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# Risk Disclosure in SEC Corporate Filings

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**Abstract**

Beginning in 2005, the SEC required firms to include qualitative disclosures of risk factors in item 1A in their annual 10-K forms. In this paper, we examine the textual content of this section and determine whether it reflects the firm's performance. We first categorized each risk disclosure that a firm presented into one of 29 categories and then examined these categorizations. Our investigation yields three main results. First, we find that several risk factor categories, such as government and competitive risks, are common across our sample of firms. Second, we find that a firm's industry classification (as given by its SIC code) is not a differentiating factor in the disclosures that a firm makes. Third, we find that risk factor disclosures are generally not predictive of a firm's financial performance in the form of leverage, capital structure, cash, and acquisitions. Our analysis expands on previous work by considering the content of the disclosures in more detail rather than focusing on more quantitative characteristics of disclosures.

## Introduction

In the United States, public companies must submit Form 10-K to the Securities and Exchanges Commission (SEC) annually. Though investors often use the 10-K form to access a firm's four financial statements, it also gives a summary of a company's performance as well as

supplementary qualitative and quantitative statements about the firm's condition, such as the company's history, organizational structure, and executive compensation.

Beginning in 2005, the SEC required a new section in annual 10-K reports, section 1A, in which firms are required to discuss the "most significant factors that make the company speculative or risky"[1]. As with other disclosures and financial information, firms are required to update these disclosures quarterly if they change from the previous annual filing. The SEC also provides guidelines for organizing the section as well as examples of relevant risk factors, such as:

- Lack of an operating history
- Lack of profitable operations in recent periods
- Financial position
- Business or proposed business
- Lack of a market for […] common equity securities or securities convertible into or exercisable for common equity securities

Criticism of the SEC's disclosure requirements centers around two main arguments. First, since disclosures can be purely qualitative, firms do not have to estimate the economic effect of a disclosed risk on the firm's financial performance, thus making it difficult for investors to incorporate their content into their decisions. Second, firms do not have to quantify the likelihood that a disclosed risk will ultimately affect the company, so managers could disclose all possible risks and uncertainties rather than focusing on the risks that are relevant to their firm, resulting in information that is of little utility to investors and the public. In response, managers

[1] Regulation S-K, Item 305(c), SEC 2005

might argue that estimating such likelihoods would be difficult even with inside information, and such disclosures could require firms to disclose proprietary information[2].

In 2010, because of these criticisms, the SEC revised its guidelines to instruct firms not to "present risks that could apply to any issuer or any offering," but judging the effectiveness of this revision will require both time (for firms to file 10-K forms under the revised guidelines) and detailed analysis (to identify the effect, if any, of the revision)[3].

This goal of this project is to explore the content of the "Risk Factors" section (item 1A) of the form 10-K. We are interested in determining whether the textual content of the risk disclosure has any relationship with the firm's performance.

Investigating the content of risk disclosures is important to investors as well as regulators. First, since item 1A is over 10 percent of the form 10-K (on average)[4], identifying the effectiveness of the disclosures is essential to ensure transparent yet efficient reporting. In addition, identifying specific weaknesses can ensure that the disclosure guidelines are useful for firms across industries, sizes, etc. Second, following the recent financial crisis, the SEC has increased its focus on more effective risk factor disclosures. In fact, the SEC identified "inadequate disclosure issues" as the most frequent issue in its comment letters about U.S. companies' annual and quarterly filings dated between January 2009 and July 2010.

To date, we could identify only one other study that has investigated item 1A disclosures, by looking at the impact of the length of risk factor disclosures and type of risk (idiosyncratic, systematic, financial, tax, litigation)[5]. As such, it is important to understand both the accuracy of

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[2] Campbell, John L. et al. "The Information Content of Mandatory Risk Factor Disclosures in Corporate Filings." *SSRN eLibrary* (2010): 10 May 2011.
[33] Johnson, Sarah. "SEC Pushes Companies for More Risk Information." *CFO* 2 Aug 2010. 10 May 2011.
[4] Campbell, John L. et al. "The Information Content of Mandatory Risk Factor Disclosures in Corporate Filings." *SSRN eLibrary* (2010): 10 May 2011.
[5] Ibid.

the disclosures as well as identify whether and how investors and the market utilize these disclosures. Moreover, correlating the risks with accounting data as we do could provide evidence either for or against the utility of the risk disclosures.

**Methodology**

Specifically, our investigation consisted of three stages. First, we developed a basic categorization of the risk factors that firms outline in item 1A of the 10-K. Since many firms identify common risk factors (for example, competition or supply disruptions), this allowed us to identify the commonalities among firms. We did this for a simple random sample of 122 firms. (The random sample was generated using the firms in the COMPUSTAT database, and 10-K filings are publicly available on the SEC's website. Because of variability in firms' fiscal years end dates, we considered the documents submitted in 2009, either for fiscal years ending at the end of 2008 or midway through the 2009 calendar year. For a list of firms used, see Appendix I.) Initially, as the risk factors can be lengthy, we categorized each risk in one of 116 relatively specific categories. Examples of categories included general risk factors such as "competition" as well as very specific factors such as foreign supply chains. A complete list of the initial categories is included in Appendix II.

To provide more meaningful and statistically predictive categories, we next consolidated the risk factor categories into the following smaller list of 29 categories:

| | |
|---|---|
| accounting | international |
| acquisitions | inventory |
| calamities | investments |
| capital expenditures | key personnel |
| capital structure | labor |
| cash | legal |
| competition | macro |
| contracts | marketing |
| credit risk | operations |
| customer concentration | regional |
| distribution | solvency |
| government | stock price |
| industry | suppliers |
| insurance | takeovers |
| intellectual property | |

**Table 1**

For each company, the consolidated category was simply the logical disjunction of each of the categories of which it was composed. The combination of categories that gave the consolidated category list is provided in Appendix III. We used this list of 29 categories for all further analyses.

Second, after categorizing the risk disclosures for each of the 122 selected firms, we computed descriptive statistics on the various categories. Our goal was to note categories that are nearly ubiquitous to help identify the disclosures that are essentially “boilerplate” (used repetitively across most of the filings) and reveal which disclosures are likely to provide relevant information specific to an individual firm. We also evaluated differences in risk factors across industries (as grouped by the first digit or first two digits of a company’s SIC code) with the intention of determining whether a firm’s industry is the primary driver of its risk factor disclosures.

Finally, we investigated relationships between various accounting measures of the firm and the related risk categorizations using regression; we were looking for any operating risk

factors or the total number of risk factors to influence metrics such as leverage, capital expenditures, cash, or acquisitions.

