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THE SYSTEMIC RISK OF INCREASED DEBT ON CORPORATE BALANCE SHEETS
DURING THE NEXT RECESSION

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ABSTRACT

This paper analyzes whether a systemic economic threat exists due to companies issuing too much debt in the years following the Great Recession. It utilizes a stress test similar to that of the Federal Reserve where a selection of companies across five sectors are subjected to a variety of hypothetical recessions with severities relative to the Great Recession. The analysis found that no individual sector poses a major threat, but certain sectors are more likely than others to be distressed during the next recession thus increasing their likelihoods of causing widespread damage to the economy.

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Chapter 1

Introduction

In response to the Great Recession of 2008, interest rates were lowered to record levels and were held there for an extended period of time. Even though the move was likely a contributing factor to the economy's ability to exit the recession, it meant that companies would be able to borrow money at an extremely low cost. As such, companies have borrowed large sums to finance their business leading to a corporate debt level that is expected to reach \$75 trillion by 2020 (Cox). Furthermore, corporate debt has been growing at a rate that exceeds the rate at which the economy has been growing (Cox).

In an expansionary economic environment, higher levels of debt are not an issue as companies are able to generate the necessary cash flows to service the debt. However, recessions are inevitable, and at some point the economy will contract for a period of time. This means that the companies that once enjoyed steady streams of cash flow will eventually be forced to conduct business in conditions that are not nearly as favorable.

A potential problem lies in the fact that even in recessions, companies are still required to make their interest and principal payments. If their cash flows fall below a certain level due to macroeconomic events, such as another Great Recession, they will be forced to attempt to refinance their debt. In a recession, though, refinancing debt can be difficult as investors are less willing to lend money. Therefore, companies may be forced into default if their suppressed cash flows cannot cover their debt service payments.

This paper will analyze whether companies have taken on so much debt in the years following the Great Recession of 2008 that they will be unable to service the debt in a recessionary environment where financial performance is weaker. It will subject a variety of companies and industries to three hypothetical recessions, each with a different severity relative to the Great Recession. It will then determine whether the studied companies and sectors will be at risk of severe financial distress and possibly even default, which would have a rippling effect throughout the entire economy. The analysis is effectively a basic stress test model of corporate leverage similar to the type of stress test conducted by the Federal Reserve when it looks at the potential of bank failures in severe economic conditions.

Chapter 2

Literature Review

Debt and Capital Structure Theory

Modigliani and Miller

In order to properly review capital structure theory, it is almost compulsory to begin with the work of Modigliani and Miller, which is stressed in a capital structure theory review performed by Luigi Popescu and Sorin Visinescu in 2009 that covers Modigliani and Miller and other topics that will be discussed later in this paper. In 1958, the two professors introduced their idea that the composition of a capital structure is irrelevant in determining a firm's market value (Modigliani and Miller 1958). This idea is significant because it makes the argument that the amount of debt a firm takes on should not matter to the shareholder. However, the theory relies on numerous assumptions that make its real-world application difficult to see. The most critical of these assumptions are that taxes do not exist and that companies do not experience costs associated with bankruptcy. Because these assumptions obviously do not hold up in real life, Modigliani and Miller later revisited their theory by removing the assumption of no taxes. Under this set of assumptions, including more debt in the capital structure is optimal because of the tax-deductibility of interest payments (Modigliani and Miller 1963). A major concern, though, was that Modigliani and Miller's theory did not place any sort of cap on the maximum amount of debt that should be issued (Frank and Goyal 2009). This means that, according to Modigliani and Miller, maximizing the amount of debt would be the most beneficial means of financing.

Tradeoff Theory

This idea led to the creation of the tradeoff theory. Robichek and Myers summarize the tradeoff well when they describe it as being "the present value of the tax rebate associated with a marginal increase in leverage . . . [and] the present value of the marginal cost of the disadvantages of leverage" (Kraus and Litzenberger 1973). A company's goal, therefore, should be to find the optimal combination of debt and equity financing that allows it to maximize the benefits of debt without putting too much stress on the company as a result of debt payments. Kraus and Litzenberger define the optimal level of debt as "that level of debt such that the resulting division of states (into those in which the firm is solvent and those in which it is insolvent) yields the maximum market value of the firm" (Kraus and Litzenberger 1973). Kraus and Litzenberger "suggest a stochastic dynamic programming approach to search for an optimal capital structure," but it is "too complex to implement" according to Kim (Kim 1978). Additionally, James H. Scott Jr. (1976) shows that an optimal structure may be determined, but he makes a critical assumption that investors are "indifferent to risk" (Kim 1978).

Pecking Order

In 1984, Myers wrote about the "pecking order theory" in an attempt to explain how companies determine their capital structure. According to him, there is a hierarchy of the different means of financing that companies prefer. Companies prefer internal financing, then the safer debt financing, followed lastly by equity financing (Myers 1984). Myers explains that internal financing takes precedence because it allows managers to maintain more control over their company's financials by avoiding capital markets and the costs associated with them. He also discusses how issuing debt is favored over equity because debt is a cheaper source of financing and is safer, which is defined as the security "whose future value changes least when

the manager's inside information is revealed to the market" (Meyers 1984). While Meyers does not provide an exact way of determining the optimal capital structure for a company, he does provide insight into how companies may choose their financing.

Important Factors in Capital Structure Decisions

The literature discussed thus far has shown how difficult it is to determine what the optimal capital structure is for a firm. Many different theories and models have been proposed, but we are still unsure of how to determine the optimal amount of debt. As such, it is important to look at what actual American firms have considered important to their capital structure decisions, which is exactly what Frank and Goyal (2009) did. They looked at publically traded companies from 1950 to 2003 and determined what factors affected the amount of leverage of companies. The factors and their positive (+) or negative (-) effects on leverage are as follows: "median industry leverage (+ effect on leverage), market-to-book assets ratio (-), tangibility [of assets] (+), profits (-), log of assets (+), and expected inflation (+)" (Frank and Goyal 2009). They also determined that empirical evidence does support to some degree the arguments of the tradeoff theory (Frank and Goyal 2009).

Furthermore, Jeffrey K. Mackie-Mason discusses how companies base financing decisions not as much on an overall capital structure as they do on an incremental basis (Mackie-Mason 1989). Companies appear to consider what the marginal tax benefits would be with each individual financing decision instead of looking at the aggregate of previous decisions. Furthermore, the "paper provides clear evidence of substantial tax effects on financing decisions" (Mackie-Mason 1989).

Determining what has been important to companies in the past is useful because it provides insight into how companies behave. Even though exact optimal capital structures still

evade researchers and managers, having an idea of how companies in the past approached decision-making creates a form of predictive power regarding future financing decisions. This enables us to better understand companies, and, in the scope of this paper, understand some of the reasons why companies decided to take on so much debt since the Great Recession.

Corporate Debt in the 1980s

Corporate debt levels rose in the late 1980s, which prompted a number of academic papers to be written about the causes and effects of increased corporate leverage. A paper by Ben Bernanke, John Campbell, and Toni Whited from 1990 analyzes this issue in depth. According to them, “debt-asset ratios for the nonfinancial corporate sector...rose from 0.40 in 1985 and 1986 to 0.42 in 1987 and 0.43 in 1988” (Bernanke, Campbell, Whited 1990). Additionally, “the debt-asset ratio in 1988 is the same, after a six-year economic expansion, as the ratio in 1981 and is only 1 percentage point below the all-time high in 1975, both recession troughs” (Bernanke, Campbell, Whited 1990). Debt and interest expense growth was outpacing even the fast growth in earnings and equity near the end of the decade. Even in the middle of the 1980s, as Kaufman notes in his paper, corporate debt was growing rapidly at 12.4% in 1985, exceeding the annual growth of 9.40% of the 1960s and 11.22% of the 1970s (Kaufman 1986). Kaufman also stresses how credit ratings significantly deteriorated during the same time period. He points out that “more credit ratings have been downgraded than upgraded since the start of the current business expansion in 1982” (Kaufman 1986).

As far as liquidity, Bernanke and Campbell were able to “find deterioration during the eighties in some measures of corporate liquidity, such as the ratios of interest expense to cash flow and current assets” (Bernanke and Campbell 1988).

Causes of Higher Leverage in 1980s

Kaufman looks to understand what caused debt to grow at the rate that it did. He first acknowledges that simply blaming inflation that resulted from poor policy is not satisfactory. He discusses a shift in willingness to borrow occurring after the 1930s, financial deregulation as more credit could be issued, financial innovation as it creates new means of issuing credit, securitization as it skews the idea of credit risk, globalization as companies can find creditors in other parts of the world, and an accommodative tax structure (Kaufman 1986).

