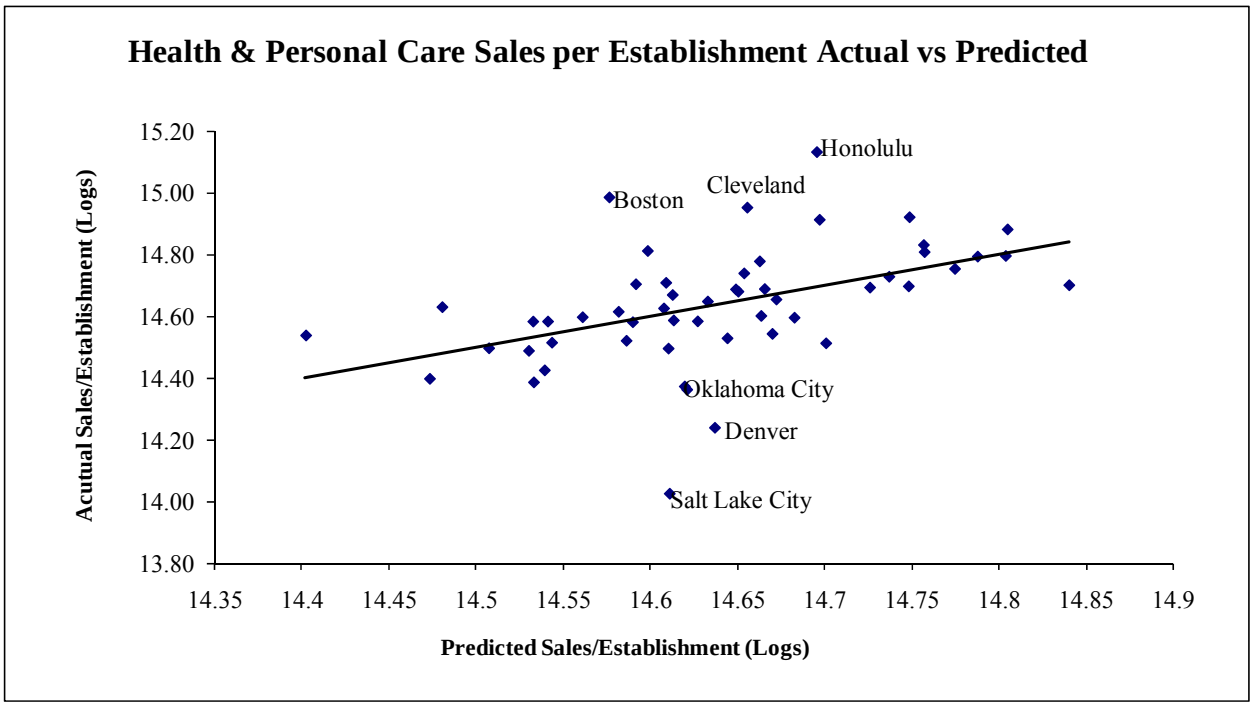
A significant portion of electronics sales today are purchased online. The 2002 data does not account for the rapid internet sales growth to-date. The dispersed cities around the trend line are affected by internet electronics orderings and other factors that can not be explained. It does show that certain cities such as San Francisco, Newark, Philadelphia and Albuquerque are over saturated with a high number of electronic stores.



