Senior Honors Thesis

Analyzing Economic Profit in the Brokerage Industry

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ABSTRACT

Economists use perfect competition as a standard by which to analyze real world markets. Equilibrium under perfect competition is efficient. This senior honor thesis therefore is concerned with determining if the brokerage and market maker industries are making zero economic profit. My research compares the actual rate of return on the brokerage firms' stock prices to the CAPM. In addition, this research also analyzes the firms' financial statements and calculates other economic indicators such as return on equity (ROE). The result of this research shows that this industry is approximately earning zero economic profit. However there are also indications of entry and exit of firms in this market due to the differences between profits made by the incumbent and entrant firms.

INTRODUCTION

One of the most surprising phenomena in asset markets over the past decade has been the proliferation of broker dealers and market makers. Institutional trading has increased 50 times from 1980 – 1999. The nature of trading has changed rapidly as measured by the growth in trades of 10,000 to 50,000 shares at a time. There has also been an estimated worldwide commission of 22.5 billion dollars per year. Of this total, 12 billion dollars is generated by institutions in the United States[1]. With the rapid growth of technology, brokerage firms face each other more competitively. Since the emergence of ECNs (Electronic Communications Networks), the ease of Internet trading has lured millions of investors to take a piece of the profitable pie in this industry. By late 2000, according to Internal Data Corp., online brokerage accounts housed more than $1.6 trillion in assets. Analysts also expect online brokerage assets to continue to grow, potentially adding another $1 trillion by 2005. The phenomenon described above is astonishing, and hence it is natural to wonder whether the market will survive.

The recognition that the institutional stock brokerage business is most certainly not an island by itself is another factor that motivates me to further research in this area. Market makers and dealers are powerful forces that connect the flow of the market activities among major business firms in the economy. Investment banking, retail stock brokerage and investment management have expanded internationally and developed important business in all the major markets in the world. It is therefore interesting to analyze the current financial status of this inter-related industry.

[1] Source: Greenwich Associates, Financial Service without Borders p. 186

Background Information on Brokerage Industry

Background and Development

The U.S. securities industry gradually evolved from a mix of financial services available as early as 1800. The securities industry rapidly expanded during the 1920s. Massive growth in municipal and utility issues caused an appetite for securities. However the industry crash in 1929 led to a reform of the industry and the establishment of the Securities and Exchange Commission (SEC). The result of the industry transfiguration was a relatively stable securities market throughout most of the remainder of the century.

During the 1980s, the securities industry experienced volatile rises and falls. However, with the deregulation and interest rate volatility in the 90's new players such as banks and insurance companies entered the securities market. The increased number of entrants reduced securities firms' profit. To decrease competition and increase commission income, a number of firms merged to benefit from economies of scale.

The late 1990s saw the beginning of online trading, a technological trend that revolutionized the industry. In 1999, online brokers shaped this industry by offering more than 5 million active accounts with discounted commissions. However performance among online brokerages varied due to disparity in the quality of service provided.

Organization and Structure

Security brokers and dealers have three major functions in financial markets. First, they provide a mechanism that links people who have money with those seeking to raise money. Second, they deliver a means of valuing and pricing investments. These firms provide extensive research for potential investors. These activities entail obtaining information on the customer's investment strategy, providing information on various investment options, and offering advice on market trends. Third brokerage firms offer investors an option to liquidate their investments. Brokers and dealers serve as liquidity providers, by buying and selling securities for investors as efficiently as possible to avoid losses not related to market conditions. By acting as an intermediary between those with and without capital, the firms channel funds between various sectors of the market.

Types of Firms

Many securities firms serve as both brokers and dealers in the market. A broker is an agent who buys and sells securities on behalf of a client for a commission or fee. A dealer is a principal that buys and sells on its own account with the intention of making a profit. Firms that serve as broker-dealers often have headquarter offices supported by numerous branch offices. The branch offices sell and market the company's services, while the main office handles administrative activities, research, and product development. Firms such as Merrill Lynch and Morgan Stanley fall into this category. Investment banking firms, such as Goldman Sachs and First Boston, provide institutional customers with services related to underwriting new securities issues. They also act as brokers and dealers.

In addition to full service, the brokerage market also includes discount ones. These companies allow retail customers to buy and sell securities for less than they would have to pay to a full service broker. These firms usually charge lower commissions. Well known firms in this category include Charles Schwab.

Industry revenues remained highly concentrated among the top-tier firms. In the early 1990s, the top 25 brokers acquired over 80 percent of all industry revenues. Furthermore, the top 10 brokers amassed nearly 70 percent of all industry revenues.[2]

Current conditions

Advances in technology had a marked impact on the securities industry in the 1990s. Companies relied increasingly on computer automation to reduce costs and meet federal reporting standards. Markets and exchanges are becoming more automated. Computer technology has created a global securities market in which investors and capital seekers around the world can collaborate. It is likely that automated trading techniques will increasingly influence the market in the future as they deliver greater benefits.

[2] Source: Business & Company Resource Center (http://galenet.galegroup.com)

Theoretical Concept and Research Objective

The first fundamental theorem of welfare economics shows that a perfect competitive equilibrium, whether in short run or long run, results in maximum economic efficiency. Since economy efficiency is the ultimate goal for most industries, it is necessary to study whether the industry is in a long run competitive equilibrium. A perfectly competitive industry is in long run equilibrium if there are no incentives for profit maximizing firms to enter or to leave the industry.

Perfectly competitive equilibrium occurs when firms enter and exit the market until each firm operates at zero economic profit. The perfectly competitive model allows the possibility of the entry of entirely new firms into the industry or the exit of existing firms from the industry. Since the model assumes there are no special costs to enter or exit from an industry, new firms will be lured into the market in which economic profits are positive. Similarly, firms will leave any industry in which profits are negative. The process will continue until no firms entering the industry is able to earn a profit. Eventually all firms in the industry earn zero economic profit.

There are two main reasons why this research focuses on the brokerage industry instead of others. First, technology has made it easy for firms to enter and take advantage of low costs and earn profits of this industry. The entry of new firms, if there are positive profits in this market, drives down the price of broker-dealer services. Consequently, the existing firms must exit this industry or modify their cost structure to maintain at least zero economic profit instead of losses. The evidence of exiting and entering of firms over the past five years gives rise to a hypothesis that brokerage industry is making zero economic profit and therefore in a state of competitive equilibrium.

The second reason for focusing on the brokerage industry is that this industry has characteristics that fit the assumptions of perfect competition. There are two main assumptions for perfect competition. First, there are a large number of firms, each producing homogeneous product and has an identical cost structure. The brokerage industry is listed under SIC code 6211, which consists of roughly 200 firms. Second is that the information in this industry is perfect. In brokerage industry, prices are assumed to be known by all market participants.

To determine if the brokerage industry is earning zero economic profit, this research compares the actual rate of return of each company (r_i) with the expected CAPM return ($E(r_i)$). If there is no significant different between ($E(r_i)$) and r_i then there is no evidence of firms earning or losing profit.

To provide a clear explanation of the brokerage industry analysis, this paper is divided into 2 sections. Section 1 describes the methodology of gathering brokerage firm data. Section 2 provides the analysis of data found in section 1. Section 2 also interprets the result of the data analysis and concludes.

Section 1: Methodology

Market makers and broker dealers are mostly listed under SIC code 6211. Even though some companies earn their revenues from providing other types of financial services, most of these companies still earn a majority of their revenues from brokerage commissions. Some examples of this type of firm are Merrill Lynch and Morgan Stanley. Moreover, some of the companies in this industry are gearing more toward making profits in the broker/dealer area.

I did some research on the internet and decide to use Hoovers Online, an online website that provides a business information database, as my major source for SIC 6211 companies' business data. In order to get a better picture of this industry, I analyzed the top 50 companies ranked by the company's revenue (as of 2002). Appendix A lists the names of the companies that I use for analysis and includes its sources.

I collected data from 1997 – 2002. Information from financial statements, annual reports, and company performance are mostly from Yahoo! Finance and Hoovers Online. Some companies within the top 50 of revenues are not taken into consideration because they are private and foreign companies. Moreover, the numbers in the sample fell drastically from 2001 to 2002 as financial data for some firms was not available.

The following table summarizes the variables I need from each company's annual income statement and balance sheet and what they are used to calculate.

