MANAGEMENT'S TONE AND COST BEHAVIOR

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ABSTRACT

This study investigates the relation between MD&A tone and cost behavior. To test the hypothesis that MD&A tone could be a predictor of firm cost behavior, textual analysis method was used with 10-K data. The test results exhibit that firm's cost stickiness is positively associated with the management's tone change. These results suggest that the management's tone change, MD&A tone change, is one of the important determinants of the cost behavior. It implicates that managers reflect the firm's current and future status in the MD&A section, and it could be a predictor of firm cost behavior.

Keywords: Managerial Accounting, Management's Tone, Cost Behavior.

INTRODUCTION

In recent years, numerous studies have attempted to explore the asymmetric cost behavior of corporates. Usually, many researchers have exploited the relation between financial data and corporate behavior. This is because financial information is generally a good representation of the company's status. Despite the usefulness of non-financial information in explaining the company's behavior, there has not been much research involved. Compared to financial information, it is expensive and time-consuming to collect non-financial information. Recently, beyond the financial data, relevant research has extended to non-financial data such as textual analysis. Because non-financial analysis using big data has become easier due to the development of technology. As part of this attempt, we intend to use non-financial information to study the cost behavior of companies.

We investigate two related research questions: (1) Does quantitative non-financial data (MD&A section tone) predict corporate asymmetric cost behavior? (2) If so, will the results of the test be affected by the manager's tenure?

Broadly speaking, there are two kinds of information relating to corporate disclosures, i.e., financial disclosures and non-financial disclosures. In managerial accounting, the relatively smaller set of researches that have studied the association non-financial disclosures and asymmetric cost behavior. Because of using non-financial data is considered costly and time-consuming tasks relatively. For these reasons, many researchers have used financial statements to help explain corporate actions. In addition, accounting numbers are generally considered an indicator of a company's performance, so many stakeholders are focusing on them. Indeed, CEOs also care about accounting numbers as well (Dichev et al. 2013). However, recent researches exhibit that non-financial data has informative values for stakeholders, and as big data analysis advances, research using non-financial information is increasing.

Especially, in this research, we focus on the MD&A section in 10k for estimating the managerial view of the firm. Although there is no certain rule to write this section, and it is not audited, it has appeared to have informative value. According to FASB, "MD&A should provide

a balanced presentation that includes both positive and negative information about the topics discussed." therefore, by reading this section, stakeholders can estimate the firm's current status, plans, and business risks collectively. In this regard, the tone of the MD&A section could be a key to predict corporate cost behaviors.

At first, we investigate whether the tone of the MD&A section could be a key to predict asymmetric cost behavior, cost stickiness. Usually, the cost stickiness is induced by two incentives, the one is the manager's bright view of future business, the other one is private incentives, "Empire Building". Regardless of its motivation, we conjecture that there is a positive relationship between MD&A tone and corporate cost behaviors. If managers describe the status of her/his firms objectively based on rational judgments, there is a positive relationship between MD&A tone and cost stickiness. Because they see/expect a future business opportunity, so they have less motivation to cut down the cost in a current decreasing of sales. Even if managers describe the status of her/his firms falsely, the relationship between MD&A tone and cost stickiness will still be positive. Because they try to cover cost inefficiency by providing an artificially rosy view in the MD&A section. In the robustness check, we modify the model using an industry adjusted tone variable to control the industry effects.

The change in the tone of the firm's financial statements is from SEC's EDGAR database. Following Berns et al. (2018), we measure the change in the tone of each firm's financial statements filed with the SEC from 2002 to 2016. Specifically, we focus on changes in tone in the MD&A section.

To measure of cost behavior, we employ Anderson et al., (2003). It is thought that managers will need time to understand the company's situation and describe their opinions properly, so the relationship between the tone of the MD&A section and cost behaviors will vary depending on the tenure of management. Long tenured managers could better reflect their view of the company to the MD&A section and firm cost behavior, so we add subsample tests with different tenures of managers. We expect that the MD&A section tone written by long tenured managers could better reflect firm cost behaviors.

