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COMPARISON OF INVESTING STRATEGIES: DURING AND AFTER THE MARKET CRASH OF 2008

SHEIVA ANSARY
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Reviewed and approved* by the following:

Patrick Cusatis
Associate Professor of Finance
Thesis Supervisor

David Buehler
Associate Professor of Economics
Faculty Reader

Thomas Amlie
Program Coordinator, Bachelor of Science of Accounting
Honors Adviser

* Signatures are on file in the Schreyer Honors College

ABSTRACT

This thesis compares the success of value and growth investing strategies from 2007 to 2018. Price-to-book ratio is used as a proxy of value versus growth to measure the effectiveness of each strategy. The time period is selected to include the market crash caused by the housing crisis in 2007-2008 as well as a stable market time period, allowing for the effectiveness of the two trading strategies to be tested in multiple scenarios. Based on this research, it is clear that value investing outperforms growth investing. There is also evidence that the market disruption of 2007-2009 impacted the effectiveness of both value and growth investing strategies.

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Chapter 1: Introduction

This paper focuses on two of the most popular portfolio strategies, value and growth investing, and how they compare to each other. Most of the research for both of these investing strategies focuses on how to optimize the strategy to get the best result. The few articles that compare the two strategies, emphasize the difference in the theories of the strategies but do not necessarily utilize any data to prove the conclusions. This research seeks to highlight the differences between value and growth investing to examine which investing strategy is more successful in the marketplace.

In this study, a long-time horizon from 2007 to 2018 is examined. This time period is selected because it includes the well-documented housing crisis. Price-to-book ratio is used as a proxy for level of value investing. Cumulative abnormal returns are computed quarterly, and stocks are ranked by price-to-book ratio to compare the market adjusted returns for each investment strategy over time. A further comparison is made between the periods from 2007 to 2008 and 2009 to 2018 to see if the housing crisis impacted the effectiveness the trading strategies.

Chapter 2: Literature Review

2.1. Value Investing

Value investing involves identifying undervalued stocks whose prices are expected to appreciate over time. It is defined as a buy and hold strategy, meaning stocks are not traded once bought. Instead, the strategy provides a safe and steady income though consistent dividends, not raising capital quickly.

Asness, et. al. (2015) looked to clarify some of the confusion surrounding value investing strategy. Initially, the paper discussed the different definitions of value investing. The authors used the academic definition, which they considered to be "highly diversified" in comparison to the opposing definition of a "concentrated value-based stock picking." Additionally, the paper discussed "pure" value investing where the price is compared to a fundamental value, such as book value, and based only on quantifiable measures instead of considering qualities such as faster growth. The authors also presented on the facts about value investing that they believed need clarification, such as the fact that value investing works well when other factors are considered. Finally, they sought to disprove fictions such as value investing only being effective in concentrated portfolios. Asness, et.al. analyzed the held belief that value is solely compensation for risk and can only be consistent with a risk-based efficient market view. By utilizing published and peer-reviewed academic papers to address the facts and fictions, the authors were able to analyze and experiment to solidify facts and disprove fictions. In the end, the authors proved each fact and fiction in an effort to clear some of the confusion that comes with value investing. Additionally, the belief that value investing works in markets both alone and with other investing strategies was reaffirmed.

Piotroski (2000) examines whether a simple accounting-based fundamental analysis strategy (value investing) can shift the distribution of returns earned when applied to a broad portfolio of high book-to-market firms. Value stocks tend to be neglected by analysts, effectively eliminating the option of analyst forecasts and stock recommendations. Instead, financial statements must be used to find all the necessary information regarding assets' and liabilities' values. Piotroski (2000) utilized *Compustat* to identify a sample from 1976 to 1996 based on the firm's aggregate score. For each firm, the market value of equity and book-to-market ratio were calculated. The higher aggregate scores were then then compared to the lower aggregate scores. The study found that by utilizing historical financial statements and simple screening techniques, a stronger value portfolio is created.

Guay (2000) discusses the academic article written by Piotroski (2000). Guay has two main questions:

1. Does the author's analysis of the data provide evidence that using value investing in high book-to-market firms, create substantial returns?
2. Without an alternative to the hypothesis of market efficiency, can empirical work on pricing anomalies advance our understanding of pricing behavior?

