ANNALS OF ECONOMICS AND FINANCE **22-1**, 83–107 (2021)

# National Tax Service Connection and Stock Price Crash Risk: Evidence from Korea

Sanghak Choi and Hail Jung*

This article uses a unique institutional setting in Korea to investigate effects of managers' connections with the financial regulator on the managers' bad news hoarding behavior, proxied by stock price crash risk measures. Regression analysis shows that connected managers are likely to withhold negative information. That is, connected managers feel protected and believe that the firm is unlikely to receive financial sanctions, and such beliefs induce them to hide and hoard negative news. Furthermore, we find that these relationships are manifested only when the firm is not an affiliate of the Chaebol group or is financially constrained.

*Key Words*: Stock Price Crash Risk; CEO's Connection.
*JEL Classification Number*: G30.

## 1. INTRODUCTION

The study of firm- or manager-level network connection is proliferating in modern corporate finance literature. Among diverse personal network channels, political connections have been used to investigate how having a connection affects managerial decisions or the level of regulation. While there is an ongoing debate as to whether political connections positively or negatively affect a firm's value, recent evidence shows that such connections have an adverse influence on firms (Bertrand et al., 2018; Piotroski et al., 2015; Chaney et al., 2011; Lee and Wang, 2017; Luo et al., 2016)[1]. Because

* Choi: School of Management Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea; Jung: Corresponding author. School of Management Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea. Email: hail95@unist.ac.kr. This work was supported by "Human Resources Program in Energy Technology" of the Korea Institute of Energy Technology Evaluation and Planning(KETEP), granted financial resource from the Ministry of Trade, Industry & Energy, Republic of Korea. (No. 20184010201680)

[1]Remarkable literature on political connection exploiting non-US market show that political connections help firms to get easier access to debt (Khwaja and Mian, 2005; Leuz and Oberholzer-Gee, 2006; Li et al., 2008), bailouts (Faccio et al., 2006; Duchin



1529-7373/2021

of certain connections a firm has built upon, it feels more protected, which induces the firm to be opaquer (Chaney et al., 2011). Furthermore, such political ties encourage managers to hoard bad news temporally for the sake of either their connected politician's careers (Luo et al., 2016 and Lee and Wang, 2017) or alter their corporate decisions to help connected politicians in their re-election efforts (Bertrand et al., 2018).

In this paper, we try to observe and explore the downside of CEO's connections. Specifically, we investigate whether the CEO's personal connection to the commissioner of the National Tax Service (NTS) manifests the managers' bad news hoarding behavior, proxied by stock price crash risk variables. While few papers have investigated the effect of the political connections on future crash risk, this article is the first attempt at observing the effect of direct connections between managers and financial regulators.

We define connected CEOs as those having alumni ties (either through undergraduate or graduate school, including MBAs) with the commissioner of the NTS. Managers may feel protected by their relationships with the commissioner and hide bad news as they would be less worried about tax investigation. There are two types of taxes in Korea: national tax and local tax. National tax is then divided into internal tax and customs tax. Among those types, the NTS is mainly in charge of the assessment and collection of internal taxes. The organization was established on March 1966, as an external organization of the Korea Ministry of Economy and Finance (KMEF). To effectively assess and collect internal tax, the organization continuously conducts "investigation for taxable income". This act allows the NTS to enforce their actions even without a seizure warrant from the prosecutor's office. Article 81-6 (Jurisdiction over tax investigation and selection of persons subject to tax investigation) of the "Framework Act on National Taxes" shows that "a tax investigation shall be conducted by the head of a tax office or the commissioner of a regional tax office having jurisdiction over the place of tax payment." However, similar to the enforcement decisions of the Securities and Exchange Commission (SEC) of the United States, the NTS is also resource constrained[2]. Because of that, only a small portion of companies are actually investigated[3], and the choice of which firms are investigated is entirely up to the NTS.

---

and Sosyura, 2012) or avoid diverse governmental sanctions and regulations (Fisman and Wang, 2015).

[2]Kedia and Rajgopal (2011) present that because the SEC is resource constrained, the institution investigates firms located close to its offices and with higher visibility.

[3]Although not reported, we find that only 0.81% of the companies (approximately 6,000 firms among 8,000,000 firms in Korea, including both listed and not listed firms) receive the tax investigation. The tax investigation status is available from the Financial Supervisory Service website.

In that sense, the commissioner of the NTS, appointed by the President of Korea, has huge authority in determining which firms are investigated. Furthermore, in addition to regular and noticed tax investigations, the organization also conducts tax investigations without prior notices[4]. While disclosing the earnings reports is voluntary in Korea, the tax investigation is an enforced activity by the NTS. According to the National Tax Statistical Yearbook of 2014, the additional tax amount imposed to the firms that received enforced tax investigation is approximately 6.4 trillion KRW (approximately $5.5 billion), and this accounts for 15.1% of the total corporate tax in Korea. This statistics imply that the tax investigation is a significant risk for firms as managing taxation risk is an important issue for corporates. Furthermore, during the investigation process, relevant departments of the firm have to be shut down. Since the investigation period depends solely on the decision of the NTS, the firm has to be temporarily closed until the NTS has finished the investigation. In addition, during the investigation, the NTS has an authority to request for all documents related to the firm's operating activities. This increased risk due to exposure of additional corporate internal information is another concern for managers. For these reasons, managing tax investigation risk is important for managers. This also implies that receiving tax investigation information such as the frequency, timing and intensity can play a large role in the risk management.

Therefore, regular or unexpected tax investigations and enforcement of search and seizure acts by the NTS will directly and negatively affect a firm's value (Jung and Hwang, 2019; Jeon et al., 2017). Once the media releases the enforcement information to the public, there may be a primary shock in the market as investors may become worried. A secondary shock to the market may follow if the NTS finalizes and announces the firm's guilt to the public. Because of such obvious negative consequences, the firm is likely to seek to build a good relationship with the commissioner of the NTS. Although different in setting, Correia (2014) previously presented that the politically connected firms are less likely to be engaged in SEC enforcement actions.

[4]For example, the NTS enforces a tax investigation when a taxpayer fails to fulfil their tax compliance obligations under tax-related acts, such as filing a return, submitting a document certifying compliant filing, preparing, delivering, and submitting a tax invoice or an invoice, or preparing and submitting a payment record; when a taxpayer is suspected of false transactions, such as undocumented transactions or disguised or fictitious transactions; when concrete information on a taxpayer's tax evasion is reported; when an evident material exists to admit a suspicion of omissions or errors in the details of a return by a taxpayer; or when a taxpayer provides a tax official with money and other valuables or helps a person provide a tax official with money and other valuables in relation to the duties of the tax official

In Korea, people feel responsible to the alumni of the school across cohorts, and such networks continue to be nurtured as graduates pursue professional careers. Because of such importance of alumni network culture of Korea, finance research related to investigating the connection effects of Korea typically uses alumni ties to measure connections. For example, reference Schoenherr (2019) used the Korea University network to measure the political connections of firms and Former President Lee Myung Bak, as he graduated from Korea University Business School. Borrowing the idea of Schoenherr (2019), we also use school networks to measure the connection between CEOs and the NTS and investigate whether the connections affect the managers' bad news hoarding behavior.

To test the conjecture, we employ a propensity score matching (PSM; Rosenbaum and Rubin, 1983 and Roberts and Whited, 2012) approach to create a matched dataset of connected managers and non-connected managers instead of using the full sample. PSM is a popular econometric technique used to address endogeneity problems. It attempts to estimate the effect of a treatment by accounting for the covariates that predict receiving the treatment. The technique therefore successfully reduces any bias from confounding variables that could be found in an estimate of the treatment effect obtained from simply comparing outcomes among units that received the treatment versus those that did not. Our regression results, with matched samples, confirm our conjecture[5].

