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The Effectiveness and Efficiency
of Female Chief Executive Officers

by
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Honors College Thesis
Director: Dr. Michael Fountain
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Abstract

Female Chief Executive Officers lead 2.4% of the top 1000 companies in the United States (Fortune). Why does such a large gender gap exist? There are many possible reasons. However, since a public company's goal is to increase its value and maximize its profits, the only acceptable excuse for the continued gender gap is if women CEOs are not as efficient and effective as male CEOs.

Financial ratios provide a comparison measurement of efficiency and effectiveness when compared to industry standard ratios commonly computed. This study uses current and quick ratios, inventory turnover ratios, debt to equity ratio, return on assets, asset turnover, net profit margin ratios and price per earning ratios. Data was collected from the financial statements of 118 female-led public companies and ratios were computed and compared to industry averages obtained through Risk Management Association as well as Dunn and Bradstreet and Thompson/Reuter. To account for economic trends, three years of data were collected.

The results of this study indicate that female CEOs' companies vary from the industry median. The largest variance occurred in liquidity and leverage related ratios. Some correlation between these variances and a negative net profit margin variance was identified.

Introduction

According to Fortune Magazine, female Chief Executive Officers (CEOs) lead 24 of the top 1000 companies in the United States. This means 2.4% of the top companies are run by women; the rest are run by men. Why does such a large gender gap exist? There are many possible reasons for the gender gap such as the existence of an “old boy’s network”, a lack of a strong business mentors for women, educational differences and family commitment differences. However, the primary goal of a public company is to increase its value and maximize its profits. Therefore, the only acceptable excuse for the large gender gap is that women CEOs are unable to increase the value of the company and maximize profits. This study is an analysis of the female CEOs’ effectiveness in managing a company. Using financial ratios and industrial average benchmarks, the study compares the ratios of companies run by women CEOs to the corresponding industry averages. If female CEOs are meeting or exceeding their respective industry averages for effective and profitable management, then the gender gap should be reduced.

Literature Review

There is little literature on female leadership in corporations pertaining to management effectiveness and profitability. Most studies available are from Denmark and Finland. Some of the literature focuses on female executives and some discusses females participating on companies’ boards. There is also little consensus regarding the effect that females have when holding a management or board position.

In 2007, a study conducted in Finland showed that female CEOs ran a more profitable business than male CEOs. The Finnish study researched the equivalent of public businesses in Finland. Similar to companies in the United States, a large gender gap exists for the CEO. In 2003, 7.6% of companies in Finland were run by women (Kotiranta). Despite the small percentage of female CEOs, the study produced significant results regarding the difference in profits. The results of the study indicated that “a

female CEO is on average slightly more than a percentage point – in practice about ten percent – more profitable than a corresponding company led by a male CEO” (Kotiranta). In the Finnish study, the largest concentration of female CEOs was in the education, health, and social work fields, followed by a large number in wholesale and retail trade. It is this study that formed the model for this report.

In 2006, a Danish study assessed the effect of female management or a combination of female management and board diversification. When looking only at those companies with female CEOs, the study indicates “we find that there is a positive performance effect of female CEOs for Danish firms” (Smith). The researchers accounted for firm size and education in an effort to reduce skewing the data. However, when observing board diversity or female management below the level of CEO, the authors were unable to prove an impact to profit.

In 2007, a different Danish study was unable to prove a connection between board diversity and increased profitability. The study used several measurements pertaining to payments, growth and ownership but concluded none of these measures were proven to “indicate statistically significant differences in profits for those companies with gender diverse boards” (Rose).

Methods/Procedures

Fortune Magazine’s Top 1000 Companies in the United States from years 2005, 2006 and 2007 produced too few female CEOs for a viable study of female-led companies. Therefore, the research for this current study was conducted on the female CEOs of all publicly traded companies with ten or more employees. There are over 6,000 publicly traded companies in the United States. The names of the companies led by women were obtained through the ReferenceUSA database. The study identifies 118 female leaders, meaning 1.97% of all publicly traded companies have female CEOs. This study identifies the types of industries represented as well as the CEO’s length of service within her company.

The 118 companies offer a wide range of products and services. Food and beverage, retail and cosmetics are a few of the traditionally female-associated businesses that are run by women CEOs. However, the list also includes utilities, oil, telecommunications, outdoor equipment, and entertainment businesses that are usually associated with males, but are currently run by female CEOs. The two largest industry sectors run by female CEOs in this study are financial (banking) and pharmaceutical/chemistry-related businesses. There are 17 pharmacy or chemistry-related corporations and 18 financial corporations in this study.

