Does managerial tone matter for stock liquidity? Evidence from textual disclosures

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Abstract

This study investigates the effect of managerial tone on stock liquidity using a sample of U.S.-listed firms over the 1994-2019 period. We find that firms with SEC filings exhibiting more positive managerial tone experience higher stock liquidity. Our findings remain unchanged after controlling for firm fixed effects, propensity score matching, and using alternative variable approaches. Further, we identify that the relationship is less pronounced during times of high policy uncertainty measured by EPU and presidential elections. Overall, this paper provides evidence that the management tone in SEC filings has price discovery and efficiency implications for investor trading decisions.

Keywords: Management tone; textual disclosures; stock liquidity; policy uncertainty; propensity score matching.

JEL classification**:** G12, G14, G32

1. Introduction

Existing research demonstrates that textual tone in the mandatory SEC filings and transcripts of conference calls matter for corporate transactions and firm stock market characteristics. For example, Loughran and McDonald (2013) find that the tone of IPO registration filings affects IPO attributes and post-IPO volatility. Furthermore, Hanley and Hoberg (2010) show that a positive tone of the IPO prospectus is associated with greater IPO pricing accuracy, whereas recent work by Jiang, Lee, Martin, and Zhou (2019) indicates that managerial tone is a strong predictor of future stock market returns.

In this paper, we build on previous studies and attempt to investigate the link between managerial tone in mandatory SEC filings and firm-level stock liquidity. Liquidity is an important source of priced risk that determines investors' estimates of firm market values (Pastor and Stambaugh, 2003). Moreover, stock liquidity decreases default risk (Brogaard, Lin, Xia, 2017), and increases firms' propensity to hold cash (Nyborg and Wang, 2021). Finally, the level of liquidity determines firm-specific price crash risk (Xu, Xuan, and Zheng, 2021). Consequently, both managers and investors care about a firm's stock liquidity – low liquidity impedes accurate price discovery, aggravates career concerns of top management and renders portfolio rebalancing more costly for investors. Managerial tone can be more broadly associated with traits such as overconfidence and narcissism particularly using speech-based measures (Malmendier and Tate, 2005; Apergis, 2021), however, there is no prior literature relating overconfidence with stock liquidity. From a behavioral perspective, Liu (2015) identifies a positive association between investor sentiment and stock liquidity. If the tone of company filings conveys managerial sentiment or belief about future expectations or performance then this may also positively relate to underlying stock liquidity. With this in mind, we try to answer the question of what extent does the tone of mandatory SEC filings impact firm stock liquidity.

Using a comprehensive sample of U.S. publicly listed corporations between 1994 and 2019, we establish that net positive managerial tone in mandatory SEC filings is associated with higher stock liquidity. This effect is economically meaningful and statistically significant. It implies that the tone of the SEC documents may affect investors' behavior in terms of trading actions and the level of stock liquidity. In an additional set of tests, we partition the sample based on the degree of policy uncertainty (Baker, Bloom, and Davis, 2006). More specifically, we identify two opposite states of the world – of high and low policy uncertainty, and document that the significant association between the managerial tone of SEC filings and individual stock liquidity is particularly pronounced when policy

uncertainty is low. Subsequently, we perform a series of robustness checks and confirm that our main results remain unaffected. We, therefore, conclude that the tone with which top managers communicate with investors matters for the level of underlying stock liquidity, which is an important outcome knowing that liquidity is associated with firm equity valuation, as well as other firm dimensions including default risk and the level of cash holdings.

This paper contributes to the existing literature in the following ways. First, we extend the literature on the tone used in mandatory disclosure filings (Loughran and McDonald, 2011, 2013; Jiang et al., 2019; Goergen et al., 2020) and establish that net positive managerial tone predicts significantly higher stock liquidity. Second, we add to the extant research on liquidity in capital markets (Brogaard et al., 2017; Nyborg and Wang, 2021; Xu et al., 2021) by documenting another important determinant of stock liquidity, namely the tone of SEC filings. Third, we contribute to studies that focus on the importance of policy uncertainty for capital markets and corporate policies (Baker et al., 2016; Gulen and Ion, 2016; Bhattacharya et al., 2017; Montone, 2022). Our study shows that high policy uncertainty is the setting in which the association between managerial tone and stock liquidity is weaker.

