1-1-2003

The change in systematic risk after the 9/11 events: An analysis of restaurant industry

Kihun Kim
University of Nevada, Las Vegas

THE CHANGE IN SYSTEMATIC RISK AFTER THE 9/11 EVENTS:

AN ANALYSIS OF RESTAURANT INDUSTRY

by

Kihun Kim

Bachelor of Science
Hanyang University
1998

Master of Science
University of Nevada, Las Vegas
2004

A thesis submitted in partial fulfillment
of the requirements for the

Master of Science Degree in Hospitality Administration
William F. Harrah College of Hotel Administration

Graduate College
University of Nevada, Las Vegas
May 2004

UNLV

Thesis Approval
The Graduate College
University of Nevada, Las Vegas

April 12, 2004

The Thesis prepared by

Kihun Kim

Entitled

The Change in Systematic Risk after the 9/11 Events:
An Analysis of Restaurant Industry

is approved in partial fulfillment of the requirements for the degree of

Master of Science in Hotel Administration

Examination Committee Chair

Dean of the Graduate College

Examination Committee Member

Examination Committee Member

Graduate College Faculty Representative

1017-53

ABSTRACT

**The Change in Systematic Risk after the 9/11 Events:
An Analysis of Restaurant Industry**

by

Kihun Kim

Dr. Zheng Gu, Examination Committee Chair
Professor of Hotel Administration
University of Nevada, Las Vegas

The tragic events of September 11, 2001 (the 9/11 events) have had a dramatic impact on all aspects of American society. Although all facets of U. S. society have been affected by the September 11 attacks, it is hard to identify an industry that felt those effects more immediately than the hospitality industry. The aftermath of the events of 9/11 has forced the hospitality industry to face a disastrous fact in terms of decreased customer demand. The purpose of this study was to investigate whether the average systematic risk, or beta, of the restaurant industry changed significantly after 9/11. More specifically, this study examined the difference in systematic risk of different types of restaurants, such as fine/casual dining restaurants, family restaurants, and fast food restaurants in the pre-9/11 and post-9/11 period. The findings indicate that the systematic risk has not changed significantly both for the restaurant industry and for each restaurant segment that was examined.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

I want to thank my Committee Chair and Advisor, Dr. Zheng Gu for his guidance, support and wisdom throughout the completion of this dissertation. Certainly, without his help, I would not have been able to successfully undertake the work that is contained herein. In addition, I want to commend the other members of my committee, Dr. Collin Ramdeen, Dr. Karl J. Mayer and Dr. Seungmook Choi, whose insight and perspective enabled me to complete this dissertation. Their assistance was invaluable throughout the course of this study.

Special thanks to my colleague and friend Minjung Kim, for the encouragement and support provided during all those trying times in various classes and the thesis process itself.

I also dedicate this thesis to my wonderful parents and to other member of my family in S. Korea. Without their support and encouragement throughout my life, I would not have had the motivation to pursue this goal and realize the importance of continuing a commitment to higher education later in my professional career.

CHAPTER 1

INTRODUCTION

In the United States, the tragic events of September 11, 2001 (9/11) have had a dramatic impact on all aspects of American society. According to Ernst and Young (2001) the immediate effect of the disaster was to accelerate the contraction of the U.S. economy, which was already languishing in the months before the events of 9/11. Soon after the events of 9/11, forecasters projected a slowdown in Gross Domestic Product (GDP) of 1.4 percent or more in the third quarter of 2001, slashing growth to minus 0.9 percent and moving the economy gradually into a recession. The U.S. National Income and Product Accounts (2003) estimated the losses to property from the 9/11 events at approximately $16 billion, just over 0.15 percent of the annual GDP.

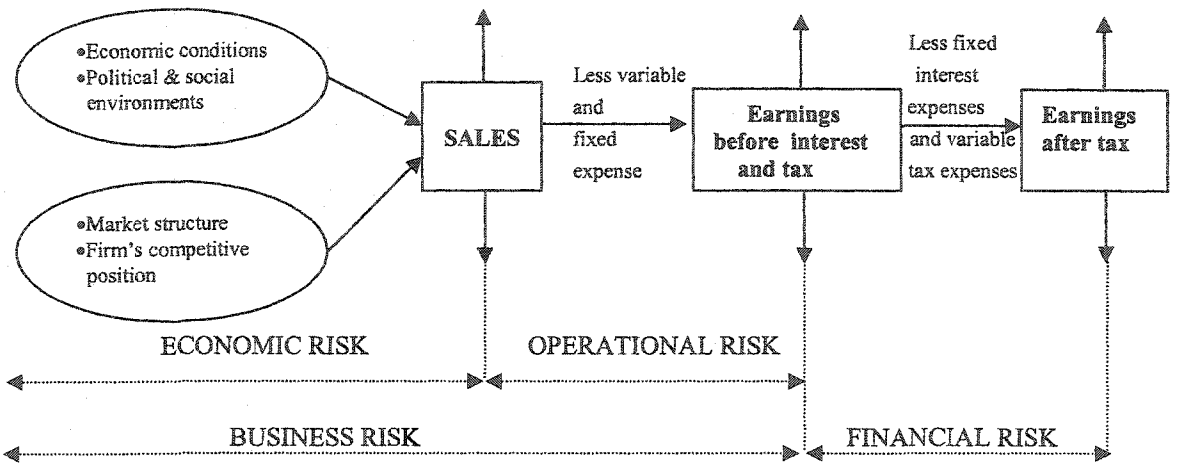
Although all facets of U.S. society have been affected by the events of 9/11, it is hard to cite an industry that has felt those effects more immediately than the hospitality industry (O'Neill & Lloyd-Jones, 2001). Since the 9/11 events, there have been many articles about its effects on various industries. The hospitality industry is no exception to the scrutiny of the impact of 9/11. The aftermath of 9/11 has forced the hospitality industry to face some hard facts in terms of decreased customer demand. Queiroz (2002) suggested that hospitality companies have been challenged with reductions in corporate travel, canceled conventions, employee layoffs, declining consumer confidence, corporate reorganizations, and insurance coverage volatility. According to the Fiscal

Policy Institute (2001), the New York City economy was expected to lose an estimated 108,500 jobs within the first month following the 9/11 as a direct result of the attack on the World Trade Center. This is approximately 2.4 percent of total local employment including full-time, part-time, and the self-employed. The greatest impact on New York City jobs as a result of the 9/11 events has been on the three industries of securities, retail trade, and restaurants. Numerous restaurants were destroyed, forced to close, or cut staff due to the spillover effects on tourism and business travel.

The 9/11 attacks in New York City and Washington, D.C., combined with the already weak domestic economy, had an adverse impact on the U.S. restaurant industry. According to the Bureau of Labor Statistics (2002), the restaurant industry lost approximately 103,000 jobs, nearly double the historical rate, due to slower sales because of the economic conditions resulting from the September 11 terrorist attacks (Nolt & Kim, 2001). According to several restaurant executives at the 2002 multi-unit Foodservice Operators Conference held in Orlando, Florida, fallout from the 9/11 events has left foodservice operators in airport venues facing skyrocketing insurance rates and other operators investing substantial resources to protect against future terrorist threats (Peters, 2002).

Hawawini and Viallet (1999) illustrated (Fig. 1) the transmission of risk from sales to profits. Hawawini and Viallet also provided the relationship between earnings after taxes (EAT) and earnings before interest and taxes (EBIT) and described the risk of this relationship as *financial risk.* They also explained the relationship between EBIT and sales and described the risk of this relationship as *operational risk.* They further specified that sales fluctuated because of the uncertain economic, political, social, and competitive

environment in which firms operated. They characterized this risk, faced by all firms, as *economic risk.* Hawawini and Viallet interpreted the cumulative effect of economic risk and operational risk as *business risk.*



Adapted from Hawawini and Viallet (1999)

Figure 1 Graphical representation of economic, operational, and financial risk

Hamada (1972) and Rubenstein (1973) demonstrated that operating risk and financial risk were the fundamental components of systematic risk. Strong (2001) extended their studies by suggesting that both operational risk and financial risk might be empirically represented through the respective use of the degree of operating leverage (DOL) and the degree of financial leverage (DFL). Griffin (2001) also expanded on their research by separating economic risk from business risk and presented empirically the economic risk construct through the use of the degree of economic leverage (DEL). Griffin proposed that the degree of economic leverage was an incremental addition to the explanation of systematic risk in the Capital Asset Pricing Model (CAPM).

Systematic risk is defined as the asset's return covariance with the market portfolio of risky assets. The specific measure of systematic risk used in the CAPM is called the asset's beta (β). Beta is further defined as the covariance between the asset returns and market returns divided by the variance of the market returns. Because the firm's returns are affected by firm sales, and variance of sales is attributed to fluctuations in the economy that result from uncertainties in the economic, political, social, and competitive environment, this thesis presents the concept that external environmental changes have an impact on the fundamental change in systematic risk of the restaurant industry. Griffin (2001) argued that the relationship between exogenous macroeconomic factors and firm sales has never been explicitly studied, even though it was commonly understood that exogenous macroeconomic factors directly affected firm sales. Further, he extended the existing Mandelker and Rhee (1984) analytical model of the determinants of systematic risk by examining the DEL as an explicit determinant of beta.

In addition to the economic impact of the 9/11 events on the restaurant industry, there is also a whole level of restaurant consumers' psychology or behavior that needs to be understood. For example, would restaurant customers continue to want to stay at home instead of eating out due to fears of terrorism? According to *Foodservice and Hospitality* ("Foodservice growth," 2001), in the weeks following the attacks, restaurant customers in Canada did not want to go out to dinner—perhaps because they were more safety conscious due to fears of terrorism or perhaps because they did not feel like celebrating birthdays or other special occasions. If the 9/11 events had a significant impact on the restaurant industry, it may have been because restaurant customers' psychology or behavior could have been basically changed. If the restaurant customers' psychology or

behavior changed due to the 9/11 events, and they did not want to keep eating out after 9/11 due to fear of terrorism, this could have caused restaurant sales to plummet. Decreased sales in the restaurant industry could affect restaurant beta, which represents the sensitivity of an individual stock to changes in the returns of average market. Thus, a change in restaurants' beta may be significant due to the change in restaurant customers' psychology or behavior after the 9/11 events. This study will address that issue.

Development of the Restaurant Industry

The word *restaurant* covers a broad range of food service operations. The term comes from the French word restaurant, which means "restorers of energy." The term was used as early as the mid-1700s to describe public places that offered soup and bread. Today, any public place that specializes in the sale of prepared food for consumption on or off the premises can be described as a restaurant (Powers, 1995).

According to the National Restaurant Association (NRA, 2003), the nation's restaurants achieved $407.8 billion in sales in 2002, an increase of almost 4 percent over 2001. More than 54 billion meals were eaten in restaurants and school and work cafeterias in 2002. According to the 2003 Restaurant Industry Forecast, the nation's 870,000 restaurants should reach $426.1 billion in sales in 2003, which represents an increase of almost 4.5 percent over 2002. Thus, the growth of the restaurant industry during the last few years has been quite good, and the restaurant industry's beta may not have been significantly affected by 9/11 events.

Purpose of the Study

The primary purpose of this study was to investigate whether the systematic risk (β) of the restaurant industry was affected by 9/11 events. More specifically, this study investigated the difference in systematic risk of several types of restaurant, such as fine/casual dining restaurants, family restaurants, and fast food restaurants, during the pre- and post-9/11 periods. This study attempts to identify the impact of the 9/11 events on the restaurant industry by examining the change in beta of the restaurant industry. The study can provide some empirical evidence on the impact of market change on the change in the restaurant business characteristics.

Problem Statement

Previous studies (Kim, Gu, & Mattila, 2002; Gu & Kim, 1998; Borde, 1998) have examined the risk features of the hospitality industry, such as hotel real estate investment trusts, casinos, and restaurants. Borde (1998) found that risk was significantly related to certain financial characteristics in the restaurant industry. Specifically, the findings suggest that liquidity, dividend–payout ratio, return on assets, and growth in earnings before interest and taxes had an influence on systematic risk. Kim et al. (2002) found that beta was found to correlate positively with financial leverage and growth but negatively with firm size. Those studies, however, concentrated on firm-wise internal factors as determinants of systematic risk.

Other studies have found that external factors could also affect beta. For example, Sankaranarayanan (1986) analyzed changes in beta related to regulatory changes. Sankaranarayanan developed a theoretical model that provided a relationship between the

types of regulatory changes and the directions of beta change: regulations increased beta, and deregulations decreased beta. Further examination showed that the observed changes in beta could not be fully accounted for by the changes in financial and operating leverages of the firms in the affected industry. According to Sankaranarayanan, regulatory changes contributed significantly to the explanation of observed changes in beta.

