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WILL NEGATIVE TEXTUAL TONE OF INITIAL PUBLIC OFFERING (IPO) PROSPECTUS AFFECT PRICE STABILISATION? EVIDENCE FROM HONG KONG

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ABSTRACT

Initial Public Offerings (IPOs) are featured with information asymmetry and aftermarket price volatility. The IPO prospectus can be a proper channel for issuing companies to convey information to underwriters and investors during IPO events, and potentially influence the level of information asymmetry and stock price volatility. We examine the association between the textual tone of IPO prospectus and price stabilisation in Hong Kong stock market from 2004 to 2021. Using a large sample of 1,185 IPOs, we find empirical evidence showing a positive relationship between price stabilisation and the negative textual tone in prospectus. This finding suggests that when more negative textual tone is implied in IPO prospectus, underwriters will stabilise more. Our results consider possible endogenous issues and perform a battery of robustness tests.

Keywords: Price stabilisation, Textual tone, Information asymmetry, IPO, Prospectus

INTRODUCTION

The information asymmetry in initial public offerings (IPOs) is high since IPO companies do not have previous public trading history in open markets (Baker et al., 2021). To reduce the asymmetric information and ensure a successful IPO, effective communication between the issuing firm and investors is necessary (Loughran & McDonald, 2011). Prior studies have identified IPO prospectus as a critical channel for issuing firms to directly convey information to potential

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investors (Hanley & Hoberg, 2010). Considering the endless innovation in products and business models, the traditional financial information is not sufficient for comprehensively understanding a company. Attempting to mitigate the information asymmetry between issuing firms and investors, the management begins to consciously emphasise on disclosing non-financial information, among which the textual tone, or the linguistic sentiment of the IPO prospectus, has been noticed by scholars recently. For example, Yan et al. (2019) find that the negative or uncertain tone of prospectus is related to the post-IPO initial return. Regarding its definiteness in rendering the prospects of listing firms, prospectus' textual tone could influence investors' risk assessment towards IPOs, and accordingly impact their estimations about the valuation of IPOs and aftermarket share prices.

Resulting from the high information asymmetry associated with IPO investment, price stabilisation, which is a form of price manipulation that helps to alleviate the aftermarket price volatility, is allowed by regulators in many stock markets. Price stabilisation involves the lead underwriters (who are usually the stabilising managers) intervening the IPO market price to prevent the price from dropping after IPOs. Typically, underwriters will establish a short position before the IPO date, and cover it by either providing price support or exercising the over-allotment option (OAO) (Aggarwal, 2000). Currently, including price stabilisation in the IPO agreement is a common practice in capital markets across the world. Previous literature has documented that price stabilisation is a substitute to IPO underpricing (Lewellen, 2006), because the motivations for keeping the secondary market price of IPO at or above the offering price are similar to originally setting a lower offering price, or underpricing (Schultz & Zaman, 1994). For example, some IPO buyers may choose to renege if they believe the IPO is overpriced. By providing price stabilisation, the IPO aftermarket price can be increased and these investors will not continue to wait to buy IPO stocks in the secondary market at a lower price and are less likely to renege. Hence, price stabilisation can be a substitute to underpricing. Furthermore, it could compensate uninformed investors more efficiently compared to underpricing (Chowdhry & Nanda, 1996). Meanwhile, some scholars argue that price support is used to disguise the overpriced issues by temporarily inflating the stock market price, because they observe significant price drop and reversal after the end of stabilising period (Hanley et al., 1993; Mazouz et al., 2013). Apparently, overpricing an IPO will damage the underwriter's reputation, and decrease its future income (Nanda & Yun, 1997). Hence, price stabilisation can also be viewed as an intentional action taken by underwriters to mitigate the loss of investors from buying overpriced issues.

Price stabilisation has been adopted in various stock markets across the world because of its positive impact on reducing IPO aftermarket price volatility. In certain markets, such as Brazil and Hong Kong, underwriters are prohibited from taking naked short positions (Carvalho et al., 2020; Jiao et al., 2017; Mazouz et al., 2013). While in countries like Italy and the U.S., underwriters are permitted to establish short positions exceeding the OAO scale (Aggarwal, 2000; Boreiko & Lombardo, 2011). Anecdotal evidences have shown that price stabilisation mitigates negative aftermarket performance (Bajo et al., 2017; Jiao et al., 2017), protects the reputation of underwriters (Carvalho et al., 2020; Lewellen, 2006), and promotes liquidity in secondary market (Boulton & Braga-Alves, 2020). Some research has found that IPO riskiness (Carvalho et al., 2020; Mazouz et al., 2013), IPO total proceeds (Boreiko & Lombardo, 2011) and underwriter's reputation (Signori et al., 2013) profoundly influence price stabilisation. Yet, the potential impact of narrative information contained in IPO prospectus on price stabilisation remains unexplored.

Theoretical arguments predict that the negative textual sentiment is positively related to stabilising actions taken by underwriters. The prospect theory argues that people care more about changes in the wealth instead of the level of wealth (Kahneman & Tversky, 1979). Loughran and Ritter (2002) further develop the prospect theory and use it to explain why managers of issuing firms tolerate IPO underpricing. Specifically, managers will not tend to bargain hard with underwriters for higher offering price when they realise they can increase their personal wealth from underpricing. Meanwhile, underwriters are inclined to deliberately underprice IPOs in order to gain the indirect benefits such as lower marketing costs (Baron, 1982) and more trading brokerage fees (Fjesme, 2019). Under this circumstance, underwriters could easily take advantage of issuing firms who construct the prospectus with more negative language since these firms are in a weaker informational position (Loughran & McDonald, 2013). This suggests that higher level of negative tone in prospectus is likely to generate an upward price revision in the aftermarket, which will trigger the price stabilisation, specifically the exercise of OAO, to happen. Moreover, the ex-ante uncertainty approach predicts that investors facing higher level of uncertainty will require more return from the IPO investment to compensate for the riskiness they bear (Beatty & Ritter, 1986; Jenkinson & Ljungqvist, 2001). The negative tone characterises the negative prospects and more riskiness of the issuing firm, which can be sensed by investors and affect their perceptions towards the firm (Zou et al., 2020). The higher level of negative tone in prospectus, the more likely the underwriter will undervalue the IPO offering price so as to reflect a lower IPO intrinsic value (Yan et al., 2019).