Guay (2000) uses other academic articles to compare their conclusions to the ones of Piotroski and creates a discussion between the two opposing sides and points about positives and negatives with Piotroski's arguments. Guay (2000) concluded that future

research needs to be done in order for him to believe in the conclusions that Piotroski reached.

Oxman, Mohanty and Carlisle (2011) sought to prove that buying stocks in companies with per share net-net current asset value (NCAV) greater than the current share price provides a better risk-adjusted return during the time period of 1975-2010. Factors for the firms included market risk, market liquidity, overreaction (long-term reversal), and distress whereas the characteristics that created the excess returns were analyst coverage, stock price per day, and turnover. Overall, the main contribution is an explanation of the source of excess returns offered by the net-net strategy. The authors used the NCAV equation given by Benjamin Graham and David Dodd to determine net-net assets (current share price is less than liquidation price):

NCAV = [Cash + 0.75*Net Receivables + 0.5*Inventory – (Total Liabilities + Preferred Stock)]/ Shares Outstanding

Their sample was selected from all firms in the Center for Research in Securities Prices (CRSP) and COMPUSTAT databases and they selected only firms that traded on the NYSE, AMEX, or NASDAQ and used price filters to construct test portfolios along with controlling firm size. Returns are calculated using 3 weighting schemes: equal-weighting, value-weighting and lagged-returns weighting. Excess returns (alpha) are then calculated using CAPM and the Fama-French 3-factor model. The results show that returns are higher among net-net stocks with low analyst coverage, low stock price per share and lower trading volume.

Erik Stafford focused his research on how outside investors can replicate how private equity firms invest in public companies using a value investing strategy. By

selecting similar investments, holding periods, leverages and hold-to-maturity calculations of portfolio net asset value, Stafford (2017) attempted to recreate a similar portfolio. The private equity funds selected small firms with low EBITDA multiples. This strategy was then used in regular portfolios to replicate the returns to see how easily the strategy can be applied for any investor to see if they could get a similar result. The results indicate that the value investing strategy that works for private equities also works for outside investors. Additionally, Stafford found that by replicating the value strategy, portfolios with liquid public equity investments provide a more accurate risk assessment compared to conservative portfolios. Stafford concluded that public equities utilized value investing combined with active investment management, conservative portfolio making and long holding periods to create their high returns and that is what is essential for outside investors to recreate those portfolios and have the same high returns.

Doukas, Arshanapalli, and Coggin (1998) examined the "robustness" of the value investing strategy by analyzing data from 18 equity markets and four regions of the world economy. Additionally, Doukas, Arshanapalli, and Coggin determined which stocks were riskier, value or growth by focusing on beta, coefficients of variation, and Sharpe ratios. Finally, they investigated whether the superiority of value investing is a CAPM related anomaly as argued in Fama and French's three-factor model. The authors used the large equity market database, International Investment Agreements (IIA), to find that value stocks tend to outperform growth stocks. Looking at data from 1975-1995, the group looked at 5 different returns of portfolios; market, value, growth, small, and large, and the difference between them in different countries. It was found that a three-factor model explains most of the variation found in the average returns across all the countries. Also,

the value stocks had better success in returns than growth stocks due to relative size and distress effects.

Using extensive data analysis, Lev and Srivastava (2019) sought to identify and prove 2 major reasons for the downfall of value investing;

1. Accounting deficiencies that cause systematic misidentification of value and growth stocks
2. Economic developments, slowing down the reshuffling of value and growth stocks, which drove the high returns of value investing.

The pair analyzed cumulative value investing of one dollar from 1970 to 2018 to show how the value strategy has lost its overall value and has been, on average, decreasing since the early 2000s. Overall, the resurgence of value investing is very unlikely due to the changing economic market.

Aswath Damodaran (2012) looked to identify two major components of modern value investing;

1. Who are value investors
2. What criteria do they use to categorize undervalued stocks and investing in those stocks in the long run.

