AN EMPIRICAL FACTOR ANALYSIS OF EFFICIENCY AND PROFITABILITY RATIOS IN THE U.S. RETAIL INDUSTRY

A Thesis

Presented to

the Faculty of the College of Business and Technology

Morehead State University

In Fulfillment

of the Requirements for the Course

IET 699 - Thesis

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by

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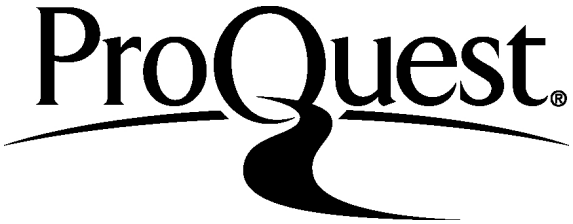
April 28, 2016



Accepted by the faculty of the College of Business and Technology, Morehead State University, in fulfillment of the requirements for the course IET 699 - Thesis.

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Efficiency ratios vary widely across retailers and over time. Historically, a lot of analysis has been done in the retail sector, but the focus was solely on inventory. On the other hand, some researchers employed ratio analysis to analyze general procedures and failures prediction. In this research, empirical models using financial data of thirty U.S retailers are developed during the period between 2006 and 2015 in order to investigate the correlation of efficiency ratios and their impact on profitability of the retail sector. The efficiency factors calculated and used in the analysis are days sales outstanding, days inventory, payables period, cash conversion cycle, receivables turnover, and inventory turnover. The two metrics; return on assets and return on invested capital are used to assess the profitability of individual retail companies. Pearson correlation and multiple regression analysis are employed to study the effect of efficiency ratios on the profitability of American retail companies as well as overall profitability of the U.S. retail industry.

While there are exceptions to the general finding, both for particular sectors in the U.S retail industry and specific firms, this study offers evidence recommending that working capital management strategies tend to improve firms' performance.

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Chapter 1: Introduction

1.1. Ratio Analysis

A ratio analysis is a quantitative analysis of information contained in a company's financial statements. It is based on the balance sheet, income statement and cash flow. Ratio analysis is used to evaluate various aspects of a company's operating and financial performance such as its efficiency, liquidity, profitability and solvency. The trend of these ratios over time is studied to check whether they are improving or deteriorating. Ratios are also compared across different companies in the same sector to see how they stack up, and to get an idea of comparative valuations. Ratio analysis is a cornerstone of fundamental analysis.

Generally, the ratios are classified on the basis of function. Therefore, they are divided into four functions: profitability, efficiency, liquidity, and solvency ratios.

The main goal of any business is to make profit with the exception of those which further a particular social cause. Unsurprisingly, these organizations are also called non-profit or non-business entities. In all probability, a business is dead without earning profits. **Profitability ratios** indicate the efficiency of the management using resources in order to earn profits. These ratios show the success or failure of a firm during a particular period, mostly quarterly or annually. Usually, a strong profitability position is synonym of higher dividend income, appreciation of the stock price, and a better situation in order to increase the production capacity or reinvest in some other areas.

Some important profitability ratios are given below:

a) Tax Rate

b) Gross Profit ratio

c) Net Profit ratio

d) Price earnings ratio

e) Operating ratio

f) Expense ratio

g) Financial Leverage

h) Interest Coverage

i) Dividend yield ratio

j) Dividend payout ratio

k) Earnings per share

l) Return on Assets

m) Return on Equity

n) Return on Invested Capital

Any firm has the purpose of adopting the philosophy of being as highly efficient as possible. In demand, efficiency ratios measure the efficiency of a firm or company in generating revenues by converting its production into cash or sales. The following list indicates some important **efficiency ratios**:

a) Account payable turnover ratio

b) Days Sales Outstanding

c) Days Inventory

d) Payables Period

e) Cash Conversion Cycle

f) Working capital turnover ratio

g) Receivables Turnover ratio

h) Inventory Turnover ratio

i) Fixed Assets Turnover ratio

j) Asset Turnover ratio

Companies financial statements have a section where they list all of the elements that can be converted into cash in a short period of time, usually a year or less. This section is sometimes referred to as "liquid" or firm liquidity. **Liquidity ratios** measure the adequacy of current and liquid assets, and help evaluate the ability of the business to pay its short-term debts. Four commonly used liquidity ratios are given below:

a) Current ratio

b) Quick ratio

c) Absolute liquid ratio

d) Current cash debt coverage ratio

Solvency is essential to staying in business. Without exception a company that is insolvent must enter bankruptcy. **Solvency ratios** (also known as long-term solvency ratios) measure the ability of a business to survive for a long period of time, i.e., to meet its long term financial obligations. Some frequently used long-term solvency ratios are given below:

a) Debt to equity ratio

b) Times interest earned ratio

c) Proprietary ratio

d) Fixed assets to equity ratio

e) Current assets to equity ratio

f) Capital gearing ratio

1.2. Retail Industry

The retail industry provides an openly competitive environment that fosters strong business operations and spurs innovations that increase efficiency and reliability. The previous 10 years have seen generous and visible changes in the way US retail business is conducted, with numerous formerly predominant companies and arrangements in the sector—for example, Sears Holdings, Costco, Whole Foods Market, and a number of shopping centers attempting to alter their policies and sometimes suffering financially in turn. Some sectors of retail, like department stores and in addition book and music stores, have seen large declines in sales and employment.

Explanations about what is happening in the retail sector have been dominated by a prediction that retail sales will migrate online and physical retail will be essentially extinguished and a prediction that future shoppers will for all intents and purposes be heading to monster design physical stores like warehouse clubs. While physical retail hasn't been killed off by online retail yet, the likelihood is ever-present. This idea is widely known as "death of retail" and it has been declared in multiple discussions. Online e-commerce in retail has been a social phenomenon and target of considerable attention in the business and technology media since the late 1990s. E-commerce has doubtlessly affected critical elements of technology, demand, and market structure in the retail sector (Hortaçsu and Syverson, 2015).

Although online retail will surely continue to be a force forming the sector going ahead and might probably emerge as the predominant mode of commerce in the retail sector, its time for supremacy has not yet arrived. Retail sales, through the physical arrangement of warehouse clubs, offer large product discounts on merchandise such as apparel; furniture; and appliances; and additionally, a full line of groceries. Some of these stores include the well-known warehouse clubs Costco, Kroger, and Walmart. *The economic impact of the U.S. Retail Industry* is a report conducted by PricewaterhouseCoopers (PwC), which proves that retail

powers the American economy. “According to the study, retail is the largest private employer in the United States. Retail directly and indirectly supports 42 million jobs, provides $1.6 trillion in labor income and contributes $2.6 trillion annually to U.S. GDP.” Wal-Mart Stores, Inc. is largely the biggest U.S company engaged in the operation of retail, wholesale and other units in various formats around the world. In the annual report of 2015, a revenue of nearly $486 billion is shown. On average, Wal-Mart serves 260 million customers weekly in 27 countries. This is much more than all e-commerce retail sales could reach.

Therefore, the current scale and influence of this single sector of physical retail relative to all of e-commerce suggests that while physical retail is likely to continue evolving in the coming years, it is unlikely to meet its demise soon. However, the retail industry is not only composed of monopolies like Wal-Mart or Kroger. Small companies create lots of jobs and significant earnings. The report of PwC also makes clear that retail is American small business. “An overwhelming majority of retail businesses – 99% –employ fewer than 50 people. In fact, these retailers provide 40 percent—or 11.5 million—of the 29 million jobs in retail.”

1.3. Problem Statement

Evaluation and enhancement of a firm's performance is a demanding goal for any business. Generally, this study involves the systematic evaluation of the economic merits of proposed solutions to engineering problems. One engineering project is more than a problem solving activity because it must be not only physically realizable, but also economically affordable.

Particularly, retail service companies must be very accurate in their accounting analysis. The ratio analysis focuses on costs, revenues, and benefits that occur at different times. At any rate, knowing the optimal value for your inventory or how much debt one would be able to afford can make the difference in the success of a company in this sector. Annual reports involve accurate statements, such as income statements, balance sheets and cash flow sheets.

The assortment of interested entities which are included and profit by the appraisal of the retail industry corporate performance shows the requirement for building up a deliberate and powerful system for its evaluation. Accounting has generally been utilized for surveying performance, essentially taking into account the use of financial ratios. This research seeks to provide a framework for assessing corporate performance by using ratio analysis and data envelopment analysis as comparators.

An insightful question to ask is which elements or variables drove the progressions in the firms' performance, both sector-wide aggregates and the distinctions over its component industries. The hypothesized impact of e-commerce on retailers could well have differential impacts crosswise over retail industries, as could the development of large-format retail outlets like warehouse clubs.

1.4. Significance of the Study

An appraisal of business' performance at the corporate level is of appropriate significance to various interested groups. For instance, shareholders of profit-making companies have a developing enthusiasm for recognizing the performance of those companies inside of which they contribute assets. Besides managers following up for the benefit of customers, they are also relied upon to put resources into firms with great performance prospects. Organization strategists are additionally worried with the performance of their firms, likewise the general performance patterns inside of the segment in which they work.

In order to help the undertaking of performance estimation, firms every now and again utilize "benchmarking" approaches for distinguishing their rivals' strengths and weaknesses, which thus helps the arrangement of strategic procedures. The evaluation of corporate performance and its effect on business methodologies is in no way, shape, or form new. New requirements for evaluating corporate performance have likewise developed amid the most recent decade, especially as a consequence of the privatization of different open utilities (power, water, gas, information transfers, and so forth) during the 1980s.

Total retail employment has increased 17 percent since 1990. In each part of the retail area, one likewise saw employment development. The special case was gas stations, which saw employment drop by around 2 percent. The industries with the quickest development rates were building material and garden stores (39 percent employment growth over the period); sports, leisure activity, and music stores (32 percent); and health and personal care stores (30 percent). Of the division's total employment growth of 2.3 million since 1990, from 13.3 to 15.6 million, the three industries contributing the biggest amount of these increases were general merchandise stores (raised 630,000 employees), motor vehicles and parts sellers (increased 400,000 employees); and building materials and garden stores (gained 360,000 employees). Non store retailers, the industry in which by far most of online retail happens, saw 27 percent

employment growth over the period. The industry's moderately small size implied that this strong development rate still represented 5 percent of overall retail employment growth. Nevertheless, warehouse clubs have included 660,000 jobs between 2000 and 2015 even as traditional department stores have incremented 350,000 job occupations (Hortaçsu and Syverson, 2015).

The industry that accomplished the biggest drop in its employment rate inside of retail was food and beverage stores, dropping from 21.0 percent to 19.5 percent of the retail sector of employment between 1990 and 2014. Gas stations' rates fell to 9.0 percent from 10.0 percent. Then again, general merchandise stores encountered the biggest rate increase, from 19.0 to 20.3 percent. While a considerable lot of these employment patterns are reflected in these commercial enterprises' rate of retail sales, one intriguing refinement is that the one business that at first represented the biggest rate of sales, food and beverage stores, has seen significant drops in sales rates during the last decade.

1.5. Research Objectives

The primary goal of this research is to study financial ratios in order to examine their impact in the U.S. retail industry. Therefore, this research seeks to analyze historical trends in efficiency and profitability ratios in the U.S. retail industry in order to find correlations between the variables studied. Additionally, efficiency ratios and their impact on profitability of the U.S. retail industry will be correlated by factor analysis for a sample of thirteen American retail companies during the last decade.

1.6. Assumptions and Limitations

Any business that sells goods and services to customers is classified as a retail service company, but there are some considerations that have to be taken into account. The U.S. Bureau of the Census uses a hierarchical set of four digit codes called the Standard Industrial Classification (SIC) in order to differentiate between the provisions of company's services. Therefore, it is clearly determined which services are offered by every single company. In any case, this study takes into consideration companies with different SIC codes, assuming that the data is similar enough in order to do an empirical comparison of a firm's profitability and efficiency ratios.

Additionally, this research does not consider the behavior of customers, suppliers and other market forces, which may impact the profitability of companies. In multiple regression analysis the estimation of the dependent variable is evaluated on the premise of know values of two or more independent factors, while the extent of the relationship between the independent variables, while the degree of the relationship between the profitability and efficiency ratios are measured in multiple correlation analysis. Therefore, for multiple regression analysis of this study the main limitations and assumptions are:

1. The relationship between profitability and efficiency ratios can be represented by a linear model.
2. The variances of the conditional distributions of the dependent variables are considered equal.
3. The successive observed values of the dependent variable are uncorrelated.
4. The conditional distributions of the dependent variables are supposed normal distributions.

1.7. Definition of Terms

The **annual report** is a document released by companies at the end of their fiscal year, which includes almost everything an investor needs to know about the business. The front part of the report often contains an impressive combination of graphics, photos and an accompanying narrative, all of which chronicle the company's activities over the past year. The back part of the report contains detailed financial and operational information.

A **balance sheet** is a financial statement that summarizes a company's assets, liabilities and shareholders' equity at a specific point in time. These three balance sheet segments give investors an idea as to what the company owns and owes, as well as the amount invested by shareholders.

An **income statement** is a financial statement that measures a company's financial performance over a specific accounting period. Financial performance is assessed by giving a summary of how the business incurs its revenues and expenses through both operating and non-operating activities. It also shows the net profit or loss incurred over a specific accounting period, typically over a fiscal quarter or year.

Cash flow is the net amount of cash and cash-equivalents moving into and out of a business. Positive cash flow indicates that a company's liquid assets are increasing, enabling it to settle debts, reinvest in its business, return money to shareholders, pay expenses and provide a buffer against future financial challenges. Negative cash flow indicates that a company's liquid assets are decreasing. Net cash flow is distinguished from net income, which includes accounts receivable and other items for which payment has not actually been received. Cash flow is used to assess the quality of a company's income, that is, how liquid it is, which can indicate whether the company is positioned to remain solvent.

An **asset** is a resource with economic value that an individual, corporation or country owns or controls with the expectation that it will provide future benefit.

A **liability** is a company's legal debt or obligation that arise during the course of business operations. Liabilities are settled over time through the transfer of economic benefits including money, goods or services.

Shareholders' equity is a firm's total assets minus its total liabilities. Equivalently, it is share capital plus retained earnings minus treasury shares. Shareholders' equity represents the amount by which a company is financed through common and preferred shares.

Accounts receivable refers to money owed by customers (individuals or corporations) to another entity in exchange for goods or services that have been delivered or used, but not yet paid for.

Inventory is the raw materials, work-in-process goods and completely finished goods that are considered to be the portion of a business's assets that are ready or will be ready for sale. Inventory consists of merchandise a business owns but has not sold. It is classified as current assets because investors assume that inventory can be sold in the near future, turning it into cash.

Revenue is the amount of money that a company actually receives during a specific period, including discounts and deductions for returned merchandise. It is the "top line" or "gross income" figure from which costs are subtracted to determine net income.

