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Exploring the Risk Tolerance in the Gold Industry: An Empirical Study

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Abstract: ***Purpose*** *– The purpose of this paper is to develop a corporate risk tolerance level based on annual reports' risk and risk management disclosures and using the Canadian gold mining industry as an example.* ***Design/methodology/approach*** *– A content analysis approach is followed to hand-collect and analyze corporate risk disclosures including risk sources, exposure, and risk management strategies reported by Canadian listed gold mining firms between 2006 and 2008. Risk information coding and scoring techniques are then used to assign risk tolerance levels to each sample company.* ***Findings*** *– The analyses indicate that Canadian gold companies have moderate levels of risk tolerance in general and that about a third of them (including some industry leaders) could be classified as risk neutral.* ***Research limitations/implications*** *– This study is based on mostly qualitative and sometimes generic corporate risk disclosures (both mandatory and voluntary) to gauge the level of corporate risk tolerance. The lack of firm-specific, detailed, and quantitative data on risk exposure and risk management could lead to the underestimation of the developed risk tolerance measure.* ***Practical implications*** *– The approach and findings are potentially useful to various firm stakeholders including shareholders, potential outside investors and employees among others. The approach could be used to check whether outside investors (or stakeholders in general) and corporate management and boards are in alignment with respect to the risk acceptance/tolerance levels as well as risk management strategies adopted. This would further reduce the agency costs (or information asymmetries) between management and outside investors. Furthermore, the proposed risk tolerance measure (with possible further refinements) could be used as an additional relative performance metric by potential investors and analysts in building their investment portfolios in the future.* ***Originality/value*** *– The paper uses publicly available corporate risk disclosures to build a risk tolerance proxy measure for Canadian listed gold companies. Going beyond assessing risk disclosure quantity and intensity, this study contributes to the emerging enterprise risk management and risk disclosure research fields by attempting to code and synthesize the risk measures to infer corporate attitudes towards risk over a multi-year period of time.*

Keywords: Risk *disclosures, risk tolerance, gold mining industry, content analysis*

1. INTRODUCTION

Corporate risk disclosure and management have received considerable research attention, recently [1]–[5]. Following the global financial crisis of 2008, investor confidence in the capital markets and particularly the oversight and monitoring role of corporate boards over management actions and decisions, was threatened. This lack of confidence was coupled with increased scrutiny of managerial decisions and increasing demands by investors and other stakeholders for more information transparency mainly through improved disclosure and accountability.

Extant theory on information disclosure maintains that increased risk and other relevant firm-specific disclosures (such as firm growth and competitive position) potentially reduce information asymmetries between management and outside investors (i.e., reduce the agency costs of the separation between ownership and control in the agency cost framework). The rationale underlying this argument relates to the potential reduction in uncertainty with regards to firm prospects and attributes and thus a more accurate assessment of its expected financial and business performance which guides investors' investment decisions. However, empirical studies testing or validating this argument show mixed results to date with more recent risk disclosure research documenting a

potential incremental informational value associated with more and improved quality of risk disclosures[1], [2], [6], [7] . These studies found that certain risk disclosure could lower the firm's cost of capital, lower its return variability and analyst forecast dispersion among other things.

In response to increased investor demands for transparency and accountability in the wake of the financial crisis of 2008, accounting standards setting bodies (CICA in Canada and FASB in the US) and exchange regulators, namely the Ontario Securities Commission (OSC in Canada) and the Securities and Exchange Commission (SEC in the US) both strive to improve risk disclosure and financial reporting [2],[4]. However, risk information disclosure remains largely voluntary (particularly for non-financial risks), scattered and sometimes vague (or generic). Furthermore, management has a high degree of discretion in selecting what to (and not to) disclose about their risks in their annual reports and so the incentives for risk disclosure are probably as important as the regulatory setting that frames and provides guidance and rules on risk disclosure.

This paper contributes to the emerging literature on corporate risk disclosure and management by examining the risk exposure and risk management strategies reported by a sample of Canadian listed gold mining companies during the period of 2006 to 2008 in their annual reports. Following a content analysis, we hand-collect all relevant risk information of the sample firms for each fiscal year from 2006 to 2008. We then code and score the risk information disclosed following a matrix format and assign a score for each sample firm for both their perceived risk exposure and risk management strategies (separately) and for each category of risk as reported by management in their annual reports [4]. In a third step, we combine both risk exposure and risk management scores and assign a level of risk tolerance based on a qualitative risk analysis of the extent of risk exposure and management response and derive a comparative assessment of the firms in our sample. We find that the majority of Canadian gold mining firms could be classified as moderately risk tolerant wit 89% of our sample falling in the mid-range of medium/low risk tolerance to medium/high along the continuum of risk tolerance. We also find that about one third of our sample could be described as risk neutral according to our risk tolerance measure. Our results should be interpreted with caution since we base our comparative analysis on company risk disclosures which could be incomplete, generic, and sometimes vague. However, our study also points to some degree of information usefulness and value that could potentially benefit outside users of financial statements and annual reports, i.e., investors and other stakeholders. In particular, a peer-based analysis within the same sector in one country (or possibly cross-countries) could offer a more meaningful way to assess and compare firms in terms of their risk perceptions, attitudes and overall tolerance and responses to various business risks and uncertainties. Therefore, this paper contributes to the ongoing debate about risk disclosure information content and value.