By analyzing market and portfolio data along with analyzing infamous value investors such as Warren Buffet and Benjamin Graham, it was found that value investors were investors that purchased stocks at a value less than what the firm's assets-in-place are worth. There are three forms of value investors as well: passive investors or screeners, contrarian value investors and activist value investors. Investors can either use specific criteria such as book to value, or by identifying bargains that are found in the aftermath

of a sell-off and that are best to buy when the price is down.

Asness, et al. (2017) define deep value as a wide valuation spread between cheap and expensive securities relative to historical prices. Using this definition, they examined deep value against global individual equities, equity index futures, currencies and global bonds to provide new evidence for value premium theories. Since deep value is an extreme of value investing, in order to have enough data points, the authors used a long period of time and a broad set of test strategies, over a century time period and 522 value strategies that resulted in 3000 instances of deep value. Additionally, rational risk-based theories such as CAPM along with sentiment theories and behavioral theories were used to achieve their purposes. Overall, the value strategy has high average returns, low market betas, high global value factor beta, deteriorating fundamentals, negative new sentiment, selling pressure, increased limits to arbitrage and increased arbitrage activity. Additionally, deep value episodes tend to cluster, and a deep value trending strategy generates excess returns that cannot be explained by traditional risk factors.

Kok, Ribando, and Sloan (2017) sought to differentiate value investing from quantitative investment strategies. Kok, Ribando, and Sloan first analyze the history of value investing by looking at Benjamin Graham and David Dodd. They then continued their analysis by looking at various academic papers while comparing all the aspects of value investing to quantitative investing strategies. Quantitative strategies do not seek to identify undervalued securities, but instead identify firms with temporarily inflated accounting numbers. Additionally, the authors found little evidence to prove that buying U.S. equities that seem underpriced instead of utilizing fundamental-to-price ratios provides a superior investment performance.

Kudoh and Takayanagi (2018) focused on value investing in the Japanese market. In recent years, the value investing strategy has not performing as well as it historically has. The authors sought to find the reasons behind why value investing has become less effective, the market's ability to value companies, and discusses whether to reconsider investing in value stocks. Kudoh and Takayangi first looked at the historical data from the Japanese market to see why value investing was not as effective. It was found that the size of negative excess returns increased significantly, and the positive excess returns could not compensate for the negative. Using the perfect foresight equation, they tested how the market values stocks using earnings-to-price ratio in the time frame of December 31, 1987 to December 31, 2016 for their sample. All financial data were obtained from WorldScope/FactSet and Nomura Research Institute's Integrated Data Service (NRI IDS). Kudoh and Takayangi analyzed the bias that can be present in an analyst's forecast. The authors concluded that the existence of asymmetry is irrational, and the market has become more efficient, leading to less value stocks.

2.2. Growth Investing

Growth investing is typically compared to value investing due to their similarities. However, growth investing consists of investing in companies that exhibit the potential for above average growth. This is a long-term investment to gain profit over a period of time. By using estimated growth rates of companies, investors typically use growth strategies for long-term investments to realize profit over time, not necessarily quickly or in the short-term. The main difference between growth stocks and value stocks is that growth stocks do not typically dividends so most of the return in the portfolio comes

from capital gains.

Penman and Reggiani (2018) analyzed the differences between value and growth investing. They found that growth investing, unlike value investing, will not turn against the investor. By using a long-term time frame, an investor can minimize risk using growth over value investing. The analysis found that for any given earnings-to-price (E/P) ratio, a high book-to-price (B/P) is considered a growth stock, not value, signals for a higher expected earnings growth that has high risk. This directly counters the previous belief that low B/P signals a growth stock.

Aswath Damodaran (2012) examined different types of growth investing, from passive screening to activist growth investing, such as venture capital investing. These types were then compared to value investing to see which investing strategy was most successful. On average, growth investing underperformed when compared to value investing, especially in the long term. There was also evidence that showed that active growth investors were better at beating passive growth investors than active value investors did against passive value investors.

Parvez Ahmed and Nanda Sudhir (2000) studied the relationship between stock characteristics and their returns. Studies prior to this used a very clear-cut standard to determine whether a stock was value or growth, without looking at other key characteristics. Ahmed and Sudhir looked at these other characteristics and reclassified the stocks based on this additional information. With this new classification the study found that a strategy focusing on investing in stocks that have both high earnings-to-price (E/P) ratio and high growth in earnings per share (EPS) outperforms the previously used strategy of high E/P alone. The study also found that some stocks were unable to

classified when using all the stock's characteristic and were not counted for or against either value or growth stocks.