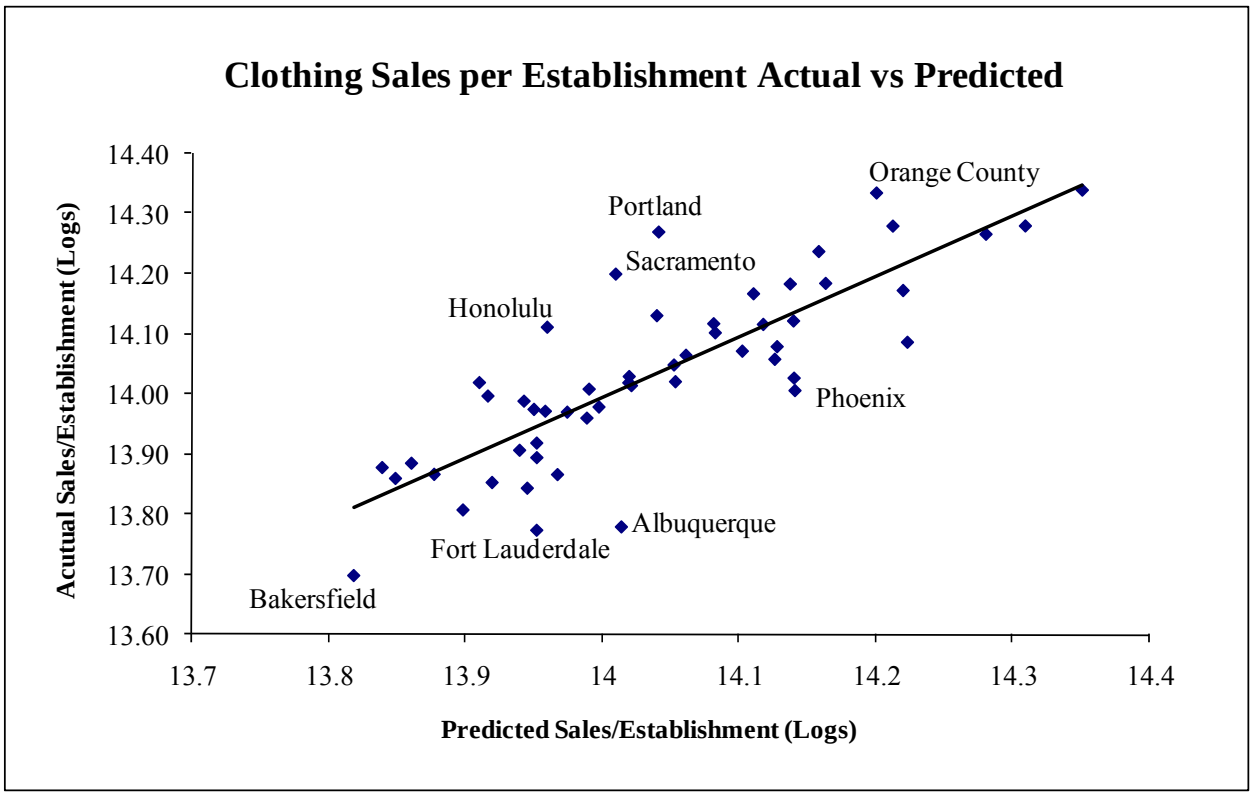
Building materials are mostly affected by the population growth. The cities such as Washington DC and Atlanta had a population growth 25.48% and 45.13% between 1990 and 2000, much above the weighted MSA average of 20.26%. Cities such as San Francisco, New York and Miami had a weighted average population growth of 10% between 1990 and 2000, much below the MSA average. This shows that a city with slow population growth will have stagnant demand for building materials so there should not be any more investment in building material establishments.