In the robustness check, the test is performed by replacing the MD&A tone variable with industry adjusted MD&A tone variable. Because the tones of words used in the MD&A section may be different depending on the industry, it is necessary to analyze using industry adjusted tone.

We find that the tone of the MD&A section is positively related to cost stickiness, and this relationship clearer in the more tenured group. It implicates that the tone of the MD&A section has information to predict corporate cost behaviors. In the robustness check, we find consistent evidence using industry adjusted tone model.

This paper contributes to the studies of cost stickiness and corporate disclosure. It complements the aspect of quantitative non-financial data in existing cost stickiness literature. This research has some limitations. At first, the implications of this study are limited by the validity of our proxies of managerial tone, which is may vary depending on the word set used to identify positive words and negative words. Second, in addition to the cost behavior measurement method used in this study, additional analysis can be conducted using other methods. The limitations of our study can be fruitful avenues for future research.

The rest of the paper is structured as follows: the next section discusses the prior literature and presents the research hypothesis. In this section, we discuss several scenarios underlying the expectation of both a negative association and a positive association. After that, we discuss the data and research methods, present the results, and provide a conclusion for the paper.

LITERATURE REIVEW AND HYPOTHESIS DEVELOPMENT

CEOs distribute disclosures, including press releases, conference calls, and Securities and Exchange Commission (SEC) filings, through various communication outlets. Tone analysis focuses on the use of language in narrative disclosures across those outlets. These studies are basically based on the belief that the use of language in CEOs is linked to the current and future performance of the company (BROWN & TUCKER, 2011; Davis & TAMA-SWEET, 2012).

Prior study suggests that textual analysis may provide useful insights into company behavior (Berns et al., 2018; Loughran & McDonald, 2011; 2014). Textual analysis studies show that tone has information usefulness as well as financial figures. For example, Ferris et al. (2012) and Hanley & Hoberg (2012) show that there is a positive relationship between conservative IPO prospectus tone and future stock performance. Studies have been conducted on the tone of analyst reports as well as corporate financial statements (A. H. Huang, Zang, & Zheng, 2014). In particular, the MD&A section offers valuable insights into the company (Berns et al., 2018; Cole & Jones, 2004; Mayew, Sethuraman, & Venkatachalam, 2014; Pava & Epstein, 1993). In line with prior literature, we extend researches by examining the relation between MD&A tone and firm cost behavior. Because of the important role of managers in the company's cost behavior, we believe that the MD&A section tone identified through the management's language will help predict cost behavior.

Generally, motivations for asymmetric cost behavior can be explained by two aspects of managerial incentives. The first one is based on the manager's rational judgment to prepare the future in a better economy. The second one is based on the agency problem, "Empire Building". The second one suggests that managerial opportunistic incentive induces asymmetric cost behavior, cost stickiness. Managers do not want to cut down the cost level in spite of the unfavorable situation in the company by pursuing private interests(Anderson et al., 2003; Anderson, Banker, Huang, & Janakiraman, 2007). Regardless of its motivation, we conjecture that there is a positive relationship between MD&A tone and corporate cost stickiness. If managers describe the status of her/his firm objectively based on rational judgments, there is a positive relationship between MD&A tone and cost stickiness. Because they see/expect future business opportunity, so they have less motivation to cut down the cost in a current decreasing of sales. Of course there is a possibility that managers do not describe the firm status fairly, because MD&A section is not audited. Even if managers describe the status of her/his firms falsely, the relationship between MD&A tone and cost stickiness will still be positive. Because they try to cover cost inefficiency by providing an artificially rosy view in a MD&A section. However, we admit that for the same reason the two factors may not be related. Therefore, authors hypothesize that there is no relation between cost stickiness and MD&A tone.

HYPOTHESIS

H1   *There is no relation between MD&A tone change and cost behavior.*

RESEARCH DESIGN AND SAMPLE SELECTION

Sample Selection

Basically, firm data is from the Compustat. The change in the tone of firm's financial statements is from SEC's EDGAR database. Following Berns et al. (2018), we measure the change

in the tone of each firm's financial statements filed with the SEC from 2002 to 2016. Specifically, we focus changes in tone in the MD&A section.

