CORPORATE GOVERNANCE: A RISK MANAGEMENT APPROACH

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Abstract

Risk management committees are now required for all U.S. financial institutions that are regulated by the U.S. Federal Reserve Bank. All U.S. public companies must now report their risk management activities for both Board of Directors and top management in their 10 K annual reports to the U.S. Securities and Exchange Commission (SEC). This paper analyzes one approach to risk management for public companies and their Boards of Directors. Since 2011, *Disclosure Insight Inc.* has issued risk ratings for over 1500 public companies in US. Its risk rating is based on the number, nature, and timing of 100 risk factors, which are across major categories, such as the SEC investigative activity, auditor issues, capital market events, and corporate governance issues. Our study finds significant positive abnormal risk-adjusted returns for companies with lower risk ratings and these companies also outperform the S&P500. Thus, this paper should be of interest to investors, company executives, and risk management committees, as well as SEC and other regulators. Alternatively, risk management committees in public companies could just establish their own rating systems, based upon their own key factors, as opposed to using the *Disclosure Insight Inc.* aggregate rating approach for all 100 risk factors.

Keywords: Risk Management, Corporate Governance, Company Performance

JEL Classifications: G11, G14

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1. Introduction

An extensive report released by the Financial Crisis Inquiry Commission (FCIC) [37] points out that failures of corporate governance and risk management at many systemically important financial institutions are among key causes of the recent financial and economic crisis in the United States. Emphasizing a new priority on risk management, the SEC now requires more disclosures about risk management and corporate governance in the proxy statements of U.S. public companies (Morris et.al. 2012). The SEC requires that proxy statements discuss the company's board leadership and its role in risk management oversight. Also, the Dodd-Frank Act requires that large banks and other non-bank financial companies have a separate risk management committee with at least one risk management expert. Claw-back policies are also now required by Dodd-Frank for the three years preceding any financial restatements from violating Generally Accepted Accounting Principles. The Sarbanes-Oxley Act (SOX) also required claw-back procedures to reduce risky reporting. Thus, fuller disclosures and transparency for risk management are now being required for U.S. companies.

Previous risk management theories also argue that increase in firm risk could have detrimental effects for shareholder wealth and that can be of first-order importance.[38] However, it proves difficult to assess firms' risk levels and distinguish firms with different risk levels. Several commercial firms now develop and offer ratings on firms' risks. Investors, shareholders, fund managers, board members and policy maker have become increasingly interested in these commercially

[37] The Financial Crisis Inquiry Commission (FCIC) is a ten-member commission appointed by the United States government with the goal of investigating the causes of the financial crisis of 2007–2010.

[38] Previous theoretical literature, i.e., Smith and Stulz (1985) and Froot, Scharfstein and Stein (1993), analyzes the impact of cash flow volatility on firm value.

developed ratings. Do these ratings identify important risk factors? How useful are the ratings? The empirical evidence is scarce on the value of these ratings and their ability to assess firm risk and predict future performance.

The purpose of this paper is to empirically evaluate newly developed commercial risk ratings from the Disclosure Insight Inc (D.I. risk ratings hereafter) as a basis for a corporate governance approach to risk management. We examine the ability of the D.I. risk ratings to assess firm risk and their associations with firm accounting and stock performance. The D.I. risk ratings provide an indicator of overall risk level associated with business and are based on over 100 risk factors, which "hold the potential to destabilize a company, distract its management, and/or interfere with underlying fundamentals". These new risk ratings are claimed to provide a better and more comprehensive measure of firms' risk level and risk exposures which could aid risk management committees.