Variables	**Financial Ratio**
Stock Price[3]	Rate of Return
Total Shareholder Equity	Return on Equity
Net Income	Return on Equity

[3] Stock prices are adjusted for all applicable splits and dividend distributions. (Yahoo! Finance)

Part 1: Rate of Return Analysis

To start analyzing economic profit, I compared the actual rate of return from each company's stock price with the expected CAPM return. In order to find the rate of return on a firm's stock price, I used data from Yahoo! Finance and Hoovers Online. Under each company ticker symbol, I looked up its historical prices for the past 5 years from 1997- 2002. If data didn't go far back as 1997, I tried to find its most recent historical price from the database. From the historical price, I calculated the rate of return on the stock price. I calculated the rate of return on an annual basis. So my price for each year is based on its price at the date when the company's fiscal year ended. After the completion of the data, I found the rate of return from the following formula[4]:

$$\text{Rate of Return } (r_i) = (\text{Price of Stock } (p_{i,t}) - \text{Price of Stock } (p_{i,\,t-1})) \div \text{Price of Stock } (p_{i,\,t-1})$$

Then I compared the rate of return on stock prices with the expected rate of return. To do that I needed the following information:

1. Beta: From ratio and performance analysis of www.multexinvestor.com. I assumed this beta (as of 2001) was constant for each company across the 5 years.
2. 1 year constant maturity interest rate (source www.moneycafe.com (2003))
3. S&P 500 Price Index: I gathered this information under stock symbol GSPC

With these variables I calculated the expected rate of return from the CAPM formula[5]:

$$E(r_i) = R_f + \text{Beta } (R_m - R_f)$$

[4] Source: Brealey, Myers. Principles of Corporate Finance 4th Edition. P. 270
[5] Source: Brealey, Myers. Principles of Corporate Finance 4th Edition. P. 162

R_m = Rate of Return on S&P 500

R_f = Rate of return on 1 year Treasury Bills

After the CAPM and actual rate of return calculation, I compared and took the difference between the r_i and $E(r_i)$, and called this difference d_i.

Part 2: Return on Equity Analysis

Next I analyzed the return on equity of each firm and similarly with part 1, compared it with the CAPM return. Return on equity (ROE) measures how well the firm manages the stockholder's investment. In finding the return on equity, I used the following formula[6].

ROE = Net Income ÷ Average Shareholder Equity

Information for net income is available from the annual income statements of each company, using data with the same date as the end of each company's fiscal year. Average shareholder equity can be found on annual balance sheets. Both financial statements are from Yahoo Finance (MultexInvestor) or Hoovers Online. In finding average shareholder equity, I took an average of the shareholder equity of the previous year with the year I wanted to find the return. The preceding computation indicates how many dollars of assets are employed for each dollar of stockholder investment on average annually. After the return on equity computation, I compared and took the difference between the CAPM return and called this difference d_r.

Part 3: Aggregate the analysis across all firms

With the data on the companies' actual rate of return and return on equity, I took the average of the difference between the actual rate of return and ROE with the expected CAPM. Before I determine if the average falls within a 95% confidence interval of t-

[6] Source: Libby, Libby, Short Financial Accounting p. 660

distribution, I need to analyze whether the differences are normally distributed. That is because the population of the samples is required to be normally distributed before t-distribution can be used as a reliable reference.[7] The easiest way to check for normality is to use graphical techniques. Therefore, after the computation of d_i and d_r I plotted histograms and box plot diagrams to check whether the sample is from a normal population. The Anderson-Darling Normality Test will also be used to determine the data distribution. If the data are normally distributed, the average of d_i and d_r will be tested under 95% confidence interval of a t-distribution. Moreover, to test whether the mean of the differences is equal to zero, I used test statistic to find each year critical value of the t-distribution (t_c). T_c is obtained by subtracting zero from the sample mean and dividing the difference by the sample standard error of the mean[8]. If the t critical value (t_c) falls within the interval that based on the number of degree of freedom and the 0.05 level of significance, then we can be 95% confidence that the mean is equal to zero.

On the other hand, if the data are not normally distributed, companies will be subdivided into two groups classified by its 2002 revenue. The same procedure will be used on these two subgroups of data. The averages, tested within 95% confidence interval, will determine whether this industry is earning zero economic profit. Similar methodology also applies to the ROE analysis. Results are shown in section 2 of this paper.

Part 4: Further Analysis

The results of part 3 allow me to test if this industry is making a positive economic profit or not. If the industry does show a trend of positive economic profit, then I would conclude that the market for brokerage firms is not perfectly competitive and there is potential for more firms to emerge in this industry. On the other hand, if the results are negative, then there are too many brokerage dealers in the market.

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[7] Source: Mendenhall, Beaver, Beaver Introduction to Probability and Statistics. p 386

[8] 1.Source: Pindyck, Rubinfield Econometric Models and Economic Forecast. p. 40

2.Sample standard error of the mean = $\frac{\sigma_s}{\sqrt{n}}$

Section 2: DATA ANALYSIS

To determine whether the brokerage industry is perfectly competitive, I answer the following questions:

1. Is there a difference between the actual rate of return and the expected rate of return (calculated by the CAPM) across the industry?
2. Does return on equity have the same trend as the rate of return across the industry each year?

Before I answer the two questions above, I need to figure out whether the data I collected are normally distributed. Anderson-Darling Normality Test is used to determine the distribution of the data. The following table summarizes the P-Value of the data from 1998 – 2002.

Year	1998	1999	2000	2001	2002
P-Value	0.508	0.000	0.352	0.000	0.961

Figure 1: Anderson-Darling Normality Test

Data are normally distributed if the P-Value is greater than 0.05.The P-Values of data in 1999 and 2001 are 0. Therefore data in these two years are not significant enough to consider 95% confidence interval of its mean and standard deviation. Their histograms and box plot diagrams below show similar conclusion. In 1999, the normal curve is skewed to the left with outliers. Similarly, differences between CAPM return and actual rate of return is skewed to the left for the year 2001.