Research Design

The variable of concern in this analysis is the change in tone of the financial statements of each company filed with the SEC between 2002 and 2016. Using the financial word dictionaries built in Loughran and McDonald (2011), we identify terms as positive or negative. With revised data used in Loughran and McDonald (2011), we calculate the tone of the aggregate 10-K financial statement of each company. We use python to parse MD&A section in 10-k filings, and measure the tone of each. By searching these documents for variations of "Item 7. Management Discussion and Analysis" and any of the phrases "the following discussion," "this discussion and analysis," "should be read in conjunction," "should be read along with," "the following discussion and analysis of management," in the following 5 sentences, we determine the beginning of an MD&A section. We determine the end of an MD&A section by searching for variations of "Item 8. Consolidated Financial Statements". We clean the text between these identifiers and measure the variables of our MD&A tone according to equations (1) and (2) and Loughran and McDonald's dictionaries (2011). We focus on the year-over-year changes in tone in each firm's MD&A section. By focusing on the change in MD&A section tone, we are more likely to understand the change in mood in the management. We measure the change in MD&A section tone as follows:

$$Tone_{i,t} = (\frac{Pos-Neg}{Tword}) * 100 \qquad (1)$$

$$\Delta Tone_{i,t} = Tone_{i,t} - Tone_{i,t-1} \qquad (2)$$

Tone and ΔTone for firm i in year t denote the level and tone change. Pos, Neg, and Tword denote the number of positive, negative, and total financial words in the MD&A section respectively(Feldman, Govindaraj, Livnat, & Segal, 2010).

We expand standard model (Anderson et al. 2003) of cost behavior by allowing ΔTone and control variables. Thus, equation (3) is specified as follows:

$$\Delta lnXOPR_{i,t} = \alpha_0 + \alpha_1 \Delta lnSales_{i,t} + \alpha_2 Dec * \Delta lnSales_{i,t} + \varepsilon \qquad (3)$$

$$\alpha_1 = \beta_1 + \beta_2 Tone_{i,t-1} + \beta_3 lnEmp_{i,t} + \beta_4 lnAint_{i,t} + \beta_5 Leverage_{i,t} + \beta_6 lagDec_{i,t} + \beta_7 GDP\_growth_{i,t} \qquad (4)$$

$$\alpha_2 = \beta_8 + \beta_9 Tone_{i,t-1} + \beta_{10} lnEmp_{i,t} + \beta_{11} lnAint_{i,t} + \beta_{12} Leverage_{i,t} + \beta_{13} lagDec_{i,t} + \beta_{14} GDP\_growth_{i,t} \qquad (5)$$

Where ΔlnXOPR is the change in the natural logarithm of operating costs. Dec is an categorical variable that equals one if sales decrease in year t, and zero otherwise. ΔlnSales is the change in the natural logarithm of sales. Tone denote the indicator variable that equals one for observations in the upper median and zero otherwise. lnEmp is the natural logarithm of the ratio of the total number of employees to sales. lnAint is the natural logarithm of the ratio of assets to sales. Leverage is the total liabilities deflated by total assets. lagDec is the categorical variable that equals one if sales decrease in year t- 1 and zero, otherwise. GDP_growth is the annual percentage

growth rate of GDP from world bank database.

EMPIRICIAL ANALYSIS

Table 1 DESCRIPTIVE STATISTICS						
	mean	sd	p25	p50	p75	count
ΔlnXOPR	0.076	0.450	-0.275	0.110	0.406	29617
ΔlnSales	0.076	0.586	-0.277	0.111	0.410	29617
Δtone1	0.541	0.498	0.000	1.000	1.000	29617
lnEmp	-5.638	1.177	-6.192	-5.552	-5.090	29617
lnAint	0.613	1.288	-0.264	0.314	1.208	29617
leverage	1.171	27.333	0.343	0.553	0.789	29617
Dec	0.301	0.459	0.000	0.000	1.000	29617
lagDec	0.296	0.457	0.000	0.000	1.000	29617
GDP_growth	0.025	0.069	0.018	0.026	0.029	29617