**Results**

After completing the categorization, we first calculated basic statistics for each consolidated risk category, such as the total number of companies that mentioned a risk in that category ("sum"), as well as the average number of companies that mentioned that category ("mean") and its respective standard deviation:

| Category | Sum | Mean | SD | Category | Sum | Mean | SD | Category | Sum | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| accounting | 38 | 0.31 | 0.47 | distribution | 24 | 0.20 | 0.40 | legal | 69 | 0.57 | 0.50 |
| acquisitions | 74 | 0.61 | 0.49 | government | 104 | 0.85 | 0.36 | macro | 91 | 0.75 | 0.44 |
| calamities | 29 | 0.24 | 0.43 | industry | 26 | 0.21 | 0.41 | marketing | 40 | 0.33 | 0.47 |
| capital expenditures | 14 | 0.11 | 0.32 | insurance | 25 | 0.20 | 0.41 | operations | 76 | 0.62 | 0.49 |
| capital structure | 88 | 0.72 | 0.45 | intellectual property | 56 | 0.46 | 0.50 | regional | 4 | 0.03 | 0.18 |
| cash | 16 | 0.13 | 0.34 | international | 59 | 0.48 | 0.50 | solvency | 37 | 0.30 | 0.46 |
| competition | 101 | 0.83 | 0.38 | inventory | 13 | 0.11 | 0.31 | stock price | 77 | 0.63 | 0.48 |
| contracts | 41 | 0.34 | 0.47 | investments | 23 | 0.19 | 0.39 | suppliers | 71 | 0.58 | 0.50 |
| credit risk | 17 | 0.14 | 0.35 | key personnel | 85 | 0.70 | 0.46 | takeovers | 42 | 0.34 | 0.48 |
| customer concentration | 40 | 0.33 | 0.47 | labor | 12 | 0.10 | 0.30 | | | | |

**Table 2**

In the table above, the five most common categories are highlighted in yellow. As we expected, "macro" factors, such as global recessions, the financial crisis of 2007 and 2008, or inflation were very frequent. In addition, as expected, risks related to capital structure, such as too much leverage or an inability to make interest payments, were also frequent. Surprisingly, we found that cash or liquidity was not a very common risk factor, which could indicate that the firms in our sample seemed to feel comfortable enough with their short-term lending arrangements that they would not list cash availability as a major risk.

For a graphical presentation of the material in Table 1, see Appendix IV. In looking at a bar chart, we did notice one significant fact in the data. There do seem to be "clusters" of a few

of the categories, such as government and competition, or macro, capital structure, and key personnel. In addition, we noticed a sharper reduction in frequency after intellectual property, with the remaining risks being almost one-third less frequent.

We also evaluated correlations between consolidated risk factor categories to identify categories that should either be excluded. We first generated a complete correlation matrix, and color-coded cells with a gradient from -1 to 1 to identify strong correlations. (This table is provided in Appendix V.) We did not notice any correlation strong enough that the categories needed to be merged. Overall, we did notice that the categories showed some slight positive correlation around 0.1, as visible in the figure below:

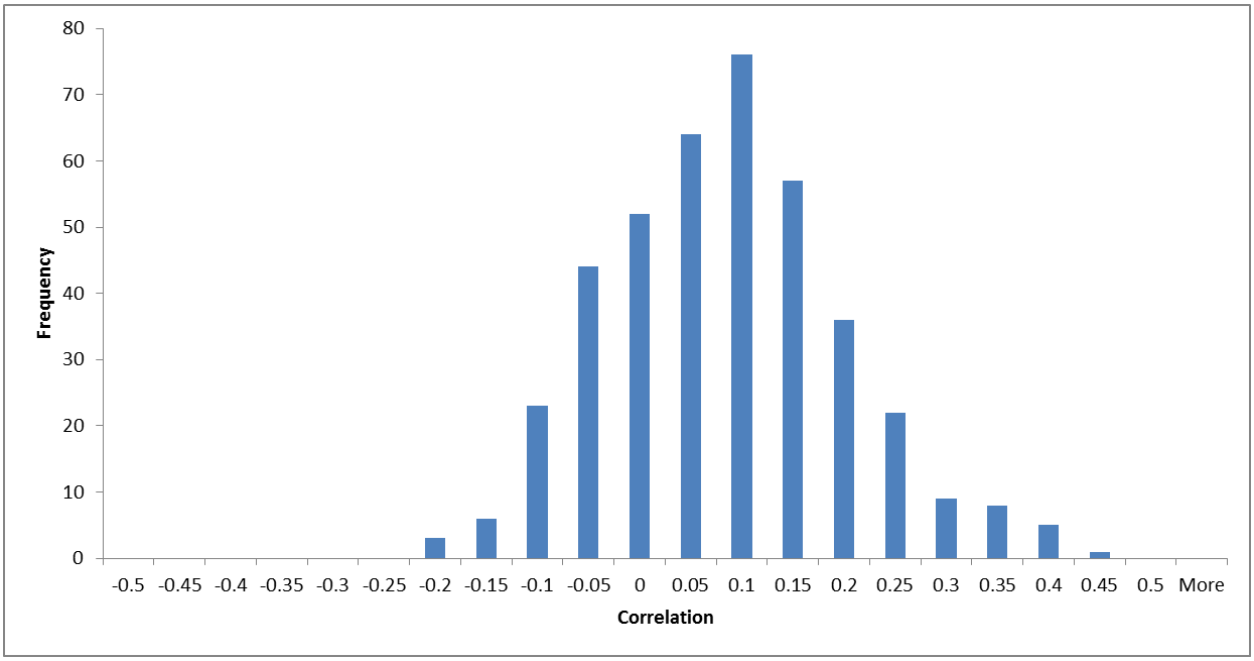



**Figure 1**

Also, as visible in the histogram in Figure 1, there were no correlations above 0.5, and few above 0.4, giving us confidence that our categorizations were independent when conducting statistical analysis and regression analysis.

We next investigated the presence of differences in risk factor disclosures across industries. We first defined "industries" as companies with the same first digit of their SIC code, and computed means for each of them; the values for each industry and category are presented in Appendix VI. As we hypothesized, when glancing only at the mean values numerically, the values seemed to differ across industries, with "international" risk and intellectual property risk being prime examples.

However, when we tested the means for differences, we found very little significance. For our statistical tests, we tried grouping firms by both the first digit and the first two-digits of their SIC code, and for each consolidated risk category, we used a Kruskal-Wallis test to identify industries that stood out, essentially providing a non-parametric analysis of variance with firms grouped by industry. Our null hypothesis was that the means were equal (i.e. $\mu_{1000} = \mu_{2000} = \mu_{3000} = \cdots = \mu_{8000}$), and our alternative hypothesis was that at least one of the industries had a different mean than the rest. Our results (in the form of p-values) are summarized below:

| | SIC 1-digit P-value | SIC 2-digit P-value | | SIC 1-digit P-value | SIC 2-digit P-value |
|---|---|---|---|---|---|
| accounting | 0.102 | 0.705 | insurance | 0.243 | 0.020 |
| acquisitions | 0.276 | 0.280 | international | 0.000 | 0.011 |
| marketing | 0.488 | 0.697 | intellectual property | 0.010 | 0.002 |
| capital strucutre | 0.608 | 0.610 | key personnel | 0.666 | 0.237 |
| capital expenditures | 0.422 | 0.609 | legal | 0.926 | 0.740 |
| cash | 0.756 | 0.992 | solvency | 0.542 | 0.559 |
| takeovers | 0.293 | 0.690 | calamities | 0.296 | 0.824 |
| competition | 0.742 | 0.433 | investments | 0.379 | 0.407 |
| credit risk | 0.698 | 0.529 | operations | 0.155 | 0.011 |
| customer concentration | 0.821 | 0.567 | regional | 0.199 | 0.001 |
| inventory | 0.259 | 0.831 | stock price | 0.238 | 0.024 |
| distribution | 0.721 | 0.674 | contracts | 0.702 | 0.196 |
| government | 0.074 | 0.011 | suppliers | 0.000 | 0.003 |
| industry | 0.142 | 0.024 | labor | 0.182 | 0.054 |
| macro | 0.385 | 0.642 | | | |

**Table 3**

In table 3, the most significant tests are highlighted in red, and demonstrated $p < \frac{0.05}{29} \approx 0.002$. (We divided by 29 to provide a Bonferroni correction for multiple testing.) In addition, we

highlighted in yellow those tests with $p < 0.01$ and in green those with $p < 0.05$. Even with these generous cutoffs, however, very few tests seemed significant.

