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SCHREYER HONORS COLLEGE

DEPARTMENT OF FINANCE

DOES THE BUSINESS CYCLE EXPLAIN CHANGES AND TRENDS IN IDIOSYNCRATIC STOCK RISK?

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ABSTRACT

Recent studies have focused on levels of idiosyncratic risk and the rising amount of volatility in stock returns. However, researchers have struggled to agree upon an explanation for this trend. In this thesis, numerous potential factors for changes in firm-specific risk and the overall level of idiosyncratic risk in financial markets is explored. I hope to show how the average level of idiosyncratic risk has changed in the last two decades and explain the factors that lead to these changes in idiosyncratic stock risk. Next, I hope to assess the relationship between idiosyncratic risk and numerous business cycle variables in an effort to prove that changes in the business cycle are causing idiosyncratic volatility to change over time.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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INTRODUCTION

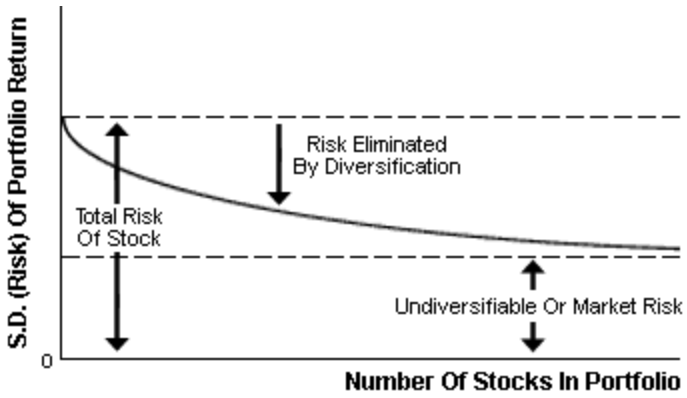
The level of idiosyncratic stock risk had increased quite dramatically during the four decades between 1960 and 1990. In this study I hope to examine the effects of economic events, such as the Tech Bubble of the early 2000's and Financial Crisis of 2008-09, on the average level of firm-specific risk present in U.S. equity markets. These crises resulted in massive levels of volatility in financial markets, notably the equity market and its indexes, but whether that market volatility transferred over to increased idiosyncratic volatility is yet to be explored.

When investing in equities an investor is exposed to two unique and separate types of risk: systematic and unsystematic risk. Systematic risk is referred to as "market risk" or "un-diversifiable risk", and is the risk that an investor is exposed to regarding market movements as a whole. Systematic risk is comprised of small changes in stock prices that are the result of day-to-day market movements and general information being priced into the entire stock market. Beta allows investors to easily measure the systematic risk of a security against the market as a whole, and is a factor used in many pricing models, including the Capital Asset Pricing Model (CAPM). The second type of risk an investor is exposed to when purchasing equities is firm-specific or idiosyncratic risk. Investopedia.com defines idiosyncratic risk as, "risk that is specific to an asset or a small group of assets." Idiosyncratic risk can be reduced or even eliminated from equity portfolios through proper diversification techniques due to the fact that firm-specific risk has a minimal amount of correlation to overall systematic risk. Although idiosyncratic risk can be eliminated through diversification it is idiosyncratic risk, rather than

systematic risk, that accounts for the majority of risk in stocks over time. As a result, most investors look to eliminate unsystematic risk through diversification by following Modern Portfolio Theory, however, investors can "over-diversify" and expose their portfolio to an excessive number of holdings reducing their ability to generate elevated returns. The level of idiosyncratic risk is important to investors, as it benefits investors by raising potential stock returns and can reduce the market risk component of total risk that a portfolio is exposed to.

Figure 1-1:

Diagram of Total Risk



Source: Investopedia.com

Additionally, idiosyncratic risk impacts the construction of mutual fund and stock portfolios through its impact on the covariance of assets in a portfolio. Specifically, increases in the overall level of idiosyncratic volatility in markets means that investors would require a higher number of holdings to diversify away idiosyncratic risk. Research shows that the average number of stocks held by different types of funds varies greatly. Mutual funds and Exchange Traded Funds (ETF's) commonly hold 40-50 different stocks in their portfolios while large institutional funds and hedge funds are shown to

average eight stocks. Furthermore, it seems that individuals are the least diversified holding an average of just four stocks in their personal accounts. Investors and institutions wishing to create diversified portfolios need access to an accurate model that will help provide them with an optimal number of holdings necessary to eliminate idiosyncratic risk.

In this thesis, I wish to calculate the overall level of idiosyncratic risk present in the market today and explain the trend in firm-specific risk from the 1990's to present day. I then hope to assess the relationship between idiosyncratic risk and the numerous economic indicators in an effort to prove that the business cycle itself has an effect on the average level of idiosyncratic volatility. This analysis of idiosyncratic risk will be conducted on a sample of companies, taken from the Standard and Poor's 500 index, that have remained publicly traded for the last 20 years and will be done on a monthly basis.