Cost of goods sold are the direct costs attributable to the production of the goods sold by a company. This amount includes the cost of the materials used in creating the good along with the direct labor costs used to produce the good. It excludes indirect expenses such as distribution costs and sales force costs.

Interest expense represents interest payable on any type of borrowings such as bonds, loans, convertible debt or lines of credit. Interest expense on the income statement represents interest accrued during the period covered by the financial statements, and not the amount of interest actually paid over that period.

Chapter 2: Literature Review

2.1. Origins

The first finding of ratio analysis was made around 300 B.C by Euclid's *Elements,* Book V. This book contains one of the most known theories of ancient Greek mathematics, which includes a section for a general theory of ratios. "*Magnitudes are said to be in the same ratio ('jEn tw/' aujtw/' lo vgw/'), the first to the second and the third to the fourth, when, if any equimultiples whatever be taken of the first and third, and any equimultiples whatever of the second and fourth, the former equimultiples alike exceed, are alike equal to, or alike fall short of, the latter equimultiples respectively taken in corresponding order*" (Euclid, 1991).

However, the adjustment of ratios as a tool of financial analysis is a relatively modern practice. Between 1900-1919, some fundamental discoveries were made under the influence of World War I, such as absolute ratio criteria, inter-firm analysis and the most popular one, current ratio. For instance, the notion of using profit margins and turnovers, which are basically ratio variables, was already developed by analysts in the retail industry. Despite of the many advantages of these ratios, most analysts had not worked with the new developments yet.

Alexander Wall (1919) published a study, which made interest in ratio analysis increase surprisingly. This paper inspired many authors to publish during the next decade as a period of high optimism about the possibilities of using ratios as tools of analysis occurred. A particular important publication was Bliss' (1923) research. This study developed a model, which suggested a relationship between ratios of cost and expense, and earnings. As any matter, ratio analysis underwent heavy criticism regarding the real correlation with financial statements. Stephen Gilman (1925) published a study in which he rejected the relationship between Bliss' ratios and business.

A relatively short time later, there were two significant developments related to ratio analysis. Roy A. Foulke (1931) developed a group of ratios, which is known as the basic

procedure for ratio analysis in United States. Moreover, Smith and Winakor (1930) concluded that the ratio of networking to total assets was the most accurate indicator of failure.

In the early 1940's, the first sophisticated research of ratio analysis appeared. Merwin's (1942) study proved that the net working capital to total assets and the net worth to debt and current ratio were positive indicators of discontinuance. The development of ratio analysis in United States has continued to date. In fact, it has gone far beyond the profit margin and capital turnover.

2.2. Financial Management

A firm is required to maintain equilibrium between liquidity and profitability while leading its everyday operations. The significance of financial wellbeing ought not to be surprising in perspective of its vital part inside of the business. This requires business must be run both efficiently and profitably. Simultaneously, an asset-liability befuddle might happen which might build the company's short-term profitability but at a risk of bankruptcy in the long run. Subsequently, the manager of a business organization is charged with the task of accomplishing coveted tradeoff balance between liquidity and profitability keeping in mind the end goal to augment the value of a firm.

Small businesses are seen as a key component of a solid and energetic economy. They are seen as indispensable to the advancement of a society and to the generation of jobs inside of the economy (Bolton Report, 1971). Small Medium-Sized Enterprises (SMEs) are expected to enhance the financial advancement of industrializing countries and they're significance is increasing across the board. Story (1994) takes note that small companies, notwithstanding, constitute the main part of undertakings in all economies on the planet. Nonetheless, given their dependence on short-term funds, it has for some time been perceived that the productive management of working capital is urgent for the survival and development of little firms (Grablowsky, 1984; Pike and Pass, 1987). Countless disappointments have been credited to

powerlessness of financial supervisors to arrange and control appropriately the current assets and liabilities of their separate firms (Smith, 1973).

Interests in current assets are vital to guarantee conveyance of merchandise or administrations to definitive clients and a legitimate management of the same ought to give the coveted effect on either profitability or efficiency. In the event that assets are obstructed at the diverse phase of the inventory network, this will delay the cash operating cycle. Despite the fact that this may expand profitability (because of expansion sales), it might likewise unfavorably influence the profitability if the costs tied up in working capital surpass the advantages of holding more inventory and/or conceding more exchange credit to clients (Padachi, 2006).

Doms, Jarmin, and Klimek (2004) find that retail foundations' profitability levels and growth rates are connected with their rates of interest in data advances. The Institute for Competitiveness and Prosperity (2010) finds that bigger retailers utilize preferable management practices over do smaller ones in the United States. The expansion in the retail sector’s scale over the last decade has additionally corresponded with more prominent product variety in numerous settings. This too could be a source of efficiency development, and could be particularly applicable for e-commerce as noted by Brynjolfsson, Smith, and Hu (2010).

In any case, the failure rate among small companies is high contrasted with that of expansive companies. Researches in the UK and the US have demonstrated that frail financial management - especially poor working capital management and insufficient long-term financing - is an essential driver of failure among small firms (Berryman, 1983; Dunn and Cheatham, 1993). The achievement variables or hindrances that add to achievement or disappointment are ordered as internal and external factors. There are a few factors that add to the achievement or failure of an organization, which are outlined in table 2.1.

Table 2.1: Internal and external factors that contribute to the success or failure of a business.

External Factors	Internal Factors
Financing	Managerial skills
Economic conditions	Workforce
Government regulations	Accounting systems
Technology and environment	Financial management practices

While it is unclear whether these connections between innovation, management, variety, and profitability are causal, the patterns do propose conceivable channels through which efficiency shapes the achievement and survival of retailers. Hence the efficiency increases of data innovations need not be limited only or even essentially however e-business retailing.

2.3. Working Capital Management

The working capital meets the short-term financial necessities of a business venture. It is an exchanging capital, not held in the business in a specific structure for more than a year. Resources and substances amid the ordinary course of business operations require cash. The requirement for keeping up a sufficient working capital can scarcely be addressed. Generally, as dissemination of blood is extremely fundamental in the human body to look after life, the stream of assets is exceptionally important to look after business. On the off chance that it gets to be frail, the business can barely thrive and survive. Working capital starvation is for the most part credited as a noteworthy cause if not the real reason for small business failure in numerous developed and developing nations (Rafuse, 1996). The achievement of a firm depends eventually on its capacity to produce cash receipts out of excess of disbursements. The cash

flow problems of numerous small firms are exacerbated by poor financial management and specifically the absence of arranging cash prerequisites (Jarvis, 1996).

While the performance levels of small businesses have customarily been ascribed to general administrative components, for example, manufacturing, marketing, and operations, working capital management might consequently affect small business survival and development (Kargar and Blumenthal, 1994). The management of working capital is imperative to the financial health of companies of all sizes. The sum resources put into working capital are frequently high in comparison to the total assets utilized, thus it is indispensable that these sums are utilized as a part of an efficient and effective way. Working capital management (WCM) is of specific significance to the small business. With constrained access to the long-term capital markets, these companies have a tendency to depend all the more intensely on proprietor financing, exchange credit and short-term bank loads to finance their required interest in real cash, accounts receivable and inventory (Chittenden et al, 1998; Saccurato, 1994).

In any case, there is confirmation that small firms are bad at dealing with their working capital. Given that numerous small companies experience the ill effects of undercapitalization, the significance of applying tight control over working capital venture is hard to exaggerate. A study has been attempted on the working capital management practices of both small and large businesses in India, UK, US, and Belgium utilizing either an overview based methodology (Burns and Walker, 1991; Peel and Wilson, 1996) to recognize the push elements for firms to embrace great working capital practices or econometric analysis to explore the relationship between WCM and profitability (Shin and Soenen, 1998; Anand, 2001; Deloof, 2003).

A business can be highly productive, yet in the event that this is not interpreted into money from operations inside of the same operating cycle, the firm would need to acquire cash to bolster its required working capital needs. Along these lines, the twin goals of profitability

and efficiency must be synchronized and one ought not encroach on the other for long. Another part of working capital is accounts payable, yet it is distinctive as in it doesn't expend assets; rather it is frequently utilized as a short-term source of finance. Consequently, it offers firms some assistance with their cash operating cycles, yet it has a certain expense where rebate is offered for early settlement of receipts (Padachi, 2006). Related to this concept there is a profitability ratio commonly known as net working capital turnover. It is an asset management ratio and measures how hard one working capital is "working" for a firm. However, this ratio is not considered in the study due to its irrelevance with the ratio analysis.

2.4. Ratio and Frontier Analysis for Assessing Corporate Performance

Financial ratio analysis has ended up, throughout the years, a settled procedure that has found various applications in numerous territories of business. Financial ratios are employed to anticipate corporate achievement or disappointment (Houghton and Woodliff, 1987), as indicators of takeover targets and as apparatuses for surveying the financial qualities of banks, loaning choices and capital adequacy (Rege, 1984; Sinkey, 1975). There are two vital employments of ratio analysis. The first is the customary regularizing use, where a company's ratios are contrasted with a pre-set standard. The second essential use is the positive utilization of ratios trying to set up utilitarian connections (Whittington, 1980). Ratios utilized along these lines are of two primary sorts, those to estimate future variables and those for incorporation in factual models foreseeing purposes, specifically the prediction of bankruptcy risk (Beaver, 1966).

One of the fundamental points of interest of financial ratio analysis is the capacity to gauge the relationship between two numbers in the financial statements. Not only can the way of the relationship be communicated in absolute terms, but it is additionally conceivable to evaluate the adjustment in the relationship after some time (Lawder, 1989). As a performance estimation instrument, ratio analysis likewise empowers the performance of a business to be

disintegrated into various angles, for instance, profitability and efficiency. This has the benefit of empowering huge, anomalous and changing patterns to be distinguished and accordingly followed up on. In spite of the boundless utilization of ratio analysis for evaluating performance, the constant way of the strategy prompts a few limitations.

As a distinct option for ratio analysis there is an approach for surveying performance, which identifies with the economic notion of a production function and an effective frontier (Athanassopoulos and Ballantine, 1995). Also, a linear programming based philosophy for evaluating performance that did not depend on the detail of a priori parametric form of the production function was developed (Farrell, 1957). This procedure was operationalized over time for evaluating performance at the firm level (Charnes, 1978; Fare, 2013), and likewise models were created with the essential goal of evaluating performance at the business level (Aigner and Chu, 1968; Forsund and Hjalmarsson, 1979).

2.5. Financial Ratio Patterns

A large exhibit of conceivably valuable financial ratios is accessible for use. Any manager or investor will for the most part need to settle on choices taking into account just a couple of ratios. For instance, Chen and Shimerda (1981) distinguish 41 unique ratios that evidently serve some valuable prescient or logical reason. Thusly, in a few studies an endeavor is made to lessen the dimensionality of a variable set by creating patterns among financial ratios by means of factor analysis.

Decreasing dimensionality of an arrangement of financial ratios centers around adding to some kind of structure or gathering framework for the ratios. For instance, Weston and Brigham order ratios into four gatherings: liquidity, influence, movement, and benefit. The client could utilize this straightforward gathering framework to take out some excess among ratios and in addition, guarantee that no imperative part of the firm’s performance is ignored (Weston and Brigham, 1979).

Numerous past investigations of financial ratio examples are intended to give foundation to other exact studies utilizing financial ratios. Pinches, Mingo, and Caruthers (PMC, 1973) analyzed interrelationships among 48 financial ratios for a specimen of 221 modern firms with SIC codes from 2000 to 3800.

They discovered seven gatherings of financial ratios including:

(1) return on investment

(2) capital intensiveness

(3) inventory intensiveness

(4) financial leverage

(5) receivables intensiveness

(6) short term liquidity

(7) cash position.

An expansion of PMC's concentrate, not yet analyzed by Chen and Shimerda, was performed by contrasting financial ratio designs for industrials and those from retail firms. The first example of firms concentrated on by PMC contains just mechanical firms and does not contain any retail firms. Later the examples for retail firms were found to be fundamentally the same as the patterns found by PMC for modern firms (Johnson, 1978).

The investigation of financial ratio designs for retail firms is headed by two factors: retail firms consistently contrast in financial attributes from manufacturing firms, and numerous studies utilizing financial ratios are coordinated toward tests containing significant quantities of retail industry. The retail sector has a tendency to have much higher turnover ratios, much lower profitability on sales and much shorter operating cycles than essential manufacturing firms. Their asset structures additionally contrast impressively, with retail companies having proportionately more current assets and proportionately less fixed assets than manufacturing firms (Gombola and Ketz, 1983).

2.6. Econometric Analysis of Inventory Turnover Performance

Retailers continuously seek to improve their inventory management processes and systems to reduce inventory levels. Since such a significant fraction of the retailers' assets is invested in inventory, retailers and stock market analysts focus on retailers and pay close attention to inventory productivity.

According to the Monthly Retail Trade Surveys of the U.S. Census Bureau, the total inventory investment of all U.S. retailers averaged $574 billion during the year 2015. All things considered, inventory speaks to 36% of total assets and 53% of current assets for retailers. Since such a critical part of the retailers' advantages is to put assets into inventory, retailers and securities exchange investigators are concentrating on retailers to give careful consideration to inventory profitability.

Inventory turnover, the ratio of a firm's expense of merchandise sold to its normal inventory level, is ordinarily used to gauge performance of inventory chiefs, analyze inventory efficiency across retailers, and survey performance upgrades after some time. Nonetheless, specialists find that the annual inventory turnover of U.S. retailers differs generally across companies, as well as inside of firms starting with one year then onto the next.

Furthermore, inventory turnover can be associated with other performance measures in a firm. Figure 2.1 plots the annual inventory turnover of four buyer hardware retailers against their gross margins (the ratio of gross profit net of markdowns to net sales) for the period 1987-2000. The figure demonstrates a solid connection between inventory turnover and gross margin. Such relationship could be brought on by numerous components—for example, contrasts in variety and cost. It brings up the issue of whether inventory turnover ought to be utilized, essentially, in performance analysis (Gaur, 2005).