Cronqvist, Siegel and Yu (2015) sought to determine what factors led investors to select their investing style. Some factors include biological basis, life course theories as well as hedging demands. Using databases such as Morningstar as well as behavioral models and social psychology, the writers looked to investigate what stocks individuals in their sample were investing in along with some of their life experiences, and socioeconomic status. They found that the genetic make-up, age and life experiences can affect whether an individual chooses to invest in value or growth stocks, which could potentially end the value premium.

Clare, et al. (2018) investigated the relationship between growth, value and momentum investing strategies in emerging international equity markets as well as well-developed markets. Through their study, the authors found that both growth and value portfolios benefit from having momentum strategies integrated into the strategy. Growth portfolios, on average, had greater returns when the growth portfolio was combined with relative momentum and the value portfolios had greater returns when combined with absolute momentum and both were compared to smart beta indices. The authors used the following three valuation ratios to determine their portfolios: forward price to earnings, enterprise value/operating cash flows, and price to book value. Their ratios were used in 23 developed and 21 developing markets to determine the sample portfolios.

2.3. Market Crash Literature

2007 to 2008 was a tumultuous period for the stock market. The market was booming with the Dow Jones Industrial Average (DJIA) hitting all-time highs. For the decade prior to the crash, the real estate market expanding and the demand for home mortgage loans was high. Lenders became lax with their lending standards by extending mortgage offers to high-risk borrowers. The housing market was growing so when borrowers defaulted, the lenders could resell the properties with little to no losses. When the housing market growth slowed in 2007, a crash was inevitable. Soon the market was in disarray with DJIA falling 22% in a single day. This unprecedented crash resulted in extreme losses for investors and volatility in the capital markets.

Chaudhury (2013) investigated the market crash 2007-2008 and how it affected the behavior of stock prices and daily returns. Using a sample of thirty-one major U.S. Stocks along with the S&P 500, Chaudhury used a GARCH (1,1) in mean model and an EGARCH (1,1) in mean model for daily returns to compare non-financial and financial portfolios to the market returns. The S&P 500 was used to represent the overall stock market. The non-financial and financial portfolios had similar mean daily returns at the later stage of the crash but the cumulative returns varied significantly. The non-financial portfolios had a cumulative return of -18.79% and the financial portfolios had a cumulative return of -33.73%. During this time frame, there was a rise in the unconditional volatility of daily returns for all stocks, with the highest value at 7.6333%, while S&P rose to a value of 1.2776%.

Chapter 3: Methods and Data

3.1. Research Purpose

Investing strategies are utilized by countless investors with varying success. As investors, the main goal is to earn a return on the investment commensurate to risk. Investors who employ a value or growth strategy also hope to earn a return in excess of the market return.

By comparing two of the most popular investing strategies, value and growth investing, over a long horizon from 2007 to 2018, it can be determined if one of the strategies provides higher market adjusted returns. A further comparison can be made between the periods from 2007 to 2008 and 2009 to 2018 to see if the housing crisis impacted the effectiveness these trading strategies.

3.2. Sources of Data

For the period from January 2007 to December 2018, all companies are examined on a quarterly basis. The initial two datasets were obtained from two databases, CRSP and COMPUSTAT. The CRSP database provided the monthly returns (RET), shares outstanding (SHROUT), and closing stock price (PRC) for all the securities within the database. COMPUSTAT was used to find the quarterly Common Ordinary Equity (CEQQ) or book value of equity. These two datasets were merged and the Price-To-Book (Prc2Bk) was calculated for each security with the following equation:

$$\text{Prc2Bk} = \frac{PRC}{\left(\frac{(CEQQ)}{\left(\frac{SHROUT}{1000}\right)}\right)}$$

After removing all companies with missing data, the merged dataset resulted in 145,577

observations.