Bernanke and Campbell also provide some explanations they had heard. First, junk bond growth increased the amount of debt that companies could issue since risk would not be increased; however, Bernanke and Campbell do not find evidence to support this (Bernanke and Campbell 1988). They also state the claim made that overfunding in pension funds enabled companies to increase leverage, but Bernanke and Campbell do not believe this to be true (Bernanke and Campbell 1988). Furthermore, a similar argument to that of Kaufman's is that the "norms of corporate finance have changed" (Bernanke and Campbell 1988). Even though they are unable to explain the shift, they acknowledge its presence. This might explain why companies were so willing to issue debt to repurchase equity and for leveraged buyouts, which hit a then-record in 1988 (Bernanke, Campbell, Whited 1990).

Causes of Higher Leverage Beyond the 1980s

The 1980s experienced its own increase in leverage, but leverage has also increased more recently for reasons both similar to and different from those of the 1980s. Bremus and Huber (2016) cited De Mooij (2011) who found that the "median tax elasticity of corporate leverage is 0.5, meaning that a 10% increase in the corporate tax rate... leads to a 5% increase in leverage"

(Bremus and Huber 2016). This idea of tax benefits from debt has already been discussed, but Bremus and Huber were able to quantify how much of a role it plays.

Cecchetti, Mohanty, and Zampolli also offer some explanation of why leverage increased. First, the macroeconomy was seen as being more stable (until the Great Recession) as a result of the Great Moderation that produced lower inflation and unemployment rates, which caused more borrowing in what was perceived as a less risky environment (Cecchetti, Mohanty, Zampolli 2011). Furthermore, lower interest rates beginning in the mid-1990s spurred more borrowing. This is particularly relevant to the economic environment following the Great Recession in which interest rates were lowered to their zero-bound. Cecchetti, Mohanty, and Zampolli also describe the importance of deregulation and tax policy in corporate leverage, but these topics have already been discussed.

Potential Consequences of Heightened Corporate Debt

Both papers acknowledge that the increased corporate leverage could have negative economic repercussions. Kaufman argues that the levels of debt caused government bonds to overtake corporate bonds as the market leader and that it is more difficult to trade bonds because “event risks, such as takeovers” frequently led to significant losses on bonds (Kaufman 1986). He also argues that an economy loses its flexibility by increasing corporate leverage when times of slowing income occur. Because debt servicing will require a greater percentage of income be dedicated to it, a recession could be exacerbated (Kaufman 1986).

Additionally, Bernanke and Campbell in an earlier paper stated that “higher levels of debt tend to magnify the sensitivity of firm net worth or equity values to aggregate shock” (Bernanke and Campbell 1988). They also argue that “debt-deflation” exists where wealth is moved from

firms to creditors when the level of inflation or prices is lower than expected. This in turn leads to lower investment and output because net worth has fallen (Bernanke and Campbell 1988).

Another argument for the negative effects of debt stems from the Keynesians who suggest that a distressed financial environment could hurt confidence and thus be an “automatic destabilizer” that makes spending more sensitive to external events (Bernanke and Campbell).

Perhaps even more consequential is the potential liquidity crisis that could ensue from corporate leverage. This argument stems from the fact that debt makes a company more prone to bankruptcy. If there is a string of bankruptcies, confidence could be affected thus prompting “all short-term creditors try to get out simultaneously,” which would greatly diminish the possibility of refinancing debt (Bernanke and Campbell 1988). The actual mechanism of bankruptcy stemming from this idea also creates risk as the legal process could hinder the liquidation of previously liquid assets, which would hurt creditors even more. Finally, the potential liquidity crisis would possibly adversely affect investment and production levels. While something similar to this idea occurred in the 1930s, the premise is still speculative due to a lack of convincing empirical evidence (Bernanke and Campbell 1988).

Bernanke and Campbell created a form of a stress test that was meant to determine how companies would react to financial distress. For instance, they ran a test under which they exposed capital structures of 1986 to the effects of the recessions in 1973-1974 and 1981-1982. They found that “about 20% of the firms in [their] sample encountered solvency problems by the second year of the 1973-74 simulation and a similar fraction...by the second year of the 1981-1982 simulation” (Bernanke, Campbell, Whited 1990). They note, however, that companies utilized interest rate hedging to reduce risk, which was not included in their simulations.

As for more recent studies, Stephen G Cecchetti, M S Mohanty, and Fabrizio Zampolli concluded in 2011 that “when corporate debt goes beyond 90% of GDP, it becomes a drag on growth” (Cecchetti, Mohanty, Zampolli 2011). Additionally, Moritz Schularick and Alan M. Taylor observe that “credit growth is a powerful predictor of financial crises” and that financial crises tend to be created by “credit booms gone wrong” (Schularick and Taylor 2012).

Corporate Debt Since the Great Recession

Since the financial crisis of the Great Recession, companies have been increasing their levels of debt, primarily long-term debt (Mukherjee 2016). Mukherjee found through his study a “higher long-term debt to asset ratio to be associated with lower capital expenditures and growth in fixed capital post-crisis” (Mukherjee 2016). Additionally, Mukherjee found that higher long-term debt levels are associated with “a greater likelihood of repurchasing shares and larger dollar payouts to equity holders” (Mukherjee 2016). Specifically, for every 1% increase in the long-term debt to asset ratio, quarterly investment as a percentage of total assets falls by 0.12%, and the relationship became stronger following the Great Recession (Mukherjee 2016). Following the financial crisis of 2008, firms became more likely to take on long-term debt as a way to increase payouts and share repurchases. As such, according to Mukherjee, higher long-term debt to asset ratios are negatively correlated with companies’ cash holdings on their balance sheets, which provides further insight into how corporate debt has been used in recent years (Mukherjee 2016). Mukherjee observes that the data he collected demonstrates that companies have been using debt to alter their capital structures rather than invest in engines of real growth, such as capital expenditures. This conclusion is significant because of both the environment surrounding and the amount of the corporate debt that has been issued. Mukherjee raises questions as to whether

corporations can maintain solvency as monetary policy and credit conditions begin to tighten as the economy moves farther and farther away from the effects of the Great Recession.

Current Corporate Debt Levels

Analysts have expressed concerns over current corporate debt levels and what they mean for defaults and recoveries. Debt to asset ratios, which Bernanke, Campbell, and Whited studied in 1990, are rising with junk-rated companies having “debt equal to about 48 percent of their assets now, up 7.5 percentage points in the last 7 years, according to Bank of America Merrill Lynch data” (Boston). The shift can at least partly be explained by how companies are using their debt. Instead of improving asset quality, companies, according to Holtz, have been using new debt to “refinance existing liabilities, buy back shares, and take other steps that do not increase asset values” (Boston). This can be seen in the lower levels of capital expenditures during the current cycle. These numbers are of concern because companies’ assets are covering less and less of their liabilities, which means that investors will be able to recover less of their funds if a company were to default. Bank of America Merrill Lynch estimates that recovery rates are about 29 percent of each dollar, which shows a significant decrease from being around 44 cents just two years ago (Boston). The average recovery rate is close to 40 percent, which typically drops by about ten percent during periods of weak economic activity (Boston). Alan Holtz from AlixPartners notes that the last economic crisis brought with it a swift cut in interest rates that allow distressed companies to refinance rather than default. He says that the economy is now beginning to feel the effects of that as interest rates are being raised and debt levels continue to rise (Boston).

Additionally, Moody’s observes that current default rates are about four percent. It estimates that number “will rise to 5.05 percent by the end of year in the best-case scenarios, and

could jump as high as 14.9 percent under the most pessimistic projection” (Boston). This could lead to even lower recoveries, which would possibly exacerbate future recessions.

A major threat to recovery and default levels is the plummeting price of oil, which has fallen from over \$100 per barrel to a range around \$50. This has made it difficult for energy companies to make their debt payments as production costs have not fallen even though oil prices have. Because oil prices are expected to remain suppressed, some oil companies are being forced to liquidate assets since refinancing is impossible for them (Boston). Fitch forecasted that U.S. high-yield bond defaults would rise to 6% with energy accounting for \$40 billion alone, which is the highest non-recessionary default rate ever predicted by Fitch (Beals). More evidence of how much these forecasts are driven by energy is shown by Fitch expecting the “energy trailing 12-month default rate to end the year in a 30% to 35% range” (Beals). Unless a rebound in oil occurs soon, energy companies that took on too much leverage, especially high-yield companies, will continue to experience distress.

Corporate Debt in the Upcoming Years

Corporate debt is expected to keep growing in the upcoming years, with the global total rising from around \$51 trillion to approximately \$75 trillion in by 2020 with the U.S. contributing \$14 trillion of the growth, according to S&P Global Ratings (Cox). S&P believes that the credit markets will inevitably face a correction but it is unsure to which degree the correction will occur (Cox). The worry is that the economy will experience multiple shocks consecutively, which would lead to the collapse of investor confidence. S&P believe that “these unforeseen events could quickly destabilize the market, pushing investors and lenders to exit riskier positions ('Ccredit' scenario). If mishandled, this could result in credit growth collapsing as it did during the global financial crisis” (Cox). This phenomenon was brought on by an extended

period of low interest rates that encouraged both companies to issue debt and investors to purchase said debt in a search for yield, which is evidenced by S&P's research showing that corporate debt has grown at a rate that far exceeds that of the global economy (Cox).