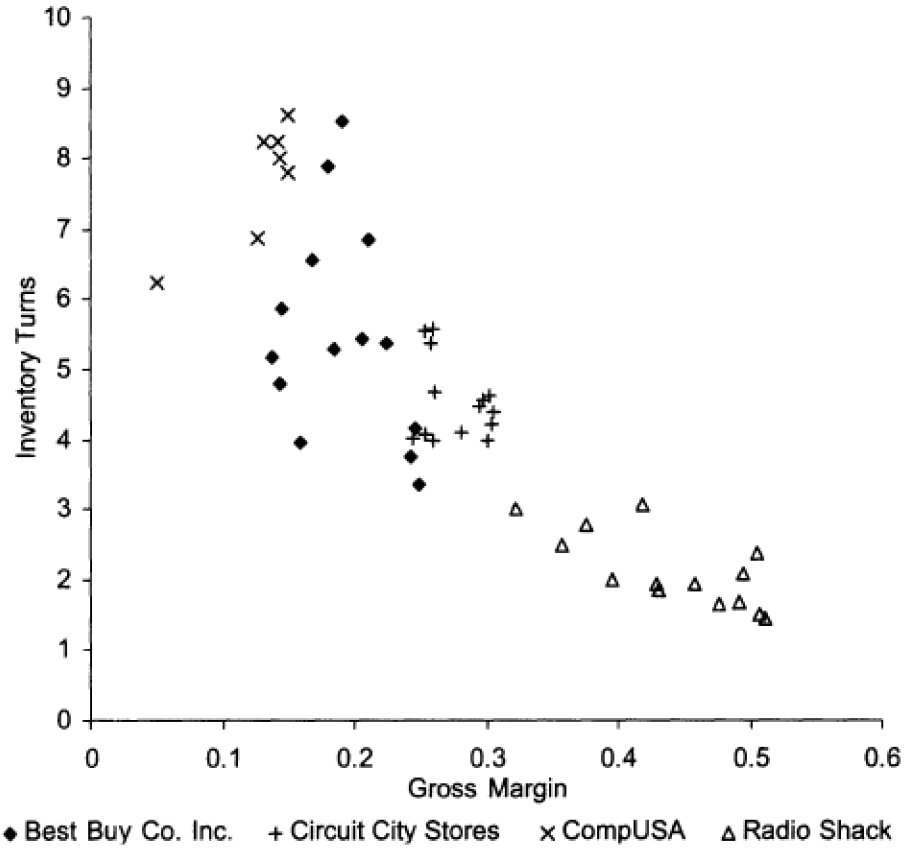

Figure 2.1: Plot of Annual Inventory Turns vs. Annual Gross Margin for four Consumer Electronics Retailers between 1987-2000. (Courtesy: Gaur, 2005).

On average, just-in-time (JIT) firms accomplish bigger enhancements in their inventory turns (Balakrishnan, 1996). The inventory turns for U.S. producers have diminished with time for each of crude material inventory, work-in-procedure inventory, and completed products inventory. When JIT got to be mainstream when contrasted with the previous period (1961-1979), the outcomes for crude material and work-in-procedure inventories are marginally better (Rajagopalan and Malhotra, 2001).

Chapter 3: Methodology

3.1. Research Design

The primary goal of this research is to study financial ratios in order to examine their impact in the U.S. retail industry. The data includes all the financial information for a relatively short-term period. Particularly for this study, liquidity ratios and solvency ratios are not employed in this study, mainly because these two terms are highly related and are not significant in order to analyze the relationship between efficiency and profitability. The list below illustrates the profitability and efficiency ratios correlated in the research, and their abbreviation in further analysis.

Profitability ratios

a) Tax Rate (TR)
b) Net Margin (NM)
c) Return on Assets (ROA)
d) Financial Leverage (FL)
e) Return on Equity (ROE)
f) Return on Invested Capital (ROIC)
g) Interest Coverage (IC)

Efficiency ratios:

a) Days Sales Outstanding (DSO)
b) Days Inventory (DSI)
c) Payables Period (PP)
d) Cash Conversion Cycle (CCC)
e) Receivables Turnover (RT)
f) Inventory Turnover (IT)
g) Fixed Assets Turnover (FAT)
h) Asset Turnover (AT)

The nature of the data will be continuous since key financial ratios will be studied over a period of ten years, specifically between 2006 to date. Continuous data will be organized using Microsoft Excel in order to further measure and analyze the data utilizing Minitab 17 software program. Firms in the sample belong to the most broadly defined industry grouping;

retail firms. The retail group studied in the research is composed of companies with SIC codes 5200 through 5900 as shown in Table 3.1. It includes a wide variety of segments such as department stores, grocery stores, shoe stores, furniture stores and drug stores. These 30 firms over the ten-year period beginning 2006 and ending 2015 comprise the sample of firms under study.

Table 3.1 Classification of data using SIC codes into retailing segments.

Retail Industry Segment	**SIC codes**	**Example of firms**
Lumber & Other Building Materials Dea	5211	Home Depot, Jewett-Cameron, Builders FirstSource,
Department Stores	5311	Macy's, Dillard's , Sears Holdings
Variety Stores	5331	Walmart, Costco, Target, PriceSmart
Grocery Stores	5411	Kroger, Ingles Markets, Whole Foods Market, Village Super Market
Family Clothing Stores and Apparel & Accessory Stores	5600, 5651	TJX, Nordstrom, Ross Stores, Hanesbrands
Drug Stores and Proprietary Stores	5912	Walgreens, CVS, Express Scripts Holding, PharMerica
Miscellaneous Shopping Goods Stores	5940	HSN, Big 5 Sporting Goods, Cabela's, Dick's Sporting Goods
Catalog & Mail-Order Houses	5961	Amazon.com, Liberty Interactive, Insight Enterprises, PC Connection

The models presented in the next section for evaluating firm and industry-based performance are represented utilizing information from the retail industry in the U.S. The industry itself has indicated significant development over the past number of years in spite of the financial recession experienced in the US. Electronic Shopping and Mail-Order Houses had the second-biggest development rate in nominal sales between 1992 and 2013, encountering an increase from $35 billion to $348 billion. Be that as it may, the quickest development rate was seen in Warehouse Clubs. The clear leaders are the well-known discount warehouse clubs

like Costco, Walmart, Target, Macy's, and Kroger. Sales in the Warehouse Clubs grew 10.5 times over between 1992 and 2013, from $40 billion to $420 billion.

An immediate examination of a percentage of the real competitors in every segment of the retail industry supports the thought that warehouse club development has surpassed the surprising development in e-commerce. Amazon, maybe the biggest organization working in Electronic Shopping and Mail-Order Houses as far as incomes, reported in annual financial fillings an expansion in US offers of $38 billion between 2000 and 2013. The biggest warehouse club chain, Costco, saw its US sales ascend by $50 billion over the same period. Walmart included $32 billion in growth amid this time. The retail sector has seen a noteworthy movement in the way that stores offering numerous assortments of merchandise operate, with a movement from the conventional service-oriented department store toward a lower-cost model that in a few measurements acquires the logistics methods of wholesale sector.

The main competitors of the industry have set out on significant advances as far as the relocation of stores, upgrading, and expanding floor space within the last few years. Moreover, the larger enterprises have additionally added more power, and now apply considerable impact over suppliers and manufacturers in the distribution system. The correspondent timing of the extension of warehouse clubs and the withdrawal of conventional department stores focuses on the likelihood that the former, in any event, led halfway to the detriment of the latter.

3.2. Data Collection Methods

In this study, several companies of retail industry have been selected in order to compare their impact on profitability. This research examines relationships between profitability measures and management of efficiency and continuous liquidity requirements for an expansive sample of companies over a ten-year period. Both ROA and ROIC are utilized to figure out whether financial-structure contrasts influence the relationship between efficiency ratios and profitability. Industry impacts are controlled by directing the investigation for each of eight distinctive industry classifications. The DSO, DSI, PP and CCC are measures of continuous liquidity management, and are developed for every company over the period between 2006 and 2015. Additionally, RT, IT, FAT, and AT measures of the structural efficiency of the company, are important to determine firm's sales performance, i.e. sales efficiency. Long run balance relationships between these factors and measures of profitability are analyzed to figure out whether aggressive liquidity management is related with higher returns.

Data to calculate the ROA, ROIC, DSO, DSI, PP, CCC, RT, IT, FAT, and AT are taken from the Annual Reports of every firm. Therefore, the first step involves the identification and collection of data retrieved from the U.S. Securities and Exchange Commission. For the ten-year period from 2006 through 2015, complete information exists for 30 firms. As a matter of fact, there is a survivor inclination in the information, since companies with serious liquidity issues vanished from the posting. The consequences of this examination may not have any significant bearing to the most disturbed companies. Initially, the first data set contained 5,750 observations across 50 firms. This batch of companies has been selected from different sectors, but always with the requisite of being part of the retail industry. Subsequent to processing every one of the variables, a few firms that had a few years of data unavailable for any sub-period amid 2006 and 2015 were omitted from the data set; there were too few data for these firms,

making it impossible to direct time-arrangement analysis. This missing information is created by new companies entering the business amid the time of the data set, and by existing firms getting delisted because of mergers, acquisitions, liquidations, and so on. Also, other firms that had missing information or accounting changes other than toward the starting or the end of the estimation period were overlooked as well. This missing information is brought about by bankruptcy filings and ensuing a rise up out of insolvency, prompting new beginning accounting.

The final data set contains 3,450 perceptions across 30 firms and 10 years of data for every firm. Table 3.2 provides summary statistics of retailing segment for the performance variables utilized as a part of the research. The information is presented without change from the "as filed" annual and quarterly financial reports submitted by each registrant. The data is presented in a flattened format to help one analyze and compare it. The data sets also contain additional fields including a company's Standard Industrial Classification to facilitate the data's use, but this part was not employed during this research.

Table 3.2 Summary statistics of the variables for each retail segment: 2006-2015

Industry	Number of firms	Average DSO	Average DSI	Average PP	Average CCC	Average RT	Average IT	Average FAT	Average AT
Lumber & Other Building Materials Dea	3	25	64	26	63	25.37	6.50	15.10	2.15
		(14.40)	(20.83)	(13.10)	(23.34)	(21.80)	(2.55)	(10.77)	(0.66)
Department Stores	3	6	111	51	67	147.21	3.34	3.88	1.49
		(8.70)	(14.40)	(24.29)	(16.51)	(191.41)	(0.57)	(1.89)	(0.37)
Variety Stores	4	9	43	39	13	167.76	9.03	5.07	2.54
		(13.89)	(10.25)	(9.39)	(13.52)	(166.69)	(2.18)	(1.90)	(0.73)
Grocery Stores	4	4	25	20	10	91.39	16.83	5.55	2.98
		(1.28)	(10.04)	(6.03)	(12.09)	(36.24)	(6.52)	(1.79)	(0.62)
Accessory and Family Clothing Stores	4	27	88	43	72	79.49	4.82	7.00	2.07
		(27.16)	(40.92)	(8.19)	(52.03)	(74.41)	(1.54)	(1.70)	(0.76)
Drug Stores and Proprietary Stores	4	24	32	20	36	18.20	28.50	35.07	2.43
		10.79	(20.42)	(9.54)	(14.81)	(6.98)	(34.27)	(34.37)	(0.65)
Miscellaneous Shopping Goods Stores	4	10	108	50	68	63.40	3.85	10.16	1.80
		(8.99)	(35.59)	(6.39)	(25.82)	(37.61)	(1.52)	(6.09)	(0.73)
Catalog & Mail-Order Houses	4	47	32	54	25	11.16	17.19	39.27	2.52
		(24.85)	(20.08)	(26.05)	(37.67)	(7.75)	(10.06)	(36.52)	(1.51)

Notes: The standard deviations are given in parentheses. The variables are defined as in Appendix A.

For every company, long run averages of DSO, DSI, PP, CCC, RT, IT, FAT, and AT show cross-sectional harmony measures for the factors. Firm-level aggregated variables have several shortcomings that limit their usefulness. The long-run average approach, instead of utilizing every year as a perception, decreases the impact of annual exceptions brought about by accounting practices or particular events to any one year. Additionally, long run averages close a harmony relationship where the company has plenty of time to change liquidity-management methods. Most of the differences between retail firms' ratios are a consequence of the variety in products and markets. To minimize these differences, retail industry segments are utilized. Therefore, eight fragments are distinguished by their four-digit SIC-codes as specified in Table 3.1.

3.3. Key Ratios

Financial ratios have a significant relevance in retail company's financial analysis. Creditors, investors and others have consolidated and have gathered key financial ratios over a period, by industry and across different industries with subjective measures predictive, illustrative and descriptive purposes (Barnes, 1987). Their targets incorporate company performance evaluation, liquidity analysis, future profit estimation, competitor analysis, future profit estimation, competitor analysis, prediction of corporate failure and cash flow potential (Zeller and Stanko, 1994).

Corporate finance hypothesis can be embraced under three principle ranges: capital budgeting, capital structure and working capital management. Capital budgeting and capital structure choices are identified with financing and managing long-term investments and their returns. On the other hand, working capital management is an essential segment of corporate finance hypothesis and manages short-term financing and firms' investment choices. (Sharma and Kumar, 2001).

3.3.1. Cash Conversion Cycle

The cash conversion cycle (CCC) is a dynamic measure of continuous liquidity management introduced by Gitman (1974) and later refined by Gitman and Sachdeva (1982). The CCC measures the time between cash receipts from item sales and cash expenses for assets. The CCC is changing as in it consolidates both balance sheet and income statement information to generate a measure with a time dimension. An aggressive way to deal with liquidity management results in a lower CCC by decreasing the inventory period and the accounts receivables period while raising the accounts payables period and vice versa. Management of the company's CCC involves finding an equilibrium between liquidity and profitability.

Some researches indicate that a lower CCC relates with better a firm's performance (Hager, 1976). Basically, every business can be seen as a procedure of converting cash to assets and back to cash. Each dollar of cash accessible for operations has a multiplier impact dictated by the recurrence of cash turnover. The CCC is a metric that expresses the length of time, in days, that it takes for a company to convert resource inputs into cash flows. The CCC attempts to measure the amount of time each net input dollar is tied up in the production and sales process before it is converted into cash through sales to customers.

This metric looks at the amount of time needed to sell inventory, the amount of time needed to collect receivables and the length of time the company is afforded to pay its bills without incurring penalties. A low CCC permits managers to minimize holdings of moderately useless assets such as cash and marketable securities. Likewise, a low CCC preserves the company's debt capacity since less short term borrowing is required to originate liquidity. Finally, a lower CCC corresponds to a higher present value of net cash flows from a company's assets (Jose, Lancaster and Stevens, 1996). The CCC measure is defined in equation 3.1.

$$CCC_{sit} = DSO_{sit} + DSI_{sit} - PP_{sit} \qquad \textbf{\textit{Equation}}\ (3.1)$$

where:

- s denotes the retail industry segment
- i refers to the firm
- t indicates the year
- DSO refers to days sales outstanding
- DSI designates days sales inventory
- PP points out payables period

Table 3.3 Cash conversion cycle summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean CCC (Days)	Maximum CCC (Days)	Minimum CCC (Days)	CCC Standard Deviation
Lumber & Other Building Materials Dea	3	63	114	39	23.34
Department Stores	3	67	92	22	16.51
Variety Stores	4	13	47	2	13.52
Grocery Stores	4	10	27	-17	12.09
Apparel & Accessory Stores and Family Clothing Stores	4	72	173	19	52.03
Drug Stores and Proprietary Stores	4	36	63	11	14.81
Miscellaneous Shopping Goods Stores	4	68	120	31	25.82
Catalog & Mail-Order Houses	4	25	81	-43	37.67

Table 3.3 shows that the highest mean value of the CCC is found in the Apparel & Accessory Stores and Family Clothing Stores and the lowest mean value is in the Grocery Stores. Additionally, Apparel & Accessory Stores and Family Clothing Stores and Catalog & Mail-Order Houses produced the highest range of CCC values. When the CCC standard

deviation is scaled by dividing by the mean level of the CCC, the Apparel & Accessory Stores and Family Clothing Stores and Catalog & Mail-Order Houses have the highest volatility of the CCC relative to the mean value.