We first examine the association between the D.I. risk ratings and firm risk level. We find that total risk and firm-specific risk are positively correlated with the D.I. risk ratings while there is no significant relationship between market risk and the D.I. risk ratings. Second, we examine the relationship between the D.I. risk ratings and firms' accounting performance. There are significantly negative relationships between the D.I. risk ratings and the industry-adjusted accounting performance measures. Third, we examine the relationship between the D.I. risk ratings and firms' excess returns (Alpha), which represents the returns above expectations. We find a significantly negative relationship between the D.I. risk ratings and excess returns. Firms with higher risk exposures have lower excess returns. Fourth, we form four equally-weighted risk-rating portfolios by allocating firms with the same D.I risk ratings into the same portfolio. We calculate and compare the risk-adjusted returns (the Sharp and Treynor ratio) of four risk-rating portfolios. We also use the S&P500 index as the benchmark portfolio. In addition, we estimate the abnormal returns of the risk-rating portfolios using the Fama-French three- and four-factor models. We find that there is a negative relationship between the D.I. risk ratings and the portfolios' risk-adjusted returns. Firms with low risk ratings and medium risk-positive bias ratings outperform the S&P500 index and have significantly positive abnormal returns.

This paper can contribute to previous literature by deepening our understanding of how and why firm risk affects shareholder wealth as one approach to risk management for corporate governance. In addition, this paper should be of interest to risk management committees, investors, and regulators. The paper proceeds as follows. Section 2 gives a brief review of related literature. Section 3 describes the data and sample. Section 4 presents the empirical methodology and results. Section 5 concludes.

2. Literature Review

There is a growing literature that examines the value and validity of commercially developed rating metrics. Most of previous studies focus on commercial corporate governance ratings. They express skepticism as to the usefulness of the commercial governance ratings. Daines, Gow and Larcker (2008) examine the association between the ratings produced by leading commercial corporate governance rating firms (CGQ, GMI, TCL and AGR) and various outcomes. They find little evidence that the governance ratings are useful in predicting subsequent accounting restatements, shareholder litigation and the cost of debt. They find weak evidence that the governance ratings are related to future operating performance. Koehn and Ueng (2005) examine corporate governance ratings, in particular, board scores, provided by Institutional Shareholder Services (ISS). They find that the governance metrics are not good indicators of either the quality of a firm's earnings or of its ethics. However, the AGR commercial ratings were found to be superior to various academic risk measures for predicting accounting irregularities in a recent study (Price, Sharp, and Wood, 2011). Accounting irregularities should be a key concern for risk management committees and good corporate governance.

3. Data, Sample description and Variables

The risk ratings are from the Disclosure Insight risk library which provides in-depth risk profiles for over 1500 public US companies, starting in 2011. The risk profiles are developed based on detailed research over 5 years of SEC filings across major categories including SEC activity, accounting/auditor issues, capital markets events, stability of the board and executives and non-SEC investigative activity. The risk profile identifies 100 risk factors that "hold the potential to destabilize a company, distract its management, and/or interfere with underlying fundamentals". Based on the risk profile, Disclosure Insight Inc. summarizes the number, nature, and timing of 100 risk factors and determines and issues the risk ratings for each company (D.I. risk ratings). Disclosure Insight Inc. ranks the companies into four levels: high risk; medium risk with positive bias; medium risk with negative bias and low risk.

Our primary sample consists of 2011 D.I. risk ratings for 1,234 firms. Based on the D.I risk ratings, we construct a categorical variable, which

takes the value of 1 (low risk), 2 (medium risk-positive bias), 3 (medium risk-negative bias) and 4 (high risk). As shown in Table 1, the average risk rating of sample firms is 2.56 with a standard deviation of 0.69. Table 2 shows that our sample spans many economic sectors (The industry composition is based on the Standard & Poor's MSCI Global Industry Classification). The 2011 rated sample has a high concentration of firms in the materials, capital goods sectors and software and services sectors. The commercial services and supplies sector has the highest risk ratings while the food, drug and retailing sector has the lowest risk ratings in 2011.

We then collect the return data from CRSP and the financial data from COMPUSTAT. To be included in the final sample, the company must have daily return records at least one year prior to the rating date and must also have complete financial data on COMPUSTAT. Table 1 shows that the average market capitalization of our sample firms is $8.890 billion, the average book-to-market ratio is 0.66, the average leverage ratio is 23% and the average sales growth rate is 17%.

4. Empirical Methodology and Results

This section provides empirical evidence on the relation between the D.I. risk ratings and the firm's risk level and performance. Table 3 presents the correlation matrix between the D.I. risk ratings and firm risk and performance. It shows that the risk ratings are positively correlated with the risk measures and negatively correlated with the firm performance measures. In the following sections, we present various regression models and empirical results.