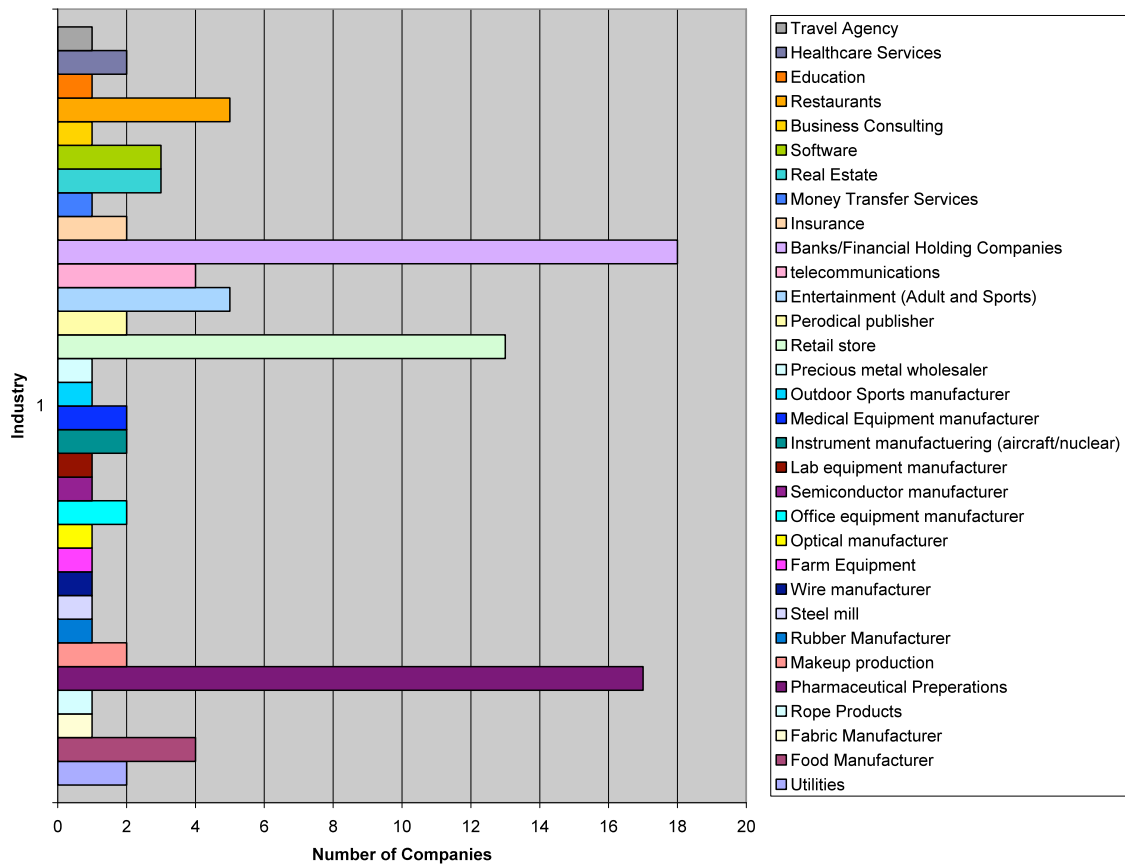


Figure 1: Breakdown of U.S. Companies with Female CEOs by Industry

The experience levels of the women in this study range from zero to 29 years. More than half of the women held their CEO positions for five or more years within their respective companies. It was not within the scope of this study to identify if any of these women CEOs had held an executive position prior to their position in the companies currently studied.

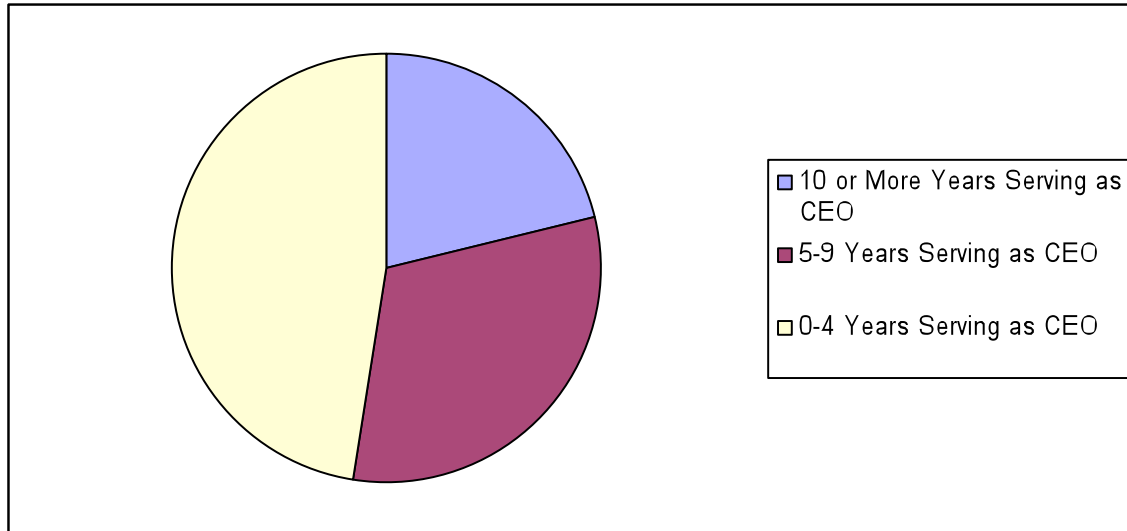


Figure 2: Length of Time in CEO Position

The firms within this study range from firms with small assets and profits to large conglomerations with many assets and large profits. To account for the varied sizes of the firms in the study, this research utilizes financial ratios commonly computed by various professional firms as a means of comparing different sized companies of the same industry. For example, the current ratio (a company's current assets divided by a company's current liabilities), facilitates the comparison of companies within the same industry but with different sized assets or liabilities. This study has established that less than 2% of the companies are managed by females, therefore, it can be assumed that 98% of the industry ratios are calculated using male-led companies financial data.

To show the financial strength of the companies led by women the study uses the following ratios:

1. Current Ratio

The current ratio divides the current assets of a company by the current liabilities. This ratio provides a gauge of the liquidity of the firm.