Chapter 3

Data Collection

In order to perform a stress test analysis on varying companies and sectors that are representative of the economy as a whole, I selected specific companies to analyze. When deciding which sectors to include, it is important to choose ones that play a fundamental role in the economy and show noticeable effects of a recession for a proper analysis. The sectors that were chosen are as follows: Consumer Staples, Consumer Discretionary, Energy, Industrials, and Materials.

Consumer Staples and Consumer Discretionary are included because they represent the consumer and allow insight into the consumer's behavior and its effect during a recession.

Consumer Staples tends to be a more risk-averse sector given that its companies typically produce goods that people need even in severe recessions. As such, leverage ratios are generally lower in Staples than in most other sectors given its safety and predictability. The sector as a whole is more likely to outperform during recessions.

Consumer Discretionary also enables the direct study of the consumer, but its performance fluctuates much more than Staples in different states of the economy. In periods of growth, Discretionary will likely outperform Staples as consumers are more willing to spend on goods that are of more luxury than necessity. However, during a recession, consumers may lack the money to spend on anything more than the necessities. Analyzing Discretionary is particularly relevant because of this heightened sensitivity to economic conditions.

Energy is relevant to every sector and is often significantly affected by macroeconomic events, such as the Great Recession. Furthermore, Energy companies have a tendency to issue high levels of debt when the economy is strong so that they can finance the exploration and production of energy. These projects require large amounts of initial capital because of how expensive it is to build the infrastructure and machinery. Therefore, the Energy sector will likely be very sensitive to changes in economic conditions, especially when it relates to debt since these companies were able to secure financing at such favorable rates for so long.

Finally, Industrials and Materials serve as an indicator of overall economic growth as they are involved in many different processes and outcomes that are pivotal to an expanding economy. Similarly to Energy, companies in both Industrials and Materials will often need to issue debt in order to fund their capital-intensive projects, such as a factory for building airplanes. They are sensitive to swings in the economy because consumers and businesses will be less likely and less able to purchase their products in deteriorating economic conditions given their higher costs. Without having an economic expansion to promote the use of equipment and machinery and the production of goods, companies in Industrials and Materials will not be able to generate the revenue and cash flows that they otherwise would.

With these five sectors, a broader picture of the economy is created as they provide insight into a variety of industries that are particularly sensitive to changing economic conditions as it relates to debt.

The next step is to determine which companies in each of the five sectors to choose for analysis. Companies had to be chosen that can represent each sector as a whole while also representing more focused components of each sector. For instance, Industrials is broad as there are many different types of companies that make up the sector. Therefore, companies that can

represent the entire spectrum of Industrials are required. In order to choose the most relevant companies, five (six for Industrials) companies are chosen from the top ten holdings of the relevant Vanguard ETF. These companies are selected on the basis of providing an all-encompassing look into each sector. The top ten holdings are used as a list to choose from because Vanguard had already selected them as being the most relevant companies to utilize as a means to mimic the movements of their sector. Therefore, the selected companies are both diverse and foundational to each sector being analyzed. The companies are listed in Table 1 directly below:

Table 1: Selected Companies

Staples	Discretionary	Energy	Industrials	Materials
Wal-Mart	Comcast	Exxon Mobil	General Electric	Dow Chemical
Procter & Gamble	Home Depot	Chevron	Boeing	Monsanto
PepsiCo	Starbucks	EOG Resources	3M	PPG Industries
CVS	Disney	Anadarko Petroleum	Caterpillar	Freeport-McMoRan
Coca-Cola	Nike	Halliburton	Union Pacific	Ecolab Inc.
			Lockheed Martin	

Following the selection of sectors and companies, the financials of each company are collected. All financial information for the analysis is gathered from Bloomberg. Utilizing the financial analysis function in Bloomberg, the following are collected for each company from either fiscal year 2007, fiscal year 2008, or fiscal year 2009: revenue, depreciation and amortization, interest expense, and EBITDA (used as a proxy for free cash flow). The chosen fiscal year varies to best match the period of the Great Recession since the fiscal year for each company ends at a different date. The same information is also collected for the following fiscal year and the most recent last-twelve-month period for each company, but the LTM data also includes short-term debt, long-term debt, and interest expense. For any LTM period that is missing information from the income statement on Bloomberg, the LTM is calculated by using

the most recent full year, subtracting the oldest quarter of that year, and then adding the most recent quarter of financial information. Using this data, the leverage ratio (Debt/EBITDA) and the interest coverage ratio (EBITDA/Interest Expense) for each company are calculated.

The leverage ratio is important because it provides insight into the relative amount of debt that a company holds on its balance sheet. Instead of simply analyzing the magnitude of debt, the leverage ratio provides a look into how much debt the company has in terms of its EBITDA. This allows a better comparison between companies and industries because companies that produce more EBITDA are able to take on more debt.

The interest coverage ratio is valuable because it measures a company's ability to make its interest payments. A ratio above 1.00x indicates that a company is generating enough EBITDA to make its interest payments and that it is not at risk of default. A higher ratio indicates that a company is more capable of making its interest payments, which means that it is more capable of surviving periods of suppressed cash flow. The interest coverage ratio is particularly relevant to this paper because it shows whether a company will remain solvent.

Chapter 4

Data Analysis

Data analysis begins by performing the stress test given the financial information for each company. The primary objective of the analysis is to determine whether companies would be able to service their debt amid a recessionary environment with lower cash flows.

First, the percentage decrease (or increase) in each of the financial line items during the main year of the Great Recession (2008) is calculated. For example, the change in Home Depot's revenue from FY 2008 to FY 2009 is calculated, along with all the other line items. This provides insight into how the company performed during the Great Recession.

The next step is using the financial performance during the Great Recession as a base level to which other hypothetical recessions could be compared. In this analysis, recessions that are 25%, 50%, and 75% as severe as the Great Recession are applied to each company. For instance, Home Depot's revenue fell by 7.84% from FY 2008 to FY 2009. Using this value as a base, it is calculated that if a recession were to occur that were 25% as severe as the Great Recession in 2008, Home Depot's revenue would fall by approximately 1.96% (25% multiplied by 7.84%) from its LTM levels. The same process is used for Home Depot's EBITDA. This method is then repeated for the other two hypothetical recessions, with only the severity of each recession changing. Instead of Home Depot's revenue falling by 25% of the level it fell from the Great Recession, it would fall by 50% and then 75%.

After these steps of the stress test are repeated with each of the companies, the leverage ratio and interest coverage ratio changes are calculated. By comparing the new values to what the values were as of the last-twelve-month period, each company's financial position is determined so that its ability to service debt is better understood. Percentage changes in the leverage ratios

and interest coverage ratios are also included in order to make the increases/decreases easier to observe.

Consumer Staples

Leverage Ratio Analysis

Table 2: Changes in Consumer Staples Leverage Ratios

Consumer Staples				
Leverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Wal-Mart	1.42x	1.40x	1.39x	1.37x
P&G	1.78x	1.81x	1.85x	1.88x
PepsiCo	2.96x	2.86x	2.76x	2.68x
CVS	2.14x	2.10x	2.07x	2.03x
Coca-Cola	4.44x	4.46x	4.49x	4.51x
Average	2.55x	2.53x	2.51x	2.49x

Table 3: Changes in Percent of Consumer Staples Leverage Ratios

Consumer Staples			
% Change in Leverage Ratio			
	Recession Severity		
	25%	50%	75%
Wal-Mart	-1.11%	-2.19%	-3.25%
P&G	1.73%	3.52%	5.38%
PepsiCo	-3.42%	-6.61%	-9.60%
CVS	-1.70%	-3.34%	-4.93%
Coca-Cola	0.54%	1.08%	1.63%
Average	-0.77%	-1.47%	-2.10%

Consumer Staples is the only sector that experiences an average decrease in its leverage ratio. PepsiCo's leverage decreases from 2.96x at LTM to 2.86x at a recession 75% as severe as the Great Recession. This movement represents a decrease of close to 10%. Wal-Mart and CVS also experience a decrease in leverage but not to the degree of PepsiCo.

The only two companies to undergo an increase in leverage during a recession are Procter & Gamble and Coca-Cola. P&G sees its leverage ratio climb from 1.78x at LTM to 1.88x at a recession 75% as severe, which is an increase of 5.38%.

