Why do U.S. CEOs pledge their own company's stock?

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Abstract

Between 2007 and 2016, 7.6% of publicly listed U.S. firms disclosed that their CEOs had pledged company stock as collateral for a loan. On average, CEOs pledge 38% of their shares. The mean loan value is an economically sizeable $65 million. CEOs use the funds to either double down (6.0%), hedge their ownership (3.5%), or to obtain liquidity while maintaining ownership (90.5%). My event study results reveal that stock market participants view pledging as value-enhancing, but perceive significant pledging as value-destroying. Similarly, I find no evidence of its negative shareholder value consequences, except for CEOs who engage in significant pledging.

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1. Introduction

Compensation committees and executive compensation consultants think carefully about the level of CEO compensation and ownership. I find that in 2018, 83% of S&P 1500 companies had share ownership requirements and 45% of their CEOs' total compensation was in the form of stock awards. However, CEOs can alter their effective ownership by pledging shares for margin loans. Pledging allows the owner of shares to put them up as collateral to a third party in exchange for cash. Between 2007 and 2016, many large U.S. firms, including Fedex, Marriott, Oracle, Starbucks, and Tesla, were led by CEOs who pledged shares. Forced sales due to unmet margin calls during the financial crisis of 2007/2008 uncovered several CEOs who used pledging to build a leveraged position in their company stock (i.e., to double down) or to hedge their ownership. As a result, Institutional Shareholder Services (ISS), the largest proxy advisory firm, took a strong stance against pledging. Since 2009, when ISS made its first official statement concerning pledging, its view remains that "[...] any amount of pledged stock is not a responsible use of company equity" (Institutional Shareholder Services, 2018).

My paper is the first large-scale empirical analysis of the pledging phenomenon among U.S. CEOs. In contrast to previous research on this topic, I focus on understanding the motives for pledging, before moving to an analysis of its shareholder value consequences. I identify three main motives for pledging based on the use of funds obtained through it. CEOs might use the proceeds from pledging to increase their position in company stock, they might monetize wealth tied up in the firm while maintaining ownership, or they might hedge through prepaid variable forwards (PVFs).[1] These different uses have different implications for effective CEO ownership and thus different predictions for how CEO behavior may change because of pledging.

I carefully document the relative incidence of each CEO's motive as well as the shareholder value consequences of the most prevalent one. I find that 90.5% of firm-year observations with a pledging CEO belong to the monetizing group. The second most common use of funds, accounting for 6.0% of firm-year observations, is to double down. It is followed by hedging which accounts, perhaps surprisingly, for only 3.5% of my sample. I find that ex post, monetizing CEOs rarely lose their exposure to company stock due to margin-call-induced sales. Therefore, even if the loans were non-recourse[2], for the vast majority of pledging CEOs, pledging is not associated

[1] A PVF is equivalent to a zero-cost collar combined with a zero-coupon loan. Economically, it allows the CEO to hedge against future stock price uncertainty.

[2] If a margin loan is non-recourse, the most a borrower can lose in case of default are the shares put up to secure a loan.

with a decreased exposure to company stock.

My analysis is based on a comprehensive sample of CEOs who have pledged their shares since 2007, which is the first full year pledging disclosure by insiders has been mandated by the Securities and Exchange Commission (SEC). Between 2007 and 2016, 7.6% of CRSP-Compustat firms have experienced at least one year during which their CEO pledged shares. Firms with pledging CEOs tend to be larger, more leveraged, as well as more successful than other CRSP-Compustat firms. Conditional on pledging, CEOs pledge on average 38% of their shares. The mean (median) value of margin loans is an economically sizeable $65 million ($4.9 million) considering that the mean (median) total compensation for CEOs of S&P 1500 companies over fiscal years 2006-2015 equalled $5.9 million (3.8 million). The average magnitude of a single pledging transaction is approximately 60 times larger than an average open-market sale transaction initiated by the same CEO within the year preceding pledging initiation. The total dollar amount pledged aggregated across all U.S. CEOs each year is substantial and fluctuates between $7.8 billion and $19.3 billion.

The motives for pledging vary not only across but also within the three categories of pledging CEOs. The first group of CEOs, doubling-down CEOs, is comprised of CEOs who increase their exposure to company-specific risk by taking a leveraged position in company stock. CEOs might choose to do so if they believe to have positive private information about future performance even at the cost of being exposed to additional company-specific risk. Alternatively, signaling (e.g., Babenko, Tserlukevich, and Vedrashko (2012)), overconfidence (e.g., Malmendier and Tate (2005)), or the desire to increase voting power (e.g., Bach and Metzger (2018)) might explain why CEOs increase their ownership.

The second group of CEOs, monetizing CEOs, are CEOs who pledge shares without changing their effective ownership.[3] Thanks to pledging, these CEOs can access some portion of their wealth tied up in the company without having to sell their shares. Pledging can be valuable to founder-CEOs, who account for approximately one third of my sample of pledgers, because it allows them to retain the voting power over the pledged shares. It also avoids immediate public scrutiny, as insiders are only required to report shares pledged as of the record date of

[3]The only circumstance when pledging to monetize could cause the effective ownership to change would be if a stock price drop triggered a margin call that resulted in a forced sale of shares either by the CEO attempting to meet it, or by the lender if the CEO defaulted on the loan.

the proxy statement, and not within two business days as required after open-market sales.[4]

The third group of CEOs, hedging CEOs, consists of CEOs who enter into hedging transactions (the disclosure of which is mandatory within two business days), such as PVF contracts, which involve pledges of the underlying company equity securities as collateral. These CEOs could be using pledging to decrease the risk associated with concentrating wealth in a single asset.[5] Their decision might also be driven by negative inside information or uncertainty about future firm performance.

