How different types of restaurants behaved differently through the recent recession an analysis of stock market and financial ratios

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How different types of restaurants behaved differently through the recent recession
an analysis of stock market and financial ratios

by

Xiaofan Wang

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Hospitality Management

Program of Study Committee:
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Iowa State University
Ames, Iowa
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# TABLE OF CONTENTS

| LIST OF TABLES | v |
| ACKNOWLEDGEMENTS | vi |

## CHAPTER 1. INTRODUCTION

**Background**

**Purpose of Study**

## CHAPTER 2. LITERATURE REVIEW

*The Impact of the Recent Recession*

*Differences among Different Types of Restaurants*

*Stock Index*

*Financial Ratio Analysis*

**Overview**

**Summary of ratios**

**Studies used financial ratio analysis**

## CHAPTER 3. DATA AND METHODS

**Study Design**

*Impact of Recession on U.S. Restaurants Stock Market*

**Restaurant classification**

**Data collection**

**ARIMA with Intervention Analysis**

*Financial Differences between Two Types of Restaurants*

**Financial ratios data**
Independent samples t-test 47

Impact of the Recession on Financial Conditions and Performances 49

Data 49

Paired-samples t-test 50

The Wilcoxon signed rank test 53

CHAPTER 4. RESULTS AND DISCUSSION 54

Findings of U.S. Restaurant Stock Market 54

The impact and recovery of the recession on U.S. restaurant stock market 54

Discussion of the recession’s impact on limited service restaurants 55

Discussion of the recession’s impact on full service restaurants 58

Findings for Ratios Comparisons of Restaurants 59

Liquidity 59

Leverage 60

Profitability 62

Asset management 62

Market-based 63

Discussion of financial differences between two types of restaurants 64

Findings of the Impact of the Recession on Financial Conditions and Performances 66

Findings of the recession’s impact on full service restaurants 66

Findings of the recession’s impact on limited service 68

Discussion of restaurant industry before and after the recession 69

CHAPTER 5. CONCLUSIONS 72

Implications 72
Limitation

APPENDIX 1. A LIST OF SAMPLE RESTAURANT FIRMS 78
APPENDIX 2. DAILY TREASURY REAL YIELD CURVE RATES 80
REFERENCES 81
LIST OF TABLES

Table 1. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on limited service restaurant data 40

Table 2. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on full service restaurant data 40

Table 3. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on overall restaurant data 40

Table 4. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on S&P 500 data 41

Table 5. Summary of statistics of ARIMA with intervention analyses (impact) 44

Table 6. Summary of statistics of ARIMA with intervention analyses (recovery) 45

Table 7. Dates of impact and recovery 46

Table 8. Summary of financial ratios 47

Table 9. Financial ratios comparisons of restaurants 49

Table 10. Summary of ratio statistics for full service restaurants 51

Table 11. Summary of ratio statistics for limited service restaurants 52

Table 12. Summary of ratio statistics for limited service restaurants: Wilcoxon signed rank test 53
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CHAPTER 1. INTRODUCTION

Background

There were approximately 970,000 restaurants in the United States with the estimated sales of $632 billion in 2012 (National Restaurant Association, 2012). The restaurant industry is one of the largest private sector employers in the United States with about 12.9 million employees in 2012 (National Restaurant Association, 2012). As the foundation of U.S. economy, the restaurant industry suffered during the recent recession (CBS News, 2009). The cause-and-effect relationship was straightforward, after watching the deterioration of the housing market, consumer confidence declined; as a result consumers started cutting back on discretionary spending such as eating out (Barbardo, & Uchitelle, 2008). Sales and profits of restaurant industry first began to slide in late 2007, the drop in sales and profits leading to bankruptcy filings of restaurant chains such as Bennigan’s and closure of more than 600 Starbucks locations in 2008 (CBS News, 2009).

The restaurant industry was already suffered from the recent recession, the ever-rising gas price definitely made it more challenging. According to Stensson (2012), the increase in gas price had negatively effect on restaurant operations either on sales or operation side. In general, restaurants has a relatively large proportion of customers on the lower end of income scale, the rising gas price means less disposable income that could be spent in discretionary areas like restaurants (Stensson, 2012). The corresponding impact was lower sales. On operational sides, operators says due to fuel surcharges, supplier prices are higher, in average, their sales were off 5% due to the elevated level of gas and energy prices (Stensson, 2012).
The Dow Jones U.S. Restaurants & Bars Index dropped about 13% in 2008 (CBS News, 2009). This index includes 12 full service restaurants and limited service restaurants such as McDonald’s, Starbucks, Olive Garden, Red Lobster and Ruby Tuesday (CBS News, 2009).

Some full service restaurants were negatively affected by the recent recession. For example, the shares of Ruby Tuesday sink 85% due to high remodeling costs and falling sales, the shares of Cheesecake Factory fell 60% in 2008 (CBS News, 2009). Even worse, the private owned parent company of the Bennigan’s and Steak & Ale chains were forced to file bankruptcy in 2008 due to the drop in sales and profits (CBS News, 2009). Full service restaurants typically require customers to pay a tip, and their sale prices are higher. Customers are frequently encouraged to purchase expensive add-ons such as drinks and desserts. During the recession, people were extra sensitive to the high priced items; this probably was the reason of sluggish sales of full service restaurants.

On the contrary, limited service restaurants are reported fared better due to lower prices. For instance, shares of McDonald’s jumped about 5% due to the big increases in sales of 2008, Darden’s shares rose about 1%, its Olive Garden chain was popular among diners for being a good deal and offers all the salad that customers can eat (CBS News, 2009).

Is that true that different types of restaurants performed differently through the recent recession? To come up to an answer to the question, one must first examine the impact of the recession to the restaurant industry. To be more specific, how different types of restaurant firms’ stock performance reacted to the recession differently through and after the most recent recession? Did full service restaurants and limited service restaurants differ financially? Were there any changes in financial conditions and performances of full service and limited
service restaurants before and after the recent recession? This study endeavors to find out these differences between full service restaurants and limited service restaurants, therefore find out the corresponding ways to improve their performances during a recession or similar market downturn.

**Purpose of Study**

The first purpose of this study was to understand how different types of restaurant firms reacted differently to the recession by examining their stock performances through and after the most recent recession and the time it took for restaurants to recover. This is a two-stage study. First of all, this study attempted to quantify the differences, if any, among the impact of the recession had on different types of restaurant firms. Secondly, this study attempted to identify the differences, if any, among the lengths of time between when the recession ended and when their stock performance started showing significant recover. The finding of this study is expected to help practitioners understand how different types of restaurant firms behave through a recession or similar economic condition and cope with the impact of such market condition. It will also help restaurant investors make more scientific and informed decision in their investing activities through a recession.

Furthermore, full service restaurants and limited service restaurants represent different market sectors of the food service industry, these restaurants are different in many ways such as product line, service style, organization, structure and so forth, might they also differ financially? To answer this question the author performs a financial ratio analysis between full service restaurants and limited service restaurants to examine if their financial conditions and performances were different. To be specific, thirteen ratios of pre-recession
period (2005 and 2006) were examined; the thirteen ratios were classified into five groups: liquidity ratios, leverage ratios, profitability ratios, asset management ratios and market-based ratios. This analysis will not only contribute to an in-depth understanding of financial characteristics of full service and limited service restaurants, but also help the management with possible solutions to their existing financial problems.

Lastly, in order to identify the changes in financial conditions and performances of full service and limited service restaurants before and after the recent recession, the author compared the aggregate ratios of restaurants in 2005 and 2006 (the years prior to the recent recession) to the ratios of restaurants in 2010 and 2011 (the years after the recent recession). Such analysis not only empirically examines the impact of the recent recession on U.S. restaurants’ financial performances, but also provides some crucial managerial implications for the U.S. restaurant industry.
CHAPTER 2. LITERATURE REVIEW

The Impact of the Recent Recession

According to the National Bureau of Economic Research (NBER), the United States experienced an economic recession from December 2007 through June 2009 (The National Bureau of Economic Research, 2010). It is believed that the recession was the worst one since the Great Depression in terms of its duration and impact (Sum, Khatiwada, McLaughlin & Palma, 2009). In the first 18 months of the recession, gross domestic product (GDP) shrunk by about 5.1% (Bureau of Economic Analysis, 2011). 10.6 million people became unemployed and the unemployment rate reached 6.9% in the fourth quarter of 2008 (Borbely, 2009). In the autumn of 2008, months of trouble in housing, credit and financial markets resulted in a stunning decline in stocks (Shinkle, 2008). The Dow Jones Industrial Average tumbled by nearly 2,400 points, including a sharp 18% decline on a single week in late September of 2008 (Shinkle, 2008). During the This Week interview by George Stephanopoulos (2009), President Obama summarized the recession as “whether it’s retail sales, manufacturing, all of the indicators show that we are in the worst recession since the Great Depression.”

Recent history shows that recession depresses stock price (Lim, 2008). According to Gitman, Joehnk & Smart, the intrinsic value of stocks is the present value of the future cash flow of expected earnings discounted by a risk adjusted rate of return (2010). During the economic recessions, the intrinsic value of stocks reduces since the ability of corporations to generate future earnings diminished (Franz, 2010). Stock prices, measured by stock index such as Standard & Poor 500 Stock Index or Dow Jones Industrial Average, experienced a
reduction during 2008 due to the concern that the earnings of corporations were going to reduce because of the recession (Mulligan, 2009). In 2008, the S&P 500 experienced its worst year since 1937 with 38.49% reduction in its value (Solin, 2011). The percentage loss in the Dow industrial and Nasdaq Composite Index in 2008 is 33.84% (worst since 1937) and 40.54% (worst in history), respectively (Gaffen, 2009). The slumps of stock prices due to recession further reduced business profit, which forced firms to slow production and lay off employees.

According to Harvey (1989), reduction in earnings is the most common consequence for most equities during the recession since the decease of the companies’ stock prices. The recent recession had forced many corporations to cut or suspend payments to shareholders as profits dropped. Howard Silverblatt, the senior index analyst at S&P, said that overall, dividend cuts cost investors $58 billion in 2009 (Norris, 2010). In the first quarter of 2009, 64% of dividend announcements were negative (Norris, 2010). Decreased dividends lowered shareholder’s confidence in the profitability of the companies; they chose to sell their shares, this further lowered the stock price and depressed the stock market as a whole. Analysts at Ned Davis Research describe the steep declines in early October of 2008 resemble the "type of waterfall decline that occurs at the end of bear markets when fear feeds on itself" (Shinkle, 2008). In addition, stock volatility increases during recessions (Schwert, 1990). During the recent recession, investment risk increased while returns decreased with higher market volatility, therefore many investors were withdrew their investments on stock market and migrated to less risky financial products, such as bonds. As the investment in stock market declined, the overall stock market value declined.
The restaurant industry is vulnerable to economic downturns (Gu, 1993). For example, eating and drinking places, the principal portion of the restaurant industry, which provides about three fourths of the total employment opportunities in the restaurant industry, posted 17,600 job losses in November 2008, which was the fifth consecutive month of job losses in the industry (National Restaurant Association, 2008). According to the statistics released by Bureau of Labor Statistics, prior to the recession, eating and drinking places had not posted job losses for five consecutive months since 1958 (National Restaurant Association, 2008).

The restaurant industry has low profit margins ranges between 2% and 6%, compared to 20.4% of the most profitable industry such as network and other communications equipment industry (Skidelsky, 2009; Anonymous, 2009). Rising food, commodity and gas prices and increases in minimum wages placed increasing pressure on menu prices and profit margins (Trowbridge, 2011). In addition, as the food and labor costs rose rapidly, the recent economic recession also created major cash-flow problems for these restaurateurs who have problems with get enough credit lines to cover investment and operating costs (Caplan, 2008). Under these circumstances, some high profile restaurants filed for bankruptcy in 2008, such as Bennigan's, Steak and Ale, and Metromedia Steakhouse, Buffets Holdings Inc., VICORP Restaurants Inc., and Black Angus Steakhouse (Sheel, 2008). In addition, the decrease of market demand made the environment more challenging for the restaurant industry. Korkki (2008) found that during the recession, in order to prevent personal financial ruin, people simply choose not to dine out to reduce expenses. According to 2008 annual report on eating patterns in America, 72% of all meals were homemade, the average American had a meal at a restaurant 79 times, a history new low (The NDP Group, 2009). In 2008, the $550 billion U.S. restaurant industry suffered from the sluggish sales for the first time in nearly two decades.
According to Warren Solochek, the vice president of NPD Group, the industry had lost 2 billion visits due to the recent recession (Ruggless, 2010).

In addition, a research done by United States Department of Agriculture showed that food prices increased substantially during the early stage of the recession (Kumcu & Kaufman, 2011). In 2008, the annual rate of food price inflation was 5.5 percent when the food prices peaked. The average annual growth rate of food prices between 2007 and 2009 was almost 3.8 percent; this is undoubtedly a double squeeze of lower incomes and higher food prices for customers to reduce food spending (Kumcu & Kaufman, 2011). According to the Economic research service of USDA, during the recent recession, the food away from home spending, such as at fast food restaurants or full service restaurants, declined 11.5 percent while the spending in grocery aisle increased as a result of consumers replaced restaurant meals with at home eating (Kumcu & Kaufman, 2011).

As the unemployment rate had soared and consumers curtailed spending, the National Restaurant Association’s performance index shows that the industry had been shrinking for 23 months in a row ending November of 2009 (Newman, 2009). In November of 2008, the Dow Jones U.S. Restaurant & Bars Index, which includes 12 leading restaurant firms, slipped about 12% (Rosenberg, 2009).

The recent recession adversely affected the stocks of restaurant industry. In February of 2009, the stock price of the top 26 restaurant companies lost an average 49.3% of their value from their highest points over the past 52 weeks (Krantz, 2009). Some individual restaurants and their investors even suffered more—Ruth’s Hospitality (RUTH), which runs the Ruth’s Chris Steak Houses; DineEquity (DIN), operator of International House of
Pancakes (IHOP) and Applebee’s; and Ruby Tuesday (RT) have all seen their stock fall nearly 90% (Krantz, 2009).