Although many articles have discussed the nonstationary characteristic of beta and variables that may be associated with beta nonstataionarity, the studies nevertheless did not identify the determinants of the beta change. Griffin (2001) suggested that the exogenous economic disturbance, defined as any unforeseen event that possesses the power to have an impact on the firm's sales, could make a firm's beta nonstationary. This study attempts to identify the impact of market changes on the restaurant industry by empirically examining the change in systematic risk of the restaurant industry, if any, in the wake of the 9/11 terrorist attacks. Specifically, this study compares the beta for several types of restaurant in the periods before and after the events of 9/11 to determine whether characteristics of each restaurant segment changed as a result of the 9/11 events. The following four research questions were investigated in this study:

1) Did the entire restaurant industry's systematic risk change significantly after the events of 9/11? ;
2) Did the fine/casual dining restaurant's systematic risk change significantly after the 9/11 events? ;
3) Did the family restaurant's systematic risk change significantly after the 9/11 events? ; and,

4) Did the fast-food restaurant's systematic risk change significantly after the 9/11 events?

Research Hypotheses

In this section, implicit hypotheses are described. The rejection of the null hypothesis (H_0) would imply that there is a statistically significant difference in pre-9/11 and post 9/11 systematic risks, which may signal the underlying change of the restaurant business characteristics. The test hypothesis is thus formulated and presented in Table 1.

Soon after the events of 9/11, Technomic, Inc., a Chicago-based food service consulting company, released new, reduced-growth estimates at the International Foodservice Manufacturers Associations' (IFMA) annual Forecast and Outlook seminars, reflecting the impact of the 9/11 events and the general economic slowdown in the U.S. foodservice industry ("Foodservice Growth Forecasts Reduced," 2001). Technomic forecasted that consumers would continue to eat out, but would likely trade down in their dining choices. As a result, limited-service restaurants such as fast-food restaurants would face a slight boost, with 2002 sales growth projected to range from flat to approximately 3.5 percent. However, they projected that sales growth for the full-service and upscale segment, such as fine/casual dining restaurants, could be between –3 percent and 3 percent. According to a U.S-based NPD Group Inc. report, a higher-than-average number of Americans were choosing to order take-out fast food in the wake of the 9/11 attacks ("Fast Food Favoured," 2001). NPD also reported that full-service restaurant sales, including upscale restaurants and mid-scale restaurants, dropped 1.2 percent each year in the United States. Since the 9/11 events may have affected each restaurant

segment differently, three sub-hypotheses were tested to see if the systematic risk of each restaurant segment changed significantly due to the events of 9/11:

Table 1

The Test Hypothesis and Three Sub-hypotheses for this Study

Type of Restaurant	Hypothesis
Entire Restaurant Industry	H_0: The post-9/11 beta of the restaurant industry was not significantly different from its pre-9/11 beta. H_a: The post-9/11 beta of the restaurant industry was significantly different from its pre-9/11 beta.
Fine/casual dining Restaurant	H_{o1}: The post-9/11 beta of the fine/casual dining restaurant was not significantly different from its prior-9/11 beta. H_{a1}: The post-9/11 beta of the fine/casual dining restaurant was significantly different from its prior-9/11 beta.
Family Restaurant	H_{o2}: The post-9/11 beta of the family restaurant was not significantly different from its prior-9/11 beta. H_{a2}: The post-9/11 beta of the family restaurant was significantly different from its prior-9/11 beta.
Fast-food Restaurant	H_{o3}: The post-9/11 beta of the fast-food restaurant was not significantly different from its prior-9/11 beta. H_{a3}: The post-9/11 beta of the fast-food restaurant was significantly different from its prior-9/11 beta.

Limitations of the Study

This study has the following limitations:

1) The sample used in this study is limited to the restaurants whose common stocks were publicly traded on the security market and whose financial data are available on the Internet Website of http://www.finance.yahoo.com; and,
2) Due to the small number of fine dining restaurant firms, they have to be combined with casual dining restaurant firms.
3) Numerous empirical studies have used the 60-month stock prices to estimate beta. According to Fernández (2002), historical betas depend on the data used (daily, weekly, months, etc.), in almost all companies. This study only employs weekly stock prices in the pre- and post-9/11 period over 52 weeks.

Significance of the Study

First, this study confirms whether the 9/11 events significantly changed the systematic risk of restaurant firms, thus providing some empirical evidence on the impact of market change on the change in the restaurant business characteristics. Second, this study helps restaurant investors better assess the nature of risk in the restaurant industry in the post-9/11 time, thus assisting them in making informed investment decisions according to their risk tolerance.

Third, the findings should provide useful information for restaurant executives regarding their financing decisions in the post-9/11 era. According to Ramchand and Sethapakdi (2000), stock price volatility is driven by systematic as well as unsystematic risk. Ramchand and Sethapakdi suggested that changes in risk were important not only

for theoretical reasons but also for the cost of capital of a firm, because they affect the required rate of return on equity. The cost of capital of the firm is of concern to restaurant entrepreneurs. A better understanding of the possibility that risk feature can be changed in the restaurant industry in the wake of the 9/11 events should help industry executives adjust their financing strategy, if needed, such as with debt leverage.

Organization of the Study

Chapter 1 presents the study's objectives, problem statement, research questions, hypotheses, limitations, significance, and definitions of terms. Chapter 2 reviews the literature on the basic CAPM model and the change in systematic risk. Chapter 3 presents a discussion of restaurant categories, data collection procedures, the time frame of the study, the characteristic line and beta, the estimation of beta, the cumulative abnormal return, and the statistical methods used in this study. Chapter 4 reports the empirical results and analyzes the results. Finally, Chapter 5 concludes the study by summarizing its findings, discussing its implications, and providing recommendations for future research.

Definition of Important Terms

1. Restaurant industry. A group of firms that cover a broad range of food service operations. The term comes from the French word *restaurant*, meaning "restorers of energy." Any public place that specializes in the sale of prepared food for consumption on or off premises can be described as a restaurant (Powers, 1995).

2. Fine/casual dining restaurant. Most full-service establishments are small, independent operations, some seating fewer than 100 guests (Powers, 1995). The average per-person check at the typical fine dining restaurant is $25 or more (Ebbin, 2000). Casual dining offers popular foods in a setting that is more appealing than most midscale restaurants and more of a value than fine dining (John & Wayne, 1994). The average sale per guest in a typical casual dining restaurant ranges from $15 to 24.99 (Ebbin, 2000).
3. Family restaurant. Family restaurants usually offer breakfast, lunch, and dinner. The average check per-person in a typical family restaurant is less than $15 (Ebbin, 2000).
4. Fast-food restaurant. Parsa and Kahn (1992, p.19) define a fast-food restaurant as a "firm with a mission to provide quicker service and core technology geared towards this mission and commonly more attractive for the customers that demand convenience, speed, and simplicity of service at an affordable price." According to the NRA's Restaurant Industry Operation Report 2000, the average daily seat turnover of fast food restaurants is the highest among the restaurant categories (Ebbin, 2000).
5. Systematic risk. The term *systematic risk* is to be interpreted as the portion of the variation (or total risk) in return on a security or portfolio that can be eliminated by diversification (Levy and Sarnat, 1984). It is defined as the risk that results from factors that affect the stocks of all companies. It is the part of a security's total risk that cannot be eliminated through an investor's diversification.

6. Unsystematic risk. It is defined as the risk that results from factors that are unique to a particular firm. It is the part of a security's total risk that can be eliminated by an investor's diversification.
7. Beta. The term *beta* is defined as a measure of the systematic risk of a firm's common stock. It measures the sensitivity of the financial asset's return to the change in return on the overall market portfolio.
8. Characteristic line. A regression line that shows a linear relationship between the rate of return of a security or portfolio and the corresponding rates of return of the overall market portfolio. The slope of this line is used as the estimated beta for the security or portfolio.
9. Capital Asset Pricing Model (CAPM). The term *Capital Asset Pricing Model* (CAPM) is defined as the model that proposes that any stock's required rate of return is equal to the risk-free rate of return plus a risk premium, where risk reflects diversification (Brigham, 1992).

CHAPTER 2

LITERATURE REVIEW

Introduction

In order to provide a better understanding of how a change in systematic risk may result from major market events, such as the 9/11 events, this chapter reviews previous studies examining the fundamental determinants of systematic risk and the factors that may cause changes in systematic risk.

Basic Capital Asset Pricing Model (CAPM)

One of the pillars in the theory of finance is the CAPM that grew out of the seminal work by Markowitz on the mean-variance hypothesis (Markowitz, 1952). CAPM was later formally developed by Sharpe (1963; 1964) and Lintner (1965). According to Lintner (1965) and Sharpe (1963; 1964), the CAPM theory describes a relationship between the expected return on a security and its systematic risk measured by the beta coefficient. In CAPM, the equilibrium return on an asset *i* is symbolized as follows:

$$E(R_i) = R_f + \beta_i\left(E[R_m] - R_f\right) \tag{2.1}$$

where:

R_i is the return to holders of equity securities of firm i;

R_f is the risk free rate of interest available to all individuals and firms;

R_m is the expected rate of return on the market portfolio; and,

β_i is defined as the systematic risk of security i.

The basic CAPM equation above can also be expressed as:

$$E(R_i) = \alpha_i + \beta_i E(R_m), \text{ where}$$

$$\beta_i = \frac{Cov(R_i, R_m)}{\sigma^2(R_m)} \text{ and } \alpha_i = R_f(1-\beta_i).$$

Also, $E(R_i) = R_f + \lambda Cov(R_i, R_m)$, where

$$\lambda = \frac{(E[R_m] - R_f)}{\sigma^2(R_m)}$$

The CAPM theory (Lintner, 1965; Sharpe, 1963, 1964) proposes that the expected return on a risky asset is composed of the risk-free rate plus the risk premium, where the risk premium is the excess market return over the risk-free rate multiplied by the level of systematic risk for the specific investment. The beta is denoted by the symbol β and is defined as an index of systematic risk. In CAPM, beta is the only security-specific parameter that affects the expected return on a security because of two diversified portfolio assumptions. The model suggests that if markets are in equilibrium, the expected rate of return on a security is the sum of the risk-free rate and the risk premium, where the risk premium is the product of the market price of risk and a security's systematic risk (Haugen, 1995).

According to Haugen (1995), the CAPM model assumes that two types of events have impact on the volatility in a stock's rate of return. The first type of event is called a *microevent*, which affects an individual firm. Microevents do not influence other firms. In other words, they have no effect on the value of the market portfolio or its rate of

return. However, they do affect the rate of return on the individual stock. The developments of new products, the changes in accounting techniques in a particular firm, employee strikes, or the resignation or death of a key person in a firm are examples of microevents.

Other types of events are macroevents. Unlike microevents, macroevents have an impact on all firms' stock prices and the rates of return on individual securities. An unexpected change in the rate of inflation, an unexpected change in the Federal Reserve discount rate, a change in the term structure of interest rates, or the 9/11 events is examples of macroevents.

The Change in Systematic Risk

Another area of studies involving CAPM investigates forces that cause a firm's beta, or an industry's beta to change. Officer (1973) examined changes in the variability of the market factor of the NYSE and concluded that the changes in macroeconomic indicators have some effect on beta. Turnbull (1977) offered a theoretical model, implying that the systematic risk of a firm can be determined by the changes in the firm's specific components and economic variables. Robichek and Cohn (1974) indicated that beta coefficients are generally affected by macroeconomic variables.

Hamada (1972) adopted CAPM to depict the relationship among operating leverage, financial leverage, the variance of sales or earnings, and the market beta. Hamada demonstrated that the systematic risk of the levered firm consists of two parts: a financial leverage component and an operating risk component. Rubenstein (1973) extended Hamada's work, and was the first researcher to demonstrate that the systematic

risk of the levered firm could be written as a function of operating risk. Rubenstein, while holding price and variable cost constant and allowing quantity sold to be stochastic, stated that the levered firm's beta (β_U) is a function of operating risk, the variance of sales per dollar of assets, and a term that reflected the influence of economy-wide events. Therefore, Rubenstein was the first researcher to explicitly demonstrate the fact that exogenous economic events play a part in explaining systematic risk, using the following expression:

$$\beta_U = \frac{(1-T)\sum_{a=1}^{A} \alpha_a (P_a - V_a)\rho(\hat{Q}_a, \hat{R}_m)\sqrt{Var\left(\frac{\hat{Q}_a}{\alpha_a S_U}\right)}}{\alpha_{\tilde{R}m}}$$

Where the terms are as follows:

α_a = the proportion of the firm's total assets devoted to activity a;

S_u = the total equity value of the unlevered firm;

T = the corporate tax rate;

A = the number of product lines the firm supports;

P_a = price per unit of output in activity a;

V_a = variable cost per unit of output in activity a;

F_a = fixed costs in activity a;

$(P_a - V_a)$ = the contribution margin, which Rubenstein suggested reflects the operating risk;

$\rho(\hat{Q}_a, \hat{R}_m)$ = reflects the influence of economy-wide events on activity a; and,

$\sqrt{Var\left(\frac{\tilde{Q}_a}{\alpha_a S_U}\right)}$ = the uncertainty of sales of per dollar of assets devoted to a.