I next analyze the determinants of pledging. I first show that pledging is a voluntary decision of CEOs that is not driven by stock ownership requirements or an insufficient number of vested shares. Finding that pledging is voluntary and that the most prevalent motive of CEOs is to monetize their equity stake leads to the question of why do CEOs choose pledging over selling shares. I examine the relative importance of variables proxying for the cost of open-market sales of shares versus variables proxying for the opposition to pledging mainly propagated by proxy advisory firms. My results indicate that pledging is more common in larger firms, firms with higher leverage, firms led by founders, firms that have experienced a considerable stock price appreciation, firms with higher CEO ownership, firms led by CEOs with longer tenure, firms with a history of poor liquidity, and firms with larger boards. I also find that institutional ownership, the number of analysts, and the proportion of the board represented by independent directors are associated with a lower probability of pledging, but the economic magnitude of these effects is small. My results suggest that the decision to pledge principally depends on an executive's preference for avoiding open-market sales and is only to a minor extent determined by outside pressure against the practice.

I analyze returns in the 250 trading days surrounding the initiation of pledging transactions to address the concern that CEOs who use pledging to access liquidity might use the proceeds from pledging to purchase certain perquisites that could have a distracting effect and lead to inferior shareholder returns (see e.g., Yermack (2006)). I find that the largest group of

[4]CEOs who unwind their pledging shortly before the record date might be able to fully avoid pledging disclosure. This strategy is, however, impeded by the fact that certain forms that also contain the beneficial ownership section have to be filed upon occurrence of certain corporate events. For example, my sample also contains proxy statements relating to a merger, acquisition, or disposition (Forms PREM14A and DEFM14A) or contested solicitations (Forms PREC14A and DEFC14A). Some of the listed events occur relatively frequently and are unlikely to be under control of management. For approximately 3.2% of CEOs, the first time pledging is disclosed is via forms other than DEF 14A. Stricter disclosure requirements might uncover more CEOs who pledge shares.

[5]I define hedging transactions as those that "[...] hedge or offset, or are designed to hedge or offset, any decrease in the market value of equity securities granted as compensation, or held directly or indirectly by the employee or director" (Securities and Exchange Commission, 2018).

CEOs, monetizing CEOs, initiates margin loans following good firm performance and that their companies continue to perform well in the post-initiation period.[6] I also measure performance in excess of multiple benchmarks (such as industry returns, and equal- and value-weighted market returns) and find evidence consistent with the raw return patterns. The alternative benchmarks can be useful for gaining insight into the nature of the information held by the monetizing CEO at the time of margin loan initiation that influences the decision to pledge or to sell (i.e., whether the information relates to the firm, its industry competitors, or to the market as a whole). However, I am not able to conclude that pledging CEOs earn alpha on a risk-adjusted basis, i.e., whether they incorporate information in their decisions above and beyond the information contained in observable firm characteristics, such as their exposure to the market factor, firm size, book-to-market ratio, and immediate past returns. The reason is that the exact initiation date is unobservable. Pledging becomes publicly known only once the proxy statement is filed. I find that a trading strategy of investing in firms with pledging CEOs does not achieve economically meaningful risk-adjusted returns.

ISS, as a part of the RiskMetrics Group, has been speaking out against share pledging since at least 2009 and, as an important proxy advisor, likely contributed to shaping the general attitude towards the practice (RiskMetrics Group, 2009). To better understand the negative view on share pledging, I look at two often-voiced concerns associated with it. The first concern is that pledging could affect CEOs' risk-taking incentives. For example, hedging CEOs could be more likely to implement riskier corporate policies. The same could be expected of CEOs who are monetizing and investing the proceeds into assets that diversify their total personal wealth. On the other hand, CEOs who are monetizing and investing the proceeds into assets that do not have a diversifying effect could be more likely to implement conservative corporate policies. In the analysis of the riskiness of corporate policies, I study monetizing CEOs in a setting in which their firms are in an industry downturn. In this setting, the probability of receiving a margin call increases. In the event of a margin call, the CEO can add more company stock, substitute other collateral, or agree to reduce the loan amount. If the non-diversifying use of proceeds from monetizing dominates, one would expect CEOs who fear a margin call to implement conservative corporate policies. I examine firm diversification, R&D intensity, as well as capital expenditures and find no evidence suggesting changes in the risk-taking appetite.

[6] I study returns over the following time windows: [-250 to -1], [-60 to -1], [0 to +60], and [0 to +250], where 0 corresponds to the observed (or assumed if unobservable) start date of the margin loan.

This could be explained by either pledging not having any effect on the riskiness of the studied corporate policies or by monetizing CEOs equally representing diversifying and non-diversifying groups.

The second concern is the effect of margin-call-induced share sales on the company's stock price. The concern is that pledging a significant amount of company stock may cause pressure on the stock price if the executive is forced to sell shares to meet a margin call or if the executive cannot meet a margin call and the lender sells shares to repay the loan. I use the global financial crisis as a large negative shock to stock prices. I examine stock returns between the end of May 2008 and the end of October 2008 to test whether pledging exacerbates firms' stock price declines. I find that firms with heavily pledged CEOs experience steeper stock price declines.[7] In particular, I find that a one standard deviation change in the fraction of shares pledged (corresponding to 13.9%) is associated with returns that are 2.9 percentage points lower.

Finally, I identify two important events related to share pledging that allow me to study the stock market's perception of the practice. Both events are based on the treatment of pledging in the 2013 U.S. Proxy Voting Guidelines issued by ISS. The first event (when ISS issued the *proposed* guidelines) allows me to test whether stock market participants would welcome a blanket prohibition of pledging. The second event (when ISS issued the amended *final* guidelines) allows me to test whether shareholders are concerned about CEOs' pledging only when they pledge a significant amount of company stock.[8] The events took place on October 15, 2012 and November 16, 2012, respectively.[9]

If allowing pledging is optimal and adds value, one would expect negative returns on the day the proposed guidelines are released. Pledging might be optimal when the alternative to pledging is selling shares in the open market. In such cases, pledging preserves "skin in the game". In contrast, if allowing pledging is suboptimal and reduces value, one would expect positive returns when the guidelines are released because the probability of a pledging ban goes up. The proposed guidelines suggested that ISS would oppose pledging of stock seemingly in

[7] I use the terms "heavily pledged CEOs" and "CEOs with significant pledging" interchangeably. I use the two terms to refer to pledging in excess of 75% of shares held. I base the 75% threshold on Dou, Masulis, and Zein (2019) who study pledging in the Taiwanese market. Abstracting from the many differences between the two markets, it is likely to be a reasonable estimate for what consitutes significant pledging from the shareholder perespective also for the U.S. market. Dou et al. (2019) suggest that a stock price fall of 28% would be a reasonable estimate for a stock price change that would trigger margin calls. The threshold is based on a loan-to-value (LTV) ratio of 60% and a 120% over-collateralization requirement and is calculated as 1-(0.6x1.2).