In addition, the signalling theory proposed by Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989) suggests that there is asymmetric information between the issuing firm and public investors. Specifically, IPO companies have private information regarding their future cash flows and they know their true value, which is hard for outside investors to obtain. Hence, IPO companies can send the signal by conveying the private information in their prospectuses. The negative words employed in prospectuses reveal the true prospect of IPO firms to investors, which may result in price volatility and trigger price stabilisation. Furthermore, the agency theory suggests that there will be a misalignment of interest between companies' shareholders and management team caused by the separation of ownership and control (Jamaani & Alidarous, 2019). As a result, the shareholders of companies might underprice IPOs in order to attract major block-holders that can act as internal monitoring roles inside companies to reduce agency problems and maximise firms' value after listing (Stoughton & Zechner, 1998). Similarly, using more negative words in prospectuses may result in lower offer price determined by the underwriters, and issuing firms would agree on the undervalued offer price in order to minimise agency problems, which could possibly trigger price stabilisation.

In this article, we examine the nexus between textual tone of IPO prospectus and price stabilisation using a large sample of listed companies in Hong Kong. The reasons for choosing Hong Kong are as follows. First, the regulatory disclosure requirements in Hong Kong enable us to precisely capture price stabilisation. Compared to developed countries including the U.S. where underwriters are not compulsory to disclose their stabilising actions taken, regulations in Hong Kong require underwriters to reveal all the details related to price stabilisation publicly. Specifically, the Securities and Futures (Price Stabilising) Rules (Cap. 571 sub. leg. W) enforced on 1st April 2003 regulates that underwriters should disclose the following information in 7 days after the stabilising period ends:

1. The stabilising ending date.
2. Whether the IPO is stabilised.
3. Whether price support happens and the price range for the support.
4. The date for the last price support.
5. The extent to which any OAO is exercised.

Hence, we can fully capture the stabilisation and precisely analyse potential factors for such actions. Second, we notice that relatively less research focus for price stabilisation has been put on emerging markets. Considering Hong Kong is one of the major capital markets in Asia in which the price stabilisation practice has been commonly adopted for decades, the outcomes of this study may provide constructive implications for other Asian and emerging markets.

Our sample includes 1,106 IPO companies listed in Hong Kong Stock Exchange (HKEx) from 2004 to 2021. We manually download the price stabilisation announcement and the IPO prospectus of each company from the HKEx official website. We adopt a textual analysis to determine the tone of prospectus. First, using the word lists developed by Loughran and McDonald (2011), we count the word frequency of negative sentiment in the prospectus. We conjecture that the negative tone of prospectus serves as a proxy for the riskiness perceived by investors. Then we manually collect price stabilisation information from the price stabilisation announcement which contains detailed information of stabilising actions (whether any price support and/or OAO has been taken), number of shares being stabilised and so forth. Next, we conduct empirical experiments to reveal the association between textual tone of the prospectus and price stabilisation using ordinary least square (OLS) approach. We then use the two-stage least square (2SLS) regression to solve potential endogenous problems. We also perform a series of robustness checks to validate our results by using alternative measurements for price stabilisation, adding control variables and taking the possible effect of COVID-19 into account. We find that the negative textual tone of prospectus is positively related to the price stabilisation taken by underwriters.

Our study makes contributions to the literature in the following ways. First, this paper fills the literature gap by directly investigating the relationship between textual tone and price stabilisation using text analysis. To the best of our knowledge, this is the first study that examines the factors of price stabilisation via sentimental narration using textual analysis in Hong Kong market, as current studies of price stabilisation focusing more on firm- and market-level characteristics using traditional financial data (Carvalho et al., 2020; Fjesme, 2019; Lewellen, 2006; Mazouz et al., 2013; Schultz & Zaman, 1994). The results of this study contribute to the existing literature by displaying the extent of price stabilisation is relevant to the textual tone of the prospectus, further showing that the trigger of price stabilisation may not entirely depend on traditional financial and market factors. Second, our findings suggest that price stabilisation can be stipulated by the negative tone implied in prospectus, which offers implications for various market participants including future IPO issuing firms, regulators and investors. For example, issuing firms may refer from this study and decide their ways to construct and disclose information in their prospectuses, depending on whether companies want to be stabilised or not. Regulators can establish or adjust proper rules for stabilisation regarding information disclosure so that this aftermarket activity can be thoroughly monitored. Investors may refer from this study by better estimating potential price stabilisation conducted by underwriters when they perceive more negative tone implied in the IPO prospectus, which can protect them from losses generated by the significant price volatility of IPO. Third, the study provides theoretical ground for understanding the occurrence of price

stabilisation. As there are no specific theories explaining the phenomenon of price stabilisation, previous studies suggest that theories regarding IPO underpricing can be employed to understand price stabilisation (Schultz & Zaman, 1994). Based on theories relevant to underpricing, including prospect theory, ex-ante uncertainty approach, signalling theory and agency theory, this study reveals the positive link between negative sentiment of the prospectus and price stabilisation. Hence, this study provides future scholars with potential theoretical foundation to examine the occurrence and/or other unexplored factors of price stabilisation. Last, although Mazouz et al. (2013) firstly examine the price stabilisation activities in Hong Kong market, our study complements their work by significantly expanding the sampling size from 355 to 1,106 IPOs and sampling period from 7 to 18 years.

DATA AND RESEARCH DESIGN

Data Set

Our sample includes firms listed in the Main Board of HKEx from 2004 to 2021. The Securities and Futures (Price Stabilising) Rules (Cap. 571 sub. leg. W) regulate that price stabilisation is permitted to undertake when the offer value of the IPO exceeds 100 million Hong Kong dollar (HKD). Thus, we exclude IPOs whose offer values are lower than HKD100 million. We then exclude IPOs that belong to the categories of "Introduction", "Private Placement" and "Transfer from General Enterprise Market to Main Board" following Mazouz et al. (2013). We also exclude companies that have been delisted since their prospectuses and price stabilisation announcements are no longer available online. These restrictions leave us with 1,106 IPOs finally.