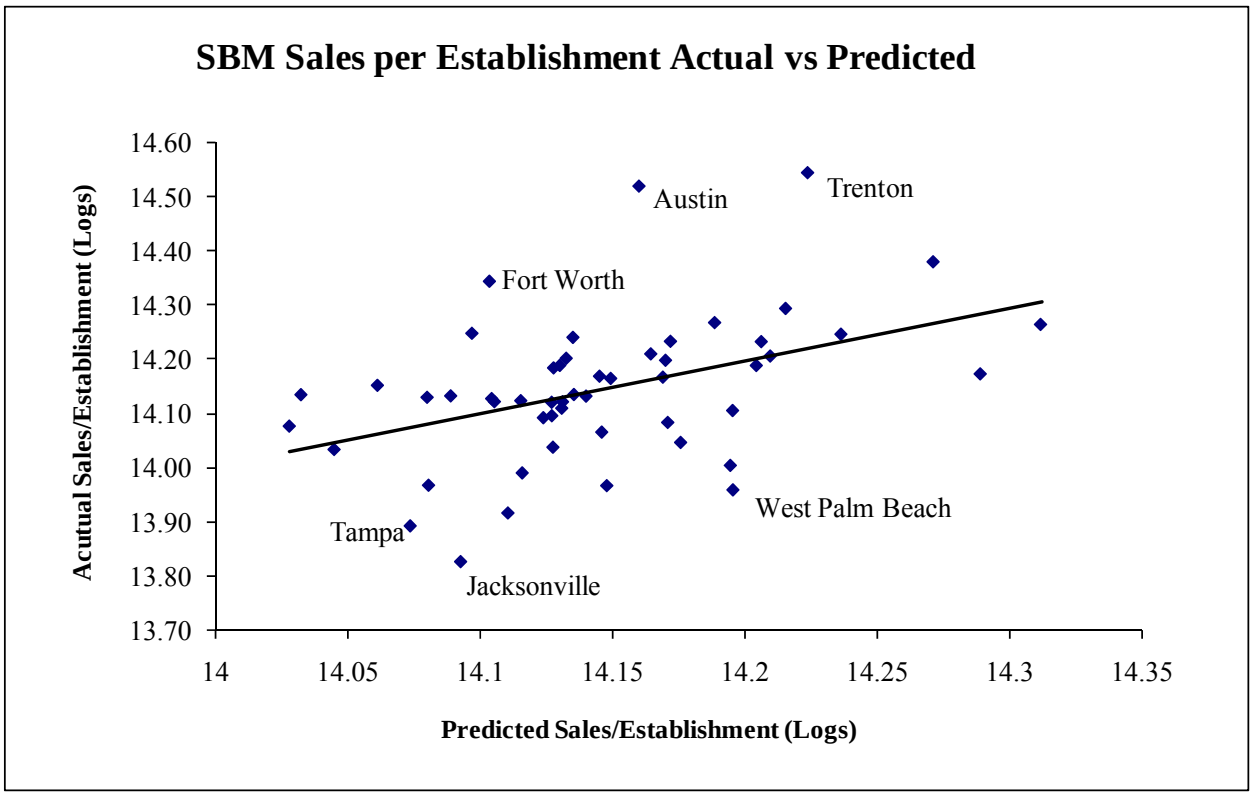
The food and beverage sales are mostly affected by income per population and employment per population. However food and beverages are necessity goods and are not drastically affected by changes in different variables. The employment per population for Tucson is 17% less than the MSA average, which explains why there is higher demand of food and beverage consumptions because people would have more time to eat in. As for Salt Lake City, Austin, Las Vegas, Honolulu, Oklahoma City, and New York, there are other unexplained factors that offset the results of sales per establishment.