Lev and Kunitzky (1974) recognized that there might exist industry-wide, exogenous, and uncertain variables that affect all firms in the marketplace. They examined the negative relationship between earnings volatility and stock price. Their research showed that if firm management had the intuition to anticipate the arrival of these random economic shocks, management could install internal smoothing mechanisms designed to either reduce or eliminate the negative impact of these shocks on the firm's income, thus minimizing or eliminating the variance of the firm's earnings.

Conine (1982) extended the Rubenstein (1973) work by developing a theoretical relationship between systematic risk and business risk. Conine demonstrated that not only is the firm's quantity of output a random variable, subject to macroeconomic factors exogenous to the firm, but also that both price and variable costs may be random variables, subject to those same exogenous macroeconomic forces. Conine demonstrated that the systematic risk of the unlevered firm is a function of price, variable costs, quantity sales, market return, the uncertainty of both quantity sales, the contribution margin, and the influence of economy-wide events on an activity. Therefore, Conine demonstrated the reaction of the overall marketplace to an exogenous economic perturbation.

More recently, Griffin (2001) examined the degree of economic leverage (DEL) as an explicit determinant of systematic risk and assessed the incremental explanatory power of the DEL through empirical testing. The DEL is defined as the percentage change in the firm's sales that results from a unit percentage change attributable to an

exogenous economic disturbance. Griffin also indicated an economic disturbance as any unforeseen event that possesses the power to disturb the equilibrium of the model and equilibrium of firm operations. The exogenous economic disturbance used here is the tragic events that had a disastrous impact on firm sales. Because the firm's returns are generated by firm sales, and the variance in sales is attributed to fluctuations in the economy resulting from uncertainties in the economic, political, social, and competitive environment, an exogenous economic disturbance may be the explanation of the change in systematic risk.

Literature Review Summary

The objective of this literature review is to represent a historical roadmap of the relevant financial research of the efforts expended trying to better explain the change in systematic risk depending on an external environment. In this thesis, systematic risk is considered as the variable beta contained within the CAPM, expression (2.1). This chapter reviews historical studies examining the fundamental determinants of systematic risk and factors that may cause changes in systematic risk.

Sharpe (1963, 1964) and Linter (1965) developed the CAPM theory, which describes a relationship between the expected return on a security and its systematic risk measured by the beta coefficient. In other words, in CAPM the expected return on a security could be expressed as a function of the risk-free rate, the difference between the market return and the risk-free rate, and a systematic risk factor called beta.

Haugen (1995) explained that the CAPM model assumed that two types of events affected the volatility in a stock's rate of return: microevents and macroevents.

Microevents have no effect on the value of the market portfolio or its rate of return. However, unlike microevents, macroevents have an impact on all firms' stock prices and the rates of return on individual securities.

Another aspect of CAPM studies involved the change in systematic risk. Hamada (1972) was the first researcher to decompose the systematic risk of the levered company in order to express beta as a function of operating risk and financial risk. Building on Hamada's work, Rubenstein (1973) was the first researcher to explicitly demonstrate the fact that exogenous economic events play a part in explaining systematic risk. Rubenstein stated that the levered firm's beta is a function of operating risk, the variance of sales per dollar of assets, and economy-wide events.

Lev and Kunitzky (1974) perceived that industry-wide, exogenous, and uncertain variables that affect all firms in the marketplace might exist. Lev and Kunitzky demonstrated the negative relationship between earnings volatility and stock price. Furthermore, Lev and Kunitzky proposed that a firm could either reduce or eliminate the affects of these shocks by using internal smoothing mechanisms, if the firm had an ability to foresee the economic shocks.

Conine (1982) expanded Rubenstein's (1973) work by developing a theoretical relationship between systematic risk and business risk. Conine demonstrated the reaction of the overall marketplace to an exogenous economic disturbance.

Griffin (2001) examined the DEL as an explicit determinant of systematic risk and assessed the incremental explanatory power of the DEL through empirical testing. Griffin also indicated an economic disturbance as any unforeseen event that possesses the power to disturb the equilibrium of the model and equilibrium of firm operations. Griffin

recognized that the exogenous economic disturbance might be the explanation of the change in systematic risk.

In order to provide a better understanding of how a change in systematic risk may result from major market events such as the 9/11 events, this chapter reviews previous studies examining the fundamental determinants of systematic risk and factors that may cause changes in systematic risk.

CHAPTER 3

DATA AND METHODOLOGY

Introduction

This chapter specifies the data and the research methodology used to accomplish the objectives of this study. First, a restaurant classification is presented in which three different types of restaurants are categorized. Second, the data collection procedure is explained. Third, the time frame employed for the study is discussed. Fourth, the characteristic line (CL) and beta are described. Fifth, the procedure used to estimate beta or systematic risk of a firm's common stock is explained. Sixth, Cumulative Abnormal Return (CAR), which was employed to detect the pattern of restaurant stock returns after the 9/11 events, is discussed. Finally, the hypotheses regarding beta changes are tested.

Restaurant Classification/Categories

According to the National Restaurant Association (NRA), the restaurant industry is defined as an industry including all meals and snacks prepared outside the home. The definition of the restaurant industry also includes all takeout meals and beverages. The NRA classifies all eating establishments into three categories. The major restaurant grouping used by the NRA in its analysis of the industry is as follows (Lundberg, 1994):

1. Commercial Restaurant Services (Group 1): This group consists of establishments that are open to the public, are operated for profit, and may

operate facilities and/or supply meal service regularly for others. Commercial restaurant service accounts for 91 percent of industry sales.

2. Noncommercial Restaurant Services (Group 2): This group comprises the business, educational, institutional, and governmental and noncommercial organizations that operate their own restaurant services. As compared to commercial food service, institutional foodservice does not aim to make money; it simply strives to provide a service. Although some establishments operate at a profit, this is not the aim of the restaurant-service activity. Rather, they serve food principally for their own employees, students, patients, and so on.
3. Military Restaurant Services (Group 3): Military foodservice is the smallest segment. This group comprises the sales of food and beverages at officers' and enlisted personnel clubs and military bases.

The commercial restaurant segment includes the fine dining restaurant, casual dining restaurant, family restaurant, and fast-food restaurant segments as defined by average check and other characteristics. The NRA (2000) described a full-service restaurant as an establishment that provides servers, and patrons pay after they eat. In contrast, at a fast-food restaurant there is usually no table service, and patrons generally order at a cash resister or drive-thru window, or they select items from a food bar and pay before they eat.

Fine and Casual Dining Restaurants

Fine dining restaurants concentrate on providing services of high standards and establishing a reputation that draws customers back time and time again. Most fine dining establishments are small, independent operations, some seating fewer than 100 guests

(Powers, 1995). The chef and staff are highly trained and are well known for giving personalized service. According to Ware and Rudinick (1991), this type of restaurant requires lower employee turnover because of the high guest–check average. According to the NRA Restaurant Industry Operation Report 2000, the average per-person check at the typical fine dining restaurant is $25 or more (Ebbin, 2000).

Casual dining restaurants provide a varied menu and table service, with prices ranging from mid to upscale. Most casual restaurants have a unifying theme that pervades the design of the menu, interior décor, and often the exterior of the building (Powers, 1995). The ambience is intended to support a dining experience that is fun and relaxing. In order to achieve this theme, casual dining restaurants may use an ethnic theme in both décor and food service, depicting an event or adventure in a faraway place. In the midscale price range, chains predominate with operations such as TGI Friday's, Chili's, Applebee's, Bennigan's, Red Lobster, and Olive Garden (Kochak, 2000; Powers, 1995). According to the NRA Restaurant Industry Operation Report 2000, the sales per guest in a typical casual dining restaurant average from $15 to $24.99 (Ebbin, 2000).

Family Restaurants

Family restaurants, such as Denny's, Shoney's, and Big Boy, are table service restaurants but compete principally with fast-food operations and have more in common with these lower priced operation than with upscale units (Powers, 1995). Family restaurants usually offer breakfast, lunch, and dinner. Most meals consist of a choice of soup or salad, an entrée with rolls and butter, and perhaps a dessert. This reduction in courses simplifies service compared to fine/casual dining restaurants. Platters, sandwiches, and salads are the mainstay of the menu, all attractively but simply served.

Many family restaurants offer budget menus or special selections for seniors. To appeal to all these market segments, family restaurants are offering expanded menus featuring selections that are lighter and healthier (Powers, 1995). According to the NRA's Restaurant Industry Operation Report 2000, the average check per person in a typical family restaurant is less than $15 (Ebbin, 2000).

Fast-Food Restaurants

Fast-food restaurants are those that sell quickly prepared foods. This kind of restaurant is often a franchise operation. The limited menu is generally low priced; the food is mainly take-out in disposable containers. The staffing requirements are minimal, and staffs need not be highly trained (Ware & Rudnick, 1991). The key to the success of fast food is its simplicity; for instance, its limited menu. Each item on the menu has been engineered to simplify and standardize its purchase, production, and service. Simplification of the production process permits the use of unskilled labor (Powers, 1995). Automation is also critical to the modern fast-food restaurant. The automating concept means a reduction in menu choices, sharp limitations on customer service, and different customer behavior. Through self-service, the customer replaces the entire front-of-the-house staff, even to the point of cleaning up. Moreover, because fast-food operations offer a simple menu, very specialized and highly efficient kitchens can be built around this limited menu (Powers, 1995). According to the NRA's Restaurant Industry Operation Report 2000, the average daily seat turnover of fast-food restaurants is the highest among the restaurant categories (Ebbin, 2000).

Data Collection

This study attempted to identify beta differences, if any, of restaurant firms in the pre-and post-9/11 periods. The restaurant stock data used in this study were taken from Historical Stock Quotes at http://www.finance.yahoo.com. The sample for each type of restaurant in this study comprised all public restaurant companies whose shares were traded on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), or National Association of Securities Dealers Automated Quotations (NASDAQ) during the 52 weeks prior to and the 52 weeks after the 9/11 events. The weekly stock returns for each restaurant, defined as the percentage changes of firms' stock prices adjusted for dividends and stock splits, and the weekly stock return on market portfolio, were collected for estimating the beta of the categorized restaurant industry segment. The weekly return on market portfolio was represented by the changes in the Standard & Poor's (S&P) 500 index, because the S&P 500 index is one of the best indicators of overall market direction. Many previous studies have used S&P 500 index to represent overall market behavior. Restaurant firms that did not have 52-week data before 9/11 or after 9/11 were not included in the sample for this study. Seventy-three restaurant companies with complete stock price data between the period of 52 weeks before 9/11 and 52 weeks after 9/11 were selected as the initial sample for the study. Six companies that were traded in the over-the-counter bulletin board were removed from the total sample for this study. Thus, a total of Sixty-seven firms were included in the final sample. Twenty-three companies were in the fast-food restaurant industry, sixteen firms were in the family restaurant industry, and twenty-eight were gathered from the fine/casual dining restaurant industry. The sample of firms is listed in Table 2.