Days sales outstanding (DSO) are the number of days that it takes for customers to pay their bills. A lower number of days is better because this means that the company gets its money more quickly. If the days in receivables are increased too much, the firm loses sales from customers requiring credit. The average collection period varies from industry to industry, however. It is important that a company compare its average collection period to other firms in its industry. The DSO measure is defined in equation 3.2.

$$DSO_{sit} = \frac{\overline{AR_{sit}}}{CS_{sit}} \cdot 365 \qquad \textbf{Equation } (\mathbf{3.2})$$

where:

- $\overline{AR}$ denotes the average accounts receivable
- CS refers to credit sales
- s, i, t are defined as above

Table 3.4 Days Sales Outstanding summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean DSO (Days)	Maximum DSO (Days)	Minimum DSO (Days)	DSO Standard Deviation
Lumber & Other Building Materials Dea	3	25	60	5	14.40
Department Stores	3	6	48	1	8.70
Variety Stores	4	9	45	1	13.89
Grocery Stores	4	4	6	2	1.28
Apparel & Accessory Stores and Family Clothing Stores	4	27	84	2	27.16
Drug Stores and Proprietary Stores	4	24	44	12	10.79
Miscellaneous Shopping Goods Stores	4	10	31	2	8.99
Catalog & Mail-Order Houses	4	47	93	11	24.85

Table 3.4 illustrates that the highest mean value of the DSO is found in the Catalog & Mail-Order Houses and the lowest mean value is in the Grocery Stores, as well as for CCC. Unsurprisingly, the highest range of DSO values and the highest volatility of the DSO relative to the mean value are produced by the Apparel & Accessory Stores and Family Clothing Stores and Catalog & Mail-Order Houses, coinciding with the CCC statistic summary.

Days sales inventory (DSI) are the number of days it takes for the company to go through its inventory. This ratio measures the company's financial performance for both the owners and the managers as it pertains to the turnover of inventory. Generally, a lower number of days' sales in inventory is better than a higher number of days. If the days in inventory are increased too much, the firm risks lost sales due to maintain for too long the stock. It will vary from industry to industry. The DSI measure is defined in equation 3.3.

$$DSI_{sit} = \frac{\bar{I}_{sit}}{COGS_{sit}} \cdot 365 \qquad \textbf{Equation (3.3)}$$

where:

- $\bar{I}$ denotes the average inventory
- $COGS$ refers to the cost of good sold
- s, i, t are defined as above

Table 3.5 Days Sales Inventory summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean DSI (Days)	Maximum DSI (Days)	Minimum DSI (Days)	DSI Standard Deviation
Lumber & Other Building Materials Dea	3	64	95	30	20.83
Department Stores	3	111	135	63	14.40
Variety Stores	4	43	62	29	10.25
Grocery Stores	4	25	42	14	10.04
Apparel & Accessory Stores and Family Clothing Stores	4	88	173	54	40.92
Drug Stores and Proprietary Stores	4	32	73	3	20.42
Miscellaneous Shopping Goods Stores	4	108	168	53	35.59
Catalog & Mail-Order Houses	4	32	66	11	20.08

Table 3.5 represents that the highest mean value of the DSI is found in Catalog & Mail-Order Houses, as well as DSO and the lowest mean value is in the Grocery Stores and Drug Stores and Proprietary Stores, appearing for first time. As a rule, the highest range of DSI values and the highest volatility of the DSI relative to the mean value are produced by the

Apparel & Accessory Stores and Family Clothing Stores, but with the exception of Miscellaneous Shopping Goods Stores, similarly to the CCC and DSO statistic summaries.

Payable period (PP) states how long it takes a company to pay its invoices from trade creditors, such as suppliers. It is typically looked at either quarterly or yearly. This value represents the number of days that the account payable relative to revenue the company has. An increase of Payables Period may suggest that the company delays paying its suppliers. If the firm increases the days in payables too much, discounts for early payments and flexibility for future debt are both lost. The PP measure is defined in equation 3.4.

$$PP_{sit} = \frac{AP_{sit}}{COGS_{sit}} \cdot 365 \qquad \textbf{Equation } (\mathbf{3.4})$$

where:

- AP denotes the accounts payables
- $COGS$ refers to the cost of good sold
- s, i, t are defined as above

Table 3.6 Payables Period summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean PP (Days)	Maximum PP (Days)	Minimum PP (Days)	PP Standard Deviation
Lumber & Other Building Materials Dea	3	26	50	5	13.10
Department Stores	3	51	115	23	24.29
Variety Stores	4	39	63	29	9.39
Grocery Stores	4	20	33	10	6.03
Apparel & Accessory Stores and Family Clothing Stores	4	43	66	25	8.19
Drug Stores and Proprietary Stores	4	20	37	6	9.54
Miscellaneous Shopping Goods Stores	4	50	69	39	6.39
Catalog & Mail-Order Houses	4	54	97	21	26.05

Table 3.6 demonstrates that the highest mean value of the PP is found in the Department Stores and the lowest mean value is in the Grocery Stores, as well as for CCC and DSO. As expected, the highest range of PP values and the highest volatility of the PP relative to the mean value are produced by the Apparel & Accessory Stores and Family Clothing Stores and Catalog & Mail-Order Houses, concurring with the CCC and DSO statistic summaries.

3.3.2. Activity Ratios

Efficiency in working capital management is crucial, especially for retail firms as it accounts for more than half of its total assets. Working capital management likewise directly affects a firm's liquidity as it relates to the management of current assets and liabilities, which are vital for an idyllic business development. Kripke (1959) expressed how the twentieth-century advancement of durable assets representing a long-term use-value created the increase of partial payments offering, when the customers were incapable to pay for the products over a timeframe, generally identified with their period of life. Kripke also described how the long-term credit has introduced issues on the retailer for working capital, which he clarifies by going into some sort of a financing payment plan with a financing office.

A confirmation of the insufficiency of conventional categories shows up in the issues of the relationship between a retailer and a supplier, bank, or other financial institution which gives him the assets to finance the subsequent instalment receivables. The receivable turns or receivable turnover (RT) is a great financial ratio to learn when analyzing a business or a stock because common sense tells one the faster a company collects its accounts receivables, the better. Generally, the higher the receivables turnover, the better it means collecting credit accounts on a timely basis. If receivables turnover is low, probably one needs to take a look at credit and collections policies and be sure they are on target. The RT ratio is defined in equation 3.5.

$$RT_{sit} = \frac{CS_{sit}}{\overline{AR_{sit}}} = \frac{365}{DSO_{sit}} \qquad \textbf{\textit{Equation}}\ (\mathbf{3.5})$$

where:

- $\overline{AR}$ denotes the average accounts receivables
- CS refers to credit sales
- DSO refers to days sales outstanding
- s, i, t are defined as above

Table 3.7 Receivables turnover summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean RT	Maximum RT	Minimum RT	RT Standard Deviation
Lumber & Other Building Materials Dea	3	25	68	6	21.80
Department Stores	3	147	695	8	191.41
Variety Stores	4	168	554	8	166.69
Grocery Stores	4	91	181	59	36.24
Apparel & Accessory Stores and Family Clothing Stores	4	79	188	4	74.41
Drug Stores and Proprietary Stores	4	18	31	8	6.98
Miscellaneous Shopping Goods Stores	4	63	160	12	37.61
Catalog & Mail-Order Houses	4	11	32	4	7.75

Table 3.7 shows that the highest mean value of the RT is found in the Variety Stores and the lowest mean value is in the Catalog & Mail-Order Houses. Unsurprisingly, the highest range of RT values and the highest volatility of the RT relative to the mean value are produced by the Department and Variety Stores. Inventory constitutes a critical part of the assets of any retail firm and consequently the profits too. In particular, inventory is the biggest asset on the

balance sheet for 57% of all the firms studied in the data set of this research. Inventory is not by any means the only extensive in dollar value, however, it is essential for retailers' performance (Gaur and Kesavan, 2008). Thus, the significance of improving inventory management in the retail industry can't be overlooked. For instance, as indicated by Standard and Poor's industry overview on general retailing, "Merchandise inventories are a retailer's most important asset, even though buildings, property and equipment usually exceed inventory value in dollar terms" (Sack, 2000).

The signs that managers and experts use to decide how well a retailer is managing its inventory mainly embraces the inventory turnover (IT). The inventory turnover represents how much of the inventory is really worth on the balance sheet. It can also be defined as how fast the inventory is "turned," or sold. At the end, the result is the number of times that the company sells all its inventory each year. Normally a high number indicates a greater sales efficiency and a lower risk of loss through un-saleable stock. However, an inventory turnover that is out of proportion to industry norms may suggest losses due to shortages, and poor customer-service. The IT ratio is defined in equation 3.6.

$$IT_{sit} = \frac{COGS_{sit}}{\bar{I}_{sit}} = \frac{365}{DSI_{sit}} \qquad \textbf{Equation } (\mathbf{3.6})$$

where:

- $\bar{I}$ denotes the average inventory
- $COGS$ refers to the cost of good sold
- DSI refers to days sales inventory
- s, i, t are defined as above

Table 3.8 Inventory turnover summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean IT	Maximum IT	Minimum IT	IT Standard Deviation
Lumber & Other Building Materials Dea	3	7	12	4	2.55
Department Stores	3	3	6	3	0.57
Variety Stores	4	9	13	6	2.18
Grocery Stores	4	17	26	9	6.52
Apparel & Accessory Stores and Family Clothing Stores	4	5	7	2	1.54
Drug Stores and Proprietary Stores	4	28	121	5	34.27
Miscellaneous Shopping Goods Stores	4	4	7	2	1.52
Catalog & Mail-Order Houses	4	17	33	6	10.06

Table 3.8 represents that the highest mean value of the IT is found in the Variety Stores and the lowest mean value is in the Catalog & Mail-Order Houses. As expected, the highest range of IT values and the highest volatility of the IT relative to the mean value are produced by the Department and Variety Stores.

Eventually, if a company can't use its fixed assets to generate sales, they are losing money due to those fixed assets. Property, plants, and equipment are expensive to buy and maintain. In order to be effective and efficient, those assets must be used as well as possible to generate sales. In any case, the fixed asset turnover ratio (FAT) is an important asset management ratio because it helps the business owner measure the efficiency of the firm's plant and equipment.

Therefore, the FAT measures the company's effectiveness in generating sales from its investments in plants, property, and equipment. If the fixed asset turnover ratio is low as compared to the industry or past years of data for the firm, it means that sales are low or the investment in plants and equipment is too high. This may not be a serious problem if the company has just made an investment in a fixed asset to modernize, for example. However, if the fixed asset turnover ratio is too high, then the business firm is likely operating over capacity and needs to either increase its asset base (plants, property, and equipment) to support its sales or reduce its capacity. The FAT ratio is defined as given in equation 3.7.

$$FAT_{sit} = \frac{NS_{sit}}{NPAE_{sit}} \qquad \textbf{Equation } (\mathbf{3.7})$$

where:

- NS denotes the net sales
- $NPAE$ refers to net plant and equipment
- s, i, t are defined as above

Table 3.9 Fixed assets turnover summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean FAT	Maximum FAT	Minimum FAT	FAT Standard Deviation
Lumber & Other Building Materials Dea	3	15	33	3	10.77
Department Stores	3	4	10	2	1.89
Variety Stores	4	5	8	2	1.90
Grocery Stores	4	6	8	3	1.79
Apparel & Accessory Stores and Family Clothing Stores	4	7	9	4	1.70
Drug Stores and Proprietary Stores	4	35	124	6	34.37
Miscellaneous Shopping Goods Stores	4	10	20	2	6.09
Catalog & Mail-Order Houses	4	39	152	6	36.52

Table 3.9 illustrates that the highest mean value of the FAT is found in the Catalog & Mail-Order Houses and the lowest mean value is in the Department Stores. As expected, the highest range of FAT values and the highest volatility of the FAT relative to the mean value are produced by the Catalog & Mail-Order Houses and Drug Stores and Proprietary Stores.

The asset turnover ratio measures the ability of a company to use its assets to efficiently generate sales. This ratio considers all assets, current and fixed. Those assets include fixed assets, like plants and equipment, as well as inventory, accounts receivable, as well as any other current assets. The lower the total asset turnover ratio, as compared to historical data for the firm and industry data, the more sluggish the firm's sales. This may indicate a problem with one or more of the asset categories composing total assets - inventory, receivables, or fixed assets.

If the total asset turnover is excellent as compared to historical data for the firm and to industry data, it means that the firm is utilizing all its assets - its asset base - efficiently to generate sales and that is a very good thing. On the contrary, if there is a problem with inventory, receivables, working capital, or fixed assets, it will show up in the total asset turnover ratio. The total asset turnover ratio shows how efficiently your assets, in total, generate sales. The higher the total asset turnover ratio, the better and the more efficiently one uses asset base to generate sales. Knowing a company's position regarding the efficiency of using assets to make sales is crucial to the success of a company. The AT ratio is defined in equation 3.8.

$$AT_{sit} = \frac{NS_{sit}}{TA_{sit}} \qquad \textbf{Equation } (3.8)$$

where:

- NS denotes the net sales
- TA refers to total assets
- s, i, t are defined as above

Table 3.10 Total assets turnover summary for the sample of 30 firms by retail industry segment classifications.

Industry	Number of firms	Mean FAT	Maximum FAT	Minimum FAT	FAT Standard Deviation
Lumber & Other Building Materials Dea	3	15	33	3	10.77
Department Stores	3	4	10	2	1.89
Variety Stores	4	5	8	2	1.90
Grocery Stores	4	6	8	3	1.79
Apparel & Accessory Stores and Family Clothing Stores	4	7	9	4	1.70
Drug Stores and Proprietary Stores	4	35	124	6	34.37
Miscellaneous Shopping Goods Stores	4	10	20	2	6.09
Catalog & Mail-Order Houses	4	39	152	6	36.52

Table 3.9 demonstrates that the highest mean value of the AT is found in the Grocery Stores and the lowest mean value is in the Miscellaneous Shopping Goods Stores. The Catalog & Mail-Order Houses and Lumber & Other Building Materials Dea produced the highest range of AT values. Surprisingly, the highest volatility of the AT relative to the mean value are produced by the Catalog & Mail-Order Houses and Apparel & Accessory Stores and Family Clothing Stores, differing from AT's highest range.