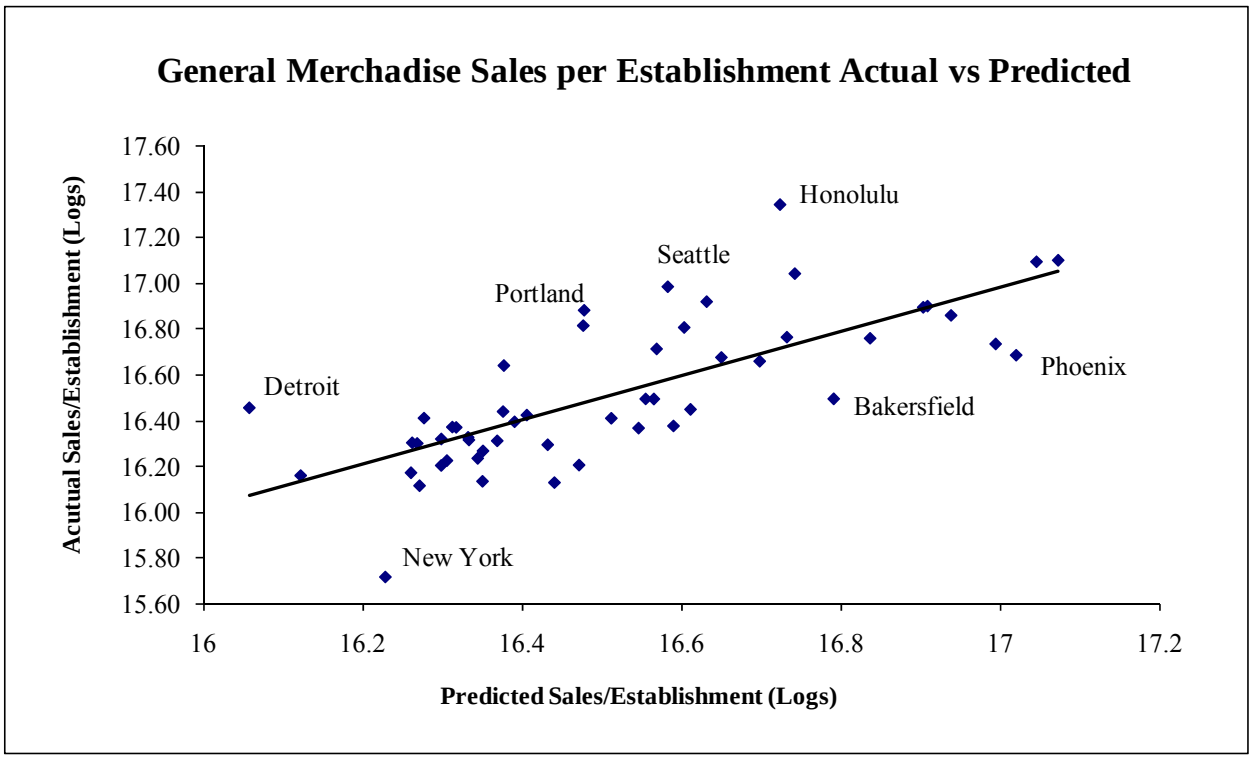
The health and personal care stores sell inelastic normal goods. It is not significantly affected by any single variable. As shown in the graph above, most cities are fitted closely to the trend line without much regression errors. The outlier cities noted in the graph have other unexplained factors that affect the results of actual versus predicted sales per establishment. It appears that Boston Cleveland and Honolulu have higher demand for health and personal care stores than Oklahoma City Denver and Salt Lake City, indicating more room for health and personal care stores in Boston, Cleveland, and Honolulu.