**Differences among Different Types of Restaurants**

Even though all types of restaurants share the common characteristics such as require a large amount of labor to produce products and services, seasonal fluctuation in sales, different restaurant segments tend to perform differently through the recession since they have different styles of operation, target customers and financial characteristics (Gu, 1996). For example, full service restaurants generally rely on high profit margin, the sales of full service restaurant are mainly from customers’ discretionary expenditure, when recession comes, customer sentiment and household income are lower, full service restaurants are the first to feel the effects (Youn & Gu, 2010). Fast food restaurants, on the other hand, rely on the large sale volume to compensate the low profit margin; their sales are primarily from consumers’ necessity expenditure therefore they have more steady revenues (Youn & Gu, 2010). As another example, the second highest cost in restaurant industry-labor costs, are 24.2% and 29.8% of sales for limited service restaurants and full service restaurants, respectively (Nelson, 2001). The 5.5% difference represents more routine activities are executed in the limited service restaurant industry (Nelson, 2001). Consider the labor-intensive nature, full service restaurants are more vulnerable to change in labor and benefit costs. These differences may have eventually resulted in the different performances of full service and limited service restaurants during the recession. For instance, limited service restaurants may fare better than full service restaurants due to their lower menu price and labor costs.
Stock Index

A stock index is a list of stocks put together to measure the composite value and to track performance of its components of the stock market (U.S. Securities and Exchange Commission, 2007). It is a tool used to represent the common characteristics of its component stocks, such as trading on the same stock market exchange, belonging to the same industry, or having same market capitalization (U.S. Securities and Exchange Commission, 2007). News and financial service firms use stock indices as benchmarks to evaluate the performance of investment portfolios while investors use stock indices to assist them in their investment decisions (U.S. Securities and Exchange Commission, 2007). Stock indices are highly convenient tools to assess general trends in the stock market.

The major stock indices in the U.S. include Dow Jones Industrial Average (DJIA), New York Stock Exchange (NYSE) Composite Index, National Association of Securities Dealers Automated Quotations (NASDAQ) Composite Index, American Stock Exchange (AMEX) Composite Index and Standard & Poor’s 500 Index (S&P 500). Stock indices use various methods to determine their value. Dow Jones Industrial Average adopted the price-weighted method. In a price-weighted index, the price of each component stock is the only consideration when determining the value of the index (Dow Jones Indexes, 2011). The calculations are simply adding the price of each stock, and then divide this by the total number of stocks. Regardless of the actual size or numbers of shares outstanding of the companies, stocks with higher quoted price received greater proportions of weighting in the index therefore have a greater impact on the performance of the index. In contrast, NASDAQ Composite Index, NYSE and S&P 500 Index employed a market-value weighted, also known as the capitalization-weighted method (S&P Indices, 2011). This method factors in the size
of the company. Market capitalization means the value of a corporation determined by multiplying the stock price of a share by number of total outstanding shares (U.S. Securities and Exchange Commission, 2007). A relatively small shift in the price of a large company therefore will heavily influence the value of the index (Standard & Poor’s, 2011).

A weighting based on the market cap is thought to be more effective than price weighting on tracking stocks’ performance (Handley, 2011). For instance, in price-based weighting system, a stock split changes the weight of a company in the index, even there is no fundamental change in the business. Under market-value or capitalization-weighting system, there is no need to adjust for the stock splits. Morningstar analyst Paul Justice summarized the twofold advantages of market-value weighted index, “it was really reflective of the overall stock market, and two, that it minimized the turnover costs,” he added, “basically, a stock would reweight itself just as its price appreciated, you don’t have to rebalance that index” (Handley, 2011).

Financial Ratio Analysis

Overview

Introduction

Like most of other industries, Generally Accepted Accounting Principles (GAAP) requires hospitality industry issues financial statements to provide basic information of a company on a periodic basis (Raymond, 2007). When it comes to effective financial management or scientific investment, the figures on the financial statements is not enough since the figures cannot be compared against standard or expected criteria (Schmidgall, Hayes, & Ninemeier, 2002). However, these figures can be more useful and meaningful
when they converted into ratios. Ratios are computed by dividing a number by another, they express the direct relationship between two items for the same accounting period (Schmidgall, Hayes, & Ninemeier, 2002). A ratio can be expressed in different ways such as percentage, decimals, times, dollars, or on a per-unit basis.

Ratios can be used to trend or time-series analysis to assess a company’s performance over time, they are also can be used to cross-sectional analysis, for example, they can be used as a measurement to compare with different firms at the same point in time, benchmarks of previous years, industry standards or management goals (Jagels, & Coltman, 2004). Jagels, & Coltman summed up ratio analysis as a tool people used to compare related information such as two figures, quantity values or numerical dollar values by conduct a quantitative evaluation of information from a corporation’s financial statements such as balance sheet, the statement of cash flows and income statement (2004). Thus, with the help of financial ratio analysis, financial statement readers can evaluate the financial position or performance of a company or detect trends over a longer period more easily.

**Users**

Ratio analysis is a major tool used by financial managers and analysts, it involves the methods of calculating and interpreting financial ratios to evaluate a company’s financial condition and performance. Ratio analysis is an accounting tool to present accounting variables in a simple, concise, intelligible and understandable form. The main objectives of ratio analysis include examine earning capacity, financial soundness and operating efficiency of a company (Chatfield, & Dalbor, 2005). Most of financial statements users find ratio analysis helpful. Generally speaking, there are three groups of people are interested in ratios:
managers, current and potential creditors, and the company’s owners or stockholders (Chatfield, & Dalbor, 2005).

The main responsibilities of managers include profit maximization, controlling cost, and safeguarding assets (Coltman, 1979). By analyzing ratios, mangers could monitor the company’s performance against pre-set goals, industry average, or benchmark of prior years to determine if the operating objectives are being achieved, to evaluate the effectiveness and financial viability of the operation, to assess current liquidity position and other economic positions to satisfy owners and creditors (Jagels, & Coltman, 2004).

Creditors, by definition, are the entities (organization or person) that extend credit or loan money to a company (Jagels, & Coltman, 2004). Therefore, naturally, they pay attention to the ratios that served as indicators of the safe level of their loaned money or trade credit. Current and potential creditors also interested in certain ratios that they could use to estimate the risk of future loans that the company may need (Jagels, & Coltman, 2004).

For owners or shareholders, they particularly interested in the ratios that they could adopt to measure the return on investment, to estimate the risk level of the investment, and to assess the probability of success of future operations (Coltman, 1979). Shareholders can use certain ratios to assess the ability of a company to pay dividends, to help them make informed investment decisions such as whether they should buy shares from a particular company, and the timing to sell or hold on to the shares they already own (Coltman, 1979).

**Advantages & disadvantages**

There are various advantages of ratio analysis. First of all, ratios are user friendly and they can be easily calculated. An analysis of ratios highlights the crucial information in a simple form. Users do not have to read the whole financial statements; they can get the
information they want by looking few numbers in ratio analysis. Secondly, ratio analysis helps the company in comparing the benchmark established by management and industry standard (Jagels, & Coltman, 2004). In the other words, ratio analysis helps management in assessing the operating efficiency of the company. Thirdly, ratios can pinpoint the problem areas (Jagels, & Coltman, 2004). By locating the weak spots, managers can then pay attention to the weakness and take remedial actions. Last, ratios help in trend analysis, business planning, and forecasting (Jagels, & Coltman, 2004).

Despite its usefulness, ratio analysis also has limitations. Some key disadvantages include the following. First of all, financial statements contain estimates and assumptions. Accounting standard allow different accounting methods (such as depreciation and inventory valuation methods); under this situation, ratio analysis is less useful due to the impaired comparability (Raymond, 2007). Second, ratios highlight the problems but cannot solve them (Raymond, 2007). Third, ratios can be misleading if they are not properly interpreted (Raymond, 2007). Last, ratio analysis by its nature explains the relationships between past information, but users are more interested in current and future information (Raymond, 2007).

**Summary of ratios**

**Liquidity**

Liquidity ratios are the category of ratios that reveal a company’s ability to meet its approaching obligations without difficulty (Moyer, McGuigan, & Kretlow, 2001). A company may be profitable in its income statement, but lacks of cash to pay its bill on time; this can lead to financial difficulties even bankruptcy. Liquidity ratios measure a company’s ability to remain liquid — in other words, a company’s ability to provide adequate cash to
conduct business in a reasonable period of time (Raymond, 2007). Creditors and investors are typically interested in this category of ratios; with the knowledge of whether a company can pay its bill without borrowing money can help assess the risks of investment (Jagels, & Coltman, 2004).

The two most frequently adopted ratios in assessing liquidity are the current ratio and the quick ratio. The current ratio indicates the relationship between current assets and current liabilities (Moyer et al., 2001). It is also called the working capital ratio. The equation is,

\[
\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}
\]

Liquidity ratios assume that the current assets are the major source of funds to pay current obligations. Current assets consist of cash on hand or in the bank, and any other assets that can be converted to cash within an operating period of 12 months, for instance, marketable securities, account receivable, notes receivable, inventories, and prepayments. Included in current liabilities are accounts payable, notes payable, the current portion of long-term debt due, other payables, taxes, and wages due (Moyer et al., 2001).

Calculations can be easily done by use of the formula below, however how to interpret the ratios is the thing really matters to the users of ratio analysis. The interpretation of this ratio is illustrated in the following example. Suppose that the current ratio calculated for a company in a given year is 1.4, the interpretation of the current ratio is 1.4 to 1; this result means that for every dollar of current liabilities, there is $1.4 of current assets. Another way to state this result is the current assets are 1.4 times larger than the current liabilities.

In general business, the rule of thumb developed for organizations with large amounts of inventories is to use a ratio of 2.0 (Schmidgall, Hayes, & Ninemeier, 2002). Since food, beverage and supplies are the only current inventories for restaurant industry, the thumb of
rule for restaurants is less than 1 to 1 (Schmidgall, Hayes, & Ninemeier, 2002). It means with a current ratio less than 1 to 1, restaurants can operate without difficulties in paying its current liabilities.

Generally speaking, the larger the current ratio, the less difficulty a firm should encounter in paying its bill. Financial institutions like banks often have the term stated that the borrower to maintain a specific current ratio, a violation of the loan agreement could lead the lender to demand immediate full payment (Schmidgall, Hayes, & Ninemeier, 2002). Potential and current creditors like to see a high current ratio, since too low a ratio leads to difficulties in paying bills, however, owners prefer a low current ratio, too high a ratio sacrifices profitability, as the money tied up in working capital (current assets minus current liabilities) is not earn income (Jagels, & Coltman, 2004). Therefore, management of a company must try to maintain an acceptable current ratio for both creditors and owners, that is, a current ratio that does not create problems to pay short-term liabilities or sacrifice profitability.

The interpretation of the current ratio needs more than industry standards and comparison with other ratios (Jagels, & Coltman, 2004). For instance, two companies may have the same current ratio, however, one company may be in a better liquidity position suppose it has large amounts of cash and short-term investments compared to the other company that may have large amounts of account receivable and inventories. To overcome the limitations of the current ratio, the acid test ratio (also known as quick ratio) was developed to exclude the less liquid current assets such as inventories and prepaid expenses. The formula of quick ratio is,

\[
\text{Quick ratio} = \frac{\text{cash} + \text{accounts receivable} + \text{marketable securities}}{\text{current liabilities}}
\]
It is also can be expressed as following,

$$\text{Quick ratio} = \frac{\text{current assets} - \text{inventories} - \text{prepaid expenses}}{\text{current liabilities}}$$

Quick assets referred to the part of current assets that can be readily converted to cash readily. The less liquid current assets, such as inventories and prepaid expenses, are subtracted from current assets (Moyer et al., 2001). The quick ratio is a stringent version of current ratio. There is an important assumption behind the quick ratio is that a company’s account receivable may be converted into cash within a normal collection period and with a little shrinkage, or within a period of time for which credit initially was granted (Moyer et al., 2001).

**Leverage**

Total assets in any business could be financed mostly by either equity such as shares and retained earnings or debt (Moyer et al., 2001). Financial leverage management ratios show the balance between these two finance methods (Moyer et al., 2001). Financial leverage is a term that refers to a firm using debt rather than equity to finance its assets to increase the return on equity. Financial leverage management ratios indicate the degree of financial leverage employed by a company and the ability of a company to repay its financial obligations when the due date is approaching (Moyer et al., 2001).

Ratios under this category typically are of interest to lenders and owners (Schmidgall, Hayes, & Ninemeier, 2002). Both long-term and short-term lenders are concerned with the degree of leverage a company used since it indicate the risk they may be taking if they lend money to the company. Lenders prefer companies with light to medium use of debt since there is less protection and more risk involved with a company that is heavily financed by
debt in the event of bankruptcy (Schmidgall, Hayes, & Ninemeier, 2002). Lenders want to be assured that they will be repaid. An example is illustrated as following. Suppose that 80% of a company’s assets are financed by debt, the lender’s funds are in a danger if the value of the assets shrink by only 20%. In contrast, if a company’s assets are financed with only 20 percent debt, the assets value can decline 80% before putting lenders at risk.

Owners are interested in financial leverage, but for a different reason. Owners often want the firm to use more debt to increase the rate of return on their investment of capital (Schmidgall, Hayes, & Ninemeier, 2002). It makes sense if the company can earn more than the cost of the borrowed funds, however, if earnings are less than the cost, the company is better off not borrowing. For instance, if a company can borrow money at 8% and use it at 12%, then the earning is the 4% difference that will increase the rate of return to the owners. On the contrary, if the company can earn only 3%, then the 5% difference are unfavorable to the owners.

Both income statement and balance sheet data can be used to calculate a company’s use of leverage. The balance sheet approach is more static since it measures leverage at a specific point in time and focuses on total debt. The income statement approach is rather dynamic (Schmidgall, Hayes, & Ninemeier, 2002). Both approaches are used widely in practice.

It is quite common to use debt in the hospitality industry. Another advantage in addition to increasing returns is that the interest expense is tax deductible under American system of taxation (Coltman, 1979)). However, companies must use debt cautiously since the more use of debt, the more risk and chance for bankruptcy.
Ratios under this category include debt ratio, the debt-to-equity ratio, the time interest earned ratio.

The formula for debt ratio is as follows,

$$\text{Debt ratio} = \frac{\text{Total debt}}{\text{Total assets}}$$

The term 'debt' used here refers to all short-term liabilities and long-term borrowing. From the formula, it is obvious that the debt ratio calculates the percentage of a company’s assets financed by lenders (Moyer et al., 2001).

Bondholders and other long-term lenders are typically interested in debt ratio of a company (Schmidgall, & DeFranco, 2004). A low debt ratio is favorable to them because the company offers more protection in the event of liquidation or other major financial problems (Chatfield, & Dalbor, 2005). A company’s fixed-interest charges increase as debt ratio increases. A high debt ratio may encounter problems such as insufficient cash flow needed to pay interest during an economic recession (Chatfield, & Dalbor, 2005). As debt financing reaches a certain level, it is harder and harder to raise new funds by debt since the implied high risks perceived by investors (Chatfield, & Dalbor, 2005).

Proportionate equity base refers to the percentage of assets financed with equity (Moyer et al., 2001). Therefore, a high debt ratio implies a low proportionate equity base. Traditionally, the hospitality industry has a range between 60% to 90% of debt and 10% to 40% of equity (Schmidgall, Hayes, & Ninemeier, 2002).

One thing the debt ratio users should pay attention to is that this ratio is based on assets at their book value. In hospitality industry, if a hotel or restaurant owns its land or buildings, the debt ratio could be misleading since in this calculation the book value was used (Schmidgall, Hayes, & Ninemeier, 2002). Land and buildings usually appreciate over time, if
fair market or replacement value of assets were used, then this ratio would decline and probably more precise to the true situation (Schmidgall, Hayes, & Ninemeier, 2002).