The remainder of the paper is organized as follows: Section 2 presents the data and the methodology. Section 3 reports the results including the robustness checks, and Section 4 concludes.

2. Data and methodology

2.1 Data

We collect data from several sources to construct variables for U.S firms for the 1994-2019 period[1]. Specifically, (*i*) Individual stock liquidity data are from the CRSP database; (*ii*) Management tone is obtained from Loughran and McDonald' website (https://sraf.nd.edu), while data on alternative proxies for management tone are from the WRDS SEC Analytics Suite; (*iii*) stock returns and trading volume come from CRSP; (*iv*) accounting-based control variables originate from Compustat; (*v*) and analyst coverage data are from I/B/E/S, while institutional ownership data are from the Thomson Reuters Institutional 13F database. Our final sample consists of 45,720 firm-year observations, representing 6,575 U.S. firms from 1994 to 2012

[1] Data coverage for our dependent variable of interest, i.e., management tone, starts in 1993. However, our sample begins in 1994 because our baseline model specification regresses stock liquidity with a current period.

Table 1 presents the summary statistics of firm-specific variables for the whole sample over the 1994-2019 period. The average of stock liquidity is -0.0089 for *BASpread* and -0.0177 for *Amihud*. Also, as noted from Table 1, management tone (*MATONE*), on average, is approximately -0.0926, suggesting that the number of positive words is less than the number of negative words in the average annual report.

[Insert Table 1 here]

2.2 Methodology

We begin the analysis by investigating whether management tone is related to stock liquidity. We implement this analysis by performing a regression of the liquidity measure on the management tone variable while controlling for other firm-specific characteristics. Our baseline regression model takes the following form:

$$LIQUID_{i,t} = \alpha + \beta MATONE_{i,t-1} + CONTROLS_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

where, $LIQUID_{i,t}$ denotes stock liquidity of firm *i* in year *t* and is proxied by Bid-Ask Spread (*BASpread*) and *Amihud*. *MATONE* is a proxy for management tone and defined as 100 multiplied by the difference between the number of positive words and the number of negative words, divided by the total number of words in the annual report. *CONTROLS*[2] is the set of control variables potentially affects stock liquidity (Li, Wang, and Ye, 2021), including *firm size (SIZE), tangibility (TANG), leverage (LEV), the inverse of average stock price (INVPRC), institutional ownership (IO), trading volume (TRADEVOL), analyst coverage (ANALYST), return volatility (RETVOL), R&D expenses (R&D), and advertising expenses (ADAT).* All independent variables are lagged by one year to alleviate the issue of reverse causality. We also use industry and year fixed effects. We employ two-way cluster-robust standard errors, clustered by firm and year. This clustering helps correct for cross-sectional and time-series dependence (Petersen, 2009; Gow et al., 2010; Pham, 2020). Detailed variable definitions are presented in Appendix.

3. Empirical results

3.1 Management tone and stock liquidity

Table 2 presents the results for the regression of the liquidity measure on the management tone in 10-K filings. The results across the two proxies for liquidity show that management tone is significantly and positively associated with liquidity. For the *BASpread* variable, the coefficient estimate on *MATONE* is 0.0006 (*t-stat*=9.76), and 0.0065 (*t-*

[2] Detailed definitions of the variables are provided in Appendix.

stat=19.94) for the *Amihud* measure controlling for firm-level characteristics, industry and year effects. The magnitude of the results is economically significant; for example, a one-standard-deviation increase in management tone (88.39%) results in an increase of approximately 0.05 percentage points (=0.8839*(0.0006)) in stock liquidity, which is roughly 5.96% (=(0.8839*(0.0006))/-0.0089) of the average liquidity across sample firms. These results overall suggest that greater management tone is associated with higher liquidity.