Measurement of Variables

Measure of price stabilisation

For the dependent variable, we treat both price support and the exercise of OAO as price stabilisation in this study. The first measure of price stabilisation is the price stabilisation percentage (*PS_Percentage*), which is calculated by the total number of stabilising shares (including both price support and the exercise of OAO) scaled by the total number of offering shares before any OAO was exercised. The reason to choose this measure is that it can clearly show the extent to which the stabilising action was taken. The exact number of shares being stabilised either via price support or the exercise of OAO is found in the price stabilisation announcement obtained from HKEx official website. An example of such announcement can be seen in the Appendix A.

Measure of textual tone in prospectus

We use the word sentiment lists developed by Loughran and McDonald (2011) to measure the textual tone of IPO prospectus. The full word lists can be accessed from the Loughran-McDonald Master Dictionary with Sentiment Word List official website. We have no translation problem because the prospectus of IPO in Hong Kong is written in both Chinese and English versions at the same time. Although there are word lists developed by other scholars (Henry, 2008; Tetlock et al., 2008), the one that was constructed by Loughran and McDonald are the most frequently used in accounting and finance work (Allee & Deangelis, 2015; Bian et al., 2021; Dougal et al., 2012; Garcia, 2013). Specifically, Loughran and McDonald categorise English words into six types, including *uncertain, negative, positive, legal, strong modal* and *weak modal*. It is noticed that in IPO prospectuses, IPO issuing firms tend to use mild version of positive words to convey negative information, instead of directly using negative words (Loughran & McDonald, 2013). For instance, when describing a situation where customers complain about a specific product produced by the company in the prospectus, the issuers can use the description of "not satisfactory", where "satisfactory" is categorised into the positive word list, rather than using the word "complain" which is a negative word. This tendency may result in biases in the statistics of measuring positive textual tone, and the economic significance of such empirical results cannot be determined (Loughran & McDonald, 2013; Yan et al., 2019). Hence, the positive tone of the prospectus is not examined in this study.

To obtain the textual tone of prospectus, we count the word frequency of negative words. For instance, if "accuse" or "barrier" (both belong to negative tone in the word lists) appears in the prospectus, the number of negative words will be assigned with one. An exemplary list of negative words developed by Loughran and McDonald (2011) can be seen in Appendix B.

To count the word frequency of negative sentiment, we download all the prospectuses of IPO issuers during the sampling period manually and use a self-developed program using C# Language. In particular, the program can identify every single English word in the IPO prospectus PDF file. The negative words from the Loughran and McDonald (2011) word lists are pre-set in the program so that the program can identify when reading the prospectus. Next, we download each IPO prospectus file from HKEx website and manually import the prospectus files to the program. Then, the program will count the negative words which has been previously set by counting their appearance frequencies in the prospectus. Finally, the number of total words and negative words in the prospectus are generated in an Excel file.

Finally, we obtain the percentage of negative tone for each IPO as follows:

$$\%\ \text{negative tone} = \frac{\text{Number of negative words in prospectus}}{\text{Total number of words in prospectus}} \times 100\% \quad (1)$$

Definitions of control variables

Following existing IPO underpricing and stabilisation literature, we control for a battery of known factors that might affect price stabilisation. We include the *IPO Size* (Carvalho et al., 2020; Signori et al., 2013) measured by the natural log of the IPO proceeds, we control for *Firm Age* (Lewellen, 2006), measured by the difference between the listing year and the establishing year. *Underwriter Reputation* is also controlled following Bajo et al. (2017), calculated by a dummy variable which will be one if a lead underwriter's name repeatedly shows above the average frequency during the sample period, and zero otherwise. We include the standard deviation of companies' profit growth rate (*SD_Earnings*) three years before the IPO to control for the pre-IPO riskiness (Mazouz et al., 2013). We also include *Syndicate Size* (Chung et al., 2000), measured as the natural log of the total number of underwriters for IPOs.

In addition, considering Hong Kong is a major international market that serves corporations from China Mainland, we include the variable state-owned enterprises (*SOE*) to control for the possible influence exerted by Chinese government using a dummy variable, because Zhang et al. (2022) find that Chinese state-owned enterprises experience underpricing. If the IPO has Chinese government ownership, the value will be 1, and 0 otherwise. Furthermore, prior studies document that the existence of cornerstone investors impacts the IPO underpricing (Bhattacharya et al., 2020; McGuinness, 2012). Because the presence of cornerstone investors in Hong Kong IPO market is common (McGuinness, 2014), we also include the potential effect of cornerstone investors on price stabilisation by using a dummy variable – *Cornerstone*. Table 1 presents the definitions of all variables.

Table 1
Definitions of variables

Variables labels	Definition
Dependent variable	
PS_Percentage	The total number of stabilising shares, including price support and/ or exercise of OAO, divided by the total number of initial offering shares (before any OAO has been exercised).

(*Continued on next page*)

Table 1 (*Continued*)

Variables	Definition
PS_Dummy	A dummy variable which will be assigned one if there is a stabilising action taken, including price support and/or exercise of OAO, and zero otherwise.
Independent variable	
% Negative Tone	Negative word percentage within the IPO prospectus calculated using Equation (1).
% Negative Tone_Mean	The average negative textual tone of peer companies within the same industry in the same year.
Control variables	
IPO Total Proceeds	The total proceeds of each issuer gathered from the IPO event, denominated in Million Hong Kong Dollar.
Offer Price	The offer price of each IPO issuer.
IPO Size	The natural logarithm of IPO total proceeds.
Firm Age	The natural logarithm of the difference between the listing year and the establishing year of a company.
Underwriter Reputation	A dummy variable which will be assigned one when a lead underwriter's name repeatedly shows above the average frequency during the sample period, and zero otherwise.
Syndicate Size	The natural logarithm of the total number of underwriters forming the syndicate.
SD_Earnings	Standard deviation of the company's profits growth rate three years prior to IPO.
SOE	A dummy variable, assigned one if the issuer has a majority of equities owned by Chinese state-related entities, and zero otherwise.
Cornerstone	A dummy variable, assigned one if the cornerstone investor agreement is disclosed in prospectus, and zero otherwise.
Board Size	The total number of board directors disclosed in the IPO prospectus when the company is listed.
Independence	The number of independent non-executive directors divided by the total number of board directors.
COVID	A dummy variable which will be assigned one if the IPO went public after March 2020, and zero otherwise.
Subscription	The subscription rate from the public for each IPO.
LnSubscription	The natural logarithm of subscription rate for each IPO.
Month IPO No.	The number of IPO issuance within one month for each IPO.