The primary benefit of using PSM is that it allows us to compare the NTS connected firms to a set of firms that are the same on all other observable dimensions. This allows us to attribute any observed effects more clearly to the connection with the NTS itself, rather than to other firm characteristics associated with it. Therefore, using the matched method addresses a potential endogeneity concern.

Results show that when a manager gains a connection with the commissioner of the NTS, his or her firm's stock price crash risk increases. In terms of economic magnitude, we find that a connected firm, compared to non-connected firm, has a 0.162 (0.071) higher crash risk, measured by $NCSKEW_t(DUVOL_t)$. $NCSKEW_t$ is the negative conditional skewness of firm-specific weekly returns over the fiscal year. The measure is calculated by taking the negative of the third moment of firm-specific weekly returns for each year. We then normalize it by the standard deviation of firm-specific weekly returns raised to the third power. Our second crash risk measure, $DUVOL_t$ (down-to-up volatility), captures asymmetric volatilities between negative and positive firm-specific weekly returns (Chen et al., 2001). For both measures, higher values indicate higher crash risk

[5]Our regression analysis using full sample is consistent with regression using matched sample.

likelihoods. Furthermore, our findings are economically and statistically significant, even after including other independent variables[6], such as year and firm fixed effects to control for potential unobserved heterogeneity.[7]

With that said, we include further tests to observe how the relationship between the NTS and the manager's bad news hiding behavior is affected under the presence of external monitoring (when the firm is Chaebol[8] affiliate or is financially constrained). Regression analysis shows that the stock price crash risk is mitigated when the connected CEO is managing a Chaebol firm. This may be due to effective monitoring by Chaebol where CEOs find it difficult to hide bad news even when they have connections to the NTS. Furthermore, we find that connected CEOs tend to hoard more bad news when the firm is financially constrained. This is likely because released negative information about the firm may increase the cost of issuing equity and debt, connected CEOs are more prone to hide bad news to secure external financing (He and Ren, 2017).

This article contributes to the literature in two ways. First, the article tries to suggest an alternative variable to measure individual-level connections between managers and governmental institutions that "directly" affect a firm's value. While a few articles have tried to find the relations between some Chinese firms' connections with local politicians and the firms' future stock price crash risk (Luo et al., 2016; Piotroski et al., 2015; Lee and Wang, 2017), studying the effect of managers' networks with a national financial regulator has not yet explored. In this regard, we suggest another proxy, not political connections, but connections with heavily influential regulatory institutions, to accurately test this theory. The second contribution of the paper is further developing the recent empirical literature on behavioral characteristics that determine future stock price crashes (An and Zhang, 2013; Bao et al., 2018; Callen and Fang, 2013; Choi and Jung, 2020; Kim et al., 2011a, 2011b; Kim et al., 2016). We contribute to the crash risk literature by showing that managers' connections to the commissioner of the NTS affects their firm's risk of a future stock price crash.

The rest of the paper is organized as follows. We develop our hypotheses in Section 2. In Section 3, we describe the data, main variables and methodologies. In Section 4, we present our main findings and interpret

[6]Detailed explanation of included independent variables is on Section 3 and Table 2.

[7]We have also included the pooled OLS regression without PSM matched samples. Please refer to Appendix A for the results of the regression. We provide a consistent result.

[8]Chaebol is a large family owned conglomerate in Korea. A chaebol often consists of many affiliates in diverse industries, controlled by an owner whose power over the group often exceeds legal authority. The term is often used in a context similar to that of the English word "conglomerate". Several large Korean family owned groups are included in this definition. Samsung and Hyundai are typical examples of Chaebol firms.

the results. We include results of further tests in Section 5. Section 6 concludes the paper.

## 2. HYPOTHESIS DEVELOPMENT

Quantifying unobservable variables, such as hiding bad news from the public, is difficult. In this article, we use stock price crash risk variables to precisely measure a manager's behavior. Finding the reasons why firms experience sharp stock price shocks has be the topic of a lot of finance research. Proliferating research assumes that managers intentionally hide and hoard bad news. The intuition is built on the premise that CEOs tend to withhold bad news for an extended period. This allows the negative information to be stockpiled. Prior studies commonly find that the major incentives to hide negative news is to maximize the compensation package (Kothari et al., 2009; Kim et al., 2011a; Kim et al., 2011b). An oft?cited incentive for earnings management, and hence asymmetric disclosure of news, is to maximize the incentives?based compensation. If CEOs well block the flow of negative information into the market, the distribution of stock returns should be asymmetric (Hutton et al., 2009; Kothari et al., 2009). When the accumulation of bad news touches a certain threshold, accumulated information is revealed to the market at once. This leads to a large and significantly negative drop of stock prices (Hutton et al., 2009; Kothari et al., 2009).

There are several reasons why managers might hide bad news, including financial reporting opacity (Hutton et al., 2009), asymmetric information between managers and the market (Kothari et al., 2009), corporate social responsibility (CSR) (Kim et al., 2014), tax avoidance (Kim et al., 2011b), formal compensation contracts and career concerns (Kothari et al., 2009), stock liquidity (Zhang et al., 2018) and managerial opportunism (Kim et al., 2011a) among others. Specifically, regarding political connections, an underlying common thread of the ongoing research is that their connections encourage managers to hoard bad news temporally for the sake of their connected politician's career (Luo et al., 2016; Piotroski et al., 2015; Lee and Wang, 2017).

A financial regulator's tax investigations often negatively affect a firm's value. A common reason for a tax investigation is to search for evidence of tax avoidance, and once a firm is charged, a negative market response usually follows. For instance, Shim et al. (2013) show that cases of tax avoidance by firms with lower levels of transparency influence those firms' value more negatively than in cases done by those with higher transparency. That is, since the low-transparency firms have higher probabilities of profit adjustment by managers, tax avoidance by those managers is recognized more negatively. To offset such negative consequences, firms take various

actions. Hwang and Jung (2019) find that companies spend excessively to offset the negative effects of tax avoidance disclosure. Another stream of literature document that politically connected firms on average are less likely to be involved in SEC enforcement actions[9] and face lower penalties when they are prosecuted by the SEC (Correia, 2014).

One concern with the aforementioned literature on investigating crash risk is that they use "political" connections to observe "financial" outcomes (stock price crash risk). The assumption is that connected politicians may shelter managers and indirectly push financial regulators to overlook the firm. However, this empirical finding may not always hold, as there are other possible unobservable characteristics that are involved in the relationships between connected politicians and governmental institutions.

Therefore, this paper tries to depart from the previous literature that investigates the effects of political connections on a firm's future stock price crash risk, by using a unique institutional setting in Korea, namely, the connection between firms and the commissioner of the National Tax Service. We conjecture that when a manager gains a personal connection with the chief financial regulator, the connected manager feels protected and less worried about potential tax investigations which would negatively affect the firm. That is, with the help from the commissioner, the manager has relatively less concerns of their internal negative news to be publicly announced. This may motivate managers to more freely withhold bad news, which increases the crash risk variables since there always is a tipping point. Thus, we hypothesize as follows:

**Hypothesis**: (Other things being equal) the connection between a manager and the commissioner of the NTS (NTS connection) is positively associated with the risk of a future stock price crash at his/her firm.

## 3. DATA AND METHODOLOGY

### 3.1. Data

To investigate the association between the NTS connection and the future stock price crash risk, this article uses various data sources to construct a panel data of manager-firm matched. To match the CEO with the correspondingly connected commissioner of the NTS, we first use the TS2000 database provided by the Korea Listed Companies Association to obtain

[9]SEC enforcement of the United States is similar to the tax investigation enforcement by the NTS of Korea. SEC enforcement action begins with a triggering event (such as a restatement) and the staff of SEC decides to investigate the case. Once the investigation is over, the staff can make enforcement decision and authorize the filling of a civil or administrative action. Once the action is authorized, then an order if filed that describes the misconduct and the sanction sought. Karpoff et al. (2008) and Correia (2014) well summarize the SEC enforcement in detail.