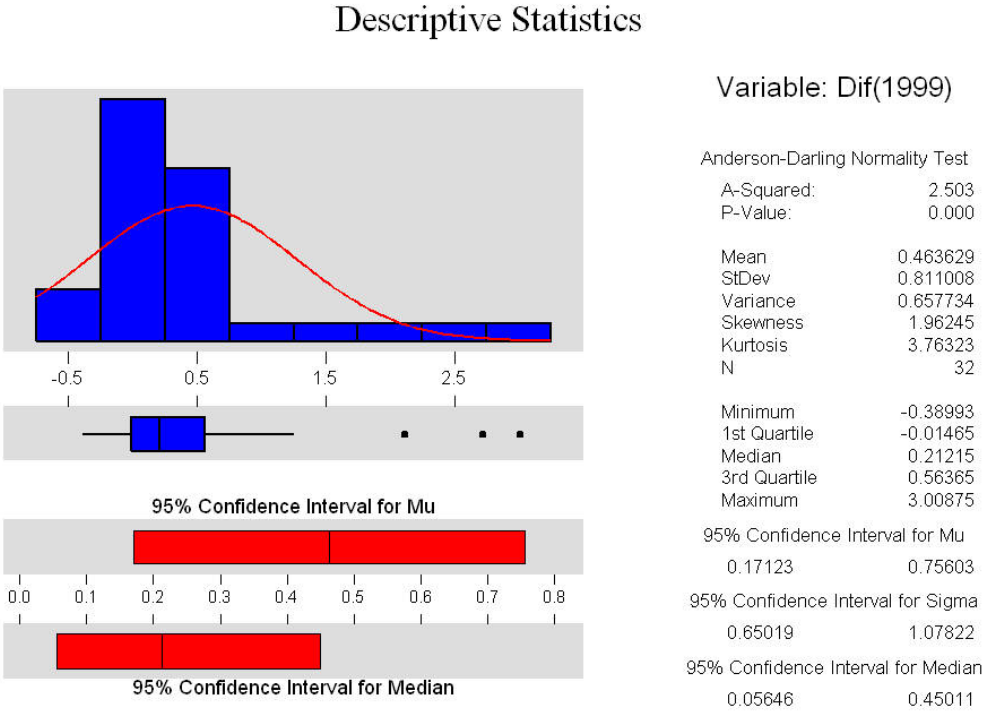


Figure 2: histogram and box plot diagram for d_i in 1999

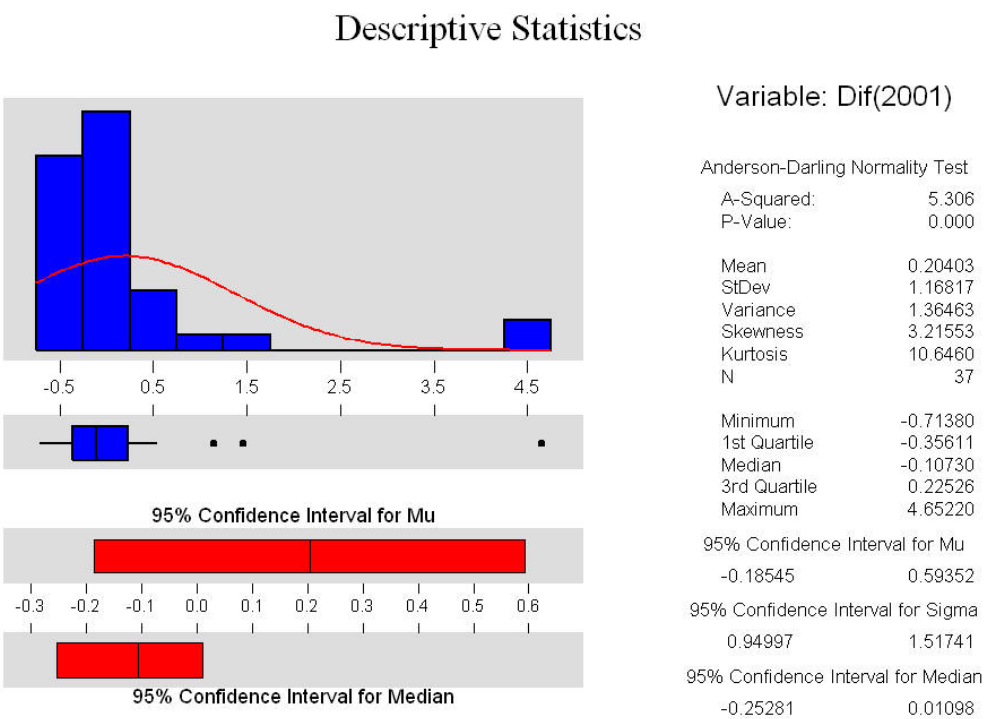


Figure 3: histogram and box plot diagram for d_i in 2001

On the other hand, the results show that d_i for other years are normally distributed across firms. Histograms and box plot diagrams of data in 1998, 2000, 2002 below give the same result as the Anderson-Darling Normality Test. The bell curves on each histogram are normal. Moreover box plot diagrams of each year data have its mean in the center of the diagram without outliers.

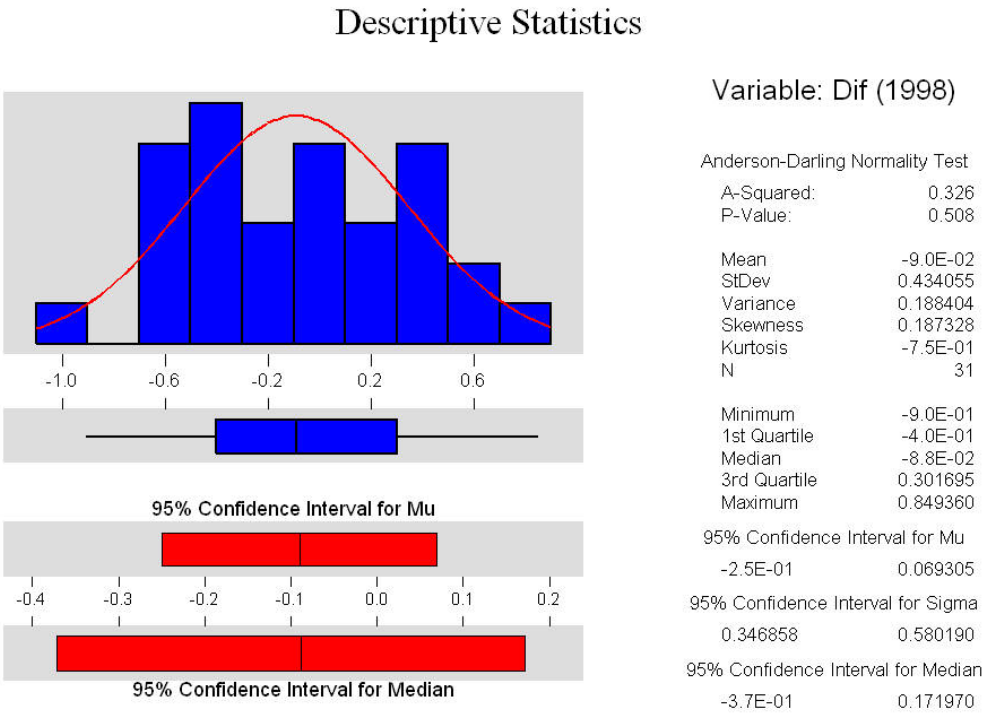


Figure 4: histogram and box plot diagram for d_i in 1998

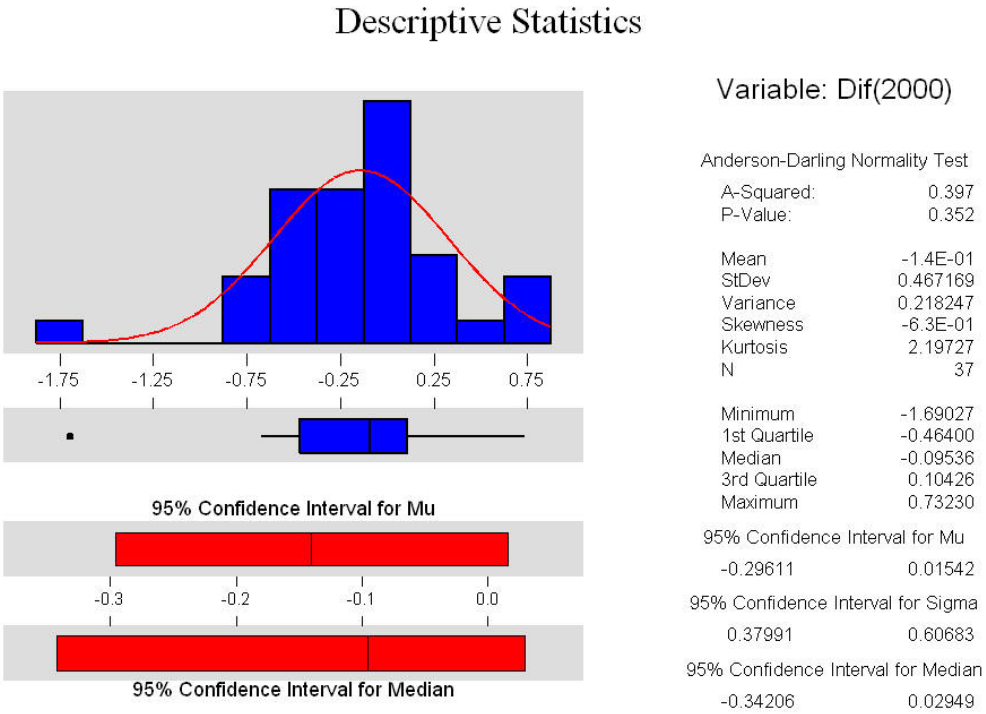


Figure 5: histogram and box plot diagram for d_i in 2000

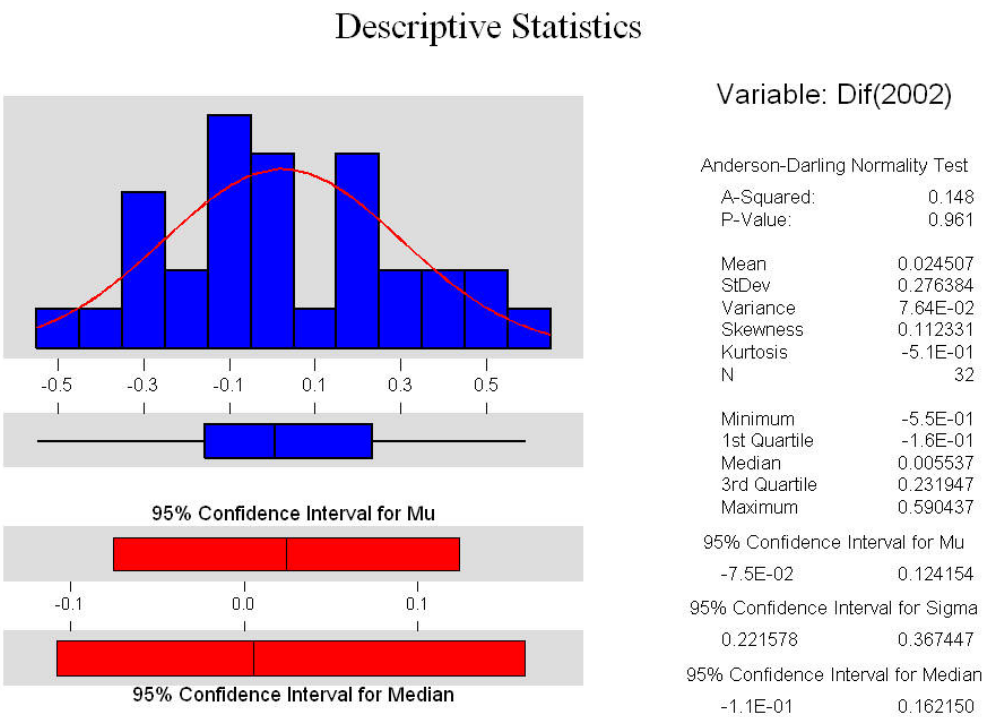


Figure 6: histogram and box plot diagram for d_i in 2002

From figure 2 – 6 above, the average and standard deviation are summarized in the table below.