Table 1. Sample Descriptive Statistics

The table presents the descriptive statistics of sample firms in 2011. The risk ratings are from Disclosure Insight Inc (D.I. risk ratings), with four different levels: values of 1 (low risk), 2 (medium risk-positive bias), 3 (medium risk-negative bias) and 4 (high risk). Total risk is measured as the annualized standard deviation of daily return. Market risk is estimated as the beta coefficient of the market index from a market model regression of daily returns on the market index as specified in equation (1). Firm-specific risk is estimated as the annualized standard deviation of the residuals from the market model regressions used to calculate market risk. ROA is the return on asset, measured as the income from operations divided by average total assets. ROE is the return on equity, measured as the net income divided by common equity. Tobin's Q is measured as the ratio of market value over book value of total assets. Excess return or Alpha is estimated as the intercept from a four-factor Fama-French model. The book-to-market (BTM) ratio is measured as the book value to the market value of total assets. Leverage is measured as the ratio of total debt, the sum of short-term debt and long-term debt, to total assets. Size is the natural logarithm of total assets. Market capitalization is the market value of common equity. Sales growth is measure d as the growth rate of total sales. The sample data is winsorized at the 99% percentiles by fiscal year to eliminate the unusual observations.

	N	Mean	Std	Min	P25	Median	P75	Max
Risk rating	1234	2.56	0.69	1	2	3	3	4
Risk measures:								
Total risk	1234	0.03	0.01	0.01	0.02	0.03	0.03	0.10
Market risk	1234	1.25	0.38	0.06	0.99	1.24	1.48	3.03
Firm-specific risk	1234	0.02	0.01	0.01	0.01	0.02	0.02	0.09
Performance measures:								
ROA	1120	0.10	0.14	-0.83	0.06	0.09	0.14	1.69
ROE	1119	0.13	1.73	-29.40	0.05	0.12	0.20	37.52
Tobin's Q	1120	2.00	1.75	0.28	1.16	1.54	2.19	36.24
Alpha (Excess return)	1234	-0.0001	0.0014	-0.009	-0.001	0.0001	0.001	0.01
Other variables:								
BTM	1120	0.66	0.30	0.03	0.46	0.65	0.86	3.63
Leverage	1219	0.23	0.23	0.00	0.05	0.19	0.34	3.02
Size	1234	7.96	1.73	3.45	6.76	7.76	9.02	14.57
Market capitalization	1120	8890	27226	29	817	1985	5450	401254
Sales growth	1116	0.17	0.38	-0.96	0.04	0.12	0.24	8.84

Table 2. Risk Ratings by Industry

The table presents the mean statistics of risk ratings by industry in 2011. The industry composition is based on the Standard & Poor's MSCI Global Industry Classification.

	Risk rating in 2011	
energy	55	2.60
materials	189	2.57
capital goods	141	2.57
commercial services & supplies	18	3.28
transportation	49	2.45
automobiles & components	11	2.27
consumer durables & apparel	44	2.39
hotels restaurants & leisure	52	2.25
media	13	2.92
retailing	27	2.33
food drug & retailing	5	2.00
food beverage & tobacco	39	2.64
health care equipment &services	130	2.59
banks	34	2.91
diversified financials	39	2.87
insurance	41	2.51
real estate	6	2.50
software & services	141	2.39
technology hardware & equipment	113	2.65
telecommunication services	41	2.73
utilities	43	2.28
other	5	3.00

4.1 Risk ratings and the level of firm risk

Following pervious literature, we construct three variables to measure the level of firm risk. We use the volatility of stock returns to capture aggregate firm risk (t*otal risk*), measured as the annualized standard deviation of daily stock returns (R_{it}) over a year. We then partition *total risk* into *firm-specific risk* and *market risk*, which are estimated based on the market model as the following:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \varepsilon_{it} \qquad (1)$$

where i and t denote firm i and time t respectively; R_i is the firm's daily return. R_m is the market index return. R_f is the risk-free rate. *Market risk* takes into account the economic conditions, which is equal to β1i for firm i. The firm-specific risk is measured as the annualized standard deviation of the residuals from the market model regression over a year. The firm-specific risk captures the idiosyncratic component of firm risk. Firms' daily stock returns, market index return and risk-free rate are collected from CRSP. Table 1 shows that the average total risk, market risk and firm-specific risk of our sample firms are 3%, 1.25 and 2% respectively.