8,991 publicly traded Korean firms' CEOs' education information. We then manually collect the NTS commissioners' historical education information and match it regarding the manager and the commissioner's graduated university.

We then use the FnGuide database to match individual manager information with the firm's annual variables including control variables and firm's credit rating information. Our final sample consists of 18,870 firm-year observations. The data period spans from 1999 to 2017. The sample begins in 1999 because the Data Analysis, Retrieval and Transfer System (DART, similar to EDGAR in the United States) began the online service from 2000. We exclude firms belong to financial and utility industries. Finally, to obtain information regarding Chaebol firms, we use the Korea Fair Trade Commission (KFTC) database to identify whether a certain firm is Chaebol. The source annually updates the list of Chaebol firms and their affiliates since 2002.

### 3.2. Main Variables

#### *3.2.1. NTS Connection*

We manually collect the education information about the commissioners of NTS from the Joins database (similar to Who's Who database of the United States). Following Schoenherr (2019), we use the graduated university of commissioner of the NTS and the CEO of the firm to link the connection between them. We find that among 18,870 firm-year observations, 2,388 samples are with connection observations and 16,482 samples are without connection observations.

#### *3.2.2. Crash risk measures*

Chen et al. (2001), Jin and Myers (2006), Kim et al. (2011a) and Kim et al. (2011b) propose several measures to measure crash risk. Following the previous literature, this article uses two different crash risk measures: NCSKEW and DUVOL. We first calculate the weekly returns of each firm and year to observe firm specific factors that contribute to a firm's crash risk. To calculate the firm specific weekly return, we compute the natural log of one plus the residual return from the expanded market model regression, and we define the return as W. The market model regression is expressed as follows:

$$r_{j,\tau} = \alpha_j + \beta_{1,j} r_{m,\tau-2} + \beta_{2,j} r_{m,\tau-1} + \beta_{3,j} r_{m,\tau} + \beta_{4,j} r_{m,\tau+1} + \beta_{5,j} r_{m,\tau+2} + \varepsilon_{j,\tau}$$

where $r_{j,\tau}$ is the return on stock $j$ in week $\tau$, and $r_{m,\tau}$ is the return on the KOSPI200 index week $\tau$. Following Dimson (1979), we include the lead and lag terms for the market index return for including nonsynchronous

**TABLE 1.**

Summary of variable definitions

| Variable | Definition | Category |
|---|---|---|
| $NCSKEW_t$ | Negative of the third moment of firm-specific weekly returns for each firm and fiscal year divided by the standard deviation of firm-specific weekly returns raised to the third power. | Dependent Variable |
| $DUVOL_t$ | Natural log of the ratio of the standard deviation of firm-specific weekly returns below the annual mean for the fiscal year to the standard deviation of firm-specific weekly returns above the annual mean for the fiscal year. | Dependent Variable |
| $NTS - CON_{t-1}$ | [National Tax Service (NTS) connection] A dummy variable that equals 1 if the CEO is the same university alumni with the director of the National Tax Service, and 0 otherwise. | Independent Variable |
| $MOJ - CON_{t-1}$ | [Ministry of Justice (MOJ) connection] A dummy variable that equals 1 if the CEO is the same university alumni with the Attorney General, and 0 otherwise. | Independent Variable |
| $SPO - CON_{t-1}$ | [Supreme Prosecutor's Office (SPO) connection] A dummy variable that equals 1 if the CEO is the same university alumni with the Prosecutor General, and 0 otherwise. | Independent Variable |
| $FSS - CON_{t-1}$ | [Financial Supervisory Service (FSS) connection] A dummy variable that equals 1 if the CEO is the same university alumni with the Director of Financial Supervisory Service, and 0 otherwise. | Independent Variable |
| $DTURN_{t-1}$ | Detrended turnover, defined as the difference between the average monthly share turnover over the current fiscal-year period and the average monthly share turnover over the previous fiscal-year period, where monthly share turnover is calculated as the monthly trading volume divided by the total number of shares outstanding during the month. | Control Variable |
| $NCSKEW_{t-1}$ | One-year lagged value of $NCSKEW_t$. | Control Variable |
| $SIGMA_{t-1}$ | Standard deviation of firm-specific weekly stock returns over the fiscal year. | Control Variable |
| $RET_{t-1}$ | Average firm-specific weekly return during the entire fiscal year | Control Variable |
| $SIZE_{t-1}$ | Natural log of total assets. | Control Variable |
| $MTB_{t-1}$ | Ratio of the market value of equity to the book value of equity. | Control Variable |
| $LEV_{t-1}$ | Long-term debt divided by total assets. | Control Variable |
| $ROA_{t-1}$ | Income before extraordinary items divided by lagged total assets | Control Variable |
| $ACC_{t-1}$ | Performance-matched discretionary accruals following the modified Jones model of Dechow et al. (1995). | Control Variable |

trading purpose. The firm-specific weekly return for firm $j$ in week $\tau$, $W_{j,\tau}$ is computed by the log of one plus the residual return, which can be formulated as:

$$W_{j,\tau} = \ln(1 + \varepsilon_{j,\tau})$$

Using $W_{j,\tau}$, Chen et al. (2001) propose two crash risk variables. The first one is the negative conditional return skewness (NCSKEW). NCSKEW is calculated by taking the negative of the third moment of firm specific weekly returns for each year and dividing it by the standard deviation of firm specific weekly returns to the third power. To formally put:

$$NSCKEW_{j,t} = -\left[n(n-1)^{3/2}\sum W_{j,\tau}^3\right] / \left[(n-1)(n-2)\left(\sum W_{j,\tau}^2\right)^{3/2}\right]$$

Following Chen et al. (2001), our second crash risk measure is the down-to-up volatility (DUVOL). For each firm $j$ over a fiscal-year period $t$, we divide all the weeks into "up" weeks and "down" weeks. Down weeks indicate weeks where the firm-specific weekly returns are below the annual mean and up weeks indicate all weeks where the firm-specific weekly returns are above the annual mean. We then calculate the standard deviation for each group. $DUVOL$ variable is then calculated as the log of the ratio of the standard deviation on the down weeks to the standard deviation on the up weeks. To formally put, $DUVOL$ is calculated as follows:

$$DUVOL_{j,t} = \log\left\{\left[(n_u - 1)\sum_{DOWN} W_{j,\tau}^2\right] / \left[(n_d - 1)\sum_{UP} W_{j,\tau}^2\right]\right\}$$

where $n_u$ and $n_d$ denote the number of up and down weeks, respectively, during the fiscal year $t$. For both $NCSKEW_{j,t}$ and $DUVOL_{j,t}$, higher values indicate a greater crash risk.

### *3.2.3. Control Variables*

Borrowing ideas from prior literature (Chen et al., 2001), we include other control variables that may affect the relation between the NTS connection and the manager's bad news hoarding behavior. For firm-level control variables, we include lagged stock turnover ($DTRURN_{t-1}$), lagged negative conditional skewness ($NCSKEW_{t-1}$), lagged stock return volatility ($SIGMA_{t-1}$), lagged firm specific average weekly return ($RET_{t-1}$), lagged firm size ($SIZE_{t-1}$), lagged market-to-book ratio ($MB_{t-1}$), lagged leverage ratio ($LEV_{t-1}$), lagged return on assets ($ROA_{t-1}$), lagged earnings quality ($ACC_{t-1}$), lagged R&D ratio ($R\&D_{t-1}$) and lagged R&D missing

indicator variable ($R\&D\_MISSING_{t-1}$) and lagged kurtosis ($KUR_{t-1}$). To control for potential bias rising from manager's characteristics, we additionally control for CEO's gender ($GEN_{t-1}$) and age ($AGE_{t-1}$).

We lag all control variables to mitigate, but not completely wash out, potential endogeneity concerns from the reverse causality. We also include firm and year fixed effects, and Table 1 presents all the variables included in this article with their detail descriptions.