Interest Coverage Ratio Analysis

Table 4: Changes in Consumer Staples Interest Coverage Ratios

Consumer Staples				
Interest Coverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Wal-Mart	14.06x	14.22x	14.38x	14.54x
P&G	30.10x	29.59x	29.08x	28.56x
PepsiCo	11.29x	11.69x	12.09x	12.49x
CVS	5.33x	5.42x	5.51x	5.60x
Coca-Cola	4.53x	4.51x	4.48x	4.46x
Average	13.06x	13.09x	13.11x	13.13x

Table 5: Changes in Percent of Consumer Staples Interest Coverage Ratios

Consumer Staples			
% Change in Interest Coverage Ratio			
	Recession Severity		
	25%	50%	75%
Wal-Mart	1.12%	2.24%	3.36%
P&G	-1.70%	-3.40%	-5.10%
PepsiCo	3.54%	7.08%	10.62%
CVS	1.73%	3.46%	5.19%
Coca-Cola	-0.53%	-1.07%	-1.60%
Average	0.17%	0.35%	0.52%

As with its leverage ratio, Consumer Staples experiences a positive change in its average interest coverage ratio meaning that it would more easily make interest payments. PepsiCo's interest coverage increases by 10.62% from 11.29x at LTM to 12.49x at a recession 75% as

severe as the Great Recession. Wal-Mart and CVS also experience an increase in interest coverage while P&G and Coca-Cola experience a decrease.

Consumer Staples Summary

The movements of companies in Consumer Staples are not surprising given the nature of the sector. Because staples are often seen as a necessity and not a luxury, sales and EBITDA can often rise in recessions. For example, Wal-Mart experienced an increase in both sales and EBITDA during the Great Recession, likely because it attracted consumers with its low prices during a time when consumers had less money to spend. As such, Consumer Staples appears to be healthy and would likely be able to service its debt even in a severe recession.

Consumer Discretionary

Leverage Ratio Analysis

Table 6: Changes in Consumer Discretionary Leverage Ratios

Consumer Discretionary				
Leverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Comcast	2.31x	2.29x	2.26x	2.24x
Home Depot	1.53x	1.66x	1.81x	2.00x
Starbucks	0.60x	0.62x	0.64x	0.66x
Disney	0.89x	0.94x	0.99x	1.05x
Nike	0.69x	0.72x	0.76x	0.81x
Average	1.20x	1.24x	1.29x	1.35x

Table 7: Changes in Percent of Consumer Discretionary Leverage Ratios

Consumer Discretionary			
% Change in Leverage Ratio			
	Recession Severity		
	25%	50%	75%
Comcast	-1.10%	-2.17%	-3.22%
Home Depot	8.57%	18.74%	31.01%
Starbucks	2.78%	5.71%	8.82%
Disney	5.30%	11.19%	17.77%
Nike	5.23%	11.03%	17.51%
Average	3.41%	7.40%	12.14%

Consumer Discretionary experiences a significant increase in its average leverage ratio. All companies other than Comcast see their leverage ratios increase in each severity level, with Home Depot, Disney, and Nike all suffering a more than 5% jump in a recession only 25% as severe as the Great Recession. In the most extreme of the recessions, Home Depot's leverage ratio increases from 1.53x at LTM to 2.00x, which represents an increase of 31%. Comcast's leverage ratio decreases slightly, but it remains largely stable as it only falls by about 3% during the most severe recession.

Interest Coverage Ratio Analysis

Table 8: Changes in Consumer Discretionary Interest Coverage Ratios

Consumer Discretionary			
% Change in Interest Coverage Ratio			
	Recession Severity		
	25%	50%	75%
Comcast	1.11%	2.22%	3.32%
Home Depot	-7.89%	-15.78%	-23.67%
Starbucks	-2.70%	-5.41%	-8.11%
Disney	-5.03%	-10.06%	-15.09%
Nike	-4.97%	-9.93%	-14.90%
Average	-4.35%	-8.70%	-13.05%

Table 9: Changes in Percent of Consumer Discretionary Interest Coverage Ratios

Consumer Discretionary				
Interest Coverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Comcast	8.98x	9.08x	9.18x	9.28x
Home Depot	15.50x	14.28x	13.05x	11.83x
Starbucks	59.74x	58.12x	56.51x	54.89x
Disney	40.60x	38.56x	36.52x	34.48x
Nike	105.33x	100.10x	94.86x	89.63x
Average	46.03x	44.03x	42.02x	40.02x

Consumer Discretionary experiences similarly large movements in its average interest coverage ratio. Home Depot again suffers the most negative movement, as its interest coverage falls by about 23% at a recession 75% as severe as the Great Recession. Disney and Nike both experience drops of about 15% at the most severe recession, while Comcast enjoys a slight increase in its ratio throughout all three recession scenarios.

Consumer Discretionary Summary

Even though the average leverage ratio increases by about 12% for a recession 75% as severe and the average interest coverage ratio decreases by about 13% for the same recession, the changes are not nearly as concerning as they appear given the current health of the Consumer Discretionary sector. The current average leverage ratio is 1.20x and interest coverage ratio is 46.03x. Both of these ratios exhibit extremely healthy companies that are highly capable of servicing their debt. Therefore, even though the percentage change during a recession is significant, the value changes are not nearly as extreme. Even in the worst case of a recession 75% as severe as the Great Recession, the average leverage ratio and interest coverage ratio are still 1.35x and 40.02x, respectively. As such, consumer discretionary is likely to experience a noticeable decrease in revenue and EBITDA during a recession, but it should not be a concern given its current strength.

One note is that Comcast actually experiences a decrease in its leverage ratio and an increase in its interest coverage ratio after the stress test is applied. This is likely because Comcast behaves more similarly to a Consumer Staples company than the other Consumer Discretionary companies. Being a large telecommunications company, Comcast has traditionally enjoyed a more stable market in which to operate. However, given the change in the market conditions with the advent of services like Netflix, Comcast finds itself as more of a discretionary company than in the past. Even so, Comcast is likely not at risk of suffering severe financial distress during a recession.

Energy

Leverage Ratio Analysis

Table 10: Changes in Energy Leverage Ratios

Energy				
Leverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Exxon Mobil	2.07x	2.38x	2.79x	3.37x
Chevron	3.44x	3.83x	4.32x	4.95x
EOG Res.	2.91x	3.06x	3.24x	3.44x
Anadarko	7.77x	8.90x	10.41x	12.54x
Halliburton	-2.35x	-2.59x	-2.89x	-3.27x
Average	4.05x	4.54x	5.19x	6.08x

Table 11: Changes in Percent of Energy Leverage Ratios

Energy			
% Change in Leverage Ratio			
	Recession Severity		
	25%	50%	75%
Exxon Mobil	14.78%	34.68%	62.93%
Chevron	11.31%	25.51%	43.86%
EOG Res.	5.40%	11.42%	18.16%
Anadarko	14.53%	33.99%	61.43%
Halliburton	10.37%	23.14%	39.25%
Average	12.24%	28.22%	50.12%

Leverage ratios in the Energy sector increase by an average of over 50% for a recession 75% as severe as the Great Recession, signifying that a recession is likely to affect energy companies significantly. Four out of the five chosen companies experience a double-digit percentage increase in leverage ratio even for the mildest of the recession. The most affected company is Exxon Mobil, which suffers a leverage ratio increase from 2.07 at LTM to 3.37x in

the most severe recession. EOG Resources is the least affected, but it still sees a sharp rise in its leverage ratio.

Interest Coverage Ratio Analysis

Table 12: Changes in Energy Interest Coverage Ratios

Energy				
Interest Coverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Exxon Mobil	70.07x	61.05x	52.03x	43.01x
Chevron	65.88x	59.18x	52.49x	45.79x
EOG Res.	8.54x	8.10x	7.66x	7.23x
Anadarko	2.21x	1.93x	1.65x	1.37x
Halliburton	-7.56x	-6.85x	-6.14x	-5.43x
Average	36.67x	32.57x	28.46x	24.35x

Table 13: Changes in Percent of Energy Interest Coverage Ratios

Energy			
% Change in Interest Coverage Ratio			
	Recession Severity		
	25%	50%	75%
Exxon Mobil	-12.87%	-25.75%	-38.62%
Chevron	-10.16%	-20.33%	-30.49%
EOG Res.	-5.12%	-10.25%	-15.37%
Anadarko	-12.68%	-25.37%	-38.05%
Halliburton	-9.40%	-18.79%	-28.19%
Average	-11.20%	-22.41%	-33.61%

The Energy sector also suffers a large negative change in its average interest coverage ratio, with an average decrease of over 30% during the most severe of the recessions. While the interest coverage ratios are not affected as severely, three out of five companies still undergo a double-digit percentage decline during the least severe of the recessions. Exxon Mobil again is

the most affected as its interest coverage ratio decreases by about 40% during a recession 75% as severe as the Great Recession.