We run regressions of risk measures on D.I. risk ratings and control variables. Table 4 presents the results. We find that the risk ratings are positively associated with total risk and firm-specific risk, but not market risk. The coefficients are significant at the 1% levels. For the control variables, we find that firms with higher leverage, lower market value of equity, and lower book-to-market ratios have higher risk, which is consistent with Hentschel and Kothari (2001).

Table 3. Pearson's Correlations Between Risk Ratings, Firm Risk and Performance

	1	2	3	4	5	6	7	8
Risk rating	1							
Total risk	0.192[a]	1						
Market risk	0.058[b]	0.670[a]	1					
Firm-specific risk	0.217[a]	0.932[a]	0.371[a]	1				
ROA	-0.138[a]	-0.299[a]	-0.169[a]	-0.292[a]	1			
ROE	-0.059[b]	-0.165[a]	-0.065[b]	-0.167[a]	0.118	1		
Tobin's Q	-0.106[a]	0.064[b]	-0.149[a]	0.141	0.083	-0.038	1	
Alpha	-0.213[a]	-0.302[a]	-0.228[a]	-0.270	0.261	-0.024	0.393	1

The table presents the Pearson's correlation between risk ratings and firm risk and performance. The variables are defined in Table 1. The p-value is not reported. The statistical significance is denoted using [a], [b] and [c] at the 1%, 5% and 10% levels.

Table 4. Risk Ratings and the Level of Firm Risk

	Total risk	Market risk	Firm-specific risk
Intercept	0.022***	1.201***	0.013***
	(20.15)	(27.3)	(11.98)
Risk ratings	0.003***	0.018	0.003***
	(6.97)	(1.07)	(8.35)
BTM	-0.003**	0.009	-0.003**
	(-3.17)	(0.27)	(-4.02)
Leverage	0.002***	0.066***	0.001***
	(3.34)	(3.17)	(2.61)
Ln(MVE)	-0.11***	-0.16***	-0.12***
	(-10.53)	(-8.37)	(-9.44)
N	1234	1234	1234
Adj. R^2	0.13	0.07	0.13

The table presents estimates of the coefficients in the regressions,

$$Risk_{it} = \gamma_0 + \gamma_1 \text{Risk Ratings}_{it} + \gamma_2 \text{ Control Variables}_{i,t-1} + \varepsilon_{it}$$

where $Risk_{i,t}$ is the level of firm risk. We use three risk measures, total risk, market risk and firm-specific risk. Ln(MVE) is the natural logarithm of market value of equity. Other variables are defined in Table 1. All control variables are measured at the beginning of T-statistics is reported in parenthesis. ***, **, and * denote statistical significance at 1%, 5% and 10% levels.

4.2 Risk rating and Accounting Performance

In this section, we examine the relationship between D.I. risk ratings and firms' accounting performance measures. Following previous literature (Dvbvig & Warachka, 2010; Gompers et al. 2003; Larcker et al. 2007; Morck, Shleifer, & Vishny 1988), we use the traditional performance measures – return on asset (*ROA*), return on equity (*ROE*) and Tobin's Q. *ROA* is calculated as operating income over total assets. It is a useful measure of how efficiently a firm is using its assets to generate revenue. *ROE* is the net income over equity capital and is an assessment of the financial return of shareholders' investment. Tobin's Q is commonly used as an indicator of firm value[39] and measured as the ratio of market value over book value of total assets. Furthermore, we use the industry-adjusted accounting performance measures, which take the difference between a accounting performance measure of a firm and the median accounting performance measure for its industry[40] in that fiscal year. Table 1 shows that the average ROA, ROE and Tobin's Q for our sample firms are respectively 10%, 13% and 2.

We run the regressions of accounting performance measures on D.I. risk ratings and various control variables. Table 5 presents the results. The coefficients on D.I. risk ratings are

[39] There are arguments that Tobin's Q ratio might not be a good proxy for firm value. However, given its popularity in previous literature, we also report the Tobin's Q results. We believe that the more interpretable results are the return on asset, return on equity and stock performance.