Year	Mean	StDev	Median	Min	Max	# of samples	t^{9}_{c}
1998	-0.0899	0.4341	-0.0880	-0.9044	0.8494	31	-1.16
1999	0.4636	0.811	0.2121	-0.3899	3.0087	32	3.20
2000	-0.1403	0.4672	-0.0954	-1.6903	0.7323	37	-1.81
2001	0.2040	1.1682	-0.1073	-0.7138	4.6522	37	1.04
2002	0.0245	0.2764	0.0055	-0.5480	0.5904	32	0.502

Figure 7: mean and standard deviation of d_i

Since the data are normally distributed only in 1998, 2000, and 2002, it is more realistic to study closer at the descriptive statistics for these years instead of 1999 and 2001. The mean of the difference between the actual rate of return and the expected CAPM return for these three years does not precisely equal zero. The 95% confidence interval from t-statistic in figure 4 - 6, however, covers d_i of zero (1998: μ= (-0.25, 0.07), 2000: μ= (-0.29, 0.02), 2002: μ= (-0.07, 0.02)). The t critical values also indicate that d_i for all years are 95% confidence eqal to zero except for 1999. Although the mean statistic reflects a possibility of this industry making zero economic profit, the standard deviations of these data, however, are proportionally large. The high volatility can imply that there are big gaps in profits among the firms in the brokerage industry. This could be an indication that some firms in this industry might be performing poorly. On the other hand, there exist firms that are making positive economic profit as well. For example, in the year 2001, where the standard deviation is the largest, the Maxcor Financial Group Inc. (total net sales (2002) 170.6 million) has an actual rate of return greater than the expected CAPM expected return by 4.652. By contrast, Detwiler Mitchell & Co (net sales (2002) 9.80 million) had its actual rate of return -0.714 below the expected CAPM return. This sample can possibly be an indication that the large standard deviation in the sample is due to the size of the firms in this industry.

[9] t value for n greater or equal to 30 at 95% level of significance is 1.96

To find out whether overall this industry is making positive or negative profit, I analyzed the return on equity (ROE) of each firm. ROE measures how much the firm earned relative to the stockholders' investment. Firms with higher ROE are expected to have higher stock prices in the long run. Therefore firms that have an effective business strategy and earn positive net incomes should have positive ROE and a higher return on stock prices. The difference between the ROE and CAPM return (d_r) is another indicator of whether this industry is making positive or negative profit. Figure 8 summarizes the 95% confidence interval from the t-distribution of the differences from 1998- 2002.

Year	**Min**	**max**	**# of samples**	**t-value**
1998	-0.385	-0.132	29	-4.24
1999	-0.078	0.1015	35	0.25
2000	0.1489	0.297	37	6.08
2001	.0.032	0.2101	39	1.35
2002	-0.0706	0.3426	30	1.29

Figure 8: 95% confidence interval of d_r

(statistical details in Appendix B)

From figure 8, we can see that in 1998, ROE was lower than expected CAPM return. T critical value also confirms that in 1998, the difference is significantly different from zero. In 1999, however, the 95% confidence interval covers zero. In addition, t_c for 1999 falls within the 95% confidence interval of t distribution with degree of freedom equal 34 (-1.96, 1.96). From 2000 – 2001, ROE were higher than the CAPM return. Although the critical value for 2001 is in the 95% confidence interval, t_c for 2000 indicates that its d_r is different from zero. Since ROE is also an indication of net profit margin, the ROE numbers in the table above show that most of the firms during these two years made quite a moderate profit. In 2002, ROE decreased and the interval covers negative numbers of ROE as well. One possible interpretation for the decrease of ROE is the higher level of ROE during previous years. Such high levels of ROE tend to be driven down over time by additional competition from new and existing competitors. Another possibility for the cause of this result could be from heavy investment of existing firms in

research and development, for example in technology. The evidence for such investment can be seen from the popularity of online business. By late 1999 and early 2000, major firms such as Merrill Lynch, BNP Cooper Neff revolutionized new ways of trading securities by starting to invest in Electronic Communications Networks (ECN).[10]

In summary, the analysis so far has shown that the brokerage industry could be making zero economic profit. The analysis on ROE suggests that many brokerage firms earned positive net income during the boom of the economy in late 1999 – 2000. The positive number of ROE in 2000-2001 indicates that this market responded quickly to profit opportunities. The volatility in some years and the large value of the standard deviation, however, leaves an ambiguous conclusion as to whether this industry is perfectly competitive.

To determine if this finding is robust, one could break the sample data into large and small firms according to net sales in 2002. Small firms will be considered as entrant firms. On the other hand, those with higher revenue are considered as incumbent firms. Incumbent firms in this sample are firms with net sales between 81,000 and 7,822 million in 2002. Small firms are those with revenues ranging from 737 – 108 million in the same year. By dividing the sample data into smaller subgroups, the next analysis should result in a smaller standard deviation and a more significant result for differences in actual rate of return and the CAPM return.

Year	Large firms			Small firms		
	n	t_c	$t_{0.05}$	n	t_c.	$t_{0.05}$
1998	14	-1.31	2.16	16	-0.35	1.87
1999	14	2.52	2.16	17	-2.40	2.12
2000	16	1.87	2.13	20	-3.56	2.09
2001	16	1.45	2.13	20	0.89	2.09
2002	18	-0.05	2.11	13	0.25	2.18

Figure 9: t_c of large and small firms

Figure 9 shows the t crtical value for both small and large firms in the brokerage industry. From the table, we can see that the actual rate of return is significantly different from the CAPM return for large firms. T_c values from 1998 – 2002 all fall within $t_{0.05}$

[10] Source: www.archipelago.com

confidence interval. For the small firms, however, tc for 1999 and 2000 are not in the 95% confidence interval of t-distribution. These findings indicate that the actual rate of return in those two years is lower than the CAPM return.

To compare the differences of profit made my small and large firms, I analyze the data further by compare the 95% confidence interval of d_i. The Anderson-Darling Normality Test shows that all the sample data are normally distributed for large firms. Unfortunately the P-Value of A-D normality testing is less than 0.05 for data of small firms in 1999 and 2000. To get an accurate comparison between d_i of the small and large firms, the next analysis will take into account only the years with normally distributed data (details of descriptive statistic in Appendix C).

Year	95% confidence interval of d_i	
	Large firms	Small firms
1998	-0.34 to 0.09	-0.3 to0.21
2001	-0.017 to 0.32	-0.51 to 0.63
2002	0.20 to 0.40	-0.15 to 0.19

Figure 10: Differences in CAPM return and actual return (d_i) of small and large firms

In 1998, 95% confidence interval of d_i for both large firms and small firms covers zero. The result indicates that the brokerage industry that year on average was earning zero economic profit. In 2001, d_i for large and small firs still showed signs of earning zero economic profit. However, in the year 2002, most large firms were earning positive economic profits, while some of the smaller firms were doing poorly.

The results above can be interpreted as follows. In 1998, the industry as a whole can be considered as perfectly competitive. Since both large and small firms on average earn zero economic profit, it can be assumed that this market is in competitive equilibrium. Couple of years later, Advances in technology changed the way most brokerage firms do their business. ECNs and internet service caused a decline in operating expenses for the brokerage industry. The appearance of many online brokers and dealers during the turn of the century could be the reason why small firms earned

positive net income. At the same time these entrants attracted customers away from the existing firms. That is why in 2001, d_i of larger firms from figure 10 still covered a negative range.