Note: This table explains the definitions of all variables used in the study.non-performing loans (NPL), bank stability (ZSCORE) and EARNINGS VOLATILITY. Robust standard errors in parentheses. *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively.

Model Design

We adopt a multivariate regression to estimate the relationship between the textual tone of IPO prospectus and price stabilisation taken by underwriters. The baseline regression model is as follows.

$$Price\ stabilisation_i = \beta_0 + \beta_1 \%Negative\ Tone + \sum \beta_n Controls_i + \varepsilon_i \quad (2)$$

In Equation (3), *i* stands for each IPO. The dependent variable *Price Stabilisation* is measured by the percentage of shares for stabilisation (*PS_Percentage*). %*Negative Tone* is the independent variable measured by the percentage of negative words in the entire prospectus. *Controls* include *IPO Size, Firm Age, Underwriter Reputation, Syndicate Size, SD_Earnings, SOE* and *Cornerstone*. Finally, the year fixed effect will be included to control the heterogeneity following Mazouz et al. (2013).

RESULTS AND DISCUSSION

Summary Statistics

Table 2 illustrates the descriptive statistics of independent and control variables after separating IPOs into two groups by whether any price stabilisation (including price support and the exercise of OAO) is taken or not. From 2004 to 2021, among 1,106 IPOs, 760 companies have been stabilised, accounting for approximately 68.72% of the total sample. This indicates that price stabilisation is a common practice occurred in Hong Kong IPOs. To ensure the two groups (IPOs with/ without price stabilisation) have significant differences in terms of mean and median, we conduct the t-test and the non-parametric Mann–Whitney test. It can be seen that both *t* and *z* scores between the two groups are significantly negative excerpt for *SD_Earnings*. The test results for both t-test and Mann-Whitney test indicate that IPOs without stabilisation have fewer negative words, hence less negative sentiments implied in their prospectuses. Furthermore, IPOs that were stabilised have higher subscription level from the public compared to those were not stabilised. In general, IPOs which experienced price stabilisation have longer firm ages, are offered at higher prices, gather more proceeds, have larger syndicates, hire more reputable underwriters, and are more likely to have Chinese state ownership and cornerstone investors, compare to IPOs without stabilisation.

Table 2
Descriptive statistics

Variables	IPO without price stabilisation					IPO with price stabilisation					t-test	Mann–Whitney
	N = 346					*N* = 760					*N* = 1,106	
	Mean	Median	S. D.	Min	Max	Mean	Median	S. D.	Min	Max	t-score	Z-score
%Negative Tone	0.00903	0.0093	0.00162	0.00596	0.0142	0.00923	0.00911	0.00177	0.00518	0.0156	–1.756*	–1.743*
Firm Age	1.177	1.0986	0.592	0.693	4.025	1.405	1.0986	0.76	0.693	3.555	–4.946***	–4.100***
Offer Price	1.543	1.075	1.937	0.13	21.25	7.625	3.45	15.32	0.33	205	–7.358***	–19.391***
IPO Total Proceeds	4,218	435.113	37,400	45.46	651587	62,679	1749.356	536,610	65.03	1.01E+07	–2.024**	–13.763***
IPO Size	19.21	18.829	0.843	18.42	23.47	20.92	20.898	1.302	18.43	25.12	–22.422***	–19.587***
SD_Earnings	2.106	0.394	22.17	0	405.2	7.7	0.401	134.1	0	3,617	–0.771	–1.362
Syndicate Size	1.535	1.609	0.618	0	2.996	1.746	1.791	0.609	0	3.296	–5.300***	–5.053***
Underwriter Reputation	0.355	0	0.479	0	1	0.808	1	0.394	0	1	–16.504***	–14.788***
SOE	0.078	0	0.269	0	1	0.226	0	0.419	0	1	–6.044***	–5.950***
Cornerstone	0.208	0	0.407	0	1	0.546	1	0.498	0	1	–11.053***	–10.493***
Subscription	93.93	11.515	253.6	0.0168	2,601	171.6	15.305	372.7	0.028	4,133	–3.523***	–2.087**

Note: This table describes the summary statistics of the independent variable (% Negative Tone) and control variables including Firm Age, IPO Size, SD_ Earnings, Syndicate Size, and Underwriter Reputation, SOE and Cornerstone. Offer Price represents the offer price of each IPO issuer. Subscription is the subscription rate from the public for each IPO. We categorize the total sample into two subgroups sorting by the stabilisation happens or not. The % Negative Tone is calculated using word lists developed by Loughran and McDonald (2011). All the variables are defined in Table 1.

Tables 3 and 4 show the sample distribution by listing year and industry sorted by stabilisation activities. Year 2019 has the most listing events with 134 IPOs, while year 2008 has the fewest with only 20 IPO events, probably caused by the outbreak of the 2008 Global Financial Crisis. It is noticed that in 2004, more than 95% of IPOs were stabilised (21 out of 22), while in 2012 and 2017, less than 50% of IPOs were stabilised. Companies from Pharmaceutical, Biotechnology and Life Sciences industry were mostly stabilised (90.9%), followed by the industry of Healthcare Equipment and Services (85.94%). On the contrary, IPOs from Capital Equipment and Business and Professional Services industries were less likely to be stabilised, whose percentage of stabilisation were less than 45%.