2. Quick Ratio

The quick ratio is similar to the current ratio except that the quick ratio removes inventory from the current assets. This is done because inventories are less liquid than most current assets. Therefore, the quick ratio provides a gauge of the liquidity of the firm not including inventory.

3. Debt to Equity Ratio

The debt to equity ratio divides the total liabilities by the total assets. This ratio indicates the amount of debt a company carries in respect to the company's assets. Companies with a high debt to equity ratio may have difficulty meeting their debt obligations in a weakened state of business.

To show the management effectiveness and efficiency the study uses the following ratios:

1. Return on Assets Ratio

The return on assets ratio divides the net income by the total assets. This ratio indicates the firm's effective use of its assets in generating income.

2. Asset Turnover Ratio

The asset turnover ratio divides the sales by the net fixed assets. This ratio indicates the efficiency of the use of assets to generate income. Firms that have low asset turnover ratios are not using their assets to the full capacity.

3. Inventory Turnover Ratio

The inventory turnover ratio divides the sales by the inventory. This ratio indicates the amount of inventory turnover occurrences. A high inventory turnover ratio indicates that the company is selling products quickly.

Finally, to show the value of the firm, a price per earnings was calculated for each firm. The price per earnings indicates the market price per share divided by the earnings per share. This figure indicates if the firm is a growth stock or if it is a value stock. Firms

with low price per earnings (P/E) are generally undervalued while firms with high price P/E ratios are considered growth or established firms.

Industry benchmarks are readily available through an annual publication from Risk Management Association and also available through a variety of financial websites such as Yahoo Finance and Google Finance. For the purposes of this study the majority of the ratios were obtained through Risk Management Association. Risk Management Association uses more than 190,000 financial statements to compile their annual report (9). Risk Management Association requires at least 30 statements for analysis in order for an industry to be listed (9). For those industries which were not available through Risk Management Association, the ratios were obtained through Dunn and Bradstreet's and Thompson/Reuter's finance websites. These websites did not publish the number of statements used to compile the ratios.

To gather the necessary data, financial statements for years 2005, 2006, and 2007 were pulled for each of the 118 companies. The figures from the financial statements were entered into Excel and the ratios were calculated for each of the companies and for each of the years in this study.

Then, financial ratios were gathered from the above sources for each respective year. Ratios were recorded by industry and by year. Therefore, the final data provided the company's three years of financial data with the corresponding annual ratio benchmark to be used for comparison.

Additionally, the company data was compared to its corresponding annual ratio and a variance from that ratio was computed. This variance was computed for each ratio and for each year for every company in the study. The variance for any given ratio is either positive or negative. Variances that are positive indicate that the company's respective ratio is above that of the industry. Any variance that is negative indicates that the company's respective ratio is below that of the industry. For most ratios, a positive variance indicates a more effective, efficient or profitable company than the industry

average. However, in the case of the debt ratio, a negative variance would indicate that a company is not over leveraged which would, in most cases, indicate effective and efficient management. Additionally, a negative price per earning ratio might indicate a company is undervalued by the investors.

Then, variances were averaged by benchmark and by year for the entire data set and also for financial and pharmaceutical/chemistry industries individually. The average variances indicate the difference that the group of female CEOs had from their respective industry standard benchmark, on average. These average variances were compiled by year to show the trends over the three years of the study.

By taking the company's annual data, and the corresponding annual ratio benchmark, the study accounts for any economic trends that would have affected any given industry. Recording three years worth of data, the study reveals trends over time rather than a snapshot of one year.

Findings

The data trends reveal that female CEOs have a positive variance in the areas of financial strengths of the firms they run. Over the three years of the study, the current ratio and quick ratios variances were consistently higher than the respective industry's ratio.

	2005	2006	2007
Current Ratio	1.611465	1.458176	0.597214
Quick Ratio	0.952415	1.213956	0.445779

Figure 3: Current and Quick Ratio Average Variances from Industry Benchmarks by Year

The trends do indicate that female CEOs are reducing their variance from the respective industry's current ratio each year. The variances in year 2007 were lower than the variances in 2005.

The average variances for debt ratios indicate that female CEOs are maintaining lower debt levels than males in the respective industry. The figures indicate that females are consistently and significantly under leveraging their firms.

	2005	2006	2007
Debt Ratio	-1.91482	-1.64452	N/A

**Figure 4: Debt Ratio Average Variance from Industry
Benchmarks by Year**

Inventory turnover ratio variances are extremely high in female-led companies. The average variance from the respective industry's ratio climbed annually. This indicates that females leading companies turn over the inventory quickly or female companies are keeping low inventory which would also result in a high inventory turnover ratio.

	2005	2006	2007
Inventory			
Turnover	12.33494	16.14145	24.63097

**Figure 5: Inventory Turnover Ratio Average Variance from Industry
Benchmarks by Year**

The average variances fixed asset turnover and total asset turnover were mixed. This indicates that female CEOs' efficiency is inconsistent. In some cases female CEOs are very efficient at managing their assets and in other cases female CEOs are significantly under managing their assets.

	2005	2006	2007
Fixed Asset Turnover	31.71821	-16.4815	
Total Asset Turnover	-0.77664	-0.10441	0.812509

**Figure 6: Fixed and Total Asset Turnover Ratio Average Variances from Industry
Benchmarks by Year**

The variances of the return on assets ratios indicate a consistently inefficient management of the companies led by women. The return on assets variances from the respective industry ratio is significant. This indicates that female CEOs are not managing their assets as well as others in the industry.