As an alternative approach, we attempted to use principal component analysis to see if industry classification was a major driver of variation in our risk categorizations. Principal component analysis "rotates" the dataset such that the maximum variance is captured by the first few principal components, allowing us to reduce the dimensionality of the data. We considered the first two principal components for each company, and grouped companies by the first digit of their SIC code to identify any potential clustering:

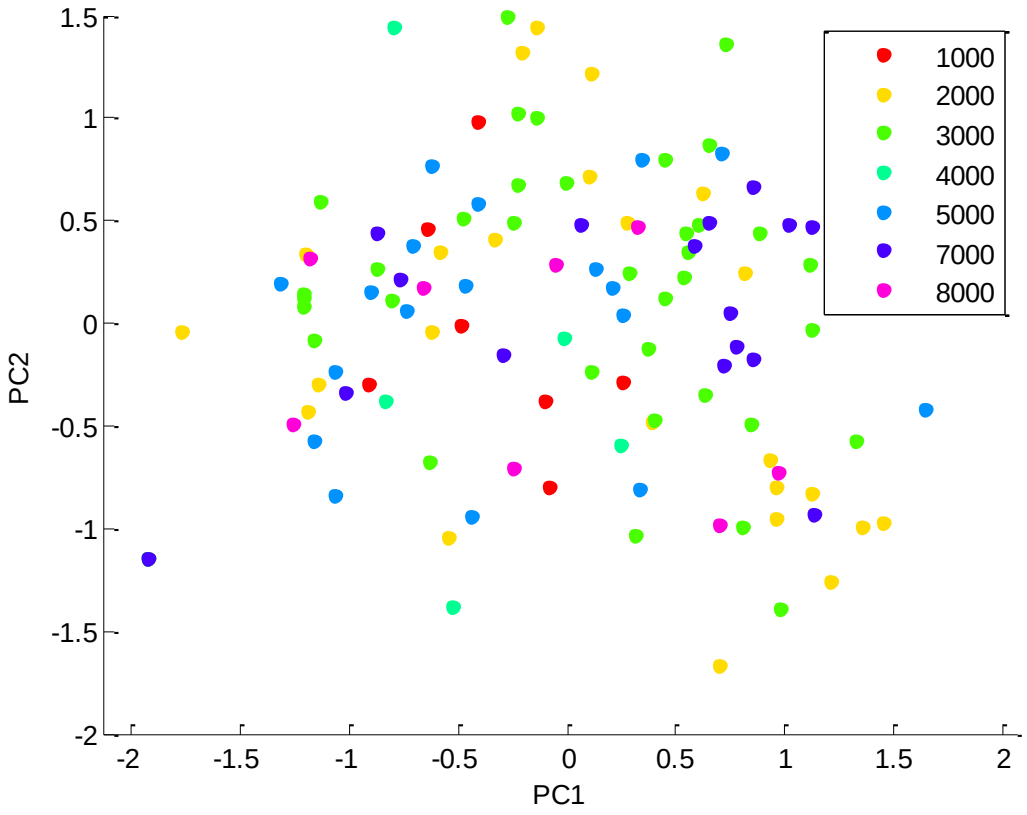



**Figure 2**

As visible in the figure above, we did not see any clustering in the data based on the SIC code, indicating that for at least the first two principal components of the data, industry classification is

not a major source of variance. We saw similar results for the third and fourth principal components as well (figure not shown).

There are a few potential explanations for the results we have seen regarding the relationship between industry and risk disclosures. One possibility is that disclosures are firm-specific and that firms distinguish their disclosures other firms in the same industry; thus, the fact that industry is not a major driver of variation is a positive aspect because it means that each firm provides information in its disclosure that an investor could not derive easily based on its industry affiliation.

The second possibility is that disclosures are in fact less informative than we might hope because they do not reflect a major source of risk: industry-wide risk. This is supported by the fact that several of the consolidated categories, such as government and macro risks, are common across almost all of the companies in our sample. In fact, the 10 most common categories are present in well over half of the companies. To test this further, one would need a method of identifying the expected similarity between two given companies' risk disclosures, to understand the similarity two randomly selected annual reports.

A third possibility is that our analysis simply used a sample size that was too small to detect statistically significant differences between categories. (To check this, one would need to repeat the analysis with a substantially larger sample size, and/or develop an automated method of categorizing large numbers of 10-K filings.)

The final step of our analysis consisted of evaluating the relationship between our categorizations and various accounting metrics. We used four different independent variables, normalized as appropriate to account for firm size:

- Total debt (divided by total assets)

- Capital expenditures (divided by net property, plant, and equipment)
- Cash (divided by total assets)
- Cash acquisitions (divided by net property, plant, and equipment)

As independent variables, we used the following:

- All operating risk categories (as binary variables); we included the following consolidated risk categories as "operating risk":

| | |
|---|---|
| competition | macro |
| credit risk | intellectual property |
| customer concentration | operations |
| inventory | contracts |
| distribution | suppliers |
| government | labor |
| industry | |

**Table 4**

- Total number of risk factors, as well as the logarithm of the total number of risk factors

First, we conducted the regression of total debt upon operating risk, and found the following:

| **Dependent Variable** | Debt / Total Assets | |
|---|---|---|
| | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** |
| intercept | 0.283 | 0.016 |
| 'competition' | 0.182 | 0.060 |
| 'credit risk' | -0.029 | 0.778 |
| 'customer concentration' | -0.053 | 0.460 |
| 'inventory' | 0.072 | 0.523 |
| 'distribution' | 0.018 | 0.842 |
| 'government' | 0.033 | 0.743 |
| 'industry' | 0.136 | 0.094 |
| 'macro' | -0.151 | 0.061 |
| 'intellectual property' | -0.090 | 0.248 |
| 'operations' | -0.083 | 0.287 |
| 'contracts' | 0.005 | 0.946 |
| 'suppliers' | -0.010 | 0.885 |
| 'labor' | 0.090 | 0.443 |
| | | |
| **R-square** | 0.103 | |
| **F-test P-Value** | 0.503 | |

**Table 5**

This regression was clearly insignificant overall, but more surprisingly, we found that none of the operating risk categories predicted debt amount in a statistically significant way. In addition, we found that only around 10 percent of the variance in the dependent variable can be explained by these categories, as indicated by the low $R^2$ value.

However, several of the coefficient signs were somewhat interesting. For example, both competition and macro risks were approaching significance (and perhaps would be significant in a larger sample), but competition seemed to result in increased leverage while macroeconomic risks resulted in reduced leverage. One possible explanation is that competition forces firms to be more aggressive in the market, leading them to borrow more and take more risks, while macro risk factors cannot be predicted or "defeated," and should therefore result in reduced leverage.

We next checked for the relationship between leverage (debt divided by total assets) and the total number of risk factors:

| **Dependent Variable** | Debt / Total Assets | | | **Dependent Variable** | Debt / Total Assets | |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** | | **Variable** | **Independent Variable** | **P-Value** |
| intercept | 0.291 | 0.005 | | intercept | 0.180 | 0.505 |
| total number of risk factors | -0.001 | 0.906 | | log(total number of risk factors) | 0.039 | 0.720 |
| | | | | | | |
| **R-square** | 0.000 | | | **R-square** | 0.001 | |
| **F-test P-Value** | 0.906 | | | **F-test P-Value** | 0.720 | |

**Table 6**

However, we found that neither the total number of risk factors nor its logarithm was a significant explanatory factor. Based on previous work[6] that has found a relationship between market-based risk measures and length of risk disclosures, we did expect some relationship since the total number of risk factors should be associated with disclosure length. Therefore, we were surprised to find no relationship.

