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FINANCIAL ANALYSIS AND INFORMATION TECHNOLOGY: THE IMPACT OF BEING AN INTERNET-DEPENDENT FIRM ON THE FIRM'S STANDARD FINANCIAL RATIOS AND STOCK RETURNS

A DISSERTATION

Presented for the

DOCTOR OF PHILOSOPHY

Degree

THE UNIVERSITY OF MISSISSIPPI

Aurore José Kenmegne Kamssu

May 2000

To the Graduate Council:

I am submitting herewith a dissertation written by Aurore José Kamssu entitled "Financial Analysis and Information Technology: The Impact of Being an Internet-dependent Firm on the Firm's Standard Financial Ratios and Stock Returns." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration, with a major in Management Information Systems.

Dr. Brian Reithel, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the council:

Dean of The Graduate School

DEDICATION

This dissertation is dedicated to:

my husband, Honore Kamssu, for all the sacrifices he made for me and with me

and

my parents: Francois Didemnou & Elisabeth Tchewa, who have raised me and made me realize at an early age the importance of education.

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I would like to take this opportunity to express my deep appreciation to the people who have made this dissertation possible.

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Finally, I would like to thank my brothers, sisters and brother-in-laws for their moral support.

ABSTRACT

This research attempts to assess the impact of being an Internet-dependent firm on a firm performance. The need for this research exists because information technology is an important element in business strategy. The choice of a particular technology (such as Internet technology) to implement a firm's business strategy may impact the firm's financial structure and stock valuation.

Based on a search of the previous literature, most research in the field of management information systems has focused on areas such as information quality, user satisfaction, and organizational impact as measures of information technology success. There appears to be a lack of research measuring the impact of information technology on companies' stock valuation. Stock valuation is an important aspect of company success that involves not only management's and users' evaluations, but also outsiders' perception of the company. This study analyzes the impact of being an Internet-dependent firm on both the standard financial ratios and the stock return.

The result of financial ratio analyses revealed that some ratios show a significant difference between Internet-dependent firms and non-Internet firms. Ratios such as total asset turnover and return on assets reveal that Internet-dependent firms have fewer total assets than non-Internet firms. Profitability is one other factor that discerns both types of firms. The net profit margin and return on assets show that currently Internet-dependent firms are less profitable than non-Internet firms. Finally, the market-to-book ratio shows that Internet-dependent firms appear to be relatively overpriced compared to non-Internet firms.

Empirical results indicated that dependency on the Internet has a positive effect on stock returns. It appears that Internet-dependent firms have higher returns than non-Internet firms. These high stock returns seem to justify why Internet-dependent firms' stocks are selling at higher prices than non-Internet firms' stocks are trading. The reason is that the price of a stock is the discounted value of future returns.

The present study shows that the Internet affects some financial ratios as well as stock returns. It can therefore be concluded that the choice of a particular

technology impacts not only the financial structure of a company, but also the firm's market capitalization.

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CHAPTER ONE

Introduction

As we enter the second millennium, innovations and competitive pressures force organizations to rethink the manner in which they conduct business and to redefine the essential ingredients for success (Hoplin, 1995). Effective communication has become essential to the welfare or even the survival of many organizations. Effective communication can be defined as the fast transfer of information at low costs.

Since information is viewed as a key in developing business strategies, information technology (IT) and information systems (IS) are essential tools for success. In addition, the growth and the convergence of computing, communication, and knowledge technologies allow businesses to formulate strategies that transcend boundaries of time, places and form (Ferguson, 1996) and therefore, take advantage of global markets and business opportunities.

This globalization of the business environment has lead to the creation of virtual organizations.

Virtual organizations are complex organizational structures created as a result of the changes in both technology and its management. These structures are evolutions that enable the emerging organizations to adapt, survive, and become stronger in a new business environment brought about by global competitive pressures (Rockart, 1998).

As organizations increasingly depend on IT, problems related to construction, use, management, and maintenance of technologies become more frequent. Companies are investing more and more in IT by building infrastructures to support increasing volume of cross-border trading (Ferguson 1996). Given the increasing amounts to time and money invested in IT infrastructures, it has become important for decision-makers to know how a specific infrastructure may impact their company.

Previous research has had difficulty establishing a direct linkage between IT investment and organization performance (Tam, 1998). This difficulty becomes more crucial with Internet investments. The latest convergence of IT investment toward the Internet has made investment

decisions a challenging task for IT managers. The Internet explosion is a major change in the field of IT.

The Internet explosion has led to the creation of a group of virtual organizations (called Internet-dependent firms) that are challenging for investors. Research in this area is necessary because investors' behavior toward Internet-dependent firms cannot easily be explained using the traditional methods for analyzing a firm's performance. For example, some Internet firms are not showing profits but their stock values are increasing dramatically. A well-known case is Amazon.com. The company's stock value has rapidly increased, although it is not expected to become profitable before 2003 (*Business Week*, December 14, 1998).

It has been difficult to establish direct linkages between IT strategy and business strategy (Groenfeldt, 1997). By examining investor behaviors with respect to Internet-dependent firms, researchers may be able to identify at least one key linkage between internal IT investment decisions and the firms' perceived performances.

1.1 Statement of the Problem

In an attempt to define and assess information system success, most research in the field of Management Information Systems (MIS) has focused on information system quality, user satisfaction, and organizational impact (Delone and McLean, 1992). Those areas of focus do not fully explain a company's decision to adopt a given technology.

The choice of an IT-strategy is important when developing a firm's business strategy because using a particular technology may have an impact on a firm's market capitalization. Therefore, the impact of the IT investment on a firm's financial performance may explain a company's decision to invest in one type of information technology rather than another. In other words, the information conveyed to investors by the company's decision to invest in an information system may have an impact on the company's stock valuation; and the firm's stock performance should be an indicator of IT investment success.

When faced with the choice of implementing a business strategy using a particular technology, decision-makers must take into account the impact of IT strategy. Choosing a particular IT strategy may affect not only the company's

productivity, but also on the market valuation of the company's stocks. In other words, decision-makers should try to understand how IT investments affect each group of individual (users, suppliers, customers, and shareholders).

Decision-makers are likely to encounter some difficulties when trying to predict the impact of investing in a technology on their firm. One major problem with connecting IT investment to firm performance is that little scientific research has been done (Tam, 1998). Kettinger, et al. (1994) studied the sustainability of competitive advantage resulting from IT investment. They stated that little empirical research has been done to evaluate the role that IT plays in changing a firm's competitive advantage. Other researchers, such as Avison, et al. (1998) and Bleiweiss (1998), have expressed the belief that the use of information technology enhances competitive advantage; however, research results suggest different explanations for the impact of IT on a firm's performance.

For instance, Kettinger, et al. (1994) analyzed the competitive position of firms that were using strategic information systems. Their study defined three sets of factors: environmental factors (industry structure), foundation factors (size, technological resources), and

action factors (managing risk) that are important parts of the IT impact equation. Their examination was based on relative measures of profitability and market share. The results suggested that firms that were strategic users of IT not only realized sustained gains in profitability and market share relative to competitors in their respective industry, but also exhibited differences in sustainability factors from firms that did not use strategic information systems. They concluded that firms using strategic IT systems have an advantage over firms without comparable systems.

In addition to the need for conclusive research measuring the impact of information technology on a firm's competitive advantage, there is also a need for research relating IT investment and financial performance. Tam (1998), in measuring the impact of information technology investments on firm performance, faced the problem that little work has been done related to IT-investment and firm performance. The findings did not give any leads as to how IT investment affects financial performance. Tam concluded that IT investment was not correlated with stockholders' return.

Tam's (1998) findings do not provide guidance to decision-makers in choosing a technology that improves market performance. Tam's results imply that all IT investments will have no effect on the firm's stock valuation. These results appear not to be applicable to Internet investment. Internet technology is so new that conclusive research has not been found to confirm or deny Tam's propositions.

In the past few years there has been a rapid increase in the number of firms that offer goods and services over the Internet. This rapid growth has not been followed with sufficient research exploring the decision-making process used by investors as they attempt to choose stocks in which to invest based on the company's IT-investment. There seems to be a strong link between IT-investment and firm valuation. This link is even more pronounced with investment in Internet technology.

The current flow of investment activity in Internet-dependent firms offers a rare and unique opportunity to study the impact of a firm's decision to invest in a new technology on the perceived future value of the firm when that firm is compared to others in the same industry.

1.2 Purpose of the Study

The swift development of Web-site technology and the cultural shift toward encouraging electronic commerce have led to the growth of the Internet and the electronic marketplace. The Internet is increasingly being used to accomplish transactions formerly realized through person-to-person contact. This increase of Internet use leads to a rapid increase in the price of Internet shares. Anders (1998) reports that e-Bay Inc. went public at $18 a share on September 24, 1998, and the stock quickly tripled in value by closing.

DePrince, et al. (1999) reports that the Internet economy is growing so fast that economists are struggling to grasp and measure all its effects. This rapid growth is creating irrational excesses in market valuations. It means that contrary to Tam's (1998) conclusion, Internet technology may have some impact on a firm's market valuation. Therefore, Internet-dependent firms present an ideal test case for studying the impact of IT investment on a firm's performance.

The goal of this dissertation is to assess how using a particular technology (in this case Internet technology) can have a measurable impact on the firm's financial

performance. The study focuses on two types of performance measures: the financial ratios and the stock return. Financial ratios are tools used to set the price of an asset whereas Stock return is a measure of the value added to the price of the stock.

Financial ratios contribute to the understanding of a firm's business strategy. James (1999) says that in the past, well-understood measures such as the current ratio of stock price to corporate earnings determined an Initial Public Offer (IPO). These ratios vary according to the structure of the balance sheets and the income statement of the company. Internet-dependent firms' income statements and balance sheets may be structured differently compared to non-Internet firms. This difference may be attributed to the fact that Internet-dependent firms appear to have fewer assets and are not yet showing profits. This study will conduct a competitive analysis of Internet-dependent firms and non-Internet firms to explore the differences in their financial ratios and to determine if the differences are fundamental or transient.

This dissertation will also develop a model to determine whether a firm's investment in Internet technology has an impact on that firm's stock return. To

accomplish this, the present study adds an Internet variable to the Fama and French (1993) model and determines the significance of the variable and whether the model is a better predictor of stock return.

The Fama and French (1993) model suggests that stock returns are affected by two principal factors: the portfolio size and the book-to-market ratio. Fama and French found a negative relationship between firm size and stock return and a positive relationship between book-to-market value and stock return.

The present study is important for company decision-makers in the sense that using a technology may convey some information about a firm's expected future performance. Perceptions by investors may shift the firm's value and affect the stock return. Therefore, IT managers have to make good technology decisions, because these decisions may impact the way investors establish the value of the company. In the case of the Internet, a corporate decision-maker must understand the impact of Internet technology decisions on the company's stock valuation before making a significant Internet technology investment decision.

1.3 Conceptual Model

The research model in this study presents various firm performance measures and the determinants of firm value as illustrated in the existing literature. In addition, this study examines the significance of another variable: the firm's dependency on Internet technology.

In practice, there are many different levels of firm dependency on the Internet. The present study considers three levels.

1.3.1 Levels of Dependency on the Internet

- **Non-Internet firms** are firms that do not use the Internet in their business. They use other, more traditional means to market and sell their goods and services. Many times, a major part of the traditional firm's customers do not use the Internet, and transactions are completed using other means. Figure 1.1a presents transactions of traditional firms. In the current study, a firm that realizes less than 25 percent of its transactions over the Internet will be considered a non-Internet firm.

- **Mixed firms** are firms in which part of their market share is tied to the use of the Internet. These are

ordinary firms that take advantage of Internet technology to improve or expand their scope of action by attracting a new category of customers while remaining loyal to old ones. These firms can supply goods and services to local customers as well as to those in remote areas. Figure 1.1b represents transactions of mixed firms. If a firm realizes between 25 and 75 percent of its business over the Internet, it is classified as a mixed firm in this study. This study does not address the valuation of mixed firms.

- **Internet-dependent firms** are firms that could not exist without the Internet. These are organizations that function only via the Internet. They start with no other means to market their goods and services to customers. Given their virtual presentation, there is no distinction between local and distant customers. Figure 1.1c represents transactions of Internet firms. A firm that realizes more than 75 percent of its sales over the Internet is classified as an Internet-dependent firm in this study.

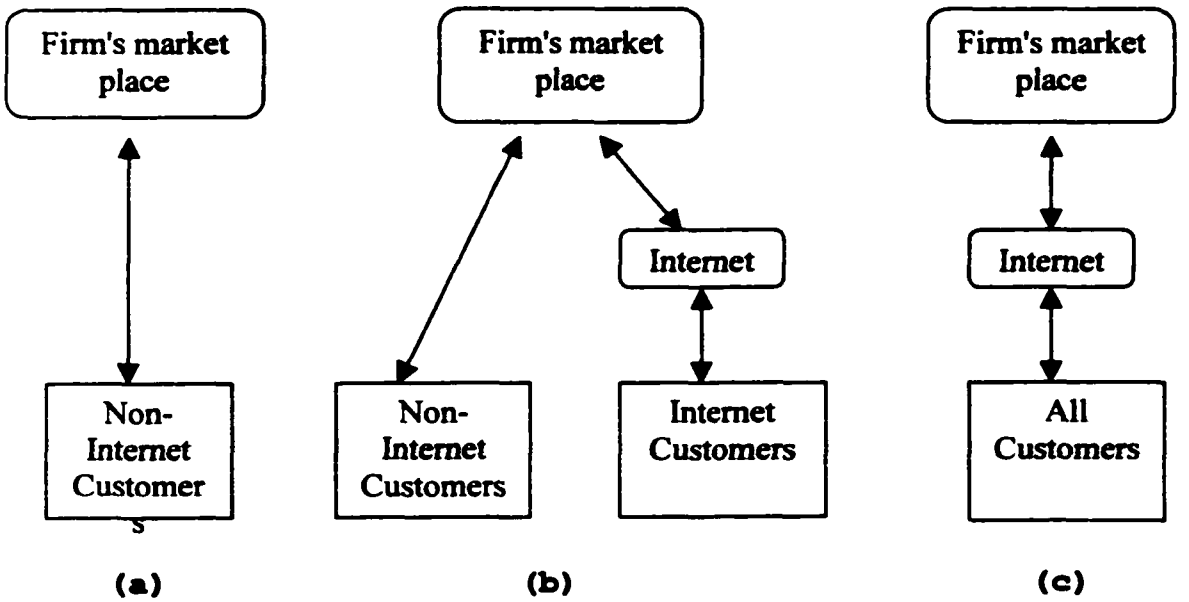

Figure 1.1: Steps in a Business Transaction Using (a) Traditional Firms, (b) Mixed Firms, (c) Internet Firms.

Dependency on the Internet may affect a firm's financial ratios, stock returns, and perceived market value. Firms depending strictly on the Internet are expected to have a financial structure different from that of other firms. Their assets are more likely to be current assets than fixed assets (plant and equipment). The majority of Internet firms will not have as much investment in office space, furniture, and supplies as standard firms and most of them do not carry much inventory. They are more likely to invest in computers and software since customers usually do not need to meet company representatives face to face. In the event of liquidation,

shareholders incur more risk because not much can be earned from selling the firm's limited physical assets. Therefore, valuation of their stocks should be based on different criteria and their performance in the stock market must show a different pattern. The values of Internet-dependent stocks are more volatile than those of non-Internet stocks.

1.3.2 Financial Performance

> "Much research indicates that accounting statements provide important information about the value of a firm. Financial analysts and managers learn how to rearrange financial statements to squeeze out the maximum amount of information. In particular, analysts and managers use financial ratios to summarize the firm's liquidity, activity, financial leverage, and profitability. When possible, they also use market values." Ross S. A, Westerfield R. W., and Jaffe J. (1996, p. 39)

A financial analyst assists in identifying an organization's strengths and weaknesses. An analysis of the firm's financial ratios is generally one of the first steps in financial analysis. Financial ratios are calculated using the firm's financial statements. The commonly used financial statements are balance sheets (Table 1.1) and income statements (Table 1.2). While the market value gives the true value of the firm as perceived

by outsiders, the return on stock gives the value added to the price of the stock.

Table 1.1: Balance Sheets

ASSETS	LIABILITIES & EQUITY
Current Assets	***Current Liabilities***
• Cash	• Accounts payable
• Marketable securities	• Notes payable (Bank)
• Accounts receivable	• Accrued taxes payable
• Inventories	• Other current liabilities
	• Current long-term debt
	Long-term debt
Net Fixed Assets	***Stockholders' equity***
• Plant & equipment - depreciation	• Stock
	• Retained earnings

Table 1.2: Income Statement

Net sales
(-) Cost of sales
= Gross profit margin
(-) Operating expenses
= Earnings before interest and taxes (EBIT)
(-) Interest charges
= Earnings before taxes (EBT)
(-) Taxes
= Earnings after taxes (EAT)
(-) Dividends paid
= Retained Earnings

a) Financial Ratios

A financial ratio is a relationship that gives information about a firm's activities. For instance, a liquidity ratio compares the firm's short-term assets and liabilities. Financial ratio analysis is achieved by evaluating the information from the financial statement in the form of percentage values.

No single financial ratio could answer all the analytical needs. Five commonly-used categories of financial ratios (Lee and Finnerty (1990), Moyer, et al. (1998) and Weston and Brigham (1987)) include:

- ***Liquidity or short-term solvency ratios:*** measure the firm's ability to meet its short-term financial obligations. In general, these obligations are normally due within one year.
- ***Asset management or activity ratios:*** measure the ability of the firm to manage its investment in assets. They indicate how efficiently the firm is using its resources. These ratios are also referred to as turnover ratios.
- ***Financial leverage or long-term solvency ratios:*** measure the extent to which the firm relies on debt financing. These ratios emphasize the long-term commitments to creditors and indicate a firm's capability to meet not only long-term but also short-term debt obligations.
- ***Profitability ratios:*** measure the extent to which a firm is profitable. These ratios show the combined effects of liquidity, asset management, and debt management on operating results by measuring how effectively a firm's

management generates profits on sales, assets, and stockholders' equity.

- ***Market-value ratios:*** measure the financial market's evaluation of a company's performance. These ratios are more complete in the sense that they indicate the true value of the firm's securities as assessed by the market. They reflect forward estimates of earnings and the resulting dividends to investors. The price of a security is often used by analysts and investors in stock analyses because it is the discounted value of future cash earnings.

Analysts must examine a mixed of financial ratios from different categories. Those ratios should be compared with other firms' ratios or intra-firm ratios from previous years. Therefore, it is important to perform either an *inter-firm* (industry) analysis or an *intra-firm* (trend) analysis. Moyer, et al. (1998) observes that, "Financial ratios enable an analyst to make a comparison of a firm's financial condition over time or in relation to other firms."[1]

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[1] Moyer R. C., McGuigan J. R., & Kretlow W. J., *Contemporary Financial Management*, (Cincinnati: South-Western College, 1998), p. 68-69.

By definition, an inter-firm analysis compares ratios of one firm with those of other firms at one point in time; whereas, an intra-firm analysis analyzes the trend in ratios of an individual firm over time. It tells the analyst whether the firm's situation is improving or deteriorating.