	2005	2006	2007
Return on Assets	-6.49544	-6.88143	-6.22604

Figure 7: Return on Asset Ratio Average Variance from Industry Benchmarks by Year

Lastly, the price per earnings ratios differed significantly from the respective industry ratios. This indicates that the female-led companies' stock price is undervalued when compared to other stock prices within the same industry.

	2005	2006	2007
P/E	-4.71235	-18.6479	-5.63101

Figure 8: P/E Ratio Average Variance from Industry Benchmark by year.

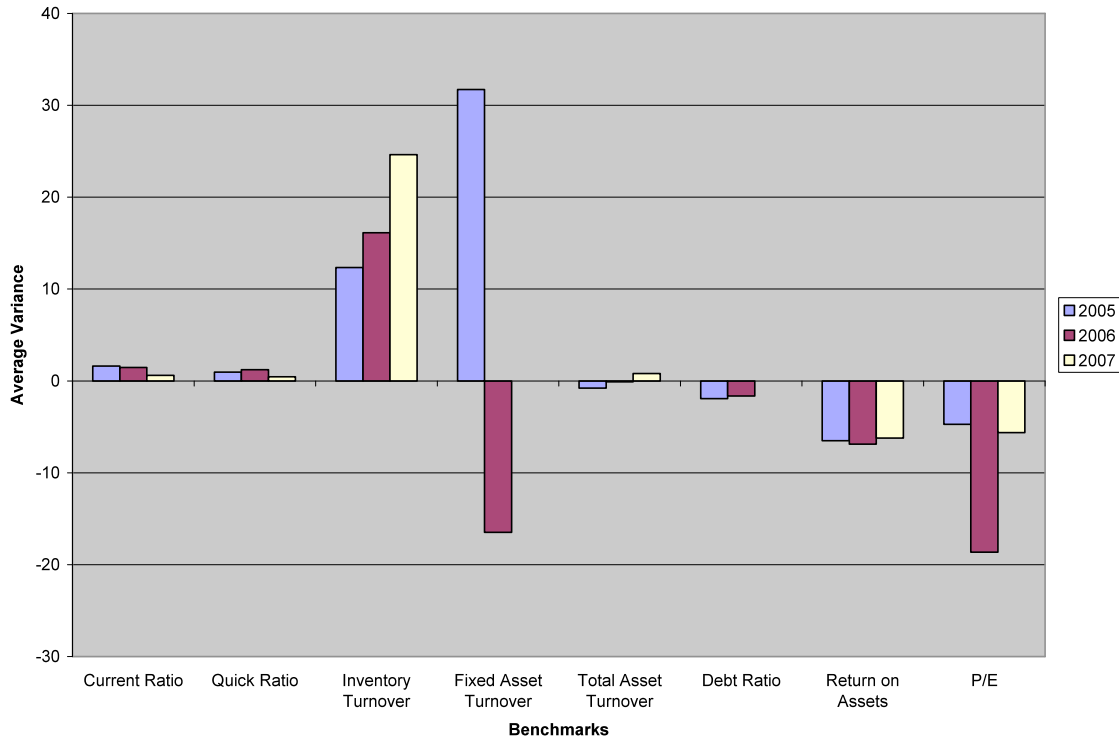


Figure 9: Chart with Ratio Variance Trends for All Female Led Companies

For pharmaceutical and chemistry-related companies, the average variances that indicate financial strength of a company become larger. This industry does not have inventory turnover, therefore the current and quick ratios are used to determine the financial strength of the companies in this industry. Like the entire data set, the trend over the three years that the study encompasses indicates that female CEOs are reducing the variance annually.

	2005	2006	2007
Current Ratio	5.082979	4.224379	1.512443
Quick Ratio	2.585616	4.577958	1.582822

Figure 10: Pharmaceutical/Chemistry Industry’s Current and Quick Ratio Average Variances from Industry Benchmark by Year

For pharmaceutical and chemistry-related industries, female CEOs' average variance from the industry's debt ratio was slightly less than the average variance of the entire data set. The trend over the period of the study indicates that female CEOs are moving towards reducing the variance from the industry average.

	2005	2006	2007
Debt Ratio	-1.39602	-0.79967	N/A

Figure 11: Pharmaceutical/Chemistry Industry's Debt Ratio

Average Variance from Industry Benchmark by Year

Similar to the whole data sets' average variance for fixed and total asset turnover, pharmaceutical and chemistry companies' ratio variances are mixed. However, the average ratio variances for pharmaceutical and chemistry companies are closer to their respective industry ratios than for the entire data set.

	2005	2006	2007
Fixed Asset Turnover	-1.23725	-2.9262	N/A
Total Asset Turnover	-0.85245	2.988676	0.294528

Figure 12: Pharmaceutical/Chemistry Industry’s Fixed and Total Asset Turnover Average Variance from Industry Benchmark by Year

Similar to the entire data set’s average variance for return on assets, the female-led pharmaceutical and chemistry-related industries’ variance is considerable. However, unlike the entire dataset’s variance, the pharmaceutical/chemistry-related industries are increasing the variance over the years included in the study.

