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Financial Report Similarity and Managerial Stock Sales in Technology Enterprises: Empirical Evidence from Beijing

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Abstract: This study delves into the connection between the similarity of Management Discussion and Analysis (MD&A) texts and managerial opportunistic stock sales in technology-oriented listed companies in Beijing from 2001 to 2022. The findings reveal that higher MD&A similarity in Beijing's technology companies is associated with an increased likelihood of managerial opportunistic stock sales. This research contributes to mitigating financial risks in Beijing's capital market and provides valuable empirical evidence to support government efforts in fostering the high-quality development of technology enterprises.

1. Introduction

The high-tech industry is experiencing continual and robust growth on a global scale, emerging as a pivotal engine and driving force for modern economies. For managers and investors in high-tech companies, gaining an accurate understanding of a firm's stable development and performance expectations holds paramount importance. However, amidst this era of information explosion, the operational status and prospects of high-tech companies are often obscured by an overwhelming amount of intricate information. Managers and investors encounter the challenge of information asymmetry, necessitating precise decision-making support.

As a fundamental component of corporate information disclosure, Management Discussion and Analysis (MD&A) plays a pivotal role in conveying governance information and predicting future performance. Managers employ MD&A to articulate the company's current situation and prospects, conveying essential operational insights to investors. Nonetheless, the language and expression used in information disclosure may be influenced by various factors, including managers' perceptions of uncertainty about the company's future performance and potential private interests.

Managerial opportunistic stock sales involve executives selling their holdings to gain short-term private benefits. This behavior partially reflects managers' pessimistic expectations about the company's prospects, potentially raising investor concerns about corporate governance and future development. Understanding the relationship between managers' expressions in MD&A and opportunistic stock sales is critical in unveiling the motives behind managerial behavior, enhancing the quality of information disclosure, and bolstering investor confidence.

However, research on the correlation between MD&A similarity and managerial opportunistic stock sales remains relatively limited, particularly in the specific context of Beijing's high-tech enterprises. Therefore, this study aims to address this research gap by conducting an empirical study on technology enterprises in Beijing. We explore the connection between MD&A similarity and managerial opportunistic stock sales, providing in-depth analysis and discussion of the results.

The purpose of this study is to offer fresh perspectives and valuable data support to academia and practitioners. It aims to assist corporate managers in better comprehending the expression patterns in MD&A and investors' responses, providing invaluable insights for improving corporate governance, enhancing market transparency, and safeguarding investors' interests. Additionally, by shedding light on the relationship between MD&A similarity and managerial opportunistic stock sales, this research can provide targeted recommendations for future policy formulation, facilitating the sustained and healthy development of the high-tech industry.

2. Literature Review and Research Hypotheses

2.1 Literature Review

In the field of accounting, research on the textual similarity of financial reports dates back to the seminal work by Brown and Tucker (2010) [1]. They examined MD&A textual similarity as an indicator of information content and found a positive market response to changes in MD&A. Another study by Meng et al. (2017) revealed that higher MD&A textual similarity is associated with an increased risk of future stock price crashes [2]. Li and Lin (2019) observed a significant positive correlation between higher audit fees and greater company strategic changes [3]. Qian and Zhu (2020) investigated the relationship between textual similarity and regulatory punishment, finding that higher MD&A similarity was positively linked to corporate violations, while non-MD&A similarity showed a negative association [4]. Hoberg and Hanley (2010) examined IPO prospectuses and found that higher similarity levels helped reduce underpricing during initial public offerings [5]. Lower similarity indicated a higher proportion of firm-specific information, enhancing stock pricing accuracy. Brown and Tucker (2011) reported a positive correlation between a company's economic changes and the variability in MD&A content [1]. Tetlock (2011) highlighted that higher similarity in 10-K texts resulted in lower stock trading volume and return volatility, as an excessive sensitivity to repetitive information could lead to a reversal in future returns [6].

Reviewing the literature related to MD&A content and textual features, it becomes evident that researchers have developed comprehensive theoretical and empirical insights. However, research on the relationship between MD&A similarity and managerial opportunistic selling remains relatively limited, particularly in the specific context of high-tech companies in Beijing.

2.2 Research Hypotheses

High-tech enterprises face a highly uncertain market and technological environment. Higher MD&A similarity may obscure information disclosure, leading to increased ambiguity in investors' perception of the company's prospects, thereby enhancing the motivation for managerial opportunistic stock sales. Additionally, the presence of managerial conflicts of interest might drive managers to use similar expressions in MD&A to downplay or conceal their intentions to opportunistically sell stocks, aiming to gain personal benefits. Given the significant performance volatility in high-tech companies, managers may attempt to portray a stable performance impression through MD&A to maintain corporate reputation and investor confidence. However, if managers hold negative expectations for future performance, they might opt for opportunistic stock sales to hedge against risks. Moreover, the widespread occurrence of managerial opportunistic stock sales in the industry may prompt managers to imitate expressions from other companies in their MD&A, exacerbating the trend of opportunistic stock sales. Based on these analyses, this study proposes the following hypotheses:

Hypothesis 1: MD&A text similarity is positively correlated with the probability of managerial opportunistic stock sales.