[Insert Table 2 here]

We perform several robustness checks to further confirm our findings in Table 2. Although we include in the regressions many firm-level control variables that are potentially correlated with liquidity and management tone, we are aware that the results can be driven by unobservable and time-invariant heterogeneity across firms. To mitigate this concern, we incorporate firm-fixed effects and the use of a lagged independent variable into Equation (1). Columns (1) and (2) of Table 3 present the results for the modelling including firm and year fixed effects, while Columns (3) and (4) report the results including a lagged independent variable in the model. We find that the coefficient estimates of the management tone variable remain positive and statistically significant at the conventional 1% level in all of these models.

[Insert Table 3 here]

As another robustness check, we consider propensity score matching (PSM) analysis to avoid systematic differences as well as identify unobserved factors. Further, this method helps us mitigate any selection bias issues arising from firm characteristics (e.g., Guindy, 2021). Accordingly, firms with high management tone (above yearly two-digit SIC industry median) are our treatment firms, whereas firms with low management tone are our control firms. To find a control group, we estimate propensity scores using our base set of controls and match firms based on year, two-dight SIC codes, and closest propensity score with a maximum distance of 1% value with no-replacement. The results in Panel A of Table 4 show that the treatment and control groups of firms are indistinguishable in terms of observable characteristics, implying that all variables are closely matched with no significant differences. Then, we re-estimate Equation (1) in a PSM framework, using the above matched treatment-control pairs. Our results show a qualitatively similar positive relation between management tone and firm stock liquidity, as shown in Panel B of Table 4.

[Insert Table 4 here]

To address the issue that the positive influence of management tone on stock liquidity may be sensitive to the measurement of management tone, we substitute our original variable

(*MATONE*) with alternative proxies for management tone: $TONE_{WORD}$, $TONE_{COMWORD}$, $TONE_{SENTENCE}$, $TONE_{UNCTERM}$, $TONE_{NEGTERM}$, $TONE_{SYLLABLE}$, and $TONE_{NEGWORD}$. Since our measures are inverse proxies for Tone, we convert these measures into direct readability measures by multiplying the natural logarithm of them by –1. Drake et al. (2016) show that investors seek out historical 10-K and 10 Q reports because they contain both qualitative and quantitative information that helps contextualize current-period information and is useful for current-period decision making. Further, Kim at al. (2019) argue that financial statement information might not be able to capture the development of a firm's key success factors due to limitations of accounting rules, and claim that and managers explain the key driving forces responsible for changes in current performance in their 10-K reports, which helps investors to better determine whether current performance is indicative of future performance. We argue that 10-K reports are one of the most comprehensive and credible channels through which managers convey their superior information to outside investors. In Table 5, we find that the coefficients on all of these different proxies for *MATONE* are positive and statistically significant, confirming our preceding findings and also highlighting that not just underlying sentiment but also the breadth, clarity and complexity / simplicity of the management content in SEC filings is relevant to stock liquidity.

[Insert Table 5 here]

It is possible that the established relation between management tone and firm stock liquidity may be spurious due to the choice of liquidity measure (Brogaard et al., 2017). Hence, to further assess the robustness of our main evidence, we also re-estimate Equation (1) using alternative proxies for stock liquidity (Liu, 2006). Specifically these are (*i*) $ZERO_1$, the natural logarithm of (1+ average monthly zero-return proportion over a fiscal year t), multiplied by -1; and (*ii*) $ZERO_2$, the natural logarithm of (1+ average monthly positive-volume days with zero-return over a fiscal year t), and multiplied by 1. As reported in Table 6, we still find a significantly positive relationship between management tone and stock liquidity based on these alternative liquidity measures.

[Insert Table 6 here]

3.2 Policy uncertainty, management tone and stock liquidity

In this subsection, we examine the role of policy uncertainty in explaining the relationship between management tone and stock liquidity. Policy uncertainty affects a variety of macroeconomic factors, including interest rates, inflation, and exchange rates, leading to unexpected changes in monetary and fiscal policy (Ng et al., 2020). We predict

that the relationship between management tone and stock liquidity is weaker during periods of high policy uncertainty. This is based on stock liquidity being lower in the presence of greater information asymmetry and economic policy uncertainty (Montone, 2022) with managerial tone or sentiment envisaged to have a more muted influence on investors and market trading in such an environment. When there is less uncertainty we expect greater relevance of management disclosures and sentiment in influencing investor actions and the volume of market trading. To quantify policy uncertainty, we consider two measures including the index of economic policy uncertainty (*EPU*) (Baker et al., 2016) and the timing of U.S. presidential elections (*ELECT*) (Bhattacharya et al., 2017). The EPU measure captures an index perspective based on newspaper references of various economic terms and entities, and it is commonly accepted that elections spike uncertainty due to the potential modification in the underlying political policy environment resulting from changes in government.