We next investigated the relationship between total capital expenditures and operating risk, and found the following:

[6] Campbell, John L. et al. "The Information Content of Mandatory Risk Factor Disclosures in Corporate Filings." *SSRN eLibrary* (2010): 10 May 2011.

| **Dependent Variable** | CapEx / PPE | |
|---|---|---|
| | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** |
| intercept | 0.245 | 0.000 |
| 'competition' | -0.045 | 0.356 |
| 'credit risk' | -0.004 | 0.942 |
| 'customer concentration' | -0.033 | 0.353 |
| 'inventory' | 0.019 | 0.741 |
| 'distribution' | 0.015 | 0.751 |
| 'government' | 0.043 | 0.394 |
| 'industry' | -0.065 | 0.111 |
| 'macro' | 0.003 | 0.948 |
| 'intellectual property' | 0.132 | 0.001 |
| 'operations' | 0.042 | 0.288 |
| 'contracts' | 0.044 | 0.266 |
| 'suppliers' | -0.027 | 0.448 |
| 'labor' | -0.086 | 0.145 |
| | | |
| **R-square** | 0.272 | |
| **F-test P-Value** | 0.001 | |

**Table 7**

Quite interestingly, we found this regression to be significant overall, but the only significant independent variable was intellectual property, with a positive relationship. This seems quite reasonable and expected, since firms with significant capital expenditures often have significant amounts of money invested in research and development infrastructure.

We also found a significant relationship between capital expenditures and the total number of risk factors:

| **Dependent Variable** | CapEx / PPE | | **Dependent Variable** | CapEx / PPE | |
|---|---|---|---|---|---|
| | | | | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** | **Independent Variable** | **Parameter Estimate** | **P-Value** |
| intercept | 0.154 | 0.007 | intercept | -0.095 | 0.518 |
| total number of risk factors | 0.013 | 0.005 | log(total number of risk factors) | 0.162 | 0.007 |
| | | | | | |
| **R-square** | 0.063 | | **R-square** | 0.062 | |
| **F-test P-Value** | 0.005 | | **F-test P-Value** | 0.007 | |

**Table 8**

This was surprising given our results on leverage and total number of risk factors. We cannot explain the fact that capital expenditures seem more sensitive to the total number of risk factors described in item 1A.

We found very similar results when we next compared cash to operating risk and total number of risk factors:

| Cash | | |
|---|---|---|
| **Dependent Variable** | Cash / Total Assets | |
| | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** |
| intercept | 0.121 | 0.030 |
| 'competition' | -0.038 | 0.403 |
| 'credit risk' | 0.026 | 0.599 |
| 'customer concentration' | -0.031 | 0.361 |
| 'inventory' | 0.005 | 0.924 |
| 'distribution' | -0.023 | 0.594 |
| 'government' | 0.082 | 0.085 |
| 'industry' | -0.018 | 0.640 |
| 'macro' | -0.068 | 0.078 |
| 'intellectual property' | 0.154 | 0.000 |
| 'operations' | 0.017 | 0.644 |
| 'contracts' | 0.084 | 0.027 |
| 'suppliers' | -0.061 | 0.075 |
| 'labor' | 0.001 | 0.982 |
| | | |
| **R-square** | 0.359 | |
| **F-test P-Value** | 0.000 | |

**Table 9**

| **Dependent Variable** | Cash / Total Assets | | | **Dependent Variable** | Cash / Total Assets | |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** | | **Independent Variable** | **Parameter Estimate** | **P-Value** |
| intercept | 0.013 | 0.812 | | intercept | -0.180 | 0.227 |
| total number of risk factors | 0.013 | 0.004 | | log(total number of risk factors) | 0.143 | 0.018 |
| | | | | | | |
| **R-square** | 0.067 | | | **R-square** | 0.047 | |
| **F-test P-Value** | 0.004 | | | **F-test P-Value** | 0.018 | |

**Table 10**

Interestingly, we noticed similar relationships for cash that we saw for capital expenditures. We hypothesized that this could be because of a strong correlation between amounts of cash that a company holds and the amount of capital expenditures it can undertake, and we found the correlation between these two independent variables to be 0.46.

Finally, when we used acquisitions (normalized by dividing by total PPE) as a dependent variable, we found almost no predictive power:

| **Dependent Variable** | Acquisitions / PPE | |
|---|---|---|
| | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** |
| intercept | 0.075 | 0.884 |
| 'competition' | 0.336 | 0.430 |
| 'credit risk' | -0.256 | 0.591 |
| 'customer concentration' | -0.050 | 0.874 |
| 'inventory' | 0.843 | 0.091 |
| 'distribution' | -0.141 | 0.726 |
| 'government' | 0.227 | 0.605 |
| 'industry' | -0.011 | 0.977 |
| 'macro' | -0.007 | 0.983 |
| 'intellectual property' | 0.220 | 0.526 |
| 'operations' | -0.365 | 0.292 |
| 'contracts' | -0.290 | 0.411 |
| 'suppliers' | 0.133 | 0.679 |
| 'labor' | -0.303 | 0.559 |
| | | |
| **R-square** | 0.057 | |
| **F-test P-Value** | 0.923 | |

**Table 11**

| **Dependent Variable** | Acquisitions / PPE | | | **Dependent Variable** | Acquisitions / PPE | |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Independent Variable** | **Parameter Estimate** | **P-Value** | | **Independent Variable** | **Parameter Estimate** | **P-Value** |
| intercept | -0.246 | 0.573 | | intercept | -1.516 | 0.191 |
| total number of risk factors | 0.052 | 0.138 | | log(total number of risk factors) | 0.765 | 0.102 |
| | | | | | | |
| **R-square** | 0.019 | | | **R-square** | 0.023 | |
| **F-test P-Value** | 0.138 | | | **F-test P-Value** | 0.102 | |

**Table 12**

## Conclusions

Our investigation made three conclusions. First, we found that certain risk factor categories, such as government and competitive risks, were mentioned in the vast majority of risk factor disclosures.

Second, we found that for most risk factor categories, there were not statistically significant differences across industries. However, a few categories, such as international and supplier risk, seemed significant, though we could not explain these results.

Third, we found through our regression analysis that intellectual property risk and total number of risk factors were statistically predictive of both capital expenditures and cash, but not of leverage or acquisitions. Overall, however, we found that operating risk factor disclosure were not useful in predicting a firm's financial accounting characteristics. While we proposed some explanations for these results, further analysis could certainly investigate these relationships further.

## Future Work

Perhaps the easiest possibility for future analysis involves increasing our sample size to understand whether our lack of significance when exploring differences across industry is simply because of a lack of power given the fact that we are only using 122 firms. One variant could be developing an electronic/automated method of processing large numbers of annual filings.

Second, future studies could explore relationships between risk and a firm's financial performance longitudinally over time, or for specific high-risk industries (such as energy

exploration, for example) since risk disclosures in such industries should have much more meaning and importance for both investors and regulators.

Third, future studies could explore market reactions to risk disclosures in more detail to identify whether disclosures result in more efficient allocation of capital. This could be in the form of measuring changes in the risk factor disclosures in annual filings, separating their effect from financial performance effects, and measuring the effect of these changes in variables such as stock prices, bond yields, etc.

We would also be interested in exploring whether risk factors can be used instead of stock price volatility or earnings volatility to measure firm risk. Thus, another exploration could measure the relationship between market-based risk measures and qualitative risk factors, and seeing whether relationships that are observed for market-based measures are also present when conducting the analysis using qualitative factors.