If, as expected, a firm's level of dependency on the Internet has an impact on the structure of its financial ratios, that impact could be assessed by evaluating the following model:

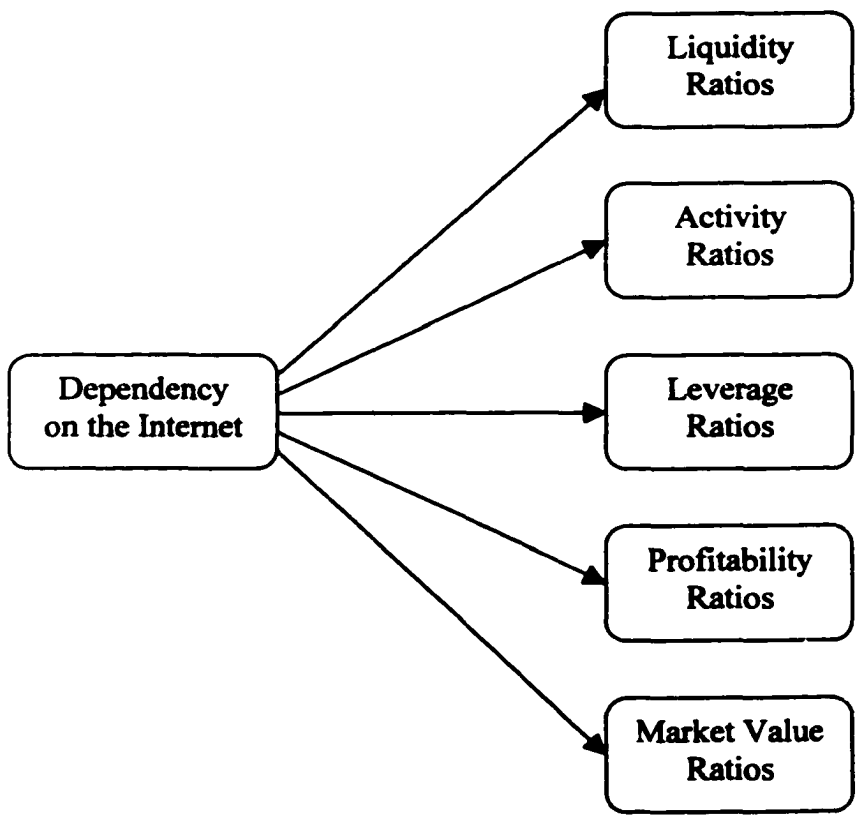


Figure 1.2: Relationship between Dependency on the Internet and Financial Ratios

One goal of this study is to measure the perceived impact of IT investment decisions on the firm's expected future performance. In other words, the purpose is to determine whether IT-investment decisions are expected to affect a firm's performance. The present study utilizes an inter-firm analysis to compare the financial ratios of Internet-dependent firms with those of non-Internet firms (also called control firms). This method differs from the traditional approach in which financial ratios are viewed as important determinants of the firm's performance as measured by stock returns.

b) Stock Return

Fama and French (1993, 1995) have studied the determinants of stock return. They have suggested that two factors determine the stock return, that is, portfolio size and book-to-market ratio. Size and book-to-market equity (BE/ME) are related to profitability. Their model can be represented as followed:

- **Traditional Model**

Figure 1.3 represents the variables that affect the stock's expected return in the traditional Fama and French model.

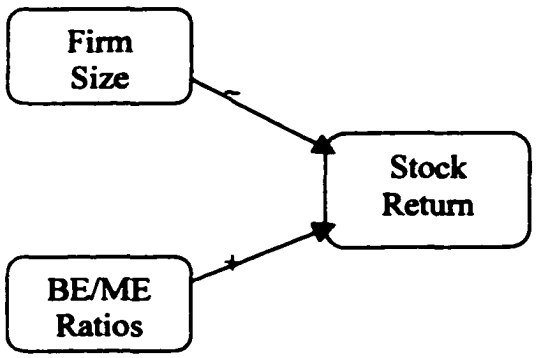


Figure 1.3: Variables Affecting Firm's Stock Return as Presented by Fama and French (1993, 1995)

(-) According to Fama and French, there is a negative relation between firm size and excess return. Stocks of small firms (low market capitalization) tend to have higher excess returns than stock of big firms (high market capitalization). Fama and French's rationale is that size is related to profitability. The stocks of small firms tend to have lower earnings on book equity than do stocks of big firms. So investors will find small firms' stocks attractive only if the value of each share will appreciate more than that of big firms' stocks.

(+) The Fama and French model also holds that there is a strong positive relation between excess returns and book-to-market equity. Firms that have high book-to-market value tend to have high returns. Fama and French hypothesize that the market makes unbiased forecasts of

earnings' growth. High BE/ME (low stock price relative to book value) signals low earnings on book equity and therefore less profitability. So a low BE/ME characterizes firms with high average returns on capital, whereas high BE/ME is typical for firms that are relatively distressed.

- **Proposed Model**

The proposed model for the variables that affect the stock return is represented in Figure 1.4. This study adds the variable of Internet-dependency to the existing Fama and French model.

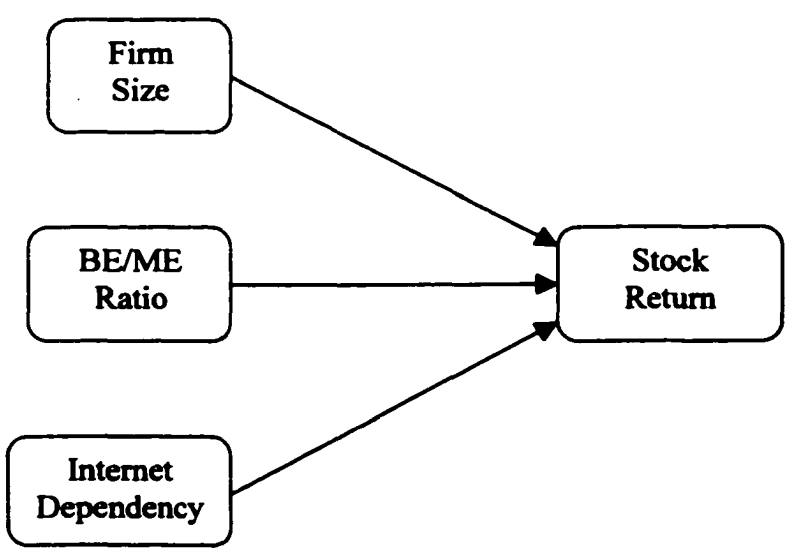


Figure 1.4: Proposed Model of Variables that Affect Firm Stock Return

The figure suggests the need to consider the impact of whether a firm is an Internet-dependent firm or not in determining the expected stock return.

- **Primary Propositions**

This study proposes that the coefficient for the variable representing dependency on the Internet will be positive and significant. This suggests that Internet-dependent firms will be expected to have a higher stock return than non-Internet-dependent firms. This proposition is based on the fact that stock prices are the discounted expected future earnings. Most Internet firms are not yet profitable. They have lower earnings on book equity compared to non-Internet firms. Therefore, they are expected to have higher returns on capital.

1.4 Data and Methodology

The process of obtaining the data and conducting the analysis is described as follows:

1.4.1 Sample and Data

The development of the sample started with a selection of companies dependent on the Internet. The requirement

was that the companies operate only through the Internet. Those firms were matched with other firms of the same size and from the same industry to provide a set of control firms. Data were collected from the balance sheet and the income statement for each firm. Information about stock performance was also gathered. The data are relatively recent and somewhat sparse, given the recent emergence of these Internet-dependent firms.

1.4.2 Methodology

The study's first stage of analysis consisted of computing financial ratios from the data gathered from firms' the balance sheets and income statements. Once calculated, the ratios of Internet-dependent were compared to the ratios of the control firms of the same size in order to determine whether Internet-dependent firms have a different financial structure. Then an ordinary least squares regression was performed to determine the impact of being an Internet-dependent firm on each financial ratio.

A second analysis was performed to show that Internet-dependent firms are not valued using standard firm measures. The analysis also intended to show that the firm's Internet investment is a significant variable

affecting the average return of Internet-dependent firms. This study used ordinary least squares regression to analyze the effects of different factors on the firm value and stock return. The variable that represents the Internet is a dummy variable that takes the value 1 if the firm is an Internet-dependent firm and 0 otherwise. The other variables are the firm size, which is proxied by the stock market capitalization, and the book-to-market ratio. The regressions in this research were run using the SAS statistical program.

1.5 Limitations of the Study

The first limitation is that in collecting the data, some Internet firms such as Yahoo or America Online are in a new type of business and they may not have any corresponding control firm. Therefore, it was difficult to find standard firms to serve as control firms in the same industry. These Internet-dependent firms were matched with control firms using fairly broad interpretations of the industry within which the firm operates. For example, Yahoo (as a directory service) was matched with other firms in the printing directory industry.

The second limitation is related to the survival bias. Many firms are created every day but only a few survive. High costs of IT is one of the factors that contribute to firms' failure. Haapaniemi (1996) found that IT can be extremely expensive and can take a long time before it delivers on its promised benefits. Since the percentage of Internet-dependent firms and non-Internet firms that fail may be different, the sample data may not be very representative.

In addition, there are some limitations with regard to financial ratios. Financial ratios rely on accounting data, but different firms follow different accounting procedures. Unless the analyst makes some adjustments for accounting reporting differences, ratio comparisons between individual companies and with various industry norms cannot be viewed as definitive. Moreover, many firms operate in more than one industry, which also makes analysis more difficult.

1.6 Organization of the Study

Following the introduction, Chapter 2 presents the literature review, which covers theoretical research on information system and firm performance, virtual

organization, and financial analysis. Chapter 3 describes the research design, data, and statistical analyses used for the study. A discussion of the empirical results of this research is the subject of Chapter 4. These results include examination of financial ratios and statistical analyses of empirical hypotheses. Finally, Chapter 5 summarizes the major findings of the research, its limitations, and potential areas for future research.

CHAPTER TWO

Literature Review

This chapter begins with a general review of innovations in information technology. Then, studies on virtual organizations are reviewed. Next, an in-depth review of firm performance is presented. Finally, financial performance and dependency on the Internet are discussed before a summary of and conclusions drawn from the literature review are given.

2.1 Innovation in IT

Only a few years ago, IT was treated by many executives as a mere servant that helped companies automate tasks that were performed manually. Today, the role of IT is perceived by executives at many firms as being integral to their products, their customers, even the very strategy on which the business functions (Bartholomew, 1998).

2.1.1 Strategic Information Technology

Computer technology has increased the flow of information between firms and their consumers. Business strategy and IT strategy are so dependent on each other for corporate success that it may be difficult to define a business strategy without first deciding on the technology to be used. Groenfeldt (1997) questions whether business strategy should be driven by technology or whether technology should be determined by business strategy. Lundquist (1997) suggests that businesses may find it helpful to follow the example of Netday and use the Internet as their organizational infrastructure, allowing the Internet to drive the corporation.

In any case, business and technology need to be aligned to achieve the desired outcomes. Groenfeldt (1997) argues that a company must have a technology-oriented Chief Executive Officer (CEO), and a business-oriented Chief Information Officer (CIO). This CIO should examine a number of issues including the impact of technology on the type of business the company is in, the IT skills of its general managers, and the IT support needed by the business strategy.

The job of the information systems manager has become more and more demanding due to the rapid change in technology and the necessity for firms to be up to date in order to satisfy consumers' needs and ensure competitiveness. Given the high demand for IT and the competition created by using IT, Ruotolo (1997) found that CIOs feel that keeping up with the latest technology is the most difficult part of their job. Haapaniemi (1996) also suggests that the effective use of information systems depends more on how IT is managed than on how sophisticated or costly the technology is. Hoplin (1995) reports that information systems (IS) should be re-engineered to put them in line with business strategies. Hoplin further contends that the ability to respond quickly to a rapidly changing business climate is a necessity in all business strategies. Today's business strategies should incorporate IT to enable processes to work faster and more efficiently.

The need to determine the impact of IT investment on firms' performances is imperative given the amount of money spent on IT each day. IT contributes in acquiring information that will help business strategists predict and respond to customers' existing and emerging needs. Moreover, IT is used as a tool to realize business

transactions. Given the different uses of IT in conducting businesses, companies should carefully choose a technology that fits the type of business in which they operate. The choice should be supported by scientific research. Therefore, as Ferguson (1996) suggests, companies should make sure that business processes are aligned with the new realities of the electronic marketplace if they want to ensure success in the new environment.

But there is still a lack of research showing that the use of IT improves business performance. Tam (1998) argues that the impact of information technology investment on a firm's performance has been the subject of active research in recent years; however, little work has been done in countries other than the U.S. to validate these results and to see if they are applicable across national boundaries.

2.1.2 Role of Information Technology

Technology has long been a tool used by people to support their business and to improve their standard of living. Innovations in information technology can profoundly change how business strategies are developed. Fundamental to the development of an effective information

strategy is the recognition of information as a key organizational resource. Today's business world requires a close management of information. In order to succeed, an organization must have the right information with little delay and at low cost, because customers may favor those corporations that are able to answer their questions fast and accurately.

Information conveys power; therefore, organizations can use information as the principal tool for expansion. For instance, professional service companies in the InformationWeek 500 are looking for new ways to use IT to better serve customers and expand their own business (Adhikari, 1998). McRae (1998) suggests that in order to deliver increasing expectations for supply quality and cost reduction, information technology has become an essential component of transmission and distribution networks. It allows firms to acquire necessary information at low cost to better serve customers. An organization that can easily and cheaply reach its customers is more likely to make products that satisfy their requirements.

Ferguson (1996) notes that through new information technologies, companies are able to offer better products and services, find new ways to locate and engage customers,

and broaden and deepen relationships with customers. Moreover, those companies can enter new market channels. Evolution of IT opens doors to new firms with particular structures. For instance, the Internet encourages the creation of virtual firms. These firms are without boundaries in terms of location. They are accessible by customers at nearby as well as distant areas.

2.2 Virtual Organizations

Online business is one of the fast-growing groups of virtual organizations. Managers seem to use the term "virtual organization" to describe two rather different phenomena which concern the innovative management of organizational boundaries. In both cases, virtual implies that things are not quite what they seem, but in different respects. One of them concerns the lack of physical proximity and the other concerns the lack of ownership. The former definition is used in this study.

2.2.1 Definition

Alexander (1997) argues that interests and frustration connected with virtual organizations are fueled by the lack of clarity as to what exactly makes an organization

virtual. Posch (1994) defines virtual organization concept as a futuristic world where barriers to communication no longer exist, and where organizations are linked to each other by an invisible Web of communications networks and smart integrated technologies. Current virtual organizations use Internet technologies and sales-force automation to better understand their customers' needs and help them make informed decisions about their products. Mowshowitz (1997) adds that virtual organizations are linked to a kiosk where varied items or services may be available. They operate with virtual constructs that replicate in a computer program actual procedures and practices. They are designed to improve resource management and task structure.

The creation of virtual organizations is progressively being realized with the help of several advancements in office technology. Such an organization is characterized by its reliance on the cyberspace medium, dependence on new computing and communications developments, and initial existence only across traditional organization structure (Barnatt, 1995). The Internet remains one of the most urgent strategic challenges faced by businesses over the long term. Preston (1997) argues that the main challenge

to a successful online strategy is putting aside the traditional way of doing business and creating a model that makes sense for cyberspace.

Traditionally, the belief that IT improves performance leads companies to invest in IT with an expectation that they will achieve competitive advantage over other firms in the industry. Haapaniemi (1996) points out that an increasing number of companies are trying to achieve a competitive advantage by using information technology to establish links among their employees, across functions, with customers, and to data. Many firms have established their presence on the Internet to allow such links.

2.2.2 Background of Virtual Organizations

From the widespread birth of large industrial organizations in the second quarter of the twentieth century until the mid-to-late 1970s, most markets were stable, and the logic of scale dominated the philosophy of organizational structure.

From the 1960s into the 1980s, the most popular new organic mode of organizational structure was the matrix organization. In the 1980s, the transition from hierarchical firms to firms geared toward mass production

leads to the emergence of more a flexible organizational pattern which characterizes the Second Industrial Revolution.

As information technologies develop during the Second Industrial Revolution, it is quite possible that many people will no longer have to be physically located near their workplace (Barnatt, 1995). Mowshowitz (1994) reported that advanced information technology makes it possible to realize virtual organization in practice, and the paradigm is manifested in the operations of some innovative firms.

Properly implemented, virtual organizations may deliver increases in efficiency and effectiveness on an unprecedented scale. Virtual organizations are likely to exhibit a set particular characteristics in addition to those found in traditional firms. For example, virtual organizations will be reliant on the medium of cyberspace, will be enabled via new computing and development of communication, and will initially only exist across conventional organizational structures (Barnatt, 1995). According to Barnatt (1995), Cyberspace refers to the global system's interconnectivity, which allows access to

single information space by every computer and telecommunications network.

2.2.3 Internet Services

Although the idea of the virtual organization is not new, recent developments in information technology capabilities, such as the World Wide Web (WWW) and artificial intelligence, have allowed the development of new types of virtual organizations. Internet-dependent firms are the most popular types of virtual organization. Ashbaugh, et al. (1999) stated that with the explosion of Internet commerce, some firms are depending entirely on the Internet technology to engage in business transactions with customers and suppliers. This relatively new communication medium is changing the way firms reach customers and disseminate information about their products and services.

Firms usually establish their presence on the Internet by creating a Website. Websites are an important way to disseminate information to customers and shareholders. They are also needed to keep pace with competitors. The contents of a firm's Website depends on the type of business a firm operates and the firm's goal. DePrince and

Ford (1999) indicate that most inroads of Internet commerce are in the service area.

According to Nash (1995), many service firms are finding benefits from using the World Wide Web to create shopping malls that facilitate comparison shopping by customers. Airlines provide a good example of products that are slowly migrating from the traditional purchase methods (via agents or telephone contact) to direct electronic purchases (DePrince and Ford, 1999). Few other industries, such as music, banking, insurance companies, real estate agents, and plumbing suppliers, can be distributed electronically with success and costs savings. The Grocers' Insurance Group reports that the Web is more effective and less expensive than traditional marketing methods.

Amar (1999) states that the success of an Internet business will depend on either the suitability of the product or service selected for the Internet business or the adaptability of a product or service to Internet operational characteristics. Gallaugher (1999) proposed three important characteristics for successful Internet businesses: lowering costs, building trust, and improving

communication quality. Consumers must be able to use online search engines to locate the product.

Financial service is another area undergoing major changes. DePrince, et al. (1999) argue that security firms have seen the biggest jump in recent years, in the trading of stocks, bonds, and other financial instruments. A growing number of financial service institutions on Wall Street are establishing an Internet presence. According to Prete (1997), these companies are compelled to go online for a number of reasons, including the growing demand from their clients for the convenience and freedom offered by the technology. Some traditional securities firms are trying to maintain their clients by going online. Many of these firms use their Web sites to provide price quotes and offer information on their products and services. These sites also offer electronic mail (e-mail) to allow customers to communicate with companies, and calculators to help them make computations about their finances.

In addition to marketing products and services, firms employ their Web pages to recruit employees, to target retail investors and corporate clients, and to promote financial seminars. Ashbaugh, et al. (1999) examined how firms use the Internet to enhance the relevance of their

financial reporting. They found a substantial variation in how firms use the Internet to provide financial and non-financial information. They also found that the quality of Internet financial reporting varies across firms.

Most rapidly growing Internet firms are essentially middlemen. Unlike other firms, Web-enabled systems allow each firm to maintain only a small inventory of products purchased or produced in advance in order to sell to customers at a future date. Virtual organizations obviate the need for a shared physical space and help to minimize overhead costs (Barnatt, 1995).

Lundquist (1997) further states that with the rapid advances in Internet tools and capabilities and its low costs, companies that can move with the pace of the Internet seem to have a better chance of success than those that rely on the relatively slow pace of corporate planning.

Virtual entities create dynamic communications, and they can be considered as a threat to traditional organizations. The Internet puts unparalleled amounts of information at the disposal of consumers and thus tends to exert enormous price pressures. Amar (1999) argues that

the biggest impact of the Internet is transforming industries into a truly competitive business environment.