The paper proceeds as follows: the following section briefly reviews the regulatory background and prior risk disclosure research. The sample selection and research methodology are presented in a subsequent section. Results and findings are reported and discussed in the fourth section. The final section concludes with limitations, implications and some suggestions for future research.

2. REGULATORY BACKGROUND AND PRIOR RELATED RESEARCH

2.1. Regulatory Background

In Canada, corporate risk disclosures are regulated through two main channels as above mentioned, namely the Canadian accounting standards setting body represented by the Canadian Institute of Chartered Accountants (CICA) and the Ontario Securities Commission (OSC) as the exchange regulator for listed companies on the Toronto Stock Exchange (TSX). Since our sample firms are Canadian publicly listed companies on the TSX and some are cross-listed on the US exchanges, it is important to review both the Canadian and US risk disclosure regulatory settings. By examining the regulatory setting for risk disclosure in both Canada and the US prior to collecting the risk information from the firms' annual reports, we are able to focus our attention on the most relevant sections of the annual reports following prior risk disclosure research [1]–[4].

Both Canadian and US risk disclosure regulations put more emphasis on financial risks categories (e.g., interest rate, exchange rate, credit, liquidity and financial instrument use risks) and much less on non-financial types of risks. Most mandatory risk disclosures deal with financial risks both in the

notes to the financial statements and in the Management Discussion & Analysis (MD&A) section of the annual reports or exchange filings [2], [4]. Both accounting regimes offer similar disclosure rules and guidance with respect to financial risks. For instance, financial and quantifiable risks are usually reported in the notes to the financial statements and further explained in the MD&A within a narrative context highlighting the risk sources or factors the company is exposed to under the condition of materiality and significance, and how management is responding or managing such risks and uncertainties. The US risk disclosure rules are usually more detailed, complex, and continuously changing. For example, FRR 48 mandates forward-looking risk information disclosure by SEC registrants on all market risks faced and proposes ways to assess such exposure while offering some discretion to the firms on how they choose to report such exposures [7]. More recently, similar requirements with regards to the enforcement of the Sarbanes-Oxley Act [8] show some variability in terms of firm compliance and actual implementation [9]. Cross-listed firms on both the Canadian and US exchanges are thus expected to disclose more forward-looking risk information which would help investors (at least in theory) have a better assessment of the degree of risk exposure for such firms.

In this study and following prior disclosure research we collect all relevant risk information provided by our sample firms and focus more specifically on their risk disclosures in the MD&A sections of the annual report since all risk factors and ways to manage them are explicitly reported in this annual report location. Furthermore, prior risk disclosure research found that the MD&A sections contained far more risk information than the notes in the North-American regulatory setting. We will further discuss our methodology in the following sections of the paper.

2.2. Prior Related Research

This paper examines corporate risk disclosures and its potential association with corporate (or managerial) risk tolerance. More specifically, we ask the following research question: Can we gauge corporate or managerial risk attitudes and tolerance levels using their risk disclosures in the annual reports?

Risk perceptions, attitudes and risk management strategies have long intrigued researchers and practitioners alike. Risk tolerance is oftentimes referred to in the literature as risk appetite, risk attitude and more commonly as the degree of risk aversion. For instance and in finance theory (e.g., [10], [11]) risk tolerance is captured by the degree of risk aversion coefficient in the agent's utility function as depicted by the following equation:

$$U = E(r) - \tfrac{1}{2} A\sigma 2 \quad (1)$$

Where U is the agent's utility level, $\sigma 2$ is variance of the expected returns and A is the coefficient of risk aversion. The higher the value of A, the greater the agent's degree of risk aversion and thus the less tolerant to risk she will be and the higher the risk premium she will demand to be willing to invest in risky portfolios. Investment theory and practice commonly uses this basic risk/return trade off framework. However, and in practice, it is difficult to implement the above utility framework because utility functions are hard to estimate with a high degree of accuracy and multiple factors including monetary, psychological/behavioral, and temporal dimensions could all affect utility levels and their stability.