Table 2

Sample Firms Selected for This Study

Type of Restaurant	Company	Stock Symbol
Casual/Fine dining Restaurants (28)	1. Applebee's, Int'l, Inc.	APPB
	2. Cheesecake Factory, Inc.	CAKE
	3. Benihana, Inc.	BNHN
	4. Brinker International, Inc.	EAT
	5. BUCA, Inc.	BUCA
	6 Champions Sports, Inc.	CMPP
	7. Chicago Pizza & Brewery	CHGO
	8. Darden Restaurants, Inc.	DRI
	9. Dave & Buster's, Inc.	DAB
	10. Granite City Food & Brewery, Ltd.	GCFBU
	11. Grill Concepts, Inc.	GRIL
	12. Landry's Seafood Restaurants, Inc.	LNY
	13. Lone Star Steakhouse Saloon	STAR
	14. Main St. & Main, Inc.	MAIN
	15. Mexican Restaurants	CASA
	16. O'Charley's, Inc.	CHUX
	17. Outback Steakhouse	OSI
	18. RARE Hospitality	RARE
	19. Rubio's Restaurants, Inc.	RUBO
	20. Ruby Tuesday's, Inc.	RI
	21. Sizzler International	SZ
	22. Star Buffet, Inc.	STRZ
	23. Total Entertainment	TENT
	24. Tumbleweed, Inc.	TWED
	25. Flannigan's Enterprises Inc	BDL
	26. P.F. Changs's China Bistro, Inc.	PFCB
	27. J.Alexanders's Corp	JAX
	28. Ark Restaurant	ARKR

Table 2 (Continued)

Sample Firms Selected for This Study

Type of Restaurant	Company	Stock Symbol
Family Restaurants (15)	29. IHOP Corp.	IHP
	30. Steak and Shake Co.	SNS
	31. Ryan's Family Steak Houses	RYAN
	32. Bob Evans Farms, Inc.	BOBE
	33. California Beach Restaurants, Inc.	CPKI
	34. CBRL Group, Inc.	CBRL
	35. CEC Entertainment, Inc.	CEC
	36. Eateries, Inc.	EATS
	37. Elmer's Restaurants, Inc.	ELMS
	38. Famous Dave's of America	DAVE
	39. Fresh Choice, Inc.	SALD
	40. Garden Fresh Restaurants	LTUS
	41. Luby's Cafeterias	LUB
	42. Max & Erma's Restaurants, Inc.	MAXE
	43. Piccadilly Cafeteria, Inc.	PIC
	44. Friendly Ice Corporation	FRN
Fast-Food Restaurants (23)	45. Jack in the Box	JBX
	46. McDonalds	MCD
	47. Wendy's	WEN
	48. Schlotzsky's, Inc	BUNZ
	49. CKE Restaurants	CKR
	50. Checkers Drive-In Restaurants, Inc	CHKR
	51. Yum! Brands, Inc	YUM
	52. Autogrill SpA	AGL
	53. Back Yard Burger, Inc	BYBI
	54. Diedrich Coffee Co.	DDRX
	55. Frisch's Restaurants	FRS
	56. Good Times Restaurants, Inc.	GTIM

Table 2 (Continued)

Sample Firms Selected for This Study

Type of Restaurant	Company	Stock Symbol
Fast-Food Restaurants (23)	57. Krispy Kreme	KKD
	58. Mertiage Hospitality Group Inc	MHG
	59. Morgans, Food	MR
	60. Nathan's Famous, Inc.	NATH
	61. Panera Bread Co.	PNRA
	62. Papa John's International, Inc.	PZZA
	63. Pizza Inn, Inc.	PZZI
	64. Quality Dining, Inc.	QDIN
	65. Sonic Corp.	SONC
	66. Starbucks Corporation	SBUX
	67. Triarc Companies, Inc.	TRY

Note. Number in parenthesis indicates number of firms in this segment included in the sample for this study.

Time Frame of the Study

In order to test the change in systematic risk after the events of 9/11, the time frame of this study was divided into two different periods: the 52 weeks before the 9/11 events and the 52 weeks after the 9/11 events. This short period was chosen because a longer post-9/11 period would include additional post-9/11 events, such as the war in Iraq and the Severe Acute Respiratory Syndrome (SARS) epidemic. Those events may also have had an impact on the restaurant stock price and beta, thus making the impact of 9/11 events on restaurant beta hard to determine.

Characteristic Line (CL) and Beta

The relationship between the rate of return on a security i (denoted by R_i) and the rate of return on a market portfolio (denoted by R_m) is explained by the characteristic line (Brigham, 1992; Haugen, 1995; Moses & Cheney, 1989; Radcliffe, 1994; Van Horne, 1989). The characteristic line describes the return that the stock can be expected to produce, as compared to the market's rate of return. It is also described by the line of best fit that minimizes the sum of the squared vertical distances from the line for each of the ordered pairs of the return on a firm's security and the return on a market portfolio (Bodie, Kane, & Marcus, 1989; Haugen, 1995; Moses & Cheney, 1989).

The characteristic line can be described by its slope and the point at which it passes through the vertical axis (its y-intercept). The slope of the characteristic line is commonly referred to as the stock's beta and is denoted by the symbol β. The slope or beta indicates the degree to which the stock responds to changes in the return produced by the overall market.

A value-weighted market portfolio, such as the Standard & Poors (S&P) 500 index, the NYSE index, or the NASDAQ composite index, is commonly used as the market portfolio index (Radcliffe, 1994; Reilly, 1994). These market portfolios contain a representative sample of all stocks, with each industry weighted in accordance with the overall market.

Researchers (Haugen, 1995; Levy & Sarnat, 1984; Van Horne, 1989) have explained the concept of a characteristic line by suggesting the possibility of classifying firms by their risks. For example, if stocks have a beta greater than one ($\beta > 1$), they are classified as aggressive (risky) stocks, because they go up faster than the market in a bull

market (rising market) but fall faster in a bear market (falling market). However, if stocks have a beta less than one ($\beta < 1$), they are classified as defensive (low-risky) stocks, because their returns fluctuate less than the market as a whole. Finally, if stocks have a beta equal to one, they are classified as the neutral (as risky as the market) stocks, because they fluctuate along with the market. According to Levy and Sarnat (1984), the price of "an ideal stock or portfolio" goes up faster than the market portfolio in a bull market and goes down more slowly than the market portfolio in a bear market. Levy and Sarnat (1984) also recommended the portfolio of an ideal stock, which combines the desirable properties of both a defensive, and an aggressive stock.

Estimation of Beta

The following simple regression equation is formulated using weekly restaurant stock return and weekly equal-weighted return on market portfolio, represented by weekly S&P 500 index change, to estimate the beta of each restaurant, where beta is a measure of the systematic risk of a firm's stock:

$$R_i = \alpha + \beta R_m + \varepsilon \qquad (3.1)$$

Where:

R_i = weekly restaurant stock return;

R_m = weekly market portfolio return;

α = constant;

β = estimated beta; and,

ε = the error about the regression line.

Based on this regression equation, the beta for each restaurant industry segment was estimated. The slope of the characteristic line is commonly referred to as the stock's beta and is denoted by the symbol β. The slope or the estimated beta indicates the degree to which the stock responds to changes in the return produced by the overall market.

Abnormal Return (AR) and Cumulative Abnormal Return (CAR)

The CAR method was introduced by Fama, Fisher, Jensen and Roll (1969). In the CAR method, the analysis period is divided into an estimation period (a pre-event period) and a post-event period. Designation of the location and length of either period is arbitrary. This study examined 104 weeks around the 9/11 events. This study designated -52, -51, -50, ..., -3, -2, -1 as the 52 weeks prior to the 9/11 events, 0 as the 9/11 event week, and +1, +2, +3, ..., +50, +51, +52 as the 52 weeks after the 9/11 events. Then, for each of the firms in the sample, the rate of return on each of the 104 weeks is computed.

The pre-event period observations were used to estimate the market model parameters, such as α_1 and β_1 in expression (3.2), for the pre-event and the post-event period. After estimating the market model parameters, AR was calculated for each of the 104 weeks for each firm in the sample. AR (ε_t) for a firm on week t is presented as following:

$$\varepsilon_t = R_{i,t} - (\alpha_1 + \beta_1 R_{m,t}) \qquad (3.2)$$

Where:

ε_t = abnormal return on week t;

$R_{i,t}$ = the actual stock return on week t;

$(\alpha_1 + \beta_1 R_{m,t})$ = the expected stock return on week t;

$R_{m,t}$ = the market return on week t;

α_1 = estimated market model constant from the pre-event period observations; and,

β_1 = estimated market model beta from the pre-event period observations.

Expression (3.2) depicts that AR (ε_t) is considered as the market model prediction error during the analysis period. An implicit assumption is that the market model parameters (α_1 and β_1) are not affected by the focal event during the post-event period. Therefore, the market model prediction error (AR), which is significantly different from zero during the post-event period, is attributed to the event. To measure the effects of the 9/11 events on sample securities, the average abnormal return on week t is obtained by averaging across the firms in the sample and is summed to yield a CAR, which stands for the cumulative abnormal return attained by each firm on each of the time intervals previously selected. The *t*-test is used to identify whether the estimated CAR of the post-9/11 period are significantly different from zero. The CAR 5 represents the CAR for week +5 in the post-9/11 period. The CAR 52 is the CAR for the 52nd week in the post-9/11 period. CAR $_{(-52,-1)}$ stands for the CARs obtained during the pre-event period; CAR $_{(-52,-20)}$ is the sum of the weekly average abnormal returns for weeks -52 to -20 during the pre-event period; CAR $_{(+1,+30)}$ is the sum of the weekly average abnormal returns for weeks 1 to 30 during the post-event period, and finally CAR $_{(+1,+52)}$ stands for those obtained for the post-event period. Since the market model is estimated by

employing the pre-event period observations, CAR (-52, -1), which means the total sum of the market model prediction errors in the pre-event period, is zero.

In this study, in order to see if the beta characteristic of the restaurant industry was changed after the 9/11 events, the analysis of the CAR pattern is concentrated on the post-9/11 period. For example, if the CAR of the post-9/11 period consistently rises or drops, then the CAR pattern of the post-9/11 period may be an indication that the beta has changed due to the 9/11 events.

The positive abnormal return is interpreted as resulting from a favorable event, which increases the profitability of the affected securities. It is possible that the positive abnormal return is affected by the increase in the risk factor when the market index rises (bull market), and vice versa. If the market index keeps rising, and the systematic pattern of a security' CAR drops gradually or becomes negative for the post-event period, it is possible that the market risk (beta) is decreased (Lee, 1996). On the other hand, when the market index keeps declining, the decrease in the market risk or beta can be a factor for the positive CAR for the post-event period. Therefore, the systematic pattern of a security's CAR can show the change in systematic risk. In order to investigate the change in beta, the CAR of entire restaurant industry and each restaurant segment is used for this study.

The Paired Sample *T* Test and Wilcoxon Signed Ranks Test for Testing the Hypotheses

The primary goal of this study was to investigate the change in systematic risk in the restaurant industry after 9/11. The Paired Samples *t* test was employed to determine whether the post-9/11 beta of the restaurant industry was significantly different from its

pre-9/11 beta. If the estimated post-9/11 beta of the restaurant industry was statistically significant from the estimated pre-9/11 beta of the restaurant industry, it would be interpreted as evidence of the impact of the 9/11 events on the restaurant industry's systematic risk. If the estimated post-9/11 beta of the restaurant industry was not statistically significant from the estimated pre-9/11 beta of the restaurant industry, it would be regarded as evidence of nonexistence of the impact of the 9/11 events on the restaurant industry's systematic risk. The paired sample *t* test was also used to identify whether the post-9/11 beta of the fine/casual dining, family, and fast-food restaurants was significantly different from its pre-9/11 counterpart. Because of the probability of the nonnormal distribution of the estimated betas of sample restaurants, the Wilcoxon Signed Ranks Test, a nonparametric substitute for the parametric *t* test, was also conducted to examine the change in systematic risk over the pre- and post-9/11 periods, not only in the entire restaurant industry, but also in each categorized restaurant segment.

The statistical computer program, Statistical Package for the Social Sciences (SPSS 11.5), was used for data analysis. The paired samples *t* test and the Wilcoxon Signed Ranks Test were conducted at the .05 level to test the null hypotheses (H_o, H_{o1}, H_{o2}, and H_{o3}). The usual significance level of .05 was employed for this study. If the observed value of the test statistic fell in the rejection region, the null hypothesis was rejected, or the alternative hypothesis was accepted. For example, if the observed z-value fell in the $z > 1.96$, the null hypothesis was rejected at the .05 level.

In summary, data collection and research methodology used to test research hypotheses of this study were specified. Three different types of restaurants were segmented. The time frame of this study was divided into two different periods, which

represent the 52 weeks prior to the 9/11 events and the 52 weeks after the 9/11 events. Furthermore, the procedure used to estimate beta or systematic risk of a firm's share and how CAR was used were explained. Next, Chapter 4 will discuss the results of the testing that was described in this chapter.

CHAPTER 4

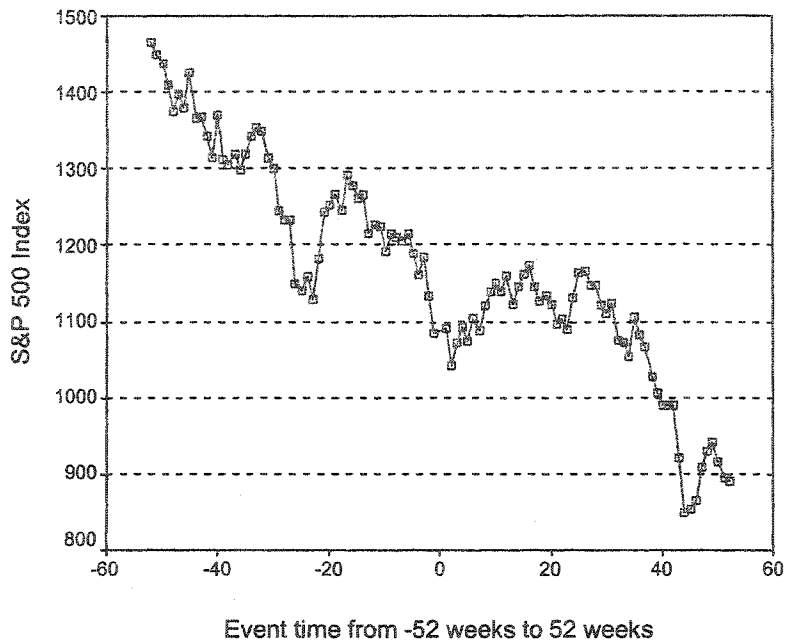
RESULTS AND ANALYSIS

Introduction

In Chapter 3, the methodology and procedure for data analysis were presented. In this chapter, the empirical results for this study are discussed and its findings are presented. First, an analysis of CAR is presented. The CAR patterns of each restaurant segment and the entire restaurant industry are discussed during the post-event period. The statistical *t* test results of the CAR are also presented for the explanation of the analysis of the CAR pattern. Second, the overview of the change in systematic risk of each restaurant firm is addressed. Third, the results of statistical testing of the restaurant beta before and after the 9/11 events are presented. Finally, the study findings are analyzed and discussed.