We divide our sample into two subgroups (High vs. Low) based on the above (below) yearly-median value using *EPU* in year *t*-1 to test our prediction. At the same time, *ELECT* (*NON-ELECT*) is a dummy measure equal to one (zero) if the U.S. holds a presidential election in year *t*-1. Then, we re-estimate Equation (1) separately for each sub-sample (i.e., High vs. Low and *ELECT* vs. *NON-ELECT*). In Panel A of Table 7, we find that the coefficients on *MATONE* are positive (i.e., *HighEPU* vs. *LowEPU*) for both sub-samples. However, the coefficients are much larger in value and statistical significance for firms in the *LowEPU sub*-sample models. In Panel B of Table 7, we observe that the coefficients on *MATONE* are significantly positive for both sub-samples (i.e., *ELECT* vs. *NON-ELECT*) during the incidence of presidential elections in the U.S., and that the relationship between management tone and stock liquidity is more pronounced during times of less policy uncertainty measured by the timing of presidential elections. These results indicate that the relationship between management tone and stock liquidity is stronger when economic policy uncertainty is lower.

[Insert Table 7 here]

4. Conclusion

In this paper, we investigate the relationship between the tone of the mandatory reports filed with the SEC and the level of stock liquidity. Consistent with our predictions, we find that net positive managerial tone is associated with significantly higher stock liquidity. This provides an extension in terms of the relevance of both the sentiment and textual analysis elements associated with managerial disclosure information, and especially to financial

market trading and stock liquidity outcomes. It further implies that the management tone in SEC filings has price discovery and efficiency implications for investor trading decisions. Moreover, we document that this relationship is stronger when the degree of policy uncertainty is lower. This result is important because it sheds light on one specific channel through which the tone of SEC filings affects stock liquidity and suggests greater relevance of managerial tone and sentiment when the wider information environment is more homogeneous. Our main results are robust to the use of different estimation procedures and alternative proxies for both management tone and stock liquidity.

A fruitful extension of our analysis would be to examine the relationship between the tone of mandatory disclosure and stock liquidity in a cross-country context to examine whether country-level institutional environments influence the nature of managerial tone and sentiment in filing documents and any broader implications depending on the level of development and liquidity of different financial markets. Broader textual analysis could also potentially extend to transaction-specific filing documents, such as capital raising prospectuses or merger announcements, to assess the wider importance of management tone on firm and investor outcomes.

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Table 1: Descriptive Statistics

This table reports the descriptive statistics for our sample. The appendix provides a detailed description of the variables used in the regression analysis. We winsorize continuous variables at the 1% and 99% levels.

Variables	Sample	Mean	Median	SD	Min	P25	P75	Max
BASpread	45,720	-0.0089	-0.0026	0.0139	-0.0913	-0.0114	-0.0009	-0.0002
Amihud	45,720	-0.0177	-0.0006	0.0565	-0.4192	-0.0050	-0.0001	0.0000
MATONE	45,720	-0.0694	-0.0926	0.8839	-2.1165	-0.7932	0.6557	2.1165
SIZE	45,720	6.6517	6.5477	1.8868	2.3580	5.3041	7.8699	11.3397
TANG	45,720	0.4898	0.4930	0.1779	0.0932	0.3770	0.5862	0.9578
LEV	45,720	0.3586	0.3163	0.2400	0.0145	0.1571	0.5289	0.9435
INVPRC	45,720	0.1056	0.0498	0.1465	0.0056	0.0255	0.1143	0.8130
IO	45,720	0.6599	0.7032	0.2793	0.0265	0.4649	0.8688	0.9794
TRADEVOL	45,720	17.9966	18.0556	1.6917	13.7614	16.8644	19.1573	21.7186
ANALYST	45,720	1.8806	1.8718	0.7637	0.6931	1.2528	2.4779	3.4313
RETVOL	45,720	0.1273	0.1087	0.0760	0.0332	0.0750	0.1571	0.4768
R&D	45,720	0.0527	0.0000	0.1075	0.0000	0.0000	0.0594	0.6653
ADAT	45,720	0.0104	0.0000	0.0276	0.0000	0.0000	0.0049	0.1710