Despite these limitations, and given the importance of determining risk tolerance levels for potential investors, portfolio managers and financial advisors among others, develop and use risk tolerance quizzes and questionnaires to elicit the degree of risk aversion of their clients. By asking hypothetical questions and putting the investors in different hypothetical investment situations with different time horizons and gains and losses probabilities (risk exposures), a final score on such test would rank the client as risk averse (or conservative), moderate risk aversion or risk lover (or aggressive) (see [10] for a similar test).

More recently, Pennings and Garcia [12] provided more evidence of the complexity of uncovering risk perceptions, attitudes, and responses and tried to alleviate the measurement problem associated with quantifying these constructs. They use individual's risk attitude measurement techniques based on experimental data and combine it with accounting data to examine the drivers for heterogeneity in hedging behaviour among investment professional managers with different decision contexts. In this paper, we do not attempt to explain risk management or hedging behaviour directly as in [12] but

rather propose an alternative approach to infer risk attitudes or risk tolerance levels of publicly listed Canadian gold companies through the lens of their own risk disclosures. To our knowledge, this is the first study to follow such an approach and using content and disclosure coding and scoring techniques to help build such a risk tolerance index.

Another related study [5] is probably one of the most widely cited in the corporate risk management literature. It also examined the key question of why managers choose to manage risk and what differentiates the degree of risk management among a group of firms in the same industry. Similar to our study, [5] focuses on the gold mining sector with the sample containing all publicly-traded North-American companies with an exclusive or main line of business being gold mining and exploration. In our study, we follow the same sample selection procedure but focus our analysis on Canadian public gold companies as will be discussed further in the following section.

Tufano [5] finds that managerial risk aversion (rather than the competing shareholder maximization motive) better explains and predicts the level of corporate risk management. Furthermore, the empirical results show that managers owning more shares of their firms (i.e., stock compensation) manage more risk relative to their counterparts who own more stock options (i.e., stock option-based compensation). Managers with large share holdings of their firms' stock are usually less diversified in their wealth portfolio and thus would tend to manage more risk especially if it is less costly than managing it on their own account. Moreover, managers with more stock option-based compensation with less exposure to downside risks while enjoying the upside risk potential of their stock value would be more tolerant to risk and will therefore manage it less at the corporate level.

Our study builds and extends prior literature on corporate risk management and disclosure and examines whether corporate risk disclosures are informative enough to infer risk tolerance levels for a sample of Canadian public gold companies. In the following section, we present and discuss the research design, sample selection and methodology followed.

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Sample Selection

The sample used for this study consists of all Canadian public gold mining companies listed on the TSX and covering the period from fiscal year 2006 to fiscal 2008. We choose the Canadian gold mining sector for the following reasons. First, this non-financial sector is characterized by various financial and non-financial risks and thus offers an ideal platform for a comprehensive risk analysis by ensuring a high level of risk disclosures following prior research and also the regulatory accounting environment discussed in the above section [4], [5], [13]. Second, single-industry studies in risk management are warranted if the goal is to examine the level of exposure and differential responses to similar risk factors (usually external or business factors) but also to assess the degree of risk exposure to firm-specific risk factors (usually internal operational and firm-based factors). By reducing the heterogeneity level associated with multiple business models and risk profiles in multi-sector studies[12], we focus on the differential risk exposure and risk management of a relatively homogeneous set of firms and develop our relative risk analysis and assessment leading up to the risk tolerance construct. Finally, the Canadian gold sector is one of the leading industries in the world with some of the largest and most profitable firms and is closely followed by investors and analysts globally. Furthermore, global investors have increased their demand for gold investments as a potential hedge (but also for speculation purposes) to their risky portfolios in the last few years and following the weakness of the US dollar as a global reserve currency. Therefore, a close analysis of this unique non-financial sector with a myriad of both financial and non-financial risks was deemed suitable for our risk tolerance development exploratory study.

To select our sample firms, we started with all Canadian TSX-listed gold mining companies from 2006 to 2008 and retained all those that had gold mining and exploration as their main or exclusive business line or segment. There were 36 firms satisfying these criteria. The sample was further reduced to 29 firms because of missing annual reports and exchange filings for some firms in the initial sample (some companies may have been taken over or went bankrupt during our 3-year time period). Table (1) shows some descriptive statistics for our final sample.