LITERATURE REVIEW

The well-known traditional CAPM model developed by Sharpe, Linter, and Black has been used to predict portfolio and stock returns since being introduced to the world in 1961. The Capital Asset Pricing Model (CAPM) is a model used to price individual securities or groups of securities arranged into portfolios. The traditional CAPM is written as,

$$r_a = r_f + \beta_a(r_m - r_f)$$

The CAPM model takes into account the expected return of the market that the security is traded (r_m), and the theoretical return of a risk-free asset (r_f), as well as an asset's variability compared to market risk, known as non-diversifiable or systematic risk, (β_a). The CAPM is a single factor model meaning that only market risk represented by beta is significant for valuation purposes. It is also an equilibrium model, meaning that demand for an individual stock or portfolio is calculated while trying to minimize risk and maximize return. However, this model takes no measure of idiosyncratic risk (diversifiable risk) into account, implying that idiosyncratic risk has no effect on security returns or expected returns because it can be completely eliminated through adequate diversification.

This model has been questioned by some of the world's most premiere financial minds who attempt to poke holes through its basic assumptions. Beginning in 1969 empirical studies began to be published rejecting the traditional CAPM model including work from Jensen and Scholes in 1972 and additional research from Douglas in 1969. These studies suggested that additional factors contributed to returns and should be

included in pricing models as variables that dictate expected returns. However, it wasn't until 1996 that Eric Falkenstein discovered the potential importance of idiosyncratic risk when he suggested that holdings of mutual funds were related to idiosyncratic volatility (Malkiel).

The Capital Asset Pricing Model is based off of the assumption that all investors have the ability to hold the entire market portfolio; however that may not actually be the case. There are many factors that deter investors of every type from holding the entire market portfolio. First, more than half of U.S. investors have accounts with brokerage firms where, because of limited resources, these investors normally only hold a handful of stocks. In fact, even institutional portfolios hold an average of only eight stocks in an effort to accept considerable amounts of idiosyncratic risk. These "actively managed funds" charge large management fees for the promise of providing returns much higher than market indices, however, they are simply exposing their investors to higher amounts of systematic risk while attempting to locate undervalued securities and arbitrage opportunities. Furthermore, average retail investors hold just four stocks in their personal trading accounts, either due to limited resources or in hopes to gain outsized profits (Simin).

Transactions costs also play a major role in limiting investors from holding an extremely large number of securities. Investors with small amounts of capital in brokerage accounts simply cannot afford to purchase shares from the number of companies necessary to construct a portfolio equivalent to the market portfolio. Mutual fund managers are also forced to keep transaction costs low and often times only re-calibrate weightings of index funds on a weekly basis. Additionally, companies have

begun to issue stock options to higher ranking employees as a form of compensation or offer to match 401K contributions with company stock. Employees may struggle to properly hedge stock from their employer and are often constrained from liquidating their positions for a number of years after they are granted shares causing these employees to hold very unbalanced portfolios that do not resemble the market portfolio. Other factors that may keep investors from holding the overall market portfolio include limitations on short sales, taxes on capital gains, issues with liquidity of smaller companies shares and incomplete information (Malkiel).

Given the above limitations it can be inferred that a large percentage of investors that actively participate in the market either choose not to hold the market portfolio or are unable to do so. We can call this group of investors who either cannot or do not hold the market portfolio "constrained investors". These constrained investors now present a problem for the rest of the market participants who wish to hold the entire market portfolio. "Free" or "Unconstrained" market participants are also now unable to hold the entire market portfolio because the market portfolio is technically made up of sum the constrained investors holdings and the free investors' holdings. A case study for this finding can be found in the U.S. stock market by looking at the holdings of mutual fund portfolios. Mutual Funds make up about one-third of the total assets invested in the U.S. equity market and typically do not allocate their portfolio's as the CAPM suggests. The enormous amount of capital controlled by mutual funds undoubtedly affects the overall supply and demand of stocks making it difficult for many investors to hold the true market portfolio even if they attempted to do so. Additionally, unconstrained investors have no way of knowing which securities constrained investors are actually holding in

their portfolios, thus making it impossible for unconstrained investors to hold the true market portfolio (Malkiel).

This finding challenges the CAPM's assumption that all investors have the ability to hold the market portfolio, and therefore forces investors to not only care about simple market risk but also idiosyncratic risk. Looking at this effect on a single stock, equities that are not held by most constrained investors will have a supply that is relatively high compared to stocks that are held by both constrained and free market participants. This elevated level of supply will therefore lead to depressed prices and the potential for abnormally high returns when supply returns to equilibrium. This is one of the ways that an idiosyncratic risk premium can reward investors for investing in stocks that are out of equilibrium states of supply (Malkiel). Looking at this effect on the market, the market portfolio can now be broken down into the *actual* market portfolio and the *available* market portfolio. The *actual* market portfolio can be defined as the ideal market portfolio constructed without taking constrained investors into account, while the *available* market portfolio is the market portfolio that exists when taking constrained investors into account. This *available* market portfolio will be made up of fewer stocks and will be less diversified, therefore making it inherently riskier. When investors use the *actual* market portfolio and traditional CAPM to value securities they are discounting the amount of risk that needs to be priced into the security. When investors cannot hold the *actual* market portfolio the expected return of securities is not only related to systematic risk captured through beta, but also idiosyncratic risk. Expected returns will also be affected by an elevated risk premium due to idiosyncratic risk forced on market participants

because of the constraints highlighted earlier. It is through this elevated risk premium that idiosyncratic risk becomes relevant to asset pricing models (Malkiel).