Internet business customers have an advantage in that they can easily access the opinion of other consumers at relatively no cost. Internet chat rooms, message boards, and news groups allow consumers to broadcast their opinions about a company to a large audience (Oberndorf, 1999). The interactive aspect, which lets consumers and marketers talk directly to each other in real time, constitutes the Internet's most potent quality. For instance, the Internet may reveal whether a firm's advertisements are working just by comparing the number to visits to the Website prior and after the advertisements. But all products are not suitable for the Internet. Many shoppers are quickly realizing that the Web is an addition to, and not a substitute for, their way of conducting business. The Internet is powerful in gathering up-to-date information about products and prices.

The growth of virtualization in business gives rise to questions about evaluating the performance of these organizations using traditional performance measures.

2.3 Performance Measures

Wright and Burns (1997) argue that performance issues relating to organizational form depend much on the performance and interworking of technology, infrastructure, and working habits. Lawless and Anderson (1996) propose that a firm's performance is determined by innovation and market complexity.

There are many different performance measures employed in corporate analysis and information system success. The prices of stocks increase with the firm's size. Keating (1997) used three types of performance metrics to investigate the factors affecting a firm's performance. Keating's study revealed that first, performance, in the division of accounting, increases with price-earnings and decreases with growth opportunities. Second, performance increases with the accounting division manager's impact on other divisions and decreases with growth opportunities and other managers' impact on the accounting division. Third, a firm's stock price increases with relative division size and the correlation between stock returns and market-wide returns. In other words, if the accounting department in a company has some power over other departments, the performance of the accounting department will be higher

than that of other divisions of the firm. The bigger the size of a firm, the higher the price of the firm's stock.

Gurley (1998) proposed that the only proper way to value a stock is to predict the company's long-term cash flows, discount them back to the present, and then divide by the number of shares. This method is the discounted cash flow model. In practice, however, many valuations are made using tools that serve as proxies for cash flow. An example of a proxy that is commonly used is the price-to-earnings ratio. Gurley further points out that Internet-dependent firms' investors are very dependent on proxies. Therefore, investors need proxies based on measurable criteria because some abstract proxy valuation tools are often inaccurate predictors of stock performance.

According to Gurley (1998), Internet proxies include market capitalization per subscriber, market capitalization per unique visitor, and ratios involving Web page views and revenues. In spite of their inaccuracy in predicting stock value, these methods do give investors a way to assess stocks. The problem is that as emerging markets begin to mature, evaluating stocks using these proxy valuations becomes much riskier.

Some investors may change their selection criteria when faced with making the decision to buy Internet companies shares. This decision may be based on the fact that some analysts believe that losing money is part of an Internet firm's strategy. Oliver (1999) lists five strategic ideas: build market shares, extend customers' life cycle, broaden product/service scope, set *de facto* market standard, and use negative networking capital. These strategies employed by Internet companies may justify their performance in the stock market and explain why investors are willing to take risks in the future.

2.3.1 Financial Ratios

According to Sampselle (1989), financial ratios have become internal measurements by which a company and its financial managers are evaluated. Financial ratios are tools used in evaluating the liquidity, leverage, and profitability of any business enterprise. The fundamental ratios include the current ratio, quick ratio, liquidity ratio, equity/debt ratio and return-on-equity ratio. Kristy (1994) proposes that their acceptance standards are 2, 1, 0.40, 1.65, and 0.14, respectively.

a) Role of Financial Ratios

Each ratio has its purpose and is usually observed by investors, banks, and other agents doing business with the company. Ford (1995) proposed that as a measure of bank financing, the debt-to-equity ratio shows the relative contribution of creditors and owners to the funding of the business enterprise. As a measure of risk, this ratio indicates the margin of error in the liquidation of assets to satisfy the claims of creditors. The debt-to-equity ratio also serves to measure the effect of interest rate changes on the performance of the firm. In other words, it plays a key role in the calculation of the return on equity and also indicates the effect on the firm of a change in the cost of debt.

Other financial ratios in use are the accounts payable/sales ratio, asset turnover ratio, and return-on-equity ratio. No single ratio can be used in the place of another since the interpretation will not be the same. Depending on the analyst and his objectives, some ratios will be favored over others.

b) Problems with Financial Ratios

Although a financial ratio may be calculated in analyzing a company, the same ratio may not necessarily be used to assess other companies. Sampselle (1989) argues that internal and external observers often use the wrong ratios to assess a company or they fail to consider changing circumstances. Financial ratios lose their meanings if they are used to compare firms across time and/or industries, or if they are used to compare firms with different financial structures. Casteuble (1997) suggests that the association of financial ratios provides benchmark measures and helps answer or clarify financial questions about organizational performance. The ratios are used to point out problem areas and focus on the strong financial areas of an organization. For instance, Mills and Yamamura (1998) suggest that cash flow ratios are more reliable indicators of liquidity than balance sheets or income statement ratios, such as the quick ratio or the current ratio.

Wofford and Gittman (1978) define risk as the possibility of receiving a return on an investment below the expected return. The risk may be calculated as a simple ratio, which measures the amount of risk a project

can absorb while continuing to remain acceptable to the investor. According to Kroncke (1984), a company's risk exposure can be assessed by looking at its leverage. He defines leveraged companies as being those that include debt in their capital structure. These companies are subject to more earning volatility than unleveraged companies. He uses earnings coverage and debt ratios to measure companies' financial risks. Earnings coverage is determined by dividing earnings-before-interest-and-taxes (EBIT) by interest expenses. The results show that the higher the leverage, the greater the debt ratio and the financial risk exposure.

2.3.2 Firm Stock Value

Financial structure may vary from firm to firm, but the role that finance plays within every organization is fairly similar. The business world tends to tie the performance of a company to the structure of its financial statements. Kroncke (1984) suggests that the decision of financial managers in determining how to finance a company's assets will affect the company's reported profits and its financial risk exposure.

On the other hand, Modigliani and Miller (1958) state the capital structure irrelevance theory: "The firm's choice of financing policy cannot affect the value of the firm as long as it does not affect the probability of the total cash flows to the firm."[2] The theory implies that no debt/equity ratio could be regarded as optimum. So firms should maximize debt rather than seeking an optimal level. Miller and Modigliani (1961) extended their capital structure analysis to dividend policy. The basic assumption in these theories is that there are no taxes and no transaction costs. In 1963, Modigliani and Miller found that when taxes are incorporated, an increase in debt in the capital structure increases the value of the firm since debts decrease tax cash flows.

Every manager needs to know the consequence of each specific capital structure and base his decisions on the advantages and risks associated with each structure. This suggests that a firm's capital structure can predict the risk associated with the company. This implies that firms that have proportionally similar capital structures must relatively be valued at about the same level since they have the same level of risk. Therefore, as a firm's

[2] Modigliani & Miller (American Economic Review: 1958), p. 261-297.

leverage increases, the risk increases. In addition, an increase in risk may affect the stock market value.

Various methods can be used to assess a stock value. Depending on the goal, every analyst will favor one or more methods. Cole, et al. (1996) argued that the dividend yield and market-to-book ratios have been at extreme levels for several years, raising doubts about their validity. Even after some adjustments, those indicators point to excessively high valuation. Farrell (1998) noted that the dividend yield was no longer a solid measure of stock valuation.

Keating (1997) investigated other factors affecting stock value. He found that a firm's stock price increases with relative firm size and decreases with the correlation between stock returns and market-wide returns. Sundaram, et al. (1996) found that the firm's stock values are positively influenced by the change in spending and negatively influenced by the company competitive strategy measure. Johnson and Pazderka's (1993) results also showed a positive and statistically significant relationship between innovation and firm market value. That is, the more a firm spends on technology, the higher will be the value of its stock.

The fast increase in stock value of Internet-dependent firms does not necessarily guarantee profitability. While some Internet-dependent firms such as Yahoo and E-trade are profitable, others such as Amazon.com are estimated to be years away from profitability. However, investors are confident that companies like Amazon.com will eventually make money (Gurley, 1998).

The *Economist* issue dated January 30, 1999, mentioned that there is a disconnection between the Internet shares and the underlying business which makes those companies difficult to value. The author(s) follow by saying that in the Internet business, the real winners are the Internet itself and the people who use it. Since most Internet companies seems to be making losses while their price is increasing at a fast pace, there must be a reason as to why people are still heavily investing in Internet stocks. That appreciation in firm value may be a result of the decision by firms to invest in Internet technology and the predicted impact of that technology on the firms' future performances.

Investment analysts interpret the fast increase in price of Internet-related stocks as an example of continuing market irrationality in that sector, which leads

to a flood of new issues (Barboza, 1999). Gurley (1998) argues that while the overall market is extremely volatile and stocks are risky, Internet stocks are holding up. The high expectations of investors in terms of future profits drive the stock values very high for Internet-dependent firms.

2.3.3 Stock Return

The average return is among the most used indicators to measure a firm's performance. Studies have proposed different variables affecting stock returns. Zantout (1997) proposed that stock returns are positively related with the debt ratio and positively related with research and development (R&D) expenditures. Fama and French (1993, 1995) and Loughran (1997) report that the firm size and book-to-market ratio capture the cross-sectional variation of average stock returns for the New York Stock Exchange (NYSE), Amex, and Nasdaq securities. They found that the firm size and book-to-market ratio have negative and positive relationships with the stock average returns respectively. Zaher (1997) and Elfakhani, et al. (1998) extended the study by adding market beta to the Fama and

French (1993) model, but found no significant relationship between beta and the stock average returns.

2.4 IT, Internet, and Firm Performance

Technology is rapidly changing the way the world looks at business, and it does so by giving some firms a competitive advantage and by increasing the firm's efficiency. In addition, manufacturers have long realized that the key to making products better, faster, and less expensive is to improve the way they share information with suppliers and customers (Stein, 1998). Therefore, IT can be seen as a tool to achieve competitive advantage.

2.4.1 IT and Competitive Advantage

The basis of competition is being fundamentally altered through the introduction of advanced technologies and public communication infrastructures, such as the Internet (Sampler, 1998). The point is that by using the Internet, the laws of supply and demand are somehow broken in the sense that the prices offered to customers may not be the equilibrium price as predicted by economists in the case of the competitive market. The price is usually not

uniform; it varies across customers acquiring the same goods or services.

On the other hand, IT investments may be seen as a tool to gain competitive advantage in the sense that companies are turning to IT to generate new business and keep their existing customers. Since IT is available to all, even smaller firms can compete with larger rivals through the effective use of information systems. Kaufman (1998) noted that on-line consulting often gives small firms their first crack at independent consultants, and it supplements the mainstream consulting offered by large firms.

With the development of IT, every firm has the opportunity of being reached by customers. It is not only big firms that have the privilege of reaching customers at distant locations. IT allows customers to weigh all the alternatives available in order to choose the firm that matches their desires. Clients get fast answers to their questions at a relatively low cost; however, those answers may be superficial.

Avison, et al. (1998) suggest that the development and incorporation of a vision of the future is an essential component of business strategy. Further, they suggest that

an ability to use this strategic vision is vital to organizations in framing a response to an increasingly turbulent business environment and achieving a sustained competitive advantage. While some firms have achieved their objectives of gaining competitive advantage, others have found that embracing information technology does not necessarily guarantee success. This may either be due to the fact that IT is not the main or only factor taken into consideration when developing strategic planning, or because the technology used is not appropriate for the company's line of business.

Kettinger, et al. (1994) indicate that managers must do more than assess the uniqueness or availability of emerging technological innovations when developing strategic IT plans. They suggest that the manager's primary reason to invest in a specific technology must be that the technology satisfies the needs of his organization. In other words, managers should look beyond the fact that a technology is the latest or is used by others when making the decision to purchase any new tool.

To be competitive, organizations must get a firm grip on their products, and many are discovering that performance measurement processes hold the solution

(Bleiweiss, 1998). Firms that use IT are more likely to outperform other firms in the same industry. This statement is true if, and only if, the technology used by the firm is adapted to its needs and is essential to its firm's strategic planning. An effective performance measure focuses on the business basics required to win in a competitive environment. Firms should use technology as a tool in their production and distribution process rather than as the main key to effective performance. In other words, businesses should use technology without being driven by technology.

2.4.2 IT and Firm Efficiency

Given the growing importance of technology to business success, many organizations are establishing stronger links between business strategy and IT. Information systems strategies can help clarify business objectives such as managing costs, analyzing profitability, tracking financial and operational measures, resource planning, and budgeting to bridge the gap between financial information and strategic decision making.

Molloy and Schwenk (1995) support the notion that IT boosts the efficiency and effectiveness of the decision-

making process. Rai, et al. (1997) suggest that while IT is likely to improve organizational efficiency, its effect on administrative productivity and business performance might depend on other factors, such as the quality of a firm's management processes and IT-strategy links, which can vary significantly across organizations.

To achieve the goals set by the decision-maker, an increasing number of firms are using the Internet. Nearly all the most innovative companies in the IT sector are using the Internet to link supply, demand, sales, and customer support processes to improve their business. Stein (1998) reports that by using the Internet, enterprise resource planning and supply-chain management applications, manufacturers are reaching out to their business partners and conducting business anytime, anywhere, and any way. Furthermore, Stein argues that today's Web technology is helping to create tighter partnerships and greater overall value for manufacturing companies. Capon, et al. (1994) found a small but positive relationship between strategic IT planning and financial performance.

2.4.3 Impact of Internet on Stock Valuation

U.S. stock prices have risen in the past ten years and information technology stocks have performed especially well. Internet companies have seen rapid stock price rises despite their having been set up within the past five years (Waters, 1998). Analysts advise against putting too much faith in the Internet. Michael Murphy, in his newsletter, advised his clients to avoid the Internet because the stock values bear very little relationship to actual values (Savitz, 1998). Ward (1999) argues that the market barometers are saying that life is beautiful, while the monthly statements arriving from advisers suggest something is terribly amiss. That may be why some people are still very reluctant to invest in an Internet-dependent firm since they believe that those firms are too risky. This belief makes Internet firms very fragile in the sense that stockholders may easily panic and try to get rid of their shares in the event of any problem. This action may create great variations in the stock prices.

Herd (1999) argues that some investors, such as the members of the New Freedom Investment Club, are still maintaining a very conservative approach when it comes to investment. The club will not invest in a stock unless it

has at least a five-year history. Since Internet stocks are fairly new, they do not fall in that category. Therefore, New Freedom Investment Club does not invest in the Internet sector although the club understands that enormous gains may be lost.

Despite some people who consider the Internet to be a passing fashion (*Economist*, January 30, 1999), others are finding it easy and convenient to use and a highly flexible means of communication (*Economist*, August 21, 1999). So the Internet is not only a technology but it is also a network of people. As DePrince, et al. (1999) said, the Internet is here to stay and surviving firms will be high earners if current prices were reflective of future earnings.

After years of hype, significant confusion exists among scholars and practitioners regarding e-commerce strategies (Gallaugher, 1999). Based on their understanding of macroeconomics, industrial structure issues and the role of technology in the economy, business economists are uniquely equipped to assess and help shape Internet business strategies, (DePrince, et al. 1999).

Internet firms trade in lots of 200-300 shares compared with an average 5,000 shares for normal companies,

(*Economist January 30, 1999*). The limited supply of shares and huge speculation, make Internet companies' stocks difficult to value. Investors behave toward Internet firms' stocks differently than they usually do with other stocks. This behavior creates a disconnection between the value of shares and the underlying businesses (*Economist, January 30, 1999*).

The financial community is attempting to reorganize its efforts to provide better insights on its prospects to the investment community (DePrince, et al., 1999). This suggestion seems not to fit e-businesses well because foundation principles and practices of business are being shaken to their very roots by the Internet.

The behavior of Internet stocks in the market may be attributed to many factors such as rapid growth, management strategies, and investment strategies. While traditional firms will grow only if they constantly renew themselves and their products (*Economist, July 31, 1999*), Internet companies tend to grow very quickly. This rapid growth may lead these companies into going public too soon. These premature IPOs (initial public offers) can weaken the market. James (1999) believes that one reason high-tech startups sometimes fail is because they go public too soon.

They give up long-term success in order to keep high stock prices in the short-term. As a result, a small drop in the stock price can drive investors away even if the company is just experiencing temporary difficulties. This negative behavior of investors toward Internet firms is mainly due to the fact that Internet firms lack the assets or earnings to support their large market capitalization (Clark, 1999).

Another reason for Internet stock behavior may reside in company management. Cusumano (1999) states that the Internet has unleashed not only tremendous entrepreneurial creativity, but also tremendous entrepreneurial mediocrity. He argues that too many Internet entrepreneurs do not think enough about their business models. One may argue that Internet-dependent firms' managers are not as prepared as non-Internet firms' managers. Salary difference is a good indicator that Internet-dependent firms' managers may not have as much experience as non-Internet firms' managers. *Wall Street & Technology* (1999) states that the salaries of Internet-dependent companies' management teams are lower than those at traditional software companies despite the rising price of Internet stocks.

A third reason for Internet stocks' behavior may be in the firms' strategy planning. Internet companies may be

delaying earnings in favor of current growth. Oliver (1999) argues that the same strategies were successfully used in the 1980s by Japanese electronic companies that are now dominating the market. These strategies include: building market share, extending customer life cycle, broadening market product/service scope, setting *de facto* market standards, and using negative working capital. These strategies seem to ensure future profitability.

Although Internet companies may some day be profitable, nothing guarantees that they will ever make enough profit to justify the current high stock prices. Financial results could fall below expectations (*Economist*, January 30, 1999). The answer resides in the formula used to set the price of Internet stocks. The valuation methodologies of Internet stocks are not very good because those stocks are not traded on fundamentals (James, 1999). Internet stocks trade more like commodities than traditional stocks. They trade based on the law of supply and demand; which creates a volatility in the price at IPO time and thereafter.

Gurley (1998) suggests that Internet proxy metrics include market capitalization per subscriber, market capitalization per unique visitor, market capitalization to

Web page view, and market capitalization to revenues. Stock valuation has always been the concern of investors and financial analysts. A Dean Witter Reynolds bank analyst, Anthony R. Davis, said that information technology ultimately will affect bank stock price (Dunaief, 1996). Based on an analysis of the technological capabilities of regional banks, Davis predicts that banks which effectively leverage information technology to boost customer service and productivity and to create alternative delivery systems will have higher stock prices than do competitors that are not as successful with their information management. Ressner (1998) also points out that the stock value of on-line flea markets, such as e-Bay, doubles on initial public offering. The price of Internet stock will go down sometime. James (1999) characterized the Internet stock overvaluation as being a disaster waiting to happen.

Stocks must be analyzed carefully to decrease the chance of bad investments. Management is an important factor in improving value. Wright, et al. (1995) suggest that firms which can lower their costs and enhance their differentiation through the effective management of their human resources have a comparative advantage. This idea applies to Web-enabled firms in the sense that these firms

decrease their labor demand and use technology to compensate.

Wall Street analysts are trying to find ways to evaluate Internet companies. They use the so-called life value of a customer, a valuation that cannot be justified by any calculation previously used in accounting (Fortune, 1999). This valuation is based upon hopes for future profits. Since the future can be unpredictable, the price of some companies' stocks may have risen so high that it will be difficult for those stocks to bring a good return to investors (Waters, 1998).

As expected returns are not the true returns, investors often speculate about the future returns; therefore, predictions may be different from reality. Internet stocks are likely to have a gap between expected returns and true returns since the method used to ascertain the value of these stocks is still not well defined. The outsiders' perceptions of a company's decision to invest in Internet technology are factors that may affect the valuation the firm's stocks.