Analysis of Cumulative Abnormal Return (CAR)

Figure 2 shows the trend of the S&P 500 index in the pre- and post-9/11 period. The S&P 500 index fell markedly during the time frame of this study. Thus, over the post-911 period, there had been net movement downward in the S&P 500 index, which means that the average stock market had a negative rate of return. Thus, an economic recession might account for deterioration in the S&P 500 index in the pre- and post-9/11 period.

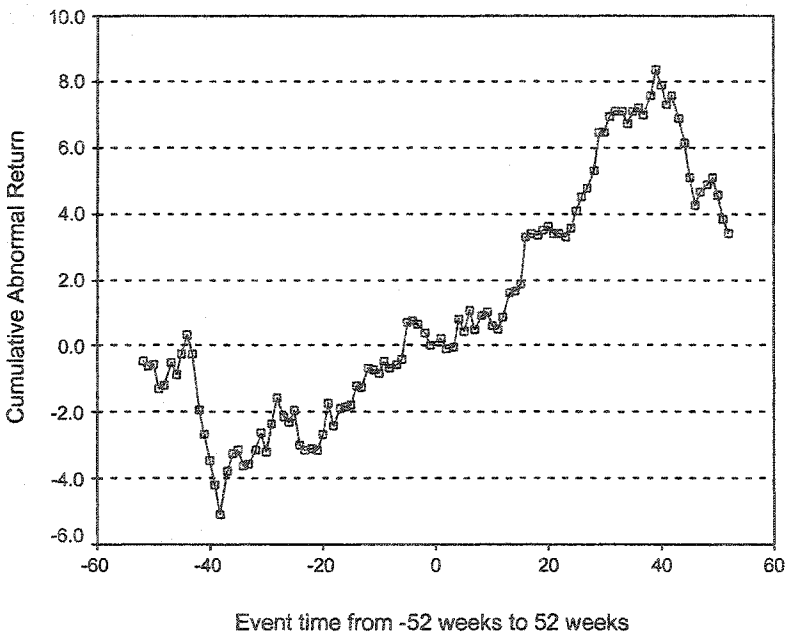


Note. Event time of 20 stands for CAR (1, 20). Event time of 0 stands for the 9/11 events week.

Figure 2 The S&P 500 Index Before and After the 9/11 Events

Figure 3 reports the CAR movement of the fast-food restaurant segment in the pre- and post-9/11 period. The CAR rose gradually from the 1st week to the 39th week in the post-911 period. The positively increasing CAR of the fast-food restaurant segment in the post-9/11 period means that its actual rate of return ($R_{i,t}$) is higher than its expected rate of return ($\alpha_1 + \beta_1 R_{m,t}$) in equation (3.2). An implicit assumption is that the market model parameters (α_1 and β_1) were not affected by the 9/11 events in the post-9/11 period. Thus, the actual rate of return ($R_{i,t}$) of the fast-food restaurant segment was relatively higher than the market rate of return ($R_{m,t}$) in the post-911 period. Because the market was in decline, with S&P 500 index, showing a negative rate of return, the actual rate of return ($R_{i,t}$) of the fast-food restaurant segment was relatively higher than the market rate of return ($R_{m,t}$).Thus, this segment's beta might be decreasing from the 1st

week to the 39th week in the post-9/11 period. However, the CAR dropped from the 39th week until the last week in the post-9/11 period. This might indicate that systematic risk was gradually increasing from the 39th week to the 52nd week in the post-9/11 period. The inconsistent patterns of CAR, which drifted upward and downward after the 9/11 events, may imply an overall insignificant change in its systematic risk for the 52 weeks after the 9/11 events.

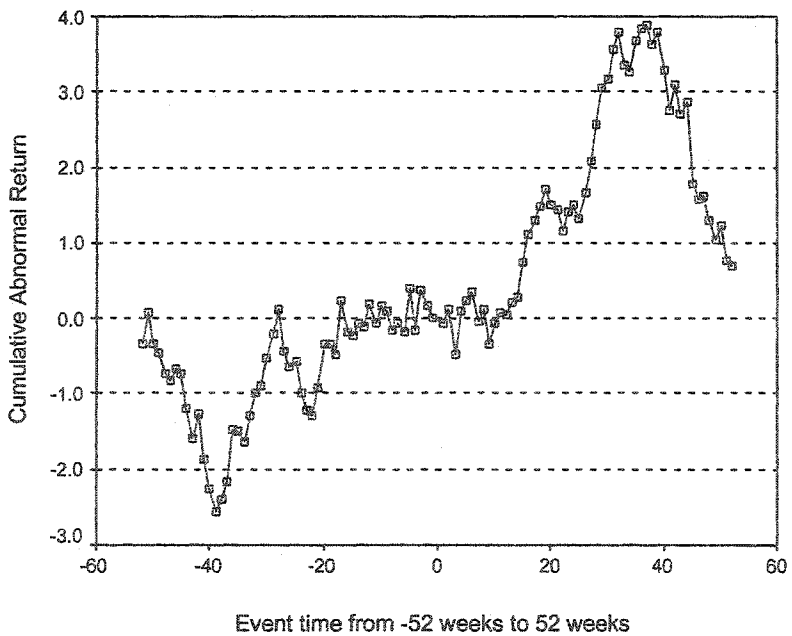


Note. Event time of 20 stands for CAR (1, 20). Event time of 0 stands for the 9/11 events week.

Figure 3 Cumulative Abnormal Return for the Fast-Food Restaurants

Figure 4 shows the CAR of the family restaurant segment during the time frame of this study period. The CAR of the family restaurant segment in the post-9/11 period shows a slightly different pattern from that of the fast-food segment. As soon as the 9/11 events occurred, the CAR repeatedly moved downward and upward for a while. After the 9/11 events, the CAR declined for a couple of weeks, rose for 4 weeks, and then dropped

for a couple of weeks again. The CAR started to rise continuously from the 9th week to the 32nd week, except for the 6 weeks from the 20th week to the 26th week, then declined for a couple of weeks and rose again in the 39th week in the post-event period. After the 39th week in the post-9/11 period, the CAR gradually decreased until the end of the time frame of this study. It is possible that the systematic risk of the family restaurant segment was unchanged during 10 weeks after the 9/11 events, gradually declined to the 32nd week, except for the 6 weeks from the 20th week to the 26th week, but then rose after the 39th week in the post-9/11 period. Thus, in Figure 4, the CAR pattern of the family restaurant segment does not show consistent movement in either direction in the post-911 period. Because of that, its average beta for the 52 weeks might not have changed significantly after the 9/11 events.

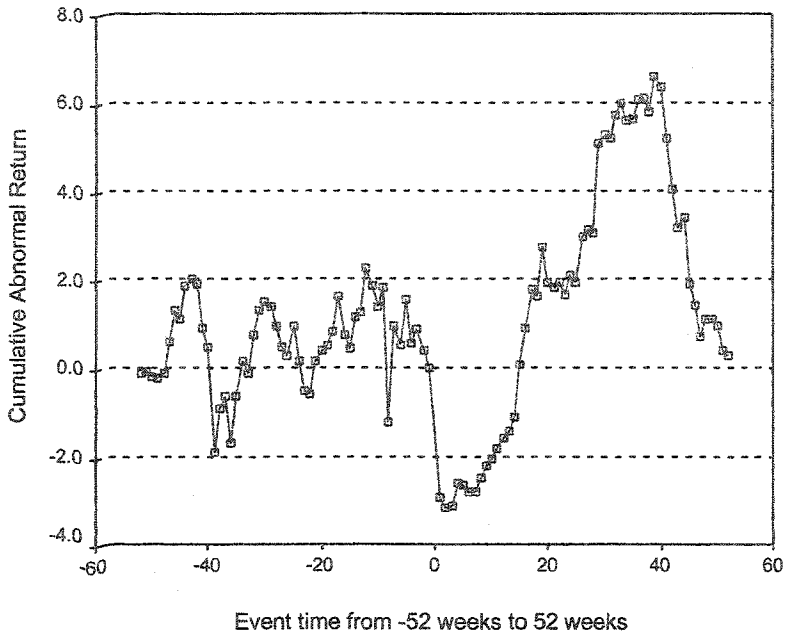


Note. Event time of 20 stands for CAR (1, 20). Event time of 0 stands for the 9/11 events week.

Figure 4 Cumulative Abnormal Return for the Family Restaurants

Based on the CAR patterns in Figures 3 and 4, the systematic risk of the fast-food and family restaurant segments, which declined but then rose in the post-9/11 period as a whole, might not have been fundamentally changed for the entire 52 weeks due to the 9/11 events. Therefore, these inconsistent movements of the CAR in the fast-food and family restaurant segments may imply that the 9/11 events did not have enough driving force to change the beta characteristics of these two restaurant segments. Overall, the fast-food and family restaurant segments seem to have experienced a clear "boost" after the 9/11 events, probably because their businesses are mainly related to customers' spending for 'necessity' aiming, whereby might reflect their unchanged beta characteristics after the 9/11 events.

Interestingly, compared to that of the fast-food and family restaurant segments, the CAR of the fine/casual dining segment shows a different pattern. In Figure 5, the CAR of the fine/casual dining segment dropped steeply as soon as the 9/11 events occurred, as if the CAR reflected the direct impact of the 9/11. However, after the 7th week in the post-9/11 period, the CAR rose sharply until the 39th week and then started to drop continuously until the end of the time frame of this study. Thus, the systematic risk of the fine/casual dining restaurant segment experienced an increase, a decrease, and then an increase again in the post-911 period. Figure 5 indicates that there is no net movement either up or down in the CAR pattern of the fine/casual dining segment in the post-911 period. This may also indicate that the 9/11 events did not have enough power to change the original beta characteristic of the fine/casual dining restaurant segment.

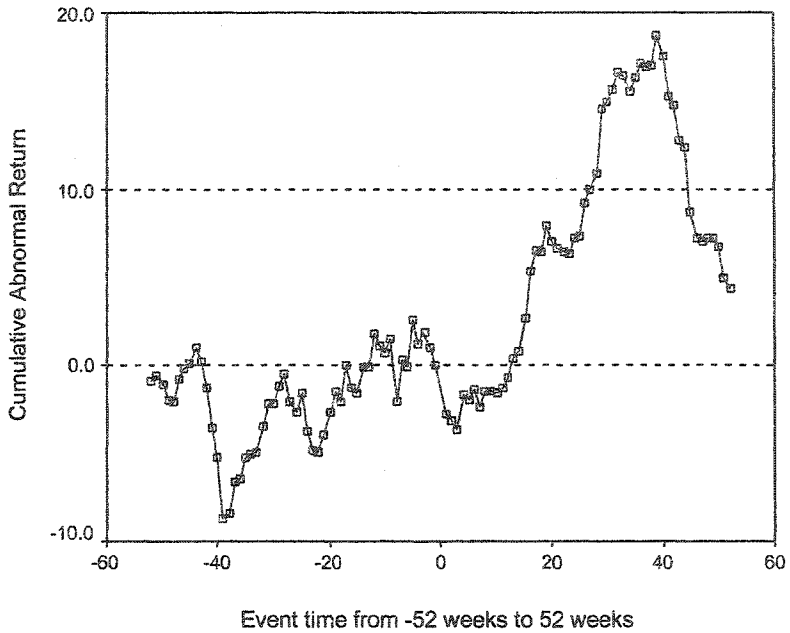


Note. Event time of 20 stands for CAR (1, 20). Event time of 0 stands for the 9/11 events week.