[8] Pledging a significant amount of company stock refers to pledging in excess of 1% of shares outstanding.

[9] ISS prepares the proxy voting guidelines several months ahead of the proxy season. The 2013 U.S. Proxy Voting Guidelines became effective for meetings on or after February 1, 2013.

all cases regardless of the specific company circumstances or the CEO's financial situation. I examine abnormal returns surrounding the day of guidelines' announcement. I compare the cumulative abnormal returns of a portfolio consisting of firms led by a pledging CEO during the 2012 proxy season (treatment group) to the cumulative abnormal returns of a portfolio consisting of firms not led by a pledging CEO during the 2012 proxy season (control group). I observe more negative announcement returns for the treatment group. In particular, the magnitude of the stock market reaction ranges from -0.40% to -0.11% for a long-short portfolio of treatment minus control firms, revealing that stock market participants perceive pledging by CEOs to be value-enhancing and seem to oppose a blanket prohibition of the practice. This result is driven by the monetizing group of pledging CEOs, which suggests that shareholders value the economic exposure preserved by pledging.

The second, final, guidelines released approximately one month later (following a comment period during which multiple objections regarding the treatment of pledging were raised) changed the blanket opposition to the practice to only apply to significant pledging of company stock which would be evaluated on a case-by-case basis. To measure the reaction to this announcement, I compare the cumulative abnormal returns of a portfolio consisting of firms led by a pledging CEO who pledged more than 1% of shares outstanding during the 2012 proxy season (treatment group) to the cumulative abnormal returns of a portfolio consisting of firms not led by a pledging CEO during the 2012 proxy season (control group). The economic magnitude of the reaction ranges from 0.50% to 1.0% for a long-short portfolio of treatment minus control firms, which suggests that shareholders become concerned when CEOs pledge a significant amount of shares. My results show that depending on the magnitude of pledging, shareholder concerns about pledging vary to an economically large extent. Because the control firms used in the analysis involve firms for which (significant) pledging might become relevant in the future, it is possible that the measured abnormal returns could be underestimating the true impact of the policy changes.

The differentiation between CEOs who pledge shares to double down, monetize, or hedge is novel and allows me to shed light on the debate of whether pledging CEOs are reducing their exposure. While previous research has studied the shareholder wealth consequences of insider pledging of company stock as collateral for personal loans mostly in markets other than the

U.S., it has not distinguished between these three arguably different purposes of pledging.[10] In addition, the U.S. market is very different from other markets used to study pledging in prior studies. It is characterized by higher governance standards as well as stricter disclosure requirements. It is therefore unclear whether one can extrapolate from evidence based on Taiwanese, Indian, or Chinese data to the U.S. market.[11]

This paper also relates to the literature on how CEOs hedge their personal portfolios (e.g., Bettis, Bizjak, and Lemmon (2001), Jagolinzer, Matsunaga, and Yeung (2007), Bettis, Bizjak, and Kalpathy (2015)). I show that, although important, share pledging to hedge is used only by a small subset of pledging CEOs. Last but not least, this paper presents an analysis of an additional factor to be considered in the ongoing debate regarding the optimal structure of CEO compensation and incentives (e.g., Jensen and Murphy (1990), Edmans, Gabaix, and Jenter (2017)).

2. Hypothesis development

Before moving to the discussion of the various motives for and consequences of pledging, it is important to establish whether or not pledging is a voluntary decision of CEOs. I define pledging as voluntary if CEOs could sell the shares they pledged without breaching explicit restrictions applying to their stock holdings. For example, if a large portion of CEOs' stock was restricted, they would not be able to sell and would instead have to resort to share pledging if they needed liquidity. Alternatively, if a CEO works for a firm with minimum stock ownership requirements, he or she might use share pledging to raise funds to meet them. For instance, Kahle and Shastri (2004) provide an analysis of personal loans granted by companies to their executives prior to the Sarbanes-Oxley Act (SOX) of 2002. They show that stock purchase loans comprised as many as 39% of executive loans and, of those, 64% were backed by company stock. In the post-SOX environment, when firms were no longer allowed to grant loans to their executives, margin loans using shares as collateral might have replaced this channel. Thus, there exists the possibility that CEOs could be pledging shares as collateral to meet minimum stock ownership requirements imposed by their firms. I summarize these arguments under this

[10] See, e.g., Chen and Hu (2007), Anderson and Puleo (2015), Hwang, Qiao, and Ku (2016), Singh (2018a), Singh (2018b), Wang and Chou (2018), Chan, Chen, Hu, and Liu (2018), Meng, Ni, and Zhang (2018), DeJong, Liao, and Xie (2018), Dou et al. (2019), and Bae and Zhang (2019).

[11] See, e.g., Chen and Hu (2007), Singh (2018a), Wang and Chou (2018), Chan et al. (2018), Meng et al. (2018), DeJong et al. (2018), and Dou et al. (2019).

hypothesis below.

Hypothesis 1 ("Nature of the decision to pledge"): *Pledging of shares is a voluntary decision of CEOs.*

If CEOs' decision to pledge is voluntary, it is important to know which use of funds from pledging is the most prevalent. For example, finding that most CEOs use the proceeds from pledging to increase their position in company stock motivates a different policy response than finding that most CEOs hedge their ownership. I categorize CEOs who pledge shares into three groups – doubling-down, monetizing, and hedging CEOs – based on how they alter their exposure to company-specific risk. The ongoing policy debate focuses on the use of pledging as part of hedging transactions, i.e., transactions that allow CEOs to immunize against expected future performance downturns or uncertainty. Indeed, ISS stated in its proposed 2013 U.S. Proxy Voting Guidelines that "[...] pledging of shares may be utilized as part of hedging or monetization strategies that would potentially immunize an executive against economic exposure to the company's stock [...]" (Institutional Shareholder Services, 2012a). I therefore test whether most CEOs pledge with the aim of decreasing their exposure to company stock.