But for the incumbent to continue operating and to compete with the entrants, large firms started to change their business strategy. Major investment firms such as Merrill Lynch and JP Morgan also started their securities trading business using the new technology. Many firms turned to ECNs and other superior technology that offered cheaper ways of trading securities. By 2002, major firms won back the brokerage market, making positive profit, while smaller firms were now suffering loss in net income. Since customers still rely on reliable investment services with high reputation for trading, they all turned back to the incumbent instead of risking their investment with startup firms. Most entrants therefore could not gain as much profit as in the previous years and eventually exited the market. Archipelago is an example of a firm with historical entering and exiting movement in brokerage industry within the last 6 years. In 1997, Archipelago was launched as one of the four original ECNs approved by SEC. However, by 2001 Archipelago and REDIBook, two leading ECN companies announced their intention to merge[11]. By late 2002, both firms completed the intergration. The evidence of merges among many online broker dealers in the late 2001 and early 2002 is an indication of firm exiting the industry in order to adjust for zero economic profit.

Overall, the brokerage industry is a perfectly competitive one. This research has shown that the industry is earning zero economic profit. Evidence of firms entering and exiting this industry proves that the brokerage industry is adjusting for long run competitive equilibrium.

[11] Source: www.archipelago.com

Shortcomings of the Analysis

In order to find the true economic profit analysis of each firm, one must also take into consideration the cost of capital. For future analysis, I would suggest a closer look at each company's financial statement, dissecting the revenues from brokerage commission and the cost of capital associated with the revenue. After that we can analyze further whether there are other variables that allow some firms to have positive economic profit and those that do not despite the external variables such as the economic condition, business cycles and other relevant factors.

Appendix A: Sources for companies' data (as of 2002)

Companies	Sales ($mil)	Historical stock price source	Financial data source
Morgan Stanley	81000	Hoovers Online	MultexInvestor (Yahoo! Finance)
Merrill Lynch &Co., Inc	32415	Hoovers Online	MultexInvestor (Yahoo! Finance)
Prudential Financial	28253	Hoovers Online	MultexInvestor (Yahoo! Finance)
The Goldman Sachs Group Inc.	22854	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Salomon Smith Barney Holdings Inc. (Citigroup)	21250	Hoovers Online	Hoovers Online
Lehman Brothers Holdings Inc.	16781	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Credit Suisse First Boston Corporation	13662.23	Hoovers Online	Hoovers Online
UBS Warburg	12760.3	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Nomura Holdings, Inc.	9961.7	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
AXA Financial Inc.	7822.70	Hoovers Online	Hoovers Online
The Bear Stearns Companies Inc.	6890.8	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Daiwa Securities Group Inc.	5684.57	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
American Express Financial Advisors	4791	Yahoo! Finance	Hoovers Online

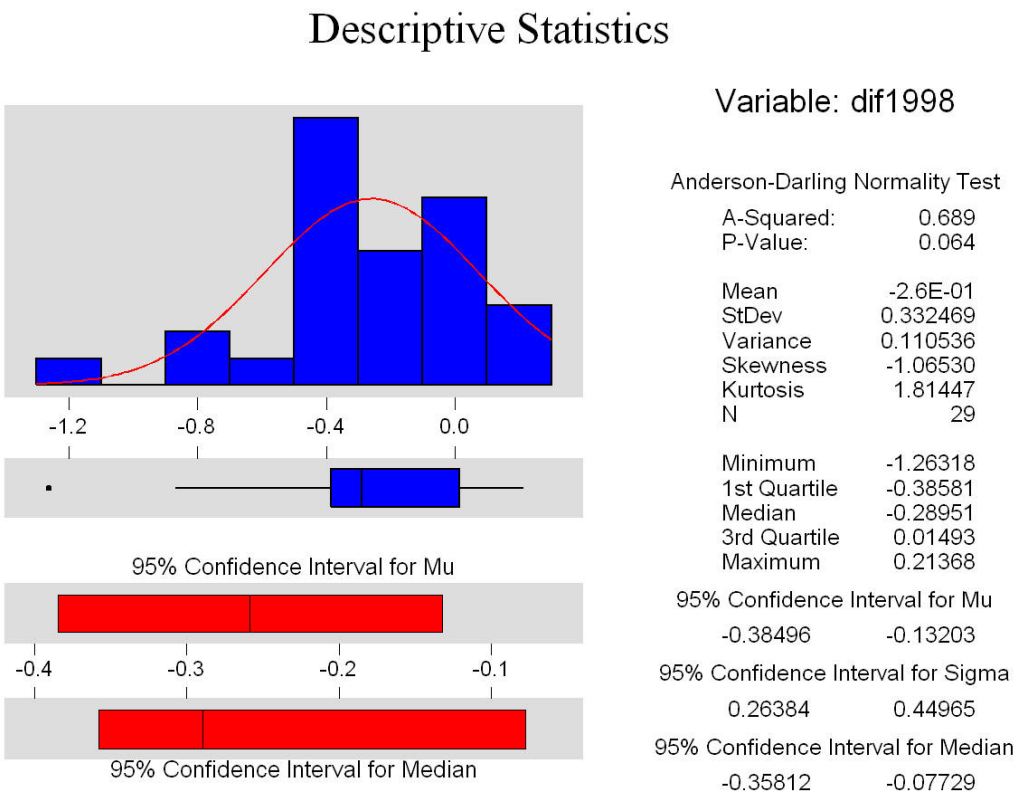
The Charles Schwab Corporation	4135	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
A.G. Edwards, Inc.	2363.80	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
E*Trade Group Inc.	21292	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Legg Mason Inc.	1578.60	Hoovers Online	MultexInvestor (Yahoo! Finance)
Raymond James Financial Inc.	1515.9	Hoovers Online	MultexInvestor (Yahoo! Finance)
Investors Group Inc.	1121.35	Yahoo! Finance	Hoovers Online
TD Waterhouse Group, Inc.	1116.60	Hoovers Online	Hoovers Online
Instinet Group Incorporated	1059.20	Hoovers Online	Hoovers Online
U.S. Bancorb Piper Jaffray Inc.	737.3	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Jefferies Group, Inc.	674.7	Hoovers Online	MultexInvestor (Yahoo! Finance)
SEI Investment Co.	620.8	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Knight Trading Group	527.4	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Morgan Keegan, Inc.	494.00	Hoovers Online	Hoovers Online
LaBranche & Co. Inc.	452.80	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Ameritrade Holding Corporation	443.10	Yahoo!Finance	MultexInvestor (Yahoo! Finance)
Waddell & Reed	434.90	Yahoo! Finance	MultexInvestor

Financial, Inc.			(Yahoo! Finance)
Investment Technology Group, Inc.	387.60	Hoovers Online	MultexInvestor (Yahoo! Finance)
The Advest Group, Inc.	343.50	Hoovers Online	Hoovers Online
SWS Group, Inc.	332.20	Hoovers Online	MultexInvestor (Yahoo! Finance)
Fahnestock Viner Holdings Inc.	283.30	Hoovers Online	Hoovers Online
Friedman, Billings, Ramsey Group, Inc.	268.20	Hoovers Online	Hoovers Online
Gabelli Asset Management Inc.	210.0	Hoovers Online	Hoovers Online
Stifel Financial Corp.	194.10	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Maxcor Financial Group Inc.	170.60	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
First Albany Companies Inc.	170.60	Hoovers Online	Hoovers Online
W.P. Stewart & Co. Ltd.	137.30	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
MFC Bancorp Ltd.	134.50	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
SoundView Technology Group, Inc.	108.60	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
Detwiler, Mitchell &Co.	9.80	Yahoo! Finance	MultexInvestor (Yahoo! Finance)
America First	0.90	Yahoo! Finance	MultexInvestor

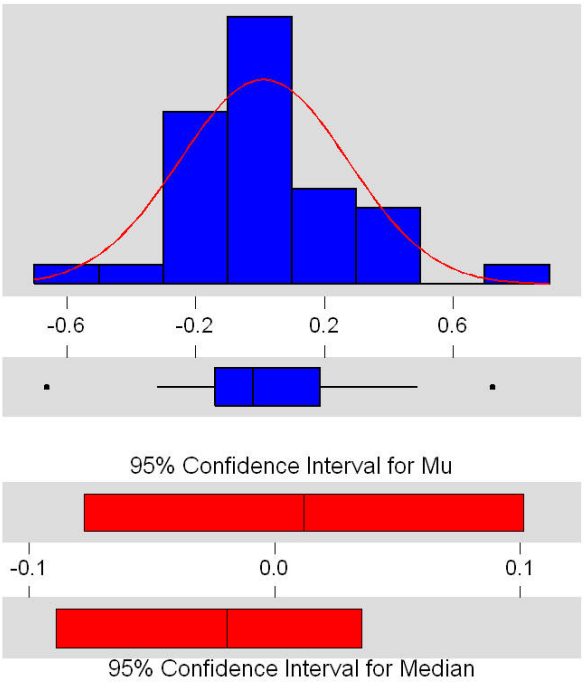
Associates Corp.			(Yahoo! Finance)

These companies are the common market makers and dealers found on NASDAQ as well. For more information please visit the following link: http://www.nasdaqtrader.com/asp/sellside.asp.