Energy Summary

The Energy sector is similar to the Consumer Discretionary sector in that the changes in percent create a grimmer picture than reality depicts. For example, Exxon Mobil sees its leverage ratio jump by about 63% and its interest coverage ratio fall by over 38% in the most severe of the recessions, but it began with ratios of 2.07x and 70.07x, respectively. Therefore, it would likely be capable of servicing its debt in a recession given its current strength.

However, the energy companies are more diverse in that some companies are currently much more financially stable than others. While Exxon Mobil and EOG Resources both currently have leverage ratios below 2.00x, Anadarko has a leverage ratio of 7.77x while Halliburton has a negative ratio due to a negative EBITDA (it was excluded from the stress test average calculations). Following the stress test, Anadarko's leverage jumps all the way to 12.54x while its interest coverage ratio is only 1.37x. This is problematic because it means that a subsection of companies within the Energy sector could be in financial trouble if performance declines, while others would be able to weather the storm relatively easily. The effects have even already begun to be experienced with the fall in oil prices. An energy company's ability to deal with lower oil prices and cheaper energy depends largely on how it has positioned itself in its

portfolio. As a result, certain companies are subjected to more intense fluctuations in performance depending on macroeconomic factors.

Overall, the Energy sector will likely be the sector that experiences the most difficulty in servicing its debt during a recession, but those difficulties will likely be contained to a certain subsection of the sector as a whole.

Industrials

Leverage Ratio Analysis

Table 14: Changes in Industrials Leverage Ratios

Industrials				
Leverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
GE	15.40x	16.81x	18.51x	20.59x
Boeing	1.29x	1.37x	1.47x	1.59x
3M	1.45x	1.47x	1.50x	1.52x
Caterpillar	10.41x	12.06x	14.33x	17.65x
Un. Pac.	1.61x	1.66x	1.71x	1.77x
Lock. Mar.	2.01x	2.07x	2.14x	2.21x
Average	5.36x	5.91x	6.61x	7.56x

Table 15: Changes in Percent of Industrials Leverage Ratios

Industrials			
% Change in Leverage Ratio			
	Recession Severity		
	25%	50%	75%
GE	9.17%	20.20%	33.71%
Boeing	6.75%	14.48%	23.41%
3M	1.68%	3.42%	5.22%
Caterpillar	15.84%	37.63%	69.53%
Un. Pac.	3.10%	6.39%	9.90%
Lock. Mar.	3.05%	6.29%	9.74%
Average	10.21%	23.30%	40.92%

The Industrials sector experiences an average increase in leverage of more than 40% during a recession 75% as severe as the Great Recession, which is driven largely by Caterpillar's 69.53% increase and General Electric's 33.71% increase. While Boeing also suffers an increase of more than 20%, the remaining three companies experience increases in their ratios of less than 10% even during the most severe of the recessions. While the average change in the leverage ratio is high, it is more of a tale of two extremes in reality.

Interest Coverage Ratio Analysis

Table 16: Changes in Industrials Interest Coverage Ratios

	Interest Coverage Ratio			
	LTM	Recession Severity		
		25%	50%	75%
GE	4.97x	4.55x	4.13x	3.72x
Boeing	25.31x	23.71x	22.11x	20.51x
3M	47.47x	46.69x	45.90x	45.12x
Caterpillar	1.50x	1.30x	1.09x	0.89x
Un. Pac.	13.34x	12.94x	12.54x	12.14x
Lock. Mar.	10.70x	10.38x	10.07x	9.75x
Average	17.22x	16.59x	15.97x	15.35x

Table 17: Changes in Percent of Industrials Interest Coverage Ratios

Industrials			
% Change in Interest Coverage Ratio			
	Recession Severity		
	25%	50%	75%
GE	-8.40%	-16.81%	-25.21%
Boeing	-6.32%	-12.65%	-18.97%
3M	-1.65%	-3.31%	-4.96%
Caterpillar	-13.67%	-27.34%	-41.01%
Un. Pac.	-3.00%	-6.01%	-9.01%
Lock. Mar.	-2.96%	-5.92%	-8.87%
Average	-3.61%	-7.21%	-10.82%

The interest coverage ratios also move sharply with an average decrease of more than 10%. However, the same idea applies as with the leverage ratios in that half of the companies move significantly while the other half does not move nearly as much. For example, General Electric sees its interest coverage ratio drop by more than 25% during the most severe recession while three other companies (3M, Union Pacific, Lockheed Martin) experience less than a 10% drop even in the worst case.

Industrials Summary

While General Electric and Caterpillar experience large increases in their leverage ratios and large decreases in their interest coverage ratios, the rest of the companies maintain leverage ratios below 2.50x and interest coverage ratios above 9.50x, which signifies a healthy ability to service debt. General Electric's problem stems from its large debt balance, which is currently over \$149 billion. It generates a healthy cash flow, but its debt stresses the company, as shown by its high leverage ratio and low interest coverage ratio. Caterpillar has also accumulated a high amount of debt as it owes more than \$36 billion, and it has experienced four consecutive years of decreasing EBITDA, which has stressed the company's financials as shown by its 17.65x leverage ratio and 1.50x interest coverage ratio. Caterpillar remains above a 1.00 interest coverage ratio until it is stressed at a recession 75% as severe as the Great Recession, after which it falls below 1.00x, which signifies a possible inability to service its debt. As whole, the Industrials sector appears to be healthy, but companies such as General Electric and Caterpillar show the risk of overburdening the balance sheet with debt, especially when trying to manage the negative effects of a recession.

Materials

Leverage Ratio Analysis

Table 18: Changes in Materials Leverage Ratios

Materials				
Leverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Dow	3.11x	3.31x	3.52x	3.77x
Monsanto	2.37x	2.64x	2.96x	3.38x
PPG	3.15x	3.49x	3.92x	4.47x
Freeport	-86.17x	-91.01x	-96.43x	-102.54x
Ecolab	2.63x	2.67x	2.70x	2.74x
Average	2.82x	3.03x	3.28x	3.59x

Table 19: Changes in Percent of Materials Leverage Ratios

Materials			
% Change in Leverage Ratio			
	Recession Severity		
	25%	50%	75%
Dow	6.21%	13.24%	21.26%
Monsanto	10.99%	24.69%	42.26%
PPG	10.96%	24.62%	42.12%
Freeport	5.62%	11.92%	19.01%
Ecolab	1.36%	2.75%	4.19%
Average	7.41%	16.38%	27.53%

The Materials sector experiences a more than 27% increase in its average leverage ratio (when excluding Freeport-McMoRan) during a recession 75% as severe as the Great Recession. Monsanto and PPG both suffer double-digit percentage increases even in the mildest of the applied recessions. Ecolab is the least affected as its leverage ratio only increases by about 4% in the most severe of the recessions.

Interest Coverage Ratio Analysis

Table 20: Changes in Materials Interest Coverage Ratios

Materials				
Interest Coverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Dow	8.00x	7.53x	7.07x	6.60x
Monsanto	8.19x	7.38x	6.57x	5.76x
PPG	11.19x	10.09x	8.98x	7.87x
Freeport	-0.24x	-0.23x	-0.22x	-0.20x
Ecolab	9.28x	9.16x	9.03x	8.91x
Average	9.17x	8.54x	7.91x	7.28x

Table 21: Changes in Percent of Materials Interest Coverage Ratios

Materials			
% Change in Interest Coverage Ratio			
	Recession Severity		
	25%	50%	75%
Dow	-5.84%	-11.69%	-17.53%
Monsanto	-9.90%	-19.80%	-29.70%
PPG	-9.88%	-19.76%	-29.64%
Freeport	-5.32%	-10.65%	-15.97%
Ecolab	-1.34%	-2.68%	-4.02%
Average	-6.84%	-13.68%	-20.53%

The average interest coverage ratio in the Materials sector decreases by more than 20% in a recession 75% as severe as the Great Recession (once again excluding the effects of Freeport-McMoRan). Like with leverage ratios, Monsanto and PPG experience the largest decreases as both ratios fall by over 29% in the most severe recession. Ecolab is again the least affected as its interest coverage ratio falls by less than 5% even in the most severe recession.

Materials Summary

As has been the case previously, the percentage changes in the sector suggest a more distressed sector than what is the case in reality. Even though leverage ratios jump by more than 27% in a recession 75% as severe as the Great Recession, all companies but Freeport-McMoRan still have leverage ratios under 5.00x. Additionally, all companies but Freeport-McMoRan maintain interest coverage ratios above 5.50x even though the average decreases by about 20% in the most severe of the recessions.