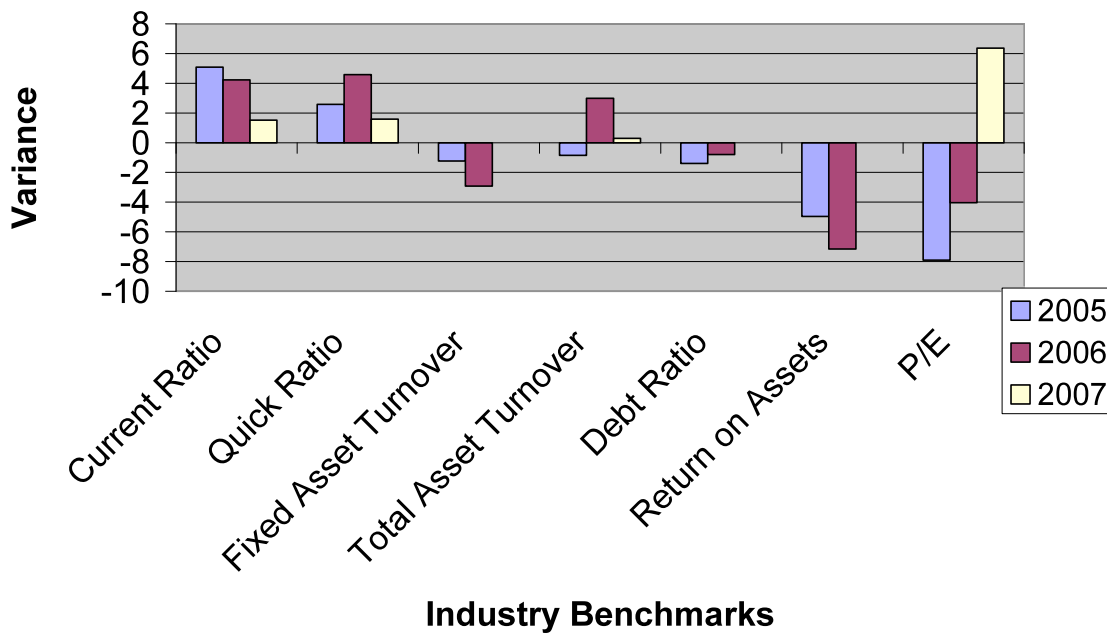
	2005	2006	2007
Return on Assets	-4.95537	-7.15523	N/A

Figure 13: Pharmaceutical/Chemistry Industry’s Return on Assets Average Variance from Industry Benchmark by Year

Lastly, the P/E ratio average variance for the pharmaceutical/chemistry industry is significant. However, unlike the entire dataset’s variance, the trend for the pharmaceutical/chemistry-related industry indicates that the average variance from the industry’s median is shrinking, even swinging into a positive variance for the last year of the study.

	2005	2006	2007
P/E	-7.90362	-4.03952	6.369596

Figure 14: Pharmaceutical/Chemistry Industry’s P/E Ratio Average Variance from Industry Benchmark by Year



**Figure 15: Pharmaceutical/Chemistry Industry Average Variance
For Each Ratio by Year**

Many of the ratios used in this study do not apply to the financial companies led by females. Financial industries do not have current liabilities or current assets. Sales and costs associated with sales are not relevant. Therefore, within the scope of this study, the measurements used to indicate the strength of female leadership are limited to return on assets and price per earning ratio. The return on asset industry ratio benchmark was unavailable through Risk Management Associates therefore Thompson/Reuter's finance website was used to obtain the benchmark. This benchmark is an average over 5 years. To arrive at a comparable number, the three year average was computed for the data obtained.

Here, the data shows that female CEOs are varying from the industry ratio for Return on Assets by a small amount. The female CEOs' P/E ratio differs significantly from the industry average P/E Ratio.

	2005	2006	2007
P/E Ratio	-2.82835	-3.26882	14.14934
3 Year Average Return on Asset Variance			-0.57052

**Figure 16: Average Variance from Industry Benchmarks
for Financial Industry for Price Per Earnings
and Return on Asset**

Overall, the data indicates that female CEOs are effective financial managers. The companies managed by women consistently have higher current and quick ratios and lower debt ratios when compared to their respective industry ratios. The fact that women's companies are more liquid and less leveraged than the industry average introduces the possibility that women are not taking as many risks as male CEOs in the industry.

The data also suggest that female CEOs are managing their inventories differently than those managed by male CEOs. There are two possibilities to account for the large variance from the industry standard: the companies run by females are holding fewer inventories, or the companies run by females are turning over inventory more quickly than the industry standard.

The results regarding asset turnover and return on assets indicate that women are possibly less efficient at managing the assets of their respective firms. Female CEOs are consistently below their respective industries' return on assets ratios.

These findings lead to the question of whether female CEOs' variances from industry standards are affecting their respective profits. Since the data indicates that female CEOs are managing their companies differently than others in the industry, are those differences causing a variance in profit margin? This research indicates that there are differences in the profits of female-led companies. The difference, however, varies for different industry sectors. To observe net profit margin variances, this study breaks down the data into three categories: entire dataset, data not including pharmaceutical/chemistry related industries, and data for only pharmaceutical/chemistry related industries. For the entire

data set, there is an overwhelmingly negative variance in female CEOs' net margin profits. However, for only pharmaceutical/chemistry-related industries, the variances of net profit margins of female CEOs from the net profit margin of the industries become positive. The three year average variance remains negative in all three scenarios.