Table 1. *Descriptive statistics for risk disclosing companies in the study sample*

	Mean	SD	Median	Min	Max	# observations
Total assets	2,266.06	5571.02	86.39	1.41	24,161.00	81
Total liabilities	695.85	1786.44	33.81	0.08	8,884.00	81
Net Sales	503.25	1375.92	10.91	0.00	7,913.00	74
Market Value – Total	3,328.98	7593.04	221.20	1.17	36,499.40	71
Total Debt/ Total Assets	7.49	12.10	0.98	0.00	60.14	73
Total Debt/ Total Equity	23.30	80.18	1.12	0.00	576.77	73
Beta	1.13	0.85	1.06	-0.37	3.30	58
Net Income (Loss)	76.37	303.15	-1.26	-807.20	1,506.00	81
EBITDA	76.31	291.88	-0.80	-807.20	1,475.60	77

Notes: This table shows the 3-year average values for selected sample firm characteristics. The final sample has 29 gold mining firms listed on TSX between 2006 and 2008. Beta is "systematic risk", and EBITDA is "Earnings before interest, taxes, depreciation and amortization". Data is collected from the Research Insight database.

Despite being in the same industry and in similar lines of business, sample firms show a high variability in terms of size (total assets and net sales), leverage or the extent of debt use (total debt to equity, and total debt to assets), systematic risk (beta factor) and profitability (net income and earnings). For example, total assets range from a maximum of over $24B to a minimum of $l.4B with a mean of $2.27B and a median of $86.39M. Leverage also ranges from 0 to 60 with a mean of about 7.5 and a median of almost 1 (see Table 1). This variability in our sample firm-specific characteristics is important and will potentially help us find some differential risk factors and exposures and risk management strategies when we code and score the firms' risk disclosures.

3.2. Content Analysis and Risk Disclosure Coding

Following prior disclosure studies [2], [14]–[16] we use content analysis to hand-collect and synthesize all available risk disclosures and information as reported by our sample firms in their annual reports from 2006 to 2008. Content analysis is suitable for our study and has been extensively used in prior risk disclosure studies because a major part of these disclosures are qualitative in nature and appear in the MD&A sections of the annual reports of North-American public firms [2], [4]. First, we pretest 10 randomly selected annual reports from our sample firms and conduct a thorough risk disclosure content analysis (both in the notes to the financial statements and the MD&A sections). We then develop risk reports for each company noting all the reported risk factors, nature and level of risk exposure (probability and impact of risk factors), and how management is responding to these risks and uncertainties (risk response strategies). A list of risk categories (factors) was then compiled based on this pretest phase and further divided into two major risk categories:

1. Financial and market risks (e.g., interest rate, exchange rate or currency, financing or liquidity, financial instrument use, credit, input and output price or commodity risks)
2. Non-financial risks (e.g., business, operational or firm-specific, environmental, and regulatory risks)

In a subsequent step, content analysis for the entire sample was conducted following the risk categorization above and risk reports based on the sample firms' disclosures for each fiscal year were compiled. Following prior content analysis research and to ensure reproducibility and inter-coder reliability, both co-authors and an experienced graduate students conducted the pretest sample content analysis independently [3], [4], [15]. A synthesis of the risk reports and categories was then compared across the researchers/coders and similar results obtained. The final risk coding grid is presented in the appendix.

This paper extends the content analysis method by going beyond coding and scoring the disclosure based on risk-related words and sentences (i.e., quantitative and volume of disclosure focus). It incorporates a risk analysis assessment based on the actual risk disclosures and scores companies on their risk exposure and risk management in a relative peer-based way as explained in the following section. In this sense, this paper contributes to prior risk disclosure by assessing the usefulness and information content and value of risk disclosures thus testing and validating their quality and potential use for outside investors and other stakeholders.

4. RESEARCH FINDINGS

4.1. Risk Exposure, Management And Tolerance Scores

The risk exposure and risk management numerical scores are listed in Table 2. They are obtained based on qualitative assessments for financial and non financial risk factors over three years: 2006, 2007 and 2008. Financial risk factors include "purely" financial risk factors such as interest rate, credit (counterparty), currency and financing risks (indebtedness and liquidity) and market risk (metal price, input or commodity volatility). Non financial risk factors include operational, business and regulatory risks.