3.3.3. Profitability ratios

The main goal of a manager is to give decision making information in order to provide orientation to their employees. A diversity of ratios exists to help managers to summarize and analyze the financial and operating information contained in the three noteworthy financial statements already explained in previous sections: balance sheet, income statement, and cash flow statement.

Profitability ratios have historically been a significant financial measure for retail industry managers and that is not a chance result, as profitability ratios are widely known as management's return on sales and investments. Profitability ratios permit any director to summarize and analyze related information to give significant solutions for making decisions. The fundamental purpose of the present section is to recognize regularly utilized profitability ratios as a part of the retail sector and find their significance level for retail managers. Profitability ratios clearly emerge as the most essential ratios for retail managers. A scope of ratios has been selected by their relative significance, rejecting those ratios that are not currently thought to be helpful for the analysis.

If there is a profitability ratio that illustrates a firm’s global performance for both bondholders and stockholders this is the interest coverage ratio (IC). For bondholders, the IC ratio is supposed to act as a safety gauge. It gives one a sense of how far a company’s earnings can fall before it will start defaulting on its bond payments. For stockholders, the IT ratio is important because it gives a clear picture of the short-term financial health of a business.

The IC ratio is a measure of the number of times a company could make the interest payments on its debt with its earnings before interest and taxes, also known as EBIT (earnings before interest and tax). The lower the IC, the higher the company's debt burden and the greater the possibility of bankruptcy or default. The IC ratio is defined in equation 3.9.

$$IC_{sit} = \frac{EBIT_{sit}}{IE_{sit}} \qquad \textbf{Equation } (\mathbf{3.9})$$

where:

- $EBIT$ denotes the earnings before interest and taxes
- IE refers to the interest expense
- s, i, t are defined as above

United States uses a progressive tax rate system, where the percentage of tax increases as the taxable income increases. The Tax Rate (TR) is the percentage at which an individual or corporation is taxed. It is the tax imposed by the federal government and some states based on an individual's taxable income or a corporation's earnings. Similarly, TR relates to a time period, such as a taxable year, rather than to a specific project, asset, or activity. It reflects the average rate of tax over the period from all a firm's activities. The TR ratio is defined in equation 3.10.

$$TR_{sit} = \frac{ITX_{sit}}{NIBT_{sit}} \qquad \textbf{Equation } (\mathbf{3.10})$$

where:

- ITX denotes the income taxes
- $NIBT$ refers to the net income before taxes
- s, i, t are defined as above

Usually companies need to assess their efficiency at allocating the capital under their control to profitable investments. Return on invested capital (ROIC) gives a sense of how well a company is using its money to generate returns. Comparing a company's return on capital with its weighted average cost of capital reveals whether invested capital is being used

effectively. In the end, this coefficient measures the return that an investment generates for those who have provided capital, i.e. bondholders and stockholders. ROIC is related as one of the three response variables of this research, stating how good a company is at turning capital into profits and is defined in equation 3.11.

$$ROIC_{sit} = \frac{OI_{sit} \cdot (1 - TR)_{sit}}{\overline{IC_{sit}}} \qquad \textbf{Equation } (\mathbf{3.11})$$

where:

- OI denotes the operating income
- TR refers to tax rate
- $\overline{IC}$ designates the average of invested captial
- s, i, t are defined as above

A company's net profit margin (NM) explains how much after-tax profit the business makes for every dollar it generates in revenue or sales. Profit margins vary by industry, but all else being equal, the higher a company's net profit margin compared to its competitors, the better. To calculate the NM most studies and books decided to take the after-tax net profit divided by sales as is shown in equation 3.12. While this is standard and generally accepted, some analysts prefer to add minority interest back into the equation, to give an idea of how much money the company made before paying out to minority owners as in equation 3.13.

$$NM_{sit} = \frac{NIAT_{sit}}{R_{sit}} \qquad \textbf{Equation } (\mathbf{3.12})$$

$$NM_{sit} = \frac{NI_{sit} + MI_{sit} + TI_{sit}}{R_{sit}} \qquad \textbf{Equation } (\mathbf{3.13})$$

where:

- $NIAT$ denotes the net income after taxes
- R refers to the revenue
- NI indicates the net income
- MI points out the minority interest
- TI designates the tax interest
- s, i, t are defined as above

The return on assets (ROA) figure is a sure-fire way to gauge the asset intensity of a business. Thus, ROA is the most stringent and excessive test of return to shareholders. The lower the profit per dollar of assets, the more asset-intensive a business is. The higher the profit per dollar of assets, the less asset-intensive a business is. All things being equal, the more asset-intensive a business, the more money must be reinvested into it to continue generating earnings. The ROA is used as another response variable in this study, showing how much profit a company generated for each dollar in assets and is denominated in equation 3.14.

$$ROA_{sit} = NPM_{sit} \cdot \overline{TA_{sit}} = NM_{sit} \cdot AT_{sit} \qquad \textbf{Equation (3.14)}$$

where:

- NPM denotes the net profit margin
- $\bar{A}$ refers to the average of the total assets
- NI indicates the net margin ratio
- AT designates the asset turnover ratio
- s, i, t are defined as above

Companies rely on a mixture of owners' equity and debt to finance their operations. A leverage ratio is any one of several financial measurements that look at how much capital comes in the form of debt (loans), or assesses the ability of a company to meet financial obligations. Financial leverage (FL) refers to the use of debt to acquire additional assets. The greater the amount of debt, the greater the financial leverage. However, while high leverage may be beneficial in boom periods, it may cause serious cash flow problems in recessionary periods because there might not be enough sales revenue to cover the interest payments. The more debt financing a company uses, the higher its financial leverage. The FL ratio is defined in equation 3.15.

$$FL_{sit} = \frac{\overline{TA_{sit}}}{\overline{TE_{sit}}} \qquad \textbf{\textit{Equation}}\ (\mathbf{3.15})$$

where:

- $\overline{TE}$ denotes the average of the total equity
- $\overline{TA}$ refers to the average of the total assets
- s, i, t are defined as above

Return on equity (ROE) reveals how much after-tax profit a company earned in comparison to the total amount of shareholder equity found on the balance sheet. Shareholder equity is what the shareholders own. So, it is a creation of accounting that represents the assets created by the retained earnings of the business and the paid-in capital of the owners. A business that has a high ROE is more likely to be one that is capable of generating cash internally. For the most part, the higher a company's ROE compared to its industry, the better provided it isn't achieved with extreme risk. Usually, the higher the ROE the better. The ROE

is identified as a response variable, if a company has no debt, the ROIC and ROE figures will be the same and is correlated in equation 3.16.

$$ROE_{sit} = \frac{NP_{sit}}{\overline{SE}_{sit}} \qquad \textbf{Equation (3.16)}$$

where:

- NP denotes the net profit
- $\overline{SE}$ refers to the average of the shareholder's equity
- s, i, t are defined as above

3.4. Correlation Analysis

Without analyzing empirical relationships among ratios, it can't be determined whether the factors fit in with one homogeneous group and are basically redundant, or whether they pertain to various groups of ratios. Return on Assets, Return on Equity, and Return on Invested Capital are profitability ratios; however, they measure somewhat distinctive parts of profitability. For instance, both times interest earned and debt/assets are leverage ratios, however they measure marginally distinctive parts of utilizing debt. Moreover, inventory turnover or receivables turnover could be considered either activity or liquidity ratios.

Analyzing empirical relationships among financial ratios can be performed through correlation analysis. On the off chance that two ratios are highly correlated, then one could consider one of the pair to be redundant, eliminating it without practically losing data. In the event two ratios are highly correlated, then one could consider each to gauge an alternate part of firm performance. Highly correlated ratios could be united into groups, where the groups would each quantify some distinctive part of firm performance. Along these lines, one could comprehend the connections and patterns among the profitability and efficiency ratios in a variable set. By revealing the quantity of homogeneous groups of ratios in a variable set, the

size of the variable set could be reduced from a large number of initial ratios to a small number of homogeneous groups.

Pearson's correlation coefficient when applied to a sample is commonly represented by the letter r and may be referred to as the sample correlation coefficient or the sample Pearson correlation coefficient. So if one dataset $\{x_1, x_2, x_3, ..., x_n\}$ contains n values and another dataset $\{y_1, y_2, y_3, ..., y_n\}$ containing n values then the formula 3.17 estimates the covariance and variance of the sample all correlated in the variable r:

$$r = r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}} \qquad \textbf{Equation } (\mathbf{3.17})$$

where:

- n, x_i, y_i are defined as above
- $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$

Rearranging equation 3.17:

$$r = r_{xy} = \frac{n\sum x_i y_i - \sum x_i - \sum y_i}{\sqrt{n\sum x_i^2 - (\sum x_i)^2}\sqrt{n\sum y_i^2 - (\sum y_i)^2}} \qquad \textbf{Equation } (\mathbf{3.18})$$

The grouping technique could be performed by factor analysis rather than by performing the groupings according to the correlation coefficients. Factor analysis takes a correlation matrix among initial variables and builds new variables where the amount of new factors to be held is smaller than the original amount of variables. In the event that the correlation coefficient between one of the first variables and a factor is near to the number one, then that variable can be utilized to speak to the factor. In this way, an extensive sample of variables can be reduced to a much smaller set, where the smaller arrangement of variables is then utilized for some predictive, informative, or descriptive reason.

It is much less demanding if the connections or examples of financial ratios are steady across various firms and across time. All scenarios considered, a reduced set of financial ratios received from a bigger variable set amid a one-time period could be utilized amid other time periods, and for different firms too. Recent studies confirm that time series follow patterns among financial ratios, but this studies cross-sectional stability of financial ratio patterns is restricted as is said in the previous sections, in any case.

Table 3.11 presents Pearson correlation coefficients for the efficiency ratios used to assess the impact of financial key ratios on firm's profitability, measured by the Return on Assets (ROA), Return on Equity (ROE) and Return on Invested Capital (ROIC). First of all, ROE is rejected as a response variable due to its dependence with other external factors not studied in this research. In the case of Retail-Apparel & Accessory Stores and Retail-Family Clothing Stores, ROA and ROIC ratios are significantly positively correlated with all the efficiency ratios, except for the cash conversion cycle elements. In terms of the positive correlations, looking at the Pearson coefficients one can see that there is one particular case in which there is not such a significant correlation with the ROA, namely the Fixed Assets Turnover (FAT). Also for this case, there is another term that is correlated with the ROIC ratio but it is considered very weak, which again match with FAT. Under suspicion, the p-value of FAT ratio confirms that there is no significant correlation with ROA and ROIC, considering this ratio as an explanatory variable in this particular sector of the U.S. retail industry.

Additionally, table 3.12 shows some differences in Retail-Drug Stores and Proprietary Stores. ROA is only negatively correlated with the Days Sales Outstanding (DSO) ratio and Cash Conversion Cycle (CCC). Similarly, ROIC is non-positively correlated with the same ratios, but adding the Days Sales Inventory (DSI) too. On the other hand, ROA is correlated weakly with DSI, Payables Period (PP), Inventory Turnover (IT) and FAT. Moreover, ROIC

matches all the weak correlations with the same ratios than ROA, but with the exception of IT and DSI, which is already pointed as a negative correlation.

As an alternative to linear correlation analysis of the relationship between profitability and efficiency ratios, firms within each sector in the U.S. retail industry are placed into eight groups. For each of the eight retail sectors the average of DSO, DSI, PP, CCC, RT, IT, FAT, and AT measures are computed, making it possible to examine the pattern of efficiency ratios and their impact on profitability. This methodology makes use of portfolios of firms and helps neutralize the impact of anomalies and measurement errors. The patterns of efficiency ratios compared to ROA and ROIC for the eight retail sectors are displayed in Appendix C along with the other matrix correlation tables for the rest of retail sectors not employed in the further research due to the absence of significant pattern between the variables of study (Appendix B). Despite the fact that Pearson correlation coefficients insinuate that there is not such a significant correlation between ROA and ROIC with the efficiency ratios in Retail-Variety Stores, as is shown in the table 3.13, the average table based on rankings of ROA and ROIC illustrates just the opposite for this particular retail sector. Therefore, this research will continue with this sector in further analysis.

However, care must be exercised while interpreting the Pearson Correlation coefficients because they cannot provide a reliable indicator of association in a manner which controls for additional explanatory variables. Examining simple bivariate correlation in a conventional matrix does not account for each variable's correlation with all other explanatory variables. In answer to that issue, the analysis will be derived from appropriate multivariate models, for instance, regression analysis.

Table 3.11 Pearson Correlation Coefficients

SIC-5600 Retail-Apparel & Accessory Stores and SIC-5651 Retail-Family Clothing Stores

	ROE	**ROIC**	**TR**	**NM**	**FL**	**IC**	**DSO**	**DSI**	**PP**	**CCC**	**RT**	**IT**	**FAT**	**AT**
ROA	0.589	0.980	0.570	0.653	-0.589	0.322	-0.713	-0.678	-0.403	-0.842	0.756	0.717	0.249	0.804
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.043)*	*(0.000)*	*(0.000)*	*(0.010)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.122)*	*(0.000)*
ROE		0.609	0.260	0.313	0.152	0.136	-0.330	-0.361	-0.295	-0.410	0.315	0.430	0.232	0.436
		(0.000)	*(0.105)*	*(0.049)*	*(0.350)*	*(0.403)*	*(0.037)*	*(0.022)*	*(0.065)*	*(0.009)*	*(0.048)*	*(0.006)*	*(0.150)*	*(0.005)*
ROIC			0.597	0.520	-0.535	0.273	-0.767	-0.685	-0.430	-0.872	0.817	0.713	0.339	0.872
			(0.000)	*(0.001)*	*(0.000)*	*(0.088)*	*(0.000)*	*(0.000)*	*(0.006)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.032)*	*(0.000)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

Table 3.12 Pearson Correlation Coefficients

SIC-5912 Retail-Drug Stores and Proprietary Stores

	ROE	**ROIC**	**TR**	**NM**	**FL**	**IC**	**DSO**	**DSI**	**PP**	**CCC**	**RT**	**IT**	**FAT**	**AT**
ROA	0.766	0.958	-0.288	0.834	0.368	0.268	-0.621	0.168	0.311	-0.422	0.548	0.327	0.177	0.512
	(0.000)	*(0.000)*	*(0.072)*	*(0.000)*	*(0.020)*	*(0.095)*	*(0.000)*	*(0.301)*	*(0.051)*	*(0.007)*	*(0.000)*	*(0.039)*	*(0.275)*	*(0.001)*
ROE		0.895	-0.203	0.435	0.791	0.046	-0.299	-0.337	-0.174	-0.571	0.189	0.708	0.597	0.688
		(0.000)	*(0.210)*	*(0.005)*	*(0.000)*	*(0.778)*	*(0.061)*	*(0.034)*	*(0.283)*	*(0.000)*	*(0.243)*	*(0.000)*	*(0.000)*	*(0.000)*
ROIC			-0.278	0.700	0.570	0.197	-0.550	-0.029	0.153	-0.539	0.456	0.516	0.373	0.641
			(0.082)	*(0.000)*	*(0.000)*	*(0.223)*	*(0.000)*	*(0.861)*	*(0.346)*	*(0.000)*	*(0.003)*	*(0.001)*	*(0.018)*	*(0.000)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