The definition of debt-to-equity ratio is,

$$\text{Debt-to-equity} = \frac{\text{Total debt}}{\text{Total equity}}$$

Actually, the debt-to-equity ratio is not really a new ratio, it is a different format of the debt ratio. The similarity of debt ratio and the debt-to-equity ratio is that both ratios examined the amount of a company’s financing with debt and equity. This ratio also is stated in percentage.

Lenders are interested in this ratio, too. Suppose that a company’s debt-to-equity ratio for a given year is 1.9, which means for each dollar invested by stockholder, the lenders have invested 1.9 dollar. The higher the lenders’ investment for each dollar of stockholder’s investment, the higher the risk for lenders (Coltman, 1979). Under such circumstances, debt financing would be more difficult and the interest rates would be higher. To the owners of companies, the higher the debt-to-equity ratio, the more profit so they want it as high as possible (Coltman, 1979). A high debt-to-equity ratio is also known as having high leverage.

The formula for time interest earned ratio is stated as follows,

$$\text{Times interest earned} = \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest charges}}$$

This ratio is also called the interest coverage ratio. Used the data from income statement, this ratio measures a company’s use of leverage. This ratio adopts EBIT figures since a company pays interests out of operating income, that is, EBIT. EBIT used in this ratio is rarely expressed as such on the income statement; a simple way to calculate EBIT is add back income taxes and interest charges to net income (Moyer et al., 2001). This ratio
indicates how many times that the interest expenses could be paid given the company’s operating income and interest charges for a specific period (Moyer et al., 2001).

All parties including lenders, owners, and management are concern with a company’s ability to meet interest payments (Coltman, 1979). All parties like to see this ratio as high as possible. From lenders’ perspective, a high number suggests there are low risks involved and that the company will be able to pay its interest charges on time (Coltman, 1979). A high number is also desirable, particularly if a company has a high debt-to-equity ratio. To management, high ratio is preferred since it pleased both lenders and owners (Schmidgall, Hayes, & Ninemeier, 2002). However, an extremely high interest coverage ratio might indicate that financial leverage is not being maximized (Schmidgall, Hayes, & Ninemeier, 2002). When this ratio falls below 1, it indicates the possibilities of failing in paying interest charges when due, thus it threatens a company’s continued viability, even lead to bankruptcy.

**Profitability**

The main purpose of most corporation operation is to generate a profit. In an incorporated corporation, the profit can be paid as dividends or be retained to expand business to increase the profits further (Moyer et al., 2001). In a partnership or proprietorship, the owners can withdraw the profit to increase their personal net worth or can left the profit in the business to expand it. Creditors also value the profitability of a company, because the higher the profits, the less the risk to lend their money to the company. Therefore, one of the major tasks of management is to ensure an increasing stream of earnings. Profitability ratios are often used to measure how effectively a company’s management is generating profits on sales, total assets, and stockholders’ investments (Moyer et al., 2001).
Anyone whose economic interests are tied to the long-run survival of a company will be interested in profitability ratios (Schmidgall, Hayes, & Ninemeier, 2002). However, one must be cautious using the word “profitability”. For example, a firm may have a net income on its income statement, and this net income, expressed as a percentage of revenue, may seem acceptable. However, the relationship between this net income and other items, such as the amount of money invested by stockholders, may not be acceptable (Schmidgall, Hayes, & Ninemeier, 2002).

The most frequently used profitability ratios include gross profit margin ratio, the net profit margin ratio, the return on investment ratio, and the return on stockholder’s equity ratio.

The formula for the gross profit margin ratio can be expressed as following,

\[
\text{Gross profit margin} = \frac{\text{Sales} - \text{Cost of sales}}{\text{Sales (revenue)}}
\]

It measures the relative profitability of the difference between a company’s sales and cost of sales, the purpose this ratio is to reveal how efficiently the company’s management is making decisions regarding pricing and the control of production costs (Moyer et al., 2001). Differences in inventory accounting methods, or, to be more specific, depreciation methods used by a company will influence the cost of sales, therefore influence the gross profit margin (Moyer et al., 2001).

The formula for net profit margin ratio can be written as,

\[
\text{Net profit margin} = \frac{\text{Earnings after taxes (EAT)}}{\text{sales}}
\]

It measures the overall effectiveness in generating sales and controlling of costs of a company’s management (Moyer et al., 2001). Say if a company’s net profit margin ratio is 5%, it means that the company is earning 5 cents of net income out of each $1.00 of sales.
revenue. This margin vary widely in the hospitality industry, the management usually compares this ratio to industry average (Jagels, & Coltman, 2004). If it is below the industry average, it indicates that the company might be having difficulties in controlling total expenses or prices of its products. Additionally, although the net profit margin ratio may seems somewhat low, it may translate to a large amount of dollars in absolute terms (Jagels, & Coltman, 2004).

The return on investment ratio (ROI) is calculated as follows,

\[
\text{Return on investment} = \frac{\text{Earnings after taxes (EAT)}}{\text{Total assets}}
\]

It is also called the return on assets ratio. This ratio compares a company’s net income to the total asset investment for a given period of time (Moyer et al., 2001). It indicates the effectiveness of management have employed asset to generate profits for owners (Moyer et al., 2001). Noted that if the total assets changed significantly during the period, it is more appropriate to use an average figure to calculate this ratio. A significant new investment in total assets could make the ratio much lower. Another factor should be considered is that the mount of depreciated fixed assets will affect this ratio. The denominator will be lower if there is a large amount of depreciated assets and therefore make this ratio appears higher.

The definition of return on stockholder’s equity ratio is as follows,

\[
\text{Return on stockholder’s equity} = \frac{\text{Earnings after taxes (EAT)}}{\text{Stockholders’ equity}}
\]

This profitability ratio indicates the rate of return that a company earned on stockholder’s equity during the period, it shows how well the management use equity funds to generate profits (Moyer et al., 2001). Similar to the ROI ratio, the denominator in this ratio can be an average for the period. Investors value and analyze this ratio when they considering
an investment. Because of the denominator only includes stockholders’ equity, this ratio is directly affected by the amount of financial leverage used to finance assets. The more financial leverage is used, the higher the expected return for shareholders, the high risks associated with the investment (Moyer et al., 2001).

**Asset management**

Asset management ratios, as indicated in its name, show how efficiently management uses its resources, sometimes referred as activity ratios or turnover ratios (Moyer et al., 2001). They are indicators of the amount of investment in particular type of asset related to the profit the asset is generating. One main objective of management is to allocate resources properly among various asset accounts such as cash, account receivable, inventories, property, equipment and so forth (Moyer et al., 2001). A company can be more effective in generating profits if the company’s asset structure is proper. Financial analysts compare the asset management ratios for various accounts of a company with industry norms to determine how well the management is distribute its resources. Asset management ratios are also used by managers to make plans.

Asset management ratios discussed in this section includes the inventory turnover ratio, the fixed-asset turnover ratio, and the total asset turnover ratio.

The formula for the inventory turnover ratio is as follows,

\[
\text{Inventory turnover} = \frac{\text{Cost of sales}}{\text{Average inventory}}
\]

The cost of sales is usually can be found on a company’s income statement, while average inventory can be calculated in various ways. It can be calculated by adding the figures for the beginning and ending inventories for the year and dividing by 2, this is
typically applied to the situation that a company has continuing growth in sales (Moyer et al., 2001). It also can be computed by taking more periods into account if the data is available, and it is a more precise method for companies that have seasonal or fluctuating sales. Some analysts calculate inventory turnover using the inventory of end of the year (Moyer et al., 2001).

The inventory turnover ratio is be used to compare with previous periods or industry average (Moyer et al., 2001). In restaurant industry, a low inventory turnover ratio is an indicator of unpopular items or an investment that purchase too much inventory (Raymond, 2007). On the contrary, a high inventory turnover ratio may be facing out of stock of certain items wanted by customers frequently and this may results lose sales to competitors (Raymond, 2007). In hospitality industry, management must manage inventory carefully and try to maintain a balanced range of this ratio due to the expenses of storing it.

The definition of total turnover ratio is as follows,

\[
\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}}
\]

This ratio indicates the effectiveness of management uses it total resources to generate sales, it suggests the changes, if any, in the use of total assets (Moyer et al., 2001). In the United States, this ratio indicates how many dollars of sales are generated for every dollar of assets. All parties, such as owners, lenders and management, are like to see a relatively high total asset turnover ratio, are like to produce revenue as high as possible from the asset base.

**Market-based ratios**

This group of ratios indicates a company’s financial market’s assessment of performance (Moyer et al., 2001). Typically analysts and investors are interested in this
group of ratios. Market-based ratios are related to the ratios discussed in the previous paragraphs, they should parallel these ratios. For instance, if the accounting ratios indicate that a company has more risks than the average of the industry and lower profit prospects, this information should be reflected in a lower marker price of that company’s stock. Two ratios are under this category are price-to-earnings (P/E) ratio and market (price)-to-book (value) (P/BV) ratio.

The formula for price-to-earnings ratio is as follows,

\[
P/E = \frac{\text{Market price per share}}{\text{Current earnings per share}}
\]

Some analysts use next year’s expected earnings per share in the denominator, but this is an alternative definition. Comparisons be done on the same basis (Moyer et al., 2001). Generally, the lower the company’s risks, the higher the P/E ratio should be. In addition, companies with high P/E ratios are usually considered to have good prospects for strong growth in future earnings, but companies with low P/E ratios are considered to have poor prospect for future earnings growth.

Investors are typically interested in P/E ratio because it allows them to easily compare this ratio with the return they can receive from other alternative investments (Raymond, 2007). In public companies, investors always have the options to withdraw their investment by selling their shares back to the stock market if they are unsatisfied with their return, they can always reinvest their money to some more ‘profitable’ companies.

Management should note that if many investors with large shareholdings withdraw their investment, the market price of the shares would be further depressed (Jagels, & Coltman, 2004). In turn, raising money when needed in future would be more difficult, since
potential buyers are reluctant to invest their money. The P/E ratio is greatly affected by how buyers and sellers of those shares perceive the risks involved in the investment, the potential growth of the earnings, and the trend of earnings. Therefore, management should try to maintain the P/E ratio as high as possible to satisfy investors and owners.

The definition of market (price)-to-book (value) (P/BV) ratio is as follows,

\[ \text{P/BV} = \frac{\text{Market price per share}}{\text{Book value per share}} \]

The book value per share is calculated by dividing the total common stockholders’ equity of a company (total assets minus total liabilities) by the number of shares outstanding (Moyer et al., 2001). Noted that stockholders’ equity is affected by the accounting methods employed by a company such as inventory valuation and depreciation, thus comparisons between companies could be misleading.

In general, the higher the rate of return on stockholders’ equity to the cost of common equity, in the other words, investors’ required return, the higher the P/BV ratio (Moyer et al., 2001).

**Studies used financial ratio analysis**

**Financial ratios used in non-hospitality industries**

At the very beginning of the finance as a discipline, analysts have used ratios to evaluate firms’ financial health (Lawder, 1989). Many studies use financial ratios as the warning signals to predict potential bankruptcy. The implied logic is that most bankruptcies happened in a foreseeable manner, that is, the factors that triggered the bankruptcy may appear much earlier than the actual time of bankruptcy (Gu, 2002). Van Horne (1998) suggests that ratios can be used to detect the financial “illness” of a firm; therefore the
probability of bankruptcy can be accessed through financial ratio analysis. In the literature, ratios are widely used as predictors of bankruptcy or failure. In 1966, Beaver studied the predictive power of 30 financial ratios separately to predict financial failure 5 years prior to the ultimate failure. According to his finding, the five best predictive ratios are cash flow/total debt, net income/total assets, total debt/total assets, working capital/total assets and current ratio (Beaver, 1966). After Beaver’s study, many studies adopted multivariate approaches to predict business failure (Deakin, 1972; Blum, 1974; Dambolena, & Khoury, 1980; Taffler, & Tisshaw, 1977; Taffler, 1982). For instance, Altman (1968) paired a bankrupt group of 33 manufactures with a group of 33 non-bankrupt firms. The five ratios he used were working capital/total assets, retained earnings/total assets, earnings before interest and taxes/total assets, market value of equity/par value of debt, and sales/total assets. By using multivariate bankruptcy model, using ratios 1 year prior to the failure, the predictive accuracy was 95% and 79% for the within samples firms and holdout sample firms, respectively (Altman, 1968).

**Financial ratios used in hospitality industries**

Financial ratio analysis is also commonly used in hospitality industry. Schmidgall (1989) focused on identifying the most important financial ratios as perceived by general managers, executives, bankers and lodging industry owners, finding that different groups of financial users perceived different degrees of importance to the various financial ratios. For instance, operating and activity ratios are the most important ratios used by general managers. Owners, by their very nature, value profitability ratios the most. Executives give liquidity ratios more importance while bankers considered solvency ratios more important. Profitability and activity ratios were the most important tools for financial executes.
In 2002, Singh, & Schmidgall further studied the rating of ratios used by US lodging financial executives. Importance and frequency of various ratios were measured by a six-point scale from 0-5 where 0 indicates “no opinion”, 1 indicates “unimportant” and 5 indicates “crucial”. Their analysis revealed that financial executives in lodging industry are very interested in activity and profitability ratios.

Schmidgall, & DeFanco (2004) focused on the club segment of hospitality management industry. They reviewed the financial history of the club industry, found the most frequently adopted and most important ratios used in club industry, set up the benchmarks for the industry. The data were collected by distributing questionnaires to 500 randomly chosen club managers. The respondents were asked to provide information for balances of accounts in the balance sheet, the statement of activities, and the statement of cash flows, and then the authors used the above information to calculate ratios. The respondents were also asked to rank 10 most important financial ratios used in their club. The most often used ratios were payroll cost percentage, cost of food sold percentage, cost of beverage sold percentage, current ratio, and inventory turnover. The five most important ratios chosen to determine the success of a private club were gross profit percentage, cost of food and beverage sold percentage, cost of food sold percentage, cash flow to debt, and mix of sales. At last, the authors suggested that ratio analysis can be an efficient financial and diagnostic tool if the users choose appropriate ratios and set realistic standards for the operations, fully comprehend the numbers behind the ratios, are able to take corrective actions after the problems were detected and lastly, review the ratios on a monthly or yearly basis.
Upneja, Kim, & Singh (2000) studied the casino industry. This study examined the differences in financial characteristics between small and large casinos by examining the financial ratios from 50 publicly traded casino firms listed on the New York Stock Exchange, the American Stock Exchange, and NASDAQ. Using data retrieved from COMPUSTAT for the fiscal year 1995, eleven financial ratios measuring liquidity, solvency, efficiency, and profitability were examined to determine if there were differences between small and large firms. Using median split, 50 casinos were classified into large firms and small firms. Sharp differences were found between small and large casino firms, for instance, small casinos had a higher liquidity ratio while larger casinos have higher percentage of long term and total debt. Large casinos have lower efficiency ratios, however, they are also more profitable.