[40] We use two-digit Standard Industrial Classification (SIC) codes for industry classification.

significantly negative at the 5% level for all three regressions, which suggests that the D.I. risk ratings have significantly negative relationship with firm's accounting performance. To assess the economic significance of the estimated coefficients, we find that one standard deviation increase of the D.I. risk ratings is associated with 2.3% decrease in ROA, 11.6% decrease in ROE and 12.4% decrease in Tobin's Q. In particular, the one-standard deviation shift of D.I. risk ratings is sufficient to move a firm across a full quartile in terms of change in ROE.

Table 5. Risk Ratings and Accounting Performance

	Ind. Adj. ROA	Ind. Adj. ROE	Ind. Adj. Tobin's Q
Intercept	-0.003	0.077	1.87***
	(-0.15)	(0.26)	(6.49)
Risk ratings	-0.034**	-0.168**	-0.18**
	(-5.74)	(-2.26)	(-2.51)
BTM	-0.066**	-0.032	
	(-5.67)	(-0.22)	
Sales growth			0.372***
			(2.98)
Leverage	0.014	0.04	0.111
	(0.77)	(0.17)	(0.5)
Size	0.015***	0.046	-0.196**
	(5.75)	(1.41)	(-6.18)
N	1234	1234	1234
Adj. R^2	0.03	0.01	0.06

The table presents estimates of the coefficients in the regressions,

$$Accounting\ Performance_{it} = \gamma_0 + \gamma_1 \text{Risk Ratings}_{it} + \gamma_2\ \text{Control Variables}_{i,t-1} + \varepsilon_{it}$$

We use three accounting performance measures, ROA, ROE and Tobin's Q, which are adjusted for industry median. Control variables are defined in Table 1.T-statistics is reported in parenthesis. ***, **, and * denote statistical significance at 1%, 5% and 10% levels.

4.3. Risk rating and Stock Performance

In this section, we examine the stock return performance of the D.I. risk ratings sample. We conduct two different analyses. The first set of tests examines the relationship between D.I. risk ratings and the firm's excess returns, *Alpha*. Second, we use the portfolio approach to construct four risk-rating portfolios and compare the risk-adjusted returns. We also estimate the excess return of portfolios.

4.3.1 Alpha

Following pervious literature, we estimate the excess stock return (*Alpha*) using the Fama-French four factor model. Specifically, for each firm in our sample, we estimate the regressions of the firms' stock returns on the standard Fama-French factor returns. The factor returns are obtained from Ken French's website. The basic model setup is as following:

$$R_{it} - R_{ft} = \alpha + \beta_1(\mathrm{R}_{mt} - R_{ft}) + \beta_2\ SMB_t + \beta_3\ HML_t + \beta_4\ UMD_t + \varepsilon_{it} \quad (2)$$

where i and t denote firm i and time t respectively. R_i is the firm's daily return. R_{ft} is the return on one-month Treasury bills; R_{mt} is the market index return. R_m-R_f is the market factor. *SMB* is the return on a value-weighted portfolio of small stocks less the return on a value-weighted portfolio of big stocks. *HML* is the return on a value-weighted portfolio of high book-to-market stocks less the return on a value-weighted portfolio of low book-to-market stocks. *UMD* is the return on the two high prior return portfolios less the returns on the two prior low return portfolios, which captures the one-year momentum anomaly reported by Jegadeesh and Titman (1993). The estimated intercepts from these regressions are the estimates of *Alpha*, which represents the returns in excess of risk factors. A positive intercept for these regressions, *a*, indicates that after controlling for the market, size, book-to-market ratio and momentum factors in returns, the firm has performed better than expected.

We then run regressions of *Alpha* on D.I. risk ratings (Since the excess returns are the intercept of running regressions on four risk factors, we do not

include additional controls in the subsequent regressions). If the stock prices incorporate all the information that are incorporated in D.I. risk ratings, we should expect no association between excess returns and the D.I risk rating. Any significant relationship between risk ratings and excess returns could be the results of either the inefficiency in the pricing, unexpected shocks that might be caused by the measures of D.I. risk ratings or an omitted risk factor that is correlated with the D.I. risk ratings. Any significant relationship suggests the value relevance of D.I. risk ratings.