For each of the securities, a market model is used to compute an expected return E(r). The expected return is computed using a market model as follows:

$$E(r) = \alpha + \beta\ (R_m)$$

This equation is estimated by regressing historic returns on the market return in the period prior to the current quarter's starting day. A prior time period of 100 days is used using 50 days before the start of the current quarter. Using the expected returns, abnormal returns (AR) are computed as follows:

$$AR_i = R_i - E(R)$$

where R_i is the actual return on day i. Then the abnormal returns are cumulated to come up with a cumulative abnormal return (CAR) for the quarter for a period of 65 business days.

The tickers for this dataset were extracted and uploaded to the CRSP U.S Daily Event Study to get the Cumulative Abnormal Return (CAR) in all available quarters for each company. Any firms with missing data were removed from the dataset. The final dataset resulted in 141,851 observations

3.3. Methodology

Price-to-Book ratio is used as a measure of relative value. In particular, if lower price-to-book ratios are associated with value stocks while high price-to-book ratios are associated with growth stocks. For this reason, as a start, the final data set was grouped into 10 groups, numbered 0-9, ordered by price-to-book. Group 0 represented the most extreme value portfolio and group 9 represented the most extreme growth portfolio, with the groups 1-8 ranging in between.

OLS regression analysis was used on the entire sample to find relationships between the groups and the cumulative abnormal return (CAR). The regression equation used in varying time periods is as follows:

$$CAR = \alpha + \beta_0 D_0 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \beta_6 D_6 + \beta_7 D_7 + \beta_8 D_8 + \beta_9 D_9 + \varepsilon$$

where D_i is the dummy variable to represent groups 0-9, excluding group 5. One less dummy variable is used, as is necessary to make the regression possible. For this reason, the intercept is capturing the effects of group 5.

If price-to-book is truly an indicator of value and growth, this relationship should be exemplified by a positive to negative trend from group 0 to group 9. The same process was done with the sample with years 2009 to 2018 to determine how a market crash would affect the results. To further test the relationship, regressions were run for the time periods of 2007-2008 to determine how the portfolios did during the span of the market crash.

3.4. Final Dataset

This final dataset contains 141,851 observations with 7,497 unique companies. As shown in table 1, the CAR for the data 2007-2018 had a mean of 0.007200 with a standard deviation of 0.348161. The CAR for the time period of 2009-2018 has a mean of 0.004382 and a standard deviation 0.343817.

The CAR for 2007-2008 had an average of 0.020865 and standard deviation of 0.368190. For the market without a crash and the market with a crash, and the crash period, regressions were run for groups 0-9 and then groups 0 and 9 as shown in table 2. These regressions show the inverse relationship between group 0 and group 9 and the positive to negative trendline of the groups. Additionally, the regression shows a positive

return on investment for value portfolios while the growth portfolios saw a negative return on investment.

Table 3 and Figure 1 show the market capitalization of the firms in the data set. For 2007-2018, the largest firm had a market capitalization of $779,674 million while the smallest firm had a value of $185,600. For 2009-2018, the largest market capitalization was the same as 2007-2018 but the smallest firm had a market capitalization of $364,000. The 2007-2008-time frame had the same smallest market capitalization as 2007-2018 but the largest firm had a market capitalization of $511,887 million.

Chapter 4: Results and Discussion

4.1. Findings

In both the period including the market crash and without a crash, value investing strategy is the better investing strategy. The inverse relationship between the two strategies is clearly shown in the 2009-2018 time period. 2007-2008 has the same relationship but is obscured by the market disturbance, thus obscuring the results for 2007-2018.

4.1.1. Market without a Crash 2009 - 2018

Table 4 summarizes the results for all three regressions. Column A represents the entire time period for the sample while column B represents the time period after the market crash. As can be seen in column A and column B, over the longer time periods the relationship between CAR and price-to-book ratio is strong. All of the coefficients are significant and there is a gradual change form positive to negative from group 0 to nine. This indicated that value investing dominates growth investing over this time period. The results are the strongest for the results in column B.

4.1.2. Market with a Crash 2007 - 2008

Column C of Table 4 summarizes the results of the regression for the years 2007 and 2008. The regression indicates that value investing had a higher return on investment than growth investing even with a market crash. Even though the market suffered a crash, the value portfolios maintained positive and significant coefficients for group 0 and group 1. The growth portfolio exhibits significant negative behavior only for group 9.