Gu (1993) specifically examined the impact of the use of debt on profitability of the restaurant industry by first examining the capital structure and profitability of the restaurant industry. According to the ranking of their debt uses calculated by long-term debt to total capitalization ratio (LTDTC), the author divided 63 publicly traded restaurant firms into three equal sized groups: light-debt group, medium-debt group and heavy-debt group. The author further divided the 63 restaurant firms based on their services to study the capital structure and profitability of different types of restaurants. These three types are full service fine dining restaurants, economy/ family restaurants and fast food chains. Three profitability ratios were analyzed on comparison basis: profit margin (PM), return on assets (ROA), and return on equity (ROE). Through analyses, the author suggests that in restaurant industry, which is sensitive to economic downturns and subject to seasonality, light use of debt, as adopted by fine dining restaurants may be optimum. Moderate use of debt, as adopted by fast food chains, usually brings higher return with substantial risks to investors. Heavy debt use,
which is common for the economy/family restaurants’ capitalization, is disadvantageous to the profitability.
CHAPTER 3. DATA AND METHODS

Study Design

This study designs to answer three sets of questions related to the restaurant industry in U.S. during and after the recent recession. The first set of questions are: (1) how the recent recession affect the stock market of restaurant industry in U.S., (2) how different types of restaurants behave differently through and after the recent recession, and (3) if there is lag time between the recession ended and the stock market showed significant recover, what is the differences in the length of the lag time between these two types of restaurants.

To gain an in-depth perspective, the author raised a second sets of questions. It is known that different types of restaurants have different characteristics, such as different production lines, different target customers, different styles of service and so forth. Might they also financially different from each other? If so, which areas are different?

Lastly, what had changed in financial conditions and performances of each type of restaurants after the recent recession? Are there any deteriorations or improvements?

Answer these three sets of questions required three different sets of data and methods. To give the readers a clear view of how each set of data are collected and the analysis process, the author organized the following section by steps involves to solve each set of questions.

Impact of Recession on U.S. Restaurants Stock Market

Restaurant classification

In this study the author used the North American Industry Classification System (NAICS) to classify the sample companies. The North American Industry Classification System (NAICS) was adopted by Federal statistical agencies in 1997, replaced the 1987
Standard Industrial Classification System (SIC) (NAICS main page, 2011). It is a unique North American industry classification system for classifying business establishments; it was developed in purpose of promoting uniformity and comparability of data collection, analysis, and publication (NAICS main page, 2011).

To understand how different segments of restaurant firms behave differently through the recession, the author divided the sample restaurant companies into full service restaurant segment and limited service restaurant segment. Full service restaurant segment comprises companies primarily engaged in providing food services to customers who order and are served while seated (i.e. table service), and pay the tab after eating (2007 NAICS Definition, 2011). For limited service restaurant segment, customers usually order and pay before eating (2007 NAICS Definition, 2011). Most of this kind of restaurants does not have waiter or waitress; some provide limited service. The limited services included cook to the orders, bring food to seated customers and provide off-site delivery.

**Data collection**

Restaurant companies that were publicly traded in the U.S. stock market between January 2005 and December 2010, a total of 313 weeks, were included in this study. All companies with a North American Industry Classification System (NAICS) code of 722110 which represents full service restaurant and 722211 which represents limited service restaurant were searched in the Mergent Online database. The search came back with 70 companies, which composed the sample of this study. Weekly stock prices of all listed companies were obtained from the COMPUSTAT database. This study was carried out based on the stock prices of 49 full service restaurants, and 20 limited service restaurants. Each
segment was analyzed separately for comparisons purposes. Appendix lists the restaurant companies included in this study.

Due to the advantages describe in Chapter 2, this study used market-value weighted index calculation method to derive the indices for full service restaurant segment, limited service restaurant segment and overall restaurant industry based on the weekly stock prices of the restaurant firms included in the segment. The indices developed for restaurant segments reflect the market values of all the stocks of the restaurant firms in that segment relative to its base period, which is January 2nd, 2005. For comparison purposes, the base values for both restaurant stock indices were set as 1,186.19, the same as that of the S&P 500 index in the week of January 2nd, 2005. The fluctuations of the indices show the impact of the recession and how each of the restaurant segments behaved through the recession. In this study, the data set begins January 2005 and ends December 2010, with a total of 313 weeks, the most recent recession occurred during week 153 through week 235 of the time series.

**ARIMA with Intervention Analysis**

ARIMA with Intervention Analysis is considered as an efficient model for evaluating an event’s influence on a time series (Enders, Sandler, & Cauley, 1990). For instance, Campbell and Ross (1968) examined the effects of new traffic law initiated in Connecticut to reduce the highway fatalities. Box and Tiao (1975) applied intervention analysis to economic and environmental problems, to be more specific; they measured the impact of air pollution control laws. With the importance of assessing impact on legal areas, intervention analysis also been used to examine the impact of policy changes, natural disasters, strikes and advertising promotions. Montgomery and Weatherby (1980) studied the impacts of Arabic

This study used the Autoregressive Interactive Moving Average (ARIMA) with intervention analysis to examine the magnitude of the impacts of the recent recession had on the stock performance of the restaurant industry

McDowall, McCleary, Meidinger, & Hay (1980) presented ARIMA with Intervention analysis using the equation

\[ Y_t = N_t + I_t \]

Where

\( N_t \) denotes the ARIMA model, or a “noise” component;

\( I_t \) represents an “intervention” component; and

\( Y_t \) is the entire time series that consists of the noise and the intervention.

This was a two-stage study. The first stage was fitting ARIMA models that represent the pre-intervention periods and the second stage was identifying the interventions to test the effect of exogenous event, which in our case, is the recent economic recession.

**Autoregressive Interactive Moving Average (ARIMA)**

According to McDowall, McCleary, Meidinger, & Hay (1980), “an ARIMA model is a model of the stochastic process which generated the observed time series”. ARIMA is a
A popular time series model that provides numerous advantages (Ismail, Suhartono, Yahaya, & Efendi, 2009). It is used more often to analyze time series data than ordinary least squares regression since the adjacent error terms are often correlated in time series data. When the covariance of error terms do not equal to 0, the standard errors of ordinary least squares parameter estimates are biased. As a result, t statistics can be vastly overstated and lead to unfounded conclusions (McDowall, McCleary, Meidinger, & Hay, 1980). In the ARIMA model, serial dependence is statistically controlled. The second important advantage of ARIMA is it can describe various non-stationary time series. By taking a proper degree of differencing, it can reduce a homogeneous non-stationary time series to a stationary time series (Ismail, Suhartono, Yahaya, & Efendi, 2009). Thirdly, random error, plus systematic trend and seasonality, which usually involved in time series data, tend to obscure any intervention. ARIMA modeling takes account of all three types of “noise” (McDowall, McCleary, Meidinger, & Hay, 1980).

An ARIMA model has three structural parameters. ARIMA (p, d, q) stands for autoregressive integrated moving average model developed by George E. P. Box and Gwilym M. Jenkins (Box & Jenkins, 1976). In this notation, the parameter p inside of the parentheses stands for the order of autoregression (that is the number of past observations used to predict the current observation), d represents differencing, and q is for the number of moving average structure in this model. The model can be written as

\[ F_t = \varphi_1 X_{t-1} + \varphi_2 X_{t-2} + \ldots + \varphi_p X_{t-p} + \varepsilon_t - \theta_1 \varepsilon_{t-1} - \theta_2 \varepsilon_{t-2} - \ldots - \theta_q \varepsilon_{t-q} \]

Where

- \( F_t \) is the forecast value for period \( t \)
- \( \varphi_t \) is the \( t \)th autoregression parameter;
\( \epsilon_t \) is the error term at time \( t \); and
\( \theta_t \) is the \( t \)th moving average parameter.

The author analyzed the weekly stock index time series of full service and limited service restaurant segments, the overall restaurant industry and the S&P 500 to (1) identify the points that each of the two segments, overall restaurant industry and S&P 500 started to recover, if the indices showed significant growth; and (2) quantify the significant impact that the recession had on each of the stock indices and the magnitude of recovery after the recession, if any.

Box-Jenkins methodology includes a three-step iterative procedure as following: tentative identification, estimation and diagnostic checking (Bowerman, Connell, & Koehler, 2005). In the tentative identification stage, the data are transformed to stationary time series first if they are nonstationary. Stationary means that the statistical properties such as the mean and the variance of the time series data are constant through time (Bowerman et al., 2005). Regular differencing and seasonal differencing can be performed to remove trend and seasonality to transform the time series data into a stationary time series values. Then by examining the behavior of Sample Autocorrelation Function (SAC) and the Sample Partial Autocorrelation Function (SPAC), a suitable model can be identified. SAC measures the linear relationship between the observations separated by a lag of \( k \) units while SPAC measures the sample correlation of observations separated by a lag of \( k \) without the effect of intervening (Bowerman et al., 2005). Based on the output of SAC and SPAC of the pre-intervention time series, a tentative model can be moving average (MA), autoregressive (AR) or mixed model.
The estimation of model parameters including the calculation of the coefficients, ensures that all the coefficients are significant and within the bound of stationarity for the AR coefficients and invertibility for MA coefficients, and the use of t-value and p-value to judge the importance of model parameters. A more overall fit measure of a time series model is the standard error. The smaller the standard error, the better the overall fit of the model.

After parameter estimation, diagnostic checking is used to examine the residuals to check if the model is adequate. The author used Ljung-Box Q-statistic to test the adequacy of a model, the formula is expressed as:

\[ Q^* = n'(n' + 2) \sum_{l=1}^{K} (n' - l)^{-1} r_l^2(\hat{\alpha}) \]

Where

\[ n' = n - d, \quad d \text{ is the number of observations in the original time series, } d \text{ is the degree of nonseasonal differencing used to transform the original time series values into stationary time series values.} \]

\[ r_l^2(\hat{\alpha}) \text{ is the square of } r_l(\hat{\alpha}), \text{ the sample autocorrelation of the residuals at lag } l \text{-that is, the sample autocorrelation of residuals separated by a lag of } l \text{ time unit.} \]

Based on the time series data before the recession started (week 1 though week 152), an ARIMA model was identified for the limited service restaurants segment, the full service restaurant segment, over all restaurant stock performance index and S&P 500 Index. No seasonal components were added, since no seasonality was observed (Figure 1). Furthermore, since stationarity was achieved by 2\(^{nd}\) order differencing, no further data transformation was performed beyond differencing. The ARIMA models identified for the four time series data are the same, which is ARIMA (4, 2, 0) without constant.
Figure 1. Plot of stock indices
SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check for the models can be seen in table 1 through 4.

Table 1. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on limited service restaurant data

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<th>P</th>
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</thead>
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<td>0.0798</td>
<td>-11.99</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 2</td>
<td>-0.7795</td>
<td>0.1024</td>
<td>-7.61</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 3</td>
<td>-0.5838</td>
<td>0.1035</td>
<td>-5.64</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 4</td>
<td>-0.2771</td>
<td>0.0810</td>
<td>-3.42</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Differencing: 2 regular differences
Number of observations: Original series 151, after differencing 149
Residuals: SS = 213811 (backforecasts excluded)
MS = 1475 DF = 145

Modified Box-Pierce (Ljung-Box) Chi-Square statistic

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<th>DF</th>
<th>P-Value</th>
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</table>

Table 2. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on full service restaurant data

<table>
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<tr>
<th>Type</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR 1</td>
<td>-0.8318</td>
<td>0.0805</td>
<td>-10.34</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 2</td>
<td>-0.6465</td>
<td>0.0990</td>
<td>-6.53</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 3</td>
<td>-0.4576</td>
<td>0.0992</td>
<td>-4.61</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 4</td>
<td>-0.2517</td>
<td>0.0810</td>
<td>-3.11</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Differencing: 2 regular differences
Number of observations: Original series 151, after differencing 149
Residuals: SS = 156221 (backforecasts excluded)
MS = 1077 DF = 145

Modified Box-Pierce (Ljung-Box) Chi-Square statistic

<table>
<thead>
<tr>
<th>Lag</th>
<th>Chi-Square</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>14.1</td>
<td>8</td>
<td>0.078</td>
</tr>
<tr>
<td>24</td>
<td>28.0</td>
<td>20</td>
<td>0.110</td>
</tr>
<tr>
<td>36</td>
<td>41.0</td>
<td>32</td>
<td>0.133</td>
</tr>
<tr>
<td>48</td>
<td>57.5</td>
<td></td>
<td>0.083</td>
</tr>
</tbody>
</table>

Table 3. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on overall restaurant data
### Final Estimates of Parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR 1</td>
<td>-0.8545</td>
<td>0.0806</td>
<td>-10.60</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 2</td>
<td>-0.7192</td>
<td>0.0988</td>
<td>-7.28</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 3</td>
<td>-0.5187</td>
<td>0.0997</td>
<td>-5.20</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 4</td>
<td>-0.2395</td>
<td>0.0815</td>
<td>-2.94</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Differencing: 2 regular differences

Number of observations: Original series 151, after differencing 149

Residuals: SS = 149314 (backforecasts excluded)
MS = 1030 DF = 145

### Modified Box-Pierce (Ljung-Box) Chi-Square statistic

<table>
<thead>
<tr>
<th>Lag</th>
<th>Chi-Square</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>9.8</td>
<td>8</td>
<td>0.280</td>
</tr>
<tr>
<td>24</td>
<td>27.8</td>
<td>20</td>
<td>0.115</td>
</tr>
<tr>
<td>36</td>
<td>34.6</td>
<td>32</td>
<td>0.343</td>
</tr>
<tr>
<td>48</td>
<td>42.1</td>
<td>44</td>
<td>0.553</td>
</tr>
</tbody>
</table>

Table 4. SAS/ETS Time Series Forecasting System output of the parametric estimation and the diagnose check an ARIMA (4, 2, 0) without constant model on S&P 500 data

### Final Estimates of Parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR 1</td>
<td>-0.9231</td>
<td>0.0816</td>
<td>-11.31</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 2</td>
<td>-0.7429</td>
<td>0.1055</td>
<td>-7.04</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 3</td>
<td>-0.4598</td>
<td>0.1072</td>
<td>-4.29</td>
<td>0.000</td>
</tr>
<tr>
<td>AR 4</td>
<td>-0.1916</td>
<td>0.0844</td>
<td>-2.27</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Differencing: 2 regular differences

Number of observations: Original series 151, after differencing 149

Residuals: SS = 77269.6 (backforecasts excluded)
MS = 532.9 DF = 145

### Modified Box-Pierce (Ljung-Box) Chi-Square statistic

<table>
<thead>
<tr>
<th>Lag</th>
<th>Chi-Square</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>13.0</td>
<td>8</td>
<td>0.111</td>
</tr>
<tr>
<td>24</td>
<td>24.4</td>
<td>20</td>
<td>0.225</td>
</tr>
<tr>
<td>36</td>
<td>33.1</td>
<td>32</td>
<td>0.415</td>
</tr>
<tr>
<td>48</td>
<td>45.0</td>
<td>44</td>
<td>0.431</td>
</tr>
</tbody>
</table>
The Intervention component

ARIMA with intervention analysis is an extension of ARIMA (Box & Tiao, 1975). Once successfully identified an ARIMA model, an intervention component can be added to estimate the effect of the event, this process is often called intervention analysis. Assuming the effect of intervention was included in a time series, the process of time series can be written as:

\[ Y_t = f(I_t) + N_t \]

Where

- \( Y_t \) is a response variable at time \( t \);
- \( I_t \) is an intervention variable; and,
- \( N_t \) is a noise model from the ARIMA (p, d, q) model.