Table 2. *Risk Disclosure scores of the study sample*

	Financial Scores		Non Financial Scores		Total Scores	
Company Name	**Risk Exposure**	**Risk Management**	**Risk Exposure**	**Risk Management**	**Risk Exposure**	**Risk Management**
AGNICO EAGLE MINES LTD	9.5	8	5	4.5	14.5	12.5
ANGLO SWISS RESOURCES INC	7.5	4	6	3	13.5	7
APOLLO GOLD CORP	8	7	0	0	8	7
ARIZONA STAR RESOURCE CORP	8	2	4	0	12	2
ARMISTICE RESOURCES CORP	8	6	8	2	16	8
AURIZON MINES LTD	8	5.5	6	2	14	7.5
BARRICK GOLD CORP	12.5	13	5	3	17.5	16
CALEDONIA MINING CORP	5.5	4	0	0	5.5	4
CAMPBELL RESOURCES INC	11	4.5	7	2	18	6.5
CENTRAL SUN MINING INC	6.5	2	8	5	14.5	7
CLAUDE RESOURCES INC	3	0	7	1	10	1
CRYSTALLEX INTERNATIONAL CP	6	4.5	6	0	12	4.5
ELDORADO GOLD CORP	8.5	5	2	0	10.5	5
EXETER RESOURCE CORP	8	1	8	0	16	1
GOLDCORP INC	8	4.5	2	0	10	4.5
GOLDEN GOOSE RESOURCE	11	6	5	0	16	6
GRANDVIEW GOLD	5.5	1	8	2	13.5	3
GREAT PANTHER RESOURCES LTD	6	3.5	8	0	14	3.5
IAMGOLD CORP	11	9	6	7	15	16
KINROSS GOLD CORP	10.5	6.5	9	6	19.5	12.5
LEVON RESOURCES LTD	10	1	8	2	18	3
MAG SILVER CORP	5	4	8	0	13	4
MINEFINDERS CORP LTD	11	3	9	2	20	5
NEVSUN RESOURCES LTD	5	2	5	0	10	2
NORTHGATE MINERALS CORP	7.5	4	5	2	12.5	6
PACIFIC RIM MINING CORP	8	3	8	3	16	6
RICHMONT MINES INC	3.5	2.5	7	4	10.5	6.5
SILVERADO GOLD MINES LTD	5.5	1	8	0	13.5	1
YAMANA GOLD INC.	7.5	7	6	2	13.5	9

Notes: Financial risks include interest rate, exchange rate, financing/liquidity, credit/counterparty; financial instruments use risks as well as commodity and input/output markets and equity risks. Non-financial risks

include business, operational and regulatory risks. The risk exposure score includes an assessment of both the likelihood and impact of the risk factor as disclosed by the sample firms. Risk management scores are based on both qualitative and quantitative firm disclosures about how they manage their risk factors.

The qualitative assessments are determined following a 5-point scale: "Low", "Low to Medium", "Medium", "Medium to High", and "High". They have been subsequently converted into quantitative scores where Low=1, Low to Medium=1.5, Medium=2, Medium to High=2.5, and High=3. Risk exposure and risk management numerical scores are then obtained by adding all scores over financial and non financial risk factors. One should note that a non disclosure on a certain risk factor results in a 0 score. This is consistent with prior disclosure and regulatory setting[14], [16] since we assume that disclosing firms follow the risk disclosure rules and guidelines under the condition of materiality and potential significant impact of the risk factors that should be reported. However, we cannot rule out the fact that some companies might withhold such information or perceive the risks to be immaterial or non-significant, thus risk under-estimation might be present in our findings and they should be interpreted with this limitation in mind.

The score for a given risk factor over the three years was the highest because we noted few differences in the form and way companies disclosed their risks from year to year with the exception for 2008 (the peak of the financial crisis) where some companies provided more detailed and sometimes a higher number of risk factors. This is expected since the financial crisis increased the level of scrutiny and demands for transparency by investors and other stakeholders. The risk exposure and risk management scoring approach proceeded as follows: For example, "Agnico Eagle Mines" presents a Low to Medium financing risk exposure level for 2006 and 2007 and a Medium to High level for this factor in 2008. Its financing risk factor over the three years will then be Medium to High, equivalent to 2.5. Besides, it has a High currency risk exposure level for the 3 years, a Low interest rate risk level for 2006 and a High market risk exposure level over the 3 years. The financial risk exposure score for "Agnico Eagle Mines" is then: 2.5+3+1+3=9.5. The non financial risk exposure score being 5, its risk exposure total numerical score will be 14.5 (see Table 2). Again and to mitigate any subjective judgment or research bias, both authors coded and scored the pretest companies independently and results were compared and discussed and showed consistent similarity in the scores obtained. This ensured reliability and reproducibility. The entire sample was then coded and scored by both authors for consistency and checked a final time before moving to the final step of risk tolerance determination.

Qualitative risk exposure and risk management scores are combined following the risk tolerance evaluation matrix provided in Table 3.

Table 3. *Risk tolerance evaluation matrix*

Risk Tolerance	Risk Exposure		
Risk Management	H	M	L
H	**N**	**LM**	**L**
M	**HM**	**N**	**LM**
L	**H**	**HM**	**N**

Notes: This table illustrates how risk tolerance levels are assigned to sample firms based on the combination of their risk exposure and management disclosure assessment.