Although we know that certain factors such as the size and book to market ratios help in explaining stock returns, there is now evidence to support the claim that idiosyncratic volatility may be a significant factor in explaining stock returns (Fama). There appears to be a large positive relationship between expected returns and levels of idiosyncratic risk, meaning that companies which frequently incur large price changes due to idiosyncratic factors will likely have higher expected returns. Furthermore, factors once thought to affect stock returns such as the size-effect may simply be attributed to idiosyncratic risk (Malkiel). Idiosyncratic risk is not only important to equity pricing models, it also effects option prices which depend on the total implied volatility of the underlying. Given the importance of idiosyncratic risk in pricing assets it is now significant to ask what factors affect the level of idiosyncratic risk in the market and for individual firms.

Researchers have pointed to many potential determinants for the growth in idiosyncratic risk over the last few decades. The most notable findings suggest that firm earnings, institutional ownership, industry composition, growth options and new listings all have varying effects on firm-specific risk.

Wei and Zhang's *Why Did Individual Stocks Become More Volatile?* hypothesizes that increased idiosyncratic volatility is the result of weak corporate earnings. In an effort to prove that increased firm-specific risk is the result of weak earnings Wei and Zhang looked to ROE as a strong fundamental indicator of earnings. Dividends were considered

as a possible fundamental indicator, however researchers were weary given the fact that dividend payout ratios are under the full discretion of management teams who attempt to smooth out dividend payments in order to achieve stable long term growth. Instead, the level of corporate earnings was decided upon as a stronger fundamental indicator. Although it is possible for management to slightly manipulate earnings reports, doing so in the long run can lead to massive criminal investigations, normally a large deterrent for potential violators (Wei).

Testing revealed that two fundamental variables are significant in explaining the trend of increased idiosyncratic risk; average return-on-equity and variance of return-on-equity over the last three years. Other fundamental variables such as firm size and leverage, however, neither proved to have a significant impact on the rise in idiosyncratic risk over the last few decades. Idiosyncratic risk proves to be negatively related to levels of ROE while being positively related to the volatility of return-on-equity (Wei). This implies that if firms report consistently strong earnings idiosyncratic risk for that security should be relatively low, while firms that report earnings that fluctuate between being strong and weak will have relatively high levels of idiosyncratic risk. Interestingly, the lion's share of the decline in ROE and rise in variance of ROE during the last few decades is attributable to newly listed companies. This is an intriguing find given that Fama and French note that a significant change occurred in the IPO market during the early 1980's which allows firms to IPO at earlier stages in their corporate life-cycle when they are less profitable. It appears that these immature and newly listed firms tend to have higher volatility of ROE and lower levels of profitability causing idiosyncratic risk to rise over time (Wei).

Another hypothesis regarding factors that affect idiosyncratic risk relates to growth options for corporate managers. Cao, Simin, and Zhao believe that the increase in firm-specific volatility can be traced to the variance of growth options available to corporate managers. The positive effects of idiosyncratic risk may eventually lead managers, especially those of highly levered firms, to select projects that actually increase the idiosyncratic volatility of the firm. This can benefit shareholders, thus indirectly benefitting managers, by increasing the total value of equity while also reducing the market risk component of total risk (Cao). Interestingly, variance in growth options only impacts the firm-specific stock risk of companies who can take advantage of the different projects available in the market. This is shown through differences in idiosyncratic risk among NASDAQ and NYSE/AMEX stocks.

Idiosyncratic risk is roughly four times larger for NASDAQ firms compared to NYSE firms. This is because NYSE/AMEX firms are healthier corporations with higher levels of cash flow and profitability, allowing them to choose from a number of growth options on the "menu" for corporate managers. However, for NASDAQ corporations only the level of growth options, rather than the level and variance, impacts the idiosyncratic risk of the firm. This means that with less variability in growth options but simply a higher number of choices on the menu firm-specific risk will grow significantly (Cao).

Additionally, corporate managers can have a large impact on their firms' level of idiosyncratic risk through the investment decisions that they make. Managers who feel their stock price will benefit from higher levels of idiosyncratic risk can select relatively high risk investment projects, while those who feel their shares may be overly risky can

simply choose projects with lower but more stable returns. Changes in the set of possible investments play a large role in levels of firm-specific risk. For example, if the menu of possible investment opportunities is highly variable, management teams will have more frequent opportunities to select projects that will either increase or decrease the idiosyncratic risk of the firm as they see fit. This study uses the ratios of market value to book value of assets (MABA) and the ratio of the market to book value of common equity (MEBE) as proxies for growth options available to a firm due to the fact that the markets value of equity and assets effectively price expected future growth options into a firms value in the way that book value does not capture.

MABA = [Total Assets – Total Common Equity + Price * Common Shares Outstanding] / Total Assets

MEBE = [Price * Common Shares Outstanding] / Total Common Equity

Both MABA and MEBE are positively related to growth options and firm-specific risk and are proven to significantly explain increases in idiosyncratic volatility. In fact, time-series data from this paper shows that variance of growth options accounts for as much as 61% of variation in idiosyncratic volatility (Cao). In fact, growth options may explain even more variation in idiosyncratic risk in the future. As the world's economies continue to develop, grow, and globalize this presents managers with a growing number and variety of growth options. As local markets continue to globalize markets will provide managers with more opportunities for growth, and due to increased competition managers will be more likely than ever to seek out risky projects with the goal of increasing firm value (Cao).