However, coefficients are not significant for the less extreme groups in terms of price-to-book ratio. Only groups 0, 1 and 9 have significant coefficients. This indicates

the market crash causes a disruption in the expected relationships between CARs and price-to-book ratios. The results show much less significance during the crash than those shown in columns A and B.

When comparing the regression to the 2007-2008 crash period, the regression of period of 2009-2018 was more gradual and uniform and better showcased the relationship between value and growth investing without being obscured by the market disturbance. This is an important result indicating that the ability to gain from value investing is mitigated during a market crisis. In the recent financial crisis value investing only worked for the lowest price-to-book stocks.

Table 5 summarizes the regression results for groups 0 and 9. These two groups represent the most extreme value investing (group 0) and growth investing (group 9) companies. It is clear that in all three time periods, the extreme price-to-book groups exhibit consistent returns. In fact, the disruption of the market crash is only seen in the magnitude of the two extreme coefficients. Returns to group 0 companies were lower during the crash while returns group 9 companies where actually higher.

Chapter 5: Conclusions

This paper focuses on the investment performance of two of the most popular portfolio strategies: value investing and growth investing. In this study, a long-time horizon from 2007 to 2018 is examined. This time period is selected because it includes the well-documented housing crisis. Price-to-book ratio is used as a proxy for level of value investing. Cumulative abnormal returns are computed quarterly, and stocks are ranked by price-to-book ratio to compare the market adjusted returns for each investment strategy over time. The periods from 2007 to 2008 and 2009 to 2018 are compared to gauge the impacts of the housing crisis on the trading strategies.

The results indicate that value investing is a better trading strategy than growth investing, in both a stable market and during a market crash. Over time, value portfolios have positive CARs while growth portfolios have a negative CARs, regardless of the presence of a market crash. The result of value investing performing better than growth investing is consistent with previous research completed by Asness, Liew (2017), Piotroski (2000), and Asness et. al (2015).

Importantly, this paper shows that the market crash in 2007-2008 disrupted the effectiveness of value investing strategy. In that time period, the otherwise monotonic relationship between value stocks and returns became less evident. Value investing worked for only the very lowest price-to-book stocks in that time period. In addition, a growth stock strategy was more profitable (less negative) than during a stable market.

Table 1: Descriptive Statistics on Cumulative Abnormal Return

This table summarizes the descriptive statistics of the cumulative abnormal returns for the dataset for the following three time periods, 2007-2018, 2009-2018, and 2007-2008.

	CAR 2007-2018	CAR 2009-2018	CAR 2007-2008
Mean	0.0072	0.0044	0.0209
Standard Error	0.0009	0.0010	0.0024
Median	0.0027	-0.0009	0.0223
Mode	-0.0617	-0.0064	0.0274
Standard Deviation	0.3482	0.3438	0.3682
Sample Variance	0.1212	0.1182	0.1356
Kurtosis	130.7655	81.5570	309.7106
Skewness	2.4140	1.1022	7.5687
Range	30.3663	26.4109	20.6369
Minimum	-12.0018	-12.0018	-2.2724
Maximum	18.3645	14.4090	18.3645
Sum	1,021.3778	515.0389	506.3388
Count	141,851	117,584	24,267

Table 2: Descriptive Statistics on Price-to-Book

This table summarizes the descriptive statistics of the price-to-book values for the dataset for the following three time periods, 2007-2018, 2009-2018, and 2007-2008.

	Prc2Bk 2007- 2018	Prc2Bk 2009-2018	Prc2Bk 2007-2008
Mean	14.7575	10.0712	37.4647
Standard Error	5.3190	2.1530	29.2895
Median	1.6455	1.6631	1.5718
Mode	1.8945	1.8945	1.0792
Standard Deviation	2,003.2984	738.2601	4,562.6853
Sample Variance	4,013,204.5353	545,028.0033	20,818,096.9598
Kurtosis	112,055.2894	72,246.3701	24,102.0072
Skewness	323.7623	252.5260	155.0017
Range	709,565.3629	222,431.9923	709,565.3615
Minimum	0.0008	0.0008	0.0021
Maximum	709,565.3636	222,431.9931	709,565.3636
Sum	2,093,367.8232	1,184,211.7825	909,156.0407
Count	141,851	117,584	24,267

Table 3: Descriptive Statistics of Market Capitalization

This table summarizes the descriptive statistics of the market capitalization values (in thousands) for the dataset for the following three time periods: 2007-2018, 2009-2018, and 2007-2008. The market capitalization was calculated by multiplying price (U.S. dollar) by shares outstanding (in thousands).