Table 2: The impact of management tone on stock liquidity

This table reports the results for the panel regression of stock liquidity on management tone. The regression model is as follows:

$$LIQUID_{i,t} = \alpha + \beta MATONE_{i,t} + CONTROLS_{i,t-1} + \varepsilon_{i,t}$$

where, $LIQUID_{i,t}$ denotes stock liquidity of firm *i* in year *t* and is proxied by Bid-Ask Spread (*BASpread*) and *Amihud*. *MATONE* is a proxy for management tone and defined as 100 multiplied by the difference between the number of positive words and the number of negative words, divided by the total number of words in the annual report. *CONTROLS* is the set of control variables with a one-year lag, including firm size (*SIZE*), tangibility (*TANG*), leverage (*LEV*), the inverse of average stock price (*INVPRC*), institutional ownership (*IO*), trading volume (*TRADEVOL*), analyst coverage (*ANALYST*), return volatility (*RETVOL*), R&D expenses (*R&D*), and advertising expenses (*ADAT*). Detailed definitions of the variables are provided in Appendix. The *t*-statistics shown in parentheses are based on standard errors that are adjusted for heteroscedasticity and are clustered at the firm and year level. We winsorize continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Variables	***BASpread***	***Amihud***
MATONE	**0.0006**	**0.0065**
	(9.76)* **	**(19.94)*** **
SIZE	0.0007	0.0014
	(9.60)***	(3.63)***
TANG	0.0015	0.0032
	(4.98)***	(1.90)*
LEV	-0.0043	-0.0067
	(-13.64)***	(-3.85)***
INVPRC	-0.0159	-0.0843
	(-23.12)***	(-20.26)***
IO	0.0069	0.0358
	(29.56)***	(27.91)***
TRADEVOL	0.0018	0.0121
	(25.19)***	(28.93)***
ANALYST	0.0006	-0.0048
	(6.14)***	(-9.27)***
RETVOL	-0.0038	-0.0367
	(-3.71)***	(-6.20)***
R&D	0.0021	0.0257
	(3.20)***	(7.05)***
ADAT	0.0084	0.0174
	(4.69)***	(1.81)*
Constant	-0.0557	-0.2164
	(-52.21)***	(-37.42)***
Industry and Year effects	Yes	Yes
Adj R^2	0.5969	0.2891
Nobs	45,720	45,720

Table 3: The impact of management tone on stock liquidity – Robustness checks

This table reports the results for the panel regression of stock liquidity on management tone (i) controlling for firm and year fixed effects, and (ii) using a lagged independent variable. The details of variables are as reported in the previous table. The *t*-statistics are shown in parentheses. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Variables	**Firm and year fixed effects**		**Lagged independent variable**	
	BASpread	*Amihud*	*BASpread*	*Amihud*
	(1)	**(2)**	**(3)**	**(4)**
MATONE	**0.0002**	**0.0034**	**0.0004**	**0.0046**
	(3.33)* **	**(12.38)*** **	**(7.63)*** **	**(14.67)*** **
SIZE	0.001	0.0046	0.0003	0.0001
	(6.89)***	(6.44)***	(5.18)***	(-0.35)
TANG	0.0012	0.0028	0.0011	0.0031
	(2.23)**	(1.00)	(3.91)***	(1.87)*
LEV	-0.0039	-0.0054	-0.0039	-0.0053
	(-8.10)***	(-2.16)**	(-13.46)***	(-3.10)***
INVPRC	-0.0081	-0.0407	-0.0158	-0.0842
	(-8.70)***	(-7.86)***	(-22.72)***	(-18.87)***
IO	0.0048	0.0135	0.0063	0.0323
	(13.07)***	(7.76)***	(26.47)***	(23.91)***
TRADEVOL	0.0013	0.0077	0.0018	0.0112
	(13.03)***	(13.06)***	(26.25)***	(26.32)***
ANALYST	0.0018	0.0049	0.0002	-0.0054
	(12.78)***	(7.17)***	(1.99)**	(-10.23)***
RETVOL	-0.0039	-0.0387	-0.0022	-0.0237
	(-3.76)***	(-6.68)***	(-2.17)**	(-3.95)***
R&D	0.0009	0.0074	0.0012	0.0171
	(0.57)	(0.99)	(1.85)*	(4.65)***
ADAT	0.0252	0.1026	0.0067	0.0137
	(7.15)***	(5.60)***	(4.06)***	(1.49)
Constant	-0.053	-0.189	-0.0565	-0.1992
	(-32.18)***	(-21.16)***	(-51.35)***	(-33.33)***
Fixed effects	FY	FY	YI	YI
Adj R^2	0.5969	0.2891	0.5849	0.2796
Nobs	45,720	45,720	39,145	39,145