Waal (1998) points out that keeping current on scientific development is just one of the pitfalls facing high-tech investors, and it is by no means the scariest.

Volatility is higher in high-tech than in any other sector. Therefore, some companies with little or no earnings can trade a very high price compared to their real value.

2.5 Summary of Literature Review

The performance of an organization is the result of a combination of factors. Depending on the analyst's background, some factors may be emphasized more than others. Information technology is one of the factors that affects company performance. Many companies are now integrating IT in their strategic planning. Some firms want to achieve effectiveness and efficiency, others want to gain a competitive advantage. In either case, the integration of IT in strategic planning is necessary.

Strategic IT has been the focus of many studies over the years. The main point has been to understand how IT has evolved from being a tool for automation to becoming a key to successful business strategy. Since efficient information management can be achieved by choosing the right technology, companies are increasing their investment in IT. Assessing the role of technology in business strategy has been the focus of many studies. Some researchers have raised the question as to whether the

business strategy should be driven by IT or should IT determine the firm's technology strategy. There has been an increasing move toward businesses driven by technology. This move encourages the creation of virtual organizations.

Internet-dependent firms have been the most popular type of virtual organization. The few studies analyzed in this research mentioned that the growth of Internet investments has not been supported with scientific research. The major problems reported in the existing literature were the lack of conclusive research measuring the impact of Internet investment on firms' financial performance and the lack of performance measure for Internet-dependent firms.

The development of standardized financial performance measures remains the hope of many Internet investors. The problem with investing in Internet-dependent firms' stocks has been that the performance of these stocks could not be explained using the traditional proxies. Some research suggests that new proxies measures should be developed to understand and predict the behavior of Internet-dependent firms stocks.

In an attempt to understand the behavior of Internet-dependent firms' stocks, more attention should be given to

the fundamentals: financial ratios and stock returns. These two indicators, traditionally used to assess and predict firm performance, have not been as successful in predicting Internet-dependent firms' performance as they have been in predicting non-Internet firms' performance. Despite this, financial ratios and stocks returns remain among the few methods available to investors for assessing stocks. Moreover, some studies have shown that Internet investments may have a considerable impact on stock returns and firms financial structure; therefore, affecting some financial ratios.

The methodology used to analyze the impact of the Internet on stock returns and on the structure of a firm's financial ratios is the focus of the next chapter.

CHAPTER THREE

Research Methodology

The main purpose of this study is to examine the relationship between Internet investment and firm performance so that managers may evaluate better how their IT investments affects shareholders' wealth. Both theoretical and empirical studies have been performed in MIS and finance to present the variables affecting firm performance. This chapter begins by examining data collection, followed by an analysis of financial ratios and the stock returns.

3.1 Data

A list of 140 publicly-traded companies involved solely in Internet-related businesses was collected from the InternetStockList located on the Internet Stock Channel. The list includes historical data such as the initial public offering (IPO) date, price, offered number of shares, and the lead underwriters.

All 140 firms could not be included in the sample selection, because the study considered only companies' data for December 1998. Some of those companies went public or were created after that period; therefore, the study is limited to these Internet-dependent companies that went public before December 1998. This restriction limits the selection to about 70 Internet-dependent firms.

The sample size was further reduced due to data availability and based on the criteria that they did not undergo changes such as stock splits. The companies included in the final selection were the Internet companies that were represented in Compact Disclosure as well as Value Line. The resulting sample consisted of 56 publicly-traded Internet-dependent firms.

The data set includes 1998 annual financial ratios and stock performance data for the 56 Internet firms (Appendix 1) and 56 control firms. The control firms are publicly-traded non-Internet companies that were selected to match Internet firms. The criteria were that the control firm must be in the same industry as the Internet firm and have approximately the same level of activity. Two firms can be considered to be in the same industry when they have the

same SIC-code. For those firms with more than one SIC-code, the primary SIC-code was considered.

The annual sales of each Internet firm were used as a basis for matching it with a control non-Internet firm. The two firms had to be in the same industry and with about the same dollar amount in sales. To get the closer value, all the firms in each database were ranked according to their annual sales. After selecting all 112 firms, the financial ratios of each firm were gathered from Compact Disclosure. These financial ratios include the current ratio, quick ratio, net-working-capital ratio, fixed asset turnover, total asset turnover, debt-equity ratio, equity multiplier, net profit margin, return on asset, return on equity, and price-earnings ratio.

On the other hand, the companies' stock information was found in Value Line and it included stock market capitalization (used as a proxy for firm size), market-to-book ratio, and the stock return for 1998. In addition to these data, the industry rank of each firm was found. All of these data were used in the statistical analyses conducted in Chapter 4.

The statistical analysis was conducted in two parts. First, a series of simple regressions was run with the

Internet variable as the independent variable and each financial ratio as the dependent variable. Secondly, a multiple regression was run with the stock return as the dependent variable and the market capitalization, the book-to-market ratio, Internet variable, and industry rank as the independent variables. An explicit description of the methodologies used follows in the next few sections. The results of these regressions are analyzed in chapter 4.

3.2 Firm Financial Ratios

The financial performance of a firm is based on its financial ratios. In their study, Stanwick and Stanwick (1998) used the profitability ratio as the measure of financial performance. Profitability is an indicator of resource availability and may also be used for financial performance. The profitability ratio used in this study is the net profit margin, which is the earnings after taxes divided by sales. This ratio allows control of variation in firm size.

3.2.1 Types of Financial Ratios

The study's first-stage analysis consisted of examining financial ratios. This study analyzed a

selection of financial ratios from each of the five groups of ratios.

a) Liquidity Ratios

Liquidity ratios compare short-term assets and liabilities. These assets can easily be converted into cash at little or no cost; the liabilities are debts that are due within one year. The most widely-used measures of accounting liquidity are the current ratio and the quick ratio.

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} \tag{3.1}$$

Current assets include the cash a firm already has on hand and in the bank, plus any assets that can be converted into cash within a year, such as marketable securities, accounts receivable, and inventories. Current liabilities include any financial obligations expected to be due within the next year, such as accounts payable, notes payable, and the current portion of long-term debt due. If a firm is having financial difficulty, it may not be able to pay its bills on time or it may need to get extended bank credit.

If current liabilities are higher than current assets, the current ratio may be low, and that is a sign of financial trouble.

$$\text{Quick ratio} = \frac{\text{Current assets - Inventories}}{\text{Current liabilities}} \qquad (3.2)$$

The quick ratio is based on quick assets, which are those current assets that are quickly convertible into cash. It is obtained by subtracting inventories from current assets. Many financial analysts believe it is important to determine a firm's ability to pay off current liabilities without relying on the sale of inventories.

Since Internet-dependent firms will tend to have fewer current assets than standard firms do, the current ratio will tend to be less for Internet-dependent firms. The quick ratio on the other hand, will be expected to be larger for Internet-dependent firms because they will have the tendency to carry very low inventories as compared to standard firms in the same industry and with a comparable level of activity. So the difference between current assets and inventories is higher for Internet-dependent firms. Gallaugher (1999) argues that most Internet

companies are essentially middlemen. Those firms rely on the communication power of the Internet to carry reduced inventories.

DePrince, et al. (1999) state that for Internet firms, corporate inventories at each stage of production will be *en route* between producers and user rather than being stored onsite awaiting fabrication into finished products. The structure of Internet firms shortens the business life cycle and enhances the opportunity for just-in-time inventory management allowing the reallocation of the firm's resources to more productive uses.

b) Activity Ratios

These ratios presume that a proper balance should exist betweem sales and various asset accounts. This study analyzes the fixed asset turnover and the total asset turnover.

$$\text{Fixed asset turnover} = \frac{\text{Sales}}{\text{Net fixed assets}} \qquad (3.3)$$

This ratio indicates the extent to which a firm is utilizing existing property, plant, and equipment to generate sales.

$$\text{Asset turnover} = \frac{\text{Sales}}{\text{Total assets}} \tag{3.4}$$

If the asset turnover ratio is high, the firm must be using its assets effectively in generating sales. If the ratio is low, the firms must either increase sales or dispose of some of the assets.

The fixed asset turnover ratio is expected to be positively related to Internet-dependency. This is because Internet companies are likely to have less fixed assets relative to sales. The total asset turnover ratio depends on the amount invested on total assets relative to the company's sales. Even though Internet-dependent firms have little investment in fixed assets, their total assets may be high relative to their sales.

Internet firms lack assets to support the large market capitalization (Clark, 1999). Ashbaugh, et al. (1999) also found that firms with Websites are larger as defined by total assets than firms without Websites. Since one of the

main characteristics of Internet firms is their Websites, Internet-dependent firms must have more total assets than non-Internet firms. Therefore, this ratio may be negatively related to dependency on the Internet. Internet-dependent firms on the other hand, do not seem to have as many fixed assets as do non-Internet firms.

c) Financial Leverage Ratios

Financial leverage ratios determine how great is the probability that the firm will default on its debt contracts.

$$\text{Debt-to-equity ratio} = \frac{\text{Total debt}}{\text{Total equity}} \tag{3.5}$$

The debt-to-equity ratio provides information about protection of creditors from insolvency and the ability of firms to obtain additional financing for potentially attractive investment opportunities.

$$\text{Equity multiplier} = \frac{\text{Total assets}}{\text{Total equity}} \tag{3.6}$$

$$\text{Equity multiplier} = \frac{\text{Total equity - Total debt}}{\text{Total equity}} \tag{3.7}$$

Equity multiplier is 1 plus the debt-to-equity ratio.

If debt is compared to equity, the ratios are expected to be negatively related to Internet dependency. Internet-dependent firms will tend to have a lower debt-to-equity ratio and equity multiplier than standard firms.

d) Profitability Ratios

Profitability is one of the most difficult attributes of a firm to conceptualize and to measure.

$$\text{Net profit margin} = \frac{\text{Earnings after taxes (EAT)}}{\text{Sales}} \tag{3.8}$$

Profit margins reflect the firm's ability to produce a product or service at a low cost or a high price. It measures how profitable a firm's sales are after all expenses, including taxes and interest, have been deducted.

$$\text{Return on assets} = \frac{\text{Earnings after taxes (EAT)}}{\text{Total assets}} \tag{3.9}$$

Return on assets (ROA) measures a firm's net income in relation to the total asset investment.

$$\text{Return on equity} = \frac{\text{Earnings after taxes (EAT)}}{\text{Equity}} \qquad (3.10)$$

Return on equity (ROE) measures the rate of return that the firm earns on stockholders' equity. The most important difference between ROA and ROE is due to financial leverage. Financial leverage is the amount of debt used by the firm to finance its assets. Profitability ratios will have the tendency to be negatively related to Internet-dependent firms as most of these firms have not yet been profitable. Barboza (1999) and Gurley (1998) support the contention that Internet-dependent companies are riskier than non-Internet firms because most of them are not yet earning real profits. Clark (1999) found that Internet-dependent firms lack assets and earnings relative to market capitalization.

e) Market Value Ratios

There are many market-based ratios, but only two are discussed in this study: the price-earnings ratio and the market-to-book ratio.

$$\text{Price-earnings ratio} = \frac{\text{Price per share}}{\text{Earnings per share}} \tag{3.11}$$

Price-earnings (PE) ratio measures how much investors are willing to pay per dollar of current earnings. A high PE ratio often means that the firm has significant prospects for future growth.

$$\text{Market-to-book ratio} = \frac{\text{Market price per share}}{\text{Book value per share}} \tag{3.12}$$

The higher the rate of return a firm is earning of its common equity, the higher the market-to-book ratio will be. This ratio is expected to be similar for Internet-dependent firms when compared to the control firms.

3.2.2 Statistical Analysis of Financial Ratios

The different groups of financial ratios considered in this study are the ones represented on figure 3.1:

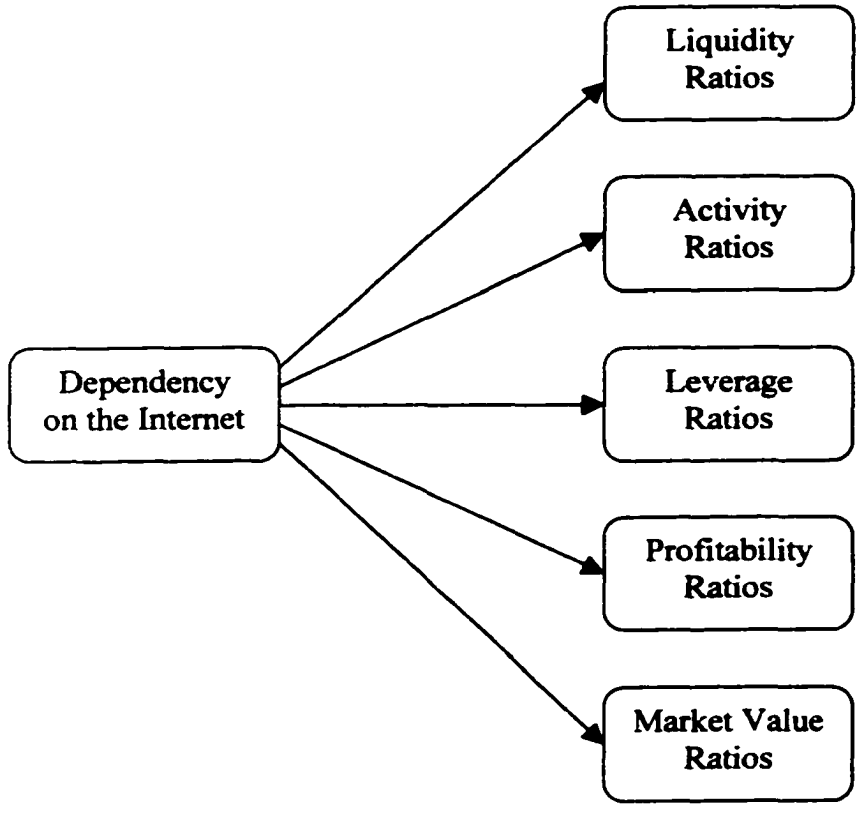


Figure 3.1: Conceptual Model of Firm Dependency on the Internet and Financial Ratios

Given the discrete representation of the Internet variable and the fact that many other variables affect financial ratios, a non-linear regression model may be more appropriate to analyze the different financial ratios. But in the present study, simple regressions are used because the purpose was not to analyze the different variables that affect financial ratios. Rather the goal was to show how the Internet affects financial ratios.

For each financial ratio, the mean, standard deviation, maximum, and minimum were calculated for Internet-dependent firms and non-Internet firms. In addition to these descriptive statistics, simple regressions were used to determine the financial ratios that were significantly affected by the dependency on the Internet. Simple regressions were used in this case only to determine the level of significance of the impact of the Internet on each financial ratio. The regression model can be represented as follows:

$$\text{Ratio} = \beta_0 + \beta_1 \text{Internet} + \varepsilon \qquad (3.13)$$

Where:

Ratio = financial ratio

Internet = Dummy variable that takes the value 1 if the firm is an Internet firm and the value 0 otherwise.

ε = error term.

3.3 Stock Returns

Fama and French (1993, 1995) have studied the determinants of stock return. They have suggested that two

factors determine the stock return. Those factors are the portfolio size and the book-to-market ratio. The statistical model proposed in the present study includes the dependency on the Internet as a third independent variable added to the Fama and French model.

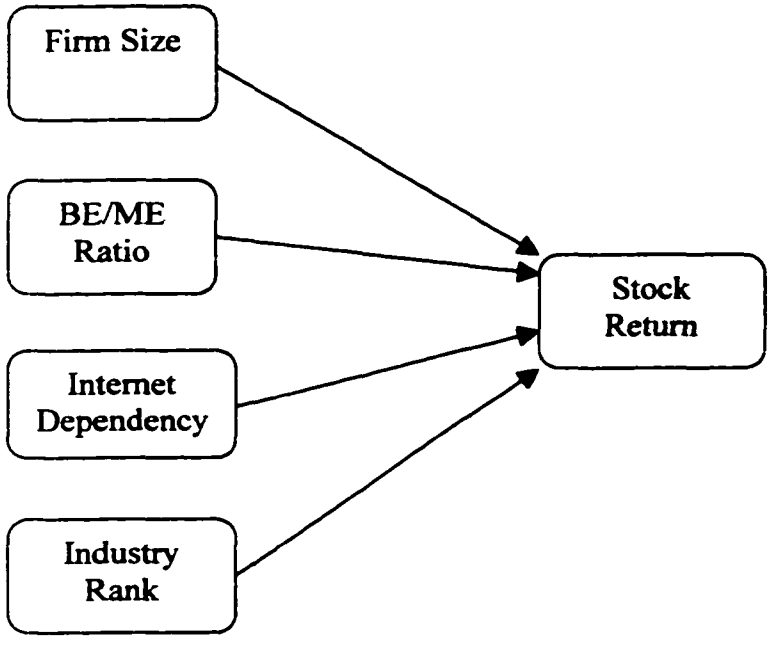


Figure 3.2: Conceptual Model of Variables that Affect Firm Stock Return

3.3.1 Statistical Analysis of Stock Returns

The statistical model presented in equation 3.14 is the ordinary least squares regression model as defined by Fama and French (1993). Instead of the excess return used by Fama and French (1993), the present study used the total

return yield for the year 1998. Excess return was defined as follows:

$$\text{Excess return} = \text{return on stock} - \text{risk free rate} \quad (3.14)$$

The Fama and French (1993) model generated R-squared ranging between 7 percent and 29 percent.

$$\text{Ratio} = \beta_0 + \beta_1 \text{Size} + \beta_2 \text{BE/ME} + \beta_3 \text{Internet} + \beta_4 \text{IndRank} + \varepsilon \quad (3.15)$$

Where:

Return = stock return

Size = firm size

BE/ME = book-to-market-equity ratio

Internet = dummy variable that takes the value 1 if the firm is an Internet firm and the value 0 otherwise.

IndRank = ranking of the industry to which the firm belongs

ε = error term.

3.3.2 Proxies Used in the Study

Given the available dataset described in Section 3.1 and the models presented in Section 3.3.1, a review of the proxies used in the study is covered in this section.

a) Firm Performance

Stock performance helps investors gauge how well their investment managers are handling their money. There are different measures of stock performance. Armitage and Jog (1996), Clinton and Chen (1998), Ferguson and Leistikow (1998), Gapenski (1996), Lehn and Makhija (1996), Ochsner (1995), Rogerson (1997), and Stephens and Bartunek (1997) have used economic value as a performance measure.

Stephens and Bartunek define economic value added as a corporate performance measure that aligns employee behaviors with efforts to improve stockholder value. It is obtained by comparing profits with the cost of capital involved in obtaining these profits.

The variations in a company's stock value represent how outsiders value the firm. Fama and French (1993, 1995), Elfakhani, Lockwood and Zaher (1998), Loughran (1997), Zaher (1997) and Clinton and Chen (1998) used stock return as a measure firm performance. The present study focuses on the total return yield for the year 1998 as the measure of firm performance. The formula used to calculate the return is the one given by Clinton and Chen (1998).

$$\text{Return}_t = \frac{\text{price}_t - \text{price}_{t-1} + \text{dividend}_t}{\text{price}_{t-1}} \quad (3.16)$$

where,

t = end of period

t-1 = beginning of period

b) Firm size

Business size is an important variable affecting stock return. Larger organizations tend to be less risky and more trusted by outsiders since the organizations own more assets that can be sold compensate for an organization's debts. This variable can be made operational in more than one way: whether or not there is a chief information officer (CIO) and/or a chief executive officer (CEO) (Kroll, Wright, Toombs and Leavell, 1997), and the number of employees (Palvia and Palvia, 1999). The relationship between CEO/CIO can be justified by the fact that firms that have a CEO/CIO are usually large firms. Due to the complexity of Internet firms, the best approximation of firm size for this research is based on the company's annual sales as presented in Fombrun and Shanley (1990) and Stanwick and Stanwick (1998). Total assets are not a good measure for Internet firms as compared to standard firms

because Internet firms are more likely to have a smaller amount of assets. The present study uses the market capitalization as a proxy for firm size.