	Market Capitalization 2007-2018	Market Capitalization 2009-2018	Market Capitalization 2007-2008
Mean	4,786,114.86	5,056,989.59	3,473,610.84
Standard Error	52,780.48	60,350.42	97,931.65
Median	556,575.35	609,839.29	364,934.39
Mode	100,726.35	32,028.75	6,298,236.73
Standard Deviation	19,878,772.64	20,694,476.46	15,255,663.64
Sample Variance	395,165,601,730,207.00	428,261,355,889,168.00	232,735,273,036,068.00
Kurtosis	256.14	246.67	261.47
Skewness	12.69	12.46	13.15
Range	779,673,375.85	779,673,197.45	511,886,947.68
Minimum	185.60	364.00	185.60
Maximum	779,673,561.45	779,673,561.45	511,887,133.28
Sum	678,915,178,590.36	594,621,064,351.41	84,294,114,238.94
Count	141,851	117,584	24,267

Table 4: Regression Results for All Groups

This table summarizes the regression results based on 3 samples: the full sample, 2009-2018 data, and 2007-2008 data. The dependent variable is the cumulative abnormal return for the following quarter (65 days). One less dummy variable is used, as is necessary. For this reason, the intercept is capturing the coefficient for group 5. For each group, the coefficient, t-stat, and adjusted R^2 were found. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level, respectively.

	Regression of All Groups								
	2007-2018			**2009-2018**			**2007-2008**		
	Coefficients	t-Stat		Coefficients	t-Stat		Coefficients	t-Stat	
Intercept	-0.0058	-2.0144	**	-0.0084	-2.6588	***	0.0056	0.7862	
D0	0.1063	26.0042	***	0.1019	22.7562	***	0.1242	12.4343	***
D1	0.0583	14.2308	***	0.0654	14.6219	***	0.0265	2.6151	***
D2	0.0330	8.0594	***	0.0380	8.5291	***	0.0098	0.9489	
D3	0.0196	4.7966	***	0.0228	5.1269	***	0.0051	0.4991	
D4	0.0124	3.0392	***	0.0133	2.9883	***	0.0086	0.8438	
D6	-0.0065	-1.5889	*	-0.0086	-1.9349	**	0.0049	0.4772	
D7	-0.0206	-5.0106	***	-0.0221	-4.9631	***	-0.0115	-1.1078	
D8	-0.0274	-6.6606	***	-0.0296	-6.6470	***	-0.0124	-1.1672	
D9	-0.0480	-11.6328	***	-0.0501	-11.2634	***	-0.0302	-2.7413	***
Adjusted R Square	0.0150			0.0160			0.0123		
Number of Observations	141,851			117,584			24,267		