Table 4: Propensity score matching

This table reports the results for the panel regression of stock liquidity on management tone using the propensity score matching approach. Panel A shows the average treatment effects obtained from the propensity score matching process. Firms with high management tone (above yearly two-digit SIC industry median) are our treatment firms, whereas firms with low management tone are our control firms. Panel B presents the results based on PSM regression. The *t*-statistics are shown in parentheses. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Variables	**Panel A: Propensity score matching**		
	Treatment	**Control**	**t-test**
SIZE	6.77	6.62	0.64
TANG	0.53	0.51	0.60
LEV	0.31	0.34	0.70
INVPRC	0.06	0.09	1.17
IO	0.59	0.57	1.13
TRADEVOL	18.06	17.35	1.35
ANALYST	2.09	1.66	5.30
RETVOL	0.11	0.15	1.54
R&D	0.04	0.07	1.17
ADAT	0.02	0.01	1.26

Panel B: Management tone and stock liquidity		
	BASpread	***Amihud***
MATONE	**0.0005**	**0.0047**
	(6.45)* **	**(11.58)*** **
Constant	-0.0876	-0.1879
	(-67.34)***	(-35.12)***
Control variables	Yes	Yes
Fixed effects	YI	YI
Adj R^2	0.5679	0.2678
NObs	10,054	10,054

Table 5: Check with alternative proxies for management tone

This table reports the results for the panel regression of stock liquidity on management tone using alternative proxies for management tone. Detailed definitions of the variables are provided in the Appendix. The *t*-statistics are shown in parentheses. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

	Panel A: *BASpread*						
	$TONE_{WORD}$	**$TONE_{COMWORD}$**	**$TONE_{SENTENCE}$**	**$TONE_{UNCTERM}$**	**$TONE_{NEGTERM}$**	**$TONE_{SYLLABLE}$**	**$TONE_{NEGWORD}$**
MATONE	**0.0021**	**0.0018**	**0.0016**	**0.0013**	**0.0032**	**0.0018**	**0.0001**
	(2.44)**	**(2.24)****	**(2.15)****	**(2.18)****	**(2.60)*****	**(2.27)****	**(3.32)*****
Constant	-0.0536	-0.0538	-0.0539	-0.0548	-0.0533	-0.0537	-0.0533
	(-37.45)***	(-40.42)***	(-43.18)***	(-50.16)***	(-50.43)***	(-36.15)***	(-46.26)***
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	YI	YI	YI	YI	YI	YI	YI
Adj R^2	0.5960	0.5960	0.5960	0.5960	0.5961	0.5960	0.5960
Nobs	45,720	45,720	45,720	45,720	45,720	45,720	45,720
	Panel B: *Amihud*						
	$TONE_{WORD}$	**$TONE_{COMWORD}$**	**$TONE_{SENTENCE}$**	**$TONE_{UNCTERM}$**	**$TONE_{NEGTERM}$**	**$TONE_{SYLLABLE}$**	**$TONE_{NEGWORD}$**
MATONE	**0.0017**	**0.0019**	**0.0015**	**0.0027**	**0.0008**	**0.0018**	**0.0014**
	(2.91)***	**(3.23)*****	**(2.29)****	**(4.79)*****	**(1.77)***	**(3.15)*****	**(2.55)****
Constant	-0.212	-0.2114	-0.2059	-0.207	-0.2002	-0.2144	-0.2046
	(-29.00)***	(-30.67)***	(-31.76)***	(-35.74)***	(-35.65)***	(-28.27)***	(-33.78)***
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	YI	YI	YI	YI	YI	YI	YI
Adj R^2	0.2831	0.2831	0.2830	0.2834	0.2830	0.2831	0.2831
Nobs	45,720	45,720	45,720	45,720	45,720	45,720	45,720