Table 3.13 Pearson Correlation Coefficients

SIC-5331 Retail-Variety Stores

	ROE	**ROIC**	**TR**	**NM**	**FL**	**IC**	**DSO**	**DSI**	**PP**	**CCC**	**RT**	**IT**	**FAT**	**AT**
ROA	0.831	0.970	-0.466	0.742	-0.314	0.108	-0.136	-0.282	-0.296	-0.148	0.376	0.139	0.251	0.213
	(0.000)	*(0.000)*	*(0.002)*	*(0.000)*	*(0.048)*	*(0.508)*	*(0.404)*	*(0.078)*	*(0.064)*	*(0.362)*	*(0.017)*	*(0.393)*	*(0.118)*	*(0.187)*
ROE		0.884	-0.291	0.812	0.212	-0.118	0.151	-0.070	-0.078	0.156	-0.142	-0.024	-0.053	-0.005
		(0.000)	*(0.068)*	*(0.000)*	*(0.188)*	*(0.468)*	*(0.354)*	*(0.670)*	*(0.630)*	*(0.335)*	*(0.382)*	*(0.883)*	*(0.746)*	*(0.976)*
ROIC			-0.435	0.686	-0.186	0.101	-0.144	-0.375	-0.361	-0.181	0.231	0.260	0.322	0.317
			(0.005)	*(0.000)*	*(0.251)*	*(0.533)*	*(0.376)*	*(0.017)*	*(0.022)*	*(0.263)*	*(0.151)*	*(0.105)*	*(0.043)*	*(0.046)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

3.5. Regression Analysis

In this section, in order to investigate the impact of efficiency ratios on profitability, the models used for the regressions analysis change the form depending on the pertinent retail industry sector. The main goal is to predict the outcome for the two dependent variables, ROA and ROIC, based on several independent efficiency ratios. A vital part of this model is that it is centered on year-to-year variations inside of a firm, rather than differences across firms. The main reason for this measure is based on the fact that the differences in efficiency ratios might be related with their ROA and ROIC, as well as with factors such as accounting policies, location strategy, management, and so on. These factors are external to the data set. Focusing on variations inside of a firm enables manager to limit their influence in a firm's performance. In the empirical analysis in ensuing sections, the variation across firms is controlled by utilizing firm-specific fixed effects.

Taking advantage of the data provided by the correlation analysis, all the efficiency terms without a significant correlation with ROA and ROIC are rejected as explanatory variables. Some of these ratios will be more significant than others, i.e. some efficiency ratios will be more highly correlated with the ROA or ROIC. Therefore, the regression analysis determines which of DSO, DSI, PP, RT, and IT are more significant in terms of predicting the ROA and ROIC. The following tables and equations give the results of the regression analysis with significant outcomes. The results being not significantly correlated are not reported.

3.5.1. SIC-5331 Retail-Variety Stores

The model used for the regression analysis of Variety Stores is expressed in the general form as given in equation 3.19 and 3.20; additionally, the variables CCC, FAT, and AT will be considered as explanatory variables.

$$ROA = \beta_0 + \beta_1\, DSO + \beta_2\, DSI + \beta_3\, IT + \varepsilon_{it} \qquad \textbf{Equation (3.19)}$$

$$ROIC = \beta_0 + \beta_1\, DSO + \beta_2\, DSI + \beta_3\, IT + \varepsilon_{it} \qquad \textbf{Equation (3.20)}$$

Where the subscript i denoting firms (cross-section dimension) ranging from 1 to 4 and t denoting years (time-series dimension) ranging from 1 to 10. The variables are defined as in Appendix A.

Table 3.14 Analysis of variance summary for the ROA of retail variety stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	5	142.701	28.540	9.29	0.000
DSO	1	14.740	14.740	4.80	0.035
DSI	1	55.504	55.504	18.07	0.000
PP	1	0.923	0.923	0.30	0.587
RT	1	4.716	4.716	1.53	0.224
IT	1	70.519	70.519	22.95	0.000
Error	34	104.459	3.072		
Total	39	247.160			

Table 3.14 presents retail variety stores' analysis of variance for the relationship between ROA and the efficiency ratios, DSO, DSI, PP, RT, and IT. The coefficients of all the variables included in the regression model are significant with more than 95% of confidence, except for PP and RT. Therefore, these two factors are not considered in the further regression analysis for this particular retail sector as is shown in table 3.15. A negative coefficient significant at the 0.93 level for DSI and 3.80 level for IT is found for retail variety stores.

However, the positive coefficient of DSO becomes significant at the 0.09 level for this sector. The regression formula for the relationship between ROA and the retail variety stores efficiency ratios is defined as given in equation 3.21. It is interesting to note that R^2 value of 0.51 denotes that 51.07% of observed variability in ROA can be explained by the differences in the independent variables for retail variety stores.

Table 3.15 Analysis of variance summary for the ROA of retail variety stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	3	135.53	45.178	14.57	0.000
DSO	1	28.16	28.163	9.08	0.005
DSI	1	129.54	129.543	41.78	0.000
IT	1	114.99	114.992	37.09	0.000
Error	36	111.62	3.101		
Total	39	247.16			

$$ROA = 80.4 + 0.0878 \cdot DSO - 0.932 \cdot DSI - 3.8 \cdot IT \qquad \boldsymbol{Equation\ (3.21)}$$

Table 3.16 illustrates analysis of variance when the ROIC measure is the dependent variable. PP and RT are again the only ones with coefficients for ROIC that are not relevant at a 0.05 level of significance. The coefficient for DSO becomes significant at the 0.14 level for retail variety stores. Again, a negative coefficient significant at the 1.25 level for DSI and 4.80 level for IT is found for retail variety stores. Overall, all the values increase from when ROA was used as the dependent variable. On the contrary, R^2 value of 0.48 denotes that 43.47% of observed variability in ROIC decreased from the ROA value. The regression formula for the relationship between ROIC and the retail variety stores efficiency ratios is defined as given in equation 3.22.

Table 3.16 Analysis of variance summary for the ROIC of retail variety stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	5	276.371	55.274	6.35	0.000
DSO	1	27.054	27.054	3.11	0.087
DSI	1	115.142	115.142	13.23	0.001
PP	1	2.086	2.086	0.24	0.628
RT	1	0.157	0.157	0.02	0.894
IT	1	132.769	132.769	15.26	0.000
Error	34	295.905	8.703		
Total	39	572.277			

Table 3.17 Analysis of variance summary for the ROIC of retail variety stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	3	273.66	91.220	11.00	0.000
DSO	1	70.52	70.519	8.50	0.006
DSI	1	235.04	235.043	28.34	0.000
IT	1	183.83	183.830	22.16	0.000
Error	36	298.62	8.295		
Total	39	572.28			

$$ROIC = 107.5 + 0.1390 \cdot DSO - 1.255 \cdot DSI - 4.8 \cdot IT \qquad \boldsymbol{Equation}\ (\mathbf{3.22})$$

3.5.2. SIC-5600 Retail-Apparel & Accessory Stores and SIC-5651 Retail-Family Clothing Stores

The model used for the regression analysis of Apparel & Accessory Stores and Family Clothing Stores coincides with the one specified above in equation 3.19 and 3.20, considering the same dependent and explanatory variables.

Table 3.18 Analysis of variance summary for the ROA of retail apparel & accessory stores and family clothing stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	5	1191.05	238.209	46.04	0.000
DSO	1	73.93	73.930	14.29	0.001
DSI	1	70.10	70.097	13.55	0.001
PP	1	1.91	1.913	0.37	0.547
RT	1	0.19	0.190	0.04	0.849
IT	1	160.45	160.450	31.01	0.000
Error	34	175.92	5.174		
Total	39	1366.97			

Table 3.18 shows retail apparel & accessory and family clothing stores' analysis of variance for the relationship between ROA and the efficiency ratios, DSO, DSI, PP, RT, and IT. As is illustrated in the table PP and RT are again the only parameters not significant, avoiding them in the regression analysis (table 3.19). The major difference between the retail apparel & accessory and family clothing stores' regression model and this particular is found at the variables sign. In this scenario, a positive coefficient significant at the 0.18 level for DSI and 6.79 level for IT is found for retail apparel & accessory and family clothing stores. Notwithstanding, the negative coefficient of DSO becomes significant at the 0.13 level for this retail group. Also, R^2 value of 0.86 denotes that the observed variability in ROA is much larger than for retail variety stores, increasing from 51.07% to 85.91%. The regression formula for

the relationship between ROA and the retail apparel & accessory and family clothing stores' efficiency ratios is defined as given in equation 3.23.

Table 3.19 Analysis of variance summary for the ROA of retail apparel & accessory stores and family clothing stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	3	1189.13	396.377	80.24	0.000
DSO	1	463.22	463.221	93.77	0.000
DSI	1	77.01	77.013	15.59	0.000
IT	1	161.51	161.508	32.69	0.000
Error	36	177.84	4.940		
Total	39	1366.97			

$$ROA = -32.52 - 0.1337 \cdot DSO + 0.1779 \cdot DSI + 6.79 \cdot IT \qquad \boldsymbol{Equation}\ (\mathbf{3.23})$$

Table 3.20 represents analysis of variance when the ROIC measure is the dependent variable. PP and RT are again the only ones with coefficients for ROIC that are not relevant at a 0.05 level of significance. Repeatedly, a positive coefficient significant at the 0.30 level for DSI and 12.10 level for IT is settled for retail apparel & accessory and family clothing stores. Additionally, the coefficient for DSO turns into negatively significant at the 0.30 level for these particular stores. As for retail variety stores, every value increases from when ROA was used as the dependent variable. Besides, R^2 value raised from 85.91% to 90.19% with ROIC as the dependent value and a 46.72% in this specific retail sector. The regression formula for the relationship between ROIC and the retail variety stores efficiency ratios is defined as given in equation 3.24.

Table 3.20 Analysis of variance summary for the ROIC of retail apparel & accessory stores and family clothing stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	5	5455.26	1091.05	69.41	0.000
DSO	1	260.78	260.78	16.59	0.000
DSI	1	218.00	218.00	13.87	0.001
PP	1	0.25	0.25	0.02	0.900
RT	1	5.77	5.77	0.37	0.548
IT	1	518.30	518.30	32.97	0.000
Error	34	534.43	15.72		
Total	39	5989.69			

Table 3.21 Analysis of variance summary for the ROIC of retail apparel & accessory stores and family clothing stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	3	5447.5	1815.84	120.57	0.000
DSO	1	2369.6	2369.63	157.35	0.000
DSI	1	213.6	213.62	14.18	0.001
IT	1	512.5	512.54	34.03	0.000
Error	36	542.2	15.06		
Total	39	5989.7			

$$ROIC = -52.3 - 0.3025 \cdot DSO + 0.2964 \cdot DSI + 12.10 \cdot IT \qquad \boldsymbol{Equation}\ (\mathbf{3.24})$$

3.5.3. SIC-5912 Retail-Drug Stores and Proprietary Stores

In this particular case, the model used for the regression analysis of Drug and Proprietary Stores differs from the other two and is expressed in the general form as given in equation 3.25 and 3.26, additionally the variables CCC, FAT, and AT will be considered as explanatory variables as well as the regression models developed above.

$$ROA = \beta_0 + \beta_1\, DSO + \beta_2\, DSI + \beta_3\, PP + \beta_4\, RT + \beta_5\, IT + \varepsilon_{it} \qquad \boldsymbol{Equation\ (3.25)}$$

$$ROIC = \beta_0 + \beta_1\, DSO + \beta_2\, DSI + \beta_3\, PP + \beta_4\, RT + \beta_5\, IT + \varepsilon_{it} \qquad \boldsymbol{Equation\ (3.26)}$$

Where the subscript i denoting firms (cross-section dimension) ranging from 1 to 4 and t denoting years (time-series dimension) ranging from 1 to 10. The variables are defined as in Appendix A.

Table 3.22 Analysis of variance summary for the ROA of retail drug stores and proprietary stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	5	357.44	71.489	15.31	0.000
DSO	1	22.32	22.315	4.78	0.036
DSI	1	24.55	24.549	5.26	0.028
PP	1	38.77	38.766	8.30	0.007
RT	1	24.15	24.150	5.17	0.029
IT	1	131.86	131.865	28.24	0.000
Error	34	158.76	4.669		
Total	39	516.21			

Table 3.22 introduces retail drug and proprietary stores' analysis of variance for the relationship between ROA and the efficiency ratios, DSO, DSI, PP, RT, and IT. The coefficients of all the variables included in the regression model are significant with more than 95% of confidence. A positive coefficient significant at the 0.11 level for DSI, 0.25 level for

PP, and 0.12 level for IT is found for retail drug and proprietary stores. On the other hand, the negative coefficient of DSO becomes significant at the 0.23 level and 0.40 level for RT in this retail area. Despite the use of two more variables in this model, R^2 value of 0.74 denotes that 74.32% of observed variability in ROA are relatively accurate when interpreted by the differences in the independent variables for retail drug and proprietary stores. The regression formula for the relationship between ROA and the retail variety stores efficiency ratios is defined as given in equation 3.27.

$$ROA = 7.22 - 0.232 \cdot DSO + 0.1094 \cdot DSI + 0.2469 \cdot PP - 0.398 \cdot RT + 0.1235 \cdot IT \qquad \textbf{\textit{Equation}}\ (\mathbf{3.27})$$

Table 3.23 represents analysis of variance when the ROIC measure is the dependent variable. Again, all the efficiency factors are relevant at a 0.05 level of significance for ROIC. The coefficient for DSO becomes negatively significant at the 0.44 level and 0.86 level for RT in retail drug and proprietary stores. Moreover, a positive coefficient significant at the 0.17 level for DSI, 0.53 level for PP, and 0.26 level for IT is found for these particular retail stores. As in the other two regression models, all the coefficients increment from when ROA was used as the dependent variable. As such, R^2 value of 0.74 evidences that 74.32% of observed variability in ROIC increased from the ROA value. The regression formula for the relationship between ROIC and the retail drug and proprietary stores efficiency ratios is defined as given in equation 3.28.