Hypothesis 2 ("Pledging to immunize"): *Most CEOs pledge shares to hedge their exposure to company-specific risk.*

If pledging is a voluntary decision and the most prevalent motive of CEOs is to monetize their equity stake, it is interesting to study why CEOs choose pledging over selling shares. From shareholders' perspective, share pledging can be beneficial for preserving CEOs' "skin in the game" if the alternative is selling shares in the open market. In addition, a margin loan is likely to be valuable to founder-CEOs because it allows them to access some of their wealth tied up in the company without having to give up control. For the same reason, one would expect pledging to be more common in firms with CEOs with a higher ownership stake. The probability of observing pledging can also be expected to be higher for CEOs with a longer tenure as CEOs with a longer tenure tend to have more wealth tied up in the firm as compared to newly hired CEOs.

Pledging to monetize might also be motivated by liquidity considerations. As shown by Fabisik, Fahlenbrach, Stulz, and Taillard (2018), liquidity history is an important determinant of insider ownership since insiders would not want to sell shares if it implied having a sizeable price impact. Therefore, CEOs in firms with a poor stock liquidity history might prefer to

pledge shares instead of selling them in the open market.

Finally, pledging to monetize might also be motivated by tax considerations (see e.g., Jin and Kothari (2008)). Pledging can be more tax efficient than an outright sale because it allows for the deferral of gains into future years (Larcker and Tayan, 2010). The value of deferring taxes increases as the time or return increase. I therefore expect pledging to be more common among CEOs whose firms experienced a considerable stock price appreciation since the start of their tenure.

Hypothesis 3a ("Pledging preference"): *Pledging is more common among CEOs facing higher (explicit or implicit) costs of open-market sales of shares.*

The ability of CEOs to pledge shares is shaped by several factors. ISS has been and still is speaking out against pledging since at least 2009. The pressure on board members of firms with pledging CEOs intensified in 2012 when ISS declared pledging to be a problematic practice and included it in a list of failures of risk oversight (Institutional Shareholder Services, 2012b). This rule change made board members accountable for significant pledging by directors and officers.[12] It might therefore be more difficult for a CEO to persuade the board to allow share pledging as it might jeopardize directors' re-election after the release of the final 2013 U.S. Proxy Voting Guidelines by ISS. Prior evidence suggests that proxy advisory firms have a significant influence on voting outcomes on director elections (see e.g., Cai, Garner, and Walkling (2009)) and executive compensation (Morgan, Poulsen, and Wolf (2006), Gow, Larcker, McCall, and Tayan (2013), Larcker, McCall, and Ormazabal (2015), Malenko and Shen (2016), Calluzzo and Dudley (2018), or Hayne and Vance (2019)). Another source of pressure to restrict pledging might be analyst coverage. If equity analysts share the negative attitude towards share pledging, the CEO or the chairman of the board might be confronted about the issue during analyst calls, leading to a greater pressure to adopt policies restricting the practice.

Hypothesis 3b ("Pledging ability"): *Pledging by CEOs is less common in firms facing a greater opposition to pledging.*

The preference for pledging might also be driven by the CEOs' expectations regarding their firms' future stock price performance. The decision of CEOs to double down might be driven by positive inside information. Monetizing CEOs who pledge a minor fraction of their holdings

[12]The threat turned out to be credible, since in 2018 alone, ISS issued a recommendation to vote against or withhold for 74 directors of Russell 3000 companies (Sullivan & Cromwell LLP, 2018).

are unlikely to be driven by specific directional expectations regarding the stock price, while those who pledge a significant portion of their holdings likely expect their firms to have stable performance or to outperform. This is based on the assumption that, in case of falling stock prices, a CEO with a high fraction of shares pledged would face a high risk of a margin call and would thus have been better off selling the shares in the open market. If pledging is a part of a hedging strategy one would expect strong firm performance prior to the initiations of hedging transactions followed by bad performance in the post-initiation period (Jagolinzer et al., 2007). If pledging is driven by the immunization motive, my prediction is that CEOs would use pledging as a part of a hedging strategy to lock in the gains prior to stock price declines.

Hypothesis 4 ("Firm stock price performance"): *If pledging by CEOs is driven by expectations about future stock price performance, one would expect*
(a) strong stock price performance in firms with CEOs who are doubling down,
(b) stable or strong stock price performance in firms with CEOs who are monetizing,
(c) deteriorating stock price performance in firms with CEOs who are hedging.

CEOs' pledging of company stock can change their exposure to company stock and hence, their risk-taking incentives. On the one hand, if pledging reduces CEOs' exposure, we should observe increased risk-taking. This channel has been studied by e.g., Bettis et al. (2015) in a study of PVFs, zero-cost collars, exchange funds, and equity swaps. Prior research on pledging includes e.g., Chen and Hu (2007) who develop a model that allows the controlling shareholder to finance company projects through personal loans. The authors find that it creates an incentive to pursue risky projects and find support for this hypothesis using Taiwanese data. Anderson and Puleo (2015) focus on insiders in S&P 1500 firms and find evidence of a positive relation between pledging and firm risk, measured by the standard deviation of stock returns.[13]

On the other hand, if CEOs are worried about potential margin calls, they could be implementing conservative firm policies. Meng et al. (2018) study pledging in China and find evidence that share pledging is associated with less volatile earnings and reduced R&D expenditures. Dou et al. (2019) study pledging in Taiwan, where pledging is made on a recourse basis, and similarly find pledging to be associated with reduced risk-taking.

[13]Similarly to Anderson and Puleo (2015), a recent work by Singh (2018b) also focuses on pledging by insiders in S&P 1500 firms and studies pledging in relation to earnings management.

Hypothesis 5 ("Firm risk-taking"): *CEOs who pledge shares are likely to implement*

(a) riskier corporate policies if they are hedging,

(b) riskier corporate policies if they are monetizing and investing the proceeds into assets that diversify their total personal wealth,

(c) less risky corporate policies if they are monetizing and investing the proceeds into assets that do not diversify their total personal wealth.