Table 6: Check with alternative proxies for stock liquidity

This table reports the results for the panel regression of stock liquidity on management tone using alternative proxies for stock liquidity. Detailed definitions of the variables are provided in Appendix. The *t*-statistics are shown in parentheses. Superscripts ** and *** denote significance levels of 5%, and 1%, respectively.

Variables	***ZERO₁***	***ZERO₂***
MATONE	**0.0011**	**0.0025**
	(2.39)**	**(2.84)*****
SIZE	0.0065	0.0063
	(28.91)***	(29.99)***
TANG	0.0072	0.0075
	(6.56)***	(7.26)***
LEV	-0.0283	-0.025
	(-26.33)***	(-25.00)***
INVPRC	-0.0528	-0.0527
	(-26.40)***	(-27.45)***
IO	0.0201	0.0182
	(25.42)***	(24.62)***
TRADEVOL	0.0011	-0.0001
	(4.87)***	(-0.60)
ANALYST	0.006	0.0064
	(16.14)***	(18.01)***
RETVOL	0.0696	0.066
	(21.62)***	(21.59)***
R&D	0.0123	0.0126
	(5.56)***	(5.85)***
ADAT	0.0272	0.0301
	(4.16)***	(4.74)***
Constant	-0.2336	-0.2108
	(-55.75)***	(-52.57)***
Fixed effects	YI	YI
Adj R^2	0.7056	0.7119
Nobs	45,498	45,498

Table 7: Policy uncertainty, management tone and stock liquidity

This table reports the results on how U.S. policy uncertainty affects the relationship between management tone and stock liquidity. Economic policy uncertainty (*EPU*) and presidential elections (*ELECT*) are used as proxies for U.S. policy uncertainty measures. For EPU, we sort the firms into two groups (High and Low) based on the median value of the measure. Detailed definitions of the variables are provided in the Appendix. The *t*-statistics are shown in parentheses. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Variables	**Panel A: Economic policy uncertainty (*EPU*)**			
	HighEPU	***LowEPU***	***HighEPU***	***LowEPU***
	BASpread	*BASpread*	*Amihud*	*Amihud*
	(1)	(2)	(3)	(4)
MATONE	**0.0002**	**0.0041**	**0.0005**	**0.0057**
	(3.31)* **	**(7.80)*** **	**(8.54)*** **	**(16.56)*** **
Constant	-0.0409	-0.1987	-0.0673	-0.2098
	(-36.78)***	(-27.16)***	(-56.73)***	(-35.67)***
Control Variables	Yes	Yes	Yes	Yes
Fixed effects	YI	YI	YI	YI
Difference in coefficient (2-1) (4-3)		0.0039		0.0052
F-Value		(6.78)**		(8.12)**
Adj R^2	0.5675	0.5678	0.2559	0.2567
Nobs	13,467	13,458	13,467	13,458
Variables	**Panel B: Presidential elections (*ELECT*)**			
	ELECT	***Non-ELECT***	***ELECT***	***Non-ELECT***
	BASpread	*BASpread*	*Amihud*	*Amihud*
	(1)	(2)	(3)	(4)
MATONE	**0.0003**	**0.0049**	**0.0004**	**0.0055**
	(5.67)* **	**(11.23)*** **	**(9.12)*** **	**(14.59)*** **
Constant	-0.0678	-0.2245	-0.0780	-0.2111
	(-46.09)***	(-30.14)***	(-49.78)***	(-38.34)***
Control Variables	Yes	Yes	Yes	Yes
Fixed effects	YI	YI	YI	YI
Difference in coefficient (2-1) (4-3)		0.0046		0.0051
F-Value		(7.16)**		(7.92)**
Adj R^2	0.5787	0.5969	0.2765	0.2789
Nobs	10,618	35,102	10,604	35,116