Another possible explanation for rising levels of firm-specific volatility is the "New-Listing Effect". The "new-listing effect" implies that increases in idiosyncratic risk can be blamed on changes in the overall composition of publicly traded firms due to financial market development. As the stock market has matured and grown more stable in the U.S. the nature of companies listing their shares appears to have grown less stable. Firms listing their shares in the 1980's and 1990's appear to have lower margins and less consistent earnings while also having higher levels of expected growth and lower survival rates (Fama). In general, firms with low market capitalization, low dividends and few tangible assets are responsible for the increase in idiosyncratic risk. Surprisingly, the new-listing effect argues that these firm characteristics are not the result of firm age but rather listing date, meaning that as companies mature and grow in size their level of idiosyncratic risk will remain the same and not change. These characteristics are not thought of as a result of firm age, but rather as a function of listing vintage (Brown).

According to the new-listing effect firm age cannot be an explanation for steady increases in idiosyncratic risk over time. If a large number of young firms were to publicly list, this may cause a short term rise in idiosyncratic risk, however under the age argument, as those firms age and become more stable their idiosyncratic risk should also decline. Evidence shows that after a firm is listed on the public market its idiosyncratic risk typically remains flat, however, when taking levels of idiosyncratic risk for different listing time series each subsequent period of listings begins trading at a higher level of idiosyncratic risk than the time frame before it. Brown and Kapadia also suggest that it is listing date rather than firm specific characteristics that cause higher firm-specific volatility. When analyzing firm fundamentals based on size, market-to-book, margins,

asset tangibility, and dividends they attempted to prove that these characteristics were actually most correlated with the time when a company lists on a public exchange, thus explaining why previous research had selected these fundamentals as the cause for increased firm-specific risk (Brown).

The new-listing-effect also attempts to disprove prior theories suggesting that increases in the size of risky industries led to rise in idiosyncratic risk. After conducting research by analyzing the top five industries by size over the course of the last 40 years it was found that more stable industries have become a smaller portion of the overall market while riskier industries have become the largest portion of the public markets. Furthermore, it was found that new listings, opposed to organic growth, proved to be the factor that led to large growth of risky industries (Brown). The new-listing effect proves that as U.S. markets grew in complexity and sophistication this allowed riskier companies to gain access to capital markets when previously no such access had existed. As a result, a larger proportion of companies in the U.S. are now publicly listed suggesting that the overall increase in idiosyncratic risk over the last 40 years originates with these newly-traded firms. Furthermore, the new-listing-effect supports the U.S. economy by disproving claims that deteriorating stability of publicly listed firms may be the result of economic instability, and proving that it may be the result of a new age of increased financial market development.

Finally, two remaining factors that cause increases in the levels of idiosyncratic risk are institutional ownership and industry competition. As firm-specific volatility has risen over the 1980's and 1990's so has the level of institutional involvement in the U.S. equity markets. Where the market was once made up of millions of retail mom & pop

investors, present day equity markets are dictated by the largest financial institutions in the world. The percentage of equity owned by large financial institutions has grown over 800% since 1950 and research indicates that institutions currently make up as much as 90% of trading volumes on the NYSE on a given day (Xu). Previously, when investment decisions were made by a largely fragmented market of individual investors were often uncoordinated and relied on multiple sources for information and news. Institutional investors, such as large hedge funds, mutual funds, and pension funds, typically rely on news from similar sources and frequently alter their views and ratings of individual securities and the overall stock market. The median level of institutional ownership among S&P 500 companies amounts to a staggering 62.5%. The highly coordinated buying and selling of large institutions will cause prices to be more volatile as market prices incorporate new information more quickly than in the past. This implies that institutional ownership will have a much more profound effect on individual stock volatilities, rather than market volatility, because acquiring new information on individual stocks happens much more frequently than on the overall market. After controlling for the size effect, Malkiel and Xu found that institutional ownership has a significant effect on idiosyncratic risk. That is to say that the higher the percentage of shares owned by institutional investors, the greater the volatility of individual stock returns.

Finally, it is possible that changes in industry weightings relative to the overall economy, have caused idiosyncratic risk to rise over the last four decades. In the paper *Why Does Firm-Specific Risk Change over Time?* James Bennett and Richard Sias propose that changes in the market weight of generally riskier industries and a growing

importance of small firms in the market may have led idiosyncratic risk to rise steadily. In 1962 the four largest industries accounted for 44% of aggregate market capitalization and included the generally safe industries of Petroleum and Natural Gas, Utilities, Telecommunications, and Automobile Production. As of 2003 those industries only represent 14% of the market and have been replaced by the generally risky industries of Banking, Business Services, Pharmaceuticals, and Trading accounting for 36% of aggregate market capitalization today, where they accounted for 5% in 1962 (Bennett). This growth in industries with high levels of idiosyncratic risk could explain changes in average firm-specific risk over time.