Table 3
Sample distribution by listing year

Year	Total	Unstabilised IPOs	Stabilised IPOs	Percentage (%)
2004	22	1	21	95.45
2005	39	8	31	79.49
2006	34	3	31	91.18
2007	57	3	54	94.74
2008	20	5	15	75.00
2009	38	4	34	89.47
2010	62	6	56	90.32
2011	43	13	30	69.77
2012	30	16	14	46.67
2013	51	7	44	86.27
2014	70	16	54	77.14
2015	72	26	46	63.89
2016	55	24	31	56.36
2017	71	36	35	49.30
2018	111	53	58	52.25
2019	134	65	69	51.49
2020	119	45	74	62.18
2021	78	15	63	80.77
Total	1,106	346	760	68.72

Table 4
Sample distribution by industry

Industry	Total	Unstabilised IPOs	Stabilised IPOs	Percentage (%)
Automobiles and Auto Parts	18	7	11	61.11
Business and Professional Services	36	20	16	44.44
Capital Equipment	134	76	58	43.28
Consumer Durables and Clothing	102	42	60	58.82
Consumer Services	84	23	61	72.62
Energy	28	7	21	75.00
Food and Staple Retail	10	4	6	60.00
Food, Drink and Tobacco	44	9	35	79.55
Healthcare Equipment and Services	64	9	55	85.94
Household and Personal Items	10	2	8	80.00
Insurance	5	1	4	80.00
Materials	83	32	51	61.45
Media	30	8	22	73.33
Pharmaceutical, Biotechnology and Life Sciences	55	5	50	90.91
Public Utilities	24	4	20	83.33
Real Estate	124	29	95	76.61
Retail Business	43	11	32	74.42
Semiconductors and Semiconductors Production Equipment	12	3	9	75.00
Software and Services	57	11	46	80.70
Technical Hardware and Equipment	34	15	19	55.88
Communications Services	5	1	4	80.00
Transportation	104	27	77	74.04
Total	1,106	346	760	68.72

Correlation Analysis

Table 5 shows the correlation matrix of variables used in this study. Based on the correlation classification proposed by Evans (1996), when the pairwise correlation coefficient is greater than 0.8 (Lee et al., 2013), serious multicollinearity issue exists. We find that all variables we chose have almost no multicolllinearity because the correlation coefficients are generally less than 0.5.

Table 5
Correlation coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *PS_Percentage*	1									
(2) *PS_Dummy*	0.7855*	1								
(3) *%Negative Tone*	0.0782*	0.0528	1							
(4) *Firm Age*	0.1201*	0.1472*	0.2542*	1						
(5) *IPO Size*	0.4466*	0.5594*	0.0725*	0.3401*	1					
(6) *Syndicate Size*	0.0388	0.0232	0.0283	0.0281	0.0288	1				
(7) *SD_Earnings*	0.0956*	0.1575*	-0.0696*	0.1484*	0.3133*	0.0337	1			
(8) *Underwriter Reputation*	0.3502*	0.4449*	0.0341	0.1777*	0.5186*	0.0287	0.0791*	1		
(9) *SOE*	0.1246*	0.1790*	0.1704*	0.5013*	0.3794*	-0.0202	0.1635*	0.1767*	1	
(10) *Cornerstone*	0.2344*	0.3156*	0.2312*	0.3099*	0.4064*	0.0368	0.1231*	0.3263*	0.2531*	1

Notes: This table reports the correlation matrix of the study. PS_Percentage is our dependent variable in the baseline model. PS_Dummy is the alternative measure of price stabilisation. %Negative Tone is the independent variable. The remaining variables are control variables. All variables are defined in Table 1.

Baseline Regression Results

Table 6 displays the estimated results of the baseline regression in Equation (2) using *PS_Percentage* as the dependent variable. The negative tone of the overall IPO prospectus (*%Negative Tone*) is statistically positively related to price stabilisation (*PS_Percentage*) at the 1% significance level. The finding is consistent with our conjecture, which argues that the negative tone of prospectus indeed positively affects the price stabilisation taken by underwriters. The result is in accordance with the prospect theory which contends that underwriters take the advantage of issuers when issuers are in a weak informational position (Loughran & Ritter, 2002). Our result also confirms the ex-ante uncertainty theory which argues that the uncertainty, or riskiness perceived by investors can be reflected in their investment aftermarket activities, i.e., higher riskiness represented by negative tone, more likely they will begin to sell the IPO shares, causing underwriters to stabilise.

The results of our control variables also reveal some implications. For example, the IPO size, or the total proceeds from the IPO events, is significantly positively associated with the price stabilisation. This suggests that larger IPO proceeds will be stabilised more in IPO events, which is in consistence with Boreiko and Lombardo (2011). Underwriter's reputation imposes a statistically positive impact on price stabilisation at 1% significance level, suggesting more reputable underwriters stabilise more in IPOs, which confirms the work done by Carvalho et al. (2020). The standard deviation of earnings growth rate three years before IPO is also positively related to price stabilisation, suggesting IPOs with more volatile earnings before listing are more likely to be stabilised, which is consistent with Mazouz et al. (2013). The syndicate size is negatively related to price stabilisation, meaning IPOs using smaller syndicate size will be stabilised more. The strong negative link between *SOE* and price stabilisation suggests that IPO issuing firms with Chinese state ownership are predicted to be stabilised more in the secondary market. While for IPOs with the presence of cornerstone investors, more shares are expected to be stabilised.

Table 6
Price stabilisation and textual tone regression

Variables	*PS_Percentage*
%Negative Tone	6.744*** (5.94)
Firm Age	0.001 (0.31)
IPO Size	0.013*** (7.54)
SD_Earnings	0.000*** (3.66)
Syndicate Size	–0.006* (–1.96)
Underwriter Reputation	0.022*** (4.81)
SOE	–0.015*** (–2.66)
Cornerstone	0.016*** (3.69)
Constant	–0.199*** (–5.77)
Observations	1,106
R-squared (R^2)	0.307
Adjusted R^2	0.291
Year Effect	YES

Note: This table presents the OLS baseline regression between the textual tone of IPO prospectus and the extent to which the price stabilisation is taken from 2004 to 2021. The percentage of price stabilisation (including both price support and the exercise of OAO) is our dependent variable. The year and industry effect are controlled. All variables are defined in Table 1. The t-statistics are displayed in parentheses under each coefficient. ***, ** and * represent a significance level of 1%, 5% and 10%, respectively.