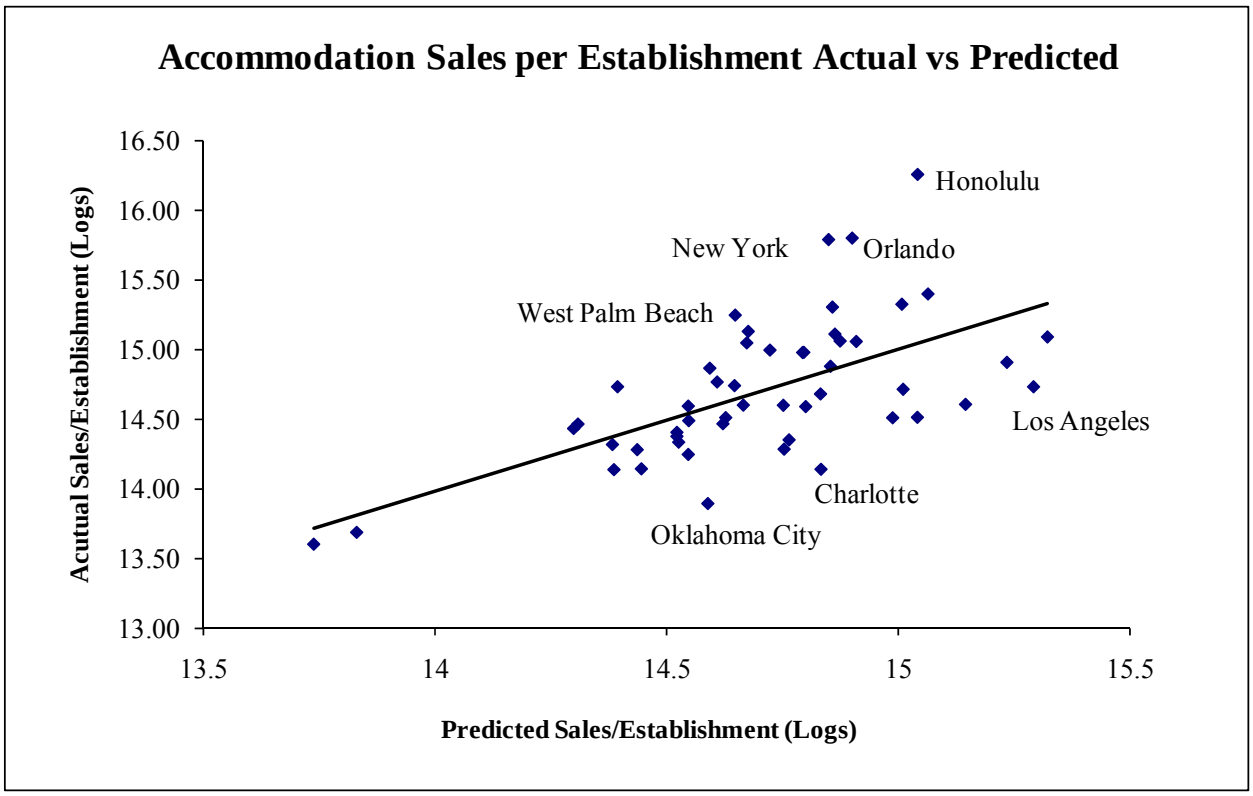
The Clothing Sales are mostly affected by temperature and income per population. Orange County, Sacramento, and Honolulu have above MSA average temperature while only Orange County has above MSA average income per population. There are other unexplained factors that cause these areas to be under-supplied with clothing establishments. Perhaps these small cities are over looked by retailers due to market size and potential sales; therefore there are less clothing store establishments in these cities. On the other hand, Fort Lauderdale has below average income, while retailers have over supplied the market due to anticipated tourism and weather.



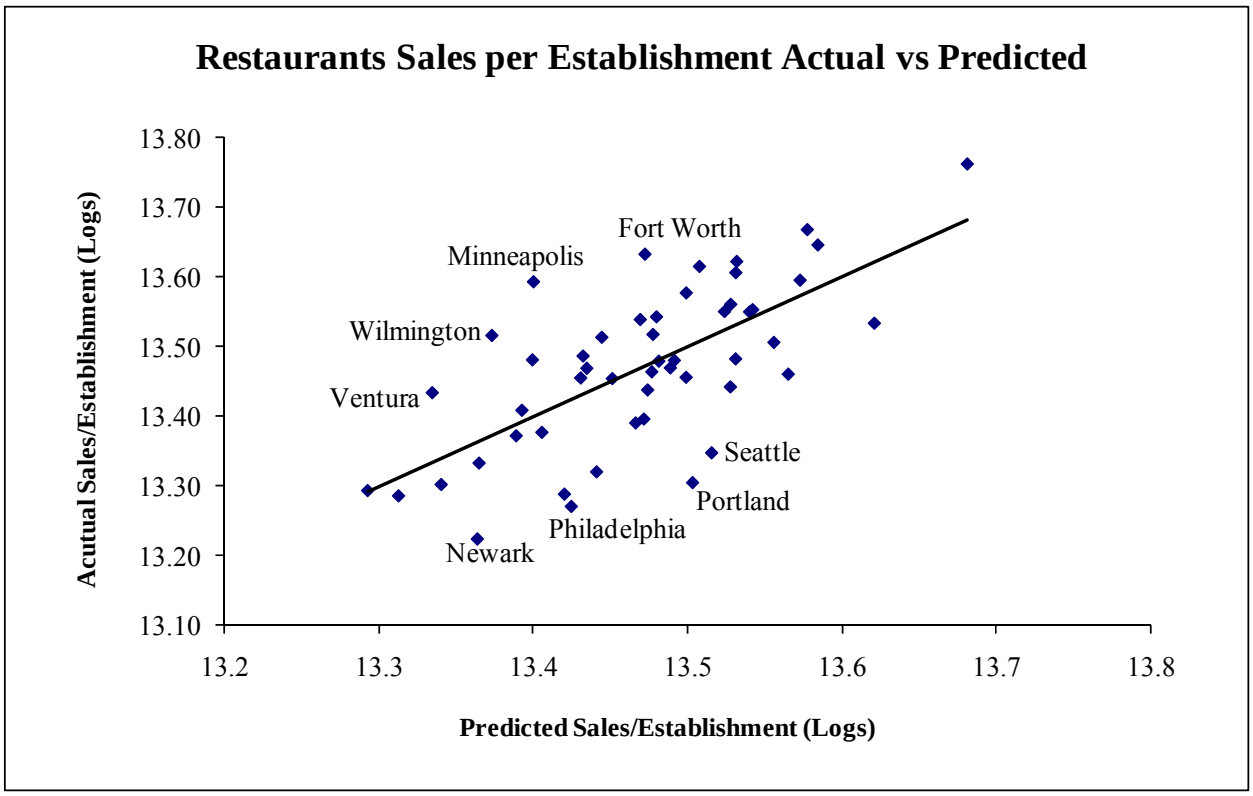
Sporting goods, books, and music have undergone a significant retail format change over the past year from brick and mortar to internet sales. Perhaps the result would be different today than in 2002. There are no significant consistencies among the outliers.