3. Research Design

3.1 Research Sample and Data

For this study, we have selected the management discussion and analysis (MD&A) sections from the annual reports of Beijing innovation and technology companies between 2007 and 2020 as our research sample. The aim is to investigate the relationship between the tone of the MD&A textual content in the annual reports and the likelihood of insider trading behavior among the company's internal personnel (such as directors, supervisors, and executives) in the secondary stock market, concerning the stocks they hold. To ensure the quality of our analysis, we have excluded certain sample values: (1) ST companies have been removed; (2) we have focused only on listed companies with high-tech attributes, categorized according to the "Guidelines for Industry Classification of Listed Companies (Revised in 2012)," where Information Technology industry (C39), Information Transmission, Software, and Information Technology Services industry (I), and Scientific Research Services industry (M) are considered as high-tech industries; (3) samples with missing financial data have been discarded; and (4) samples with missing text feature data have also been eliminated. After applying these criteria, we obtained a total of 2841 valid sample data. The financial data for the listed companies used in this study is sourced from the Guotaian database, while MD&A similarity data comes from the Wingo database. Additionally, to mitigate the influence of extreme values, we have applied a winsorization procedure, capping all continuous variables at the 1% level.

3.2 Variable Definitions and Research Model

3.2.1 Variable Definitions

Measurement of Similarity: We used the IDA method to calculate the textual similarity between company's each MD&A. The median value of these similarities is considered as the company's textual similarity (similarity). The calculation process involves: 1) segmenting the text; 2) filtering the results of segmentation; 3) computing the IDA value of the words in the text; and 4) employing the widely accepted cosine function as the metric for textual similarity, thereby obtaining the MD&A similarity value for each company and subsequently determining the median value as the company's similarity (similarity). A higher similarity value indicates a greater degree of textual resemblance, while a lower similarity value implies lower textual similarity.

Measurement of Managerial Opportunistic Selling: We defined Managerial Opportunistic Selling (IT) as an index comprising two components: the amount of opportunistic selling (SELL) and the frequency of such transactions (SellTimes) conducted by managers. We assessed whether a selling transaction was opportunistic or routine by examining the change in the cumulative abnormal return of the stock before and after each managerial selling transaction. We also considered other control variables, and their definitions and explanations can be found in Table 1.

Table 1: Variable Definition

	Variable	Description
Dependent Variable	SELL	Amount of Opportunistic Executive Stock Reductions
	SellTimes	Frequency of Opportunistic Executive Stock Reductions
Explanatory Variable	Similarity	The textual similarity between company's each MD&A
Controls Variables	Size	Natural logarithm of total assets
	Lev	Debt-to-Asset Ratio
	ROA	Net Profit-to-Asset Ratio
	Growth	Revenue Growth Rate
	Loss	Whether the company is in a loss position
	Indep	Ratio of Independent Directors to the total number of Directors
	Dual	Whether the Chairman and CEO positions are combined
	Balance1	Ownership Concentration
	BM	Book-to-Market Ratio
	ListAge	Difference between the current year and the year of the company's listing
	Mshare	Management Ownership Percentage
	Opinion	Audit Opinion

3.2.2 Model Construction

To test our hypothesis, taking inspiration from the study conducted by Zhang Cheng and Zeng Qingsheng (2021), we formulated Model (1) to examine the impact of textual similarity in financial reports on managerial opportunistic selling in listed companies. If our hypothesis is confirmed, the regression coefficient (β) in Model (1) should exhibit a significant positive relationship.

$$\mathrm{IT} = \alpha + \beta \times \mathrm{similarity} + \sum \mathrm{controls} + \mathrm{Year} + \varepsilon \tag{1}$$

Where IT represents managerial opportunistic selling, similarity denotes the textual similarity, controls encompass the control variables, and Year indicates the year of observation. The definition of variables is listed in Table 1.

4. Empirical Analysis

4.1 Descriptive Statistics

The descriptive statistics for the main variables are presented in Table 2. The average MD&A textual similarity is 0.88, with a minimum value of 0.37 and a maximum value of 0.99. The standard deviation of 0.86 indicates that there is not much variation in MD&A similarity among different companies. Regarding opportunistic selling, the maximum amount (SELL) observed is 30.57, while the minimum is 0, with an average of 5.23 and a standard deviation of 7.34. As for opportunistic selling frequency (SellTimes), the maximum value is 3.95, the minimum is 0, with an average of 0.54 and a standard deviation of 0.86. These figures demonstrate significant variations in managerial opportunistic selling behavior among the innovation and technology companies in Beijing. The descriptive statistics of the main control variables are generally consistent with existing literature.