Stanwick and Stanwick (1998) found that larger firms receive a higher level of attention from the general public, which may in turn encourage the firm to have a higher level of corporate social performance. Fombrun and Shanley (1990) confirmed that larger firms had higher value due to their reputation.

Fama and French (1993,1995) report a negative relationship between firm size and average returns. That is, large firms tend to have a lower return. Elfakhani, Lockwood and Zaher (1998), Loughran (1997), and Zaher (1997) confirm the results of Fama and French. Therefore, using the rationale given by Fama and French, it can be presumed that there will be a negative relationship between firm size and average return because size is related to profitability. Small firms' stocks tend to have lower earnings on book equity than do big firms' stocks. Therefore, investors will find small firms' stocks attractive only if the value of each share will appreciate more than that of big firms' stocks.

c) Book-to-Market Ratio

Another stock return's determinant is the book-to-market equity (Fama and French 1993, 1995). Often, low book-to-market equity (a high stock price relative to the book value) is associated with sustained strong profitability.

Fama and French (1993, 1995) found a positive relationship between book-to-market equity and stock return. Elfakhani, Lockwood and Zaher (1998), Loughran (1997), and Zaher (1997) confirm the Fama and French results. Therefore, this study predicts a positive relationship between the book-to-market equity and the firm stock value. High BE/ME (low stock price relative to book value) signals low earnings on book equity and therefore less profitability. So a low BE/ME characterizes firms with high average returns on capital, whereas high BE/ME is typical for firms that are relatively distressed.

d) Internet

The Internet variable is defined as whether or not the company is an Internet-dependent firm. Internet-dependent firms are defined as firms that could not exist without the Internet. Those firms market their goods and services via

the Internet. Internet companies seem to have a structure different from that of other firms. This difference in structure is expected to have an impact on the firm's stock return.

Based on Internet-dependency, there are three types of firms: traditional firms or firms that do not use the Internet in any of their transaction to market their goods and services; mixed firms which are firms that have part of their market share tied to the use of the Internet and another part gained as traditional firms; and Internet firms are those that market their products and services using only the Internet. Nowadays, there is a convergence toward mixed firms. Some firms start as Internet firms and compete by using traditional firms' means for some of their transactions. There is also a trend for traditional firms to attract new customers using the Internet. It becomes difficult to distinguish Internet firms from non-Internet firms and to what percent a firm uses the Internet.

Most firms have established their presence on the Internet by having Websites. However, only a few firms actually use the Internet as their principal means for providing goods and services to their customers. Ashbaugh, et al. (1999) analyzed the use of the Internet to enhance

financial reporting. They found that many firms have Web sites. However, searching into firms' Web sites for financial information, they documented different level of financial disclosures via the Internet. Ashbaugh, et al. (1999) used a dummy variable that took the value 1 if a company used the Internet for financial reporting and 0 otherwise.

The present study represents the Internet as a dummy variable, which takes the value of 1 if the company is an Internet organization and 0 otherwise. This binary representation has been made with the intention to discern firms that are qualified as Internet-dependent and firms that are not.

The average return of stocks dependent on the Internet is expected to be higher than that of firms free of the Internet, although the profitability of Internet-dependent firms may be lower. This conclusion is based on the report in *Business Week* (December 14, 1998), which argues that most Internet-dependent firms are still not profitable, despite the rapid increase in their market value. This fact suggests that Internet-dependent firms' average stock return will be higher than that of non-Internet dependent firms'. The rationale is that stock prices are the

discounted expected future earnings. Most Internet firms are not yet profitable; they have lower earnings on book equity compared to non-Internet firms. Therefore, Internet firms are expected to have higher average returns on capital.

e) Industry Rank

A firm's growth opportunity must be considered as a determinant of the firm performance. Smith and Watts (1992) argue that high-growth firms are likely to be riskier than low-growth firms. Since risk must be compensated by return, high-growth firms can be expected to have higher returns. However growth opportunity is difficult to measure. Gaver and Gaver (1995) face the problem that since the investment opportunity is unobservable and no consensus has emerged in the literature concerning an appropriate proxy variable.

The measures of investment opportunity include the ratio of market value of the firm to the book value of assets (Bizjak, et al., (1993) and Smith and Watts (1992)), the ratios of the market value of equity to the book value of equity (Chung and Charoenwong (1991)), the level of research intensity (Bizjak, et al. (1993)) and revenue or

return variability equity (Chung and Charoenwong (1991) and Smith and Watts (1992)).

Gaver and Gaver (1995) recognized the difficulty of finding the perfect proxy. Growth opportunity differs from one firm to another. This difference is more pronounced when the firms belong to different industries. Industry proxies can be used to measure a firm's growth opportunity. Smith and Watts (1992) examined the relationship between industry level and stock-based compensation.

Graves and Waddock (1997) have shown that differences exist in social and financial performance among different industries. Financial performance was measured using three accounting variables: return on assets, return on equity, and return on sales. Given this difference among industries, they found the need to control for the industry. Industry was determined by 4-digit SIC code. The present study uses industry ranking as a proxy for firm opportunity. Since the type of industry in which firms operate affects the firm's financial performance, controlling for industry seems necessary in examining stock returns of firms originating from different industries. Industry ranking is the proxy used to represent the industry factor.

The use of industry ranking is based on two facts: First, most firms considered in the study are from relatively similar industries; therefore, the SIC codes are likely to fall in the same category. Second, Internet firms are fairly new types of firms that may be relatively different from standard firms in terms of the structure of their financial ratios. For instance, using market-to-book ratios may give biased proxies because Internet firms are noted to have high market value relative to book value compared to non-Internet firms. Also, since Internet firms are new types of firms they are likely to have higher variability in their revenues and returns.

Some studies have been conducted to examine the impact of the industry on the firm's profitability rates (Schohl, 1993), the diffusion of new technology (Karshenas and Stoneman, 1993), and the variation of CEO characteristics (Datta and Rajagopalan, 1996). Industry ranking is used in the present study because the ranks of firms are based on many variables including the opportunity growth. Those ranks have been standardized in such a way that decision-makers and investors can compare firms. Lewis, et al. (1997) found that investors could achieve a significantly higher return using Value Line common stock ranking. The

ranking factor used in the present study is industry rank which was collected from Value Line.

The rank of the industry in which a firm performs is a determinant of stock return. This variable must be considered because, when an industry is ranked as one of the best, the stock returns of all the firms in the industry may be higher.

A firm that is ranked number one must have a higher stock return than one that is ranked number one hundred. Therefore, the slope of the industry variable is expected to be negative. Stocks that perform in industries that are ranked among the best will likely attract more investors. If the number of investors interested in buying an asset increases, the price of that asset will increase resulting in a high return on stocks. So, the lower the industry rank of the firm, the lower will be the return on its stock.

3.4 Summary of Research Methodology

The proposed financial ratios, statistical model and data by which companies were analyzed were presented in this chapter. The hypotheses were that the firm size and the book-to-market ratio will follow the prediction by Fama

and French (1993, 1995). This means that the size should be positively related to stock return and book-to-market ratio should be negatively related to return. Dependency on the Internet will have a positive relationship with the stock average return and industry rank should be negatively related to returns. Empirical results addressing the issues discussed in this chapter will be presented in the next chapter.

CHAPTER FOUR

Empirical Results

In the previous chapter, the research methods and sampling procedures were developed, and the proxies to be used in the study were defined. Based upon the criteria established, the present chapter provides an analysis of the results. The analysis begins with a summary of descriptive statistics of the selected financial ratios, then presents a regression analysis of the financial ratios, and finally presents a regression analysis of the stock returns.

4.1 Statistical Analysis of Financial Ratios

Table 4.1, Table 4.2, Table 4.3, Table 4.4 and Table 4.5 present summaries of the descriptive statistics for the impact of the Internet on some financial ratios. For each ratio, the mean, standard deviation, minimum, and maximum were calculated. As shown in the tables, the analysis presents non-Internet firms, Internet-dependent firms and all firms. The financial ratios are grouped by class,

which means that only one group of financial ratios is presented in each table.

Table 4.1: Liquidity Ratio Summary Statistics for Internet-dependent Firms and Non-Internet Firms

Variable	Mean	Standard Deviation	Minimum	Maximum
Non-Internet Firms				
Current Ratio	4.414	4.612	0.45	29.02
Quick Ratio	3.793	4.482	0.18	28.65
Internet Firms				
Current Ratio	4.391	2.854	0.59	11.66
Quick Ratio	4.017	2.848	0.14	11.36
All Firms				
Current Ratio	4.403	3.818	0.45	29.02
Quick Ratio	3.905	3.740	0.14	28.65

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

An examination of Table 4.1 reveals that the mean of the current ratio is a little over 4 for Internet-dependent firms, non-Internet firms, and all firms. The mean of the quick ratio is a little over 4 for Internet-dependent firms and under 4 for non-Internet firms and all firms together. This suggests that most Internet-dependent firms are created in industries in which current assets and quick assets are about four times the current liabilities. These high ratios indicate short-term liquidity, but the minimum

values of the two ratios indicate that not all firms in the industries are as liquid.

The minimum current ratio is lower for non-Internet firms, but the minimum quick ratio is lower for Internet-dependent firms. However, those minimum values are respectively comparable for each group of firms. The maximum value of both ratios is very high for non-Internet firms; the standard deviations are high as well. The high values of the standard deviation show that the current ratio and quick ratio are grouped closer to the means for Internet-dependent firms than for non-Internet firms. Figure 4.1 and 4.2 show that the values of the quick ratio and current ratio are more spread for Internet-dependent firms than for non-Internet firms.

Figure 4.1: Current Ratios

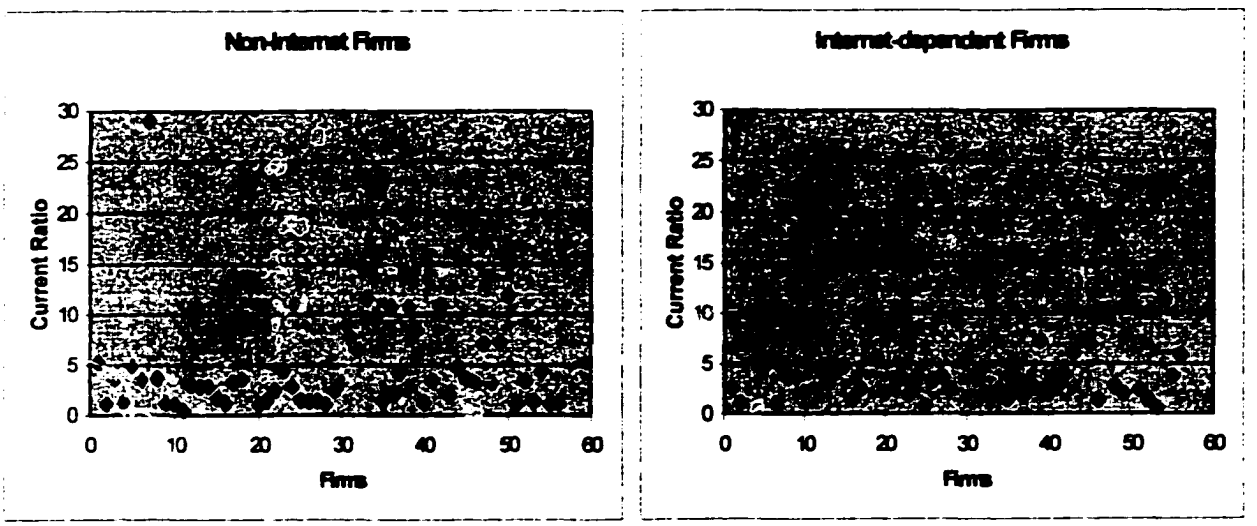
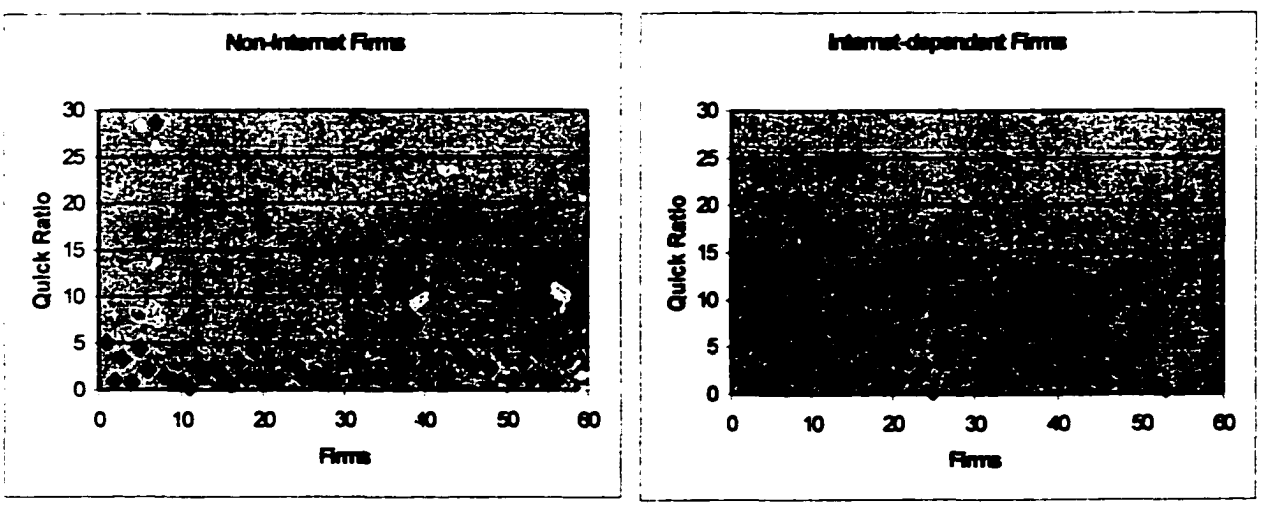


Figure 4.2: Quick Ratios



The result of the foregoing liquidity ratio comparisons suggests that Internet-dependent firms share some common characteristics in the short term that non-

Internet firms may not have. The standard deviation of non-Internet firms seems to be high because of the maximum value of the current and quick ratios which are close to 30. On average, these ratios do not vary much from Internet-dependent firms to non-Internet firms.

The next table presents information about the asset management of the company.

Table 4.2: Activity Ratio Summary Statistics for Internet-dependent Firms and Non-Internet Firms

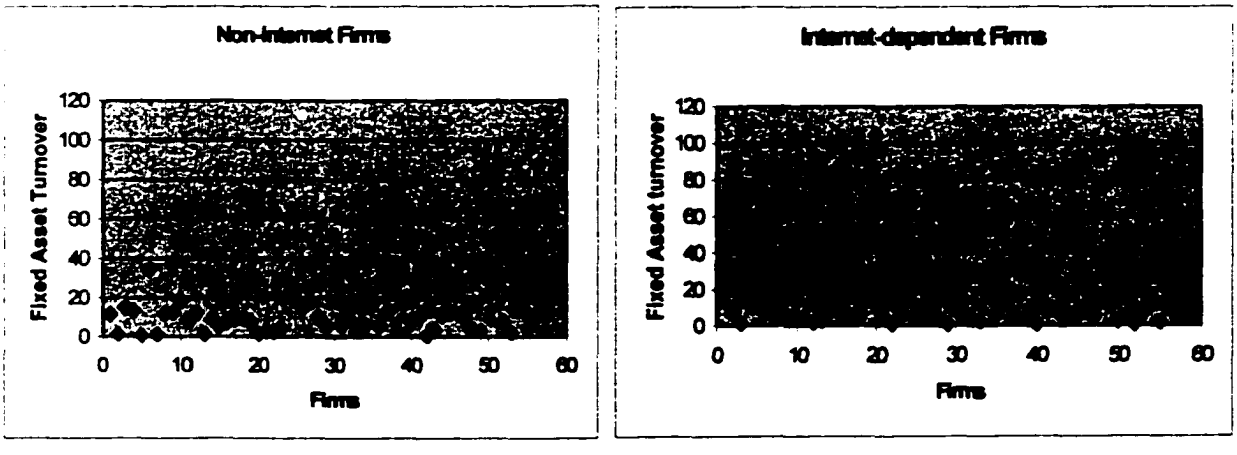
Variable	Mean	Standard Deviation	Minimum	Maximum
Non-Internet Firms				
Fixed Asset Turnover	11.398	9.973	0.46	51.72
Asset Turnover	1.035	0.626***	0.06	2.38
Internet-dependent Firms				
Fixed Asset Turnover	11.984	19.498	0.53	104.45
Asset Turnover	0.682	0.58***	0.06	2.94
All Firms				
Fixed Asset Turnover	11.69	15.39	0.46	104.45
Asset Turnover	0.86	0.63***	0.06	2.94

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

Table 4.2 summarizes the analysis of the activity ratios. On average, Internet-dependent companies have fewer fixed assets relative to their sales; but their total

assets seem to be higher relative to sales. This affects the fixed asset turnover ratio considerably. The means, the standard deviation, the maximum value, and the minimum value of the fixed asset turnover ratio are higher for Internet-dependent firms than for non-Internet firms. The asset turnover ratio has a lower mean and standard deviation for Internet-dependent firms than for non-Internet firms. These results indicate that Internet-dependent firms have fewer fixed assets than non-Internet firms but the amount of total assets is approximately the same or even larger for non-Internet firms. So Internet-dependent firms may be investing in assets other than fixed assets. Figures 4.3 and 4.4 illustrate the distribution of both ratios for each type of firm.

Figure 4.3: Fixed Assets Ratios

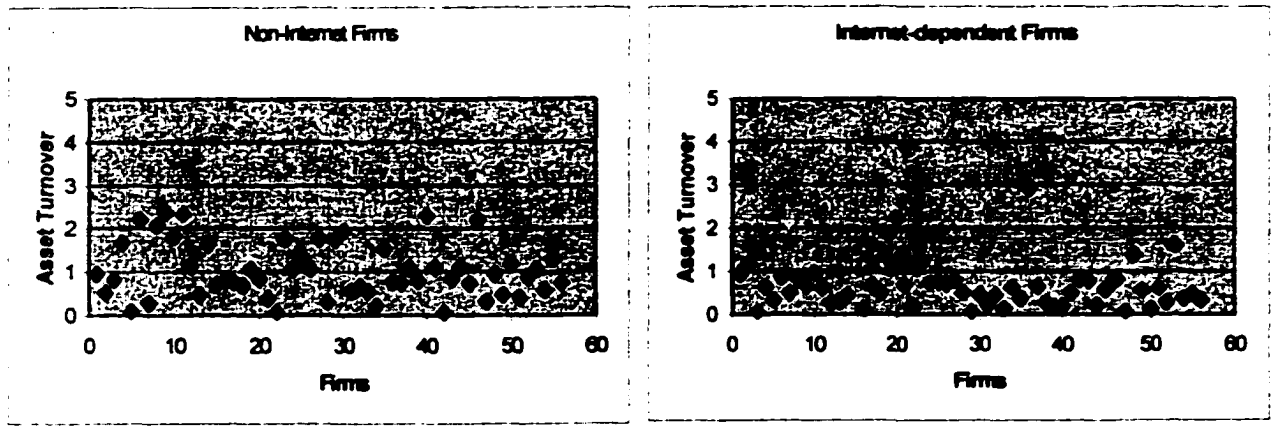


The actual mean of fixed assets turnover of 11.984 and total asset turnover of 0.682 for Internet-dependent firms do not seem too high or too low respectively when compared to the ratios for non-Internet firms (11.398 and 1.035 for fixed and total asset turnover respectively). The high means of the fixed asset turnover ratio may be partially due to the fact that the maximum of fixed asset turnovers are high (104.45 for Internet-dependent firms and 51.72 for non-Internet firms). Consequently, the maximum may be driving the means higher for Internet-dependent firms. This supposition may also be supported by the fact that first, the minimum values are about the same, and second, the standard deviation for Internet-dependent firms is very high at 19.498. The corresponding standard deviation is 9.973 for non-Internet firms.