General Merchandise sales are largely affected by income and population. Detroit, Portland, Seattle, and Honolulu are smaller cities with smaller populations. These cities have more land for general merchandise store locations. More over, Honolulu, Portland and Detroit all have income per capital below the MSA average, which is why there is more need for discounted retailers. Other outliers such as New York City, Bakersfield and Phoenix have other reasons offsetting the results and cannot be explained.



The accommodation sales are affected by temperature, employment per population and city size. Large employment centers such as New York creates higher demand for accommodation needs. Cities like Honolulu, Orlando, and West Palm Beach are warm tourist designations. These factors explain the higher demand for accommodations than other cities. Due to an under-supply of accommodation establishments given the high demand, this situation results in a higher cost per room, which is why it is more expensive to stay in the cities above the trend line. Keep in mind that trends in the construction of accommodation facilities have an effect on the supply of rooms. Overcapacity or changes in demand can have a direct impact on industry occupancy rates and profits. However cities like New York and Honolulu have demand supported markets for more construction activities.



Restaurant sales are mainly affected by employment per population, income per capita and temperature. Minneapolis and Wilmington has a higher employment per population than the MSA average, which increases the demand for restaurants and catering services. Seattle, Philadelphia, Newark, and Portland, while may not have the lowest employment per population, do have temperatures below the MSA average. This explains why the temperature and precipitation may affect restaurant sales as important factors other than employment per population. The graph shows that there are more rooms for restaurant stores in cities above the trend line since the demand is exceeding current establishment supply.

CHAPTER SIX: CONCLUSION

The intent of this thesis is to identify demand drivers for ten retail categories in the US and develop an understanding of how to best use these information to make better retail real estate investment decisions. The study brings a new perspective to understanding retail sales demand drivers by using a cross sectional approach for each of the retail categories tracked by the US Economic Census in 54 metropolitan statistical areas in 2002. This cross sectional study analyzed sales per population, establishment per population, and sales per establishment based on six important independent variables. These variables are population, employment per population, income per population, precipitation, and population growth. The results of the study have clearly demonstrated a measurable demand for each retail category given the nature of each product types. The study also examined the predicted results to see if certain cities are over saturated or under-supplied with retail establishments by category. We found that the explanatory power and statistical tests for this data set is relatively strong in explaining retail consumption key factors. This study contributes to the future retail demand forecast in a particular city given the demographic and weather related information.

So should certain retail investment be made in a MSA that is not growing in population but is growing in wealth or in a MSA that is growing in population but not getting richer? The answer is that savvy retail investors should want to invest in a market that is getting wealthier rather than bigger unless they only want to invest in furniture and building materials stores. By understanding the exact demand drivers for each retail category, real estate investors are able to use this information efficiently to make investment decisions based on demand drivers as well as retail store supplies. This methodology provides the foundation for a reasonable and well thought-out strategy to avoid unsuccessful investment outcomes.