Table 2 PAIRWISE PEARSONS CORRELATION									
	clnXOPR	clnSales	Tone	lnEmp	lnAint	leverage	Dec	lagDec	GDP_growth
ΔlnXOPR	1.00								
ΔlnSales	0.72***	1.00							
Tone	0.05***	0.04***	1.00						
lnEmp	-0.07***	-0.15***	-0.02***	1.00					
lnAint	-0.01	-0.10***	-0.02***	0.10***	1.00				
leverage	-0.01**	-0.02***	-0.00	0.06***	-0.01**	1.00			
Dec	-0.28***	-0.38***	-0.06***	0.10***	0.09***	0.02***	1.00		
lagDec	-0.19***	-0.13***	-0.11***	0.10***	0.11***	0.03***	0.26***	1.00	
GDP_growth	-0.40***	-0.30***	0.02***	0.06***	-0.02***	-0.01	-0.07***	-0.00	1.00

Table 1 and Table 2 show descriptive statistics and the correlation matrix for the variable used in the tests. All variables have 29,617 observations. The annual growth rates are 7.6 percent and 7.6 percent respectively for firm level deflated log-operating costs (ΔlnXOPR) and changes in sales (ΔlnSales). The means of employee intensity (lnEmp) and asset intensity (lnAint) are -5.638 and 0.613, respectively. Approximately 30.1 percent of sample firms experience a sales decline in year t and 29.6 percent of sample firms experience a sales decline in year t-1. The average GDP growth rate is 2.5%. The correlations are statistically significant among variables.

Table 3 presents the results of the main test for the relation between cost behavior and MD&A tone change. To test our hypothesis on the relation between MD&A section tone and cost behavior, we estimate eq (3). In the first column, we present the baseline results of Anderson et al. (2003). We find a positive coefficient (0.645) on ΔlnSales and a negative coefficient (-0.220) on Dec*ΔlnSales. This suggests the existence of asymmetric cost behavior for our sample.

In the second column, we add our variable of interest Tone. Consistent with the first column, the coefficient on ΔlnSales (0.610) is positively significant at the 1% level and the coefficient on Dec*ΔlnSales (-0.161) is negatively significant at the 1% level. More importantly, the coefficient on Tone*Dec*ΔlnSales (-0.126) is negative and significant at the 5% level, suggesting that firms with positive MD&A tone have less motivation to cut down the cost in a current decreasing of sales and rejecting our hypothesis.

	Full Sample			Sub Sample		
	Table 3 **REGRESSION OF COST BEHAVIOR ON MD&A TONE CHANGE AND CONTROL VARIABLES**					
	(1)	(2)	(3)	(4)	(5)	(6)
	clnXOPR	clnXOPR	clnXOPR	clnXOPR	clnXOPR	clnXOPR
ΔlnSales	0.645***	0.610***	0.579***	0.625***	0.588***	0.554***
	(18.60)	(15.56)	(4.06)	(17.55)	(14.68)	(3.76)
Dec	0.009	0.011	0.011	0.012	0.013	0.011
	(0.37)	(0.43)	(0.46)	(0.47)	(0.52)	(0.46)
Dec*ΔnSales	-0.220***	-0.161***	-0.285**	-0.216***	-0.151***	-0.245*
	(-10.78)	(-5.56)	(-2.37)	(-10.03)	(-5.15)	(-2.08)
Tone		0.005	0.004		0.003	0.003
		(0.26)	(0.28)		(0.18)	(0.26)
Tone*ΔlnSales		0.071	0.037		0.077*	0.037
		(1.69)	(1.15)		(1.85)	(1.13)
Tone*Dec*ΔlnSales		-0.126**	-0.088***		-0.142***	-0.097***
		(-2.80)	(-3.10)		(-3.64)	(-3.70)
lnEmp			0.080**			0.077*
			(2.20)			(2.16)
lnAint			0.042**			0.046**
			(2.77)			(2.87)
leverage			0.002*			0.002*
			(2.07)			(2.02)
lagDec			-0.057***			-0.060***
			(-5.18)			(-5.52)
GDP_growth			-0.099**			-0.104***
			(-2.98)			(-3.10)
lnEmp*ΔlnSales			-0.026*			-0.029*
			(-2.10)			(-2.15)
lnAint*ΔlnSales			-0.074***			-0.070***
			(-4.11)			(-3.84)
leverage*ΔlnSales			-0.003**			-0.003**
			(-3.03)			(-2.96)
lagDec*ΔlnSales			-0.227***			-0.225***
			(-4.70)			(-4.54)
GDP_growth*ΔlnSales			0.008			0.003
			(0.17)			(0.06)
lnEmp*Dec*ΔlnSales			-0.025			-0.020