### 3.3. Methodology

To test our baseline regression, we first use PSM to mitigate potential endogeneity concerns. PSM enables to explicitly quantify the sensitivity of the results for the primary causal variable to unobserved correlated omitted variables (Armstrong et al., 2010). To employ PSM, we first run probit regression where the dependent variable is the indicator variable indicating whether the CEO is an alumnus with the commissioner of the NTS. For variables hypothesized to be associated with both the outcome and treatment, we choose $Size_{t-1}$, $MTB_{t-1}$, $LEV_{t-1}$, $ROA_{t-1}$, $ACC_{t-1}$, $RET_{t-1}$, $SIGMA_{t-1}$, $GENDER_{t-1}$ and $AGE_{t-1}$ as confounders of the PSM. We match each component in both one-to-one and one-to-two using nearest neighbor matching.

**TABLE 2.**

Results of Propensity Score Matching (PSM)

| | Full sample | | | | PSM matching | | | |
|---|---|---|---|---|---|---|---|---|
| | Connected firms | Control group | Difference | t-test | Connected firms | Matched sample firms | Difference | t-test |
| $NCSKEW_t$ | −0.046 | −0.128 | 0.082** | 2.55 | −0.046 | −0.108 | 0.062 | 1.46 |
| $DUVOL_t$ | 0.008 | −0.028 | 0.036*** | 3.13 | 0.008 | −0.028 | 0.036** | 2.31 |
| $NCSKEW_{t-1}$ | −0.141 | −0.108 | −0.033 | −1.03 | −0.141 | −0.12 | −0.021 | −0.53 |
| $SIZE_{t-1}$ | 26.078 | 25.71 | 0.368*** | 11.55 | 26.078 | 26.081 | −0.003 | −0.06 |
| $DTURN_{t-1}$ | −0.001 | −0.002 | 0.001 | 0.65 | −0.001 | −0.002 | 0.001 | 0.68 |
| $MTB_{t-1}$ | 3.836 | 4.285 | −0.451 | −1.3 | 3.838 | 3.944 | −0.106 | −0.31 |
| $LEV_{t-1}$ | 0.434 | 0.44 | −0.006 | −1.36 | 0.434 | 0.436 | −0.002 | −0.3 |
| $ROA_{t-1}$ | 0.022 | 0.012 | 0.010*** | 2.9 | 0.022 | 0.027 | −0.005 | −1.24 |
| $ACC_{t-1}$ | 0.064 | 0.063 | 0.001 | 0.13 | 0.064 | 0.062 | 0.002 | 0.94 |
| $RET_{t-1}$ | −0.005 | −0.006 | 0.001*** | 3.08 | −0.005 | −0.004 | −0.001 | −1.31 |
| $SIGMA_{t-1}$ | 0.074 | 0.079 | −0.005*** | −4.03 | 0.074 | 0.0716 | 0.002* | 1.92 |
| Observations | 2,388 | 16,482 | | | 2,388 | 2,143 | | |

Notes: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

We then observe whether the propensity score is balanced across treatment and non-treated groups. The matching result is presented in Panel B of Table 2. For matched sample, it shows that the difference between treatment and comparison groups are statistically insignificant with p-value over 0.1 only except for $SIGMA_{t-1}$. Therefore, we conclude that the samples are well-matched.

## 4. MAIN RESULTS

### 4.1. Descriptive statistics and correlation matrix

Descriptive statistics of the variables are presented in Table 3. We find that the average of the crash risk measures, $NCSKEW$ and $DUVOL$ of Korean firms are $-0.132$ and $-0.027$, respectively. The standard deviation of $NCSKEW(DUVOL)$ is 1.499 (0.547), which is significantly larger than the values of the US market. This indicates that, in general, the Korean market is more volatile than the US market. Furthermore, note that the average of the NTS connection is 0.127. This means that 12.7% CEOs of the Korean listed companies graduated same school as the commissioner of the NTS. Results of other control variables are similar to prior literature that exploit Korean market setting.

**TABLE 3.**

Descriptive statistics

| | N | Mean | SD | 1st Pctl | 50th Pctl | 99th Pctl |
|---|---|---|---|---|---|---|
| $NCSKEW_t$ | 18,870 | −0.132 | 1.499 | −4.732 | −0.173 | 6.264 |
| $DUVOL_t$ | 18,870 | −0.027 | 0.547 | −1.327 | −0.057 | 1.944 |
| $NTS-CON_{t-1}$ | 18,870 | 0.127 | 0.333 | 0 | 0 | 1 |
| $NCSKEW_{t-1}$ | 18,870 | −0.143 | 1.519 | −4.985 | −0.194 | 6.264 |
| $SIZE_{t-1}$ | 18,870 | 25.798 | 1.492 | 23.332 | 25.509 | 30.609 |
| $DTURN_{t-1}$ | 18,870 | −0.002 | 0.037 | −0.105 | −0.001 | 0.096 |
| $MTB_{t-1}$ | 18,870 | 4.237 | 16.144 | 0.162 | 1.493 | 48.154 |
| $LEV_{t-1}$ | 18,870 | 0.444 | 0.204 | 0.062 | 0.449 | 0.899 |
| $ROA_{t-1}$ | 18,870 | 0.01 | 0.171 | −0.516 | 0.029 | 0.213 |
| $ACC_{t-1}$ | 18,870 | 0.061 | 0.071 | 0 | 0.042 | 0.326 |
| $RET_{t-1}$ | 18,870 | −0.005 | 0.017 | −0.065 | −0.003 | 0.023 |
| $SIGMA_{t-1}$ | 18,870 | 0.078 | 0.059 | 0.022 | 0.063 | 0.353 |

Table 4 shows the correlation matrix among explanatory variables and control variables used in this article. Note that among control variables, none of the correlation values exceed 0.7, a threshold determining whether two variables can enter the regression or not (Judge et al., 1988). Therefore,

this confirms that our model is relatively relaxed from multicollinearity problems.

**TABLE 4.**

Correlation matrix

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) $NCSKEW_t$ | 1.000 | | | | | | | | | |
| (2) $DUVOL_t$ | 0.935 | 1.000 | | | | | | | | |
| | (0.00) | | | | | | | | | |
| (3) $NTS-CON_{t-1}$ | 0.017 | 0.021 | 1.000 | | | | | | | |
| | (0.02) | (0.00) | | | | | | | | |
| (4) $SIZE_{t-1}$ | 0.052 | 0.046 | 0.084 | 1.000 | | | | | | |
| | (0.00) | (0.00) | (0.00) | | | | | | | |
| (5) $DTURN_{t-1}$ | −0.007 | −0.004 | 0.005 | 0.020 | 1.000 | | | | | |
| | (0.32) | (0.59) | (0.52) | (0.01) | | | | | | |
| (6) $MTB_{t-1}$ | 0.080 | 0.085 | −0.010 | −0.102 | 0.005 | 1.000 | | | | |
| | (0.00) | (0.00) | (0.15) | (0.00) | (0.50) | | | | | |
| (7) $LEV_{t-1}$ | −0.041 | −0.028 | −0.010 | 0.290 | 0.022 | 0.088 | 1.000 | | | |
| | (0.00) | (0.00) | (0.19) | (0.00) | (0.00) | (0.00) | | | | |
| (8) $ROA_{t-1}$ | 0.078 | 0.051 | 0.022 | 0.151 | −0.021 | −0.073 | −0.195 | 1.000 | | |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | | | |
| (9) $ACC_{t-1}$ | 0.002 | 0.009 | −0.001 | −0.157 | 0.006 | 0.064 | 0.018 | −0.044 | 1.000 | |
| | (0.81) | (0.23) | (0.88) | (0.00) | (0.43) | (0.00) | (0.01) | (0.00) | | |
| (10) $RET_{t-1}$ | 0.043 | −0.027 | 0.024 | 0.104 | 0.088 | 0.008 | −0.079 | 0.216 | −0.058 | 1.000 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.24) | (0.00) | (0.00) | (0.00) | |
| (11) $SIGMA_{t-1}$ | 0.015 | 0.055 | −0.028 | −0.235 | 0.125 | 0.117 | 0.108 | −0.175 | 0.132 | −0.315 |
| | (0.04) | (0.00) | (0.00) | (0.00) | (0.000) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |

Notes: statistical significance at 10% level or better is represented in bold.