Table 6 panel A presents the results of our excess returns analysis. We find that the D.I risk ratings have statistically significant association with Alpha. The coefficient is significant at the 1% level. In terms of economic significance, a one-standard-deviation increase in the D.I. risk ratings leads to an increase of 0.3% in stock returns. We also run the sub-sample regression for the high and low risk rating firms. The results are similar.

Table 6. Risk Ratings and Stock Performance

Panel A

The table presents the estimates of the coefficients of running regressions of alpha on risk ratings: *alpha* is the excess return, which is estimated as the intercept from a four-factor Fama-French model as specified in equation (2). Control variables are defined in Table 1. T-statistics are reported in parenthesis. ***, **, and * denote statistical significance at 1%, 5% and 10% levels.

	Alpha
Intercept	0.001***
	(6.74)
Risk ratings	-0.00043***
	(7.67)
N	1234
Adj. R^2	0.04

Panel B

The table presents the risk-adjusted returns of risk-rating portfolios. The risk-rating portfolios are constructed by allocating firms into one of the four (equally-weighted) portfolios based on their D.I risk ratings (high, medium-negative bias, medium-positive bias and low). The *Sharpe ratio* is calculated as the mean holding period difference between the returns of risk-rating portfolios and the T-bill return divided by the standard deviation of the daily return differences. The *Treynor* ratio is calculated as the mean holding period difference between the returns of risk-rating portfolios and the T-bill return divided by portfolio beta, while betas are found by regressing daily excess returns of risk-rating portfolios against market excess returns. The difference-in-mean statistics is reported to show the statistical significance of the difference in mean between portfolio with low risk rating and portfolio with high risk rating.

Risk-rating portfolios	Sharp Ratio	Treynor Ratio
Low risk	0.0263	0.0004
Medium risk-positive bias	0.0125	0.0002
Medium risk-negative bias	-0.0069	-0.0001
High risk	-0.0442	-0.0007
S&P500	0.0073	0.0001
Difference-in-mean	2.16	2.33

Panel C

The table presents the regression intercepts from the Fama-French three- and four-factor model regressions of the returns of risk-rating portfolios on various factors. The three-factor model is applied by regressing the daily excess returns of risk-rating portfolios (R_{pt}) on the market return factor, a size factor (*SMB*), and book-to-market factor (*HML*).

$$R_{pt} - R_{ft} = \alpha + \beta_1(\mathrm{R}_{mt} - R_{ft}) + \beta_2\ SMB_t + \beta_3\ \mathrm{HML}_t + \varepsilon_{pt}$$

The four-factor model is constructed by integrating the Fama-French (1993) three-factor model with an additional factor capturing the one-year momentum anomaly (*UMD*) reported by Jegadeesh and Titman (1993).

$$R_{pt} - R_{ft} = \alpha + \beta_1(\mathrm{R}_{mt} - R_{ft}) + \beta_2\ SMB_t + \beta_3\ \mathrm{HML}_t + \beta_4\ \mathrm{UMD}_t + \varepsilon_{pt}$$

	Three-factor model		Four-factor model	
Risk-rating portfolios	Intercept	t-statistics	Intercept	t-statistics
Low risk	0.0004***	(3.05)	0.0004***	(3.06)
Medium risk-positive bias	0.0002**	(2.57)	0.0002***	(2.75)
Medium risk-negative bias	-0.0002	(-1.63)	-0.0001	(-1.53)
High risk	-0.0009***	(-2.81)	-0.0008***	(-2.75)

4.3.2 Portfolio approach

We construct the risk-rating portfolios by allocating firms into one of the four equally-weighted portfolios based on their D.I risk ratings (high, medium-negative bias, medium-positive bias and low). We first calculate a variety of risk-adjusted return measures to determine and compare the stock performance of risk-rating portfolios. We also compare the risk-rating portfolio returns with the S&P500 index return. In addition, we use the Fama-French (1993) three-factor and four-factor models to test the excess returns. Our method and test results are discussed as the following.