To test this theory Bennett and Sias classified industries as either "risky" or "safe" based on average firm-specific risk of securities within the industry. Then they compared the ratio of total capitalization of risky to safe industries to the level of average firm-specific risk present in the market every month. Their findings showed a clear result; that the total level of idiosyncratic risk rises as risky industries become a larger portion of the overall equity market (Bennett).

Similar to industry composition, they raised the hypothesis that industry concentration may also play a role in influencing a company's level of idiosyncratic risk. First, they identified the number and rank of securities in each industry based on market capitalization and then updated their findings each month using updated security weights for the level of industry return. Their findings revealed that between 1962 and 2003 industry concentration steadily declined as the number of securities in each industry grew as new firms publicly listed and that over 55% of aggregate idiosyncratic risk was driven by changing levels of industry concentration (Bennett).

DATA & METHODOLOGY

I have collected data from FactSet for U.S. listed stocks and the S&P 500 stock market index from the period of March 1, 1994 to March 1, 2014. I then constructed a portfolio of 30 stocks to use as a sample of companies to serve as a proxy when calculating the level of average idiosyncratic risk present in the equity market. These 30 stocks only included companies that had been consistently listed on U.S. exchanges for the past 20 years in order to minimize the effect of IPO's, acquisitions and bankruptcy's. This sample includes three stocks from all ten major sectors of the S&P 500 index (Consumer Discretionary, Consumer Staples, Energy, Financials, Healthcare, Industrials, Information Technology, Materials, Telecommunications, Utilities).

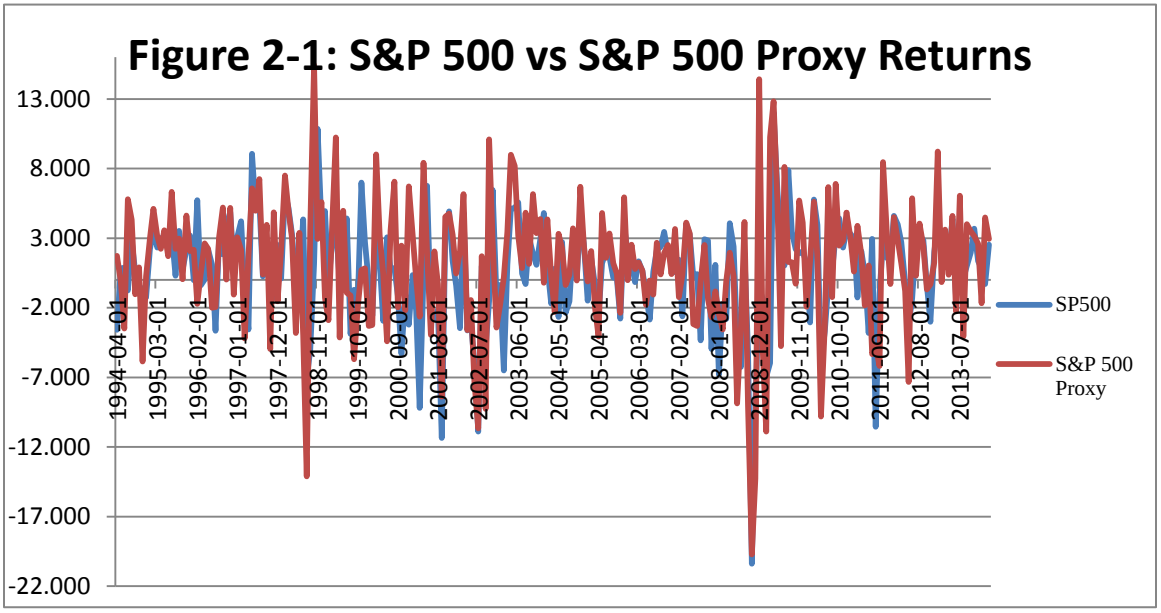
I use monthly stock returns as a basis for calculating four time series of average idiosyncratic risk over the 20 year period of returns. In order to calculate idiosyncratic risk I took a regression of the returns of each of my S&P 500 proxy companies individually versus the actual return of the S&P 500 for each company, with the S&P 500 actual returns representing the independent variable. I then took a variance of the monthly residuals from each company's regression as my measure of each stock's idiosyncratic risk. I then calculated the average variance of residuals among all 30 stocks included in the S&P 500 proxy set in order to find the average level of idiosyncratic risk in the market for the given time period. This procedure was replicated for each of the four time series being tested in this study. This average represents the level of idiosyncratic risk in the U.S. equity market. The specific number does not represent anything and is not useful in showing the level of idiosyncratic risk until compared to the average from each time

series of this study. This procedure was replicated for each of the four time series being tested in this study.

I then collected data from the St. Louis Federal Reserve Economic Database (FRED) for numerous economic indicators including Real Gross Domestic Product Growth, the Unemployment Rate, Non-Farm Payrolls, the ISM Non-Manufacturing Business Activity Index and the ISM Manufacturing PMI Composite Index. Monthly data for all economic indicators was gathered for the period of March 1, 1994 to March 1, 2014 except for Real Gross Domestic Product where quarterly data was used. In order to assess the relationship between the various economic indicators and the average level of idiosyncratic risk in the market, I calculated the correlation between each economic indicator and the level of idiosyncratic risk for each of the four time periods.