Endogeneity Issue

Although the baseline regression results show positive relationships between negative textual tone and price stabilisation, they may still be subject to endogenous issues. For instance, management might know about future plan of companies in advance, which can be implied in the tone used in prospectus. To solve the potential endogeneity problem existing in our baseline regression, we adopt a two-stage least square (2SLS) regression using an instrument variable. Following Wu et al. (2021), we use the average textual tone of peer IPO companies within the same industry in the same year (*%Negative Tone_Mean*) as the instrument variable. The average tone from companies within the same industry can be a proper instrument because issuing firms might construct their prospectuses by using information from IPOs in the same industry (Hanley & Hoberg, 2010), and no evidence has shown that single company's aftermarket performance can be affected by the average tone of its peer companies.

In the first stage of the 2SLS regression, we regress the independent variable from the baseline regression – *%Negative Tone* on the average tone of IPOs from the same industry and listed in the same year – *%Negative Tone_Mean*, and other control variables. By doing so, we can obtain the model estimated *%Negative Tone**. Table 7 shows the results from the first stage regression. Consistent with our above prediction, the instrument variable is significantly positively related to the independent variable, which confirms the work done by Hanley and Hoberg (2010). The Cargg–Donald Wald F statistics (806.688) is significantly larger than the Stock and Yogo critical value (10% maximal IV size) (16.38), which suggests that that our instrument variable is not weak (Stock & Yogo, 2005).

In the second stage of the 2SLS regression, we regress the dependent variable from the baseline regression – *PS_Percentage* using the model estimated variables – *%Negative Tone** and other control variables. The results from the second stage regression are consistent with the findings from the baseline regression, showing a statistically positive relationship between negative textual tone of prospectus and price stabilisation.

Table 7
Instrument variable 2SLS regression

Variables	(1)	(2)
	First stage	Second stage
	%Negative Tone	*PS_Percentage*
%Negative Tone_Mean	0.959*** (26.37)	
*%Negative Tone**	0.000 (0.61)	6.214*** (3.27)

(*Continued on next page*)

Table 7 (*Continued*)

Variables	(1)	(2)
	First stage	Second stage
	%Negative Tone	*PS_Percentage*
Firm Age	0.000*** (4.38)	0.001 (0.35)
IPO Size	0.000 (1.60)	0.013*** (7.68)
SD_Earnings	–0.000*** (–2.93)	0.000*** (3.74)
Syndicate Size	–0.000 (–0.86)	–0.006** (–2.02)
Underwriter Reputation	0.000* (1.94)	0.022*** (4.85)
SOE	–0.000 (–0.90)	–0.015*** (–2.60)
Cornerstone	–0.002*** (–3.19)	0.016*** (3.74)
Constant	0.959*** (26.37)	–0.196*** (–5.58)
Observations	1,106	1,106
R-squared	0.606	0.307
Adjusted R^2	0.597	0.291
Year Effect	Yes	Yes
F Statistics	109.7	23.85
Cragg-Donald Wald F statistic	806.688	
Stock-Yogocritical values: 10% maximal IV size	16.38	

Notes: This table presents the 2SLS regression using the average textual tone of IPOs from the same industry in the same year (%Negative Tone_Mean) as the instrument variable from 2004 to 2021. Column (1) shows the regression results of the first stage, using %Negative Tone as the dependent variable. Column (2) illustrates the regression results of the second stage of 2SLS, using PS_Percentage as the dependent variable. Regressions in both stages control for year and industry fixed effects. All variables are defined in Table 1. The t-statistics are displayed in parentheses under each coefficient. ***, ** and * represent a significance level of 1%, 5% and 10%, respectively.

ROBUSTNESS CHECKS

To confirm the result of our study, we perform some additional tests. First, we use an alternative measure for price stabilisation taken by underwriters. Following Mazouz et al. (2013), we use a dummy variable of price stabilisation (*PS_Dummy*) to confirm our findings. Once the price stabilisation happens, the value will be assigned one, and zero otherwise. Table 8 displays the result using Probit regression model. As can be observed from the table, the negative textual tone is still positively associated with price stabilisation at 1% significance level.

Table 8
Alternative measure of price stabilisation

Variables	*PS_Dummy*
%Negative Tone	213.477*** (5.31)
Firm Age	–0.151* (–1.72)
IPO Size	0.615*** (9.60)
SD_Earnings	0.001 (0.73)
Syndicate Size	–0.021 (–0.22)
Underwriter Reputation	0.525*** (4.81)
SOE	–0.173 (–0.93)
Cornerstone	0.528*** (4.33)
Constant	–11.853*** (–8.37)
Observations	1,106
Pseudo R^2	0.421
Year effect	Yes

Notes: This table shows the regression results using Probit model with PS_Dummy as the dependent variable from 2004 to 2021. The regression controls for year fixed effect. All variables are defined in Table 1. The *t* statistics are displayed in parentheses under each coefficient. ***, ** and * represent a significance level of 1%, 5% and 10%, respectively.

Second, since previous studies (Biswas & Bhuiyan, 2008; Carbone et al., 2022; Certo et al., 2001; Chandler et al., 2023; González et al., 2020; Kubíček et al., 2017; Wang et al., 2023; Yatim, 2011) find that factors of corporate governance can affect IPO underpricing, we also include control variables related to the board structure into our baseline model for robust checks following prior studies (Filatotchev & Bishop, 2002; Teti & Montefusco, 2022). Typically, we add the size of board of directors (*Board Size*) and the percentage of independent directors inside the board (*Independence*) in our regression. The first column of Table 9 shows the results which confirm our findings from the baseline regression that there is a positive link between the negative tone of prospectus and price stabilisation. Yet, the relationship between board structure and price stabilisation is insignificant.