			(-1.28)			(-0.98)
lnAint*Dec*ΔlnSales			0.006			0.006
			(0.34)			(0.34)
leverage*Dec*ΔlnSales			0.003**			0.002**
			(2.26)			(2.21)
lagDec*Dec*ΔlnSales			0.371***			0.369***
			(6.17)			(5.70)
GDP_growth*Dec*ΔlnSales			0.046			0.045
			(1.08)			(1.04)
Firm fixed effects	Yes					
Firm and Year clustered Standard errors	Yes					
Observations	29617	29617	29617	26406	26406	26406
Adjusted R^2	0.513	0.515	0.668	0.498	0.500	0.654

Note: t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All variables are defined in Appendix A. All p-values are based on two-tailed tests using firm and year clustered standard errors.

In the third column, we allow the slope for sales increases and decreases to vary with Tone and other well-known factors of cost behavior. Consistent with the previous columns, the coefficient on ΔlnSales (0.579) is significantly positive at the 1% level; the coefficient on Dec*ΔlnSales and Tone*Dec*ΔlnSales are negatively significant at the 5% and 1% level respectively. Thus, these test results rejecting our hypothesis.

Furthermore, we do test using subsamples with CEOs whose tenure is more than three years. column (4) to column (6) exhibits the test results of subsamples which could better reflect the tone of CEOs in the MD&A section. As we expected the coefficient on Tone*Dec*ΔlnSales (-0.097) is negatively significant at the 1% level. Collectively, we find the positive relation between managerial tone change and cost stickiness.

SENSITIVITY TESTS

In the robustness check, we test using industry adjusted tone to address the concern that measure of MD&A tone has a noise. We measure tone by first classifying words as positive or negative using the financial word dictionaries used in Loughran and McDonald (2011), and we then compute tone as the difference between the number of positive and negative words, scaled by the total words in the respective MD&A section (Feldman et al., 2010). The problem is the measurement of tone level is dependent on the particular word lists used to classify words into positive and negative and, in some cases, on the particular industry or even specific company name. For instance, "Waste" may be a negative word in general, but a general word for a company in the waste management business. Thus, we adjust MD&A tone using industry tone level. Specifically, the average tone of the industry over three years is subtracted from the tone of the individual firm. Similar results are obtained when an average period of one or five years is applied. By doing so, we address of described concern about the noise of measurements partially.

In the Table 4, we report the test results using adjusted tone. Consistent with previous tests, the results of the regression exhibit that positive relation between managerial tone change and cost

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stickiness.