A final possibility for future exploration is to analyze the relationship between a firm's risk disclosures and key person life insurance. Many firms purchase life insurance on their chief executives or presidents ("key personnel"), especially if the firm's leader provides specific technical expertise and is anticipated to stay in the company for an extended period. Moreover, many firms disclose the life insurance they purchase for their executives. Since purchasing key person life insurance is, in some ways, a measure of the risk aversion of the firm's leadership, we would be interested in looking at whether the risk categorizations we previously developed have any relationship with key person life insurance. This would pose some challenges with data collection, as firms often do not provide enough specific details about the key person life insurance that they purchase (for example, which executives are insured, for exactly how much, and how much this insurance costs), which could make meaningful analysis impractical.

## Appendix I

The following tables list the legal name and COMPUSTAT GVKEY identification number for all the companies in our random sample.

| Company Legal Name | COMPUSTAT GVKEY | Company Legal Name | COMPUSTAT GVKEY |
|---|---|---|---|
| Avon Products Inc. | 1920 | America's Car-Mart Inc | 13602 |
| Campbell Soup Co | 2663 | Dell Inc | 14489 |
| Cardinal Health Inc | 2751 | Concord Camera Corp | 14808 |
| Crane Co. | 3580 | Lattice Semiconductor Corp | 16597 |
| Crown Holdings Inc | 3619 | Fisher Communications Inc | 18364 |
| Duckwall Alco Stores Inc | 4090 | G III Apparel Group Ltd | 19402 |
| Environmental Tectonics Corp | 4415 | Contango Oil & Gas Co | 22053 |
| Jo-Ann Stores Inc. | 4523 | Wet Seal Inc (The) | 22612 |
| Ferro Corp. | 4622 | Exponent Inc | 23027 |
| HEICO Corp | 5567 | Community Health Systems Inc | 23714 |
| Herley Industries Inc | 5594 | ARI Network Services Inc | 24670 |
| Hovnanian Enterprises Inc. | 5750 | Genta Inc | 24781 |
| PhotoMedex Inc | 6598 | Vitesse Semiconductor Corp | 24803 |
| Florida Gaming Corp | 6694 | Terra Nitrogen Co LP | 24965 |
| Medical Action Industries Inc | 7205 | McAfee Inc | 25783 |
| Methode Electronics Inc | 7291 | Innodata Isogen Inc | 28717 |
| Myers Industries Inc. | 7636 | Oxigene Inc | 28795 |
| Northrop Grumman Corp | 7985 | Ultratech Inc | 28938 |
| Potlatch Corp | 8692 | AK Steel Holding Corp | 29968 |
| Regis Corp | 9023 | Eagle Materials Inc | 30032 |
| Lodgian Inc. | 9614 | International Textile Group Inc | 30169 |
| Standard Motor Products Inc. | 10000 | McMoRan Exploration Co | 30234 |
| Tellabs Inc | 10420 | GEO Group Inc (The) | 30536 |
| US 1 Industries Inc | 10676 | Stillwater Mining Co | 31203 |
| United Stationers Inc | 10981 | Borders Group Inc | 31849 |
| Vulcan Materials Co | 11228 | Socket Mobile Inc | 60801 |
| Meridian Resource Corp (The) | 12046 | Wayside Technology Group | 61028 |
| Astec Industries Inc. | 12262 | Tarrant Apparel Group | 61060 |
| Harley-Davidson Inc. | 12389 | Opko Health Inc | 61490 |
| IsoRay Inc | 12818 | Buckeye Technologies Inc | 61596 |
| Nobel Learning Communities Inc | 12855 | Westell Technologies Inc | 61646 |
| Georgia Gulf Corp. | 12895 | Nuance Communications Inc | 61685 |

(continued on next page)

| Company Legal Name | COMPUSTAT GVKEY | Company Legal Name | COMPUSTAT GVKEY |
|---|---|---|---|
| Pinnacle Data Systems Inc. | 62768 | Martin Midstream Partners LP | 150201 |
| Genesee & Wyoming Inc. | 63123 | Universal Technical Institute Inc. | 156633 |
| Diedrich Coffee Inc | 63572 | Santarus Inc | 157954 |
| Q.E.P. Co. Inc | 63593 | Metalico Inc | 160474 |
| Penske Automotive Group Inc | 63847 | Westlake Chemical Corp | 160684 |
| Famous Dave's of America Inc | 63930 | NationsHealth Inc | 161816 |
| Take-Two Interactive Software Inc | 64630 | Peoples Educational Holdings Inc | 161869 |
| Evolving Systems Inc | 110529 | Unica Corp | 162355 |
| Interstate Hotels & Resorts Inc. | 113439 | Sunesis Pharmaceuticals Inc | 162585 |
| Tigrent Inc | 114242 | Rockwood Holdings Inc | 162957 |
| Vignette Corp | 118445 | Lotus Pharmaceuticals Inc | 163088 |
| Varian Inc | 119216 | Solar Enertech Corp | 165269 |
| Priceline.Com Inc | 119314 | Coleman Cable Inc | 165640 |
| PLX Technology Inc | 119493 | Viacom Inc | 165675 |
| tw telecom inc | 120359 | Castle Brands Inc | 165691 |
| Salem Communications Corp | 121817 | H&E Equipment Services Inc | 165856 |
| Next Inc | 122914 | Global Traffic Network Inc | 166402 |
| Maxygen Inc | 127481 | Volcano Corp | 174118 |
| Sequenom Inc | 128663 | Pharmasset Inc | 174507 |
| Occam Networks Inc | 137130 | EV Energy Partners LP | 175006 |
| deCODE genetics Inc | 137803 | Armstrong World Industries Inc | 175689 |
| Illumina Inc | 138205 | XTENT Inc | 175743 |
| Peet's Coffee & Tea Inc | 140897 | Universal Power Group Inc | 176325 |
| Seattle Genetics Inc | 141460 | Accuray Inc | 176670 |
| Lawson Software Inc | 144135 | HSW International Inc | 178494 |
| Asbury Automotive Group Inc | 144640 | Power Medical Interventions Inc | 178722 |
| Corcept Therapeutics Inc | 146616 | | |
| Cycle Country Accessories Corp | 147101 | | |
| Overstock.com Inc | 147868 | | |
| TransDigm Group Inc | 148349 | | |
| TravelCenters of America LLC | 148350 | | |
| Nile Therapeutics Inc | 148552 | | |

## Appendix II

Our initial categorization of risk factors consisted of 116 categories, listed below:

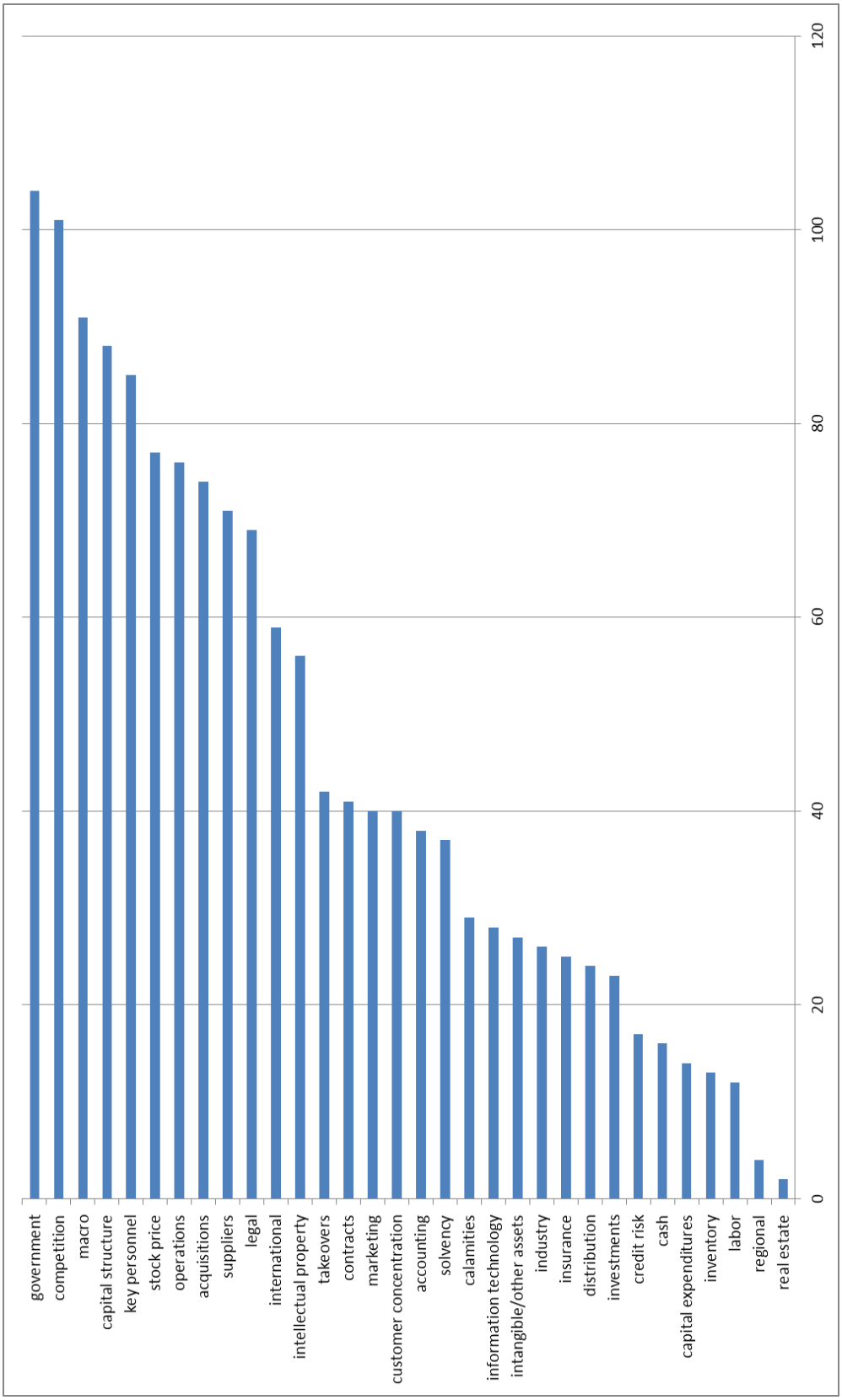
| | | |
|---|---|---|
| accounting control | industry condition | quarterly variation |
| accounting standards | inflation | raw materials availability |
| acquisitions | information security | raw materials prices |
| assets: liens | information technology | real estate |
| brand | insurance | region-specific |
| brand concentration | interest rates | regulatory |
| capital availability | international (non-US) risk | regulatory: government contracts |
| capital expenditures | international markets (challenges) | reputation |
| cash requirements | inventory management | research and development |
| charter documents | IP | restructuring |
| competition | IP: legal defense | revenue: inconsistent |
| competition: lower prices | IP: value | safety |
| consumer preferences | joint ventures | seasonality |
| contracts: estimated value | key personnel | shareholder rights plan |
| cost savings | key personnel: insurance | single product |
| credit rating | leases | stock price |
| credit risk | legal / litigation | stock price: delisting |
| currency / exchange rates | liability | stock price: issuance b/c of derivatives |
| customer concentration | liquidity / investments | stock price: volatility |
| cyclical business | losses: future | stock: no dividends |
| debt: additional | losses: past | stock: thinly traded |
| debt: covenants | macroeconomy | subcontractors |
| debt: highly levered | management ownership | substitute products |
| debt: refinancing | manufacturing / technical | suppliers: concentration |
| deferred taxes | market acceptance | suppliers: promotions |
| delivery delays | market share | supply chain |
| demand: unpredictable | marketing effectiveness | supply chain: foreign |
| dispositions | merger benefits | tax legislation |
| distribution channels | natural disasters | technological change |
| energy prices | new management | technology: unproven |
| environmental | new products | terrorism / war |
| financial crisis | new stores | third party |
| financial services | ongoing legal proceedings | transportation |
| fixed price contracts | operating risk | unions / labor |
| franchise terminations | ownership concentration | weather |
| going concern | pension / retirement benefits | working capital |
| goodwill write downs / intangible asset risk | political | |
| government contracts/funding | pricing | |
| government programs | product quality | |
| industry changes | production delay | |

## Appendix III

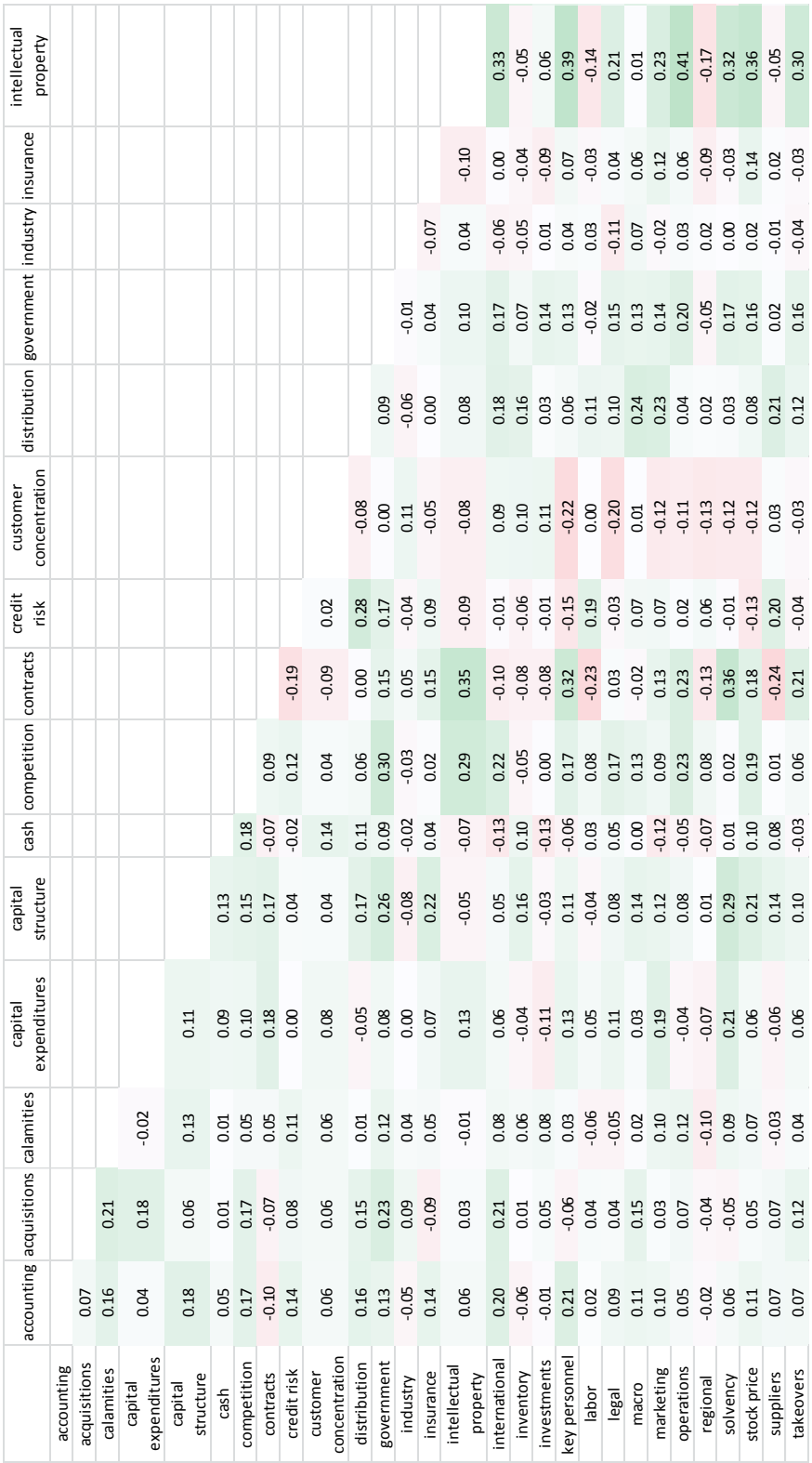
After the initial categorization, the categories were consolidated according to the following table:

| Consolidated Category | Original Categories |
|---|---|
| accounting | accounting control, accounting standards |
| acquisitions | acquisitions, cost savings, joint ventures, merger benefits, restructuring |
| calamities | natural disasters, terrorism / war, weather |
| capital expenditures | capital expenditures, research and development |
| capital structure | assets: liens, capital availability, credit rating, debt: additional, debt: covenants, debt: highly levered, debt: refinancing, interest rates |
| cash | cash requirements |
| competition | competition, competition: lower prices, substitute products |
| contracts | contracts: estimated value, fixed price contracts, franchise terminations, subcontractors, third party |
| credit risk | credit risk |
| customer concentration | customer concentration |
| distribution | distribution channels, transportation |
| government | environmental, government contracts/funding, government programs, political, regulatory, regulatory: government contracts, tax legislation |
| industry | industry changes, industry condition |
| insurance | insurance |
| intellectual property | IP, IP: legal defense, IP: value |
| international | currency / exchange rates, international (non-US) risk, international markets (challenges) |
| inventory | delivery delays, inventory management |
| investments | liquidity / investments, pension / retirement benefits |
| key personnel | key personnel, key personnel: insurance, new management |
| labor | unions / labor |
| legal | legal / litigation, liability, ongoing legal proceedings, safety |
| macro | cyclical business, demand: unpredictable, financial crisis, financial services, inflation, macroeconomy, quarterly variation, revenue: inconsistent, seasonality |
| marketing | brand, brand concentration, consumer preferences, market acceptance, market share, marketing effectiveness, pricing, reputation |
| operations | leases, manufacturing / technical, new products, new stores, operating risk, product quality, production delay, single product, technological change, technology: unproven, working capital |
| regional | region-specific |
| solvency | going concern, losses: future, losses: past |
| stock price | management ownership, ownership concentration, stock price, stock price: delisting, stock price: issuance b/c of derivatives, stock price: volatility, stock: no dividends, stock: thinly traded |
| suppliers | energy prices, raw materials availability, raw materials prices, suppliers: concentration, suppliers: promotions, supply chain, supply chain: foreign |
| takeovers | charter documents, shareholder rights plan |

**Appendix IV**


120
100
80
60
40
20
0
government
competition
macro
capital structure
key personnel
stock price
operations
acquisitions
suppliers
legal
international
intellectual property
takeovers
contracts
marketing
customer concentration
accounting
solvency
calamities
information technology
intangible/other assets
industry
insurance
distribution
investments
credit risk
cash
capital expenditures
inventory
labor
regional
real estate

## Appendix V



| | accounting | acquisitions | calamities | capital expenditures | capital structure | cash | competition | contracts | credit risk | customer concentration | distribution | government | industry | insurance | intellectual property |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| accounting | | | | | | | | | | | | | | | |
| acquisitions | 0.07 | | | | | | | | | | | | | | |
| calamities | 0.16 | 0.21 | | | | | | | | | | | | | |
| capital expenditures | 0.04 | 0.18 | -0.02 | | | | | | | | | | | | |
| capital structure | 0.18 | 0.06 | 0.13 | 0.11 | | | | | | | | | | | |
| cash | 0.05 | 0.01 | 0.01 | 0.09 | 0.13 | | | | | | | | | | |
| competition | 0.17 | 0.17 | 0.05 | 0.10 | 0.15 | 0.18 | | | | | | | | | |
| contracts | -0.10 | -0.07 | 0.05 | 0.18 | 0.17 | -0.07 | 0.09 | | | | | | | | |
| credit risk | 0.14 | 0.08 | 0.11 | 0.00 | 0.04 | -0.02 | 0.12 | -0.19 | | | | | | | |
| customer concentration | 0.06 | 0.06 | 0.06 | 0.08 | 0.04 | 0.14 | 0.04 | -0.09 | 0.02 | | | | | | |
| distribution | 0.16 | 0.15 | 0.01 | -0.05 | 0.17 | 0.11 | 0.06 | 0.00 | 0.28 | -0.08 | | | | | |
| government | 0.13 | 0.23 | 0.12 | 0.08 | 0.26 | 0.09 | 0.30 | 0.15 | 0.17 | 0.00 | 0.09 | | | | |
| industry | -0.05 | 0.09 | 0.04 | 0.00 | -0.08 | -0.02 | -0.03 | 0.05 | -0.04 | 0.11 | -0.06 | -0.01 | | | |
| insurance | 0.14 | -0.09 | 0.05 | 0.07 | 0.22 | 0.04 | 0.02 | 0.15 | 0.09 | -0.05 | 0.00 | 0.04 | -0.07 | | |
| intellectual property | 0.06 | 0.03 | -0.01 | 0.13 | -0.05 | -0.07 | 0.29 | 0.35 | -0.09 | -0.08 | 0.08 | 0.10 | 0.04 | -0.10 | |
| international | 0.20 | 0.21 | 0.08 | 0.06 | 0.05 | -0.13 | 0.22 | -0.10 | -0.01 | 0.09 | 0.18 | 0.17 | -0.06 | 0.00 | 0.33 |
| inventory | -0.06 | 0.01 | 0.06 | -0.04 | 0.16 | 0.10 | -0.05 | -0.08 | -0.06 | 0.10 | 0.16 | 0.07 | -0.05 | -0.04 | -0.05 |
| investments | -0.01 | 0.05 | 0.08 | -0.11 | -0.03 | -0.13 | 0.00 | -0.08 | -0.01 | 0.11 | 0.03 | 0.14 | 0.01 | -0.09 | 0.06 |
| key personnel | 0.21 | -0.06 | 0.03 | 0.13 | 0.11 | -0.06 | 0.17 | 0.32 | -0.15 | -0.22 | 0.06 | 0.13 | 0.04 | 0.07 | 0.39 |
| labor | 0.02 | 0.04 | -0.06 | 0.05 | -0.04 | 0.03 | 0.08 | -0.23 | 0.19 | 0.00 | 0.11 | -0.02 | 0.03 | -0.03 | -0.14 |
| legal | 0.09 | 0.04 | -0.05 | 0.11 | 0.08 | 0.05 | 0.17 | 0.03 | -0.03 | -0.20 | 0.10 | 0.15 | -0.11 | 0.04 | 0.21 |
| macro | 0.11 | 0.15 | 0.02 | 0.03 | 0.14 | 0.00 | 0.13 | -0.02 | 0.07 | 0.01 | 0.24 | 0.13 | 0.07 | 0.06 | 0.01 |
| marketing | 0.10 | 0.03 | 0.10 | 0.19 | 0.12 | -0.12 | 0.09 | 0.13 | 0.07 | -0.12 | 0.23 | 0.14 | -0.02 | 0.12 | 0.23 |
| operations | 0.05 | 0.07 | 0.12 | -0.04 | 0.08 | -0.05 | 0.23 | 0.23 | 0.02 | -0.11 | 0.04 | 0.20 | 0.03 | 0.06 | 0.41 |
| regional | -0.02 | -0.04 | -0.10 | -0.07 | 0.01 | -0.07 | 0.08 | -0.13 | 0.06 | -0.13 | 0.02 | -0.05 | 0.02 | -0.09 | -0.17 |
| solvency | 0.06 | -0.05 | 0.09 | 0.21 | 0.29 | 0.01 | 0.02 | 0.36 | -0.01 | -0.12 | 0.03 | 0.17 | 0.00 | -0.03 | 0.32 |
| stock price | 0.11 | 0.05 | 0.07 | 0.06 | 0.21 | 0.10 | 0.19 | 0.18 | -0.13 | -0.12 | 0.08 | 0.16 | 0.02 | 0.14 | 0.36 |
| suppliers | 0.07 | 0.07 | -0.03 | -0.06 | 0.14 | 0.08 | 0.01 | -0.24 | 0.20 | 0.03 | 0.21 | 0.02 | -0.01 | 0.02 | -0.05 |
| takeovers | 0.07 | 0.12 | 0.04 | 0.06 | 0.10 | -0.03 | 0.06 | 0.21 | -0.04 | -0.03 | 0.12 | 0.16 | -0.04 | -0.03 | 0.30 |