Table 3.23 Analysis of variance summary for the ROIC of retail drug stores and proprietary stores.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	5	1323.76	264.75	23.58	0.000
DSO	1	79.08	79.08	7.04	0.012
DSI	1	57.90	57.90	5.16	0.030
PP	1	177.49	177.49	15.81	0.000
RT	1	111.62	111.62	9.94	0.003
IT	1	584.77	584.77	52.08	0.000
Error	34	381.75	11.23		
Total	39	1705.50			

$$ROIC = 13.31 - 0.437 \cdot DSO + 0.1680 \cdot DSI + 0.528 \cdot PP - 0.856 \cdot RT + 0.26 \cdot IT \qquad \textbf{Equation } (\mathbf{3.28})$$

Chapter 4: Findings

4.1. Conclusions

Financial ratio analysis starts with selection of a set of financial ratios that is sufficiently vast to represent all of the critical qualities of any firm under study, yet sufficiently little to be sensible by everyone. Developing this efficiently sized set of profitability and efficiency ratios requires some comprehension of relationships among the different profitability and efficiency ratios. Previous research has utilized factor analysis to create groupings or patterns among these ratios. This research focuses on a significant time period's stability of profitability and efficiency ratios patterns, and focus on the stability of these patterns across different companies in the retail industry. The primary purpose of this study is to assess the stability of profitability and efficiency ratio patterns across companies in the U.S. retail sector. Auxiliary to this goal is the evaluation of time series stability of profitability and efficiency ratios for this specific industry.

Therefore, the primary target of this study is the examination of the suitability of financial tools for surveying corporate performance. It is demonstrated that a joint utilization of ratio analysis with data envelopment analysis can give exceptionally valuable results into the corporate performance qualities of sectors in the U.S. retail industry. Eight different sectors in the retail industry are employed to outline the utilization of linear programming models for evaluating companies' corporate performance.

The different analyses have distinguished essential management practices and are relied upon to help managers in recognizing areas where they may enhance the financial performance of their operation. The outcomes give managers with relevant data regarding the critical financial management practices used by their competitors and their competitors' reactions toward these practices. The working capital needs of a firm change after some time as does its

internal cash generation rate. Fundamentally, any firm should ensure a decent harmony of its assets and liabilities.

Working capital management is a critical piece of financial management choices in any company. The capacity of the company to be sustainable for longer time relies upon an appropriate trade-off between management of investment in long-term and short-term assets (working capital). Companies can accomplish ideal management of working capital by making the trade-off between profitability and liquidity. This research examines the relationship between the working capital management and profitability of 30 firms from the U.S. retail industry divided into eight groups by different sectors for the period 2006–2015.

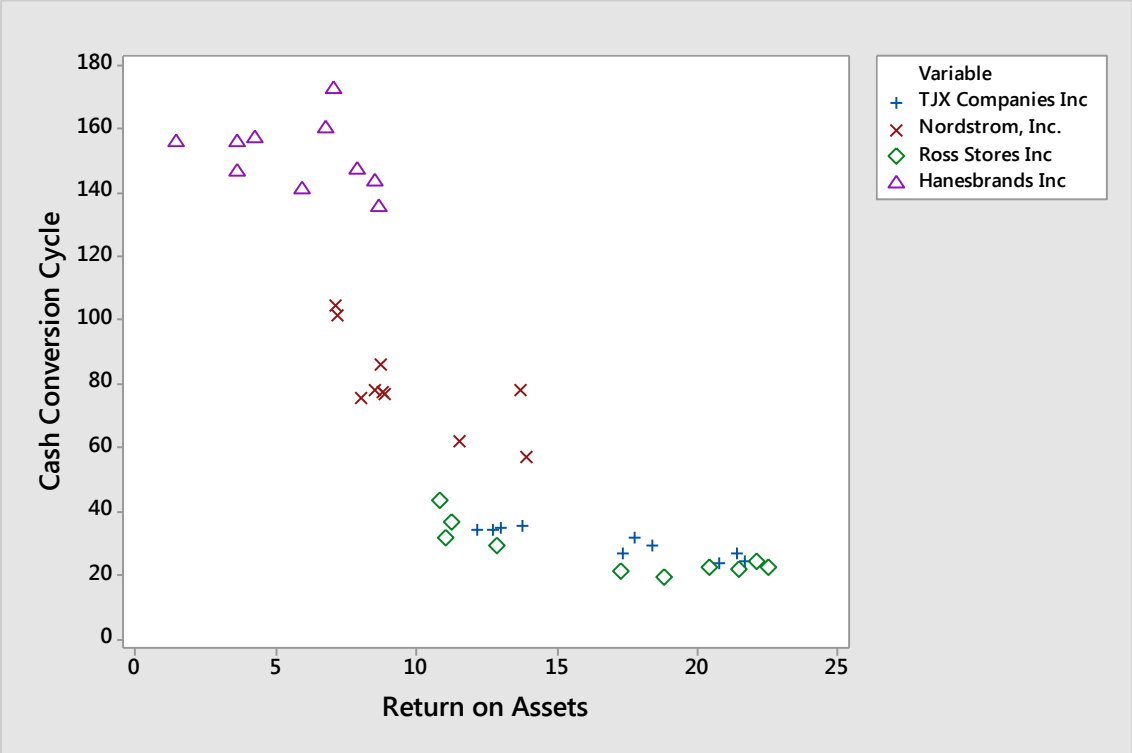

Figure 4.1 Scatter diagram for the relationship between CCC and ROA of retail-apparel & accessory stores and retail-Family Clothing Stores.

Long run balance measures of working capital management efficiency and profitability for a large number of firms give the information for this study. Correlation analysis and multiple regression models are utilized to asses the relationships between profitability measures and several efficiency ratios in the U.S. retail industry. When the results of this study are considered as a whole, a solid case can be made that more aggressive liquidity management i.e. lower CCC, is associated with higher profitability for most of the sectors in the retail industry, including variety stores, grocery stores, apparel & accessory stores, family clothing stores, drug stores, proprietary stores, and catalog & mail-order houses. But only for the sectors of variety stores, apparel & accessory stores, family clothing stores, drug stores, and proprietary stores, there is a statistically significant inverse relationship between CCC and profitability (figure 4.1 and 4.2). This finding is consistent for alternative statistical models and performs a new addition to the working capital management literature in the retail industry.

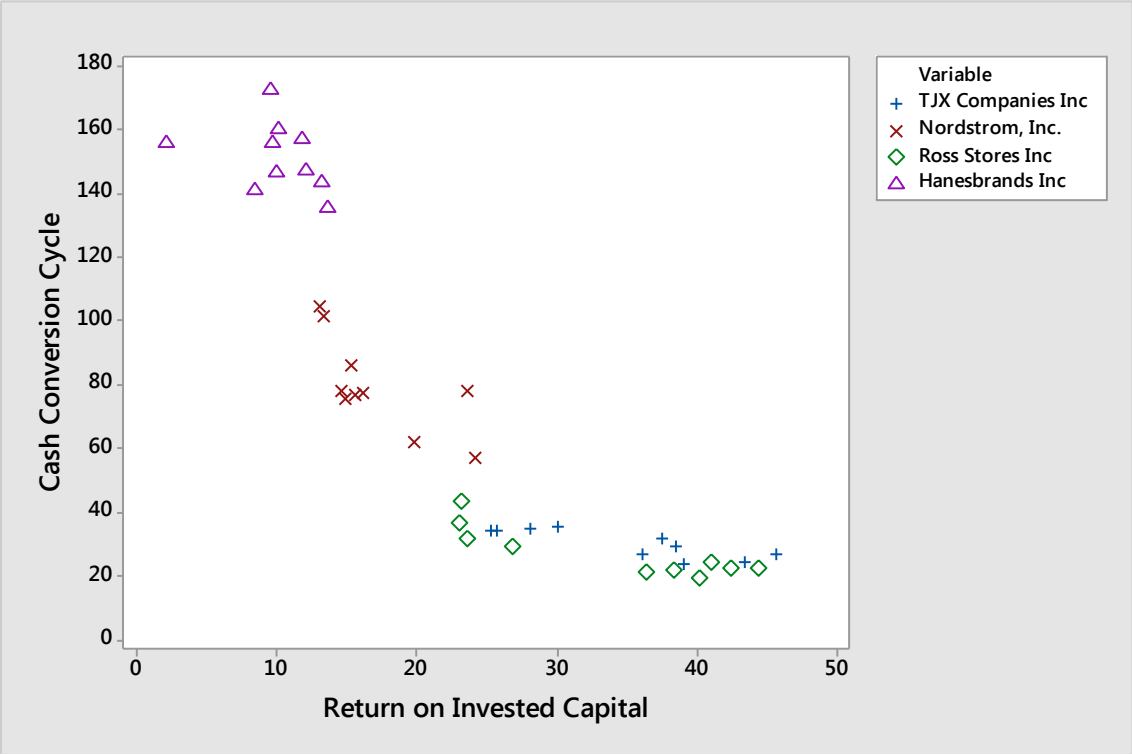

Figure 4.2 Scatter diagram for the relationship between CCC and ROA of retail-apparel & accessory stores and retail-Family Clothing Stores.

The management of the firms ought to make a move dealing the CCC. The message to the firms is that the lower CCC is more profitable level. The probable reasons of a high CCC would be keeping inventory for a quite a while, being moderate in collecting receivables, and paying obligations rapidly.

Traditionally, imperative leaders in the retail industry, for instance Costco, Walmart, Target, Macy's, and Kroger were pointed inefficient as far as their sales potential was concerned. Today as never before, Walmart, Kroger, and Home Depot are described as the business benchmarks on the premise of their impressive sales efficiency. These companies can be utilized as good examples to which sales efficient firms' policies might copy the other firms, in order to accomplish improving the firms' performance. Moreover, these three companies appear to lead completely different industry groups which indicates their diverse operating attributes.

This research has demonstrated that variety stores, apparel & accessory stores, family clothing stores, drug stores, and proprietary stores has possessed the capacity to accomplish high scores on the different segments of working capital and this has positively improved their profitability.

The effect of working capital management has been evaluated using Pearson correlation analysis and multiple regression models between efficiency and profitability ratios for the selected sectors with significance results already mentioned above. The study finds a negative relationship between profitability and PP, DSI, and DSO. In all these factors, PP, DSI, and DSO as measured by CCC, the research transmits consistent results when contrasted with numerous researches led in several countries previously. The working capital management and profitability demonstrate a negative relationship, as measured by CCC, a comprehensive measure of working capital, supporting most of theoretical last studies. This research reveals that shortening of the CCC positively influences the profitability of U.S retail firms.

A low DSI might demonstrate that the firm is not keeping enough stock close by to meet obligations and dealing with the DSO. It can be utilized to figure out whether a firm is experiencing issues collecting sales made on credit. On the contrary, a high number of DSI expresses that is an absence of interest for the item being sold. The higher the RT the faster the business is collecting its receivables and efficient business operation or tight credit policies. A low DSO shows an accumulation issue from its client. A high number of PP that is better credit terms this parameter will increase. In the event that one pays earlier in order to get a discount in the price of a specific product this parameter would decrease.

The empirical findings of this study are not sensitive to the measure of profitability utilized. The key findings hold for both ROA and ROIC. In those sectors of the retail industry where aggressive working capital management strategies are profitable, the benefits show up as far as both asset management returns (ROA) and capital management returns (ROIC). In those retail sectors where there is no evidence of a significant relationship between CCC and profitability at a 95% of confidence, the appraisals of this relationship still have a negative sign, with the exception of lumber & other building materials, department stores, and miscellaneous shopping goods stores. While there are exceptions to the general finding, both for particular sectors in the U.S retail industry and specific firms, this study offers evidence recommending that working capital management strategies tend to improve firms' performance.

4.2. Future Research

Retail Industry sectors are examined using ratio analysis and evidence of significant differences is found between the firms' profitability in this particular groups. The research shows the capability of ratio analysis in order to give robust performance measures at the firm level for testing hypotheses concerning the relationship between efficiency ratios and firm's profitability. It should be advanced further by collecting adequate data for expanding the strategic character of the business to more firms and sectors in the U.S retail industry.

In the outline, it is contended that the utilization of ratio analysis can give helpful results into the appraisal of corporate performance. Additionally, it is contended that a complementary use of ratio analysis would improve the present method for evaluating firms' profitability. As the interest for more detailed and intensive investigations of firms' profitability builds, so then ought to the interest for utilizing advanced models of evaluating profitability.

This study concludes that there is an ongoing need for further empirical researches to be attempted regarding retail industry financial management, specifically their working capital practices by extending the sample size so that an industry-wide analysis can reveal the elements that clarify the better profitability for some particular retail sectors and how these best practices could stretch out to alternate areas. This study has been compelled by the sample size and the nature of the data, which could have very much influenced the outcomes. Further studies will aim at expanding the sample size and the variety of it for still better and consistent panel estimates.

Appendix

Appendix A: Independent Explanatory Variable – Financial Ratios

Variable Name	Definition
ROA	Return on assets is Net Profit Margin · Average Assets or Net Margin · Asset Turnover
ROE	Return on equity is Net profit / Average Shareholder Equity
ROIC	Return on Invested Capital is Operating Income · (1-Tax Rate) / Average Invested Capital
TR	Tax Rate is Income tax / Net income before tax
NM	Net Margin is Net Income After Taxes / Revenue
FL	Financial leverage is Average Total Assets / Average Total Equity
IC	Interest coverage is Earnings Before Interest and Taxes (EBIT)/ Interest Expense
DSO	Days Sales Outstanding is Average accounts receivable / Credit Sales · 365
DSI	Days Sales Inventory is Average inventory / Cost of goods sold · 365
PP	Payable Period is Accounts Payables / Cost of goods sold · 365
CCC	Cash Conversion Cycle is Days Sales Outstanding + Days Sales Inventory - Payable Period
RT	Receivables Turnover is Credit Sales / Average Accounts Receivable or 365 / Days Sales Outstanding
IT	Inventory Turnover is Cost of goods sold / Average inventory or 365 / Days Sales Outstanding
FAT	Fixed Asset Turnover is Net sales / Net plant and equipment
AT	Asset Turnover is Net sales / Total assets

Appendix B: Pearson Correlation Tables

Table B.1 Pearson Correlation Coefficients

SIC-5211 Retail-Lumber & Other Building Materials Dea

	ROE	**ROIC**	**TR**	**NM**	**FL**	**IC**	**DSO**	**DSI**	**PP**	**CCC**	**RT**	**IT**	**FAT**	**AT**
ROA	0.857	0.947	0.671	0.980	-0.403	0.270	-0.467	0.645	-0.016	0.296	0.382	-0.670	-0.003	0.297
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.027)*	*(0.149)*	*(0.009)*	*(0.000)*	*(0.932)*	*(0.112)*	*(0.037)*	*(0.000)*	*(0.988)*	*(0.111)*
ROE		0.716	0.573	0.832	-0.539	0.192	-0.421	0.545	0.072	0.186	0.399	-0.550	-0.154	0.196
		(0.000)	*(0.001)*	*(0.000)*	*(0.002)*	*(0.309)*	*(0.020)*	*(0.002)*	*(0.705)*	*(0.325)*	*(0.029)*	*(0.002)*	*(0.415)*	*(0.299)*
ROIC			0.582	0.948	-0.205	0.214	-0.544	0.550	0.082	0.109	0.442	-0.568	0.002	0.340
			(0.001)	*(0.000)*	*(0.278)*	*(0.255)*	*(0.002)*	*(0.002)*	*(0.665)*	*(0.567)*	*(0.014)*	*(0.001)*	*(0.990)*	*(0.066)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