Appendix B: Graphical Summary of differences between ROE from CAPM Return (d_r) from 1998 – 2002



Descriptive Statistics



Variable: 1999

Anderson-Darling Normality Test

A-Squared:	0.664
P-Value:	0.076
Mean	0.011888
StDev	0.260910
Variance	6.81E-02
Skewness	0.413668
Kurtosis	1.39067
N	35
Minimum	-6.6E-01
1st Quartile	-1.4E-01
Median	-2.0E-02
3rd Quartile	0.187456
Maximum	0.724756

95% Confidence Interval for Mu

-7.8E-02	0.101514

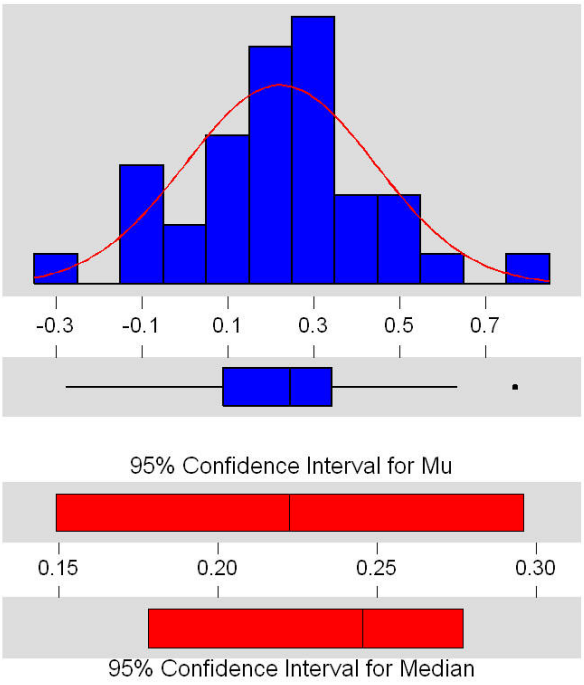
95% Confidence Interval for Sigma

0.211043	0.341845

95% Confidence Interval for Median

-8.9E-02	0.035639

Descriptive Statistics



Variable: 2000

Anderson-Darling Normality Test

A-Squared:	0.294
P-Value:	0.581
Mean	0.222501
StDev	0.220569
Variance	4.87E-02
Skewness	2.09E-02
Kurtosis	0.325198
N	37
Minimum	-2.8E-01
1st Quartile	0.090273
Median	0.245479
3rd Quartile	0.342547
Maximum	0.770167

95% Confidence Interval for Mu

0.148959	0.296042

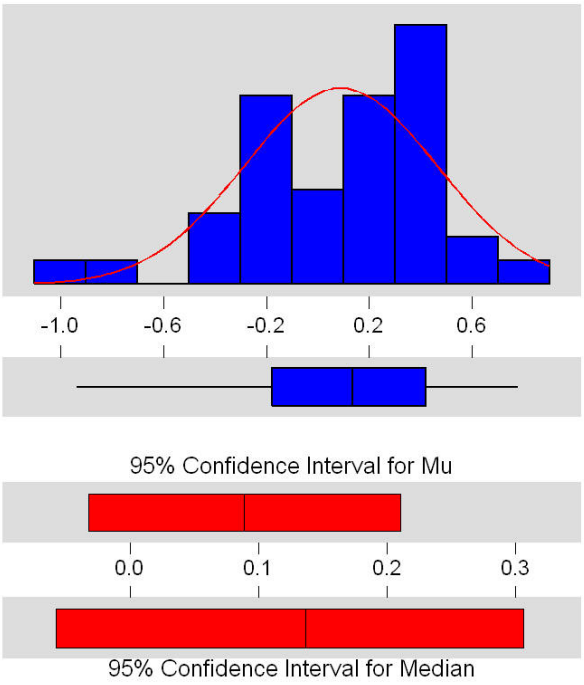
95% Confidence Interval for Sigma

0.179369	0.286511

95% Confidence Interval for Median

0.178084	0.276848

Descriptive Statistics



Variable: 2001

Anderson-Darling Normality Test

A-Squared:	0.485
P-Value:	0.215
Mean	0.088862
StDev	0.374182
Variance	0.140012
Skewness	-6.9E-01
Kurtosis	0.389888
N	39
Minimum	-9.4E-01
1st Quartile	-1.8E-01
Median	0.136627
3rd Quartile	0.420017
Maximum	0.778782

95% Confidence Interval for Mu

-3.2E-02 0.210158

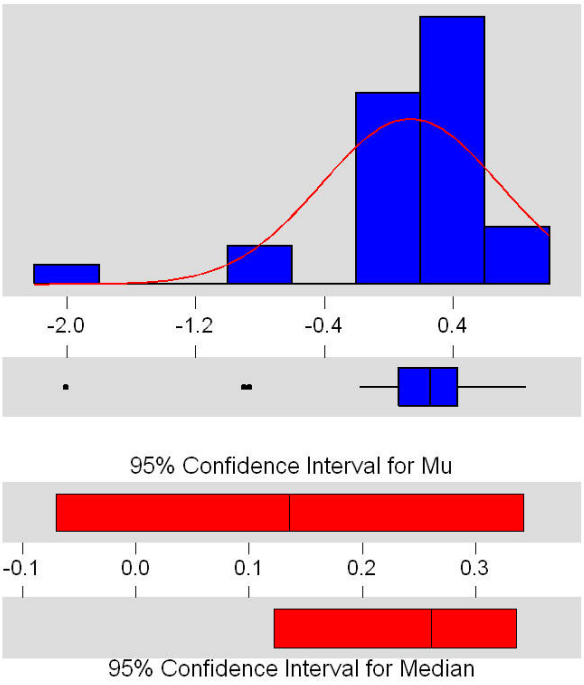
95% Confidence Interval for Sigma

0.305798 0.482237

95% Confidence Interval for Median

-5.8E-02 0.306332

Descriptive Statistics



Variable: 2002

Anderson-Darling Normality Test

A-Squared:	2.352
P-Value:	0.000
Mean	0.135973
StDev	0.553302
Variance	0.306144
Skewness	-2.40451
Kurtosis	7.46297
N	30
Minimum	-2.00797
1st Quartile	0.06487
Median	0.26074
3rd Quartile	0.43155
Maximum	0.85881

95% Confidence Interval for Mu

-0.07063 0.34258

95% Confidence Interval for Sigma

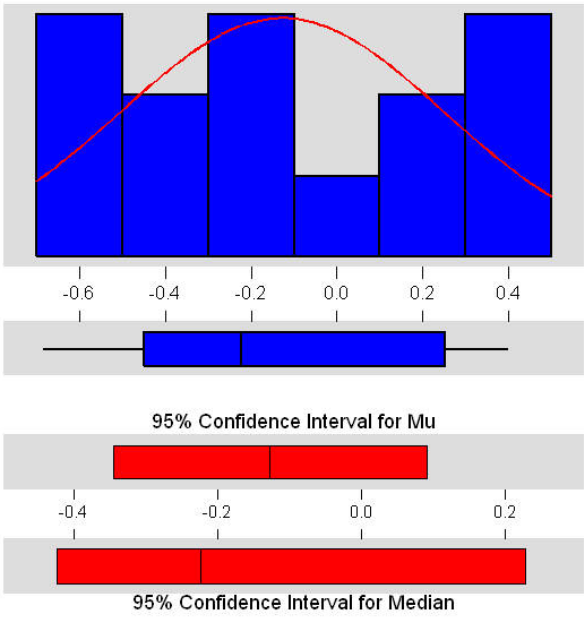
0.44065 0.74381

95% Confidence Interval for Median

0.12203 0.33625

Appendix C: Graphical Summary of d_i for large firms (1998 – 2002)