Furthermore, the correlation matrix shows that the correlation between the NTS connection and crash risk measures are both positive and significant. This indicates that the connection encourages CEOs to withhold bad news as they feel protected. However, the result may be misleading as there are other variables that affect the relationship between the manager's connection and his or her bad news hoarding behavior. Therefore, we employ multivariate OLS model for propensity score matched samples.

### 4.2. Baseline regression result

The result of the baseline regression is presented in Table 5. Note that we lag all control variables to mitigate (but not completely remove) potential endogeneity concerns from the reverse causality. Furthermore, to wash out

**TABLE 5.**

Regression analysis of the effect of NTS connection on stock price crash risk

| | 1:1 matching | | 1:2 matching | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | $NCSKEW_t$ | $DUVOL_t$ | $NCSKEW_t$ | $DUVOL_t$ |
| $NTS-CON_{t-1}$ | $0.162^{*}$ | $0.071^{**}$ | $0.111^{*}$ | $0.056^{**}$ |
| | (1.927) | (2.329) | (1.697) | (2.408) |
| $NCSKEW_{t-1}$ | $-0.099^{***}$ | $-0.027^{**}$ | $-0.102^{***}$ | $-0.027^{***}$ |
| | (−2.963) | (−2.442) | (−3.921) | (−3.097) |
| $SIZE_{t-1}$ | $0.243^{**}$ | $0.130^{***}$ | $0.263^{***}$ | $0.133^{***}$ |
| | (2.497) | (3.685) | (3.410) | (4.698) |
| $DTURN_{t-1}$ | −0.602 | −0.159 | −0.632 | −0.117 |
| | (−0.502) | (−0.411) | (−0.667) | (−0.376) |
| $MTB_{t-1}$ | $0.169^{***}$ | $0.062^{***}$ | $0.192^{***}$ | $0.708^{***}$ |
| | (3.881) | (3.754) | (3.935) | (3.934) |
| $LEV_{t-1}$ | $-1.233^{***}$ | $-0.534^{***}$ | $-1.048^{***}$ | $-0.462^{***}$ |
| | (−3.376) | (−4.156) | (−3.516) | (−4.392) |
| $ROA_{t-1}$ | 0.590 | 0.127 | $0.873^{***}$ | $0.213^{*}$ |
| | (1.513) | (0.924) | (2.681) | (1.900) |
| $ACC_{t-1}$ | 0.458 | 0.148 | 0.134 | 0.075 |
| | (0.914) | (0.857) | (0.335) | (0.548) |
| $RET_{t-1}$ | 4.029 | 1.988 | 5.132 | $2.551^{**}$ |
| | (0.871) | (1.274) | (1.436) | (2.084) |
| $SIGMA_{t-1}$ | 0.227 | −0.098 | −0.051 | −0.120 |
| | (0.263) | (−0.330) | (−0.071) | (−0.486) |
| Constant | $-5.583^{**}$ | $-2.958^{***}$ | $-6.341^{***}$ | $-3.166^{***}$ |
| | (−2.163) | (−3.140) | (−3.233) | (−4.376) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Observations | 4,531 | 4,531 | 6,369 | 6,369 |
| Adj.R-squared | 0.106 | 0.098 | 0.103 | 0.102 |

Note: This table presents the results from the OLS regression of the impact of NTS Connection on future stock price crash risk. The dependent variable in Columns (1) and (3) is the negative coefficient of skewness, NCSKEWt, and the dependent variable in Columns (2) and (4) is the down to up volatility measure of the crash likelihood, DUVOLt. Columns (1) and (2) contain the results for the regressions with the NTS connected firms and control sample using 1:1 matching. Columns (3) and (4) contain the results for the regressions with the NTS connected firms and control sample using 1:2 matching and include controls, year, and firm fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. $^{*}$, $^{**}$, and $^{***}$ indicate significance at the 10%, 5%, and 1% levels, respectively.

other biases from unobservable variables, we commonly include year fixed effects and firm fixed effects. All errors are clustered by firm.

Columns (1) and (2) show the regression results for $NCSKEW$ and $DUVOL$ for one-to-one matched observations, and Columns (3) and (4) represent regression results for one-to-two matched observations. We find that regardless of matching techniques employed, the effect of the NTS connection on crash risk measures are positive and significant. The result indicates that, for one-to-one matched samples, the difference in NCSKEW (DUVOL) between connected and not connected firms are approximately 0.162 (0.071). The results are statistically and economically significant even after inclusion of firm and year fixed effects.

This means that the managers of connected firms tend to hide negative news more as they feel more protected from their alumni network. Since connected managers are relatively free from concerns of tax investigation by the NTS, they take advantages of it and try to hide negative information about their companies. Finally, to interpret the control variables, we find that firms with larger size, higher market-to-book ratio and lesser debt are associated with the future stock price crash risks. Overall, the regression analysis confirms our conjecture that the NTS connection encourages managers to withhold bad news more as the connection makes them feel protected.

## 5. FURTHER ANALYSIS

Even if the manager is connected to the commissioner of the NTS, the connected manager's bad news hoarding behavior may alter under the presence of external monitoring. Therefore, we employ diverse to investigate what circumstances at a firm may manifest the manager's bad new hiding behavior. In this article, we observe two channels: whether or not the managing firm is large conglomerate (Chaebol) or if the firm is financially constrained.

### 5.1. Moderating effects of Chaebol firms

Study of Chaebol system in Korea is not new. For example, Black et al. (2006) assert the importance of Korean Chaebol firms since the Korean laws impose different governance requirements on those firms. Campbell and Keys (2002) argue that firms affiliated with Chaebol exhibit lower performance and higher sales growth relative to other firms. Moreover, Baek et al. (2006) show that Chaebol issuers involved in intragroup deals set the offering prices to benefit their controlling shareholders. Since CEOs

**TABLE 6.**
The moderating effects of Chaebol on the relationship between NTS connection and price crash risk

| | Chaebol | | Non-Chaebol | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | $NCSKEW_t$ | $DUVOL_t$ | $NCSKEW_t$ | $DUVOL_t$ |
| $NTS-CON_{t-1}$ | −0.174 | −0.051 | 0.215** | 0.092*** |
| | (−1.082) | (−0.782) | (2.262) | (2.645) |
| $NCSKEW_{t-1}$ | −0.140** | −0.051* | −0.109*** | −0.029** |
| | (−1.993) | (−1.967) | (−2.930) | (−2.366) |
| $SIZE_{t-1}$ | 0.265 | 0.110 | 0.171 | 0.113*** |
| | (1.434) | (1.561) | (1.503) | (2.780) |
| $DTURN_{t-1}$ | 0.912 | −1.342 | −0.714 | −0.167 |
| | (0.088) | (−0.384) | (−0.570) | (−0.412) |
| $MTB_{t-1}$ | −0.155 | −0.018 | 0.165*** | 0.060*** |
| | (−0.449) | (−0.105) | (3.938) | (3.690) |
| $LEV_{t-1}$ | −0.801 | −0.436 | −1.168*** | −0.506*** |
| | (−0.811) | (−1.241) | (−2.962) | (−3.684) |
| $ROA_{t-1}$ | 1.215 | 0.388 | 0.528 | 0.090 |
| | (0.810) | (0.815) | (1.257) | (0.609) |
| $ACC_{t-1}$ | −0.376 | 0.070 | 0.567 | 0.173 |
| | (−0.277) | (0.141) | (1.036) | (0.912) |
| $RET_{t-1}$ | −5.715 | −1.901 | 6.675 | 3.082* |
| | (−0.505) | (−0.489) | (1.286) | (1.803) |
| $SIGMA_{t-1}$ | 2.472 | 1.029 | 0.584 | 0.034 |
| | (0.668) | (0.771) | (0.658) | (0.108) |
| Constant | −7.031 | −2.893 | −3.803 | −2.565** |
| | (−1.384) | (−1.469) | (−1.294) | (−2.443) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Observations | 714 | 714 | 3,748 | 3,748 |
| Adj.R-squared | 0.018 | 0.026 | 0.136 | 0.130 |