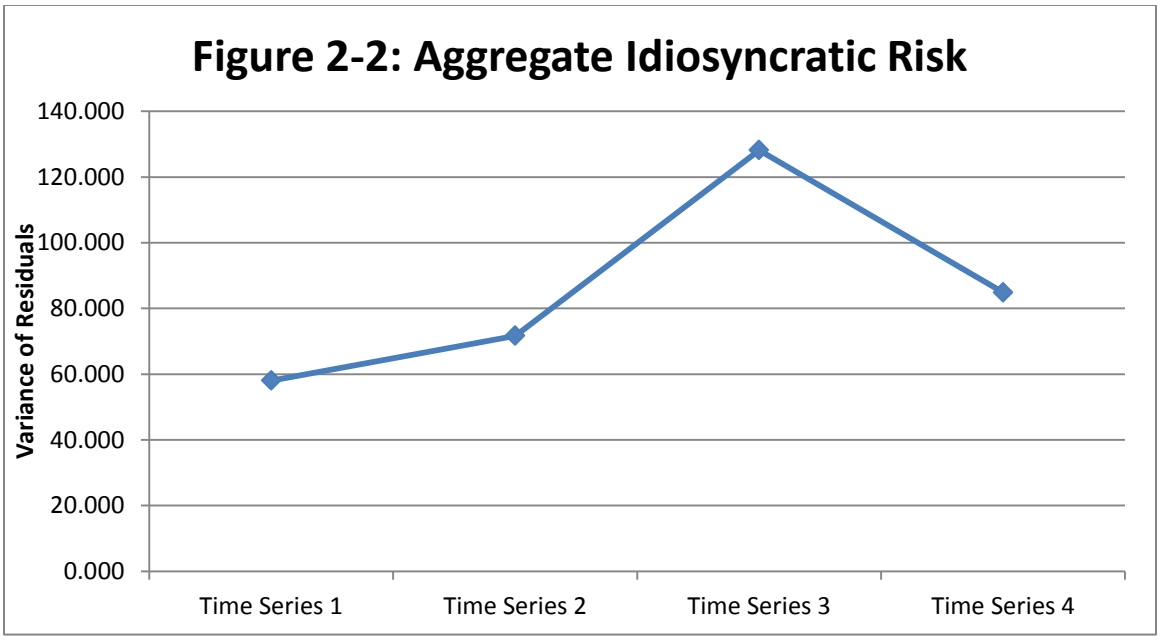
ANALYSIS AND FINDINGS

In this analysis both the level of average idiosyncratic risk in the U.S. equity market and the relationship between the business cycle and idiosyncratic risk will be examined. The effect of dividends was not included in either the returns of the S&P 500 or of the 30 sample companies as idiosyncratic risk is only the result of changes in return from price movement, rather than from price movement and reinvestment of dividends. It is important to note that the returns of the S&P 500 proxy portfolio will not exactly mirror those of the actual S&P 500 Stock Price Index; however, the proxy portfolio did adequately represent total S&P 500 returns as is visible in the figure below.



After conducting my analysis on the average level of idiosyncratic risk present in the U.S. stock market over the last two decades my findings were surprising to say the least. Numerous papers have documented the rise in firm-specific risk between the 1960's and late 1990's; however, it seems that the previous trend has ended. Time Series 4 represents the average level of idiosyncratic risk present from 1994-1999, Time Series

3 from 1999-2004, Time Series 2 from 2004-2009, and Time Series 1 from 2009-2014. Idiosyncratic risk grew a staggering 51% between Time Series 4 and Time Series 3 from a level of 84.9 to 128.2; however, this marks the peak of idiosyncratic risk in the last twenty years. From Time Series 3 to Time Series 2 idiosyncratic risk fell 44% before falling another 19% before Time Series 1.



I believe there are a few potential explanations for the departure from the previous trend. First, previous studies have argued that the previous increases in idiosyncratic risk were the result of increased numbers of new firms listing on public exchanges. It is interesting to note that by my calculation idiosyncratic risk peaked in the middle of Time Series 3. This could point to the Dot Com Bubble as an inflection point for the average level of idiosyncratic risk in U.S. equity markets. After the Dot Com Bubble new listings of small firms, especially those in the tech industry severely fell. This would have affected the level of idiosyncratic risk for two reasons. First, the overall number of new listings on U.S. exchanges declined significantly resulting in a higher percentage of firms

listed on exchanges to be more mature and stable in nature. Second, after the collapse of the Dot Com Bubble investors became obsessed with avoiding a repeat bubble. Due to this increased level of risk aversion, institutional investors became skeptical of any high risk company attempting to entice investors during road shows prior to their IPO. This increased risk aversion would likely lead to restricted access to public markets for generally risky companies, resulting in the majority of new listings originating in safe industries. The IPO market took years to recover after the collapse of the Dot Com Bubble, likely leading to the decrease in idiosyncratic risk between Time Series 3 and Time Series 2.