	2005	2006	3 Yr Avg
Net Profit Margin (with Pharmaceutical/Chemistry Industry)	-895.627	-105.506	-658.774
Net Profit Margin (without Pharmaceutical/Chemistry Industry)	4.657601	6.448601	-6.05963
Net Profit Margin (Pharmaceutical/Chemistry Industries Only)	-5380.98	-541.265	-1589.58

Figure 17: Net Profit Margin Variances from Industry Standard Ratio

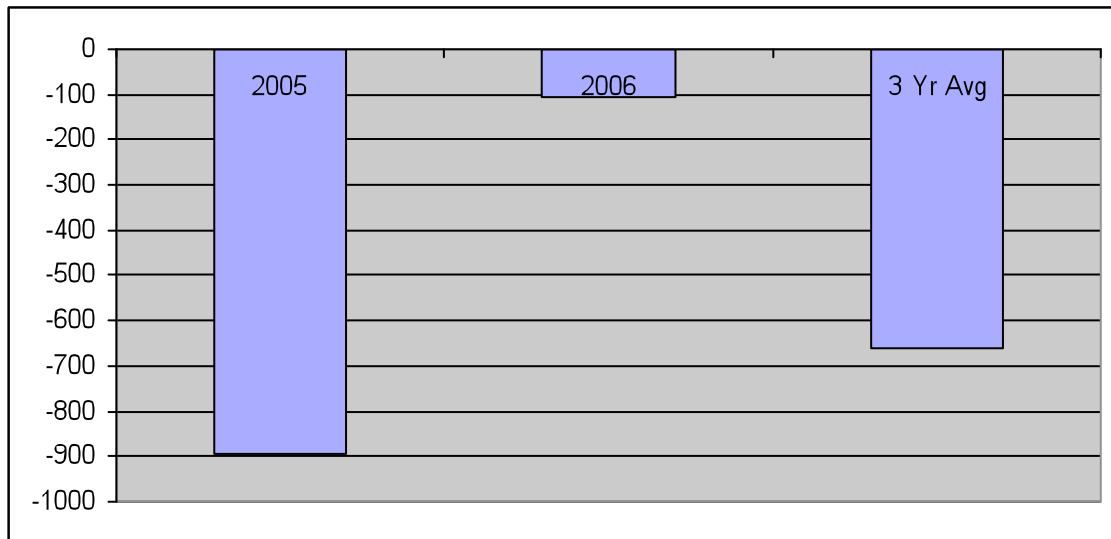
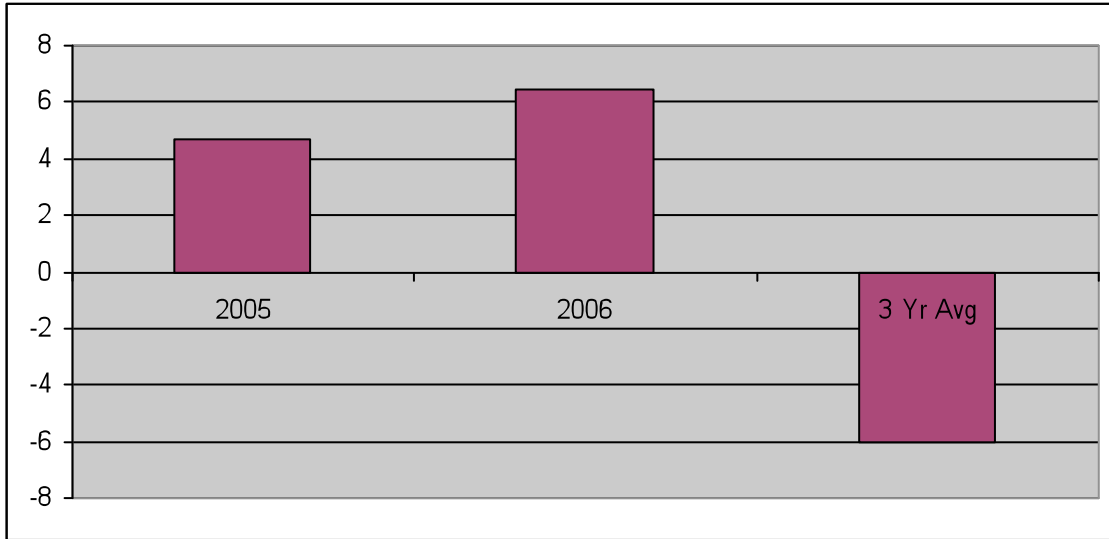


Figure 18: Net Profit Variances Including Pharmaceutical/Chemistry Industry Standard Ratio