Appendix: Variable definitions

Variables	Acronym	Description	Data sources
1. Dependent variables			
Stock liquidity	*BASpread*	The natural logarithm of (1+ average daily closing quoted spread over a fiscal year t), multiplied by -1.	CRSP
	Amihud	The natural logarithm of (1+ average daily Amihud (2002) ratio over a fiscal year t), multiplied by -1.	CRSP
2. Firm-level variables			
Management tone	*MATONE*	100 multiplied by the difference between the number of positive words and the number of negative words, divided by the total number of words in the annual report).	https://sraf.nd.edu
Firm size	*SIZE*	The natural logarithm of the firm's total assets in year t-1.	Compustat
Tangibility	*TANG*	Asset tangibility in year t-1, calculated as [(0.715 × RECT + 0.547 × INVT + 0.535 × PPENT) + CHE]/AT.	Compustat
Leverage	*LEV*	Firm leverage in year t-1, computed as total liabilities/(market value of equity + total liabilities + preferred stocks - deferred taxes).	Compustat
Stock price	*INVPRC*	Inverse of average stock price over the fiscal year t-1.	CRSP
Institutional ownership	*IO*	Institutional ownership in year t-1, calculated as the percentage of shares held by institutional investors over fiscal year t-1.	Thomson Reuters Institutional 13F
Trading volume	*TRADEVOL*	The natural logarithm of dollar trading volume in the fiscal year t-1.	CRSP
Analyst coverage	*ANALYST*	Analyst coverage in year t-1, estimated as the natural logarithm of 1 plus the average number of analysts following the firm during the fiscal year.	I/B/E/S
Return volatility	*RETVOL*	Return volatility in year t-1, measured as the standard deviation of monthly stock returns over the fiscal year.	CRSP
R&D expenses	*R&D*	R&D expenses in year t-1, calculated as a percentage of the firm's total assets over the fiscal year.	Compustat
Advertising expenses	*ADAT*	Advertising expenses in year t-1, calculated as a percentage of the firm's total assets over the fiscal year.	Compustat
Alternative proxies for stock liquidity	$ZERO_1$	The natural logarithm of (1+ average monthly zero-return proportion over a fiscal year t), multiplied by -1.	CRSP
	$ZERO_2$	The natural logarithm of (1+ average monthly positive-volume days with zero-return over a fiscal year t), multiplied by -1.	CRSP
Alternative proxies for management tone	$TONE_{WORD}$	The natural logarithm of the total number of words in the 10-K filing, multiplied by -1.	WRDS SEC Analytics Suite
	$TONE_{COMWORD}$	The natural logarithm of the total number of complex words in the 10-K filing, multiplied by -1.	Analytics Suite
	$TONE_{SENTENCE}$	The natural logarithm of the total number of sentences in the 10-K filing, multiplied by -1.	Analytics Suite
	$TONE_{UNCTERM}$	The natural logarithm of the total number of uncertain financial terms in the 10-K filing, multiplied by -1.	Analytics Suite
	$TONE_{NEGTERM}$	The natural logarithm of the total number of negative financial terms in the 10-K filing, multiplied by -1.	Analytics Suite
	$TONE_{SYLLABLE}$	The natural logarithm of the total number of syllables in the 10-K filing, multiplied by -1.	Analytics Suite
	$TONE_{NEGWORD}$	The natural logarithm of the total number of negative words counts following Harvard dictionary in the 10-K filing, multiplied by -1.	Analytics Suite
Economic policy uncertainty	*EPU*	The monthly economic policy uncertainty index compiled by Baker et al. (2016).	policyuncertainty
Presidential elections	*ELECT*	A dummy variable taking the value 1 if the USA holds presidential election in year t, and zero otherwise	Political Institutions