Total asset turnover ratios on the other hand, tend to be aggregate on the lower end for Internet-dependent firms even though the maximum value is higher than that for non-Internet firms. Figures 4.3 and 4.4 show that assets turnover ratios are more even (less spread) for Internet-dependent firms than for non-Internet firms. These figures also show that most Internet-dependent firms are comparable

to non-Internet firms when it comes to these activity ratios.

Figure 4.4: Assets Turnover Ratios



On average, for every dollar in fixed assets, Internet-dependent firms generate around 11.984 dollars in sales, whereas non-Internet firms generate about 11.398 dollars. For every dollar in assets, Internet-dependent firms and non-Internet firms generate about 0.682 and 1.035 dollars of sales respectively. These ratios indicate that most of the firms in Internet-related businesses have a low percentage of fixed assets as compared to their total assets.

The next set of ratios analyzed deals with financial leverage.

Table 4.3: Financial Leverage Ratios Summary Statistics for Internet-dependent Firms and Non-Internet Firms.

Variable	Mean	Standard Deviation	Minimum	Maximum
Non-Internet Firms				
Debt-to-Equity Ratio	1.678	5.671	0.03	41.86
Equity Multiplier	1.988	1.525	1.03	10.08
Internet-dependent Firms				
Debt-to-Equity Ratio	1.045	2.20	0	14.32
Equity Multiplier	2.117	2.22	0	15.32
All Firms				
Debt-to-Equity Ratio	1.362	4.294	0	41.86
Equity Multiplier	2.047	1.898	0	15.32

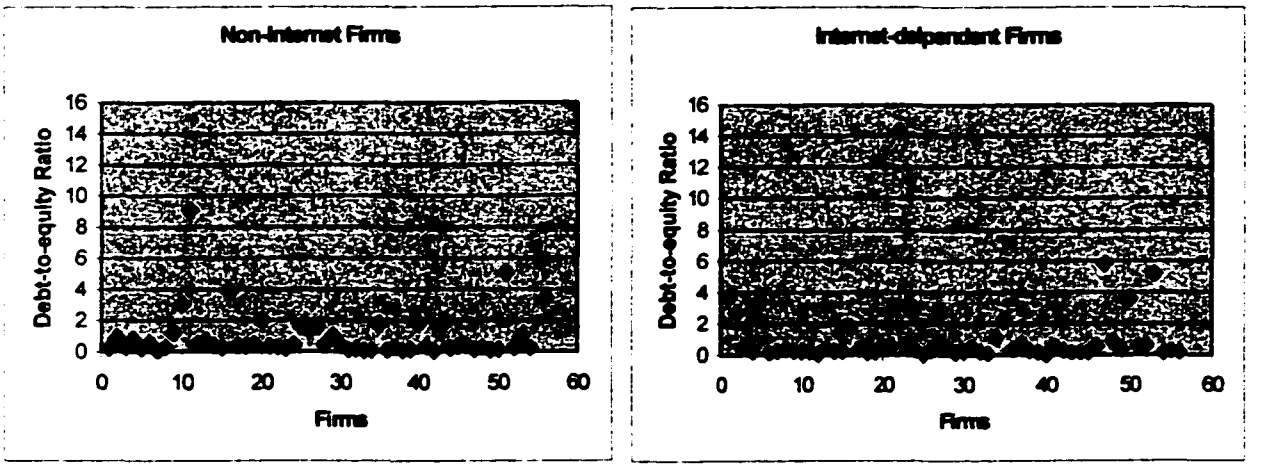
* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

In Table 4.3, the debt-to-equity ratio is 1.678 (or 167.8 percent) for non-Internet firms and only 1.045 (or 104.5 percent) for Internet-dependent firms. This ratio indicates that non-Internet firms use more borrowed funds to finance their activities than do Internet-dependent firms. The standard deviation for non-Internet firms is 5.671, which is more than twice that of Internet-dependent firms, at 2.20. Therefore, the debt-to-equity ratio is less dispersed for Internet-dependent firms than for non-Internet firms. The high mean and standard deviation may only be due to the fact that the maximum and the minimum

values of this ratio are higher for non-Internet firms than for Internet-dependent firms.

This argument is confirmed by Figure 4.5, which shows that the distribution across firms is about the same for both types of firms but the ratio tends to be higher for non-Internet firms. So, non-Internet firms use more debts to finance their activities than do Internet-dependent firms.

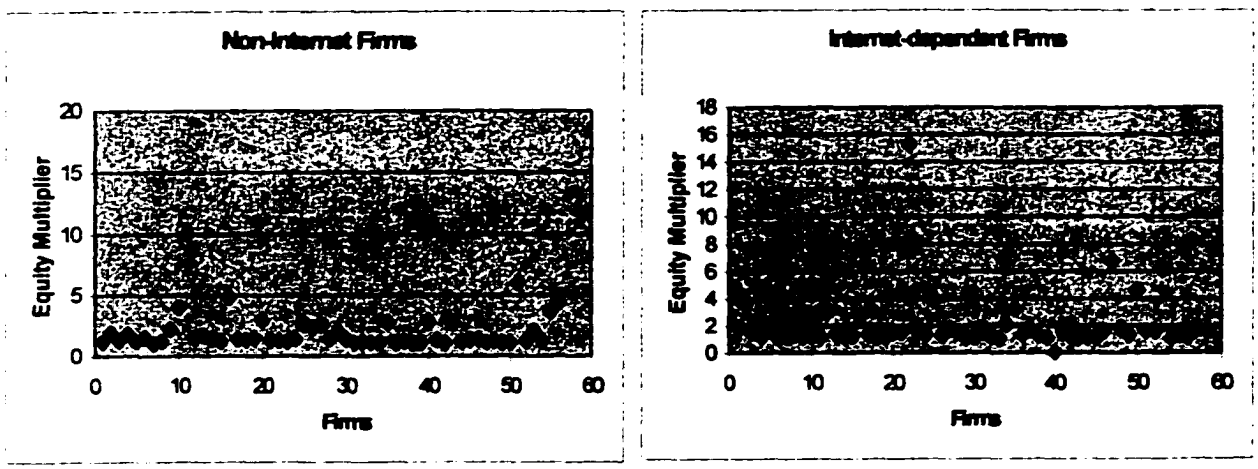
Figure 4.5: Debt-to-equity Ratio



The equity multiplier has nearly the same mean for both Internet-dependent and non-Internet firms. But the standard deviation is higher for Internet-dependent firms than for non-Internet firms; which means that the equity multiplier is more dispersed for Internet-dependent firms.

The maximum value of the equity multiplier is also higher (15.32) for Internet-dependent firms than for non-Internet firms (10.08). Also, the minimum is lower, 0, for Internet-dependent firms, against 1.03 for non-Internet firms. Figure 4.6 represents the equity multiplier.

Figure 4.6: Equity Multiplier



The next group of ratios deals with profitability.

Table 4.4: Profitability Ratios Summary Statistics for Internet Firms and Non-Internet Firms.

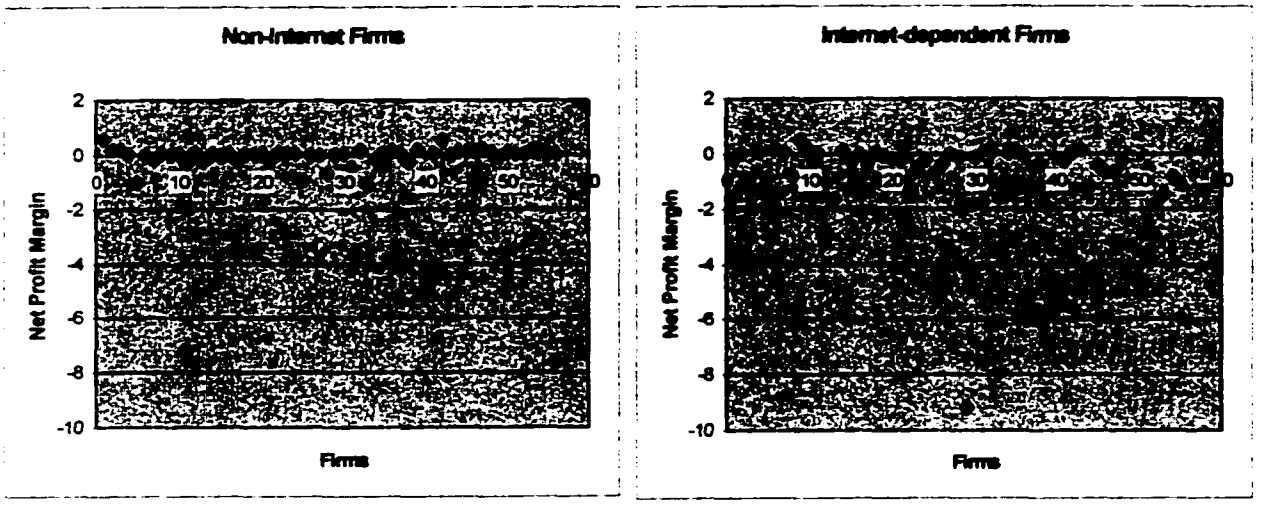
Variable	Mean	Standard Deviation	Minimum	Maximum
Non-Internet Firms				
Net Profit Margin	-0.049	0.327***	-1.10	0.58
Return on Assets	-0.049	0.362***	-1.94	0.56
Return on Equity	-0.177	1.366	-6.53	3.99
Internet-dependent Firms				
Net Profit Margin	-0.663	1.343***	-9.18	0.48
Return on Assets	-0.26	0.435***	-2.34	0.32
Return on Equity	-0.56	2.049	-14.46	1.76
All Firms				
Net Profit Margin	-0.356	1.020***	-9.18	0.58
Return on Assets	-0.16	0.412***	-2.34	0.56
Return on Equity	-0.37	1.744	-14.46	3.99

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

Table 4.4 summarizes the statistics of the profitability ratios, which are the net profit margin, the return on asset (ROA), and the return on equity (ROE). The mean of each of these ratios is negative for Internet-dependent firms as well as for non-Internet firms. These negative means imply that, on average, those firms are not generating any profit on their sales, assets, and equities. The negative means of all the profitability ratios suggest that the industries in which the Internet-dependent firms

perform may not be profitable at the moment. Most firms in these industries, Internet-dependent as well as non-Internet firms, possess a common characteristic, that is they use computers extensively in performing their tasks or are involved in computer-related businesses.

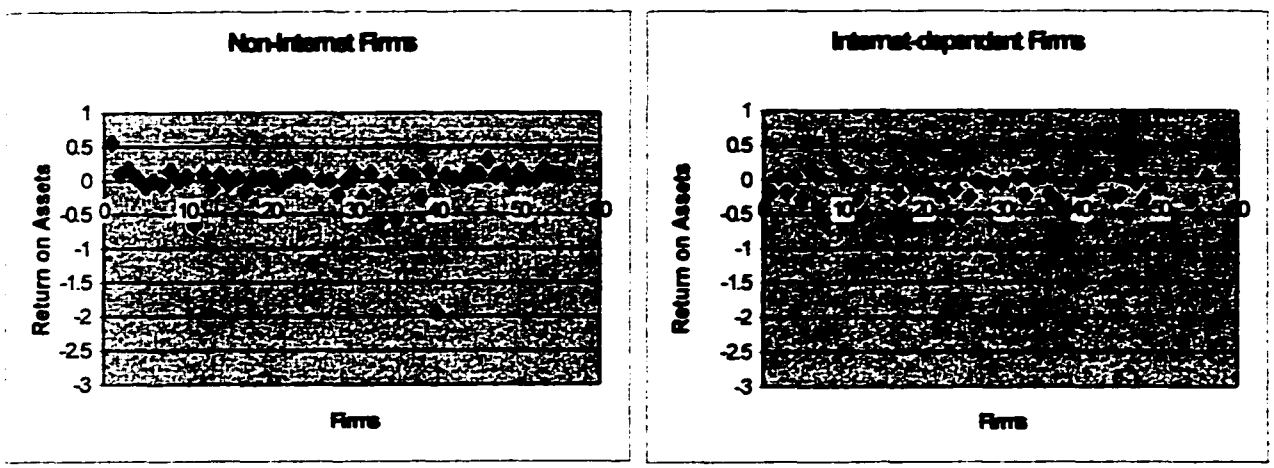
Figure 4.7: Net Profit Margin



For each profitability ratio, the standard deviation is higher than the mean for both groups of firms, and it is larger for Internet-dependent firms than for non-Internet firms. This suggests that the value of each ratio is more dispersed for Internet-dependent firms. This dispersion can be seen in Figure 4.7. There are more Internet-dependent firms below zero than non-Internet firms. Figure 4.8 also shows that the return on assets is more dispersed

for Internet-dependent firms than for non-Internet firms and more Internet-dependent firms are represented below 0.

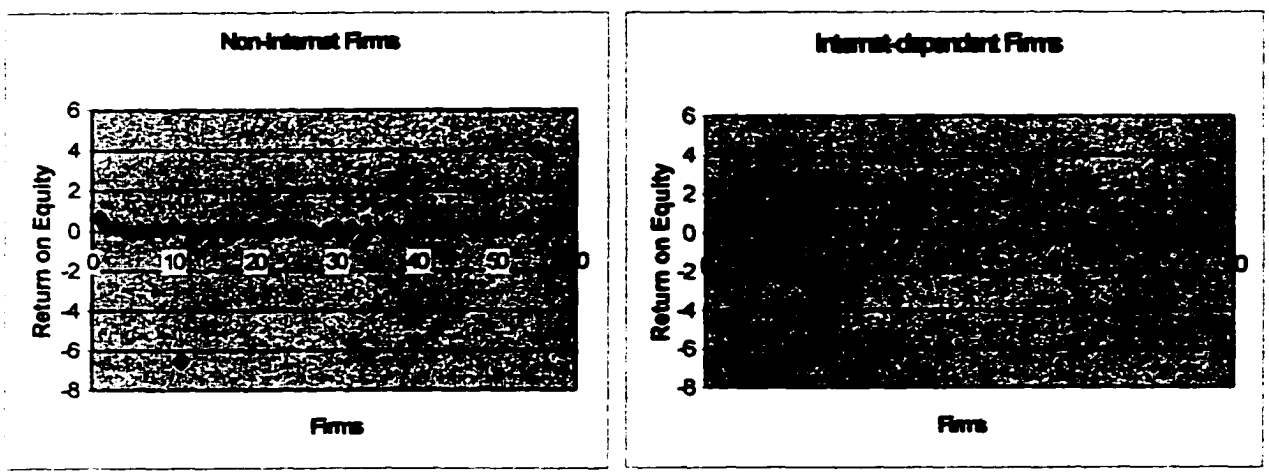
Figure 4.8: Return on Assets



The fact that the absolute value of the ROE, 0.177 for non-Internet firms and 0.56 for Internet-dependent firms, exceeds that of the ROA, 0.049 for non-Internet firms and 0.26 for Internet-dependent firms, reflects the firms' use of financial leverage. The negative signs come from the numerator of the fraction. The negative signs indicate that earnings are negative. The returns on assets are larger than the returns on equity for both Internet-dependent firms and non-Internet firms. Also, the value of assets and equity is larger for non-Internet firms than for Internet-dependent firms. Figure 4.9 shows that the return

on equity is more widely dispersed for Internet-dependent firms than for non-Internet firms. Most non-Internet firms are around 0 whereas the majority of Internet-dependent firms are represented below 0 with a minimum value of -14.46.

Figure 4.9: Return on Equity



The mean, the maximum, and the minimum values of each profitability ratio are very low for Internet-dependent firms when compared to non-Internet firms. This suggests that Internet-dependent firms are still less profitable than non-Internet firms, which supports the argument by Gurley (1998) that a large number of Internet-dependent firms are still not profitable even though their prices are rising considerably. Since the maximum value of each of

the ratios is positive, it implies that not all Internet-dependent firms are unprofitable. As Gurley suggests, a few of them are earning some profits.

The next table deals with the analysis of market value ratios.

Table 4.5: Market Value Ratios Summary Statistics for Internet-dependent Firms and Non-Internet Firms.

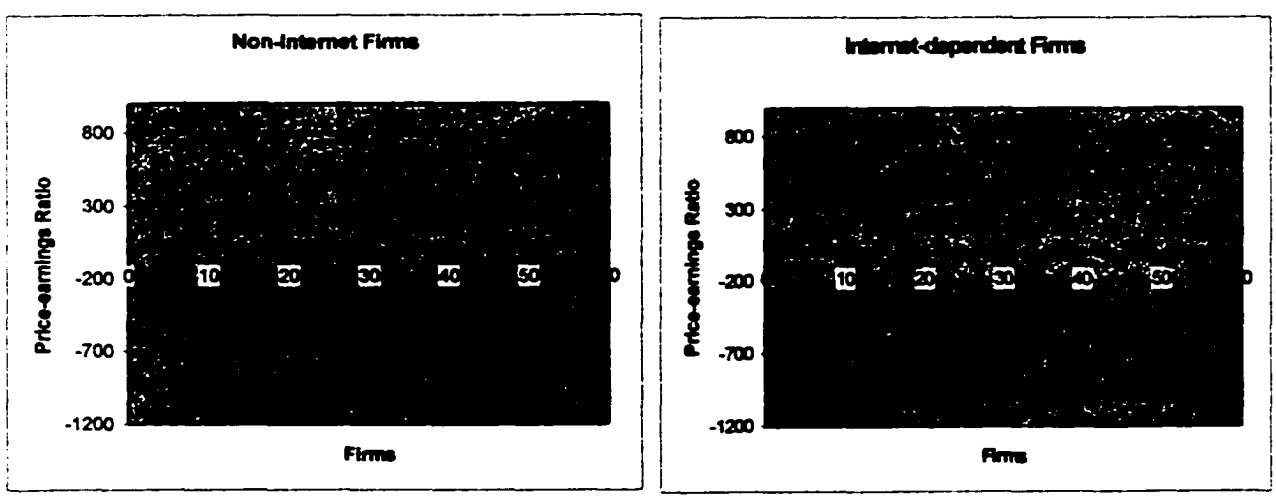
Variable	Mean	Standard Deviation	Minimum	Maximum
Non-Internet Firms				
Price-Earnings Ratio	22.982	87.636	-187.50	438.8
Market-to-Book Ratio	5.448	8. 670***	0.50	63.29
Internet-dependent Firms				
Price-Earnings Ratio	-23.60	264.39	-950.00	925.00
Market-to-Book Ratio	11.95	17.185***	1.61	95.56
All Firms				
Price-Earnings Ratio	-0.31	197.46	-950.00	925.00
Market-to-Book Ratio	8.544	13.741***	0.50	95.56

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

Table 4.5 summarizes the statistical analyses of the market value ratios. On average, the price-to-earnings (P/E) ratio is higher for non-Internet firms than for Internet-dependent firms. This implies that Internet-dependent firms are perceived to have either higher risk

than non-Internet firms, lower growth prospects, or both. The risk hypothesis supports the argument by Ward (1999), who suggests that the World Wide Web could become a real threat to many investors. The risk bore by Internet-dependent firms' stocks is higher. The maximum and the minimum P/E ratio are the highest and the lowest respectively for Internet-dependent firms. Therefore, the P/E ratio is aggregate over a wider range for Internet-dependent firms than for non-Internet firms. This contributes to the high standard deviation for Internet-dependent firms. The deviation can be seen in figure 4.10 where the values of the price-earnings ratio are more dispersed for Internet firms than for non-Internet firms.