Descriptive Statistics



Variable: 1998

Anderson-Darling Normality Test

A-Squared:	0.435
P-Value:	0.256
Mean	-1.3E-01
StDev	0.376816
Variance	0.141990
Skewness	0.111943
Kurtosis	-1.48607
N	14
Minimum	-6.8E-01
1st Quartile	-4.5E-01
Median	-2.2E-01
3rd Quartile	0.252456
Maximum	0.399637

95% Confidence Interval for Mu

-3.4E-01	0.090498

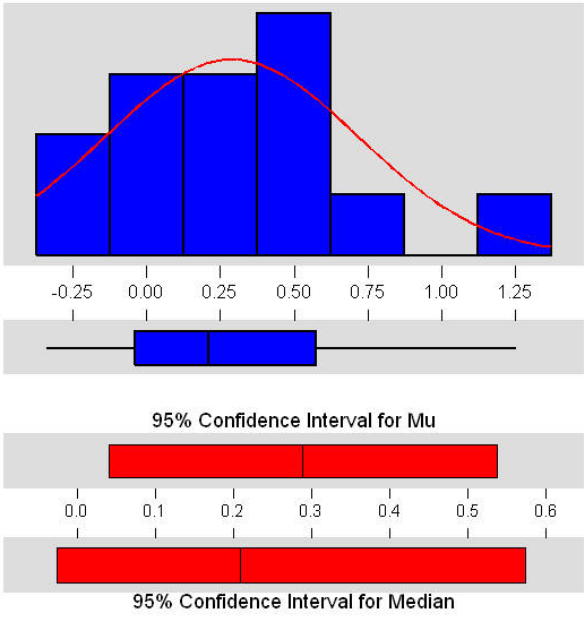
95% Confidence Interval for Sigma

0.273174	0.607066

95% Confidence Interval for Median

-4.2E-01	0.228074

Descriptive Statistics



Variable: 1999

Anderson-Darling Normality Test

A-Squared:	0.251
P-Value:	0.687
Mean	0.289160
StDev	0.430144
Variance	0.185024
Skewness	0.615987
Kurtosis	0.454970
N	14
Minimum	-0.33872
1st Quartile	-0.04110
Median	0.20913
3rd Quartile	0.57602
Maximum	1.25593

95% Confidence Interval for Mu

0.04080	0.53752

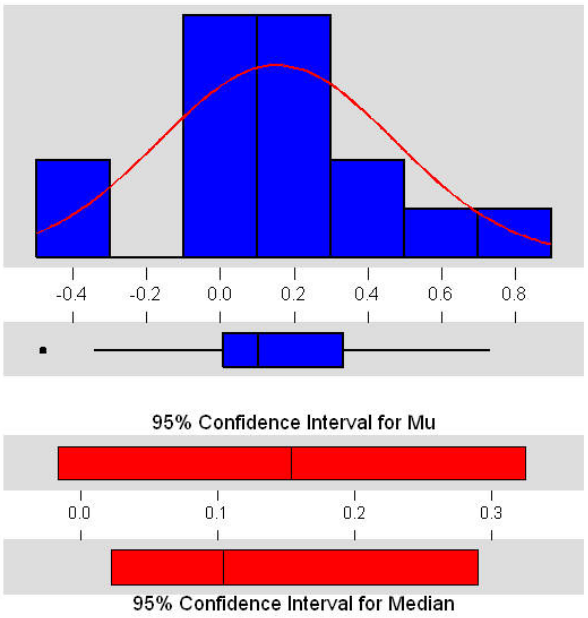
95% Confidence Interval for Sigma

0.31183	0.69298

95% Confidence Interval for Median

-0.02474	0.57415

Descriptive Statistics



Variable: 2000

Anderson-Darling Normality Test

A-Squared:	0.313
P-Value:	0.514
Mean	0.154059
StDev	0.320302
Variance	0.102594
Skewness	-3.9E-02
Kurtosis	0.332284
N	16
Minimum	-4.8E-01
1st Quartile	0.008582
Median	0.104263
3rd Quartile	0.332953
Maximum	0.732305

95% Confidence Interval for Mu

-1.7E-02	0.324737

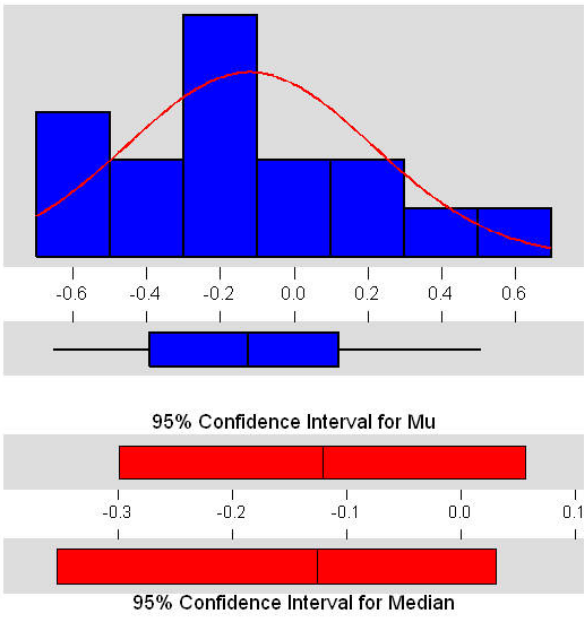
95% Confidence Interval for Sigma

0.236609	0.495729

95% Confidence Interval for Median

0.022472	0.289750

Descriptive Statistics



Variable: 2001

Anderson-Darling Normality Test

A-Squared:	0.247
P-Value:	0.711
Mean	-1.2E-01
StDev	0.333214
Variance	0.111032
Skewness	0.213375
Kurtosis	-4.2E-01
N	16
Minimum	-6.5E-01
1st Quartile	-3.9E-01
Median	-1.3E-01
3rd Quartile	0.121170
Maximum	0.508895

95% Confidence Interval for Mu

-3.0E-01	0.056980

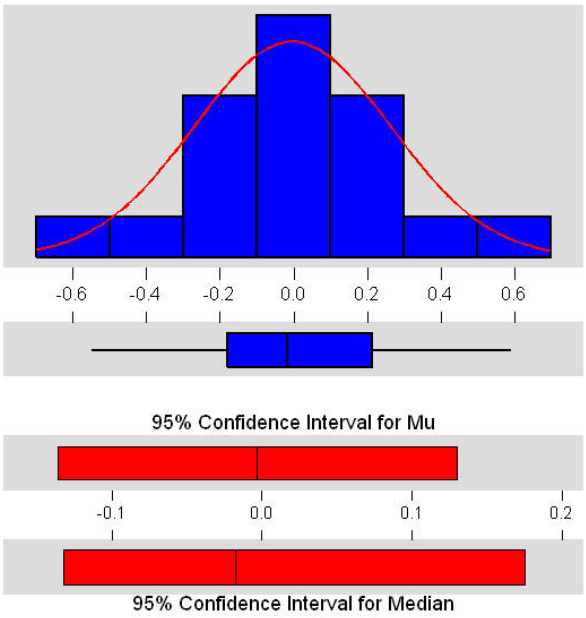
95% Confidence Interval for Sigma

0.246147	0.515713

95% Confidence Interval for Median

-3.5E-01	0.031039

Descriptive Statistics



Variable: 2002

Anderson-Darling Normality Test

A-Squared:	0.173
P-Value:	0.914

Mean	-3.2E-03
StDev	0.267495
Variance	7.16E-02
Skewness	0.169912
Kurtosis	0.494024
N	18

Minimum	-5.5E-01
1st Quartile	-1.8E-01
Median	-1.8E-02
3rd Quartile	0.212347
Maximum	0.590437

95% Confidence Interval for Mu

-1.4E-01	0.129786

95% Confidence Interval for Sigma

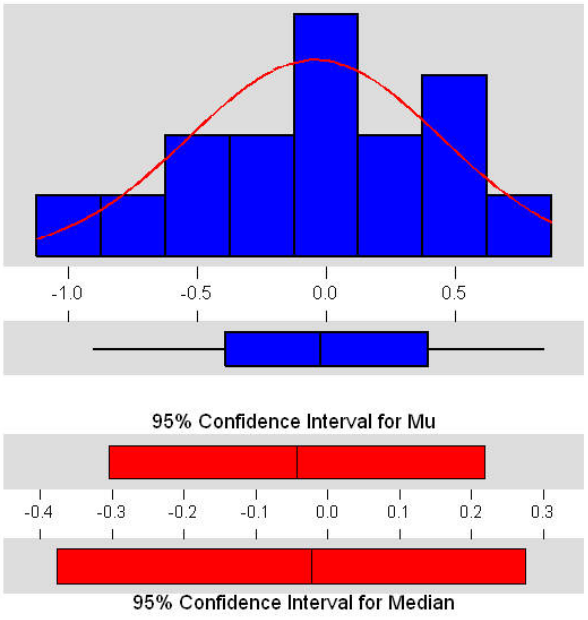
0.200725	0.401014

95% Confidence Interval for Median

-1.3E-01	0.175562

Appendix D: Graphical summary of d_i for small firms (1998 – 2002)