This argument also supports the continued decline in idiosyncratic risk witnessed between Time Series 2 and Time Series 1. The Financial Crisis or Great Recession took place in the middle of the Time Series 2. Following the Great Recession the IPO market crashed. In 2008 only seven companies listed their shares on the public market for the first time representing just $765 million of stock offered during the entire year. The IPO market hardly fared better in 2009 with just 13 companies completing an initial public offering representing just $1.9 billion of stock offered. In fact, the IPO market continued to struggle through until 2012 and 2013 when Facebook (NYSE: FB) entered the public markets by raising $16 billion in capital in one single transaction and Twitter (NASDAQ: TWTR) raised $1.8 billion in capital during their IPO. Overall, this ten year period of depressed activity in the new issue market likely played a large role in reducing the average level of idiosyncratic risk in the market.

Next, previous studies have argued that the number and variability of growth options available to corporate managers are positively related to the average level of

idiosyncratic risk. Following the Dot Com Bubble the M&A market also took a massive hit. Mergers and Acquisitions represent one of the largest and most dynamic growth options for corporate managers to take advantage of when attempting to alter their company's future profitability. Any decline in M&A activity would reduce not only the number of growth options available to corporate managers, but also the variability of those options. Corporate managers can make many types of acquisitions for many different reasons. Bolt-On acquisitions can be used to fill a gap in a company's product line or to increase the effectiveness of new products. Large acquisitions can help company's expand into entirely new geographic or end markets and can even instantly remove a competing brand from the marketplace by making them one of your own. Similar to the IPO market, the M&A market was not only affected by the Dot Com Bubble, possibly causing the decline in idiosyncratic risk from Time Series 3 to Time Series 2, but was also affected by the Financial Crisis of 2007-2009. Merger and Acquisition activity dropped significantly in 2009 when just 109 deals were closed representing just $12.4 billion in value. The recovery of the M&A market may not be complete, in 2013 only 90 M&A deals were closed representing just over $14.5 billion in value. The decline in the M&A market coupled with the decline of the IPO market due to economic shocks may have led to the significant decline in average firm-specific risk between 1999 and 2014.

The next section of my study focused on the relationship between various economic indicators and the level of idiosyncratic risk. For this analysis I selected five economic indicators including, Real GDP Growth, the Unemployment Rate, Non-Farm Payrolls, Non-Manufacturing Business Activity Index, and the ISM PMI Manufacturing

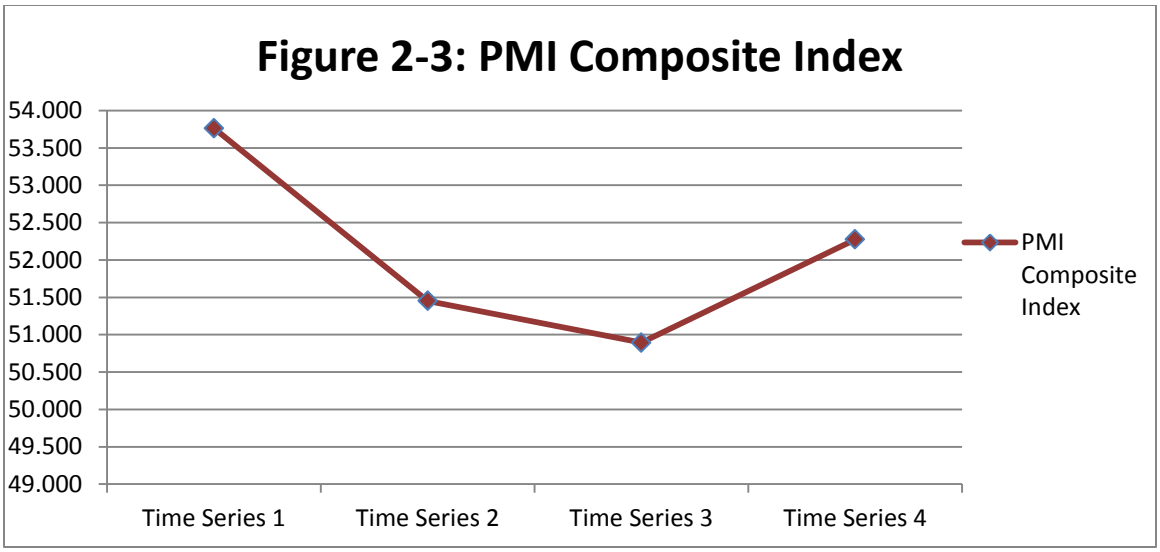
Index. I selected these indicators in an attempt to cover data from various sectors of the economy, ranging from manufacturing to the labor market, as it is difficult to predict which sector will have the biggest effect on firm-specific risk. After conducting my data I computed averages for each indicator over each time period.