Third, we include the influence of the COVID-19 pandemic in our baseline regression to ensure the robustness of our result, following the recent work done by Baig and Chen (2022) who find that the outburst of the COVID-19 pandemic cause larger return volatility. We use the dummy variable COVID

to represent the potential influence caused by the epidemic. The World Health Organisation (WHO) declared COVID-19 as a global pandemic in March of 2020. Thus, COVID will be assigned one if the company went listed after March 2020, and zero otherwise. Column (2) of Table 9 shows our result after including the potential influence of COVID-19. The positive relationship between negative tone of prospectus and price stabilisation is still consistent and significant. Contrary to prior studies (Mazumder & Saha, 2021; Panda & Guha Deb, 2023), the result shows insignificant impact of COVID-19 on IPO aftermarket performance. One possible explanation for the insignificance in the relationship between the COVID-19 dummy variable and price stabilisation could be that, by the end of the sampling period, the COVID-19 pandemic had had relatively little effect in Hong Kong, where the total number of positive cases was 12,650 including both 2020 and 2021, according to Hong Kong Department of Health. This represents 0.166% of Hong Kong's total population and indicates a relatively low impact on the city's economy and society as a whole.

Last, we consider the possible impact of market conditions on price stabilisation. As Mazouz et al. (2013) point out, underwriters may provide price support when market is cold and the demand is weak. Helwege and Liang (2004) argue that a hot IPO market is characterised with higher volume of IPO issuance and frequent oversubscription. On the contrary, a cold IPO market is featured with lower volume of issuance and less frequent oversubscription. Therefore, two control variables, *LnSubscription* and *Month IPO No.*, are introduced. Specifically, *LnSubscription* is calculated as the natural logarithm of the subscription rate of each IPO, while *Month IPO No.* is the number of IPO issuances within one month for each IPO. Column (3) of Table 9 displays the empirical results after including these two controls into the baseline model. It can be observed that the positive link between the negative tone of prospectus and price stabilisation is still consistent and significant at 1% level. Meanwhile, the level of subscription is positively related to price stabilisation at 1% significant level, suggesting that hot IPOs are more likely to be stabilised. This may be explained by the reason that the market demands for hot IPOs, representing by oversubscription, are high, hence price stabilisation is possibly triggered by the exercise of OAO. The insignificant link between *Month IPO No.* and price stabilisation indicates that the volume of IPO issuance within the month of listing does not affect the price stabilisation undertaken by underwriters.

Table 9
Regressions with additional controls

Variables	(1)	(2)	(3)
	PS_Percentage	*PS_Percentage*	*PS_Percentage*
%Negative Tone	6.682*** (5.87)	6.745*** (5.94)	5.188*** (4.58)
Firm Age	0.001 (0.32)	0.001 (0.32)	0.002 (0.89)
IPO Size	0.013*** (7.64)	0.013*** (7.50)	0.014*** (8.59)
SD_Earnings	0.000*** (3.70)	0.000*** (3.65)	0.000*** (4.70)
Syndicate Size	–0.006** (–1.97)	–0.006* (–1.96)	–0.003 (–0.95)
Underwriter Reputation	0.022*** (4.77)	0.022*** (4.80)	0.023*** (5.35)
SOE	–0.015*** (–2.69)	–0.015*** (–2.66)	–0.014*** (–2.62)
Cornerstone	0.016*** (3.63)	0.016*** (3.69)	0.017*** (4.00)
Board Size	0.001 (1.36)		
Independence	–0.006 (–0.72)		
COVID		–0.001 (–0.10)	
LnSubscription			0.007*** (8.99)
Month IPO No.			0.000 (0.67)
Constant	–0.207*** (–5.89)	–0.199*** (–5.74)	–0.253*** (–7.42)
Observations	1,106	1,106	1,106
R-squared	0.308	0.307	0.357
Adjusted R^2	0.291	0.290	0.341
Year Effect	Yes	Yes	Yes

Notes: This table presents the regression results of robust checks by including additional controls. The dependent variable is PS_Percentage. Column (1) shows the results by adding variables related to characteristics of executives of issuing firms, and Column (2) shows the results by considering the potential effect from COVID-19 pandemic. Column (3) shows the results by including variables of market conditions. The year and industry effect are controlled. All variables are defined in Table 1. The t statistics are displayed in parentheses under each coefficient. ***, ** and * represent a significance level of 1%, 5% and 10%, respectively.

CONCLUSION

In this article, we examine the linguistic sentiment, specifically the negative tone, of IPO prospectus and its effect on price stabilisation taken by underwriters in Hong Kong stock market, motivated by the recent literature focusing on the nexus between textual tone and IPO aftermarket performance (Loughran & McDonald, 2013; Wu et al., 2021; Yan et al., 2019; Zou et al., 2020). We utilise the text analysis approach following Loughran and McDonald (2011) to measure the textual tone of prospectus. Typically, we hypothesise that negative tone of prospectus will

affect how underwriters and investors view the IPO issue and their perception will be reflected in the aftermarket stock price, and accordingly impact the price stabilisation activities taken by underwriters.

Using a large sample of 1,106 IPOs listed in Hong Kong Exchange from 2004 to 2021, we find that the negative tone of IPO prospectus is statistically positively related to price stabilisation. Consistent with the prospect theory, we argue that when underwriters perceive the negative narration in the prospectus, they will deliberately underprice the IPO and gain more indirect benefits such as more trading commissions from aftermarket activities including price stabilisation. Also, our findings confirm the ex-ante uncertainty exists in IPOs where investors will sense the negative tone implied in prospectus and require return for the riskiness they bear, triggering the price stabilisation to happen. Meanwhile, the signalling theory and agency theory are supported as we find negative words used in prospectuses can act as a signal for issuing firms to intentional underprice so that investors can be attracted. Additionally, we address the potential issue of endogeneity by using instrument variables in 2SLS estimation. Our results are robust by using alternative measurements and including additional control variables.

Our findings contribute in several ways. First, we are the first to investigate the determinants of price stabilisation from the narrative perspective. Second, our results provide evidences for IPO companies when writing their prospectuses by showing the role of negative textual tone in the aftermarket price volatility and accompanying stabilising actions taken by underwriters. We believe our empirical evidence can shed light on how sentiment in IPO documents impact aftermarket performance and mitigate information asymmetry.