This evaluation matrix is built based on risk matrices commonly used as a risk assessment tool. Risk matrices and risk maps are common and simple means of risk categorization and assessment [17]–[19]. They are well suited for situations where only qualitative (usually survey or annual report narrative forms of risk information), or at most, quantitative but imprecise information is available.

The risk tolerance levels considered in this matrix are:

L = Low

LM = Low to Medium

N = Neutral

MH = Medium to High

H = High

For each company, the risk tolerance is obtained by combining its risk exposure and risk management

levels. A company that is highly exposed to risk, showing a low risk management level has very likely, a high risk tolerance. On the opposite, a low level of risk exposure combined with a high level of risk management indicates a low risk tolerance. Equivalent levels of risk exposure and risk management show a neutral attitude towards risk whereas other intermediate situations are described in the risk tolerance evaluation matrix in Table 3.

The final results are shown on Table 4. The numerical scores for risk exposure and risk management shown on Table 2 are converted into qualitative scores following a partition for the distributions of total scores. The first third of the distribution is assigned a Low level (scoring 5.5 to 12 for risk exposure and 1 to 4 for risk management) the second third a Medium level (scoring 12.5 to 14.5 for risk exposure and 4.5 to 6.5 for risk management) and the last third a High level (scoring 15 to 20 for risk exposure and 7 to 16 for risk management). The cut-off points for the risk exposure and risk management distributions respectively, are as follows:

	Risk Exposure	Risk Management
High	15-20	7-16
Medium	12.5-14.5	4.5-6.5
Low	5.5-12	1-4

For instance, "Agnico Eagle Mines" risk exposure total score (14.5) falls in the second third of the distribution and corresponds to a "Medium" qualitative score. Its risk management qualitative score is High as 12.5 falls in the last third of the numerical scores distribution for risk management.

Table 4. *Risk tolerance for the study sample*

Company name	Risk Exposure level	Risk Management level	Risk Tolerance
APOLLO GOLD CORP	L	H	L
CRYSTALLEX INTERNATIONAL CP ELDORADO GOLD CORP GOLDCORP INC RICHMONT MINES INC	L	M	LM
AGNICO EAGLE MINES LTD ANGLO SWISS RESOURCES INC AURIZON MINES LTD CENTRAL SUN MINING INC YAMANA GOLD INC	M	H	
ARIZONA STAR RESOURCE CORP CALEDONIA MINING CORP CLAUDE RESOURCES INC NEVSUN RESOURCES LTD	L	L	N
NORTHGATE MINERALS CORP	M	M	
ARMISTICE RESOURCES CORP BARRICK GOLD CORP IAMGOLD CORP KINROSS GOLD CORP	H	H	
GRANDVIEW GOLD INC GREAT PANTHER RESOURCES LTD MAG SILVER CORP SILVERADO GOLD MINES LTD	M	L	MH
CAMPBELL RESOURCES INC GOLDEN GOOSE RESOURCE MINEFINDERS CORP LTD PACIFIC RIM MINING CORP	H	M	
EXETER RESOURCE CORP LEVON RESSOURCES LTD	H	L	H

Notes: This table reports the risk tolerance levels assigned to sample firms using the risk exposure and management scores and the risk tolerance matrix (Tables 2 and 3).

4.2. Discussion

Risk exposure scores ranged from high of 20 points to a low of 5.5 points and risk management scores ranged from a high of 16 points to a low of 1 point (see Table 2). Some firms seem to disclose enough information about their risk exposure for several risk factors (both financial and non-financial) albeit in general and qualitative terms. This is consistent with the regulatory framework for risk disclosure in North-America discussed earlier in this paper. We also note a dominant effect of financial/market types of risks disclosed by our sample firms consistent with the regulatory setting and prior risk disclosure reviewed above. Cross-listed firms showed a higher quantity and more details in their market and financial risk disclosures (FRR 48 impact). Non-financial risks seem to be reported on an almost voluntary basis and probably were under-reported but we cannot ascertain this fact. Given the discretion given by the regulatory framework with regards to reporting risks under the conditions of materiality and significance and weighing the costs versus the benefits of disclosing such information, management might be reluctant to disclose on such risks.

With respect to risk management disclosures, the amount and quality of information disclosed was lower than for risk exposure. For example, 12 firms in our sample did not report anything (0 scores) in their risk management of the non-financial risks they reported (see Table 2). This lack of risk management information might signal a concealing motive for competitive hor legal or other reasons, and a relatively high degree of managerial discretions with regards to the amount and form of risk management information disclosed consistent with prior research studies [1], [4].