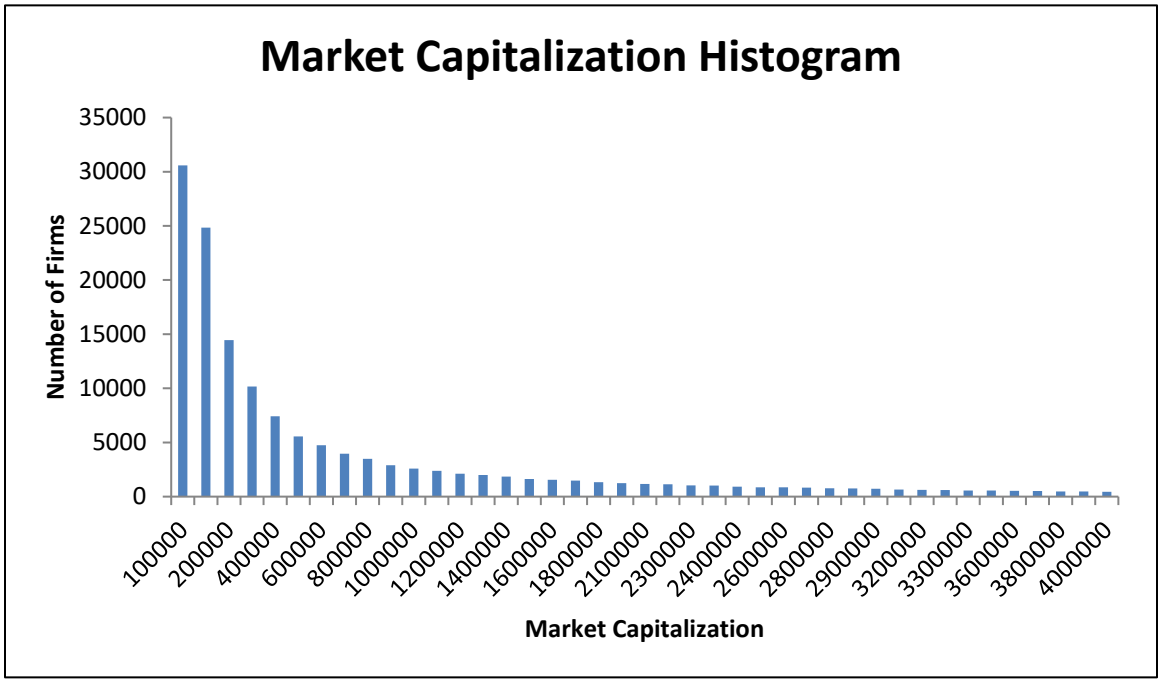
Table 5: Regression Results for Group 0 and 9 Only

This table summarizes the regression results based on 3 samples: the full sample, 2009-2018 data, and 2007-2008 data for only the extreme value (Group 0) and extreme growth (Group 9) groups. The dependent variable is the cumulative abnormal return for the following quarter (65 days). One less dummy variable is used, as is necessary. For this reason, the intercept is capturing the coefficient for group 5. For each group, the coefficient, t-stat, and adjusted R^2 were found. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level, respectively.

	Regression of only Extreme Value and Extreme Growth								
	2007-2018			**2009-2018**			**2007-2008**		
	Coefficients	t-Stat		Coefficients	t-Stat		Coefficients	t-Stat	
Group 0	0.0976	31.7908	***	0.0921	27.3314	***	0.1199	16.0969	***
Group 9	-0.0567	-18.1758	***	-0.0599	-18.0070	***	-0.0346	-3.9319	***
Adjusted R Square	0.01036			0.01005			0.01177		
Number of Observations	141,851			117,584			24,267		

Figure 1: Market Capitalization Histogram

This histogram shows the spread of the size of the firms included in the dataset. The market capitalization for each firm was calculated by multiplying the price by the shares outstanding.



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Academic Vita

Sheiva Ansary

Education:

Bachelor of Science Degree in Accounting, Penn State University, Spring 2020
Honors in Finance
Thesis Title: Initial Public Offerings After 2007 Financial Crisis
Thesis Supervisor: Dr. Patrick Cusatis
Faculty Reader: Dr. David Buehler

Experience:

Internship with Brown, Shultz, Sheridan & Fritz Accounting Firm, Summer 2011
Supervisor: Mr. Jeffrey Clippinger

Awards:

Dean's List
Athletic Service Award
Scholar Athlete Award
Student Research Award
Global Ambassador Leader Award
Financial Executives International Outstanding Student Award
Craig and Heidi Ritter Scholarship
Fazzolari Family Honors Business Award
Student-Athlete Advisory Committee Award
Women's Tennis Coach's Award
Women's Tennis Scholar Athlete Award
Intercollegiate Tennis Association Scholar Athlete Award

Activities/Presentations:

Member, Phi Kappa Phi Honors Society, 2020-Present
Member, National Society of Leadership and Success, 2018- Present
Lion Ambassador 2018-Present
Global Ambassador 2018-Present
NCAA Leadership Development Program, 2017-Present
Captain, Women's Tennis Team, 2017-Present
President, Student Athlete Advisory Committee, 2017-Present