Risk-adjusted performance measures

We calculate two risk-adjusted performance measures: the Sharpe (1966, 1994) ratio and the Treynor (1965) ratio. The *Sharpe ratio* (Sharpe, 1966, 1994) is a measure of return per unit of total risk and is calculated as the mean holding period difference between the risk-rating portfolio returns (or S&P500) and the T-bill return, divided by the standard deviation of the daily return differences. The *Treynor ratio* (Treynor, 1965) is another reward-to-volatility ratio. It measures return per unit of systematic risk and is calculated as the mean holding period difference between the risk-rating portfolio returns (or S&P500) and the T-bill return divided by portfolio beta (or market beta), while betas are found by regressing daily excess returns for the risk-rating portfolio returns against market excess returns.

The results of the risk-adjusted performance measures are shown in Table 6, panel B. When comparing the returns of the risk-rating portfolios, we find a negative relationship between risk ratings and risk-adjusted returns, with the low-risk portfolio having the highest holding period return and the high-risk portfolio having the lowest holding period return. The difference-in-mean tests show that the difference between the risk-adjusted return of low-risk portfolio and high-risk portfolio is significant.

When comparing the risk-adjusted returns of risk-rating portfolios with the benchmark portfolio-S&P500 index. We find that the risk-adjusted returns of low-risk portfolios and medium risk-positive bias portfolios exceed their respective counterpart measures for the S&P500 index, which the low-risk portfolios and medium risk-negative bias portfolios underperform the S&P500 index.

Fama-French three-factor and four-factor models

We further run the regressions of the Fama-French three- and four-factor models to estimate the excess returns of risk-rating portfolios. The Fama-French four-factor model follows equation (2). The Fama-French three-factor model is applied by excluding the momentum factor (*UMD*). A positive intercept indicates that after controlling for the risk factors in returns, the firm has performed better than expected.

Table 6 panel C shows the results of the two regressions for the risk-rating portfolios. We report only the regression intercepts and their respective *t*-statistics for brevity. The results show that for the low-risk and medium risk-positive bias portfolios, the intercepts are positive and significant at the 1% and 5% levels. For the high-risk portfolio, the intercept is negative and significant at the 1% level. For the medium risk-negative bias portfolio, the intercept is not significant. The results show that the low-risk and medium risk-positive bias portfolios have better than expected returns while high-risk portfolio has lower than expected return after controlling for the risk factors.

5. Discussion of results and concluding remarks

This paper provides an independent assessment of a newly developed commercial risk ratings from the Disclosure Insight Inc. as a potential approach to risk management for good corporate governance in public companies. Overall, our tests on stock return performance indicate the value-relevance of D.I. risk ratings. The firms with low and medium-positive bias risk ratings provide significant positive stock returns and outperform the S&P500 index. The firms with high-risk ratings yield negative excess return after controlling for the market return, size, the BE/ME ratio, and momentum factors. Also, these conclusions are not sensitive to different test statistics and measurement methods that we employ in this paper. Our study finds significant positive abnormal risk-adjusted returns for companies with lower risk ratings and these companies also outperform the S&P500. Thus, this paper should be of interest to investors,

company executives, and risk management committees, as well as the SEC and other regulators in analyzing and assessing risk management for good corporate governance in public companies.