In a time series, an intervention is regime or structural change due to external or internal factors that changed in mean of a time series data; it breaks the time series into a pre-intervention segment and a post-intervention segment (McDowall, McCleary, Meidinger, & Hay, 1980). ARIMA with intervention analysis focuses on a test of did the intervention have an impact on the time series. It is tested by comparing the pre and post intervention segments of the time series. If the impact is significant, the intervention analysis can further to be used to estimate the magnitude and form of the impact. Interventions are summarized by McCleary and Hay as “binary variables which indicate the absence of the state prior to the event and the presence of the state during and after the event” (1980). Thus, by introducing dummy variables into the ARIMA model, the statistical significance of an event can be assessed by comparing the level of post intervention segment to that of pre intervention segment.
There are three types of interventions commonly used to control the indicator variable to describe the intervention effect in the ARIMA model: point, step, and ramp (SAS/ETS® 9.22 User’s Guide, 2010). A point intervention usually is used to model an event that occurs only one time, such as September 11 terrorist attack, or a strike shut down the production line for a short time of period. In the model, dummy variables can represent the event as a change agent; the value of the intervention’s indicator variable is zero prior to the intervention, one at the moment of intervention, and zero again thereafter. A step effect indicates that the event is continuing and changes the level of the time series. For instance, the increase on tax rate will cause a step effect. The value of the intervention’s indicator variable is zero before the date specified and then steps to a constant level one thereafter. The last type of intervention is ramp, also suggests a continuing effect but with the trend that increase linearly after the intervention time, the value of the intervention’s indicator variable is zero before the date specified and increases linearly with time thereafter (SAS/ETS® 9.22 User’s Guide, 2010). Given the nature of a recession, this study used the ramp effect to conduct the ARIMA with Intervention analyses.

Based on the weekly stock indices time series prior to the recession (week 1 to week 151), Autoregressive Integrated Moving Average (ARIMA) models were identified for each of four stock indices. Two ARIMA with intervention analyses were performed for each of the four stock indices to identify the impact week (the week that the stock indices started showing a significant decrease) and recovery week (the week that the stock indices started showing significant recovery). In the other words, this study used ARIMA with intervention analyses to identify the lag time each of the stock indices recovered after the recession ended.
The analysis for each of the four stock indices is a two-step process. A step-by-step illustration is provided here using the full service restaurant as an example. The first step is to perform ARIMA with intervention analysis to identify the impact week by using the Intervention function of the Time Series Forecasting System provided by SAS 9.2. ARIMA with intervention analysis was performed on the weekly stock indices time series from week 1 to week 235 (Jan 2005 to Jun 2009) to identify the week that the stock index of the full service restaurant segment was statistically significantly affected by the recession. This is a repeating process that tested weeks from the 153rd week (the week after recession started) through the week that had the lowest value (for full restaurant, 218th week). A total of 66 tests were performed. ARIMA (4, 2, 0) without constant was used. The result suggests that the stock index of full service segment was statistically significantly impacted by the recession right after the recession started which was the week of Dec 9, 2007 (Table 5).

Table 5. Summary of statistics of ARIMA with intervention analyses (impact)

<table>
<thead>
<tr>
<th></th>
<th>Model Parameters</th>
<th>Estimate</th>
<th>t-statistic</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Restaurant industry</strong></td>
<td>AR(1)</td>
<td>-0.75963</td>
<td>-11.4309</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(2)</td>
<td>-0.54605</td>
<td>-6.9730</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(3)</td>
<td>-0.46647</td>
<td>-5.9404</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(4)</td>
<td>-0.25657</td>
<td>-3.8484</td>
<td>0.0002</td>
</tr>
<tr>
<td>week of Dec 9, 2007</td>
<td><strong>-59.10428</strong></td>
<td></td>
<td>-2.3203</td>
<td>0.0213</td>
</tr>
<tr>
<td><strong>Full Service Restaurants</strong></td>
<td>AR(1)</td>
<td>-0.78174</td>
<td>-11.2492</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(2)</td>
<td>-0.60145</td>
<td>-7.1521</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(3)</td>
<td>-0.47249</td>
<td>-5.6248</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(4)</td>
<td>-0.23549</td>
<td>-3.3462</td>
<td>0.0010</td>
</tr>
<tr>
<td>week of Dec 9, 2007</td>
<td><strong>-57.89853</strong></td>
<td></td>
<td>-2.2619</td>
<td>0.0248</td>
</tr>
<tr>
<td><strong>S&amp;P 500</strong></td>
<td>AR(1)</td>
<td>-0.90615</td>
<td>-13.8599</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(2)</td>
<td>-0.64130</td>
<td>-7.8289</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(3)</td>
<td>-0.55621</td>
<td>-6.7582</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>AR(4)</td>
<td>-0.31220</td>
<td>-4.7076</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>week of Sept 7,2008</td>
<td><strong>-55.89321</strong></td>
<td></td>
<td>-2.7161</td>
<td>0.0072</td>
</tr>
</tbody>
</table>
For step two, the author identified the recovery week based on the finding of the first step. A new weekly stock index time series started from a week after impact week, Dec. 7, 2007 (the 153rd week of the original time series) and ended at the week of Dec. 31, 2010 was developed for the analysis. The same SAS functions and same ARIMA model were used for repeating tests with weekly increments starting from July 2, 2009, which is the week after the recession ended. A total of 79 interventions were performed and the week of recovery was identified as the week of Jan. 3, 2010 (Table 6), the 262\textsuperscript{nd} week of the original time series data. In the other words, although the recession started December 2007 and ended June 2009 (a 83-week period), the stock index of the full service restaurant segment in United States was affected by the recession from November 2007 through January 2010, a total of 111 weeks, which is longer than the recent recession.

Table 6. Summary of statistics of ARIMA with intervention analyses (recovery)

<table>
<thead>
<tr>
<th>Model Parameters</th>
<th>Estimate</th>
<th>t-statistic</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Service Restaurants AR(1)</td>
<td>-0.64142</td>
<td>-7.7949</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>AR(2)</td>
<td>-0.50531</td>
<td>-5.4614</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>AR(3)</td>
<td>-0.35685</td>
<td>-3.8705</td>
<td>0.0002</td>
</tr>
<tr>
<td>AR(4)</td>
<td>-0.20233</td>
<td>-2.5271</td>
<td>0.0125</td>
</tr>
<tr>
<td>week of Jan 3, 2010</td>
<td>\textbf{68.44682}</td>
<td>1.9230</td>
<td>0.0563</td>
</tr>
</tbody>
</table>

Identical analyses were performed for limited-service restaurant segment, overall restaurant industry, and S&P 500 stock index to identify their impact and recovery weeks. For the limited service restaurant segment, no significant impact was identified. This study further attempted to identify whether there is a significant increase after the recession ended; therefore, the authors used the dataset starting from the week after the recession ended, in which the first intervention was the week of 235, July 2, 2009. Still, no significant increase
was identified (Table 7). These findings suggest that different restaurant segments behaved differently during the recession in terms of the starting and ending time of the impact, magnitudes of the impact, and the length of the impact.

<table>
<thead>
<tr>
<th></th>
<th>Impact</th>
<th>Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Restaurant industry</td>
<td>week of Dec 9, 2007</td>
<td>Not recovered until 2010</td>
</tr>
<tr>
<td>Limited service Restaurants</td>
<td>No significant impact was identified</td>
<td>No significant recovery was identified</td>
</tr>
<tr>
<td>Full Service Restaurants</td>
<td>week of Dec 9, 2007</td>
<td>week of Jan 3, 2010</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>week of Sept 7, 2008</td>
<td>Not recovered until 2010</td>
</tr>
</tbody>
</table>

**Financial Differences between Two Types of Restaurants**

**Financial ratios data**

All the financial data needed for the calculations of ratios were retrieved from the COMPUSTAT database, and annual data from financial statements of 2005 and 2006, which represent the pre-recession period, were used in this part of study. Thirteen ratios across five categories that have been widely adopted in previous studies for restaurant firms were selected for this study. All the ratios and their formulas are present in Table 8. As the data retrieved from COMPUSTAT are based on the 10Q and 10K reported to the Security Exchange Committee, all the data were audited. 49 full service restaurants and 20 limited services restaurants comprised of the sample of this study (see Appendix). The data, in their nature, are aggregated chain data rather than data of individual restaurants.
<table>
<thead>
<tr>
<th>Category</th>
<th>Ratio</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity</td>
<td>Current ratio (working capital ratio)</td>
<td>Current ratio = ( \frac{\text{Current assets}}{\text{Current liabilities}} )</td>
</tr>
</tbody>
</table>
|               | Quick ratio (acid test ratio)                                        | Quick ratio = \( \frac{\text{cash} + \text{accounts receivable} + \text{marketable securities}}{\text{current liabilities}} \)  \\
|               |                                                                     | Or \( \frac{\text{Current assets} - \text{inventories} - \text{prepaid expenses}}{\text{current liabilities}} \)  |
| Leverage      | Debt ratio                                                           | Debt ratio = \( \frac{\text{Total debt}}{\text{Total assets}} \) |
|               | Debt-to-equity ratio                                                | Debt-to-equity = \( \frac{\text{Total debt}}{\text{Total equity}} \) |
|               | Times interest earned ratio                                          | Times interest earned = \( \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest charges}} \) |
| Profitability | Gross profit margin ratio                                           | Gross profit margin = \( \frac{\text{Sales - Cost of sales}}{\text{sales (revenue)}} \) |
|               | Net profit margin ratio                                              | Net profit margin = \( \frac{\text{Earnings after taxes (EAT)}}{\text{sales}} \) |
|               | Return on investment (total asset ratio)                            | Return on investment = \( \frac{\text{Earnings after taxes (EAT)}}{\text{Total assets}} \) |
|               | Return on stockholder’s equity ratio                                 | Return on stockholder’s equity = \( \frac{\text{Earnings after taxes (EAT)}}{\text{Stockholders’ equity}} \) |
| Asset         | Inventory turnover ratio                                            | Inventory turnover = \( \frac{\text{Cost of sales}}{\text{Average inventory}} \) |
| management    | Total asset turnover                                                | Total asset turnover = \( \frac{\text{Sales}}{\text{Total assets}} \) |
| Market-based  | Price-to-earnings (P/E) ratio                                       | P/E = \( \frac{\text{Market price per share}}{\text{Current earnings per share}} \) |
|               | Market (price)-to-book (value) (P/BV) ratio                         | P/BV = \( \frac{\text{Market price per share}}{\text{Book value per share}} \) |

**Independent samples t-test**

Independent samples t-tests were conducted to compare the means of financial ratios before the recent recession of full service and limited service restaurants. The independent samples t-test is a statistical method to compare the mean scores of two different groups of subjects; it tests whether there is a statistically significant difference in the mean scores for
the two groups. In statistical terms, it tests the probability that the two sets of scores came from the same population (Mendenhall, & Sincich, 2003). The three assumptions underlying the use of independent samples t-tests are: independence of observations, the normal distribution of dependent variable, and the homogeneity of variance of dependent variable (Sprinthall, 1997). After careful examination, the author confirmed that each observation of measurement was not influenced by any other observation of measurement; therefore the assumption of independence of observations was not violated. Regarding the second assumption, the normal distribution of dependent variables, there is a cutoff point as 30, with large enough sample sizes; the violations of this assumption should not cause any major problems. This study has a sample size of 70; therefore the author concludes that the independent samples t test is reasonably robust. To test the homogeneity of variance, the author performed the Levene test on SPSS, with a significant level greater than 0.05; this suggests the two groups have equal variance, otherwise the variances for the two groups are not equal. SPSS provides two sets of results for independent samples t-tests, for the situation where the assumption is not violated and for it is violated, and the author adopted the appropriate results for the data (see Table 9).
### Table 9. Financial ratios comparisons of restaurants

<table>
<thead>
<tr>
<th>Category</th>
<th>Ratio</th>
<th>Average for limited service</th>
<th>Average for full service restaurants</th>
<th>t-value</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquidity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current ratio</td>
<td>(df=63)</td>
<td>1.2584</td>
<td>1.0462</td>
<td>.987</td>
<td>.327</td>
</tr>
<tr>
<td>Quick ratio</td>
<td>(df=62)</td>
<td>.9132</td>
<td>.7284</td>
<td>.831</td>
<td>.409</td>
</tr>
<tr>
<td><strong>Leverage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt ratio</td>
<td>(df=21.771)</td>
<td>.6976</td>
<td>.4571</td>
<td>1.739</td>
<td>.096</td>
</tr>
<tr>
<td>Debt-to-equity</td>
<td>(df=15.171)</td>
<td>2.7825</td>
<td>.9444</td>
<td>1.078</td>
<td>.298</td>
</tr>
<tr>
<td>Times interest</td>
<td>earned (df=56)</td>
<td>147.6913</td>
<td>63.2174</td>
<td>.557</td>
<td>.579</td>
</tr>
<tr>
<td><strong>Profitability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross profit</td>
<td>margin (df=63)</td>
<td>.2722</td>
<td>.2130</td>
<td>2.031</td>
<td>.046</td>
</tr>
<tr>
<td>Net profit margin</td>
<td>(df=63)</td>
<td>.0711</td>
<td>-.0262</td>
<td>1.074</td>
<td>.287</td>
</tr>
<tr>
<td>Return on</td>
<td>investment (df=50)</td>
<td>.1006</td>
<td>.1119</td>
<td>-.141</td>
<td>.888</td>
</tr>
<tr>
<td>Return on</td>
<td>stockholder’s equity (df=53)</td>
<td>.1401</td>
<td>.13442</td>
<td>1.398</td>
<td>.168</td>
</tr>
<tr>
<td>**Asset</td>
<td>management**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory turnover</td>
<td>(df=58)</td>
<td>72.6091</td>
<td>79.5977</td>
<td>-.407</td>
<td>.686</td>
</tr>
<tr>
<td>Total asset</td>
<td>turnover (df=59)</td>
<td>1.7009</td>
<td>1.5623</td>
<td>.789</td>
<td>.434</td>
</tr>
<tr>
<td><strong>Market-based</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P/E (df=63)</td>
<td></td>
<td>31.1338</td>
<td>.2202</td>
<td>1.705</td>
<td>.093</td>
</tr>
<tr>
<td>P/BV(df=19.261)</td>
<td></td>
<td>1.3981</td>
<td>2.5298</td>
<td>-.878</td>
<td>.391</td>
</tr>
</tbody>
</table>

### Impact of the Recession on Financial Conditions and Performances

#### Data

All the financial data needed for the calculation of ratios were retrieved from the COMPUSTAT database. Annual data from financial statements of 2005 and 2006, which
represent the pre-recession period, and those of 2010 and 2011, which represent the post-recession period, were used in this study.