Freeport-McMoRan is an exception and has been excluded from the average calculations because its LTM EBITDA is negative, which produces both a negative leverage ratio and a negative interest coverage ratio. The company has reported a negative EBITDA for two consecutive years, but its current cash and cash equivalents balance of over \$4 billion suggests that it should still be able to service its debt. Freeport-McMoRan is an important player in the sector, but it has experienced hardship under the commodity weakness.

While lower leverage ratios and higher interest coverage ratios would be more reassuring, the ratios experienced even in a recession 75% as severe as the Great Recession do not appear to be indicative of a sector-wide struggle to service debt. Freeport-McMoRan could experience prolonged difficulty due to suppressed commodity prices, but it is an outlier in the selection of companies that are analyzed within the Materials sector.

All Sectors

Table 22: Changes in All Sectors Leverage Ratios

All Sectors				
Leverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Staples	2.55x	2.53x	2.51x	2.49x
Discretionary	1.20x	1.24x	1.29x	1.35x
Energy	4.05x	4.54x	5.19x	6.08x
Industrials	5.36x	5.91x	6.61x	7.56x
Materials	2.82x	3.03x	3.28x	3.59x
Average	3.20x	3.45x	3.78x	4.21x

Table 23: Changes in Percent of All Sectors Leverage Ratios

All Sectors			
% Change in Leverage Ratio			
	Recession Severity		
	25%	50%	75%
Staples	-0.77%	-1.47%	-2.10%
Discretionary	3.41%	7.40%	12.14%
Energy	12.24%	28.22%	50.12%
Industrials	10.21%	23.30%	40.92%
Materials	7.41%	16.38%	27.53%
Average	6.50%	14.77%	25.72%

Table 24: Changes in All Sectors Interest Coverage Ratios

All Sectors				
Interest Coverage Ratio				
	LTM	Recession Severity		
		25%	50%	75%
Staples	13.06x	13.09x	13.11x	13.13x
Discretionary	46.03x	44.03x	42.02x	40.02x
Energy	36.67x	32.57x	28.46x	24.35x
Industrials	17.22x	16.59x	15.97x	15.35x
Materials	9.17x	8.54x	7.91x	7.28x
Average	24.43x	22.96x	21.49x	20.03x

Table 25: Changes in Percent of All Sectors Interest Coverage Ratios

All Sectors			
% Change in Interest Coverage Ratio			
	Recession Severity		
	25%	50%	75%
Staples	0.17%	0.35%	0.52%
Discretionary	-4.35%	-8.70%	-13.05%
Energy	-11.20%	-22.41%	-33.61%
Industrials	-3.61%	-7.21%	-10.82%
Materials	-6.84%	-13.68%	-20.53%
Average	-5.17%	-10.33%	-15.50%

All Sectors Analysis

Across all sectors that are analyzed, the average leverage ratio increases by 6.50%, 14.77%, and 25.72% in recessions 25%, 50%, and 75% as severe as the Great Recession, respectively. Additionally, the average interest coverage ratio decreases by 5.17%, 10.33%, and 15.50% in recessions 25%, 50%, and 75% as severe as the Great Recession, respectively.

Consumer Staples is the only sector to experience a positive change in its ratios during a recession, and Energy is the most negatively affected.

When analyzing the results to determine whether companies have taken on too much debt, it is reasonable to conclude that there are no major warning signs in the sectors that are analyzed in this paper. Percentage changes may appear large for certain sectors, but the post-recession effects are not nearly as worrisome when the actual leverage and interest coverage ratios are observed. If a company's leverage ratio doubles from 1.00x to 2.00x, it does not mean that the company is now on the verge of default. Sectors such as Energy and Industrials are likely to be more problematic in a recession than Consumer Staples, but it does not appear that any sector is on the verge of intense financial distress due to debt even during a recessionary period where cash flows are suppressed.

However, if the next recession proves to be more severe than expected, the systemic risk of debt-ridden balance sheets could become much more impactful than this paper has found thus far. Given the results of the analysis and the current market conditions, it is reasonable to conclude that distress in the Energy sector would likely be the starting point for a widespread economic crisis. Energy is the most sensitive sector to changes in the economy, especially when considering the volatility surrounding oil over the past few years.

If a debt-related crisis were to occur, it would seemingly begin with an extended period of suppressed oil and energy prices, possibly due to a recession or even just market forces. As a result, energy companies would see their interest coverage ratios begin to erode while their leverage ratios remain stubbornly high. They currently have a buffer of cash and free cash flow that can be used to service debt, but cost-intensive projects and lower revenues could quickly diminish cash positions. Larger companies, such as Exxon Mobil, are likely positioned well enough to combat destructive market forces, but smaller companies are more dependent on immediate cash flow to pay off recent projects. As has been already occurring, these smaller energy companies may be unable to handle lower energy prices, resulting in even more companies defaulting than have in the past few years. In turn, it would be difficult for energy companies to secure additional financing as investors would be weary of lending to the distressed sector thus preventing energy companies from pursuing new projects to boost growth.

The rippling effects could impact other sectors if the overall appetite for debt were to be suppressed due to weakness in the energy sector. While the other sectors may not default on their interest payments, they could find it increasingly difficult to refinance existing debt. An unwillingness to lend additional capital means that companies would be forced to accept debt at higher interest rates or even forgo entire projects because of the cost of financing. Companies with strong credit ratings would likely not be as impacted, but companies with weak credit ratings, such as non-investment grade, would have trouble accessing the credit markets, especially when considering their higher leverage ratios. Therefore, broader economic growth would be negatively impacted both because some companies would default and because other companies would be unable to secure financing for new projects, all because the Energy sector added too much debt in the years following the Great Recession.

There are other ways in which economic growth could be hindered by excessive corporate debt, such as major companies in the Industrials sector suffering severe financial distress and eroding investor confidence, but the Energy sector appears to be the most likely origin given its high leverage ratio and sensitivity to economic changes.

Chapter 5

Conclusion

Stress Test Conclusions

Upon analyzing the effects of a stress test on the chosen sectors and companies, there are no major causes for concern in regards to a sector-wide inability to service debt during a recession.

While Energy and Industrials experience a high leverage ratio and Materials suffers from a lower interest coverage ratio, no single industry appears on to be on the verge of default, as all interest coverage ratios are greater than 1.00x by at least eight times and all leverage ratios are below 8.00x even after a recession 75% as similar to the severity of the Great Recession.

However, a few sectors are more at risk than others. Energy and Industrials are currently much more leveraged than the other sectors, and the discrepancy only becomes worse after the stress test is applied. Additionally, they both see their leverage ratios increase by more than 40% in the most severe of the recessions. There are companies within each sector that are very highly leveraged, such as General Electric and Caterpillar in Industrials and Halliburton in Energy that are of greater concern.

As far as interest coverage ratios, most appear healthy. All of the selected companies in Materials have an interest coverage ratio below 12.00x but at least 8.00x, except Freeport-McMoRan with its negative EBITDA, but the sector's leverage is not high, signaling that it will be fine. Furthermore, General Electric and Caterpillar also have interest coverage ratios below 5.00x, but they have enough cash on their balance sheets should they need to service debt with more than just EBITDA.

Energy is the most affected sector in both its leverage ratio and interest coverage ratio, which is concerning given the weakness that the sector has recently experienced. While the sector is likely not in danger of a widespread default currently, it is worth noting that it is highly sensitive to changes in economic conditions. An extended period of suppressed oil prices could pose a risk to the sector.

In general, the sectors possess varying levels of sensitivity to the varying recessions in the stress test, and each sector is at a different level of financial health currently, meaning that some sectors can handle more significant decreases in EBITDA than other sectors. Additionally, certain companies in certain sectors are at a higher risk of financial distress given their current financial positions. However, generally across all chosen sectors, there are no apparent red flags of severe financial distress during the next recession.