References

1. Ashbaugh-Skaife, H., D.W. Collins, and R. LaFond, 2006, The Effects of Corporate Governance on Firms' Credit Ratings, *Journal of Accounting and Economics*, 42, 1–2, 203–243.
2. Bebchuk, L., A.Cohen, and A.Ferrell, 2009, What Matters in Corporate Governance? *Review of Financial Studies*, 22, 2, 783–827.
3. Bhagat, S. and B.Bolton, 2008, Corporate Governance and Firm Performance, *Journal of Corporate Finance*, 14, 3, 257–273.
4. Bhagat, S., B. Bolton, and R. Romano, 2008, The Promise and Peril of Corporate Governance Indices, *Columbia Law Review*, 108, 8, 1803–1882.
5. Core, J.E., W.R.Guay, and T.O.Rusticus, 2006, Does Weak Governance Cause Weak Stock Returns? An Examination of Firm Operating Performance and Investors' Expectations, *The Journal of Finance*, 61, 2, 655–687.
6. Daines, R.M., I.D. Gow, and D. F. Larcker, 2010, Rating the Ratings: How Good Are Commercial Governance Ratings? *Journal of Financial Economics*, 98, 3, 439–461.
7. Derwall, J. and P.Verwijmeren, 2007, Corporate Governance and the Cost of Equity Capital: Evidence from Gmi's Governance Rating, *European Centre for Corporate Engagement Research Note*.
8. Dybvig, P. and M.Warachka, 2010, Tobin's Q Does Not Measure Performance: Theory, Empirics, and Alternative Measures, *SSRN Working Paper*.
9. Fama, E.F. and K.R. French, 1993, Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics*, 33,1, 3–56.
10. Froot, K.A., D.S. Scharfstein, and J.C. Stein, 1992, Risk Management: Coordinating Corporate Investment and Financing Policies, *Working Paper*, National Bureau of Economic Research.
11. Gompers, P., J. Ishii, and A.Metrick, 2003, Corporate Governance and Equity Prices. *The Quarterly Journal of Economics*, 118, 1, 107–156.
12. Hentschel, L., and S.P. Kothari, 2001, Are Corporations Reducing or Taking Risks with Derivatives? *Journal of Financial and Quantitative Analysis*, 36, 01, 93–118.
13. Jegadeesh, N. and S.Titman, 1993, Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *The Journal of Finance*, 48,1, 65–91.
14. Koehn, D. and J. Ueng, 2005, Evaluating the Evaluators: Should Investors Trust Corporate Governance Metrics Ratings? *Journal of Management and Governance*, 9, 2, 111–128.
15. Larcker, D.F., S.A. Richardson, and İ. Tuna, 2007, Corporate Governance, Accounting Outcomes, and Organizational Performance, *Accounting Review*, 82, 4, 963–1008.
16. Morck, R., A. Shleifer, and R.W. Vishny, 1998, Management Ownership and Market Valuation: An Empirical Analysis, *Journal of Financial Economics*, 20, 0, 293–315.
17. Morris, J., F. Grippo, and N. Barsky, 2012, A New Era of Accountability? *Strategic Finance*, 93, 11, 42–45.
18. Price, R.A., N.Y. Sharp, and D.A. Wood, 2011, Detecting and Predicting Accounting Irregularities: A Comparison of Commercial and Academic Risk Measures, *Accounting Horizons*, 25, 4, 755–780.
19. Sharpe, S. A., 1994, Financial Market Imperfections, Firm Leverage, and the Cyclicality of Employment, *The American Economic Review*, 84, 4, 1060–1074.
20. Sharpe, W.F., 1966, Mutual Fund Performance, *The Journal of Business*, 39, 1, 119–138.
21. Smith, C.W., and R.M. Stulz, 1985, The Determinants of Firms' Hedging Policies, *Journal of Financial and Quantitative Analysis*, 20, 04, 391–405.
22. Treynor, J.L., 1965, How to Rate Management of Investment Funds, *Harvard Business Review*, 43, 1, 63–75.

Appendix

The Disclosure Insight Inc. assigns the risk ratings to individual company based on the following criteria.

High Risk: Companies with a High Risk rating carry so much risk as to hold the potential to overwhelm underlying fundamentals.

Medium risk with negative bias: Companies with a Medium Risk – negative bias rating carry sufficient risk that the rating could deteriorate to High Risk. The Medium Risk - Negative Bias rating can also be assigned to those companies previously rated as High Risk that have shown some improvement, albeit not enough to yet warrant a lower risk rating as they could just as easily become High Risk again.

Medium risk with positive bias: Companies with a Medium Risk – positive bias rating carry at least one risk factor that could potentially deteriorate into a higher risk challenge. The Medium Risk - Positive Bias rating can also be assigned to those companies previously rated as carrying higher risk, but have shown sufficient improvement.

Low rsk: Companies with a Low Risk rating carry a low risk profile. The nature and timing of the risk factors identified in the risk profile do not raise concern at the time of report publication.