Note: This table presents the results of moderating effects of Chaebol affiliate on the relationship between NTS connection and price crash risk by dividing the full sample into two groups based on Chaebol affiliate. Columns (1) and (2) contain the results for the regressions with the firms classified as Chaebol affiliate. Columns (3) and (4) contain the results for the regressions with the firms not classified as Chaebol affiliate. All results are with the NTS connected firms and control sample using 1:1 matching and include controls, year, and firm fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

of Chaebol firms have relatively less authorities compared to non-Chaebol firms, we hypothesize that the effect of the NTS connection would not be observed in Chaebol firms but observed in non-Chaebol firms.

The results are presented in Table 6. Using Korea Fair Trade Commission (KFTC) source to identify Chaebol firms, we divided samples into Chaebol and non-Chaebol samples. The subsample analysis shows that the effect of the manager's connection with the commissioner of the NTS on the firm's future stock price crash risk is observed only when the firm is not controlled by Chaebol family groups. This is because in Chaebol firms, a controlling family has huge authorities and power (Black et al., 2006), and they heavily monitor CEOs. Because of that, CEO is not likely to withhold negative news regardless of their connection with the financial regulator.

### 5.2. Moderating effects of financial constraint

Financially constrained firms have large incentives to secure external finance and they are thus likely to withhold negative news (He and Ren, 2017). Connected managers would try to hide bad news even more when they have alumni protection. Using credit rating information as a proxy to measure the firm's financial status, we conjecture that the connected managers would try to hoard bad news when the firm is financially constrained.

The results are presented in Table 7. To measure the level of financial constraint, we use bond rating of the firm. Whether the firm is rated or not on the bond rating agency is a popularly accepted measure to proxy a firm's financial status in corporate finance. We use KIS database (a Korean bond rating agency, similar to Moody's in the United States), to subsample firms into two groups: one with bond rating subscribed by KIS, and the one without any ratings. The subsample regression analysis shows that the relation between the NTS connection and the future stock price crash risk manifests only when the firms are financially constrained.

### 5.3. Alternative connections

Our main conjecture is that among diverse possible connections with other influential people, a connection with a person who can directly affect the firm value also directly affect the manifestation of the managing behavior. Therefore, to robust the argument, we match the managers to other regulators based on their graduation history. In this article, we define three more connections: prosecutor connection (manager's connection to the Attorney General of Korea), financial supervisory connection (manager's connection to the commissioner of the Financial Supervisory Service of Korea) and justice connection (manager's connection to the minister

**TABLE 7.**
Effects of Financial constraints on the relationship between NTS connection and price crash risk

| | Not constrained | | Financially constrained | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | $NCSKEW_t$ | $DUVOL_t$ | $NCSKEW_t$ | $DUVOL_t$ |
| $NTS-CON_{t-1}$ | 0.023 | 0.014 | 0.166* | 0.074** |
| | (0.150) | (0.236) | (1.772) | (2.010) |
| $NCSKEW_{t-1}$ | −0.202*** | −0.063*** | −0.090** | −0.023* |
| | (−3.166) | (−2.879) | (−2.523) | (−1.774) |
| $SIZE_{t-1}$ | 0.442* | 0.173** | 0.146 | 0.109*** |
| | (1.951) | (2.123) | (1.552) | (2.768) |
| $DTURN_{t-1}$ | −9.706** | −3.493** | −0.379 | −0.063 |
| | (−2.147) | (−2.400) | (−0.360) | (−0.158) |
| $MTB_{t-1}$ | 0.065 | 0.060 | 0.177*** | 0.064*** |
| | (0.261) | (0.721) | (4.009) | (3.547) |
| $LEV_{t-1}$ | −1.143 | −0.532 | −0.926*** | −0.431*** |
| | (−1.173) | (−1.634) | (−2.744) | (−3.046) |
| $ROA_{t-1}$ | 0.694 | 0.115 | 0.702* | 0.169 |
| | (1.181) | (0.574) | (1.707) | (0.978) |
| $ACC_{t-1}$ | 0.613 | 0.305 | 0.431 | 0.100 |
| | (0.448) | (0.650) | (0.908) | (0.535) |
| $RET_{t-1}$ | −21.695** | −6.983** | 11.579** | 4.774*** |
| | (−2.341) | (−2.347) | (2.540) | (2.683) |
| $SIGMA_{t-1}$ | 0.454 | 0.036 | 0.881 | 0.140 |
| | (0.179) | (0.042) | (1.021) | (0.413) |
| Constant | −11.620** | −4.440** | −3.037 | −2.346** |
| | (−1.980) | (−2.110) | (−1.206) | (−2.207) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Observations | 1,015 | 1,015 | 3,516 | 3,516 |
| Adj.R-squared | 0.058 | 0.102 | 0.134 | 0.118 |

Note: This table presents the results of moderating effects of financial constraints on the relationship between NTS connection and price crash risk by dividing the full sample into two groups based on the Korea Investors Service (KIS) bond rating. Columns (1) and (2) contain the results for the regressions with the group having bond ratings. Columns (3) and (4) contain the results for the regressions with the group not having bond ratings. All results are with the NTS connected firms and control sample using 1:1 matching and include controls, year, and firm fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

**TABLE 8.**

Regression analysis of the effect of alternative connections on stock price crash risk

| | (1) $NCSKEW_t$ | (2) $DUVOL_t$ | (3) $NCSKEW_t$ | (4) $DUVOL_t$ | (5) $NCSKEW_t$ | (6) $DUVOL_t$ |
|---|---|---|---|---|---|---|
| $FSS-CON_{t-1}$ | −0.023 | 0.004 | | | | |
| | (−0.312) | (0.137) | | | | |
| $SPO-CON_{t-1}$ | | | −0.005 | 0.007 | | |
| | | | (−0.078) | (0.297) | | |
| $MOJ-CON_{t-1}$ | | | | | 0.009 | 0.001 |
| | | | | | (0.137) | (0.031) |
| $NCSKEW_{t-1}$ | −0.032 | −0.003 | −0.029 | −0.005 | −0.042* | −0.009 |
| | (−1.252) | (−0.330) | (−1.244) | (−0.564) | (−1.815) | (−1.130) |
| $SIZE_{t-1}$ | 0.386*** | 0.164*** | 0.227*** | 0.108*** | 0.338*** | 0.156*** |
| | (5.030) | (6.016) | (3.167) | (4.310) | (4.766) | (6.566) |
| $DTURN_{t-1}$ | −1.484 | −0.482 | −0.995 | −0.243 | −1.190 | −0.384 |
| | (−1.554) | (−1.412) | (−1.107) | (−0.744) | (−1.222) | (−1.159) |
| $MTB_{t-1}$ | 0.036 | 0.014* | 0.146** | 0.063** | 0.072*** | 0.026*** |
| | (1.595) | (1.858) | (2.272) | (2.273) | (4.628) | (3.697) |
| $LEV_{t-1}$ | −1.448*** | −0.556*** | −1.116*** | −0.473*** | −1.179*** | −0.510*** |
| | (−5.146) | (−5.615) | (−4.081) | (−5.204) | (−4.351) | (−5.563) |
| $ROA_{t-1}$ | −0.007 | 0.001 | −0.046 | −0.009 | −0.026 | −0.010 |
| | (−0.023) | (0.019) | (−0.146) | (−0.101) | (−0.085) | (−0.113) |
| $ACC_{t-1}$ | −0.210 | 0.006 | 0.041 | 0.063 | −0.422 | −0.149 |
| | (−0.586) | (0.046) | (0.116) | (0.496) | (−1.165) | (−1.158) |
| $RET_{t-1}$ | 12.017*** | 4.498*** | 10.310*** | 4.084*** | 12.805*** | 4.701*** |
| | (3.340) | (3.865) | (3.097) | (3.559) | (3.669) | (3.956) |
| $SIGMA_{t-1}$ | 0.105 | −0.015 | −0.708 | −0.276 | 0.030 | 0.052 |
| | (0.195) | (−0.077) | (−1.228) | (−1.360) | (0.048) | (0.242) |
| Constant | −8.880*** | −3.826*** | −5.170*** | −2.499*** | −7.674*** | −3.612*** |
| | (−4.517) | (−5.508) | (−2.730) | (−3.813) | (−4.148) | (−5.842) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 6,096 | 6,096 | 6,865 | 6,865 | 6,696 | 6,696 |
| Adj.R-squared | 0.078 | 0.105 | 0.080 | 0.104 | 0.091 | 0.110 |