Table B.2 Pearson Correlation Coefficients

SIC-5311 Retail-Department Stores

	ROE	**ROIC**	**TR**	**NM**	**FL**	**IC**	**DSO**	**DSI**	**PP**	**CCC**	**RT**	**IT**	**FAT**	**AT**
ROA	0.578	0.954	0.602	0.964	-0.572	0.934	0.032	0.184	-0.059	0.264	0.156	-0.128	-0.258	-0.142
	(0.001)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.001)*	*(0.000)*	*(0.868)*	*(0.330)*	*(0.757)*	*(0.158)*	*(0.411)*	*(0.502)*	*(0.168)*	*(0.454)*
ROE		0.737	0.385	0.478	-0.419	0.542	0.022	0.306	0.129	0.089	0.113	-0.247	-0.308	-0.287
		(0.000)	*(0.036)*	*(0.008)*	*(0.021)*	*(0.002)*	*(0.909)*	*(0.100)*	*(0.498)*	*(0.638)*	*(0.553)*	*(0.189)*	*(0.098)*	*(0.124)*
ROIC			0.688	0.866	-0.640	0.896	0.020	0.259	0.035	0.185	0.169	-0.182	-0.334	-0.248
			(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.918)*	*(0.168)*	*(0.855)*	*(0.329)*	*(0.372)*	*(0.337)*	*(0.071)*	*(0.187)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

Table B.3 Pearson Correlation Coefficients

SIC-5411 Retail-Grocery Stores

	ROE	**ROIC**	**TR**	**NM**	**FL**	**IC**	**DSO**	**DSI**	**PP**	**CCC**	**RT**	**IT**	**FAT**	**AT**
ROA	0.369	0.912	-0.224	0.923	-0.529	0.361	-0.340	-0.631	-0.256	-0.432	0.330	0.570	0.381	0.175
	(0.019)	*(0.000)*	*(0.165)*	*(0.000)*	*(0.000)*	*(0.022)*	*(0.032)*	*(0.000)*	*(0.110)*	*(0.005)*	*(0.037)*	*(0.000)*	*(0.015)*	*(0.280)*
ROE		0.684	-0.393	0.213	0.491	0.004	-0.266	0.039	0.211	-0.101	0.111	-0.166	0.142	0.386
		(0.000)	*(0.012)*	*(0.188)*	*(0.001)*	*(0.981)*	*(0.097)*	*(0.812)*	*(0.192)*	*(0.535)*	*(0.496)*	*(0.307)*	*(0.381)*	*(0.014)*
ROIC			-0.374	0.793	-0.191	0.283	-0.373	-0.413	-0.108	-0.328	0.293	0.315	0.309	0.268
			(0.017)	*(0.000)*	*(0.239)*	*(0.077)*	*(0.018)*	*(0.008)*	*(0.505)*	*(0.039)*	*(0.067)*	*(0.048)*	*(0.053)*	*(0.095)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

Table B.4 Pearson Correlation Coefficients

SIC-5940 Retail-Miscellaneous Shopping Goods Stores

	ROE	ROIC	TR	NM	FL	IC	DSO	DSI	PP	CCC	RT	IT	FAT	AT
ROA	0.982	0.995	0.009	0.980	-0.173	0.719	-0.144	0.102	-0.005	0.091	0.212	-0.108	-0.117	0.290
	(0.000)	*(0.000)*	*(0.955)*	*(0.000)*	*(0.286)*	*(0.000)*	*(0.374)*	*(0.533)*	*(0.974)*	*(0.576)*	*(0.189)*	*(0.508)*	*(0.471)*	*(0.070)*
ROE		0.987	-0.029	0.949	-0.026	0.662	-0.065	0.065	-0.012	0.069	0.144	-0.057	-0.068	0.336
		(0.000)	*(0.858)*	*(0.000)*	*(0.875)*	*(0.000)*	*(0.688)*	*(0.692)*	*(0.943)*	*(0.672)*	*(0.374)*	*(0.728)*	*(0.676)*	*(0.034)*
ROIC			-0.014	0.959	-0.167	0.723	-0.118	0.075	-0.026	0.069	0.212	-0.076	-0.081	0.357
			(0.932)	*(0.000)*	*(0.302)*	*(0.000)*	*(0.467)*	*(0.644)*	*(0.872)*	*(0.672)*	*(0.190)*	*(0.643)*	*(0.619)*	*(0.024)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

Table B.5 Pearson Correlation Coefficients

SIC-5961 Retail-Catalog & Mail-Order Houses

	ROE	**ROIC**	**TR**	**NM**	**FL**	**IC**	**DSO**	**DSI**	**PP**	**CCC**	**RT**	**IT**	**FAT**	**AT**
ROA	0.776	0.959	0.186	0.510	-0.175	0.361	-0.208	-0.135	-0.135	-0.116	0.216	0.019	0.293	0.267
	(0.000)	*(0.000)*	*(0.251)*	*(0.001)*	*(0.279)*	*(0.022)*	*(0.198)*	*(0.406)*	*(0.406)*	*(0.477)*	*(0.182)*	*(0.906)*	*(0.067)*	*(0.096)*
ROE		0.842	0.154	0.416	0.413	0.046	-0.333	0.001	0.135	-0.313	0.529	-0.151	-0.001	0.054
		(0.000)	*(0.343)*	*(0.008)*	*(0.008)*	*(0.778)*	*(0.036)*	*(0.997)*	*(0.407)*	*(0.050)*	*(0.000)*	*(0.353)*	*(0.996)*	*(0.743)*
ROIC			0.176	0.456	-0.050	0.197	-0.193	-0.091	0.053	-0.212	0.308	-0.026	0.138	0.146
			(0.276)	*(0.003)*	*(0.759)*	*(0.223)*	*(0.234)*	*(0.575)*	*(0.747)*	*(0.189)*	*(0.054)*	*(0.871)*	*(0.397)*	*(0.368)*

Notes:
The p-value is given in parentheses. The variables are defined as in Appendix A.

Appendix C: Efficiency Ratio Pattern Tables

Table C.1 Average Days Sales Outstanding (DSO) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**DSO for ROA (Days)**	**DSO for ROA (Days)**	**DSO for ROA (Days)**	**DSO for ROA (Days)**	**DSO for ROIC (Days)**	**DSO for ROIC (Days)**	**DSO for ROIC (Days)**	**DSO for ROIC (Days)**	**Overall Mean DSO (Days)**
Lumber & Other Building Materials Dea	37	7	31		37	31	7		25
Department Stores	6	12	2		6	12	2		6
Variety Stores	29	4	4	1	29	4	1	4	9
Grocery Stores	6	4	3	5	6	3	4	5	4
Apparel & Accessory Stores and Family Clothing Stores	42	60	2	3	42	60	2	3	27
Drug Stores and Proprietary Stores	41	20	20	14	41	20	14	20	24
Miscellaneous Shopping Goods Stores	25	6	6	4	25	6	6	4	10
Catalog & Mail-Order Houses	84	46	16	42	46	84	42	16	47
Equal-weighted Mean DSO	34	20	10	11	29	27	10	9	19

Table C.2 Average Days Sales Inventory (DSI) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**DSI for ROA (Days)**	**DSI for ROA (Days)**	**DSI for ROA (Days)**	**DSI for ROA (Days)**	**DSI for ROIC (Days)**	**DSI for ROIC (Days)**	**DSI for ROIC (Days)**	**DSI for ROIC (Days)**	**Overall Mean DSI (Days)**
Lumber & Other Building Materials Dea	39	80	72		39	72	80		64
Department Stores	95	119	121		95	119	121		111
Variety Stores	58	30	43	40	58	30	40	43	43
Grocery Stores	39	29	14	19	39	14	29	19	25
Apparel & Accessory Stores and Family Clothing Stores	157	64	69	63	157	64	69	63	88
Drug Stores and Proprietary Stores	24	45	5	53	24	45	53	5	32
Miscellaneous Shopping Goods Stores	59	121	153	99	59	121	153	99	108
Catalog & Mail-Order Houses	12	61	39	16	61	12	16	39	32
Equal-weighted Mean DSO	60	69	65	48	66	60	70	45	60

Table C.3 Average Payable Period (PP) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**PP for ROA (Days)**	**PP for ROA (Days)**	**PP for ROA (Days)**	**PP for ROA (Days)**	**PP for ROIC (Days)**	**PP for ROIC (Days)**	**PP for ROIC (Days)**	**PP for ROIC (Days)**	**Overall Mean PP (Days)**
Lumber & Other Building Materials Dea	27	40	11		27	11	40		26
Department Stores	34	74	45		34	74	45		51
Variety Stores	54	30	37	36	54	30	36	37	39
Grocery Stores	20	24	24	12	20	24	24	12	20
Apparel & Accessory Stores and Family Clothing Stores	47	45	44	36	47	45	44	36	43
Drug Stores and Proprietary Stores	14	20	10	34	14	20	34	10	20
Miscellaneous Shopping Goods Stores	46	54	54	45	46	54	54	45	50
Catalog & Mail-Order Houses	67	36	88	25	36	67	25	88	54
Equal-weighted Mean DSO	39	40	39	31	35	41	38	38	38

Table C.4 Average Cash Conversion cycle (CCC) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**CCC for ROA (Days)**	**CCC for ROA (Days)**	**CCC for ROA (Days)**	**CCC for ROA (Days)**	**CCC for ROIC (Days)**	**CCC for ROIC (Days)**	**CCC for ROIC (Days)**	**CCC for ROIC (Days)**	**Overall Mean CCC (Days)**
Lumber & Other Building Materials Dea	49	47	92		49	92	47		63
Department Stores	67	56	78		67	56	78		67
Variety Stores	32	3	10	5	32	3	5	10	13
Grocery Stores	25	9	-7	12	25	-7	9	12	10
Apparel & Accessory Stores and Family Clothing Stores	152	80	27	30	152	80	27	30	72
Drug Stores and Proprietary Stores	50	46	15	33	50	46	33	15	36
Miscellaneous Shopping Goods Stores	38	73	104	58	38	73	104	58	68
Catalog & Mail-Order Houses	29	70	-32	33	70	29	33	-32	25
Equal-weighted Mean DSO	55	48	36	28	60	46	42	15	41

Table C.5 Average Receivables Turnover (RT) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**RT for ROA (Days)**	**RT for ROA (Days)**	**RT for ROA (Days)**	**RT for ROA (Days)**	**RT for ROIC (Days)**	**RT for ROIC (Days)**	**RT for ROIC (Days)**	**RT for ROIC (Days)**	**Overall Mean RT (Days)**
Lumber & Other Building Materials Dea	10	54	12		10	12	54		25
Department Stores	62	54	325		62	54	325		147
Variety Stores	49	98	99	425	49	98	425	99	168
Grocery Stores	64	92	139	71	64	139	92	71	91
Apparel & Accessory Stores and Family Clothing Stores	9	7	172	130	9	7	172	130	79
Drug Stores and Proprietary Stores	9	18	19	27	9	18	27	19	18
Miscellaneous Shopping Goods Stores	15	63	67	109	15	63	67	109	63
Catalog & Mail-Order Houses	4	8	23	9	8	4	9	23	11
Equal-weighted Mean DSO	28	49	107	128	28	49	146	75	75

Table C.6 Average Inventory Turnover (IT) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**IT for ROA (Days)**	**IT for ROA (Days)**	**IT for ROA (Days)**	**IT for ROA (Days)**	**IT for ROIC (Days)**	**IT for ROIC (Days)**	**IT for ROIC (Days)**	**IT for ROIC (Days)**	**Overall Mean IT (Days)**
Lumber & Other Building Materials Dea	10	5	5		10	5	5		7
Department Stores	4	3	3		4	3	3		3
Variety Stores	6	12	8	9	6	12	9	8	9
Grocery Stores	9	13	26	19	9	26	13	19	17
Apparel & Accessory Stores and Family Clothing Stores	2	6	5	6	2	6	5	6	5
Drug Stores and Proprietary Stores	16	8	82	7	16	8	7	82	28
Miscellaneous Shopping Goods Stores	6	3	2	4	6	3	2	4	4
Catalog & Mail-Order Houses	30	6	10	23	6	30	23	10	17
Equal-weighted Mean DSO	11	7	18	11	8	12	8	21	12

Table C.7 Average Fixed Assets Turnover (FAT) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**FAT for ROA (Days)**	**FAT for ROA (Days)**	**FAT for ROA (Days)**	**FAT for ROA (Days)**	**FAT for ROIC (Days)**	**FAT for ROIC (Days)**	**FAT for ROIC (Days)**	**FAT for ROIC (Days)**	**Overall Mean FAT (Days)**
Lumber & Other Building Materials Dea	17	3	25		17	25	3		15
Department Stores	6	3	3		6	3	3		4
Variety Stores	3	7	4	6	3	7	6	4	5
Grocery Stores	3	6	8	5	3	8	6	5	6
Apparel & Accessory Stores and Family Clothing Stores	8	4	7	9	8	4	7	9	7
Drug Stores and Proprietary Stores	31	13	89	7	31	13	7	89	35
Miscellaneous Shopping Goods Stores	19	3	11	7	19	3	11	7	10
Catalog & Mail-Order Houses	36	9	17	95	9	36	95	17	39
Equal-weighted Mean DSO	15	6	21	21	12	13	17	22	16

Table C.8 Average Asset Turnover (AT) for firms based on rankings of ROA and ROIC within each of eight retail sectors.

	LOWEST ROA		HIGHEST ROA		LOWEST ROIC		HIGHEST ROIC		
Industry	**AT for ROA (Days)**	**AT for ROA (Days)**	**AT for ROA (Days)**	**AT for ROA (Days)**	**AT for ROIC (Days)**	**AT for ROIC (Days)**	**AT for ROIC (Days)**	**AT for ROIC (Days)**	**Overall Mean AT (Days)**
Lumber & Other Building Materials Dea	2	2	3		2	3	2		2
Department Stores	2	1	1		2	1	1		1
Variety Stores	2	4	2	3	2	4	3	2	3
Grocery Stores	2	3	4	2	2	4	3	2	3
Apparel & Accessory Stores and Family Clothing Stores	1	2	3	3	1	2	3	3	2
Drug Stores and Proprietary Stores	2	2	3	3	2	2	3	3	2
Miscellaneous Shopping Goods Stores	2	1	2	2	2	1	2	2	2
Catalog & Mail-Order Houses	3	0	2	5	0	3	5	2	3
Equal-weighted Mean DSO	2	2	3	3	2	2	3	3	2

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