**Figure 19: Net Profit Margin Variances from Industry Standard Ratio
(without Pharmaceutical/Chemistry Industry)**

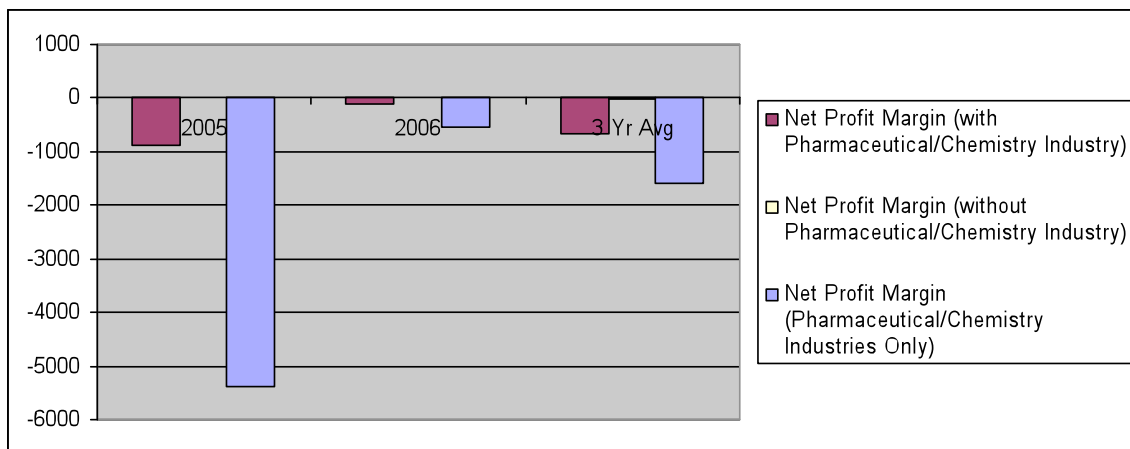


Figure 20: Net Profit Margin Variances

These differences indicate the possibility that the female CEOs' variances in the respective industry ratios are affecting the profitability of the company, even when the variances from industry ratios are positive in nature. Less than a third of the female-managed companies had positive net profit margins variances, indicating that female CEOs are not meeting, or exceeding, their respective industry's net profit margins.

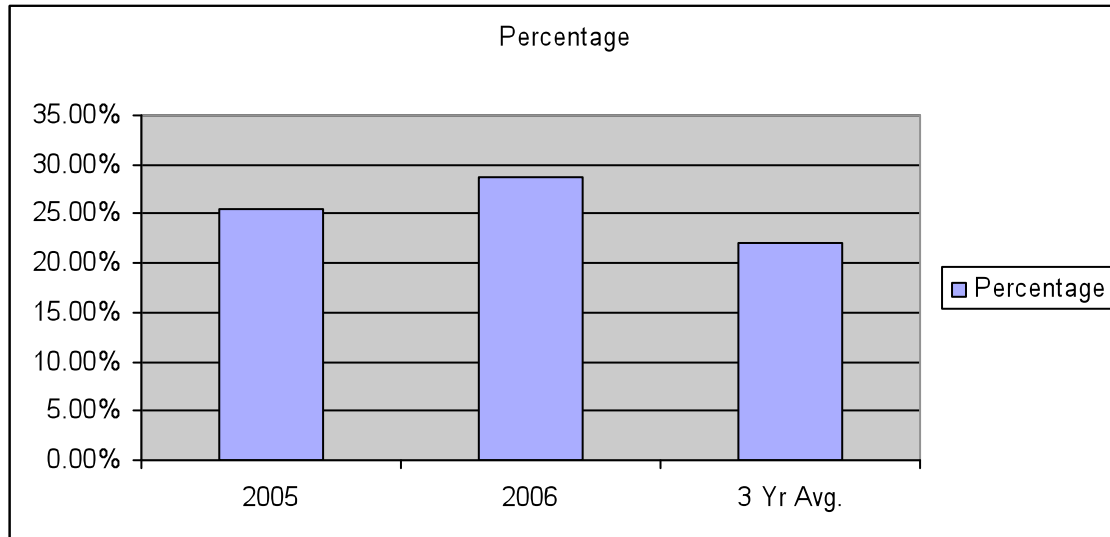


Figure 21: Percentage of Women Managed Companies Having Positive Net Profit Margin Ratio Variance from Industry Standard

To study the relationship between the female CEOs' ratio variance and the industry standard ratio, a regression analysis was conducted between the current ratio variance (x variable) and the net profit margin variance (y variable). This analysis indicates that there is a statistically significant inverse relationship between the current ratio variance and the net profit margin variance. As the current ratio variance increases, the net profit margin variance decreases. Therefore, as a female CEO increases her current ratio away from the industry standard, her respective net profit margin decreases from the industry standard. Eventually, the female CEO can over increase her current ratio causing the net profit margin to decrease below the industry standard.

It is important to note that regression analysis was conducted on the variances of all benchmark ratios included in this study and only the current ratio variance was found to be statistically significant when regressed with the net profit margin variance.