BIBLIOGRAPHY

Kenton L. Ownbey, Kyle Davis, and Harvey H. Sundel, 1994. **"The Effect of Location Variables on the Gross Rents of Neighborhood Shopping Centers ,"** Journal of Real Estate Research, Springer, vol. 9 (1), pages 111-124.

A. Ason Okoruwa, Hugh O. Nourse, and Joseph V. Terza, 1994. **"Estimating Sales for Retail Centers: An Application of the Poisson Gravity Model,"** Journal of Real Estate Research, Springer, vol. 9 (1), pages 85-98.

Ming-Long Lee & R. Kelley Pace, 2005. "**Spatial Distribution of Retail Sales**," The Journal of Real Estate Finance and Economics, Springer, vol. 31(1), pages 53-69, August.

Benjamin, John D & Jud, G Donald & Winkler, Daniel T, 1995. "**An Analysis of Shopping Center Investment**," The Journal of Real Estate Finance and Economics, Springer, vol. 10(2), pages 161-68, March.

John Benjamin & G. Donald Jud & Daniel T. Winkler, 1998. "**A Simultaneous Model and Empirical Test of the Demand and Supply of Retail Space**," Journal of Real Estate Research, American Real Estate Society, vol. 16(1), pages 1-14.

John Benjamin & G. Donald Jud & Daniel T. Winkler, 1998. "**The Supply Adjustment Process in Retail Space Markets**," Journal of Real Estate Research, American Real Estate Society, vol. 15(3), pages 297-308.

Rose, Louis A., 1989. "**Urban land supply: Natural and contrived restrictions**," Journal of Urban Economics, Elsevier, vol. 25(3), pages 325-345, May.

Mejia, Luis C & Eppli, Mark J, 2003. "**Inter-center Retail Externalities**," The Journal of Real Estate Finance and Economics, Springer, vol. 27(3), pages 321-33, November.

Eppli, Mark J & Shilling, James D & Vandell, Kerry D, 1998. "**What Moves Retail Property Returns at the Metropolitan Level?**," The Journal of Real Estate Finance and Economics, Springer, vol. 16(3), pages 317-42, May.

Hendershott, Patric H & Ward, Charles W R, 2003. "**Valuing and Pricing Retail Leases with Renewal and Overage Options**," The Journal of Real Estate Finance and Economics, Springer, vol. 26(2-3), pages 223-40, March-May.

Benjamin, John D & Jud, G Donald & Winkler, Daniel T, 1995. "**An Analysis of Shopping Center Investment**," The Journal of Real Estate Finance and Economics, Springer, vol. 10(2), pages 161-68, March.

Ewald Walterskirchen, 2006. "**Economy Supported by Higher Retail Sales**," Austrian Economic Quarterly, WIFO, vol. 11(1), pages 58-65, April.

Martha Starr-McCluer, 2000. "**The effects of weather on retail sales**," Finance and Economics Discussion Series 2000-08, Board of Governors of the Federal Reserve System (U.S.).

Carroll, Christopher D & Fuhrer, Jeffrey C & Wilcox, David W, 1994. "**Does Consumer Sentiment Forecast Household Spending? If So, Why?**," American Economic Review, American Economic Association, vol. 84(5), pages 1397-1408, December.

Heien, Dale, 1983. "**Seasonality in U.S. Consumer Demand**," Journal of Business & Economic Statistics, American Statistical Association, vol. 1(4), pages 280-84, October.

Miron, Jeffrey A, 1986. "**Seasonal Fluctuations and the Life Cycle-Permanent Income Model of Consumption**," Journal of Political Economy, University of Chicago Press, vol. 94(6), pages 1258-79, December.

Lundholm, Russell J. and McVay, Sarah E., "**Forecasting Sales: A Model and Some Evidence from the Retail Industry**" (January 2004).

IBIS World " **IBISWorld Industry Report**" 2008