Finally, risk tolerance scores as reported on Table (4) indicate that most of our sample firms could be characterized as moderately risk tolerant with 89% of the firms falling between the qualitative levels of L/M and M/H risk tolerance (see Table 4). Furthermore, about 1/3 of our sample firms had a "neutral" risk tolerance level suggesting that these firms would be indifferent between a fair gamble (or investment) and a risky one with the same expected utility or return level. Taken together, these results suggest that gold mining companies in Canada are generally moderately risk tolerant, a result that seems to coincide with the risk tolerance of investors in general [10] when risk tolerance questionnaires are used to gauge their degree of risk aversion. The risk neutrality result is also interesting to note particularly for some large players in our sample such as "Barrick Gold" which would suggest that such a company is not taking excessive risks, nor is a conservative or risk averse firm, but rather falling in the middle as being risk neutral and thus seems to make its investment decisions based on expected returns thus following conventional economic and financial theory assumptions [11]. Figure (1) illustrates the classification and distribution of our sample firms according to their inferred risk tolerance following our content and risk analyses results.

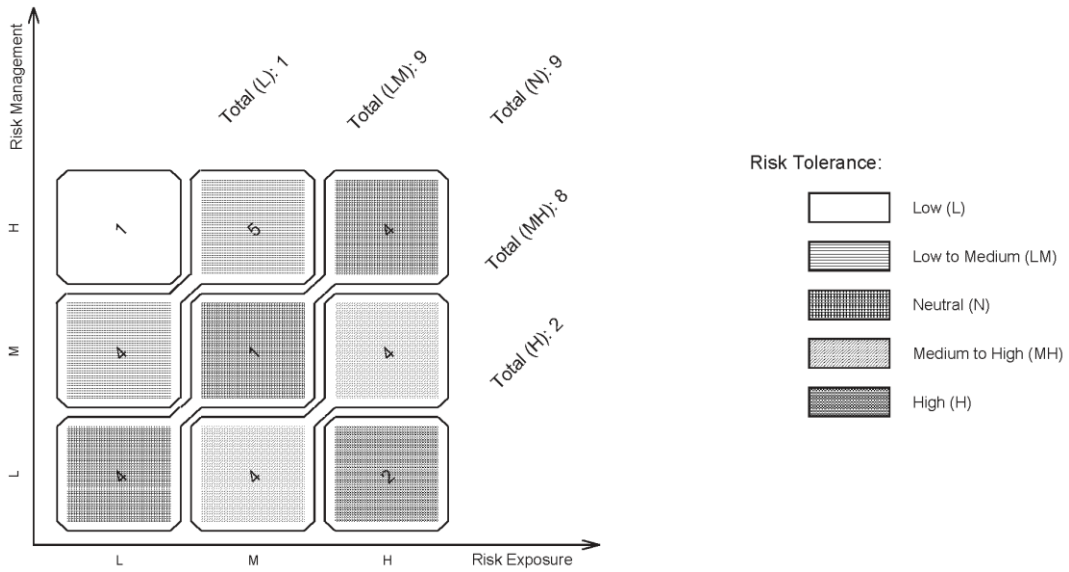

Figure 1. *Risk tolerance distribution for the study sample*

To further help validate the risk scores built using the content analysis and check for any associations with firm characteristics, a correlation matrix is presented in Table 5. As shown on Table 5, the risk management and risk tolerance scores are negatively correlated whereas the risk exposure score is positively correlated with risk management and risk tolerance scores. This is expected as the risk tolerance measure was derived from both the risk exposure and risk management as explained in Table 3. More importantly, the risk scores are significantly correlated with publicly-available firm risk proxies. For example, the higher the firm's financial leverage ratio (the Debt-to-Assets ratio) which could be a proxy to financial risk, the higher the risk exposure score. Furthermore, the higher the systematic risk of the firm (i.e., beta), the lower the risk management score. This is consistent with finance theory (e.g., [11]) where the systematic risk is market-based and non-diversifiable whereas firm-specific risk (i.e., idiosyncratic risk) which is the focus this paper is diversifiable and should be managed inside the firm, thus the expected negative correlation between "beta" and the risk management score derived from the content analysis. Another widely used risk proxy for business risk is the price-to-book ratio which is positively and significantly correlated with the risk tolerance score. More risk tolerant firms have higher business risk profiles using the market-to-book ratio measure, and the content analysis-based score confirms this relationship. Finally, firm profitability as measured by "EBITDA", "ROE" and "net sales growth" are positively and significantly correlated the risk exposure score, and negatively correlated with the risk tolerance score for ROE only (see Table 5). This finding suggests that higher firm-specific risk exposure increases with earnings, sales growth and size (market value variable is also positively correlated with risk exposure score) whereas the risk tolerance is inversely related to ROE, a measure of shareholder wealth creation. This latter result should be further investigated in future research to better understand the underlying agency problems between management and shareholders in terms of risk tolerance levels and risk management and exposure choices. Collectively, the correlation results seem to be consistent with other firm-specific risk measures and offer a primary step towards further investigating the validation and usefulness of such risk scores.