Note: This table presents the results from the OLS regression of the impact of alternative connections on future stock price crash risk. Columns (1) and (2) contain the results for the regressions with the Financial Supervisory Service (FSS) connected firms. Columns (3) and (4) contain the results for the regressions with the Supreme Prosecutor's Office (SPO) connected firms. Columns (5) and (6) contain the results for the regressions with the Ministry of Justice (MOJ) connected firms. All results are with the NTS connected firms and control sample using 1:1 matching and include controls, year, and firm fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

of Ministry of Justice of Korea). First, Financial Supervisory Service of Korea, though similar to SEC of the United States, has no investigation right. Therefore, they have no authorities to directly affect the firm. Second, Ministry of Justice also has no authority to directly investigate the firm unless the firm is accused of guilty from the Prosecutor's office. If our assumption is true, then the manager's connection with other influential institutions which do not have a direct effect on the firm value would not affect the manager's bad news hiding behavior.

The results are shown in Table 8. The regression result confirms the hypothesis and supports our baseline regression. Regardless of other connections we choose, we find that those connections do not necessarily affect the future stock price crash risks. Interestingly, the result is not observed for the manager's connection to the Attorney General of Korea. Since the Prosecutor's office can investigate the accuse the firm, one may argue that the result should be significant. However, the prosecution is also possible when there is sufficient evidence of corporate crimes, and the Prosecutor's office is in charge of other non-corporate crimes too while the NTS can investigate the firm before having sufficient evidences, and the institution is established solely to investigate the corporate crimes.

## 6. CONCLUSION

This article empirically examines how the presence of a relationship between a CEO and the commissioner of the financial regulator affects the firm's future stock price crash risk. Using a sample of listed Korean firms over a period spanning from 1999 to 2017, we find that connected managers tended to hide and hoard bad news more than non-connected managers. This may be because, as connected managers feel protected by the belief that the commissioner will not monitor or investigate them, those managers try to take advantage by hiding some negative information.

Further to the baseline results, we also examine whether a firm's ownership structure influences the future stock price crash risk. Using Chaebol and non-Chaebol groups to classify our observations, we find that the effect of NTS connected managers on stock price crash risk is predetermined by a firm's ownership structure. Specifically, the relationship is observed only when the firm is non-Chaebol. As Chaebol firms are controlled and monitored by Chaebol family groups, it is difficult for CEOs to make decisions that favor him- or herself, even when the CEO has a personal connection with the commissioner of the NTS. Secondly, this article investigated whether or not a firm's level of financial constraint affects the relationship.

Supporting the main idea, we found that connected managers of budget constrained firms are more likely to hide negative news.

Our study assumes that managers take advantage of their personal networks in making decisions. Among numerous connections, managers know which connection would help them hide and hoard negative information. As crash risks occur largely due to agency costs between managers and shareholders, managers would rely on connections that may increase agency costs. The NTS is therefore a valid identification in this study as the NTS can directly affect a firm's value through tax investigations. If that is true, then a manager's connections with other influential institutions, such as the Public Prosecutor's Office, Ministry of Justice or Financial Supervisory Service should not affect the CEO's behavior to hide negative news. Our further analysis also shows that the NTS is the only significant institution that directly affects a manager's bad news hoarding behavior, and connections with other institutions do not necessarily cause the behavior to occur. That is, among the many connections that managers may made during their school lives, they are aware of which connections are helpful in making decisions for their own benefit at the expense of other shareholders.

This research contributes to the growing body of research on CEO's behavior characteristics, specifically, the effects of CEOs' networks on firm-level decisions. While prior studies focused on the effect of political connections on a firm's crash risk (Piotroski et al., 2015; Lee and Wang, 2017; Luo et al., 2016), this paper uses a unique connection with commission of the NTS, which can directly affect the firm value. Therefore, this research may be used to understand the nature of connections in Korea, its financial institutions, and the interaction between firm and politics.

We believe that there are two potential implications of the research. First implication is for policy makers. Since the tax investigation is a significant risk for firms, knowing whether or not the firm would receive a tax investigation prior to the shock - through political connection between CEOs and the commissioner of the National Tax Service — undermines the market efficiency. As we provide empirical evidence that managers take advantage of the connections to intentionally withhold negative news, policy makers should consider providing guidelines to monitor connected firms. Another implication is for investors. As a crash risk implies a significantly negative drop of the stock price, it is harmful for investors' portfolio. Therefore, we show that investors should be more careful in including connected firms into their investment portfolio as such firms have increased likelihoods of stock price crash risk.

## APPENDIX: A.

**Regression analysis of the effect of NTS connection on stock price crash risk with non-PSM sample.**

| | (1) $NCSKEW_t$ | (2) $DUVOL_t$ |
|---|---|---|
| $NTS-CON_{t-1}$ | 0.038 | $0.026^{*}$ |
| | (0.901) | (1.703) |
| $NCSKEW_{t-1}$ | $-0.040^{***}$ | $-0.010^{**}$ |
| | $(-3.155)$ | $(-2.347)$ |
| $SIZE_{t-1}$ | $0.347^{***}$ | $0.151^{***}$ |
| | (8.706) | (10.961) |
| $DTURN_{t-1}$ | $-0.857^{**}$ | $-0.246^{*}$ |
| | $(-2.037)$ | $(-1.688)$ |
| $MTB_{t-1}$ | $0.008^{***}$ | $0.003^{***}$ |
| | (3.162) | (3.364) |
| $LEV_{t-1}$ | $-1.117^{***}$ | $-0.451^{***}$ |
| | $(-7.419)$ | $(-9.187)$ |
| $ROA_{t-1}$ | $0.385^{*}$ | 0.106 |
| | (1.655) | (1.551) |
| $ACC_{t-1}$ | 0.104 | 0.021 |
| | (0.567) | (0.325) |
| $RET_{t-1}$ | $11.961^{***}$ | $4.485^{***}$ |
| | (5.906) | (6.783) |
| $SIGMA_{t-1}$ | 0.263 | 0.072 |
| | (0.944) | (0.764) |
| Constant | $-8.067^{***}$ | $-3.527^{***}$ |
| | $(-7.746)$ | $(-9.714)$ |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |
| Observations | 18,870 | 18,870 |
| Adj.R-squared | 0.055 | 0.081 |

Note: This table presents the results from the OLS regression of the impact of NTS Connection on future stock price crash risk. All results include controls, year, and firm fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

## REFERENCES

An, H. and T. Zhang, 2013. Stock price synchronicity, crash risk, and institutional investors. *Journal of Corporate Finance* **21**, 1-15.