Table 2: Variable Descriptive Statistics

Variable	mean	sd	min	P50	max
SELL	5.23	7.34	0.00	0.00	30.57
SellTimes	0.54	0.86	0.00	0.00	3.95
Similarity	0.88	0.12	0.37	0.92	0.99
Size	21.45	1.07	18.59	21.40	24.29
Lev	0.37	0.22	0.04	0.34	1.29
ROA	0.03	0.09	-0.44	0.04	0.25
Growth	0.23	0.57	-0.66	0.14	4.07
Loss	0.14	0.35	0.00	0.00	1.00
BM	0.53	0.41	0.05	0.42	2.27
ListAge	1.92	0.79	0.00	1.95	3.47
Mshare	0.18	0.21	0.00	0.08	3.00
Opinion	0.94	0.24	0.00	1.00	1.00

4.2 Regression Results and Analysis

To test hypothesis H1, which suggests that higher MD&A textual similarity in a company is associated with a greater likelihood of managerial opportunistic selling, we conducted regressions using Model (1), and the results are displayed in Table 3. In Table 3, column (1) shows the dependent variable as the opportunistic selling amount (SELL), while column (2) shows the dependent variable as the opportunistic selling frequency (SellTimes). In both columns, the explanatory variable is MD&A textual similarity (Similarity). The regression results in Table 3 reveal a significant positive relationship between MD&A textual similarity (Similarity) and the occurrence of managerial opportunistic selling, significant at the 1% level. This suggests that as the MD&A textual similarity increases, there is a higher probability of managerial opportunistic selling, along with a greater frequency and larger amounts of such opportunistic selling. Thus, hypothesis H1 is supported and confirmed.

Table 3 Empirical Results

	(1)	(2)
Variables	SELL	SellTimes
Similarity	4.350***	0.466***
	(3.14)	(2.96)
Size	0.287	0.025
	(1.15)	(0.83)
Lev	-0.319	-0.023
	(-0.29)	(-0.19)
ROA	-3.433	-0.140
	(-1.23)	(-0.41)
Growth	-0.170	-0.007
	(-0.69)	(-0.21)
Loss	-0.419	0.007
	(-0.65)	(0.09)
BM	-1.138*	-0.129*
	(-1.82)	(-1.73)
ListAge	-0.148	-0.023

	(-0.51)	(-0.71)
Mshare	6.326***	0.645***
	(5.48)	(4.75)
Opinion	1.347**	0.159**
	(2.00)	(2.05)
Constant	-6.061	-0.521
	(-1.22)	(-0.88)
Year	Control	Control
Observations	2,841	2,841
R-squared	0.083	0.077

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

In this study, we have examined the relationship between MD&A textual similarity and managerial opportunistic selling among high-tech companies in Beijing, and our findings reveal a significant positive correlation between the two. By analyzing the management discussion and analysis (MD&A) sections of annual reports from 2001 to 2022 for innovation and technology companies in Beijing, we have uncovered a strong connection between MD&A textual similarity and managerial opportunistic selling behavior. Specifically, when a company's MD&A text exhibits higher similarity to that of other companies in the same industry, it is more likely that the management engages in opportunistic stock selling. This discovery sheds valuable light on the potential link between managerial selling behavior and the textual similarity of MD&A in high-tech companies, providing a fresh perspective for understanding the underlying motivations driving managerial actions.

Our research findings carry significant implications for regulatory bodies, investors, and other stakeholders in the high-tech industry. Understanding the positive correlation between managerial selling behavior and MD&A textual similarity can help predict and identify instances of opportunistic selling by executives, thereby enhancing risk management, safeguarding investor interests, and promoting a healthy and stable market environment. Furthermore, this conclusion provides essential insights for internal corporate management, encouraging high-tech companies to strengthen the standardization and transparency of their MD&A texts to mitigate any potential negative impacts of managerial selling behavior on company reputation and business operations.

Nevertheless, we acknowledge certain limitations in our study. Firstly, our sample was confined to high-tech companies in Beijing, which may not fully represent other regions or industries. Secondly, despite controlling for various potential influencing factors in our research, there may still be other unaccounted variables affecting the results. Therefore, future studies could broaden the sample scope and incorporate more comprehensive control variables to further validate and deepen our research conclusions.

To sum up, our study provides robust evidence for understanding the relationship between MD&A textual similarity and managerial opportunistic selling, offering valuable insights for high-tech company management and regulation, while also inspiring future research in related fields. We hope this study contributes to financial research and corporate decision-making, driving progress in relevant domains.

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