Figure 4.10: Price-earnings Ratio

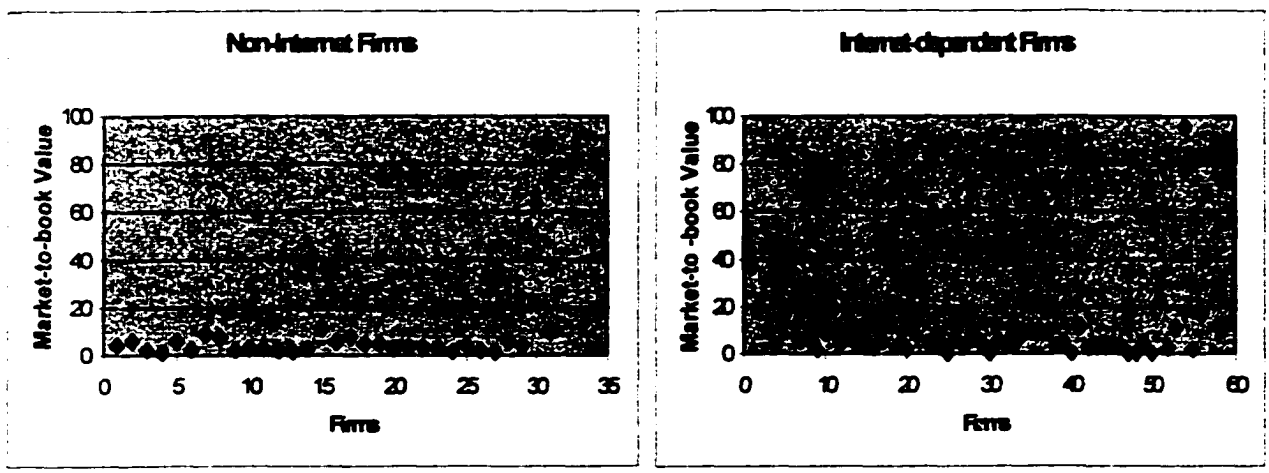


The average market-to-book ratio, on the other hand, is larger for Internet-dependent firms than for non-Internet firms. The standard deviation, maximum, and minimum are also larger in the case of Internet firms. The large standard deviation means that the market-to-book value is more dispersed for Internet-dependent firms as shown in Figure 4.11. This ratio shows that the market overvalues Internet-dependent firms' stocks at least twice as much as it does non-Internet stocks. The maximum market-to-book ratio is about 95.56 for Internet-dependent firms and 63.29 for non-Internet firms. These results suggest that compared to non-Internet firms' stocks, Internet-dependent firms' stock are more likely to be traded at prices higher than their suggested book value.

The minimum value of the market-to-book ratio is 0.50 for non-Internet firms and 1.61 for Internet-dependent firms. This can be interpreted as some non-Internet firms having a book value below the market value, which means that the stocks are worth less than the current market value. But for Internet-dependent firms, at least for the firms included in the sample selection of this study, none of the firms' stock is priced less than it is worth. This

observation supports the argument by Savitz (1998) that Internet-dependent firms' stock values bear little relationship to their actual values.

Figure 4.11: Market-to-book value



Upon one examining the various financial ratios, it appears that for most ratios, the standard deviation is close to or even larger than the absolute value of the means for both groups of firms. This implies that the ratios are dispersed, which fact makes it difficult to discern Internet-dependent firms from non-Internet firms. Further analysis is needed to determine whether Internet-dependent firms' financial ratios differ from those of standard firms. The next analyses applied to those financial ratios are simple regression analyses.

4.2 Regression Analysis of Financial Ratios

Although the summary statistic of the financial ratios presented on the five previous tables provide support for some of the previously stated hypotheses, regression analysis offers more conclusive evidence of the relationship a firm's Internet-dependency and the selected financial ratios. The model used to evaluate the effect of Internet dependency on the firm financial ratios is an ordinary least squares regression model with a dummy variable as the independent variable. The dummy variable takes the value 1 if the firm is an Internet-dependent firm and 0 otherwise. The following three tables present the results of the regression analyses, showing which ratios are significant and at what level. The tables summarize the value of the parameter estimates for the intercept, the Internet, the t-statistic in parentheses, the F-statistic, and the R-squared.

Table 4.6: Ordinary Least Squares Estimates of the Internet for Liquidity Ratios and Activity Ratios. Parameter Estimated (t-statistic in parentheses)

	Liquidity Ratios		Activity Ratios	
Dependent Variable	Current Ratio	Quick Ratio	Fix-Asset Turnover	Asset Turnover
Intercept	4.414 (8.613)***	3.793 (7.558)***	11.397 (5.518)***	1.035 (12.841)***
Internet	-0.023 (-0.031)	0.224 (0.316)	0.588 (0.201)	-0.353 (-3.096)***
F-Ratio	0.000964	0.099719	0.040474	9.58553***
R-Squared	8.76E-06	0.000906	0.000368	0.080156

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

- **Liquidity Ratios**

Liquidity ratios presented in Table 4.6 show that Internet dependency is not a significant variable in determining both liquidity ratios. The Internet parameter is negative for the current ratio and positive for the quick ratio. This means that for Internet-dependent firms, the current ratio is slightly lower, whereas the quick ratio is slightly higher than that of standard firms. This

observation supports the results given in Table 4.1, which showed that for Internet-dependent firms the mean current ratio was lower and the mean quick ratio was higher than those of non-Internet firms. The values of the F-statistic and R-squared are very low; which suggests that the variations in liquidity ratios are determined by many other variables.

- **Activity Ratios**

The parameter estimate for the intercept and the Internet variable is positive but not significant in the case of the fixed asset turnover and negative and significant at the 1 percent level in the case of total asset turnover. As the descriptive statistics suggest in Table 4.2, the ordinary least squares estimate reports that fixed asset turnover and asset turnover are higher and lower respectively for Internet-dependent firms than for non-Internet firms. However, this result is only significant for the total asset turnover. Dependency on the Internet is not a significant determinant of the fixed asset turnover ratio. In other words, how Internet-dependent firms use their fixed assets to generate sales is not distinctive from how non-Internet firms do. The very

low F-statistic and R-squared values show that the Internet alone is not sufficient to explain the changes in the fixed asset turnover ratio.

Table 4.7: Ordinary Least Squares Estimates of the Internet for Financial Leverage and Market value Ratios. Parameter Estimated (t-statistic in parentheses)

	Leverage Ratios		Market Value Ratios	
Dependent Variable	Debt/ Equity	Equity Multiplier	Price/ Earnings	Market/ Book
Intercept	1.678 (2.820)***	1.978 (7.769)***	22.982 (0.873)	5.448 (3.013)***
Internet	-0.633 (-0.778)	0.139 (0.387)	-46.584 (-1.252)	6.502 (2.481)***
F-Ratio	0.606	0.015	1.566	6.154**
R-Squared	0.0055	0.00136	0.01404	0.05638

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

- **Leverage Ratios**

Leverage ratios measure likeliness of a firm to default on its long-term contracts. On the one hand, the parameter estimates are positive and significant for the

intercepts of both the debt-to-equity ratio and the equity multiplier. On the other hand, the parameter estimate for the Internet variable is negative but not significant for the debt-to-equity ratio and positive for the equity multiplier ratio. The negative sign of the D/E ratio suggests that Internet-dependent firms have lower debts compared to their equities. R-squared and the F-statistic are not significant for both ratios, which again means that dependency on the Internet does not have much impact on the value of leverage ratios.

- **Market Value Ratios**

The market value ratios are presented in Table 4.7; the price-earnings ratio shows no significance for the intercept parameter as well as for the Internet parameter. Therefore, it can be said that the fact that a firm is an Internet-dependent organization does not have an impact on its price-earnings ratio. The coefficient of Internet dependency is negative, meaning that Internet-dependent firms tend to have a lower price-earnings ratio than non-Internet firms do. The F-statistic and the coefficient of determination are relatively small, which suggests that the model is not a good fit.

The market-to-book ratio is one of the few ratios which show significant results in this study. The coefficients of both the Internet and the intercept are positive and significant at the 1 percent level. So the Internet is a significant explanatory variable of the market-to-book ratio. Firms that are dependent on the Internet are more likely to have a higher market-to-book ratio than those that do not depend on the Internet.

Since dependency on the Internet is represented by a dummy variable which takes the value of 1 if the firm is an Internet-dependent firm, and 0 otherwise, it can be predicted that the value of market-to-book ratio is on average higher for Internet-dependent firms than for non-Internet firms by about 6.502. This result supports the statistical analysis from Table 4.3, which shows that the average values of market-to-book ratio are 5.448 for non-Internet and 11.95 for Internet-dependent firms. The intercept value is 5.448 in the regression, and the summation of both the intercept and the coefficient of Internet variable is 11.95.

R-squared is 5.6 percent and the F-statistic is significant at the 5 percent level. The Internet may not be the only explanatory variable for market-to-book ratio

but it is significant enough to be considered as a determinant of this ratio. One explanation is that the market value of Internet stocks seems to be very high when compared to the book value of the stock. Dunstan (1999) and Waters (1998) assert that the value of Internet stocks is rising considerably.

Table 4.8: Ordinary Least Squares Estimates of the Internet for Profitability Ratios. Parameter Estimated (t-statistic in parentheses)

	Profitability Ratios		
Dependent Variable	Net Profit Margin	Return on Assets	Return on Equity
Intercept	-0.049 (-0.377)	-0.049 (-0.922)	-0.177 (-0.759)
Internet	-0.613 (-3.322)***	-0.212 (-2.808)***	-0.382 (-1.160)
F-Ratio	11.033**	7.883***	1.346
R-Squared	0.091	0.067	0.012

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

- **Profitability Ratios**

There are three profitability ratios analyzed in the present study: the net profit margin, the return on assets, and the return on equity. The results presented in Table 4.8 show that for each ratio, the intercept value, and the slope of the Internet variable are negative, meaning that most Internet-dependent firms are less profitable than non-Internet firms. These results support Gurley's (1998) argument that Internet-dependent firms are yet to be profitable. Of these three ratios, only one Internet parameter estimate appears statistically significant.

The return on assets is significant at the 1 percent level but the return on equity is not significant. This implies that the Internet is a significant determinant of stock return on asset. The F-statistic is somewhat high for the return on equity although it did not reach the level required for this analysis, and R-squared is higher than 1 percent for both ratios. The other ratio that is statistically significant is the net profit margin. The t-statistic of the Internet parameter is significant at 1 percent, which strongly suggests that dependency on the Internet is an important determinant of a company's net profit margin. The F-statistic is 11.033 and the

coefficient of determination is 9.12 percent. Therefore, the overall model is significant at the 5 percent level.

Evidence suggests that most financial ratios are not affected by a firm's dependence on the Internet. From the 11 ratios analyzed in this study, only four show significant dependency on the Internet. The four ratios are the total assets turnover ratio, the market-to-book ratio, the net profit margin, and the return on assets. These are significant at the 1 percent level.

All four ratios are related to what seems to be the concern of many investors and financial advisors. The market-to-book ratio has a positive and significant value, which supports the arguments by Savitz (1998), Waters (1998), Barboza (1999) and others, that the prices of Internet stocks are increasing rapidly. Despite this rapid growth in price, these Internet stocks are still very risky and not profitable (Barboza, 1999; Ward, 1999). The total asset turnover ratio and the return-on-asset ratio are both affected by the fact that Internet firms have to invest in high technology and these investments depreciate more quickly than fixed assets.

For those financial ratios that are significant, other variables besides the Internet factor have to be included

in the model, and there is a need to analyze the various elements that affect the stock return in order to understand the role played by the Internet in explaining that return.

4.3 Regression Analysis of Stock Returns

Multiple regressions were used to assess the impact of the Internet on a firm's performance. The dependent variable was the stock return and the independent variables were those proposed by Fama and French (1993, 1995), which are the firm size and the book-to-market equity. In addition to these independent variables, this study considered two more variables: the dependency on the Internet and the industry ranking. Dependency on the Internet was represented by a dummy variable which took the value 1 if the firm was an Internet-dependent firm, and 0 otherwise. The industry ranking was added to the model because in the Fama and French model, most firms were grouped to some extent by the rating of their stock. Since the present study considered all types of firms together, a firm's industry performance may affect the way investors perceive individual firms in the industry.

A preliminary test was performed on the data to detect if heteroscedasticity was present. The Goldfeld-Quandt test was used. To perform the Goldfeld-Quandt Test, the observations were divided into two groups for the purpose of calculating two separate variances. Under the hypothesis of homoscedasticity the disturbance variances would be the same in the two groups. While under the alternative hypothesis (heteroscedasticity), the disturbance variances would differ systematically.

By ranking the observations based on sales, high observations were separated into those with high and low variance. The test was applied by dividing the sample into two groups with n_1 and n_2 observations. The test statistic is

$$F[n_1 - k, n_2 - k] = \frac{e_1' e_1 / n_1 - k}{e_2' e_2 / n_2 - k} \qquad (4.1)$$

The first set of observations goes from 1 to 35 and the second set goes from 78 to 112. By omitting the observations between 36 and 77, two statistical independent variance estimators were obtained, which increased the power of the test. The sums of squared residuals in the

two regressions are 1,077,952 and 508,698. So the test statistic is

$$F[30,30] = \frac{1,077,952}{508,698} = 2.119$$

Given an F[30,30] of 2.119 and the 1 percent critical value of 2.39 from the F table is 2.39, the hypothesis of homoscedasticity should not be rejected. Having established the possibility of homoscedasticity, it was possible to continue with the analyses.

First, the study examined how independent variables (firm size and book-to-market equity) proposed by Fama and French (1993) affect the stock returns. Then the Internet variable was added to the Fama and French model. A third analysis considered the industry rank in addition to the firm size, the book-to-market equity and the Internet variable. After including all four variables in the regression analysis, some variables became insignificant. Therefore, it was important to analyze the interaction between different variables and to examine the effect of omitting an insignificant variable on the model.

Table 4.9: Ordinary Least Squares Estimates of Stock Return for 56 Internet-Dependent Firms and 56 Non-Internet Firms. Parameter Estimated (t-statistic in parentheses)

	Dependent Variable: Stock Return for 1998			
Regression	(1)	(2)	(3)	(4)
Intercept	118.813 (4.50)***	59.594 (1.709)*	107.377 (2.42)**	88.168 (2.237)**
Size	-0.002295 (-2.702)***	-0.001972 (-2.354)**	-0.001973 (-2.378)**	-0.002046 (-2.477)**
BE/ME	127.768 (2.11)**	76.219 (1.21967)	59.208 (0.945)	
Internet		94.493 (2.516)**	67.698 (1.678)*	76.743 (1.959)*
Industry Rank			-2.434 (-1.71695)*	-2.646 (-1.891)*
F-Ratio	6.921***	6.965***	6.061***	7.793***
R-Squared	0.1195	0.1714	0.1951	0.1880

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

Table 4.9 reports results from four different ordinary-least-squares regression models in which the dependent variable is the stock return during 1998.

(1) The first regression only considers the independent variables used by Fama and French (1993, 1995). As in the Fama and French analysis, all of the parameters estimated are consistent and significant, although they are at different levels. Firm size effect is negative and significant at the 1 percent level. The estimate of firm size is -0.0023 and the t-statistic is -2.702; therefore, if the firm size increases by 1 unit, the stock return should decrease by about 0.0023.

The book-to-market equity gives a positive effect, and the coefficient is 127.768 with a t-statistic of 2.11. This variable is significant at the 5 percent level. If the book-to-market value increases by 1 unit, the stock return is expected to increase by 127.768. The F-statistic is significant at the 1 percent level and R-squared equals 11.95 percent; this means that overall the model explains 11.95 percent of the changes in stock returns.

Table 4.10: Summary of the Pearson-correlation between the Independent Variables

	Size	BE/ME	Internet	Ind. Rank
Size	1			
BE/ME	-0.1542	1		
Internet	-0.1956	0.3479	1	
Ind. Rank	0.1005	-0.2898	-0.4514	1

(2) In addition to the two independent variables used in the first regression, the second regression considers the Internet variable, which is represented by a dummy variable, taking the value 1 if the firm analyzed is an Internet-dependent firm and 0 otherwise.

The new regression improves the intercept value in the sense that the intercept has less impact on the entire model. The significance level deteriorates from 1 percent to 10 percent and the coefficient drops by about half, from 118.813 to 59.594.

The coefficient on the company size changes and the significance level goes from 1 percent to 5 percent level of significance (t-statistic goes from -2.702 to -2.354). This change in the level of significance may partly be due

to the correlation (-19.56 percent) between the firm size and the Internet variable.

The parameter estimate for the book-to-market equity loses its significance. The slope decreases from 127.768 to 76.219, and the level of significance, which was at about 5 percent, is not significant even at 10 percent. The variable is significant at about the 23 percent level where the t-statistic becomes 1.22. The fact that the significance level deteriorates does not necessarily mean that the variable is not important. An analysis of the omission of the book-to-market ratio from the model is presented later in the fourth regression.

The Internet variable is positively related to the stock return, with a coefficient of 94.493 and t-statistic of 2.516. This new variable is significant at the 5 percent level. Since adding the Internet variable changes the significance level of the book-to-market ratio, the two variables must be correlated to some extent. The coefficient of correlation was computed for the two variables and the value is ρ = 34.79 percent.

The positive correlation between the two variables is quite significant. Table 4.7 supports the idea of correlation between the variables because regressing the

Internet variable on the market-to-book ratio gave a significant t-statistic (2.481) at the 1 percent level. Market-to-book ratio was one of the four ratios that showed significant results when analyzing the impact of an Internet-dependent firm on financial ratios.

The overall model shows that there is an improvement in the fit. The F-statistic increases from 6.921 to 6.965 and remains significant at the 1 percent level; the coefficient of determination, R-squared, also improves from 11.95 percent to 17.14 percent. This means that about 17.14 percent of variations in stock return are explained by the variation in the proposed independent variables (firm size, BE/ME, Internet).

(3) The third regression includes another variable in addition to the Internet variable. This new variable is the industry rank. The intercept value increases from 59.594 to 107.377, and its t-statistic becomes significant at the 5 percent level. The coefficient of the firm size does not change, and the t-statistic remains significant at the 5 percent level.

The book-to-market equity remains positive, and the parameter decreases to 59.208 with a -0.945 t-statistic. This low value of the t-statistic reduces the confidence

level. The variable is not significant at the 23 percent level anymore; it becomes significant only at about the 35 percent level. This deterioration of the level of significance of the book-to-market equity does not necessarily mean that the variable is not important. One explanation of the change in significance level in the book-to-market variable is that the correlation between the industry rank and the book-to-market equity is about 28.97 percent. Both variables are negatively correlated, which means that if one variable decreases, the other is likely to increase.

The coefficient of the Internet variable decreases from 94.493 to 67.698 as its t-statistic decreases from 2.516 to 1.678, becoming significant at only the 10 percent level. This change in significance can be attributed to the fact that the Internet variable and the industry rank of firms are negatively correlated at 45.14 percent. This high level of correlation can be explained by the fact that most Internet-dependent firms perform in booming industries. These industries obtain better ranking because of their rapid growth.