Armstrong, C. S., A. D. Jagolinzer, and D. F. Larcker, 2010. Chief executive officer equity incentives and accounting irregularities. *Journal of Accounting Research* **48(2)**, 225-271.

Baek, J. S., J. K. Kang, and I. Lee, 2006. Business groups and tunneling: Evidence from private securities offerings by Korean chaebols. *The Journal of Finance* **61(5)**, 2415-2449.

Bao, D., S. Y. K. Fung, and L. Su, 2018. Can shareholders be at rest after adopting clawback provisions? Evidence from stock price crash risk. *Contemporary Accounting Research* **35(3)**, 1578-1615.

Bertrand, M., F. Kramarz, A. Schoar, and D. Thesmar, 2018. The cost of political connections. *Review of Finance* **22(3)**, 849-876.

Black, B. S., H. Jang, and W. Kim, 2006. Predicting firms' corporate governance choices: Evidence from Korea. *Journal of corporate finance* **12(3)**, 660-691.

Callen, J. L. and X. Fang, 2013. Institutional investor stability and crash risk: Monitoring versus short-termism? *Journal of Banking & Finance* **37(8)**, 3047-3063.

Campbell II, T. L. and P. Y. Keys, 2002. Corporate governance in South Korea: the chaebol experience. *Journal of corporate Finance* **8(4)**, 373-391.

Chaney, P. K., M. Faccio, and D. Parsley, 2011. The quality of accounting information in politically connected firms. *Journal of accounting and Economics* **51(1-2)**, 58-76.

Chen, J., H. Hong, and J. C. Stein, 2001. Forecasting crashes: Trading volume, past returns, and conditional skewness in stock prices. *Journal of financial Economics* **61(3)**, 345-381.

Choi, S. and H. Jung, 2020. Director liability reduction and stock price crash risk: Evidence from Korea. *International Review of Finance*.

Correia, M. M., 2014. Political connections and SEC enforcement. *Journal of Accounting and Economics* **57(2-3)**, 241-262.

Dechow, P. M., R. G. Sloan, and A. P. Sweeney, 1995. Detecting earnings management. *Accounting review*, 193-225.

Dimson, E., 1979. Risk measurement when shares are subject to infrequent trading. *Journal of Financial Economics* **7(2)**, 197-226.

Duchin, R. and D. Sosyura, 2012. The politics of government investment. *Journal of Financial Economics* **106(1)**, 24-48.

Faccio, M., R. W. Masulis, and J. J. McConnell, 2006. Political connections and corporate bailouts. *The Journal of Finance* **61(6)**, 2597-2635.

Fisman, R. and Y. Wang, 2015. The mortality cost of political connections. *The Review of Economic Studies* **82(4)**, 1346-1382.

He, G. and H. Ren, 2017. Financial constraints and future stock price crash risk. *SSRN Electronic Journal*.

Hutton, A. P., A. J. Marcus, and H. Tehranian, 2009. Opaque financial reports, R2, and crash risk. *Journal of financial Economics* **94(1)**, 67-86.

Jeon, K., Y. Kim, and Y. Shin, 2017. A Study on the Change of the Tax Avoidance Level before and after the Tax Investigation. *Korean Journal of Taxation Research* **34(1)**, 107-147.

Jin, L. and S. C. Myers, 2006. R2 around the world: New theory and new tests. *Journal of financial Economics* **79(2)**, 257-292.

Judge, G. G., R. C. Hill, W. E. Griffiths, H. Lütkepohl, and T. C. Lee, 1988. Introduction to the Theory and Practice of Econometrics (No. 330.015195 I61 1988). J. Wiley.

Jung, K. and B. Hwang, 2019. The Impact of the Disclosure of tax Penalty on the Reputation Expenses. *Korean Journal of Taxation Research* **36(4)**, 147-168.

Karpoff, J. M., D. S. Lee, and G. S. Martin, 2008. The cost to firms of cooking the books. *Journal of financial and quantitative analysis* **43(3)**, 581-611.

Kedia, S. and S. Rajgopal, 2011. Do the SEC's enforcement preferences affect corporate misconduct? *Journal of Accounting and Economics* **51(3)**, 259-278.

Khwaja, A. I. and A. Mian, 2005. Do lenders favor politically connected firms? Rent provision in an emerging financial market. *The Quarterly Journal of Economics* **120(4)**, 1371-1411.

Kim, J. B., Y. Li, and L. Zhang, 2011. CFOs versus CEOs: Equity incentives and crashes. *Journal of financial economics* **101(3)**, 713-730.

Kim, J. B., Y. Li, and L. Zhang, 2011. Corporate tax avoidance and stock price crash risk: Firm-level analysis. *Journal of Financial Economics* **100(3)**, 639-662.

Kim, J. B., Z. Wang, and L. Zhang, 2016. CEO overconfidence and stock price crash risk. *Contemporary Accounting Research* **33(4)**, 1720-1749.

Kim, Y., H. Li, and S. Li, 2014. Corporate social responsibility and stock price crash risk. *Journal of Banking & Finance* **43**, 1-13.

Kothari, S. P., S. Shu, and P. D. Wysocki, 2009. Do managers withhold bad news? *Journal of Accounting research* **47(1)**, 241-276.

Kwon, S., T. Jung, H. Y. Sunwoo, and S. G. Yim, 2019. Does Stock Price Crash of Firms in the Same Business Group Cause Stock Price Crash in Other Member Firm? Evidence from Korea. *Emerging Markets Finance and Trade* **55(7)**, 1566-1592.

Lee, W. and L. Wang, 2017. Do political connections affect stock price crash risk? Firm-level evidence from China. *Review of Quantitative Finance and Accounting* **48(3)**, 643-676.

Leuz, C. and F. Oberholzer-Gee, 2006. Political relationships, global financing, and corporate transparency: Evidence from Indonesia. *Journal of financial economics* **81(2)**, 411-439.

Li, S., X. Song, and H. Wu, 2015. Political connection, ownership structure, and corporate philanthropy in China: A strategic-political perspective. *Journal of Business Ethics* **129(2)**, 399-411.

Lim, H., S. K. Kang, and H. Kim, 2016. Auditor quality, IFRS adoption, and stock price crash risk: Korean evidence. *Emerging Markets Finance and Trade* **52(9)**, 2100-2114.

Luo, J. H., M. Gong, Y. Lin, and Q. Fang, 2016. Political connections and stock price crash risk: evidence from China. *Economics Letters* **147**, 90-92.

Piotroski, J. D., T. J. Wong, and T. Zhang, 2015. Political incentives to suppress negative information: Evidence from Chinese listed firms. *Journal of Accounting Research* **53(2)**, 405-459.

Roberts, M. R. and T. M. Whited, 2013. Endogeneity in empirical corporate finance1. In Handbook of the Economics of Finance (Vol. 2, pp. 493-572). Elsevier.

Rosenbaum, P. R. and D. B. Rubin, 1983. The central role of the propensity score in observational studies for causal effects. *Biometrika* **70(1)**, 41-55.

Schoenherr, D., 2019. Political connections and allocative distortions. *The Journal of Finance* **74(2)**, 543-586.

Shim, C., J. Lee, and J. Kim, 2013. Tax avoidance and firm valuation by the tax investigation. *Accounting Information Review* **31(4)**, 81-104.

Wen, F., L. Xu, B. Chen, X. Xia, and J. Li, 2019. Heterogeneous institutional investors, short selling and stock price crash risk: Evidence from China. *Emerging Markets Finance and Trade*, 1-14.

Yin, Y. and R. Tian, 2017. Investor sentiment, financial report quality and stock price crash risk: Role of short-sales constraints. *Emerging Markets Finance and Trade* **53(3)**, 493-510.

Zhang, H., B. Arda, Y. Lu, and S. Miao, 2018. Stock Liquidity and Price Crash Risk: Evidence from a Kernel Matching Approach. *Annals of Economics and Finance* **19(2)**, 653-681.