**Paired-samples t-test**

In order to identify the changes in financial conditions and performances of full service and limited service restaurants before and after the recent recession, the author used the paired-samples t-test to compare the mean of aggregate ratios of two types of restaurants in 2005 and 2006 (the years prior to the recent recession) to the ratios of restaurants in 2010 and 2011 (the years after the recent recession). The paired-samples t-test, also referred to as repeated measures, is used when there is only one group of subjects; the data were collected from them on two different occasions or under two different conditions (Mendenhall, & Sincich, 2003). This technique is appropriate for this research since the author intend to study if the two types of restaurants had statistically significant changes before and after the recent recession. In this case, the two different conditions when collected the data were before the recent recession and after the recent recession (see Table 10 and 11).
Table 10. Summary of ratio statistics for full service restaurants

<table>
<thead>
<tr>
<th>Category</th>
<th>Ratio</th>
<th>Average before recession</th>
<th>Average after recession</th>
<th>t-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquidity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current ratio (n=31)</td>
<td>1.1018</td>
<td>.9528</td>
<td>.944</td>
<td>.353</td>
</tr>
<tr>
<td></td>
<td>Quick ratio (n=31)</td>
<td>.7938</td>
<td>.6613</td>
<td>.811</td>
<td>.424</td>
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<tr>
<td><strong>Leverage</strong></td>
<td>Debt ratio (n=31)</td>
<td>.4167</td>
<td>.5621</td>
<td>-3.757</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Debt-to-equity (n=30)</td>
<td>.8276</td>
<td>4.1277</td>
<td>-1.712</td>
<td>.098</td>
</tr>
<tr>
<td></td>
<td>Times interest earned (n=25)</td>
<td>81.4394</td>
<td>20.5291</td>
<td>1.324</td>
<td>.198</td>
</tr>
<tr>
<td><strong>Profitability</strong></td>
<td>Gross profit margin (n=31)</td>
<td>.2316</td>
<td>.2170</td>
<td>1.685</td>
<td>.102</td>
</tr>
<tr>
<td></td>
<td>Net profit margin (n=31)</td>
<td>-.0433</td>
<td>.0242</td>
<td>-.834</td>
<td>.411</td>
</tr>
<tr>
<td></td>
<td>Return on investment (n=26)</td>
<td>.0758</td>
<td>.0554</td>
<td>1.515</td>
<td>.142</td>
</tr>
<tr>
<td></td>
<td>Return on stockholder’s equity (n=30)</td>
<td>.0915</td>
<td>-.0172</td>
<td>1.613</td>
<td>.118</td>
</tr>
<tr>
<td><strong>Asset management</strong></td>
<td>Inventory turnover (n=30)</td>
<td>81.0008</td>
<td>72.6084</td>
<td>.777</td>
<td>.443</td>
</tr>
<tr>
<td></td>
<td>Total asset turnover (n=31)</td>
<td>1.4845</td>
<td>1.6203</td>
<td>-1.524</td>
<td>.138</td>
</tr>
<tr>
<td><strong>Market-based</strong></td>
<td>P/E (n=31)</td>
<td>19.2153</td>
<td>-2.8367</td>
<td>.686</td>
<td>.498</td>
</tr>
<tr>
<td></td>
<td>P/BV (n=31)</td>
<td>2.9048</td>
<td>3.7762</td>
<td>-.967</td>
<td>.341</td>
</tr>
<tr>
<td>Category</td>
<td>Ratio</td>
<td>Average before recession</td>
<td>Average after recession</td>
<td>t-value</td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
<td>---------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Current ratio (n=15)</td>
<td>1.2964</td>
<td>1.2169</td>
<td>.389</td>
<td>.703</td>
</tr>
<tr>
<td></td>
<td>Quick ratio (n=15)</td>
<td>.9862</td>
<td>.8312</td>
<td>.847</td>
<td>.411</td>
</tr>
<tr>
<td>Leverage</td>
<td>Debt ratio (n=14)</td>
<td>.8064</td>
<td>.8573</td>
<td>-.336</td>
<td>.742</td>
</tr>
<tr>
<td></td>
<td>Debt-to-equity (n=11)</td>
<td>3.7193</td>
<td>4.6282</td>
<td>-.357</td>
<td>.728</td>
</tr>
<tr>
<td></td>
<td>Times interest earned (n=15)</td>
<td>185.6669</td>
<td>-124.3671</td>
<td>1.266</td>
<td>.226</td>
</tr>
<tr>
<td>Profitability</td>
<td>Gross profit margin (n=15)</td>
<td>.2865</td>
<td>.2831</td>
<td>.259</td>
<td>.800</td>
</tr>
<tr>
<td></td>
<td>Net profit margin (n=15)</td>
<td>.0761</td>
<td>.0447</td>
<td>.945</td>
<td>.361</td>
</tr>
<tr>
<td></td>
<td>Return on investment (n=12)</td>
<td>.0853</td>
<td>.0548</td>
<td>.881</td>
<td>.397</td>
</tr>
<tr>
<td></td>
<td>Return on stockholder’s equity (n=11)</td>
<td>.1470</td>
<td>.2060</td>
<td>-.363</td>
<td>.724</td>
</tr>
<tr>
<td>Asset</td>
<td>Inventory turnover (n=15)</td>
<td>74.3498</td>
<td>73.4794</td>
<td>.236</td>
<td>.817</td>
</tr>
<tr>
<td>management</td>
<td>Total asset turnover (n=15)</td>
<td>1.7361</td>
<td>1.8559</td>
<td>-.692</td>
<td>.500</td>
</tr>
<tr>
<td>Market-based</td>
<td>P/E (n=15)</td>
<td>33.6460</td>
<td>19.6422</td>
<td>.643</td>
<td>.531</td>
</tr>
<tr>
<td></td>
<td>P/BV (n=15)</td>
<td>1.1329</td>
<td>7.0399</td>
<td>-1.684</td>
<td>.114</td>
</tr>
</tbody>
</table>

The basic assumption for the paired-samples t-test is that the difference between the two scores obtained for each subject should be normally distributed (Mendenhall, & Sincich, 2003). With a sample size larger than or equal to 30, violation of this assumption is unlikely to cause any serious problems. Since the sample size for limited service restaurants in this study is small, it is difficult to guarantee that this assumption is not violated. To overcome the limitation of the paired-samples t-test, the author conducted a non-parametric Wilcoxon
signed rank test in parallel with the paired-samples t-test, since it did not require the assumptions mentioned above.

**The Wilcoxon signed rank test**

The Wilcoxon signed rank test, sometimes also referred to as the Wilcoxon matched pairs signed rank test, is designed for use with repeated measures (when the subjects are measured under two different occasions or conditions). It is the non-parametric alternative to the paired-samples t-test (Miller, & Miller, 2004). Instead of comparing means, the Wilcoxon signed rank test converts scores to ranks and compares them at time 1 and at time 2. It tests if there is a significant change in score from time 1 to time 2 (see Table 12).

Table 12. Summary of ratio statistics for limited service restaurants: Wilcoxon signed rank test

<table>
<thead>
<tr>
<th>Category</th>
<th>Ratio</th>
<th>z-value</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquidity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current ratio (n=15)</td>
<td>-.220</td>
<td>.826</td>
<td></td>
</tr>
<tr>
<td>Quick ratio (n=15)</td>
<td>-.157</td>
<td>.875</td>
<td></td>
</tr>
<tr>
<td><strong>Leverage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt ratio (n=14)</td>
<td>-.594</td>
<td>.552</td>
<td></td>
</tr>
<tr>
<td>Debt-to-equity (n=11)</td>
<td>-1.274</td>
<td>.203</td>
<td></td>
</tr>
<tr>
<td>Times interest earned (n=15)</td>
<td>-.785</td>
<td>.433</td>
<td></td>
</tr>
<tr>
<td><strong>Profitability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross profit margin (n=15)</td>
<td>-.157</td>
<td>.875</td>
<td></td>
</tr>
<tr>
<td>Net profit margin (n=15)</td>
<td>-.408</td>
<td>.683</td>
<td></td>
</tr>
<tr>
<td>Return on investment (n=12)</td>
<td>-.889</td>
<td>.374</td>
<td></td>
</tr>
<tr>
<td>Return on stockholder’s equity (n=11)</td>
<td>-.764</td>
<td>.445</td>
<td></td>
</tr>
<tr>
<td><strong>Asset management</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory turnover (n=15)</td>
<td>-.596</td>
<td>.551</td>
<td></td>
</tr>
<tr>
<td>Total asset turnover (n=15)</td>
<td>-.282</td>
<td>.778</td>
<td></td>
</tr>
<tr>
<td><strong>Market-based</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P/E (n=15)</td>
<td>-.785</td>
<td>.433</td>
<td></td>
</tr>
<tr>
<td>P/BV (n=15)</td>
<td>-2.040</td>
<td>.041</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 4. RESULTS AND DISCUSSION

Findings of U.S. Restaurant Stock Market

The impact and recovery of the recession on U.S. restaurant stock market

The results of ARIMA with Intervention analysis suggested that different restaurant segments performed very differently through and after the recession. For the full service restaurant segment, the mean of the weekly stock index dropped by about 57.9 after the week of Dec. 9th, 2007. However, the weekly stock index of full service restaurants was fully recovered by the week of Jan 3rd, 2010, 28 weeks after the recession ended (the 262nd week of the weekly time series), the mean value of its weekly stock index recovered 68.45, actually exceeded what it was before the recession.

On the other hand, the weekly stock index of the limited service restaurants segment was not significantly affected by the recent recession. There is no significant recovery was identified.

The author also examined the impact of the recession on the overall restaurant industry, the mean value of the weekly stock index dropped about 59.10 after the week of Dec. 9th, 2007. The impact was long lasting since there is no significant recovery was identified till the end of 2010 (the end of the time series).

The S&P 500 weekly stock index was not significantly affected by the recession until the 193rd week. After the week of Sep. 7th, 2008, the mean of the weekly stock index dropped about 55.89, and it was not fully recovered till the end of 2010 (the end of the time series). On September 15, 2008, Lehman Brothers declared bankruptcy (Sorkin, 2008). During the week, panicky banks withdrew nearly 144 billion from money-market funds, which usually
to be considered as the safest investment next to cash and bank deposit (Mollenkamp, Craig, Ng, & Lucchetti, 2008). The author believed that the sudden decrease of S&P 500 stock index was a response to this event.

**Discussion of the recession’s impact on limited service restaurants**

This study aims to explain how the different restaurant segments behaved differently through the recent recession by examining weekly stock indices of limited service restaurants segment and full service restaurants segment. From Tables 5-7, the author concluded that when recession hit, restaurant industry was its first victim, restaurant industry’s stock performance was immediately affected. Limited service restaurants weathered better than full service restaurants during the recession. There was no significant impact of the recession was identified on limited service restaurants, on the other hand, the full service restaurants were negatively affected by the recent recession.

The most important reason that limited service restaurants segment fared better was their low menu prices compared to the full service restaurant segment. Their products are considered as necessities while the products of full service restaurants are considered as luxuries (Youn & Gu, 2010). Their comparably economic prices made fast food restaurants more resistant to the recession, and recession-caused problems: higher unemployment and lower disposable income (Youn & Gu, 2010).

Even people are reluctant to go out for dinner, Ron Paul, the founder and president of Technomic, said customers are not get back to do pure cooking from an ingredient (Enis, 2009). During the recession, when the consumers are needed to cut their spending on eat-out, cheap meals like Big Macs and Whoppers become more tempting. The logic of “trading
down” theory is that limited service restaurant firms take over the customers who could not afford to eat at full service restaurants any longer, this theory was proved true for the recent recession (The Economist, 2010). For instance, the $5 foot-long sub of Subway, is quite a value for consumers. In fact, Subway enjoyed more than $8 billion in sales in 2007 (Enis, 2009). Consumers were migrated to lower price menus such as Buffalo Wild Wings (BWLD), where they can enjoy televised sports while enjoy beer and chicken wings. This chain had grown rapidly and expanded nationally, opened 60 new restaurants, which equals to 15 percent more outlets in 2009. With the rapid expansion, the profits were up by 34% in 2009 (Newman, 2009). Similarly, McDonald’s (MCD), with its relatively low menu price, even benefited from the recession. While other restaurants were slow in business, sales of McDonald’s rose 5.4% in January 2009 (Krantz, 2009).

The limited service restaurants as a whole weathered the recent recession better than their pricier competitors—full service restaurants. In 2009, the sales of full service restaurants fell by more than 6 percent, while the total sales of limited service restaurants remained the same (The Economist, 2010). As mentioned above, some of the limited service restaurants are reported enjoyed a increase in sales and profits during the recession due to lower price or higher quality such as McDonald’s, Panera Bread, Buffalo Wild Wings. Some other limited service restaurants suffered from the recession, therefore, in general, the limited service restaurants segment remained the same in the total sales. This study reviewed both cases in order to make suggestions that can improve the performances of limited service restaurants during the recession or a similar market downturn.

Some of limited service restaurants’ sales have fell during the recession such as Burger King, Jack in the Box and Carl’s Jr. One reason that these smaller chains were hit
particular hard during the recession is that the highly competitive environment of limited service restaurants. For instance, McDonald’s, as a global powerhouse, spent 7% more on advertisement in 2008 while others cut back (O’Brien, 2012).

Further more, improper marketing strategies applied to cope with the recession also resulted decreases in profits. During the recession, some limited service restaurants set a low menu price, hoping they could attract customers to come to eat and persuade them to order more expensive items. For instance, Burger King sold its double cheeseburger for $1 when the cost is $1.1 in 2008, which resulted a lawsuit sued by franchisees. The promotion strategy was unsuccessful since its “value menu” accounted for 20% of its sales during the recession, up from 12% before the recession started (The Econimist, 2010). The promotion was designed to attract customers to spend more on more profitable items, when people just order from the “value menu”; the traffic increased instead of profits. On the contrary, McDonald’s menu changes led its increased sales and profits during the recession. McDonald’s was tried to get more customers and sales by intruding its new drinks. They started selling better coffee to compete with Starbucks. Its “McCafe” line accounted for about 6% in the U.S. in 2009 (The Econimist, 2010). They also started offer frappe coffees and smoothies during the recession. To keep prices down for customers without sacrificing their own profit, McDonald’s replaced the dollar Double Cheeseburger with a new sandwich McDouble in 2008. The McDouble is identical to the Double Cheeseburger except it has only one slice of cheese, and the Double Cheeseburger was removed from the Dollar menu, but it is still available with a price raise of 19 cents (Bury, 2008). The changes of Double Cheeseburger/ McDouble boosted cash flow by 15,000 a year per restaurant (Bury, 2008).
Limited service restaurants were proved to be a recession-proof business since the severity of the recession did not cause a significant effect on them.