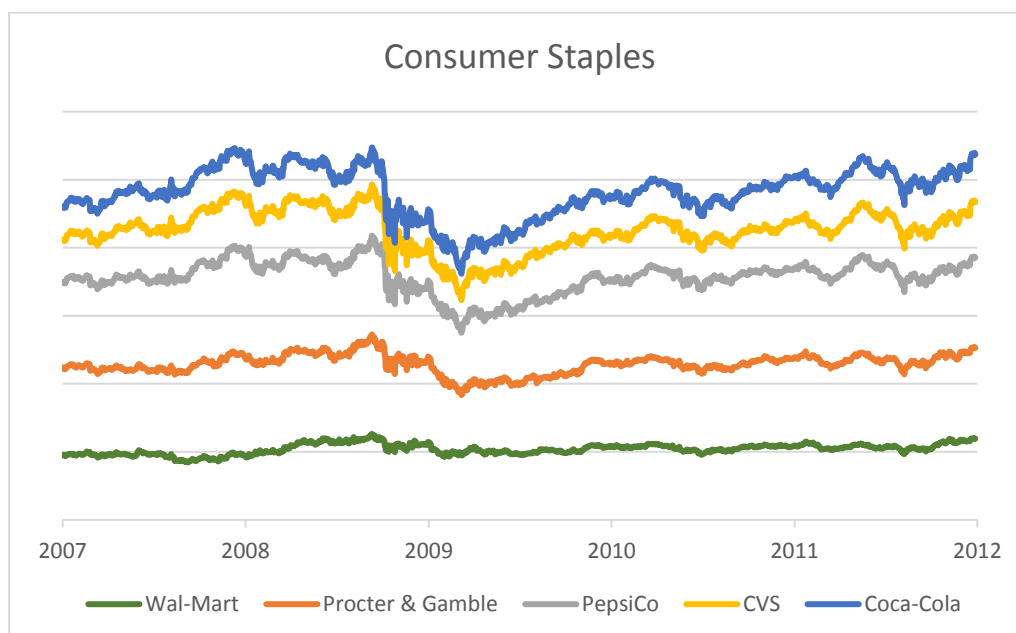
Future Study

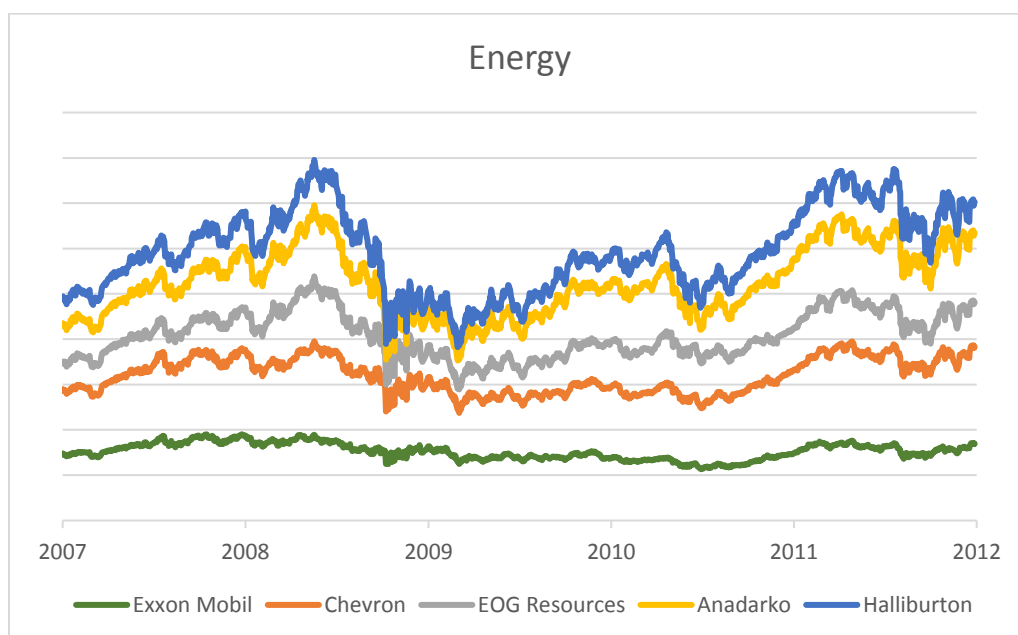
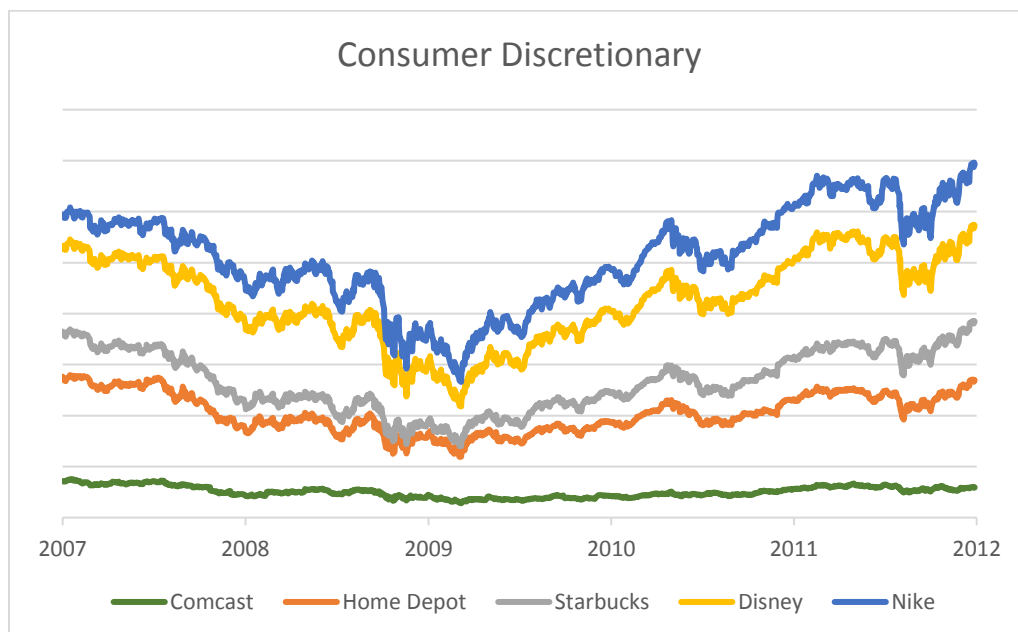
For future study, a broader range of sectors and companies could be chosen. Rather than limiting the sectors and companies to five each, the analysis could include all sectors and a greater number of companies within each sector. This would provide a more comprehensive look at the economy and capture some potential patterns that may have been hidden from the selections of this paper.

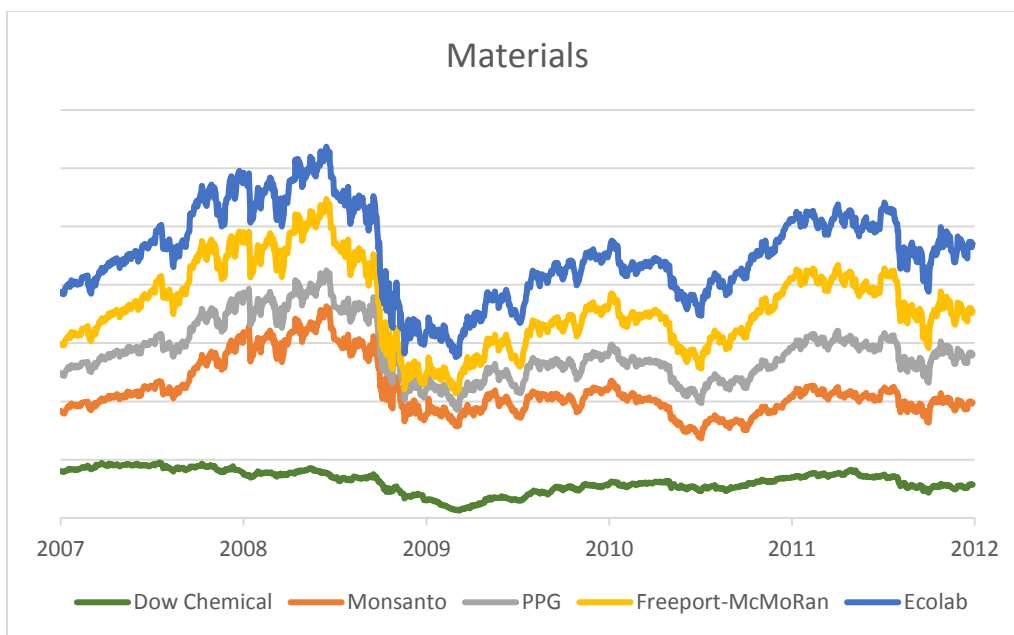
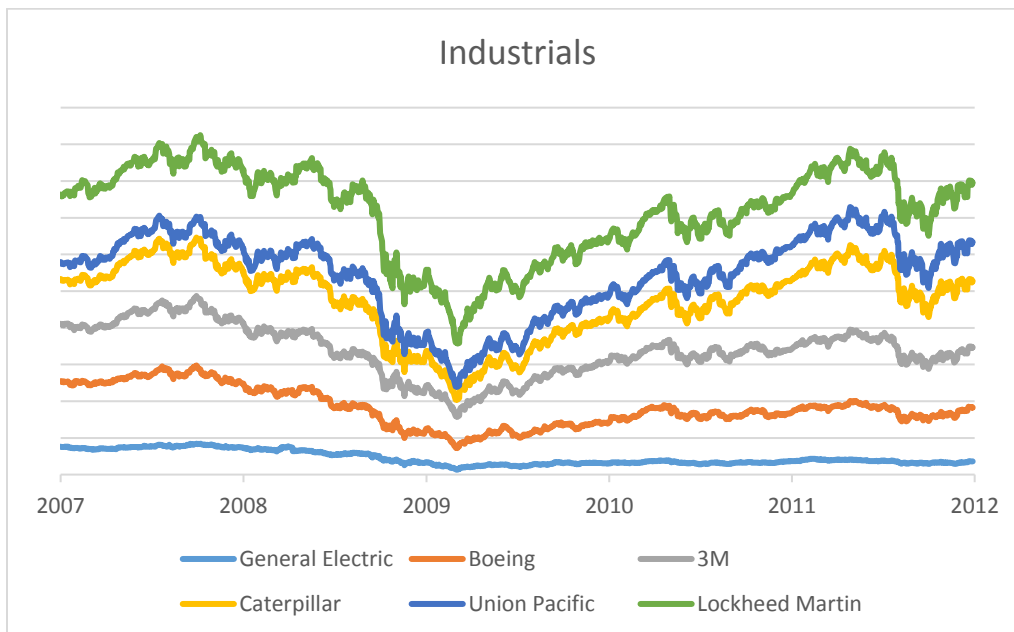
Moreover, a future study could relate the effects of the increased leverage and decreased interest coverage to the performance of the market. Stock prices could be analyzed in tandem with changing leverage and interest coverage ratios in order to further understand the impact of debt on stock prices. Volatility and Beta could be included so that the debt-related effects could be isolated in the stock price movements. Refer to Appendix A for graphs of how the stock price of each company was affected by the Great Recession.