Table 5. *Risk scores and firms' characteristics correlation matrix*

		1	2	3	4	5	6	7	8	9	10
1	RE Score	1									
2	RM Score	**0.3788***	1								
3	RT Score	**0.4533****	**-0.365***	1							
4	Net sales growth	0.3611	**0.5243***	0.099	1						
5	Market Value	0.1478	**0.5429****	-0.2506	**0.9517*****	1					
6	D/A ratio	**0.3519***	0.0942	-0.0332	0.0689	-0.0262	1				
7	Beta	-0.1627	**-0.6021****	0.267	-0.3714	-0.2413	-0.2434	1			
8	EBITDA	-0.0095	**0.3772***	-0.2412	**0.8933*****	**0.9419*****	-0.0165	-0.1764	1		
9	ROE	-0.1223	**0.3691***	**-0.4297****	0.1779	0.1259	**-0.9253*****	0.1936	0.097	1	
10	Price/Book	0.1243	**-0.3813***	**0.4142****	-0.1708	-0.1119	**0.9143*****	-0.2118	-0.091	**-0.9701*****	1

*Notes: Pearson correlation coefficients. *significant at 90% level, ** significant at 95% level, *** significant at 99% level*

5. SUMMARY AND CONCLUSIONS

This study builds on previous risk disclosure research and examines managerial risk tolerance in the Canadian gold mining sector. Corporate risk disclosures in the annual reports for a sample of TSX-

listed gold mining firms between 2006 and 2008 were compiled and coded using content and risk analyses methods. Going beyond counting the number of risk sentences and the describing the risk disclosures as in prior risk disclosure research (Lajili and Zeghal 2005, Kothari et al. 2009, Dobler et al. 2011), our study uses the risk disclosures to build both risk exposure and risk management relative scores (that could be qualitative or quantitative/numerical) for each sample firm. We then combine both risk assessments to infer a degree of risk tolerance for each of our sample firms. By interpreting and coding the risk disclosures in this way, we contribute to extant risk disclosure literature by extending its findings to the gold sector (single-industry study) and also assessing the quality and thus potential usefulness of the reported risk information to see if any incremental content or value could be achieved by such disclosures. To our knowledge, this is the first study to examine corporate risk tolerance using risk disclosures in the annual reports thus linking both content and risk analyses. By focusing on a single sector with a myriad of risks both financial and non-financial, we extend prior corporate risk management literature [5], [12] and provide a first step in validating or testing the usefulness and relevance of corporate risk disclosures.

Our results show that Canadian gold companies could be characterized as moderately risk tolerant with a third of the sample described as risk neutral according to our risk tolerance evaluation matrix and based on the risk exposure and management assessments. In addition to being consistent with prior risk disclosure literature, our results further show that investors and corporate management risk attitudes could be in perfect alignment on average and investors could choose if the corporate risk tolerance of the companies they consider as potential investment vehicles are compatible with their level of individual risk tolerance or acceptance, thus our study has both important implications for both policy makers (regulators) and outside investors as users of company financial statements and annual reports. Future research could further examine how and what kind of risk disclosures are more relevant to report and how to code and interpret such disclosures to uncover risk tolerance levels in various accounting regimes (different countries) and across different sectors.

Our study suffers from some limitations. First, our study sample is relatively small although we attempted to mitigate this limitation by examining 3 years which increased our number of observations. Considering multi-year observations is also consistent with risk management and disclosure as a process rather than a "one-shot" or discrete decision [20]. Secondly, the risk disclosures particularly for non-financial types of risks in our sample were scarce and sometimes non-existent. This might have affected our risk scores and overall risk tolerance under-estimating the true values and levels. This is a disclosure and regulatory limitation as the data set is limited and relatively light. We try to mitigate this limitation by having a relative risk scoring considering the peers in one single and thus homogenous industry.

Finally, our scoring techniques and results could suffer from subjectivity and researcher bias. We attempted to mitigate this limitation by having multiple and independent scoring sheets by both authors and checking for any discrepancies. Future studies could follow our approach and further refine the risk tolerance measures by supplementing risk disclosure-based score with management surveys similar to the risk tolerance quizzes used by portfolio managers and financial advisors in financial institutions. Uncovering managerial risk tolerance could be a potentially useful metric to add to the selection process of investment alternatives for both investors and other stakeholders.

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