ANOVA

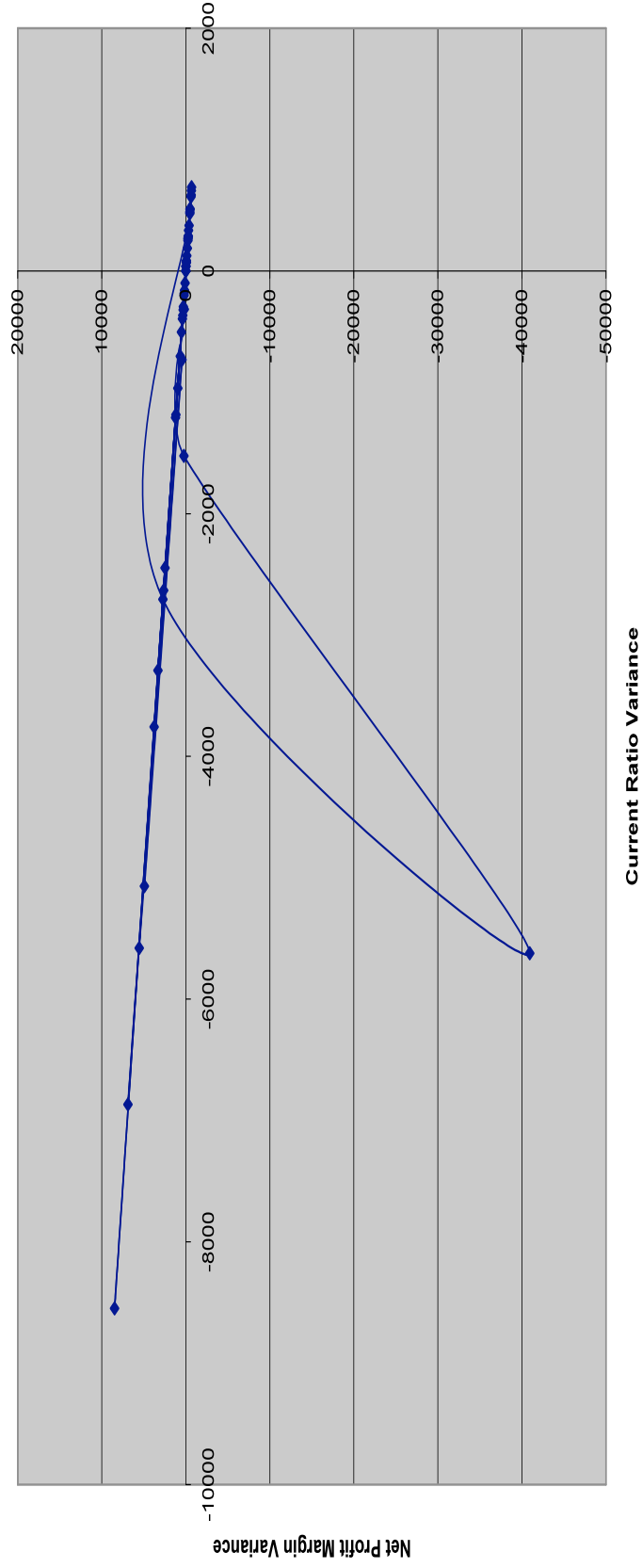
	df	SS	MS	F	Significance F
Regression	1	2.18E+08	2.18E+08	5.507141	0.023113602
Residual	48	1.9E+09	39652632		
Total	49	2.12E+09			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	283.599	1038.159	0.273175	0.785891	-1803.758828	2370.957	-1803.758828	2370.956741
X Variable 1	-642.299	273.6996	-2.34673	0.023114	-1192.609047	-91.9891	-1192.609047	-91.98909073

Figure 22: Regression Analysis of Current Ratio Variance and

Net Profit Margin Variance
(2005)

Regression of Current Ratio Variance With Net Profit Margin Variance



Conclusions

To summarize, female CEOs' ratios vary from their respective industries. These variances consist of positive variances for financial strength related ratios and negative variances for asset management related ratios. For the bottom line, female CEOs' net profit margins ratios show mixed results. Some profit margins are positive, some are negative, and a fairly small percentage of female-managed companies show a positive net profit margin variance.

Furthermore, many of the financial strength related ratios' variance possibly relate to risk and risk aversion behavior. For example, this study revealed that female-led companies are, on average, exceeding the industry standards for current and quick ratios. This indicates that female-led companies have stronger cash or liquid assets than male-led companies in their respective industry. Additionally, female CEOs are running companies with lower debt ratios than the industry standard, indicating that female CEO companies are conservatively leveraging their companies. Lastly, the inventory turnover ratio for female managed companies, on average, indicates that female CEOs might be carrying fewer inventories than the industry standard. In combination, these ratio variances point to company that is more liquid than the industry standard. One possibility for this is that female CEOs are more risk averse than their industry peers.

In an attempt to verify the assumptions that this study's findings indicate risk aversion as a cause for the variances in female-managed companies, further literature was reviewed. Current literature on the topic of the risk aversion behavior of women is mixed. Johnson and Powell found that in the "non-managerial" population [...], men appear to risk more of their resources for the prospect of a future uncertain gain than women, and are less inclined to choose risk-hedging strategies" (133). However, Johnson and Powell also found that when females and males had "formal management training" there was not a significant difference in their risk aversion behavior (134). Additionally, Shubert, Brown, et al. found that women differ in risky decisions on an abstract level but that when faced with a "contextual" risky decision "no gender differences in risk attitudes are found" (385).

Therefore, further study is needed to explore the underlying reasons for the differences in the female managers' ratios when compared industry benchmarks noted by this study. Information on the CEOs' education level, training level, confidence level, and risk aversion level may provide insight as to why female CEOs are managing their respective companies differently. Additionally, it would be interesting to study women-run businesses during times of recession. Typically in a recession environment, many of the variances discovered in this study could present an advantage, particularly as in the current recession where a cash heavy and underleveraged firm may prove to be more economically viable.

This study has identified the management areas in which the female manager differs from her male peers. The differences appear related to risk aversion. Furthermore, these differences indicate that the CEOs' different management techniques might be affecting the profit of their companies, thereby fueling the existing gender gap. In order to lessen the gender gap, the causes for these management differences need to be identified and proven to be nonthreatening to profits, or women managers should take action to correct these differences.

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