We offer implications to various market participants. First, this study sheds some light on IPOs investors. IPO investment is quite risky for investors caused by information asymmetry (Reber et al., 2022), and the information from the IPO prospectus helps them to better evaluate their investments. IPO investors can predict possible price stabilisation from underwriters when they perceive more negative words are used in the prospectus. Second, our study offers references for future IPO issuers when they are composing their IPO prospectuses. As more negative words used in the prospectus, the more likely the IPO is stabilised by underwriters. Third, this study provides implications to market regulators worldwide. It is noticed that mature price stabilisation practices have not been established in many stock markets. The study offers market regulators hints that thorough information disclosure in IPO prospectuses and actions regarding price stabilisation conducted by underwriters are necessary for price stabilisation to better serve as a real "stabiliser" to reduce share price volatility in IPO aftermarket.

This study also has limitations. First, although a series of robustness checks have been conducted, unobserved factors of price stabilisation may still exist. For example, Table 9 shows that corporate governance factors, represented by board structure, are not significantly related to price stabilisation, while previous studies suggest significant links between corporate governance and IPO underpricing. Hence, we suggest future scholars can use alternative proxy such as CEO gender for corporate governance to explore whether corporate governance can affect price stabilisation. Second, the sampling period can be further expanded, i.e., from 2004 to 2023, in order to fully examine how COVID-19 might possibly impact price stabilisation in Hong Kong stock market.

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APPENDICES

Appendix A

An example of price stabilisation announcement

BANK OF GANSU CO., LTD.*

甘肅銀行股份有限公司*

(A joint stock company incorporated in the People's Republic of China with limited liability)

(Stock Code: 2139)

STABILIZING ACTIONS AND END OF STABILIZATION PERIOD

STABILIZING ACTIONS AND END OF STABILIZATION PERIOD

The Bank announces that the stabilization period in connection with the Global Offering ended on February 10, 2018, being the 30th day after the last day for the lodging of applications under the Hong Kong Public Offering.

Further information of stabilizing actions undertaken by Guotai Junan Securities (Hong Kong) Limited, the Stabilizing Manager, its affiliates or any person acting for it during the stabilization period is set out in this announcement.

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STABILIZING ACTIONS AND END OF STABILIZATION PERIOD

The Bank announces that the stabilization period in connection with the Global Offering ended on February 10, 2018, being the 30th day after the last day for the lodging of applications under the Hong Kong Public Offering.

The stabilizing actions undertaken by Guotai Junan Securities (Hong Kong) Limited, the Stabilizing Manager, its affiliates or any person acting for it during the stabilization period are set out below:

(i) over-allocation of an aggregate of 331,800,000 H Shares in the International Offering, representing in aggregate 15% of the Offer Shares initially offered under the Global Offering before any exercise of the Over-allotment Option; and

(ii) the full exercise of the Over-allotment Option by the Joint Representatives, on behalf of the International Underwriters, on February 5, 2018 in respect of an aggregate of 331,800,000 H Shares, representing in aggregate 15% of the Offer Shares initially offered under the Global Offering before any exercise of the Over-allotment Option, at the Offer Price of HK$2.69 per H Share (exclusive of brokerage fee of 1%, SFC transaction levy of 0.0027% and Hong Kong Stock Exchange trading fee of 0.005%), to cover the over-allocations in the International Offering.

There had been no purchase or sale of any H Shares on the market for the purpose of price stabilization by the Stabilizing Manager during the stabilization period.

Appendix B

Negative words examples

Negative Words Examples				
ABANDON	CONCEDE	EXACERBATE	LOSS	SCANDALOUS
ACCUSE	CONFESSED	EXPULSION	MALFUNCTION	SCANDALS
ADVERSARIAL	CONFRONT	FAIL	MANIPULATE	SCRUTINIZE
ADVERSE	CONSPIRING	FAILURE	MISAPPLY	SEIZED
ALIENATE	CONTRADICT	FINED	MISHANDLE	SEVERE
ANNOY	CORRUPTION	FLAW	MISLEAD	SHUT
ARGUE	CRIME	FRAUD	MISTAKE	SHUTDOWN
ARREST	CRITICIZING	GUILTY	NEGATIVE	SLOWLY
BACKDATING	CURTAIL	HALT	NEGLIGENT	STRESSFUL
BAIL	DAMAGE	HAMPER	NONFUNCTIONAL	SUE
BANKRUPT	DANGER	HARM	OBJECTED	SUSCEPTIBLE
BARRIER	DEADLOCKING	HINDERING	OFFENCE	TAINTED
BOTTLENECK	DEADLOCKS	IDLE	OMISSION	THREATEN
BOYCOTT	DECEPTION	IGNORE	OUTAGES	TRAGEDY
BRIBE	DEFAME	ILL	OUTDATED	UNABLE
BURDEN	DEFICIT	ILLEGAL	OVERDUE	UNACCEPTABLE
CALAMITY	DEGRADE	ILLIQUID	OVERESTIMATE	UNAWARE
CANCEL	DELIST	IMBALANCE	PANIC	UNFAIR
CARELESS	DENIAL	IMPAIR	PENALTY	UNFAVORABLY
CARELESSLY	DEPRIVE	IMPEDIMENT	POOR	UNFORTUNATELY
CATASTROPHICALLY	DETRIMENT	IMPROPER	PRECLUDE	UNLAWFUL
CAUTION	DETRIMENTAL	INACTIVATE	QUESTIONABLE	VICTIMS
CEASE	DIFFICULT	INCARCERATION	RECALL	VIOLATE
CENSURED	EMBEZZLEMENT	INEQUITY	REFUSAL	WEAKEN
CLOSED	ENDANGERED	LIE	RETALIATE	WORRIES
COLLAPSE	ERRONEOUS	LIMITATION	RISKY	WRONG
COMPLAIN	EVADE	LOSING	SABOTAGE	WRONGDOING
…	…	…	…	…