Figure 5 Cumulative Abnormal Return for the Fine/Casual Dining Restaurants

Figure 6 reports the CAR of the entire industry as a whole. The CAR pattern of the entire restaurant industry in the post-911 period is quite similar to that of the fine/casual dining restaurant segment. In Figure 6, after the 9/11 events, the CAR of the entire restaurant industry dropped for a while. Because the CAR dropped in the fine/casual dining segment immediately after the 9/11 events, the CAR of the entire restaurant industry had a negative value from the 1st week to the 12th week in the post-911 period. However, the CAR of the restaurant industry gradually rose from the 13th week to the 39th week. After the 39th week, the CAR consistently plummeted again until the last week of the time frame of this study. According to Figure 6, it is possible that the systematic risk of the entire restaurant industry temporally rose for a while as soon as the 9/11 events occurred, then gradually declined from the 12th week to the 39th week, and rose again from the 39th week until the end of the time frame of this study. That may be

an indication that even though the 9/11 events might have affected the entire restaurant industry temporarily, they did not have an impact on the fundamental change in the beta characteristic of the entire restaurant industry in the post-9/11 period.



Note. Event time of 20 stands for CAR (1, 20). Event time of 0 stands for the 9/11 events week.

Figure 6 Cumulative Abnormal Return for the Entire Restaurant Industry

In order to measure the effects of the 9/11 events on restaurant firms' securities, Table 3 reports the results of *t* tests used to identify whether the estimated CAR of the post-9/11 period is significantly different from zero. The weeks +5, +10, +15, +20, +25, +30, +35, +40, +45, and +52 were chosen to see whether the estimated CARs are significantly different from zero on each selected week and to identify whether the statistical results are consistent with the CAR pattern of each restaurant segment and for the entire restaurant industry.

In the fast-food restaurant segment, the CAR was significantly different from zero in the weeks +15, +20, +25, +30, +35, +40, and +45 (CAR 15: $t = 1.748, p = 0.094$; CAR 20: $t = 2.409, p = 0.025$; CAR 25: $t = 2.410, p = 0.025$; CAR 30: $t = 3.298, p = 0.003$; CAR 35: $t = 2.904, p = 0.008$; CAR 40: $t = 3.000, p = 0.007$; CAR 45: $t = 1.849, p = 0.078$). The CAR for these weeks, which is significantly different from zero, might be evidence of the effects of the 9/11 events. The CAR being significantly different from zero in the +15, +20, +25, +30, +35, +40, and +45 weeks might reflect the CAR's upward drift in the fast-food restaurant segment after the 9/11 events, as shown in Figure 3. However, the CAR was not significantly different from zero in the weeks +5, +10, and +52 (CAR 5: $t = 0.718, p = 0.480$; CAR 10: $t = 0.750, p = 0.461$; CAR 52: $t = 1.055, p = 0.303$). The insignificant fast-food CAR of 52 in Table 3 might reflect the fast-food CAR's persistent drop after the 39th week in the post-9/11 period in Figure 3. It is interesting that the CAR is significantly different from zero in the weeks +15, +20, +25, +30, +35, +40, and +45, but is not in the week +52 in the post-9/11 period. In Figure 3, the CAR did not continuously drift either upward or downward but moved up and down in the post-911 period. If the CAR had moved up consistently until the end of the time frame of this study in the post-911 period, then the fast-food CAR of 52 in Table 3 would have been significantly different from zero. Thus, these statistical results of the fast-food segment in Table 3 are consistent with the CAR pattern of the fast-food restaurant segment in Figure 3, which does not show continuous net movement either up or down. This consistency between the statistical results and the CAR patterns may indicate that the systematic risk of the fast-food restaurant segment was not significantly changed after the 9/11 events.

The CAR of the family restaurant segment was significantly different from zero in the weeks +30 and +35 (CAR 30: $t = 1.752, p = 0.100$; CAR 35: $t = 1.873, p = 0.081$). The significant family restaurant CAR of 30 and family restaurant CAR of 35 in Table 3 might mirror the CAR's move-up in the family restaurant segment after the 9/11 events in Figure 4. However, the CAR for this segment was not significantly different from zero in the weeks +5, +10, +15, +20, +25, +40, +45, and +52 (CAR 5: $t = 0.317, p = 0.756$; CAR 10: $t = -0.130, p = 0.899$; CAR 15: $t = 0.773, p = 0.451$; CAR 20: $t = 1.320, p = 0.207$; CAR 25: $t = 0.962, p = 0.351$; CAR 40: $t = 1.530, p = 0.147$; CAR 45: $t = 0.737, p = 0.472$; CAR 52: $t = 0.269, p = 0.792$). The non-significant family restaurant CARs of the weeks 5, 10, 15, and 20 in Table 3 might reflect the CAR's moves up-and-down for a while right after the 9/11 events in Figure 4. The insignificant family restaurant CARs of 40, 45, and 52 might reflect the family restaurant CAR's drop after the 39th week in the post–911 period in Figure 4. In Figure 4, the CAR in the family restaurant segment repeatedly drifted downward and upward until the 9th week after the 9/11 events. Then it gradually rose until the 39th week but, after that, it plummeted until the last week of the time frame of this study. The statistical results are also consistent with the CAR pattern of the family restaurant segment in Figure 4, which drifted upward and downward. Thus, the statistical results of the family restaurant segment might represent that its average systematic risk was not significantly changed due to the 9/11 events.

In the fine/casual dining restaurant segment, the CAR was significantly different from zero in the weeks +5, +10, +30, +35, and +40 (CAR 5: $t = -4.374, p = 0.000$; CAR 10: $t = -1.705, p = 0.100$; CAR 30: $t = 2.462, p = 0.021$; CAR 35: $t = 2.421, p = 0.022$; CAR 40: $t = 2.463, p = 0.020$). The significant CAR in the weeks +5 and +10 in Table 3

might reflect the CAR's plummet right after the 9/11 events in the fine/casual dining restaurant segment, but weeks +30, +35, and +40 mirror the CAR's gradual ascent. However, the CAR was not significantly different from zero in weeks +15, +20, +25, +45, and +52 (CAR 15: $t = 0.046, p = 0.963$; CAR 20: $t = 1.404$, p = 0.172; CAR 25: $t = 1.037, p = 0.309$; CAR 45: $t = 0.734, p = 0.469$; CAR 52: $t = 0.094, p = 0.926$). The non-significant fine/casual dining CARs of 15, 20, and 25 in Table 3 might reflect the recovery from the drop of the fine/casual dining restaurant segment right after the 9/11 events in Figure 5. The CAR's continuous plummet after the 39th week might have caused the non-significant fine/casual dining CARs of 45 and 52. In the fine/casual dining restaurant segment, statistical results in Table 3 are consistent with the CAR patterns in the post-9/11 period in Figure 5. Thus, these statistical results might also indicate that the average systematic risk of the fine/casual dining restaurant segment was not significantly changed after the 9/11 events.

In the entire restaurant industry, the CAR was significantly different from zero in the weeks +5, +20, +25, +30, +35, +40, and +45 (CAR 5: $t = -1.667, p = 0.100$; CAR 20: $t = 3.040, p = 0.003$; CAR 25: $t = 2.574, p = 0.012$; CAR 30: $t = 4.405, p = 0.000$; CAR 35: $t = 4.247, p = 0.000$; CAR 40: $t = 4.147, p = 0.000$; CAR 45: $t = 1.968, p = 0.053$). The significant CAR in week +5 might reflect the CAR's rapid plummet after the 9/11 events, but in weeks +20, +25,+30, +35,+40, and +45 it might mirror the CAR's continuous ascent in the entire restaurant industry after the 9/11 events. However, the CAR of the entire restaurant industry was not significantly different from zero in weeks +10, +15, and +52 (CAR 10: $t = -0.989, p = 0.326$; CAR 15: $t = 1.350, p = 0.182$; CAR 52: $t = 0.872, p = 0.386$). The non-significant CAR in week +52 might reflect the CAR's

continuous drop after the 39th week. In the entire restaurant industry, the statistical results of this study support the explanation for the CAR patterns because they are consistent with the CAR pattern of the entire restaurant industry in the post-9/11 period. In summary, the statistical *t* tests results in Table 3 are generally consistent with the CAR patterns of each restaurant segment and of the entire restaurant industry in the post-9/11 period. According to the statistical results in Table 3, the change in average systematic risk may not be significant for each restaurant segment, or for the entire restaurant industry in pre-and post-911 period.

Table 3

T Test for CAR difference by week

Type	*t* value	*df*	*P* (2-tail Sig.)
Fast-Food CAR 5	0.718	22	0.480
Family Rest CAR 5	0.317	15	0.756
Fine/Casual Dining CAR 5	-4.374	27	0.000***
Entire Restaurant CAR 5	-1.667	66	0.100*
Fast-Food CAR 10	0.750	22	0.461
Family Rest CAR 10	-0.130	15	0.899
Fine/Casual Dining CAR 10	-1.705	27	0.100*
Entire Restaurant CAR 10	-0.989	66	0.326
Fast-Food CAR 15	1.748	22	0.094*
Family Rest CAR 15	0.773	15	0.451
Fine/Casual Dining CAR 15	0.046	27	0.963
Entire Restaurant CAR 15	1.350	66	0.182
Fast-Food CAR 20	2.409	22	0.025**
Family Rest CAR 20	1.320	15	0.207
Fine/Casual Dining CAR 20	1.404	27	0.172
Entire Restaurant CAR 20	3.040	66	0.003***

Table 3 (Continued)

T Test for the CAR difference by week

Type	*t* value	*df*	*P* (2-tail Sig.)
Fast-Food CAR 25	2.410	22	0.025**
Family Rest CAR 25	0.962	15	0.351
Fine/Casual Dining CAR 25	1.037	27	0.309
Entire Restaurant CAR 25	2.574	66	0.012**
Fast-Food CAR 30	3.298	22	0.003**
Family Rest CAR 30	1.752	15	0.100*
Fine/Casual Dining CAR 30	2.462	27	0.021**
Entire Restaurant CAR 30	4.405	66	0.000***
Fast-Food CAR 35	2.904	22	0.008***
Family Rest CAR 35	1.873	15	0.081*
Fine/Casual Dining CAR 35	2.421	27	0.022**
Entire Restaurant CAR 35	4.247	66	0.000***
Fast-Food CAR 40	3.000	22	0.007***
Family Rest CAR 40	1.530	15	0.147
Fine/Casual Dining CAR 40	2.463	27	0.020**
Entire Restaurant CAR 40	4.147	66	0.000***
Fast-Food CAR 45	1.849	22	0.078*
Family Rest CAR 45	0.737	15	0.472
Fine/Casual Dining CAR 45	0.734	27	0.469
Entire Restaurant CAR 45	1.968	66	0.053*
Fast-Food CAR 52	1.055	22	0.303
Family Rest CAR 52	0.269	15	0.792
Fine/Casual Dining CAR 52	0.094	27	0.926
Entire Restaurant CAR 52	0.872	66	0.386

Note. The data is based on the 2-year period 2000–2002. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Overview of the Changes in Systematic Risk

Table 4 provides descriptive statistics of both the pre- and post-9/11 beta for the entire restaurant industry and each of three restaurant segments. The objective of providing the descriptive statistics of each restaurant segment's beta and the entire restaurant industry's beta during the analysis period is to profile and summarize the overall change in systematic risk after the 9/11 events. In Table 4, the sample shows that the mean beta declined after the 9/11 events in the entire restaurant industry from 0.56 to 0.51. The decline of mean beta in the fast-food restaurant segment was largest, from 0.67 to 0.47. The mean beta of the family restaurant segment also declined from 0.51 to 0.39. However, the mean beta of the fine/casual dining restaurant segment increased slightly from 0.50 to 0.62 after the 9/11 events. This result might be reflected by both substantial negative declines of CAR for a time right after the 9/11 events and the continuous decline of the CAR after the 39th week in the fine/casual dining restaurant segment in the post-9/11 period.

Table 4

Descriptive Statistics of Beta for the Restaurant Industry and Three Restaurant Segments in the Pre-9/11 and the Post-9/11 Period

Type	Mean		Standard Deviation		Minimum		Maximum	
	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11
Restaurant industry	0.56	0.51	0.52	0.45	-0.45	-0.54	2.08	2.18
Fast-food	0.67	0.47	0.62	0.39	-0.45	-0.54	2.08	1.16
Family	0.51	0.39	0.41	0.37	-0.36	-0.23	1.21	1.04
Fine/Casual dining	0.50	0.62	0.48	0.50	-0.26	-0.16	1.88	2.18

Note. The data is based on the 2-year period 2000–2002.