Descriptive Statistics



Variable: 1998

Anderson-Darling Normality Test

A-Squared:	0.165
P-Value:	0.927
Mean	-4.3E-02
StDev	0.489847
Variance	0.239950
Skewness	3.99E-02
Kurtosis	-6.5E-01
N	16
Minimum	-9.0E-01
1st Quartile	-3.9E-01
Median	-2.3E-02
3rd Quartile	0.393358
Maximum	0.849360

95% Confidence Interval for Mu

-3.0E-01	0.218022

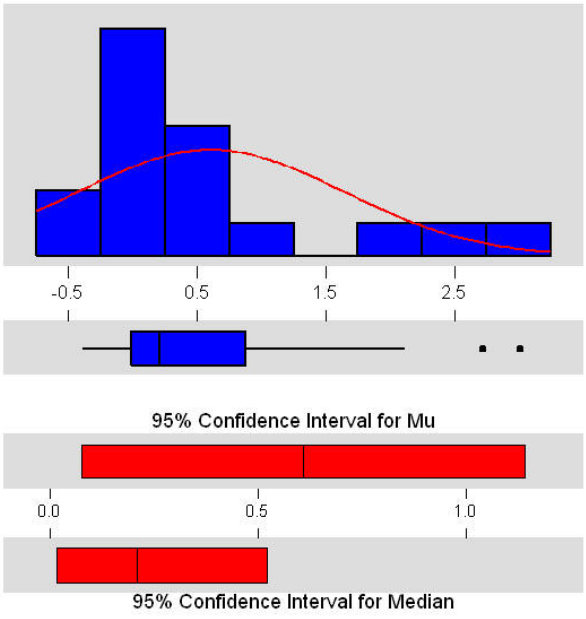
95% Confidence Interval for Sigma

0.361852	0.758132

95% Confidence Interval for Median

-3.8E-01	0.276044

Descriptive Statistics



Variable: 1999

Anderson-Darling Normality Test

A-Squared:	1.647
P-Value:	0.000
Mean	0.60929
StDev	1.03645
Variance	1.07423
Skewness	1.50466
Kurtosis	1.15247
N	17
Minimum	-0.38993
1st Quartile	-0.00841
Median	0.21096
3rd Quartile	0.87800
Maximum	3.00875

95% Confidence Interval for Mu

0.07639	1.14218

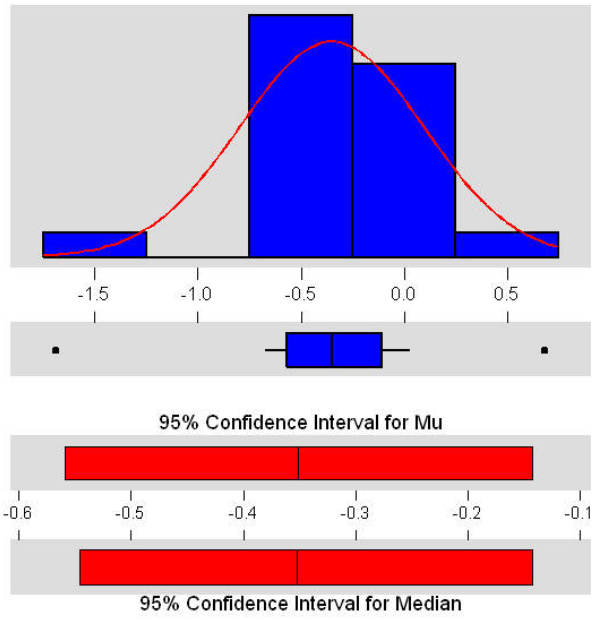
95% Confidence Interval for Sigma

0.77192	1.57741

95% Confidence Interval for Median

0.01800	0.52198

Descriptive Statistics



Variable: 2000

Anderson-Darling Normality Test

A-Squared:	0.827
P-Value:	0.027
Mean	-3.5E-01
StDev	0.446102
Variance	0.199007
Skewness	-8.2E-01
Kurtosis	4.56676
N	20
Minimum	-1.69027
1st Quartile	-0.57015
Median	-0.35166
3rd Quartile	-0.10517
Maximum	0.68436

95% Confidence Interval for Mu

-0.55948	-0.14192

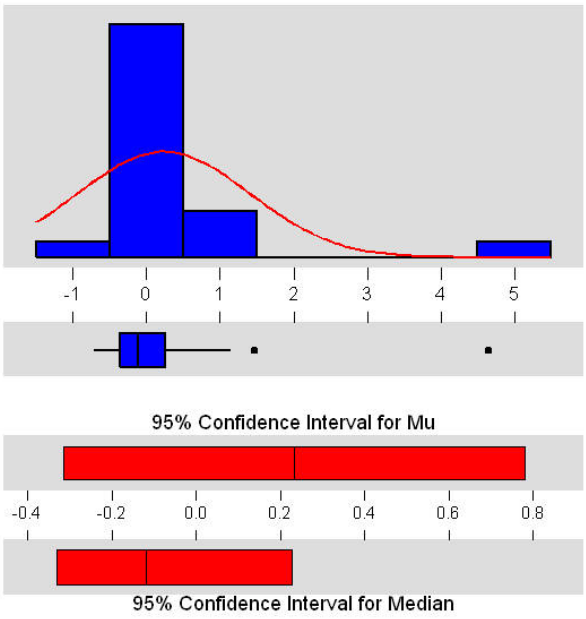
95% Confidence Interval for Sigma

0.33926	0.65156

95% Confidence Interval for Median

-0.54571	-0.14203

Descriptive Statistics



Variable: 2001

Anderson-Darling Normality Test

A-Squared:	2.510
P-Value:	0.000
Mean	0.23376
StDev	1.17123
Variance	1.37178
Skewness	3.13910
Kurtosis	11.2816
N	20
Minimum	-0.71380
1st Quartile	-0.36638
Median	-0.11949
3rd Quartile	0.25209
Maximum	4.65220

95% Confidence Interval for Mu

-0.31439	0.78191

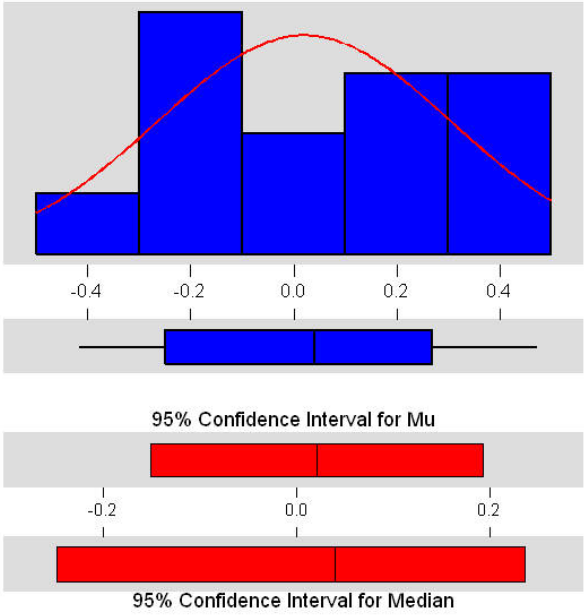
95% Confidence Interval for Sigma

0.89071	1.71066

95% Confidence Interval for Median

-0.32928	0.22859

Descriptive Statistics



Variable: 2002

Anderson-Darling Normality Test

A-Squared:	0.242
P-Value:	0.715

Mean	0.021019
StDev	0.285545
Variance	8.15E-02
Skewness	0.113373
Kurtosis	-1.19861
N	13

Minimum	-4.2E-01
1st Quartile	-2.5E-01
Median	0.039616
3rd Quartile	0.270022
Maximum	0.473510

95% Confidence Interval for Mu

-1.5E-01	0.193572

95% Confidence Interval for Sigma

0.204760	0.471359

95% Confidence Interval for Median

-2.5E-01	0.237157

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