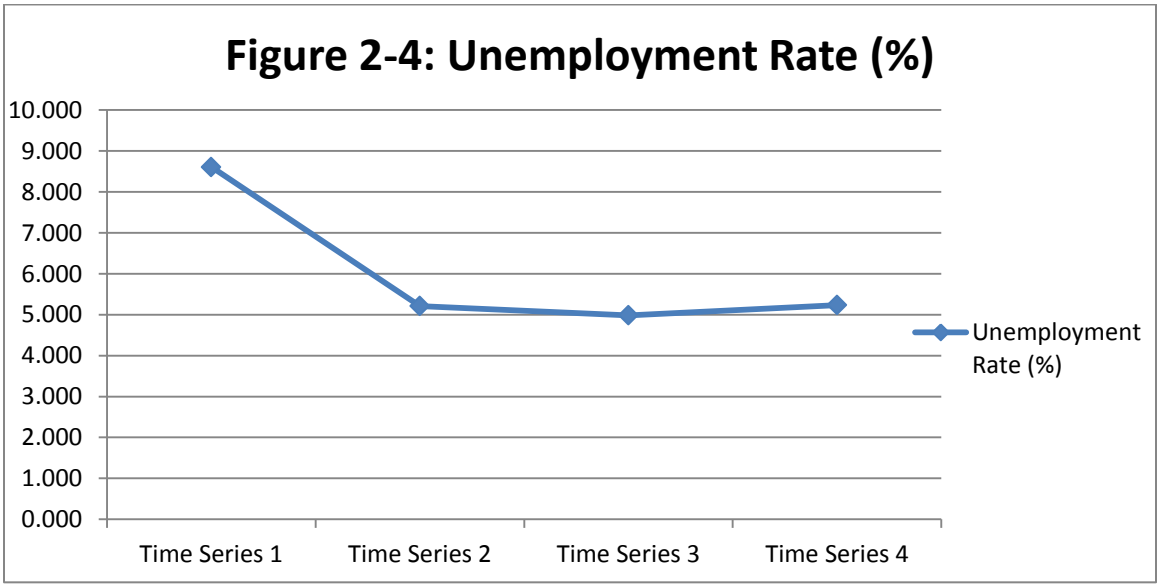
Table 2-1: Economic Data Summary	Average Time Series 1	Average Time Series 2	Average Time Series 3	Average Time Series 4
Idiosyncratic Risk	58.060	71.665	128.182	84.866
GDP Growth (%)	0.548	0.278	0.688	0.995
Unemployment Rate (%)	8.607	5.210	4.983	5.233
Non-Farm Payrolls	132893	135542	130953	120653
Non-Manufacturing Business Activity Index	55.893	56.070	56.387	58.225
PMI Composite Index	53.763	51.452	50.893	52.275

Using the averages presented above, I computed the correlation between each indicator and the level of idiosyncratic risk over the four time series.

Table 2-2: Correlation Matrix	
	Idiosyncratic Risk
GDP Growth	0.344
Unemployment Rate	-0.655
Non-Farm Payrolls	-0.184
Non-Manufacturing Business Activity Index	0.169
PMI Composite Index	-0.776

From this analysis I concluded that the only variable that could possibly explain changes in the level of idiosyncratic risk is the PMI Composite Index. The PMI Composite Index and the Unemployment Rate produce similarly shaped curves when graphed and have high negative correlations with firm-specific risk, but tell significantly different stories about the economy.





The PMI Composite Index is a monthly, seasonally adjusted index that reports data on the current state of manufacturing in the United States economy. A reading above 50 indicates that the manufacturing sector of the economy is expanding, while a reading below 50 indicates that the manufacturing sector is generally contracting. The Unemployment Rate represents the percentage of individuals in the labor force who

cannot find work. The data is restricted to individuals over the age of 16 and excludes members of the Armed Forces.

Although the unemployment rate has a strong negative correlation with idiosyncratic risk, this is slightly misleading. This would infer that as the unemployment rate rises and companies lay off workers and cut jobs in efforts to remain profitable in tough economic times, during which idiosyncratic risk should fall. This logic does not make sense because as firms struggle to remain profitable and begin to cut jobs, all else equal, this undoubtedly increases firm-specific risk.

I do believe that the PMI Composite Index qualifies as a strong explanatory variable when attempting to explain changes in average idiosyncratic risk over time. As the PMI Index fell between Time Series 4 and Time Series 3, the level of idiosyncratic risk peaked. Between 2004 and 2014 the PMI Index experiences a steady recovery to sustained manufacturing sector expansion while the level of idiosyncratic risk declines steadily over the same period. I believe the PMI Index represents an adequate proxy for overall business activity in the United States, and therefore accurately reflects the state of corporate earnings levels. As the PMI Composite Index declines to near or below 50, this represents a level where corporate earnings struggle to grow and any negative firm specific news is immediately reflected in prices as it cannot be ignored due to rapid earnings growth. However, as the PMI Composite Index strengthens to readings above 50 corporations are consistently growing and corporate earnings are healthy. Minor firm specific news does not impact prices in the way that it would if earnings growth was uncertain, and as a result firm-specific risk and the frequency of large news driven trade downs decline.

CONCLUSION

After analyzing the findings of this study, there is strong evidence that the overall trend of firm-specific risk has significantly changed in the years following the Dot Com Bubble. While it is confirmed that idiosyncratic risk trended upward from the 1960's through the late 1990's, significant declines in the volume of newly listed companies and declines in the number and variability of growth options may help to explain the significant decline in firm-specific risk from 1999 through the present day. Furthermore, there is strong evidence to suggest that the PMI Composite Index is highly correlated with the average level of idiosyncratic risk in the U.S. equity market due to its ability to serve as an adequate proxy for corporate strength in U.S. markets. However, other macroeconomic indicators such as Real GDP Growth and the Unemployment Rate are much more likely to explain and predict the level of market risk, rather than average idiosyncratic risk.

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