In Table 5, each restaurant firm's beta during the pre- and post-9/11 period is estimated over the 52 weeks of each period by the single index model in equation (3.1). As Table 5 shows, restaurant stocks are generally regarded as low-risk (defensive) stocks because most restaurant betas over the 2-year period 2000–2002 were much lower than one. In Table 5, the betas of pre-9/11 in the entire restaurant industry are slightly higher than those of the post-9/11. The betas of 30 firms out of the total sample increased after the 9/11 events. However, the betas of the 37 companies out of the total sample decreased in the post-9/11 period. In the fine/casual dining restaurant segment, the betas of 13 firms decreased, and 15 firms' betas increased after the 9/11 events. The betas of 11 firms out of the family restaurant segment decreased, and only four companies' betas increased after the 9/11 events. In the fast-food restaurant segment, 13 firms' betas dropped and 10 increased after the 9/11 events. Both in the pre- and post-9/11 period, eight firms out of the total sample (the pre-9/11 period: BNHN, CHGO, CHUX, TENT, ARKR, LTUS, BUNZ, PZZI, and the post-9/11 period: GRIL, STRZ, EATS, ELMS, GTIM, NATH, PZZI, QDIN) had a negative beta, which usually indicates that when the market return increases, the return of an individual stock decreases, and vice versa (Fernández, 2002).

Table 5

Restaurant Firms' Beta Values for the Pre-9/11 and the Post-9/11 Period

Type of Restaurant	Symbol	Pre-9/11 beta	Post-9/11 beta
Fine/Casual Dining	1. APPB	0.381	0.367
Restaurants	2. CAKE	1.032	0.724
	3. BNHN	-0.164[a]	0.115
(28)	4. EAT	0.803	0.496

Table 5 (Continued)

Restaurant Firm's Beta Values for the Pre-9/11 and the Post-9/11 Period

Type of Restaurant	Symbol	Pre-9/11 beta	Post-9/11 beta
	5. BUCK	0.830	2.178
	6. CMPP	0.005	0.478
	7. CHGO	-0.258[a]	0.805
	8. DRI	0.461	0.429
	9. DAB	0.711	0.236
	10. GCFBU	0.795	0.148
	11. GRIL	1.877	-0.100[b]
	12. LNY	0.812	0.927
	13. STAR	0.665	0.982
	14. MAIN	0.100	0.577
	15. CASA	0.809	0.703
Fine/Casual Dining	16. CHUX	-0.150[a]	0.334
	17. OSI	0.437	0.709
Restaurants	18. RARE	0.292	0.922
(28)	19. RUBO	0.583	0.689
	20. RI	0.296	0.729
	21. SZ	0.337	1.077
	22. STRZ	0.541	-0.155[b]
	23. TENT	-0.056[a]	1.738
	24. TWED	0.881	0.222
	25. BDL	0.151	0.102
	26. PFCB	1.255	0.790
	27. JAX	0.596	0.523
	28. ARKR	-0.112[a]	0.708
Family Restaurants	29 IHP	0.705	0.374
(15)	30. SNS	0.332	0.556
	31. RYAN	0.416	0.932

Table 5 (Continued)

Restaurant Firm's Beta Values for the Pre-9/11 and the Post-9/11 Period

Type of Restaurant	Symbol	Pre-9/11 beta	Post-9/11 beta
Family Restaurants (15)	32. BOBE	0.166	0.729
	33. CPKI	1.085	1.035
	34. CBRL	0.908	0.215
	35. CEC	0.447	0.130
	36. EATS	0.152	-0.152[b]
	37. ELMS	0.109	-0.234[b]
	38. DAVE	1.206	0.157
	39. SALD	0.711	0.151
	40. LTUS	-0.363[a]	0.010
	41. LUB	0.606	0.836
	42. MAXE	0.168	0.046
	43. PIC	0.738	0.693
	44. FRN	0.699	0.500
Fast-food Restaurants (23)	45. JBX	0.821	0.320
	46. MCD	0.334	0.696
	47. WEN	0.544	0.533
	48. BUNZ	-0.446[a]	0.548
	49. CKR	1.510	1.155
	50. CHKR	0.793	0.941
	51. YUM	0.946	0.476
	52. AGL	0.158	0.675
	53. BYBI	0.439	0.848
	54. DDRX	2.080	0.650
	55. FRS	0.052	0.403
	56. GTIM	0.785	-0.544[b]
	57. KKD	1.790	0.501
	58. MHG	0.402	0.613
	59. MR	0.738	0.064

Table 5 (Continued)

Restaurant Firm's Beta Values for the Pre-9/11 and the Post-9/11 Period

Type of Restaurant	Symbol	Pre-9/11 beta	Post-9/11 beta
	60. NATH	0.083	-0.035 [b]
	61. PNRA	1.173	0.780
	62. PZZA	0.862	0.461
	63. PZZI	-0.127 [a]	-0.003 [b]
Fast-food Restaurants	64. QDIN	0.361	-0.073 [b]
(23)	65. SONC	0.367	0.494
	66. SBUX	1.435	0.994
	67. TRY	0.360	0.364

Note. The data is based on the 2-year period 2000–2002. Number in parenthesis indicates the number of firms in this segment included in the sample for this study. [a] represents a negative beta in the pre-9/11 period. [b] represents a negative beta in the post-9/11 period.

Test Results

The results of the paired sample *t* test were used to identify whether the estimated pre-9/11 beta of the restaurant industry differed statistically significantly from its estimated post-9/11 beta. Table 6 shows the results of the paired sample *t* test of the entire restaurant industry, the casual/fine dining restaurant segment, the family restaurant segment, and the fast-food restaurant segment. The research hypothesis (H_a) is not supported because the *t* statistic ($t = 0.605$, $p = 0.547$) for the beta of the entire restaurant industry was not statistically significant at the 0.05 level. H_a states that the post-9/11 beta of the entire restaurant industry is significantly different from its pre-9/11 beta. This result explicitly shows that the post-9/11 beta of the entire restaurant industry is not statistically different from its pre-9/11 beta at the 0.05 level of significance.

Table 6

Paired Sample T Test for the Entire Restaurant Industry and Three Restaurant Segments

Industry	*t*-value	*df*	*P* (2-tail Sig.)
The entire restaurant industry	0.605	66	0.547
Fine/Casual dining restaurants	-0.918	27	0.367
Family restaurants	1.193	15	0.251
Fast-food restaurants	1.581	22	0.128

Note. The data is based on the 2-year period 2000–2002.

The research hypothesis (H_{a1}) is also not supported, because the *t* statistic value ($t = -0.918$, $p = 0.367$) for the beta of the fine/casual dining restaurant segment was not statistically significant at the 0.05 level of significance. H_{a1} stated that the post-9/11 beta of the fine/casual dining restaurant segment is significantly different from its pre-9/11 beta. This result clearly presents that the post-9/11 beta of the fine/casual dining restaurant segment was not statistically different from its pre-9/11 beta at the 0.05 level of significance.

The research hypothesis (H_{a2}) is rejected because the *t* statistic value ($t = 1.193$, $p = 0.251$) for the beta of the family restaurant segment was not statistically significant at the 0.05 level. H_{a2} stated that the post-9/11 beta of the family restaurant segment is significantly different from its pre-9/11 beta. This result explicitly indicates that the post-9/11 beta of the family restaurant segment was considered the same value as its pre-9/11 beta at the 0.05 level.

The research hypothesis (H_{a3}) is also rejected, because the *t* statistic value ($t = 1.581$, $p = 0.128$) for the beta of the fast-food restaurant segment was not statistically significant at the 0.05 level. H_{a3} stated that the post-9/11 beta of the fast food restaurant

segment is not significantly different from its pre-9/11 beta. This result clearly shows that the post-9/11 beta of the fast-food restaurant segment was not statistically different from its pre-9/11 beta at the 0.05 level.

The results of the Wilcoxon Signed Ranks Test for the entire restaurant industry and three restaurant segments are shown in Table 7. The entire restaurant industry, with 33.11 negative ranks and 35.10 positive ranks, shows that the minimum sum of ranks is 1225 for the negative ranks and is 1053 for the positive ranks. The mean rank reported in the test data table is computed by dividing the sum of ranks total by the number of negative or positive ranks. The p value ($p = 0.591$) for the Wilcoxon Signed Ranks Test of the entire restaurant industry implies that the research hypothesis (H_a) is not supported at the 0.05 level. Therefore, the post-9/11 beta of the entire restaurant industry is not significantly different from its pre-9/11 beta. As a result, it clearly shows that there is no significant change in average beta for the entire restaurant industry after the 9/11 events.

In the fine/casual dining restaurant segment, with 12.12 negative ranks and 16.57 positive ranks, the minimum sum of ranks is 157.50 for the negative ranks and is 248.50 for the positive ranks. The p value ($p = 0.300$) for the Wilcoxon Signed Ranks Test of the fine/casual dining restaurant segment implies that the research hypothesis (H_{a1}) is rejected at the 0.05 level. Therefore, the post-9/11 beta of the fine/casual dining restaurants is not significantly different from its pre-9/11 beta. This result clearly shows that there is no significant change in average beta for the fine/casual dining restaurant segment after the 9/11 events.

Table 7

The Wilcoxon Signed Ranks Test for the Entire Restaurant Industry and Three Restaurant Segments

The Entire Restaurants	N	Mean Rank	Sum of Ranks	W Statistic	*P* Value
Negative Ranks	37	33.11	1225	-0.537	0.591
Positive Ranks	30	35.10	1053		
Ties	0				
Total	67				
Fine/Casual Dining	N	Mean Rank	Sum of Ranks	W Statistic	*P* Value
Negative Ranks	13	12.12	157.50	-1.036	0.300
Positive Ranks	15	16.57	248.50		
Ties	0				
Total	28				
Family Restaurants	N	Mean Rank	Sum of Ranks	W Statistic	*P* Value
Negative Ranks	11	8.00	88	-1.034	0.301
Positive Ranks	5	9.60	48		
Ties	0				
Total	16				
Fast-Food Restaurants	N	Mean Rank	Sum of Ranks	W Statistic	*P* Value
Negative Ranks	13	14.15	184	-1.399	0.162
Positive Ranks	10	9.20	92		
Ties	0				
Total	23				

Note. The data is based on the 2-year period 2000–2002. Negative ranks mean the post-9/11 beta is less than the pre-9/11 beta. Positive ranks mean the post-9/11 beta is greater than the pre-9/11 beta. Ties mean the post-9/11 beta is equal to the pre-9/11 beta.

In the family restaurant segment, with 8 negative ranks and 9.6 positive ranks, the minimum sum of ranks is 88 for the negative ranks and is 48 for the positive ranks. The p value ($p = 0.301$) for the Wilcoxon Signed Ranks Test of the family restaurant segment implies that the research hypothesis (H_{a2}) is not supported at the 0.05 level. Therefore, the

post-9/11 beta of the family restaurants is not significantly different from its pre-9/11 beta. As a result, there was no fundamental change in average beta of the family restaurant segment after the 9/11 events.

In the fast-food restaurant segment, with 14.15 negative ranks and 9.20 positive ranks, the minimum sum of ranks is 184 for the negative ranks used for the Wilcoxon Signed Ranks Test. The p value ($p = 0.162$) for the Wilcoxon Signed Ranks Test implies that the research hypothesis (H_{a3}) is not supported at the 0.05 level. Therefore, the post-9/11 average beta of the fast-food restaurant was not significantly different from its pre-9/11 beta.

In summary, when it comes to comparing average betas, the paired sample t test and the Wilcoxon Signed Ranks Test show that one must accept the hypotheses that the pre- and post-9/11 betas are equal for the entire restaurant industry and each restaurant segment. Therefore, these results can be considered as strong evidence that there was no significant impact of the 9/11 events on the systematic risk of the entire restaurant industry, nor on that of each restaurant segment.

Summary

In general, restaurant stocks are recognized as defensive (low-risky) stocks because their firms' average beta values over the 2-year period 2000–2002 are much less than one. Due to an economic recession over the 2-year period, the S&P 500 index continuously dropped during the time frame of this study. Both the CAR pattern and the results of the CAR's t tests in the entire restaurant industry and in each restaurant

segment suggest that the 9/11 events did not have an impact on the fundamental change in the beta characteristic of the restaurant industry in the post-9/11 period.

The results of the paired sample *t* test show that the post-9/11 beta was not statistically different from the pre-9/11 beta in the entire restaurant industry and each categorized restaurant segment. Also, the results of the Wilcoxon Signed Ranks Test are consistent with the previous results of the paired sample *t* test.

This chapter has presented the findings and results of this study. The next chapter presents a summary of this study and discusses the implications of the tests of the hypotheses, and presents an agenda for future study.

CHAPTER 5

SUMMARY AND CONCLUSION

Summary

The primary purpose of this study was to investigate whether the systematic risk of the restaurant industry was significantly changed after the events of 9/11. More specifically, this study's objective was to investigate the change in systematic risk of three types of restaurants, including the fine/casual dining, family, and fast-food restaurant segments, after the 9/11 events. The study investigated 67 restaurant companies whose shares were traded on NYSE, AMEX, or NASDAQ during the 52 weeks prior and the 52 weeks after the 9/11 events. Twenty-three restaurants were included in the fast-food restaurant segment. The family restaurant segment consisted of 16 firms. Twenty-eight companies were included in the fine/casual dining restaurant segment. Thus, the total number of firms included in the study was 77.