Lastly, I focus on the concern that pledging a significant amount of company stock as collateral for a loan may have an additional negative effect on the company's stock price if there is a forced sale of company stock to meet a margin call (see e.g., Institutional Shareholder Services (2012a), Dou et al. (2019)). This concern, also sometimes referred to as the increased tail risk, is mentioned in multiple shareholder proposals requiring the introduction of a ban on pledging.[14]

Hypothesis 6 ("Crash risk"): *Share price declines of firms with pledging CEOs become exacerbated by the additional price pressure due to margin calls.*

3. Data and descriptive statistics

I begin by describing how I construct the dataset of pledging CEOs. I then describe how I classify pledging CEOs. Next, I describe additional variables used in my empirical analysis. I conclude the section with summary statistics.

3.1. Data on pledging CEOs

I identify pledging CEOs through keyword searches of the footnotes of the beneficial ownership section in firms' proxy statements, accessible via the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database. The pledging disclosure requirement was implemented in August 2006 when the SEC amended Item 403 of Regulations S-K and S-B to require footnote disclosure of the number of shares pledged as collateral by named executive officers, directors, and director nominees (Securities and Exchange Commission, 2006). My sample consists of the universe of all firms reporting to the SEC over the calendar years 2007-2016.

[14] See, e.g., the filing by Amalgamated Bank's LongView Funds asking FedEx Corporation to prohibit company insiders from hedging or pledging company stock (Amalgamated Bank LongView Funds, 2013).

Firms with annual shareholder meetings later than August 2006 are impacted by the disclosure in 2006, but because the calendar year 2007 is the first year in which all firms are required to report insiders' pledging activity, I use 2007 as the first year of my sample. To be part of the sample, data must be available from the Center for Research in Security Prices (CRSP) and Compustat. In the initial phase of data collection, I use an algorithm to identify pledging CEOs and to extract the number of shares pledged by them. I use a number of regular expressions together with a standard tagger in named entity recognition (NER), the "Stanford NER tagger", to extract the number of shares pledged by the CEO. Since the disclosure is not standardized, I manually verify most of the data in the second phase.[15] My sample of pledging CEOs consists of 528 individuals, resulting in 1,904 firm-year observations for 501 different firms. 34 firms have a dual class share structure. Approximately 10% and 40% of firm-year observations belong to the S&P 500 index and S&P 1500 index, respectively.

In Table 1, I report the frequency of pledging CEOs by fiscal firm-years between 2006 and 2015. The fractions of firms (and firm-years) in Panel A reveal the representation of pledging CEOs in the universe of CRSP and Compustat firms. I find that 7.6% of firms experienced at least one year during which its CEO pledged shares. The breakdown by fiscal years in Panel B of Table 1 shows that the percentage of firms led by pledging CEOs fluctuates between 3.2% and 5.0%. Pledging CEOs are pledging shares for an average (median) duration of 3.7 (3.0) years. For CEOs whose tenure begins and ends within my sample period, the average (median) duration is 2.8 (2.0) years.

[Table 1 here]

Figure 1 shows fractions of shares pledged by pledging CEOs over the sample period.[16] The most frequent fraction of shares pledged by the CEO is 30-35%, followed by pledging in the range of 15-20% and 95-100%.

[Figure 1 here]

Table 2 shows that the mean (median) fraction of shares pledged by CEOs is 38.4% (30.2%). This is in line with the fraction of equity holdings hedged or pledged by insiders in previous

[15] In Appendix A, I provide a detailed description of the algorithm I use to extract the number of shares pledged as well as additional information about the data collection process.

[16] The fraction of shares pledged is defined as shares pledged over total shares owned.

studies. For example, Bettis et al. (2001) find that hedging transactions such as zero-cost collars and equity swaps allow insiders to reduce their ownership by about 25%; Jagolinzer et al. (2007) find that PVF transactions cover 30% of the insider's firm-specific wealth; Larcker and Tayan (2010) find that the average pledge transaction covers 44% of the insider's total holdings; Bettis et al. (2015) report that the average fraction of total insider equity holdings hedged is around 30%; Anderson and Puleo (2015) and Singh (2018b) report the mean fraction of shares pledged to be 33%. Interestingly, most studies based on Chinese, Indian, and Taiwanese data report fractions of shares pledged by insiders that are considerably lower.[17]

[Table 2 here]

3.2. Classifying pledging CEOs

I classify pledging CEOs into three groups – doubling-down CEOs, monetizing CEOs, and hedging CEOs – based on their transactions reported on the SEC's Form 4 filings.[18]

To identify CEOs who pledged shares to double down, I use all non-derivative transactions reported by the CEO and apply three criteria. The first criterion requires that the CEO has engaged in open market purchase transactions in the 12 months prior to or post the record date of the proxy statement. This criterion ensures that the increase in shares owned is driven by the CEO's trading behavior and not by e.g., grants or awards. It also allows for sufficient time for the CEO to build up the position as the exact initiation date of the margin loan is not publicly available information.

The second criterion requires that the CEO is a net buyer over the studied period. This criterion mitigates the risk of misclassifying a CEO as doubling-down if he or she purchased some company stock, but sold an equivalent or larger amount of it.

The third criterion requires that the change in shares owned over the studied period corresponds to at least 75% of the borrowed amount. Because the LTV ratio is not publicly available information, I assume that the amount of money received by the CEO for each pledged share equals 50% of the share price as of the record date. This criterion mitigates the risk of misclassifying a CEO as doubling-down who combine monetizing with small purchases of company stock.

[17] Specifically, Meng et al. (2018) report 19.7%; Dou et al. (2019) report 15.1%; Chan et al. (2018) report 7.6%; and Singh (2018a) reports 31.89%.

[18] Each CEO-year observation is assigned to one of the three categories.

Throughout the process, I control for corporate actions such as stock splits, stock dividends, etc. I apply this set of rules to all first-time observations of pledging by CEOs.

A CEO is classified as doubling-down in subsequent years only if he or she has been classified as such in the first year and if the above-listed criteria continue to apply. The only criterion that is subject to a minor adjustment is the third criterion. I require that the change in shares owned over the relevant period corresponds to at least 75% of the change in the change in the borrowed amount (and not the borrowed amount itself as in the case of first-time firm-year observations).