(continued on next page)

| | international | inventory | investments | key personnel | labor | legal | macro | marketing | operations | regional | solvency | stock price | suppliers | takeovers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| accounting | | | | | | | | | | | | | | |
| acquisitions | | | | | | | | | | | | | | |
| calamities | | | | | | | | | | | | | | |
| capital expenditures | | | | | | | | | | | | | | |
| capital structure | | | | | | | | | | | | | | |
| cash | | | | | | | | | | | | | | |
| competition | | | | | | | | | | | | | | |
| contracts | | | | | | | | | | | | | | |
| credit risk | | | | | | | | | | | | | | |
| customer concentration | | | | | | | | | | | | | | |
| distribution | | | | | | | | | | | | | | |
| government | | | | | | | | | | | | | | |
| industry | | | | | | | | | | | | | | |
| insurance | | | | | | | | | | | | | | |
| intellectual property | | | | | | | | | | | | | | |
| international | | | | | | | | | | | | | | |
| inventory | 0.20 | | | | | | | | | | | | | |
| investments | 0.12 | -0.03 | | | | | | | | | | | | |
| key personnel | 0.17 | 0.05 | 0.00 | | | | | | | | | | | |
| labor | 0.12 | -0.02 | 0.12 | -0.14 | | | | | | | | | | |
| legal | 0.09 | -0.07 | 0.00 | 0.14 | 0.07 | | | | | | | | | |
| macro | 0.19 | 0.20 | 0.09 | 0.11 | 0.13 | 0.10 | | | | | | | | |
| marketing | 0.13 | 0.10 | -0.07 | 0.16 | -0.05 | 0.26 | 0.13 | | | | | | | |
| operations | 0.14 | 0.10 | 0.03 | 0.19 | -0.08 | 0.03 | 0.13 | 0.26 | | | | | | |
| regional | -0.18 | 0.09 | 0.03 | 0.02 | 0.09 | -0.02 | 0.11 | -0.03 | -0.14 | | | | | |
| solvency | -0.07 | 0.00 | -0.14 | 0.28 | -0.04 | 0.15 | -0.07 | 0.22 | 0.18 | -0.02 | | | | |
| stock price | 0.30 | 0.10 | -0.20 | 0.35 | -0.09 | 0.22 | -0.06 | 0.28 | 0.25 | -0.15 | 0.32 | | | |
| suppliers | -0.01 | 0.08 | 0.07 | -0.20 | 0.22 | -0.01 | 0.15 | 0.03 | 0.09 | -0.03 | 0.05 | -0.03 | | |
| takeovers | 0.16 | -0.03 | -0.08 | 0.14 | -0.12 | 0.01 | -0.05 | 0.08 | 0.03 | -0.13 | 0.31 | 0.38 | -0.05 | |

## Appendix VI

| | Mining & Construction | Manufacturing | Manufacturing | Transportation, Comm., Utilities | Wholesale & Retail Trade | Services | Services |
|---|---|---|---|---|---|---|---|
| | SIC Code 1000 | SIC Code 2000 | SIC Code 3000 | SIC Code 4000 | SIC Code 5000 | SIC Code 7000 | SIC Code 8000 |
| accounting | 0.29 | 0.08 | 0.34 | 0.17 | 0.44 | 0.47 | 0.38 |
| acquisitions | 0.71 | 0.60 | 0.61 | 0.33 | 0.44 | 0.82 | 0.63 |
| calamities | 0.14 | 0.20 | 0.22 | 0.50 | 0.11 | 0.41 | 0.25 |
| capital expenditures | 0.29 | 0.16 | 0.07 | 0.00 | 0.06 | 0.12 | 0.25 |
| capital structure | 1.00 | 0.76 | 0.71 | 0.67 | 0.72 | 0.59 | 0.75 |
| cash | 0.14 | 0.12 | 0.17 | 0.17 | 0.17 | 0.00 | 0.13 |
| competition | 0.86 | 0.92 | 0.83 | 0.67 | 0.78 | 0.76 | 0.88 |
| contracts | 0.43 | 0.32 | 0.29 | 0.50 | 0.22 | 0.47 | 0.38 |
| credit risk | 0.29 | 0.04 | 0.17 | 0.17 | 0.17 | 0.12 | 0.13 |
| customer concentration | 0.29 | 0.28 | 0.39 | 0.50 | 0.22 | 0.29 | 0.38 |
| distribution | 0.14 | 0.16 | 0.24 | 0.17 | 0.28 | 0.18 | 0.00 |
| government | 1.00 | 0.80 | 0.90 | 0.67 | 0.67 | 0.94 | 1.00 |
| industry | 0.14 | 0.04 | 0.22 | 0.50 | 0.22 | 0.35 | 0.25 |
| insurance | 0.57 | 0.12 | 0.17 | 0.33 | 0.22 | 0.18 | 0.25 |
| intellectual property | 0.00 | 0.52 | 0.61 | 0.17 | 0.28 | 0.59 | 0.25 |
| international | 0.00 | 0.44 | 0.68 | 0.17 | 0.28 | 0.76 | 0.13 |
| inventory | 0.00 | 0.12 | 0.15 | 0.00 | 0.22 | 0.00 | 0.00 |
| investments | 0.14 | 0.24 | 0.27 | 0.00 | 0.06 | 0.12 | 0.25 |
| key personnel | 0.57 | 0.56 | 0.76 | 0.67 | 0.78 | 0.71 | 0.75 |
| labor | 0.00 | 0.16 | 0.12 | 0.33 | 0.06 | 0.00 | 0.00 |
| legal | 0.43 | 0.56 | 0.63 | 0.50 | 0.50 | 0.53 | 0.63 |
| macro | 0.71 | 0.60 | 0.78 | 0.67 | 0.89 | 0.82 | 0.63 |
| marketing | 0.29 | 0.36 | 0.27 | 0.17 | 0.28 | 0.41 | 0.63 |
| operations | 0.71 | 0.68 | 0.76 | 0.33 | 0.44 | 0.53 | 0.50 |
| regional | 0.14 | 0.04 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 |
| solvency | 0.43 | 0.44 | 0.29 | 0.17 | 0.22 | 0.29 | 0.13 |
| stock price | 0.43 | 0.72 | 0.68 | 0.33 | 0.50 | 0.76 | 0.50 |
| suppliers | 1.00 | 0.56 | 0.78 | 0.17 | 0.72 | 0.12 | 0.25 |
| takeovers | 0.14 | 0.44 | 0.37 | 0.00 | 0.28 | 0.47 | 0.25 |