Appendix A

Stock Performances of Each Sector from 2007-2012







WORKS CITED

- Beals, Rachel Koning. "Energy Sector Defaults Could Go like Dominoes." *MarketWatch*. N.p., 17 Mar. 2016. Web. 28 Apr. 2016.
- Bernanke, Ben S., and John Y. Campbell. "Is There a Corporate Debt Crisis?" *Brookings Papers on Economic Activity* 1988.1 (1988): 83-139. *JSTOR*. Web. 27 Apr. 2016.
- Bernanke, Ben S., John Y. Campbell, and Toni M. Whited. "U.S. Corporate Leverage: Developments in 1987 and 1988." *Brookings Papers on Economic Activity* 1990.1 (1990): 255-86. *JSTOR*. Web. 27 Apr. 2016.
- Boston, Claire. "The Coming Default Wave Is Shaping Up to Be Among Most Painful." *Bloomberg.com*. Bloomberg, 5 Apr. 2016. Web. 28 Apr. 2016.
- Bremus, Franziska, and Jeremias Huber. "Corporate Taxation, Leverage, and Macroeconomic Stability." *DIW Roundup: Politik Im Fokus* 93 (2016): n. pag. Web.
- Cecchetti, Stephen G., M. S. Mohanty, and Fabrizio Zampolli. *The Real Effects of Debt*. Working paper no. 352. N.p.: Bank for International Settlements, 2011. Print.
- Cox, Jeff. "Corporate Debt Seen Ballooning to \$75 trillion: S&P." *CNBC.com*. CNBC, 20 Jul. 2016. Web. 2 Dec. 2016.
- Frank, Murray Z., and Vidhan K. Goyal. "Capital Structure Decisions: Which Factors Are Reliably Important?" *Financial Management* 38.1 (2009): 1-37. *JSTOR*. Web. 27 Apr. 2016.
- Kaufman, Henry. "Debt: The Threat to Economic and Financial Stability." *Economic Review* (1986): 3-11. Web.
- Kim, E. Han. "A Mean-Variance Theory of Optimal Capital Structure and Corporate Debt

- Capacity." *The Journal of Finance* 33.1 (1978): 45-63. *JSTOR*. Web. 27 Apr. 2016.
- Kraus, Alan, and Robert H. Litzenberger. "A State-Preference Model of Optimal Financial Leverage." *The Journal of Finance* 28.4 (1973): 911-22. *JSTOR*. Web. 27 Apr. 2016.
- Mackie-Mason, Jeffrey K. "Do Taxes Affect Corporate Financing Decisions?" *The Journal of Finance* 45.5 (1990): 1471-493. *JSTOR*. Web. 27 Apr. 2016.
- Modigliani, Franco, and Merton H. Miller. "Corporate Income Taxes and the Cost of Capital: A Correction." *The American Economic Review* 53.3 (1963): 433-43. *JSTOR*. Web. 27 Apr. 2016.
- Modigliani, Franco, and Merton H. Miller. "The Cost of Capital, Corporation Finance and the Theory of Investment." *The American Economic Review* 48.3 (1958): 261-97. *JSTOR*. Web. 27 Apr. 2016.
- Mukherjee, Abhik. "Let Them Eat Debt But to What End? - Corporate America after the Great Recession." *Ecole Polytechnique Fédérale de Lausanne* (2016). Web. 2 Dec. 2016.
- Myers, Stewart C. "Capital Structure Puzzle." *Journal of Finance* 39.3 (1984): 575-92. Web.
- Popescu, Luigi, and Sorin Visinescu. "A Review of the Capital Structure Theories." *Annals of the University of Oradea: Economic Science Series* (2009): 315-20. Print.
- Schularick, Moritz, and Alan M. Taylor. "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008." *The American Economic Review* 102.2 (2012): 1029-061. *JSTOR*. Web. 27 Apr. 2016.
- Scott, James H., Jr. "A Theory of Optimal Capital Structure." *The Bell Journal of Economics* 7.1 (1976): 33-54. *JSTOR*. Web. 27 Apr. 2016.

Troy Merigliano

EDUCATION

Schreyer Honors College, The Pennsylvania State University
Smeal College of Business, Bachelor of Science in Finance
College of Liberal Arts, Minor in Economics

University Park, PA
Class of 2017

RELEVANT EXPERIENCE

Bank of America Merrill Lynch

Investment Banking Summer Analyst – Leveraged Finance

New York, NY

Jun 2016 – Aug 2016

- Prepared debt comparables, capitalization tables, presentations for potential lenders, and internal approval presentations for a variety of companies across multiple industries
- Pitched a potential Leveraged Buyout (LBO) that incorporated multiple areas of analysis, including financial statement analysis and credit risk analysis

University of Pittsburgh Medical Center (UPMC)

Finance Summer Associate

Pittsburgh, PA

May 2015 – Aug 2015

- Developed new cost analyses designed to break down patient costs and reduce the cost of care associated with various medical diagnoses among physician groups across the health network
- Prepared budget reports for hospital leadership in order to ensure effective management and accountability
- Performed analyses to determine the feasibility of specializing hospitals to improve patient care

Millcraft Investments

Summer Finance Intern

Washington, PA

May 2014 – Aug 2014

- Implemented a new integrated online accounting system that improved efficiency by 33%
- Assisted CFO in negotiations of multi-million dollar deals with banks to secure loans for property investments
- Prepared and analyzed both annual and monthly budgets for over 15 companies

Penn State Asset Management Group

President

University Park, PA

Jan 2016 – Jan 2017

- Led a team to implement the first steps of a student-run loan trading fund
- Established an organizational structure where sector leads would hold weekly breakout meetings with members to discuss different areas of the market, such as currencies, commodities, and derivatives
- Created a professional development series where speakers would present to members about different careers within the financial services industry and how to secure positions in those careers

Wall Street Boot Camp

Graduate

University Park, PA

Aug 2014 – Dec 2014

- Selected from hundreds of applicants as one of 40 students to participate in a comprehensive training program that prepares graduates for careers on Wall Street
 - Instructed and evaluated on resume, interview, communication, and networking skills as preparation for internships
-

LEADERSHIP

Penn State Finance Society (PSFS)

Executive Vice President of Finance

University Park, PA

Dec 2014 – Present

- Served as the Treasurer on the Executive Board of an organization of ~ 150 members while creating transparency into a \$10K account and increasing the budget surplus by 10% through austerity measures
- Organized and led the 50-member Trading Committee, which teaches members about the markets, investing, and Excel through educational lessons, a stock trading competition, and interactive market discussions
- Increased Trading Committee attendance by 25% by shifting the committee's focus to more relevant financial topics

Penn State Residence Life

Honors Resident Assistant

University Park, PA

Aug 2015 – Present

- Supervised a floor of ~ 40 honors and academic residents while also serving as a mentor and advisor
- Organized floor events to promote community building and intellectual curiosity among residents

Schreyer Honors College Student Council

Scholar Liaison

University Park, PA

Aug 2013 – Present

- Led groups of ~ 35 prospective students and parents on tours of the Schreyer Honors College and Penn State
 - Served as one of the largest influences on prospective students' and parents' opinions of the university
-

AWARDS/INTERESTS

- The President's Freshman Award, The President Sparks Award, Schreyer Academic Excellence Scholarship, Society of Distinguished Alumni Trustee Scholarship, Bayard D. Kunkle Scholarship, The Evan Pugh Award
- Superheroes, fantasy football, gardening, New England Patriots, television shows, sports betting, financial markets