I assign a CEO to the hedging category if he or she entered into a hedging transaction. The disclosure of hedging contract initiation is mandatory and timely. It occurs via SEC Form 4, which must be filed before the end of the second business day following the transaction date. I search Form 4 filings for phrases indicating that the CEO entered into a PVF. Even though pledging is not a part of hedging strategies such as collars[19], swaps, exchange funds, or equity funds, in the presented summary statistics, I assign pledging CEOs to the hedging group if they entered into a PVF or into any of these transactions. This allows me to capture CEOs who potentially use a combination of hedging and pledging as a means of managing their idiosyncratic risk exposure.[20] The remaining pledging CEOs are assigned to the monetizing group. I find that 6.0% of pledging CEOs double down, 90.5% of them monetize, and 3.5% of them hedge.

The only group of pledging CEOs that is perfectly observable is the hedging group. To address potential concerns about the sensitivity of the classification to the criteria mentioned above, I perform multiple analyses. Amending the first criterion to capture only purchase transactions over the period spanning a maximum of six months around the record date results in a drop in the fraction of doubling-down CEOs from 6.0% to 2.4%. Next, I test the sensitivity of the classification to the presence of the other two criteria. When I keep only the first criterion, the fraction of doubling-down CEOs reaches 26.7%. I also analyze the sensitivity of the third criterion to the required percentage of shares purchased using the borrowed funds. Changing it from 75% to 35% results in a fraction of doubling-down CEOs equal to 6.7%. Lastly, omitting the third criterion would yield 18.3% firm-years with doubling-down CEOs. The conclusion from this sensitivity analysis is that the monetizing CEOs would still present the vast majority

[19] PVFs offer the option for cash or share settlement, so the transaction can also be economically viewed as a zero-cost collar combined with a zero-coupon loan as pointed out by Jagolinzer et al. (2007).

[20] In the following analyses, I focus only on hedging CEOs who entered into PVFs.

of pledging CEOs – exceeding two thirds of the sample of pledging CEOs under all scenarios.

But to what extent does pledging change the CEOs' exposure to the stock of their companies? Figure 2 provides a visualisation of the exposure changes for doubling-down and hedging CEOs. The median exposure change for the group of doubling-down CEOs is +21.8%. For hedging CEOs, the median exposure change is -23.5%. This simple visualization shows two interesting facts. The first is that most hedgers do not hedge most of their ownership. The second is that few doubling-down CEOs increase their exposure to company stock to an extent likely to cause excessive risk aversion.

[Figure 2 here]

3.3. Additional data sources and variable definitions

Apart from CRSP and Compustat, I merge my data with several additional databases. From the Institutional Brokers' Estimate System (I/B/E/S) database, I calculate the average number of analysts that issue forecasts about the firm's earnings during the fiscal year. Similar to Bettis et al. (2015), I use Thomson Financial's Securities Data Company (SDC) Platinum database to create a proxy for investment bank ties. The variable *Investment bank ties* is defined as the sum of mergers and acquisitions (M&As) and equity offerings (initial and seasoned equity offerings) undertaken by a firm in the three years prior to the occurrence of the pledging transaction.[21]

I obtain data on board size and board independence from the GMI Ratings database.[22] I also use the ISS database to enhance the data that is not contained in the GMI Ratings database. I further use the Thomson Reuters 13-F Filings database to obtain data on institutional ownership. The data on founder-CEO status is from Fahlenbrach (2009). Founder data in later periods is enriched using the GMI Ratings database. For pledging CEOs, I hand-collect data on CEO ownership. For non-pledging CEOs, I use data on CEO stock ownership from Lilienfeld-Toal and Ruenzi (2014).

I measure stock liquidity via a proxy developed by Amihud (2002).[23] In most analyses, I do not use the liquidity measure in its raw form, but instead use a measure derived from the

[21] When calculating the measure, I eliminate M&A transactions with a deal value below $1 million.

[22] The data is also known as The Corporate Library's Board Analyst database. GMI Ratings was formed in 2010 through the merger of GovernanceMetrics International, The Corporate Library and Audit Integrity.

[23] The calculation methodology of the illiquidity measure is detailed in Appendix B. In unreported robustness analyses, I also use the illiquidity measure developed by Fong, Holden, and Trzcinka (2017). Both measures reflect illiquidity and therefore a higher value of the measure corresponds to a lower liquidity.

one used in Fabisik et al. (2018). In particular, I use the relative number of high liquidity years accumulated over the past ten years. A given firm-year observation is categorized as "high liquidity" if the value of its Amihud measure lies in the bottom illiquidity quartile relative to the entire CRSP universe of firms in a given year.

To control for the capital gains tax motive, I compute the stock price appreciation since the beginning of the CEOs' tenure. I create a dummy variable equal to one if the stock price of the company where the CEO works appreciated by more than 25%, and zero otherwise. The results of my analyses are robust to variations of the selected stock price appreciation threshold.

3.4. Descriptive statistics

In Panel A of Table 3, I provide descriptive statistics for firms led by pledging CEOs as well as non-pledging CEOs and compare these two groups of firms along multiple firm and CEO characteristics. Several characteristics of the data are worth highlighting. Based on medians, firms led by pledging CEOs tend to be larger than other firms in the CRSP-Compustat database. Firms with pledging CEO are more leveraged (27% vs. 21%), but also less volatile and on average more successful when measured in terms of the fraction of firms that appreciated by more than 25% since the CEO took office. Based on the Amihud illiquidity measure, these firms tend to be more liquid than those with non-pledging CEOs. Firms with pledging CEOs are followed by a comparable number of analysts and have similar institutional ownership as other firms in the sample. In addition, their boards are slightly larger but less independent. Firms with pledging CEOs have interacted more frequently with investment banks over the past three years (1.8 times vs. 1.5 times). On average, 32% of pledging CEOs are founders, as compared to 11% in the non-pledging CEO sample. Pledging CEOs tend to have a significantly longer tenure (12.7 years vs. 8.5 years). One average, pledging CEOs also own significantly more of the firm's stock (11.3% vs. 5.7%).