The F-statistic decreases from 6.965 to 6.061, but the significance level remains at 1 percent. There is a net

improvement in the coefficient of determination R-squared, which goes from 17.14 percent to 19.51 percent. This model explains the stock return better than the previous one.

(4) In order to better understand the impact of the book-to-market equity on the stock return, another regression analysis was conducted. This regression analyzed the impact of omitting the book-to-market equity as a variable that determines the stock return. The results are summarized in the last column of Table 4.9. The intercept value and the t-statistic decrease from 107.377 to 88.168 and from 2.42 to 2.237 respectively; but the significance level is still 5 percent. The coefficient of firm size increases slightly in magnitude to 0.002046 with a t-statistic of -2.477 and a significance level at 5 percent.

The firm size and the book-to-market equity are correlated at only -15.42 percent; therefore, omitting the book-to-market equity does have an important effect on the firm's size coefficient and its t-statistic. Omitting the book-to-market equity increased in absolute value the coefficient of the Internet dependency and the industry rank. However, the level of significance remains at 5 percent for both variables.

The F-statistic, 7.793, is higher than that of the three other regressions. The R-squared, 18.80 percent is bigger for Regression 4 than that of Regressions 1 and 2; but it is lower than that of Regression 3, taking into account all of the variables including size, book-to-market equity, Internet dependency, and industry rank. This means that Model 3, including all the variables, is superior. Therefore, although the book-to-market equity becomes less significant, it does not necessarily mean that the variable is not an important one. It rather shows some dependency and correlation among the independent variables.

Table 4.10 shows a correlation of -0.45 between the Internet variable and the industry rank. This correlation must be tested to determine its effect on the validity of the results. Following Wells, et al. (1995), to perform this test an interaction variable was created. This variable is the result of multiplying the Internet variable by the industry-rank variable. The results of the tests are represented by Regression 5 in Table 4.11.

Table 4.11: Ordinary Least Squares Estimates of Stock Return for 56 Internet-Dependent Firms and 56 Non-Internet Firms. Parameter Estimated (t-statistic in parentheses)

	Dependent Variable: Stock Return for 1998	
Regression	(3)	(5)
Intercept	107.377 (2.42)**	65.334 (1.329)
Size	-0.001973 (-2.378)**	-0.00193 (-2.352)**
BE/ME	59.208 (0.945)	60.097 (0.971)
Internet	67.698 (1.678)*	146.327 (2.538)**
Industry Rank	-2.434 (-1.71695)*	-0.544 (-0.316)
Internet*Rank		-5.490 (-1.886)*
F-Ratio	6.061***	5.684***
R-Squared	0.1951	0.223

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

(5) Regression 5 adds an interaction variable to Regression 3. The F-statistic decreases to 5.684 and remains significant at the 1 percent level. R-squared increases to 22.3 percent

The intercept value decreases from 107.377 to 65.334 and is not significant even at the 10 percent level. The coefficient for firm size remains almost the same as well as its level of significance which is at 5 percent. The slope of book-to-market equity remains almost the same. The book-to-market equity remains not significant.

The slope of the Internet variable increases by more than 100 percent of its original value. This slope of 146.327 is now significant at the 5 percent level. However, the industry rank loses some level of significance. Its coefficient changes to -0.544. The new variable Internet*Rank has a negative slope of -5.490. This variable is significant at the 10 percent level.

Given that the Internet variable and the interaction variable have slopes with opposite signs and both variables are significant, it is necessary to determine their net effect. The net effect can be obtained by computing the weighted average of both slopes.

$$\text{Net effect} = \beta_3 * \text{AVG(Internet)} + \beta_5 * \text{AVG(Internet * Rank)} \quad (4.2)$$

$$= 146.327*0.5 + (-5.49)*4.762$$

$$= 47.02$$

The average net effect is positive and only 2.68 percent (3 firms out of 112) of firms in the sample exhibit a negative effect. This net is 0 for non-Internet firms and is positive for most Internet-dependent firms. The net effect will become negative if the company is an Internet-dependent firm, with a rank of 27 or above. As Wells, et al. (1995) have concluded, it can be said that the interaction effect is statistically but not economically significant for the data set.

4.4 Summary of Empirical Results

The findings of this analysis suggest that dependency on the Internet is a factor that should be taken into account when analyzing a company performance. The analysis of the different financial ratios reveals that of the five groups of financial ratios, only four appear to be significantly impacted by the Internet. The four ratios belong to three groups of financial ratios. Those three

groups are the activity ratios, the market value ratios and the profitability ratios as presented in Table 4.12.

The liquidity ratios (quick and current ratios) appear to be more dispersed for Internet-dependent firms than for non-Internet firms, which means that the liquidity of Internet-dependent firms varies over a wider range.

Activity ratios (fixed asset turnover and total asset turnover) are likely to be grouped below 1 for most Internet-dependent firms compared to those of non-Internet firms; but few Internet-dependent companies have rather high ratios, which drive the means and the standard deviations up for Internet-dependent firms. Therefore, it can be said that most Internet-dependent firms manage their assets with similar levels of efficiency even though few firms appear to be generating greater money sales from their assets.

Leverage ratios (debt-to-equity and equity-multiplier ratios) seem to have similar distributions for both Internet-dependent firms and non-Internet firms. So even though the mean is higher for Internet-dependent firms, Figure 4.5 and Figure 4.6 show that Internet-dependent firms and non-Internet firms behave the same in terms of financing their activities with debts.

Profitability ratios (net profit margin, ROA, ROE) are more dispersed and have the tendency to be more negative for Internet-dependent firms than for non-Internet firms even though few non-Internet firms show a ROA and ROE lower than those of Internet-dependent firms. This finding implies that most Internet-dependent firms are not, or at least not yet, as profitable as the majority of non-Internet firms.

Market value ratios (P/E, market-to-book ratio) are more dispersed for Internet-dependent firms than for non-Internet firms. The price-earnings ratio appears to be grouped around 0 for both Internet-dependent firms and non-Internet firms; but few Internet-dependent firms have either a very high positive value or a very low negative value. This means that the prices of Internet-dependent firms' stocks do not necessarily reflect the level of earnings. The market-to-book value is higher for Internet-dependent firms than for non-Internet firms.

These findings are agreeable with the current stock behavior on the market. The market-to-book ratio is impacted by a firm's dependency on the Internet because the price of Internet-dependent firm's stocks tends to rise drastically after the initial public offering. This

increase in price reflects how investors perceive Internet-dependent firms.

Another ratio that appears to be significant is the profitability ratio. This is due to the fact that most Internet-dependent firms are not profitable yet. Only a few Internet-dependent firms such as Yahoo, eBay, and E*trade are profitable. Investors believe that other firms like Amazon.com will eventually make money. This belief is the reason why, even though many Internet-dependent firms are not yet profitable, their market values keep increasing; therefore, increasing the market-to-book value. The negative value of the net profit margin results from the fact that Internet-dependent firms are for the most part not yet profitable.

Table 4.12: Summary of the Results of Regressing the Internet-dependency on the each Financial Ratio

Dependent Variable: Ratio	Independent Variable: Internet	Significant
Current Ratio	-	no
Quick Ratio	+	no
Fix-Asset Turnover	+	no
Asset Turnover	-	Yes***
Debt-to-equity	-	no
Equity Multiplier	+	no
Price/Earnings	-	no
Market/Book	+	Yes***
Net Profit Margin	-	Yes***
Return on Asset	-	Yes***
Return on Equity	-	no

* Statistically significant at 10% confidence level.
** Statistically significant at 5% confidence level.
*** Statistically significant at 1% confidence level.

Table 4.13 gives the summary of the determinants of the stock return. Internet-dependent firms will tend to have a higher stock return. The industry rank appears to have a negative impact on the firm's stock return. Therefore, firms in best-ranked industries will have a

lower return. So dependency on the Internet affects investment decisions and firm performance.

Table 4.13: Summary of the Expected Signs and Actual Signs of the Determinants of the Stock Return

Variable	Expected sign	Actual sign
Firm Size	-	-
Book-to-market value	+	+
Internet	+	+
Industry rank	-	-

Table 4.13 shows that the expected sign and the actual sign of each parameter estimate are the same. This concludes the presentation of the empirical results. The next chapter provides a summary and the conclusions.

CHAPTER FIVE

Summary and Conclusions

In the preceding chapters, hypotheses relating firms' performance to Internet dependency were discussed. Empirical evidence supporting some of these hypotheses was presented. In the present chapter, a summary and conclusions of the entire dissertation will be presented. First, a summary of findings and the contribution of the study is presented, then the limitations of the research and finally, some suggestions for future research.

5.1 Summary of Findings and Contribution of the Study

This dissertation has attempted to provide empirical evidence to establish a link between dependency on the Internet and firm performance. Internet-dependent firms are those firms that could not exist without the Internet. Each Internet-dependent firm was matched with a control firm in the same industry and with relatively the same level of activity.

The basic hypothesis of the study is that Internet-dependent firms' stocks will perform better than non-Internet firms' stocks. These Internet-dependent firms will be overvalued. This hypothesis implies that the market value of those firms' stocks is relatively higher compared to those of non-Internet firms. The results are consistent with the predictions, although all the tests were not significant.

Financial ratio analyses indicate that the Internet is likely to affect only specific ratios. Liquidity ratios of Internet-dependent firms seem not to be different from those of non-Internet firms. This means that in the short run, Internet-dependent firms should behave similarly to non-Internet firms in order to meet company solvency needs. Also, both types of firms face the same type of short-term insolvency problems.

On the management side, the fixed asset turnover ratio seems to be higher for Internet-dependent firms than for non-Internet firms. This is a sign that Internet-dependent firms have fewer fixed assets relative to sales. However, the test of this difference in fixed asset turnover gives results that are not significant. The total asset turnover on the other hand, is lower for Internet-dependent firms

and the test shows significance at the 1 percent level. This reveals that Internet-dependent firms invest in assets that are not fixed assets.

The test of leverage ratios suggests that non-Internet firms tend to have higher debts relative to equity than Internet firms do. In other words, Internet-dependent firms use less borrowed money to finance their activities. This may be due to the fact that Internet-dependent firms are still young. They have not established a strong line of credit yet. However this test appears not to be significant.

Based on investors' analyses of Internet-dependent stocks, the hypothesis was established that these stocks will be less profitable than non-Internet firms' stocks. The results confirm that Internet-dependent firms have lower profitability compared to non-Internet firms. These results were significant in the case of the net profit margin and the return on assets. Finally, the market value ratios significantly confirm that Internet-dependent firms' stocks are overvalued compared to those of non-Internet firms.

Given that only some financial ratios appear to be significant, more attention was devoted to the study of the

variables that affects the stock return. In addition to the two variables (size and book-to-market equity) considered by Fama and French (1993, 1995) as the determinants of stock return, this study analyzes two new variables: Internet dependency and industry rank.

The signs of each parameter in the present study seem to be consistent with the findings by Fama and French. The firms' size is negatively related to stock return and the book-to-market equity has a positive relationship with the stock return. This implies that larger firms' stocks will have a lower return compared to that of small firms; this implication can be justified by the fact that the stocks of most small firms are riskier than those of large ones.

It has been proven in finance that low risk is associated with low return and high risk with high return. However, the book-to-market equity loses some level of significance when the two new variables are added. This may be due to the fact that these new variables have some degree of correlation with the book-to-market equity. Dependency on the Internet appears to be positively related to the stock return and the industry rank is negatively related to the return. These variables appear to be significant.

5.2 Limitations of the Study

The current research is subject to some potential limitations that must be addressed. The first limitation is related to the sample data. The sample is a collection of 56 Internet-dependent firms and 56 control firms. Some Internet firms operate in relatively new industries; therefore, the control firms used to match those Internet firms are only in related businesses since there is not a perfect match. These close matches may have a different financial structures. Also, Internet firms are fairly new compared to the control firms used; this difference in maturity between the two groups may bias the results. Internet firms may be too young to be generating profits.

The second limitation is also related to data collection. Many firms are created every day but only a few survive. The survivor bias is due to the fact that firms that fail are not reported. Therefore, the data set is biased toward big firms. It would be interesting to determine what percentage of Internet-dependent firms and non-Internet firms survive and how long does it take for firms in each group to fail.

The use of a cross-sectional analysis may be presented as a limitation. The available data does not allow for an analysis over many years. Internet-dependent firms were created at a moment where the stock market was experiencing a bull market with technology stocks leading the way. One of the reasons Internet-dependent firms' stocks have higher stock returns may be because they are predominantly high-beta (β) stocks. In a bull market, high-beta (β) stocks tend to perform exceptionally well; therefore, Internet-dependent stocks may not perform as well when the market adjusts. Sheu, et al. (1998) show that stocks' beta were negatively related to stock returns in down markets and positively related to stock returns in up markets. Therefore, if the market reaches an absolute minimum, Internet-dependent firms may perform worse than non-Internet firms. This constitutes an area for future research when appropriate data are available.

The third limitation is that it is difficult to determine a firm's level of dependency on the Internet. Some firms start as non-Internet firms and progress toward Internet-dependency, whereas other firms may start as Internet-dependent firms and merge or move toward the activities of non-Internet firms. This crossover makes it

difficult to specifically define an Internet-dependent firm. Due to the type of business and industry in which most Internet-dependent firms are involved, many of the non-Internet firms are using the Internet in their daily activity. The industries selected make it difficult to have a firm that is purely an Internet-dependent firm and a firm which is only non-Internet. The use of binary variables for the present study does not represent the convergence toward mixed firms and this convergence is not reflected in the results.

The fourth limitation is related to the type of data collected. The data were based on the 1998 fiscal year, but some of those firms may have reported their information at different times and different firms may follow different accounting procedures.

A fifth and final limitation is that most firms operate in more than one industry. The approach used to overcome this problem was to consider that the firm belongs to its primary industry, which is represented by its primary SIC-code.

Given these limitations and the purpose of this research, this study can be considered valuable but not

complete. There are many other angles to be explored. Those areas must be left for future research.

5.3 Suggestions for Future Research

Many areas for further research are possible. Since, this research is limited to Internet-dependent firms and non-Internet firms, it may be interesting to look into the fact that a firm may start as an Internet-dependent firm and work toward being a non-Internet firm and vice-versa. A suggestion may be to determine at what percentage a firm depends on the Internet and use that variable as the Internet variable, instead of a dummy variable which can take the value 1 if the company is an Internet-dependent firm and 0 otherwise.

In this case the firm performance is the dependent variable and the level of dependency on the Internet is one of the independent variables. Dependency on the Internet can be calculated by dividing the amount of sales made via the Internet by the total sales. The ratio will be a number between 0 and 1 instead of discrete values (dummy variables) as considered in the scope of the present research.

A second area of extension may be to determine the variables that impact the stock value in order to understand why the value of Internet stocks is growing at an exponential rate and determine if the growth is sustainable. In this case, the proposition would be to use the percentage change in price of stocks as the dependent variable and the Internet value as one of the explanatory variable. The percentage change in price is calculated by dividing the difference in price between the current and the previous period by the price in the previous period. The variable representing the Internet can be either the dummy variable 1 if the firm is an Internet-dependent firm or 0 otherwise. Or it can be the actual value as a percentage of activity generated using the Internet.

A third suggestion is the use of a non-linear approach such as Neural Network to estimate the determinants of stock performance. This will lead to fewer restrictions created by the assumptions made before using a linear regression models.

These suggestions bring to an end the current discussion and present the possibility of new ideas that hopefully will be tested in the near future.

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APPENDIX

APPENDIX

Appendix: List of the 56 Internet-Dependent firms

INTERNET COMPANY NAME	TICKER	IPO Date	INDUSTRY NAME
Amazon.com	AMZN	5/15/97	Internet
America Online	AOL	3/19/92	Internet
At Home Corp	ATHM	7/11/97	Computer Software & Svcs
AXENT Tech Inc	AXNT	4/24/96	Computer Software & Svcs
Beyond.Com Corp	BYND	6/17/98	Internet
Broadcom Corp	BRCM	4/17/98	Telecom. Services
BroadVision Inc	BVSN	6/21/96	Computer Software & Svcs
CDNOW Inc.	CDNW	2/10/98	Internet
Checkpoint Systems	CKP	6/28/96	Precision Instrument
Cisco Systems	CSCO	2/16/90	Computer & Peripherals
CNET Inc.	CNET	7/1/96	Internet
Concentric Network	CNCX	8/1/97	Computer Software & Svcs
CyberShop Intl Inc	CYSP	3/23/98	Internet
Cylink Corp	CYLK	2/16/96	Computer Software & Svcs
DoubleClick Inc	DCLK	2/20/98	Internet
E*Trade Group	EGRP	8/16/96	Internet
EarthLink Network	ELNK	1/22/97	Internet
eBay Inc.	EBAY	9/24/98	Internet
Efax Com Inc	EFAX	6/11/97	Computer & Peripherals
Egghead.com	EGGS	7/7/88	Retail (Special Lines)
Excite Inc.	XCIT	4/4/96	Internet
Exodus Communications	EXDS	3/19/98	Internet
Fine.com Corp	FDOT	8/12/97	Computer Software & Svcs
FVC Com Inc	FVCX	4/29/98	Computer Software & Svcs
Genesis Direct Inc	PRTM	5/8/98	Internet
Homecom Communications	HCOM	5/7/97	Computer Software & Svcs

IDT Corp.	IDTC	3/15/96	Telecom. Services
Infoseek Corp.	SEEK	6/11/96	Internet
InterVu Inc	ITVU	11/20/97	Computer Software & Svcs
ISS Group Inc	ISSX	3/24/98	Computer Software & Svcs
Lycos Inc.	LCOS	4/2/96	Internet
MindSpring Enterpr.	MSPG	3/13/96	Internet
NetSpeak Corp	NSPK	5/29/97	Computer Software & Svcs
Network Assoc.	NETA	10/6/92	Computer Software & Svcs
Network Solutions	NSOL	9/26/97	Computer Software & Svcs
OnSale Inc	ONSL	4/17/97	Internet
Open Market Inc	OMKT	5/23/96	Internet
Peapod Inc	PPOD	6/11/97	Internet
Preview Travel	PTVL	11/20/97	Internet
PSINet Inc	PSIX	5/8/95	Internet
RealNetworks Inc	RNWK	11/21/97	Computer Software & Svcs
Rogue Wave Software	RWAV	11/22/96	Computer Software & Svcs
Security Dynamics Tech	SDTI	12/14/94	Computer Software & Svcs
SportsLine USA	SPLN	11/13/97	Internet
Spyglass Inc	SPYG	6/27/95	Internet
Think New Ideas	THNK	11/26/96	Advertising
Ticketmaster Online	TMCS	12/3/98	Internet
uBID Inc.	UBID	12/4/98	Internet
USWeb Corp	USWB	12/5/97	Internet
Verio Inc	VRIO	5/12/98	Computer Software & Svcs
Verisign Inc	VRSN	1/30/98	Computer Software & Svcs
Visual Data Corp	VDAT	7/30/97	Advertising
V-One Corp	VONE	10/24/96	Computer Software & Svcs
Voxware Inc	VOXW	10/30/96	Computer Software & Svcs
White Pine Software	WPNE	10/11/96	Computer Software & Svcs
Yahoo! Inc.	YHOO	4/12/96	Internet

VITA

Aurore José Kamssu was an undergraduate student from 1989 to 1993 at The Advanced School of Economics and Commerce in Cameroon. As an undergraduate student, her major was Finance and Accounting. She entered the graduate program at The University of Kansas in January 1995 and graduated in May 1996 with a Master in Economics. In August 1996, she was admitted to The University of Mississippi, and in May 2000, received a Doctorate degree in Management Information Systems.

Aurore is currently an Assistant Professor at the University of Texas-Pan American.