	Full Sample			Sub Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	clnXOPR	clnXOPR	clnXOPR	clnXOPR	clnXOPR	clnXOPR
ΔlnSales	0.638***	0.606***	0.577***	0.618***	0.584***	0.551***
	(18.84)	(16.01)	(3.99)	(17.69)	(15.52)	(3.71)
Dec	0.013	0.011	0.009	0.016	0.015	0.010
	(0.50)	(0.42)	(0.38)	(0.64)	(0.56)	(0.41)
Dec*ΔlnSales	-0.223***	-0.166***	-0.309**	-0.220***	-0.160***	-0.271**
	(-11.11)	(-5.89)	(-2.47)	(-10.32)	(-5.06)	(-2.22)
AdjTone		-0.021	-0.006		-0.023	-0.007
		(-0.81)	(-0.45)		(-0.90)	(-0.49)
AdjTone*ΔlnSales		0.062	0.041		0.068	0.043
		(1.65)	(1.28)		(1.77)	(1.29)
AdjTone*Dec*ΔlnSales		-0.116**	-0.097**		-0.124**	-0.102***
		(-2.47)	(-2.88)		(-2.76)	(-3.14)
lnEmp			0.088**			0.085**
			(2.53)			(2.50)
lnAint			0.039**			0.042**
			(2.59)			(2.70)
leverage			0.002*			0.002*
			(2.03)			(1.98)
lagDec			-0.056***			-0.059***
			(-4.78)			(-4.99)
GDP_growth			-0.103**			-0.108***
			(-3.05)			(-3.18)
lnEmp*ΔlnSales			-0.026*			-0.029*
			(-2.11)			(-2.16)
lnAint*ΔlnSales			-0.075***			-0.071***
			(-4.21)			(-3.93)
leverage*ΔlnSales			-0.003**			-0.002**
			(-2.93)			(-2.85)
lagDec*ΔlnSales			-0.223***			-0.220***
			(-4.58)			(-4.43)

Table 4
REGRESSION OF COST BEHAVIOR ON ADJUSTED MD&A TONE CHANGE AND CONTROL VARIABLES

GDP_growth*ΔlnSales			0.002			-0.003
			(0.04)			(-0.07)
lnEmp*Dec*ΔlnSales			-0.025			-0.020
			(-1.22)			(-0.94)
lnAint*Dec*ΔlnSales			0.010			0.009
			(0.51)			(0.52)
leverage*Dec*ΔlnSales			0.002*			0.002*
			(2.19)			(2.14)
lagDec*Dec*ΔlnSales			0.371***			0.368***
			(6.17)			(5.72)
GDP_growth*Dec*ΔlnSales			0.058			0.058
			(1.37)			(1.34)
Firm fixed effects	Yes					
Firm and Year clustered Standard errors	Yes					
Observations	28580	28580	28580	25424	25424	25424
Adjusted R^2	0.501	0.502	0.660	0.486	0.487	0.646
Note: t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All variables are defined in Appendix A. All p-values are based on two-tailed tests using firm and year clustered standard errors.						

CONCLUSION

We find that the tone of the MD&A section is positively related to cost stickiness, and this relationship clearer in the more tenured group. It implicates that the tone of the MD&A section has information to predict corporate cost behaviors. In the robustness check, we find consistent evidence using industry adjusted tone model.

This paper contributes to the studies of cost stickiness and corporate disclosure. It complements the aspect of quantitative non-financial data in existing cost stickiness literature. However, our study has some limitations. first, the implications of this study are limited by the validity of our proxies of managerial tone, which is may vary depending on the word set used to identify positive words and negative words. Second, in addition to the cost behavior measurement method used in this study, additional analysis can be conducted using other methods. The limitations of our study can be fruitful avenues for future research.

Appendix A VARIABLE DEFINITION		
Name	**Source**	**Definition**
ΔlnXOPR	Compustat	log-change in deflated operating costs
Tone	Berns et al. 2018	Tone and ΔTone for firm i in year t denote the level and tone change. Pos, Neg, and Tword denote the number of positive, negative, and total financial words in the MD&A section respectively (Feldman, Govindaraj, Livnat, & Segal, 2010). In the regression, we use indicator variable that equals one for observations in the upper median, and zero otherwise.
ΔlnSales	Compustat	log-change in deflated sales

Dec	Compustat	categorical variable that equals one if sales decrease in year t and zero, otherwise
lagDec	Compustat	categorical variable that equals one if sales decrease in year t- 1 and zero, otherwise
lnEmp	Compustat	natural logarithm of the ratio of the total number of employees to sales
lnAint	Compustat	natural logarithm of the ratio of assets to sales
Leverage	Compustat	total liabilities deflated by total assets
GDP_growth	World Bank	annual percentage growth rate of GDP

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