[Table 3 here]

In Panel B of Table 3, I show descriptive statistics for the subsamples of doubling-down, monetizing, and hedging CEOs. Interestingly, firms with hedging CEOs tend to be the largest across the three groups. On the other hand, firms with doubling-down CEOs have the highest leverage and are the least profitable of the three groups. Firms with monetizing CEOs constitute the least liquid group of pledging CEOs. Hedging CEOs have the longest tenure (almost twice

that of doubling-down CEOs) and also have the highest stock ownership. The three groups of pledging CEOs are fairly similar across the characteristics such as investment bank ties, stock volatility, being led by founder CEOs, and CEO ownership.

4. Understanding the motives for share pledging

In this section, I first provide two analyses that show that the decision of CEOs to pledge shares is voluntary. Then, I proceed to the analysis of the various motives for pledging outlined in Section 2 and their empirical tests.

4.1. Nature of the decision to pledge shares

To address the question whether the decision to pledge shares is voluntary, i.e., whether CEOs could sell the amount of shares they pledged without breaching explicit restrictions applying to their stock holdings, I first focus on restricted stock. I match my data to the S&P's ExecuComp database that covers the current S&P 1500 companies and companies that used to be part of the index. I obtain a match on 47.4% of firm-year observations in my sample. When I test whether any portion of the shares pledged is coming from the pool of restricted stock, I find that for 92.4% of firm-year observations, the difference between the total number of shares owned and the restricted shares owned is larger than the number of shares pledged by the CEO. In addition, I find that many firms have strict guidelines in place related to permissible transactions with respect to restricted stock awards based on the results of my parsing algorithm. For example, a common disclosure states: "The Restricted Shares may not be sold, pledged, assigned or transferred in any manner; any such purported sale, pledge, assignment or transfer shall be void and of no effect." (Office Depot, Inc., 2012).

Second, to find out whether CEOs pledge shares as collateral to meet the minimum stock ownership requirements imposed by their firms, I analyze all firm-years in my sample in which the CEO's beneficial ownership lies below 3%. For ten firm-year observations that account for 0.5% of my entire sample, I find that the CEO is not meeting the minimum stock ownership requirements as of the record date. In all remaining cases, the CEO ownership lies well above the minimum stock ownership requirements, or the firms do not have any stock ownership guidelines in place. I therefore conclude that it is unlikely that pledging is used to meet minimum stock ownership requirements. Overall, the evidence lends support to the hypothesis that pledging of

shares is a voluntary decision of CEOs.

4.2. Determinants of the CEO's pledging decision

In this section, I use a marginal effects logit model with a CEO pledging indicator as the dependent variable to test to what extent firm and CEO characteristics influence the probability of share pledging by CEOs. I base my test on the hypotheses discussed in Section 2 and present results in Table 4. In Columns 1 and 2, I present results based on the full sample of pledging CEOs. In Columns 3 to 6, I present the results using the subsamples of monetizing CEOs split at the 75% threshold of shares pledged. I do not analyze the determinants for the doubling-down and the hedging groups due to the small sample size.

In the specification presented in uneven-numbered columns in Table 4, I first test whether CEO share pledging is related to firm size, book leverage, number of analysts following the firm, institutional ownership, stock volatility, and firm liquidity. In the specification presented in even-numbered columns in Table 4, I further include CEO-founder status, CEO stock ownership, investment bank ties, CEO tenure, board size and its independence as well as a dummy variable indicating whether the stock price appreciation since the beginning of CEO's tenure exceeds 25%. When interpreting the marginal effects, I use the specification in Column 2 as the baseline model unless indicated otherwise. The following analysis is based on the assumption that all other variables are held at their means.

The marginal effects of a logistic regression suggest that an average CEO who is also a founder has a 11.1% higher probability of pledging than an average non-founder CEO (13.9% as compared to 2.8%). I further find that a one standard deviation increase in CEO stock ownership (corresponding to 11.5%) increases the probability of observing pledging by the CEO by 0.8%. Pledging is also more prevalent in firms led by CEOs with a longer tenure. For example, the probability of observing pledging by the CEO is approximately 5.3% for a CEO with a five-year long tenure and 6.4% for a CEO with twice as long tenure. The definition of liquidity as the relative number of years spent in the high liquidity state over the past ten years allows me to estimate the effect of additional years on the probability of observing pledging. I find that the average CEO has twice as high probability to pledge shares if his or her firm experienced no year with high liquidity than if his or her firm had spent all ten years in the high liquidity state (4.4% as compared to 2.7%), holding all other variables at their means.

I find a negative effect of analyst coverage, institutional ownership as well as board indepen-

dence. In particular, I find that being followed by one more analyst decreases the probability of CEO pledging by 0.2%. A one standard deviation increase in institutional ownership (corresponding to 22.0%) decreases the probability of CEO pledging by 0.2%. A one standard deviation increase in board independence (corresponding to 14.2%) decreases the probability of having a pledging CEO by 0.3%. I find a positive effect of board size on the probability of observing pledging by the CEO. While larger boards exhibit higher potential for director free-riding (Jensen, 1993), in the context of pledging, having more members might translate into an increased probability that some of the directors are pledging shares as well. Adding one more board member increases the probability of observing pledging by the CEO by 0.3%.

I further find that pledging is more common in larger firms and firms with higher book leverage. Increasing firm size from \$1 billion to \$10 billion translates into an increase in the probability of observing pledging by the CEO by 5.6% (5.2% as compared to 10.8%). A one standard deviation increase in book leverage (corresponding to 19.9%) increases the probability of observing pledging by the CEO by 1.7%.[24] I also control for investment bank ties, as close ties to investment banks likely have a positive effect on the probability of observing pledging by the CEO. A search-cost based explanation implies that recent interactions with investment banks might result in CEOs being more likely to initiate margin loans originated by the same financial institution. An alternative explanation based on cross-selling suggests that CEOs could be offered margin loans at favorable terms if the granting financial institutions expect to make sufficient profit through cross-selling of primary market services in the future (see e.g., Financial Conduct Authority (2016)). I find a significant positive effect of the variable proxying for investment bank ties in all tested samples suggesting that interactions with investment banks affect the CEOs' propensity to pledge shares. Engaging in one more interaction related to underwriting or M&A over the past three years increases the probability of observing pledging by 0.4%.