**Discussion of the recession’s impact on full service restaurants**

Full service restaurant segment, however, was negatively affected by the recession. As the unemployment rate soared during the recession, people lost jobs have less disposable income and therefore were more sensitive to high menu price (Campbell, 2011). As customers look to trim down their expenses, restaurants with highest tabs are the first to see business drop off, says Jeff Farmer, an analyst from Jefferies (Krantz, 2009). For example, customers might forgo brunches at Cheesecake Factory when they worried about their jobs.

The BLS Consumer Expenditure Survey (CE) revealed that during the 2007-2009 recession, middle-income households cut total food spending the most, their real food expenditures decreased about 12.5% from 2007 to 2009, lowest-income household cut their spending about 1.8%, and highest-income households reduced food spending about 5.7% (Kumcu & Kaufman, 2011). According to the IBISWorld Industry Report 72211, full service restaurants tend to draw their customers from higher income households, such as middle and highest income households (Zwolak, 2010). The full service restaurants depend on the discretionary expenditure of households, with their major target customers cut spending on foods, it is not surprising that the full service restaurants adversely affected by the recent recession (Zwolak, 2010). While guest traffic fell, customers who still frequent restaurants were on a tighter budget, they ordered fewer courses and looked for value offerings, such as discounted prices or three-course meal package with a two-course price (Zwolak, 2010).
Surviving from the recession was the main objective of full service restaurants during the recession.

Besides higher menu prices, considering its high input and labor costs nature, full service suffered the most during the recession. Full service restaurants are more labor intensive than limited service restaurant segment (Walker, 2002). Also, the costs to sales percentage is about 30% to 35% for the full service restaurant while it for the fast food restaurants is 16% to 18% (Walker, 2002). A survey of operations in full service restaurant industry done by the Nation Restaurant Association reported higher costs of purchases of food and beverages, salaries and wages (Zwolak, 2010).

However, when the economy was recovering, people are less sensitive to higher menu prices, and full service restaurants fully recovered in a short time after the recession’s end.

**Findings for Ratios Comparisons of Restaurants**

**Liquidity**

Liquidity ratios disclose a company’s ability to repay its short-term liabilities and how quickly it can convert its assets into cash at their fair market price (Scott, Martin, Petty, & Keown, 1999). Studies show that good liquidity management can improve operating results and enhance company performance; on the contrary, poor liquidity management can hurt company performance and lead to low profits (Moyer et al., 2001). In terms of the restaurant industry, inadequate cash may lead to difficulties in repaying approaching obligations; on the other hand, too much cash at hand would hurt the profitability (Schmidgall, 2006). The goal of liquidity management is that to find the optimal point
between liquid and illiquid assets to minimize operating costs without hurting the company’s performance.

Table 9 reports the means of financial ratios for each restaurant type prior to the recent recession and the statistical significance of the independent samples t-test. As shown in Table 9, the group means of both current ratio and quick ratio of limited service restaurants are higher, indicating that limited service restaurants have better short-term liquidity position than full service restaurants. The statistical significances of independent samples t-tests on the differences in these two liquidity ratios are higher than the 0.10 level, indicating that there is no significant difference between these two groups when it comes to liquidity.

The thumb of rule of current ratio for the restaurant industry is less than 1 to 1, since the only inventories for are food, beverage and supplies. As shown in Table 9, the average current ratios for limited service and full service restaurants are 1.2584 and 1.0462, respectively. Even though the t-test shows that there is no significant difference between these two types of restaurants, these means indicate that even limited service restaurants are in a “better” liquidity position. In fact, full service restaurants outperformed limited service restaurant since they do not have problems in repaying their current obligations or sacrifice profitability.

Leverage

Financial leverage ratios measure a company’s capital structure, specifically, debt versus equity. These ratios reflect a company’s ability to meet with its long-term liabilities. They are also indicators of potential risks. The optimal capital structure theory proposed by
Moyer, McGuigan, and Kretlow alleged there is an inverted U-shaped relationship between debt usage and firm value as reflected in capital market (2001). When the cost of debt offsets the benefits of debt, the optimal debt level is reached.

All the means for the three ratios under this category: debt ratio, debt-to-equity ratio, and times interest earned ratio of limited service restaurants were substantially greater than those of full service restaurants. The debt-to-equity ratio for limited service restaurants is almost three times that of full service restaurants, indicating that limited service restaurants are using three times more borrowed funds to finance its activities as compared with full service restaurants. The times interest earned ratio for limited service restaurants is twice of it for full service restaurants, this ratio is a further evidence that the limited service restaurants make extensive use of creditors’ funds to finance their operations, however, the variability of limited service restaurants is not threatened since their EBIT covered annual interest payments in the average of 147.6913 times. Even the means seemed substantially different with each other, after independent samples t-tests, only debt ratio is significant different on the 0.10 level. The statistics provided strong evidence that the financial structure of full service restaurants and limited service restaurants are different from each other. Limited service restaurants seemed to use considerably more debt financing than full service restaurants. This outcome might be partly explained by the expanding operations of limited service restaurants. In response to the higher customers’ demand for good value and convenient dining choices, many limited restaurant corporations have been expanding operations, these expanding operations refer to not only the aggressive pursuit of new market areas, but also the new service concepts such as Burger King’s Expressway concepts. Such expansion could be a factor in the higher level of debt financing found through this analysis.
**Profitability**

Profitability ratios reflect all areas of management’s responsibilities, and sometimes they can be used to assess the management’s operational ability. Three of four ratios, namely gross profit margin, net profit margin, and return on stockholder’s equity for limited service restaurants are higher than those of full service restaurants. Full service restaurants only outperformed limited service restaurants on the return on investment ratio. On the basis of these ratios, limited service restaurants outperformed full service restaurants; however, full service restaurants are not far behind from limited service restaurants. The test on gross profit margin ratios demonstrates there is a significant difference between limited service restaurants and full service restaurants at the 0.05 level. The gross profit margin tells the profit a company makes on its cost of sales, in the other words; it indicates how efficiently management uses labor and supplies in the production process. However, the test on net profit margin ratios shows that there is no significant different between these two types of restaurants. The group mean of net profit margin for limited service restaurants is 0.2722 while it for full service restaurants is -0.0262, therefore there is still weak evidence that limited service restaurants generate more profits than full service restaurants.

**Asset management**

Asset management ratios measures how well or poorly a company operates and how efficient it is using its assets. Both the means of inventory turnover ratio and total asset turnover ratio for limited service restaurants were slightly higher than those for full service restaurants. None of the tests on the asset management ratios demonstrate a statistical value
even close to the 0.10 level of significance. Therefore, in terms of asset management, the two different types of restaurants were not significantly different from each other.

**Market-based**

Last, a company’s profitability, risks, effectiveness of management, and many other factors are reflected in its stock and security prices. Hence, market-based ratios indicate the market’s evaluation of the company’s securities’ value. Price/Earning ratio gives the insight of how much the investors are willing to pay for each dollar of the company’s earnings per share. The price-to-book value ratio measures the market’s valuation relative to balance sheet equity. Higher ratios indicate that investors are more confident about the market value of a company’s assets, its intangible assets and the management’s ability. The mean of P/E ratio for limited service restaurants was 31.1338 while the mean for full service restaurants was 0.2202, in the other words; in average, limited service restaurants’ P/E ratio was 141.39 times of it for full service restaurants. The statistical value of the test on P/E ratio, as reported in Table 9, was 0.093, in the other words; there were significant differences between these two types of restaurants in terms of the P/E ratio. The lower P/E ratio of full service restaurants indicated that full service restaurants less impressed the investors. The investors are generally considered limited service restaurants have good prospects for strong growth in future earnings. On the other hand, the mean of P/BV ratio for the full service restaurants was almost twice of it for limited service. The independent samples t-test showed there is no significant difference between these two types of restaurants in terms of P/BV ratios.
Discussion of financial differences between two types of restaurants

To study if different types of restaurants also differ financially, the author examined 5 groups of 13 ratios of full service and limited services restaurants before the recession. While the means of ratios seemed to differ substantially between these two types of restaurant companies, the statistics showed that some of the leverage, profitability, and market-based ratios were significantly different with each other. To be more specific, debt ratio, gross profit margin ratio, and P/E ratio were statistically significantly different between full service and limited service restaurants.

The limited service restaurants were heavily financed by debt. The possible explanations may include: (1) their operational expansion plans to satisfy more customers’ needs (Gu & McCool, 1993), (2) easy access to debt since most of limited service restaurants are large companies at corporation level (Gu, 1993), and (3) relatively stable revenues (Mao & Gu, 2008).

According to Tuttle (2012), for limited service restaurants, dine-in customers tend to spend more compared to drive-thru visits. To increase the likelihood that customers will dine in, linger longer, and spend more on each visit, some of the limited service restaurants employed a pricey strategy- remodel. Tuttle liken the remodel of limited service restaurants as a mantra: make the restaurant looks nice inside and out, the customers will come, and spend more (2012). Wendy’s “image activation” plan was an example of attracting customers by remodeling. The remodeled Wendy’s locations are almost loft-apartment-type feel includes many features such as lounge seating, fireplaces, flat-screen televisions, wood laminate floors, free Wi-fi (Tuttle, 2012). Many studies had showed that an inviting and attractive restaurant atmosphere is good for sales (Fitzsimmons & Mauer, 1991). But how
good is it? Wendy’s have the equation to estimate the cost of remodeling and payoff in forms of increased sales down to science. For example, a “Tier 1” investment, with the cost of 650,000-700,000, can boost the sales about 25%, a “Tier 2” investment with the cost of 500,000, will lift 15% of sales (Kelso, 2012). Many firms were used the strategy of remodels to boost sales and profits such as McDonald’s, Starbucks, Panera Bread, Taco Bell (O’Brien, 2012).

The Restaurant Performance Index (RPI) is a monthly composite index that tracks the health of and outlook for the U.S. restaurant industry (NRA, 2012). The index value above 100 indicates that a period of expansion, while index value below 100 suggests a contraction period. The RPI of 2005-2007 suggests that the restaurant industry is in a period of expansion. From 2005 through 2006, the limited service restaurants’ revenue was driven by strong economic growth; operators competed ferociously in the domestic market and expanded internationally in order to grow overall revenue and profits (Zwolak, 2010). Expansion plans were launched by many limited service restaurants to meet with the consumers’ need and to increase the revenue. For instance, in 2005, Yum brands opens 409 new restaurants in China. KFC has opened more than 2,300 stores in 450 Chinese cities (Ding, 2008). These remodel and expansion plans were a major reason that limited service restaurant have a higher debt ratio since most operators chose to finance their expansion by debt.

Compare to full service restaurants, revenue volatility is low for limited service due to the very high household penetration rate. Limited service restaurants’ relatively stable sales revenue may boost their confidence in using debt financing since they are optimistic to cover the interest charges on debt incurred, therefore induce them to use more financial leverage to achieve higher returns. Not to mention many of them are large size companies may have
easier access to financial leverage. On the other hand, full service restaurants have volatile sales, and their relatively small size may put them in a disadvantageous bargaining position when considering debt financing.

The limited service restaurants also had significantly higher gross profit margin than full service restaurants. By observing the formula used to calculate this ratio, a high gross profit margin indicates a low cost of sales. It is not surprising that the limited service restaurants have significantly lower cost of sales. Firstly, according to previous study, Walker (2002) pointed that full services restaurants are more labor intensive than limited service restaurants. While full service restaurants have the higher labor cost to sales percentage about 30%-35%, in comparison with limited service restaurants’ 16%-18%. Secondly, the inferior performance of full service restaurants may be attributable to the rising operational costs associated with expansion and market penetration plans. The Weekly Corporate Growth Report (Valuation of the restaurant industry, 1999) suggests that labor costs were main operating expenses for lower profit margin particularly in the full service restaurants in the fierce competition caused by market penetration. Labor costs have the rising trend due to the mandated minimum wage Increases, training, and highly competitive wage packages (Valuation of the restaurant industry, 1999).

Findings of the Impact of the Recession on Financial Conditions and Performances

Findings of the recession’s impact on full service restaurants

The group means of thirteen ratios for the full service restaurants and their paired samples t-test statistic results are reported in Table 10. As shown in Table 10, the debt ratio was significantly different before and after the recent recession at the 0.01 level, suggested
that full service restaurants had significantly increased their use of debt to operate their activities during the recent recession. Before the recent recession, the average debt ratio for full service restaurants was 0.4167; this means on average, the full service restaurant companies were financed by 42% of debt and 58% of equity. After the recession, the debt ratio increased to 0.5621, this means on average, the full service restaurant companies were 56% financed by debt and 44% by equity. The increased 15% suggested that full service restaurant firms’ significantly higher use of debt financing. After the recent recession, these restaurants were 15% more indebted than they were prior to the recession.

At the 0.10 level, one more ratio became significant, the debt-to-equity ratio. The average mean of debt-to-equity ratio for full service restaurants before the recent recession was 0.8276, suggested that for every dollar invested by stockholders, the creditors invested 83 cents. After the recession, this ratio increased to 4.13, means that the creditors invested 4.13 dollars for each dollar invested by stockholders. These statistics provided strong evidence that the full service restaurants used considerably more debt financing during the recession, particularly relative to their equity investments.

The statistical significant of tests on the differences in the other ratios were all greater than the 0.10 level. However, the significant level of paired samples t-test on gross profit margin is very close to the 0.10 level, 0.102. The empirical results indicated that there was at least weak evidence that full service restaurants may have significantly lower gross profit margin after the recent recession. The decrease of gross profit margin may suggest that the increase of cost of sales. A reasonable explanation of the increased costs maybe related to the increased interest charges due to increased debt. With further examination of the statistics, the author found that even the times of interest earned ratio before and after recession has no
significantly changes, the mean of this ratio did drop from 81 before the recession to 20 after the recession.

Put all the factors together, the author concluded that among the thirteen ratios employed in this study, three of them changed significantly before and after the recent recession. The ratios of after recession period showed considerable deterioration in financial leverage and profitability, indicated that the severe negative impact of the recent recession. The deterioration may have cause by (1) the low sales as a result of low customers’ demand during the recession, (2) the increased using of debt financing, and accompanying high interest charges.

Findings of the recession’s impact on limited service

The group means of thirteen ratios for the limited service restaurants and their paired samples t-test statistic results are reported in Table 11. The parallel non parametric Wilcoxon statistic results are reported in Table 12. The statistical significant of t-tests on the differences for all the ratios were greater than the 0.10 level, indicated that there is no significant changes for limited service restaurants during the recession. However, the significant level of paired samples t-test on P/BV ratio is close to the 0.10 level, 0.114. As shown in Table 12, the associated significant level with Wilcoxon signed rank test for this ratio is 0.041, less than the 0.05 level. Therefore, this is the evidence that for limited service restaurants, there was a statistically significant difference in terms of P/BV ratio. As shown in Table 11, although there is no significant evidence of deteriorations before and after the recession, from the means, the author believed there were deteriorations to some extent for all five groups of
ratios. However, unlike full service restaurants, limited service restaurant fared well through the recent recession.