According to the CAR patterns in Figures 4.2 through 4.5 and the statistical results of the CAR *t* test in Table 3, the change in systematic risk may not be significant, either in each restaurant segment or in the entire restaurant industry. The restaurant stocks' mean beta is 0.56 over the 52 weeks in the pre-9/11 period and is 0.51 in the post-911 period. Based on the results of descriptive statistics, all of the restaurants experienced a slight decrease in beta after the events of 9/11. The fast-food and family restaurant segments also experienced declines in their average beta values after the 9/11 events.

However, the average beta value in the fine/casual dining restaurant segment slightly increased after the 9/11 events. During the 2-year period 2000–2002, restaurant stocks could be characterized as defensive stocks (low risk) on the whole. This risk profile is probably characterized by less sensitivity to the exogenous environment, such as the economic growth rate, the inflation rate, recession, or acts of terrorism.

The results of the paired sample *t* test and the Wilcoxon Signed Ranks Test show that the post-9/11 beta was not statistically different from the pre-9/11 beta for the entire restaurant industry, or by each categorized restaurant segment. Because the entire restaurant industry and each type of restaurant segment did not experience a fundamental change in beta, it is possible that the results reflected the stability of restaurant firms' betas due to quickly rebounding and increased sales in the restaurant industry; thus, a structural shift precipitated by the 9/11 events evidently did not occur. According to the NRA (2002), in the 6 months following the 9/11 events, the restaurant industry continued to recover from the impact of these events. Although the restaurant industry was affected by the terrorist attacks and an economic recession, its sales had rebounded to pre-attack levels by November 2001. In December 2001, restaurant-industry sales jumped above pre-attack levels, posting a single-month sales record of $ 28.4 billion. In 2001, restaurant-industry sales had an increase of 0.8 percent on an inflation-adjusted basis. After the 9/11 events, restaurant-industry sales increased 1.3 percent in 2002 (National Restaurant Association, 2003). Due to the resiliency of the restaurant industry, the restaurant industry was able to minimize the effects of the 9/11 events. In other words, the 9/11 events did not fundamentally impact restaurant customers' psychological behavior. Restaurant customers continued eating out after the 9/11 events. This powerful

finding demonstrates that the US restaurant industry is indeed resilient, which has potentially important implication for restaurant manager and investor. Therefore, the resilient restaurant industry was able to experience a recovery and increased sales after 9/11. Due to the increased sales in the restaurant industry, the beta might not have changed after 9/11.

Conclusions

The conclusions of this study are as follows:

1. Restaurant stocks are generally defensive (low risky) stocks in comparison to the market;
2. The post-9/11 beta is not significantly different from the pre-9/11 beta for the entire restaurant industry and each segment of restaurant, such as the fine/casual dining restaurant, the family restaurant, and the fast-food restaurant;
3. The unchanged beta might reflect recovered sales and increased sales in the post-9/11 period. Therefore, the change in beta might not be significant; and,
4. Even though the 9/11 events might have an impact on the restaurant industry temporarily, they do not have enough driving force to change the beta characteristic for the 52 weeks after the events of 9/11.

Implications of the Study

The risk feature unaffected by an exogenous environment in the restaurant industry may have important implications for investors and executives of the hospitality industry. This study shows that the restaurant industry was generally characterized by

low risk during the period 2000–2002. Furthermore, the post-9/11 beta of the entire restaurant industry and each restaurant industry segment is not statistically different from the pre-9/11 beta. These results are probably due to the resiliency of the restaurant industry. Thus, the restaurant industry recovered its sales far more quickly and at a much faster pace than did other industries after the 9/11 terrorist attacks (Nolt & Foulkes, 2003).

According to the theoretical framework of CAPM (Lintner, 1965; Sharpe, 1963, 1964), a firm's systematic risk is the risk related to the capital markets, rather than to the firms itself. Therefore, beta, which measures systematic risk, influences the investors' required rate of return. The higher the beta, the higher the required rate of return and hence the lower the stock value for an existing shareholder. The lower the beta, the lower the required rate of return and hence the higher the stock value for the existing shareholder. Based on an improved understanding of the unchanged risk of the restaurant industry in the wake of the 9/11 events, restaurant investors and portfolio managers with restaurant shares can use restaurant stocks as buffers to offset high risk stocks and to create a more efficient investment portfolio.

Management is concerned with maximizing wealth; therefore, it needs to consider the relationship between decisions and risk. The cost of capital depends on risk. Therefore, capital structure decisions are dependent on risk. Based on the knowledge of the unchanged risk feature in the restaurant industry after the 9/11 events, restaurant management can make more competent and aggressive capital decisions that can increase systematic risk, such as the addition of new services, expansion of existing services, debt financial leverage. Its quick recovery from the 9/11 events implies low business risk for

restaurant firms. Therefore, aggressive restaurant owners can afford to take more financial risk by increasing leverage. Because interest rates are currently at very low levels, increasing a firm's debt will likely lower its overall cost of capital.

Recommendations for Future Research

In order to investigate the impact of the exogenous environment such as the 9/11 events on the hospitality industry, future studies can extend the time frame by collecting monthly stock prices instead of weekly stock prices. Numerous empirical studies have used 60-month stock prices to estimate beta. Therefore, in order to generalize the results of beta estimation, beta can be estimated over 60 months in the pre- and post-9/11 period for future studies.

Finally, the study can be extended to other hospitality industry sectors such as hotels, gaming firms, and airline companies. Because they have different characteristics, the impact of changes in the exogenous environment on them may differ. Thus, in order to investigate the impact of the 9/11 events on the hospitality industry as a whole, each hospitality segment will need to be discussed in future studies.

BIBLIOGRAPHY

Bodie, Z., Kane, A., & Marcus, A. J. (1989). Investments. Homewood: Irwin Inc.

Borde S. F. (1998). Risk diversity across restaurants. Cornell Hotel and Restaurant Administration Quarterly, 39, (2), 64-69.

Brigham, E. F. (1992). Fundamentals of financial management (6th ed.). Fort Worth, TX: The Dryden Press.

Ebbin, R. (2000, November). Checking out the competition. Restaurants USA. Retrieved May 7, 2003, from http://www.restaurant.org/rusa/magArticle.cfm

Ernst & Young (2001). The state of the industry: Assessing the impact of September 11. Retrieved May 3, 2003, from http://www.ey.com/GLOBAL/content.nsf/ International

Fama, E. F., Fisher, L., Jensen, M. C., & Roll, R. (1969). The Adjustment of Stock Prices to New Information. International Economic Review. 10, (1), 1-21.

Fast food favoured for comfort and value. (2001). Food Service and Hospitality, 34, (9), 8.

Fernández, P. (2002). Valuation methods and shareholder value creation. Amsterdam, Spain. Academic Press.

Foodservice growth forecasts reduced. (2001). Foodservice and Hospitality, 34, (9), 18.

Griffin, H.F. (2001). The impact of exogenous factors upon systematic risk. Dissertation Abstracts International, (UNI No. 3008534).

The Fiscal Policy Institute (2001, September 28). Economic impact of the September 11 World Trade Center attack [Preliminary Report]. Retrieved May 8, 2003, from http://www.fiscalpolicy.org/sep28WTCreport.pdf

John, F.R., & Wayne D. (1994). Restaurant industry update, security analysis. NY: Wertheim Schroder & Co.

Hamada, R.S. (1972). The effects of the firms' capital structure on the systematic risk of common stocks. Journal of Finance, 27, (2), 435-452.

Haugen, R. A. (1995). Modern investment theory. Englewood Cliffs: Prentice Hall.

Hawawini, G., & Viallet, C. (1999). Finance for executives. Cincinnati, OH: South-Western College Publishing Co.

Kiefer, N. M (2002). Economics and the origin of the restaurant. Cornell Hotel and Restaurant Administration Quarterly, 43, (4), 58-64.

Kim H., Gu Z., & Mattila A. S. (2002). Hotel real estate investment trusts' risk features and beta determinants. Journal of Hospitality & Tourism Research, 26, (2), 138-154.

Kim K. & Foulkes T. (2003). National Restaurant Association statement on the impact of war on the nation's restaurants. Retrieved September 25, 2003, from http://www.restaurant.org/pressroom/pressrelease.cfm.

Kochak, J. (2000). Getting carried away. Restaurant Business, 99, (22), 55-69.

Lee, J. (1996). Effects of DIDC announcements on common stock returns of depository institutions: An event study approach. Dissertation Abstracts International, (UMI No. 9710602).

Levy, H., & Sarnat, M. (1984). Portfolio and investment selection: Theory and practice. Englewood Cliffs, NJ: Pentice-Hall International.

Lintner, J. (1965). Security prices, risk and maximal gains from diversification. Journal of Finance, 20, (4), 587-615.

Lundberg, D. E. (1994). The hotel and restaurant business (6the ed.). New York, NY: Van Nostrand Reinhold.

Mandelker, G.N. & Rhee, S. G. (1984). The impact of the degrees of operating and financial leverage on the systematic risk of common stock. Journal of Financial and Quantitative Analysis, 19, (1), 45-57.

Markowitz, H. (1952). Portfolio Section. Journal of Finance, 6, (1), 77-91.

Megginson, W. L. (1997) Corporate finance theory. Massachusetts, MA: Addison-Wesley Educational Publishers, Inc., Reading.

Moses, E. A. & Cheney, J. M. (1989). Investment: Analysis, selection, and management. St. Paul: West Publishing company.

National Restaurant Association. (2003). 2003 Restaurant industry forecast. Washington, DC: Author.

Nolt, K. & Foulkes, T. (2002). Restaurant industry sales bounce back six months after 9/11. Retrieved September 25, 2003, from http://www.restaurant.org/pressroom/pressrelease.cfm

Nolt, K. & Kim, K. (2001). Local Restaurateur Explains Economic Impact of September 11 Tragedy on Her Business, Suggests Ways Congress Can Help Boost Economy. Retrieved September 26, 2003, from http://www.restaurant.org/pressroom/print/index.cfm

O'Neill, J. W. & Lloyd-Jones A.R. (2001). Hotel values in the aftermath of September 11, 2001. Cornell Hotel and Restaurant Administration Quarterly, 24, (6), 10-21.

Parsa, H. G. & Khan, M. A. (1992) Trends in the quick service restaurant industry. FIU Hospitality Review, 10, (1), 19-26.

Peters, J. (2002, October 21). Risk management becomes order of the day in aftermath of 9/11. Nation's Restaurant News, 36-42.

Powers, T. (1995). Introduction to management in the hospitality industry (5th ed.). NY: John Wiley & Sons, Inc.

Queiroz, L. (2002, Spring) Risk management strategies for the hospitality industry. FIU Hospitality Review, 20, (1), 31-33.

Radcliffe, R. C. (1994). Investment: Concepts, analysis, and strategy. New York: HarperCollins College Publishers.

Ramchand, L. & Sethapakdi, P. (2000). Changes in systematic risk following global equity issuance. Journal of Banking & Finance, 24, (9), 1491-1513.

Reilly, F. K (1994). Investment Analysis and Portfolio management. Fort Worth: The Dryden Press.

Robicheck, A. & Cohn, R. (1974). The economic determinants of systematic risk. Journal of Finance, 29, (2), 439-447.

Rubenstein, M.E. (1973). A mean-variance synthesis of corporate financial theory. Journal of Finance, 28, (1), 167-181.

Sankaranarayanan, S. (1986). An analysis of the effects of government regulations of business in the CAPM framework: A test of risk-change hypothesis. Unpublished doctoral dissertation, University of Pittsburgh.

Sharpe, W.F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. Journal of Finance, 19, (3), 425-442.

Sharpe, W.F. (1963). A simplified model of portfolio analysis. Management Science, 9, (2), 277-293.

Strong, R. A. (2001) Practical investment management (2nd ed.). Cincinnati, OH: South-Western College Publishing Co.

Turnbull, S.M. (1977). Market value and systematic risk. Journal of Finance, 32, (4), 1125-1142.

Van Horne, J. C. (1989). Financial management and policy. Englewood Cliffs: Prentice Hall.

Ware, R., & Rudnick, J. (1991). How to open your own restaurant: A guide for entrepreneurs. New York: Penguinbooks.

VITA

Graduate College
University of Nevada, Las Vegas

Kihun Kim

Home Address:
3269 E. Flamingo Rd. #206
Las Vegas, NV 89121

Degrees:
Bachelor of Science, Tourism, 1998
Hanyang University

Thesis Title: The Change in Systematic Risk after the 9/11 Events:
An Analysis of Restaurant Industry

Thesis Examination Committee:
Chairperson, Dr. Zheng Gu, Ph.D.
Committee Member, Dr. Collin Ramdeen, Ph.D.
Committee Member, Dr. Karl J. Mayer, Ph.D.
Graduate Faculty Representative, Dr. Seungmook Choi, Ph.D.