**Discussion of restaurant industry before and after the recession**

This study continues to investigate the impact of the recent recession by comparing means of 13 ratios prior and after the recession. The findings indicate that full service restaurants were negatively affected by the recession in three major areas, namely debt ratio, debt-to-equity ratio and gross profit margin ratio. Limited service restaurants, on the other hand, were not significant affected by the recent recession.

The full service restaurants industry depends on the discretionary expenditures of household, during the recession, the unemployment risen rapidly, while the consumer sentiment and household income declined, under this economy, full service restaurants were the first to feel the effect (Zwolak, 2010). During the recession, most operators of full service restaurants were focused on surviving the recession. Customers were cut their spending on visiting full service restaurants, even for these who still frequent restaurants were on a tighter budget, they were searched for discounts and ordered few items. In response to the recession-caused effect and trying to lure customer’s visits, menu prices were reduced, and new lower-cost menu items were being substituted.

The gross profit margin of full service restaurants was significantly affected by the recession. The major reasons were: (1) the increasing food, commodity and gas prices from mid-2008; (2) the increases in minimum wages; (3) the declines in industry revenue.

According to the U.S. Bureau of Labor Statistics, wholesale food prices jumped about 7.6 percent in 2007 and continued to rise at 8.5 percent in 2008, the wholesale food price
inflation was highest in 27 years (Hensley & Stensson, 2008). Several individual food commodities central to the majority of restaurant industry have increased dramatically during 2008, for instance, flour has risen 87%, eggs jumped about 73%, and other increases include fat and oil, 49%; cheese, 27%; milled rice, 25%; and milk, 20% (Hensley & Stensson, 2008). With food and beverage costs being one of the most significant line items for restaurant, accounting for about 33 cents on every sales dollar, the NRA suggested that the increased costs of food and beverage have a dramatic impact on the restaurants’ bottom line, which average 4% to 6% (Hensley & Stensson, 2008).

Limited service restaurants were often forced either to raise prices or shave profits from already slim bottom lines, they were struggled to maintain sales and offset the rising costs. For instance, McDonald’s raised prices to keep up with food inflation, their strategy was absorb some of the initial costs by gradually raise prices to recoup the cost of food increases (Melendez, 2011). Other fast food restaurant firms made similar moves include YUM Brands-parent of KFC, Pizza Hut and Taco Bell, and Wendy’s. According to Peter Bensen, the chief financial officer of McDonald’s, “the atmosphere was right because previous rounds of pricing changes had not dissuaded clients” (Melendez, 2011).

As customers paid more attention to the value and were extra sensitive to the menu price during the recession, the restaurateurs of full service restaurants were trying to not pass these increased costs on to customers, they were working hard to avoid menu price increases unless absolutely necessary (Hensley & Stensson, 2008). In fact, throughout the recession, full service restaurants offered many fire-sale bargains to attract traffic. For instance, crowd came to Chili’s when it offered a three-for-$20 two-person promotion featuring a shared appetizer, two entrees, and a shared dessert (Shee, 2011).
According to a survey done by the National Restaurant Association, the highest costs reported by operators in the full service restaurants are costs of food and beverages, salaries and wages. Profit margin in this industry is relatively small; this makes the full service restaurant industry extremely vulnerable to the increases of food and commodity prices and utility prices, and the increases in labor and benefit costs, given its labor-intensive nature. From 2007 to 2008, full service restaurants were adversely affected by the increased wages costs due to labor shortages. Benefits cost included health insurance benefits were also increasing therefore increased the operating costs. In January 2008, Buffet Holdings Inc. filed bankruptcy; it was largely blamed by external economic factors, such as the decline of disposable income and significant increased food and energy prices, as well as the increased minimum wages.
CHAPTER 5. CONCLUSIONS

Implications

The author examined the weekly stock indices of the full service and limited-service restaurants, the overall restaurant industry, and the S&P 500 stock index by using ARIMA with Intervention Analysis and t-tests. The results showed that limited service restaurants were immune to the recession, and outperformed than full service restaurants and S&P 500 stock index. On the other hand, the full service restaurants segment was sensitive to the changes in the economic environment. When recession hit, it reacted to it immediately; the stock prices and gross profit recovered fairly rapidly after the recession, but this recovery was at the price of far greater debt. The purpose of this study is to help practitioners and investors to understand how different restaurants behaved differently through and after the recession by examining their stock indices performance, and provide helpful suggestions and tips to help them to cope with a similar market downturn. Especially now the U.S. economy is facing the risk of a double-dip recession, it is core for restaurant operators and investors to strategically plan ahead to survive another challenge.

The findings of this study are informative for the restaurant industry for many reasons. First of all, the recent recession was the most severe in U.S. since the Great Depression, therefore limited service restaurants might be recession proof. For long-term or cautious investors, the stocks of limited service restaurants are countable since they were not decline in such a sharp economic downturn; they are more secure than the stocks of full service restaurants. Recessions are always bad news for stocks since they are marked by prolonged declines in economic activity. However, even in a recession some companies and their stocks
do well. For investors, picking stocks to avoid the downturn is difficult. From the weekly stock indices, the author suggested that there were some great buying opportunities when the economy dragged down the stock price. For example, investors who bought a portfolio of full service restaurants when the stock prices reached a zenith and who cashed out after the full service restaurant segment was fully recovered from the recession received impressive returns. On the contrary, panic investors who bought the same portfolio before the recession but who chose to cash out when the recession started definitely suffered a loss of some magnitude. Thus the stocks of full service restaurants might be a good choice for short-term or adventurous investors. An economic slowdown or recession does not necessarily mean that it is time to sell the remaining stocks and safely store the money. Instead, the recession should be a time to re-evaluate the investment strategy.

Second, many evidence showed that U.S. economy, even not confirmed in a double-dip recession, might be headed for it, or at least it is not expected to fully bound in the near future (Barro, 2012). The Treasury Real Yield Curve Rates (the interest rates the U.S. government pays on bonds that are indexed to inflation) supported the author’s viewpoint. From Appendix 2, as of October 1, 2012, they were negative for all bonds of less than 20 years maturity (United States Department of the Treasury, 2012). The negative rates mean that investors are paying the government to take their money. This fact strongly suggests that the investors are pessimistic about the ability of U.S. economy to create significant gains in the near future (Krugman, 2012). For practitioners of full service restaurants, this suggests a pressing change in strategic thinking. As the recent recession started, the stock prices of full service restaurants first reacted to it in December 2007. Full service restaurants purchased continued profitability at the expense of ever-greater debt. As economy continues as
expected, this is not a sustainable course of action. The operators must adjust their strategies to deal with the slow economy.

The author summarized some efficient strategies from the past to deal with a recession; the operators might find those strategies helpful under the current situation. Promotions, coupons and affordable menu price seemed to be an efficient way to tide over the recession. According to Joe Lutriario of Restaurant magazine (Skidelsky, 2009), “The logic is that it’s better to get bums on seats, and maybe make a tiny profit on each one, than allow places to stand half empty”, he explained more, “Restaurants have always made most of their money on things like wine and mineral water, so even if the food is cheaper, they can still do OK.” A vivid example here is, Little Bay, a London restaurant. Throughout the February of 2009, it allowed diners to pay exactly what they want for food while drinks are priced normally. Not only the place was packed but also the restaurant found that 80% of customers paid more than normal (Skidelsky, 2009). Since consumers are being tempted to voucher schemes, 2-for-1 offers and cheap menu price, the full service restaurants better set affordable menu price to tide over market downturns.

According to a research of the National Restaurant Association, guest loyalty programs helped restaurants grow business during the recession. Hudson Riehle, the National Restaurant Association’s senior vice president of research and knowledge, says, “Repeat customers are an important demographic for restaurant operators. Loyalty programs can provide strong incentive to increase visits from those individuals” (Stensson, 2010). 90% of operators who engaged in this research agreed loyalty programs give them a competitive advantage while 77% of operators said loyalty programs helped drive repeat traffic during the recession (Stensson, 2010). For limited service restaurants, since the profit margin is
already low, the operators may continue to put out more products, and continue to advertise and promote. Since what customers value most about limited service restaurants are convenience, relative low pricing, consistency of food quality, and speed of service, operators should pay attention to those qualities and strive to remain competitive during a recession.

To determine whether different types of restaurants differed financially, the author examined 5 groups of 13 ratios of full service and limited services restaurants before the recession. While the means of ratios seemed to differ substantially between these two types of restaurant companies, the statistics showed that some of the leverage, profitability, and market-based ratios were significantly different. To be more specific, debt ratio, gross profit margin ratio, and P/E ratio were statistically significantly different between full service and limited service restaurants.

Compared to full service restaurants, revenue volatility is low for limited service due to the very high household penetration rate, therefore limited service restaurants have relatively stable sales revenues, and that may boost their confidence in using debt financing. They are optimistic about being able to cover the interest charges on debt incurred, and are therefore induced to use more financial leverage to achieve higher returns. In addition, many of them are large companies that may have easier access to financial leverage. On the other hand, full service restaurants have volatile sales, and their relatively small size may put them in a disadvantaged bargaining position when considering debt financing.

This study continued to investigate the impact of the recent recession by comparing the means of 13 ratios before and after the recession. The findings indicate that full service restaurants have been negatively affected by the recession in three major areas, namely debt
ratio, debt-to-equity ratio and gross profit margin ratio. The possible explanations have been already discussed in the previous part. Limited service restaurants, on the other hand, were not significantly affected by the recent recession.

The findings of this study carried crucial management implications for the restaurant industry. This study endeavored to identify the major financial differences between the two types of restaurants and to look for the areas that were significantly negatively affected by the recent recession. The findings may help restaurant practitioners find possible ways to improve financial performances. Many studies have shown that financial leverage ratios have a significant impact on the performance of a company, which is consistent with the results of this study. Mao and Gu suggested leverage variable has a significant negative effect on restaurant performance, since the heavy indebtedness has the tendency to decrease the company’s value in the capital market (2008). Therefore, the managers of U.S. restaurants should try to lower their debt leverage. This negative impact suggests that the costs of using debt outweighed its benefits. Optimal capital structure theory states that when the use of debt exceeds its optimal level, the firm’s value declines (Moyer et al., 2001). Therefore, reducing the use of debt would be beneficial to the industry. During the recession, the challenging market conditions led to greater business risks for restaurant industry; it is well known that excessive debt leads to higher risks because of the high interest charges and principal repayment burden. Therefore, lowering the debt ratio may help offset the high risks. The results of this study have particular relevancy for full service restaurants that have less stable sales; they should keep the debt ratio low to neutralize the high risks and to enhance the financial performance in the capital market. When the economy is booming, sales are high; use of debt financing can further increase the return to the owner since the interest costs
are fixed (Youn & Gu, 2007). On the contrary, when the recession hits, the sales are negatively affected by the recession; the interest charges due to using debt will further depress the profitability. The author suggests that the restaurant companies should take urgent measures to avoid using debt financing. Instead, they should use more conservative financing such as issuing new equity. It is recommended that the restaurants take advantage of the recovery of stock market after the recession, raise additional equity to improve their financial performances.

Secondly, the managers of restaurants should concentrate more on improving operation efficiency. During a recession, raising sales revenue with existing assets is more crucial than expansion (Moyer et al., 2001). Restaurants lost sales during the recent recession, to improve their financial performances; they should make efforts to raise sales. Although the impact of the recession is inevitable, the managers should come up with solutions to minimize the down effects.

**Limitation**

In this study, only publicly held restaurant firms were surveyed. Privately owned companies and these were not large enough to list their stocks on large exchanged which not included in this study may have been affected differently. Future research opportunities should include these other companies, as well as examining limited service restaurants more closely to determine whether they are proof to recessions.
## Appendix 1. A List of Sample Restaurant Firms

<table>
<thead>
<tr>
<th>722211 Limited Service (20)</th>
<th>722110 Full Service (49)</th>
<th>722110 Full Service (49)</th>
</tr>
</thead>
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<tr>
<td>AFC Enterprises Inc.</td>
<td>AFCE</td>
<td>Applebee's International, Inc.</td>
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<td>Burger King Holdings Inc.</td>
<td>BKC</td>
<td>Ark Restaurants Corp.</td>
</tr>
<tr>
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<td>Back Yard Burgers, Inc.</td>
</tr>
<tr>
<td>Carrols Restaurant Group Inc.</td>
<td>TAST</td>
<td>Benihana Inc.</td>
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<tr>
<td>Checkers Drive-In Restaurants</td>
<td>CHKR</td>
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</tr>
<tr>
<td>CKE Restaurants, Inc.</td>
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<td>Biglari Holdings Inc.</td>
</tr>
<tr>
<td>COSI Inc.</td>
<td>COSI</td>
<td>BJ's Restaurants Inc.</td>
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<tr>
<td>Domino’s Pizza Inc.</td>
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<td>Bob Evans Farms, Inc.</td>
</tr>
<tr>
<td>Einstein Noah Restaurant Group</td>
<td>GTIM</td>
<td>Brinker International, Inc.</td>
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<tr>
<td>Good Times Restaurants Inc.</td>
<td>JACK</td>
<td></td>
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<td>BUCA Inc.</td>
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<td>Buffalo Wild Wings Inc.</td>
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<tr>
<td>Nathan's Famous, Inc.</td>
<td>NATH</td>
<td>California Pizza Kitchen Inc.</td>
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<tr>
<td>Papa John's International, Inc.</td>
<td>PZZA</td>
<td>CEC Entertainment, Inc.</td>
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<td>Red Robin Gourmet Burgers Inc.</td>
<td>RRGB</td>
<td>Champps Entertainment, Inc. (DE)</td>
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<td>Cheesecake Factory Inc. (The)</td>
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<td>Chipotle Mexican Grill Inc.</td>
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<td>Cracker Barrel Old Country Store, Inc.</td>
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<td>Worldwide Restaurant Concepts</td>
<td>SZ</td>
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<td>O'Charley's Inc.</td>
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References:

AFCE, BKC, CBOU, TAST, CHKR, CKR, COSI, DPZ, GTIM, JACK, MCD, NATH, PZZA, RRGB, RYAN, SONC, WEN, SZ, YUM, APPB, ARKR, BYBI, BNHN, A, BH, BJRI, BOBE, BUCA, BWLD, CPKI, CEC, CMPP, CAKE, CMG, CBRL, DRI, DENN, DIN, ELMS, DAVE, BDL, FRN, FRS, GCFB, JAX, JMBA, KONA, LNY, STAR, LUB, MAIN, MAXE, MSSR, CASA, MRT, CHUX, OSI
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## APPENDIX 2. DAILY TREASURY REAL YIELD CURVE RATES

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<tr>
<th>Date</th>
<th>5 YR</th>
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<th>20 YR</th>
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REFERENCES