I observe a negative relation between the annualized stock volatility and the probability of observing pledging by the CEO in both the full sample of pledging CEOs as well as the sample of monetizing CEOs with significant pledging.[25] Last but not least, the data show that an

[24]The observation of a higher book leverage appears to be consistent with the previous finding of Cronqvist, Makhija, and Yonker (2012) who examine the relationship between CEO personal and corporate leverage and find that CEOs tend to imprint their personal preferences on the firms they manage.

[25]In Appendix C, Table C4, I present the results of a more detailed analysis of volatility similar to the one by Jenter, Lewellen, and Warner (2011). I find that volatility surrounding the initiations of pledging transactions is stable and that firms with and without pledging CEOs of similar size and from the same industry experience volatility of a similar magnitude over the studied period.

average CEO in a company that experienced a stock price appreciation greater than 25% since the beginning of his or her tenure has a 1.3% higher probability of pledging than otherwise expected. This finding is suggestive of the importance of the tax motive.

[Table 4 here]

In summary, I find evidence consistent with the *pledging preference hypothesis*, suggesting that pledging is more common among CEOs preferring to avoid an open-market sale of shares. Even though I also find that CEO's ability to pledge shares is impeded by several factors proxying for outside pressure against the practice, the economic magnitudes of their effects are multiple times smaller than those proxying for CEOs' preference to pledge shares. I also find evidence suggesting that pledging by CEOs is also driven by several firm characteristics such as firm size, firm liquidity, and leverage.

To account for the fact that pledging could be more common in some industries than others, in Appendix C, Table C1, I present the results of the same analysis estimated using an ordinary least squares (OLS) regression with year and industry fixed effects. My analysis based on two-digit SIC codes reveals that "Finance, Insurance, & Real Estate" is the most represented industry among pledging CEOs with 45.4%, followed by "Manufacturing" with 21.3%, and "Services" with 10.0%. The dominance of the financial industry in the context of pledging might be driven by the access to the providers of margin loans and/or deeper understanding of financial instruments. A closer examination of the types of financial firms in my sample shows the dominance of "Banking", "Trading", and "Insurance" subcategories. As per Table C1, the economic magnitudes of the majority of observed effects remain comparable.

It is also important to note that the pressure against pledging has been intensifying over the past years as suggested by my analysis of the number of firms that explicitly prohibit pledging. In unreported robustness analyses, I also perform the determinants analysis in a sample of control firms which do not provide any reference to pledging in their proxy statements. I use this group of firms as a proxy for firms in which pledging is allowed, but not used by the CEO as firms that do have anti-pledging policies in place prefer to state so to signal their policy choice. The results do not alter the presented conclusions.

4.3. Returns surrounding the initiation of pledging transactions

This section begins with an analysis of returns surrounding the initiation of pledging transactions, which is intended to shed more light on the association between pledging and stock performance. I compute raw returns and also compare sample firm returns to three different benchmark portfolio cumulative returns. I consider multiple benchmarks due to the unobservability of the CEO's true alternative investment opportunity set. As the first benchmark, I use the mean return for firms in the same industry according to the Fama and French 49 industry classification as the sample firm.[26] My second (third) benchmark is the equal- (value-) weighted CRSP index. The exact initiation date, i.e., the date on which the CEO entered into a pledging agreement is observable only for the hedging group of CEOs. For the doubling-down and monetizing groups of CEOs, the analysis is based on the assumption that the initiation date takes place as of the record date.

To analyze the pre- and post-initiation period, I consider the 250 trading days surrounding the pledging contract disclosure. I exclude observations from the year 2007, which is the first full year of data after the disclosure requirement has been put in place, to ensure that I capture true initiations instead of merely capturing those that have been initiated a long time ago and just appear to have been initiated due to the introduction of the disclosure requirements. I identify 355 pledging initiations.

In Panel A of Table 5, I present results for the full sample of pledging CEOs. I find that in the year prior to contract initiation, firms led by pledging CEOs appreciate on average by 11.6%. Over the same period, they also outperform the benchmark portfolios by economically meaningful and statistically significant 4.1% to 6.1%. In the year following the initiation, firms with pledging CEOs appreciate on average by 6.0% in excess of the value-weighted benchmark and by 11.5% when measured using raw returns. The evidence suggests that CEOs pledge shares following good performance.

Panel B of Table 5 shows the results for CEOs who use pledging to double down. The mean firm performance in terms of raw as well as excess returns is not statistically or economically significant in any of the studied periods. The only exception can be found at the two-month horizon after pledging initiation with raw returns equal to 9.0%. The evidence does not hint at any particular pattern among this group of pledging CEOs.

[26] I access the data from Kenneth French's website (see Fama and French (1993, 1997); https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_49_ind_port.html).

In Panels C and D of Table 5, I show the results for the subsamples of monetizing CEOs split at 75% threshold of shares pledged. The results of Panel C, which shows the returns for monetizing CEOs who pledged less than or equal to 75%, show that in the year prior to contract initiation, firms led by these CEOs appreciate on average by 13.5%. Over the same period, they also outperform the benchmark portfolios by economically meaningful and statistically significant 5.2% to 7.7%. Afterwards, in the year following the initiation, the excess returns remain positive and lie 5.0% above the value-weighted benchmark portfolio while the corresponding raw returns equal 9.4%.

The results of Panel D, which shows the returns for monetizing CEOs who pledged more than 75%, show that in the year prior to contract initiation, firms led by these CEOs appreciate on average by 15.0% but do not outperform any of the benchmark portfolios. Afterwards, in the year following the initiation, the excess returns remain positive and are 11.4% above the value-weighted benchmark portfolio while the corresponding raw returns equal 21.7%. This evidence is consistent with the hypothesis formulated in Section 2.

Hedging CEOs outperform the alternative investment opportunity set preceding the initiation of PVF contracts. The results in Panel E of Table 5 indicate that in the year prior to contract initiation, their firms outperform the value-weighted benchmark portfolio by economically meaningful and statistically significant 13.8% and appreciate in value by 27.0% when measured using raw returns. The excess returns in the hedging subgroup of CEOs during the pre-initiation period are in line with Jagolinzer et al. (2007) who provide evidence that insiders' PVF transactions systematically follow strong stock performance. However, I do not find evidence consistent with the hypothesis that these transactions would precede worsened firm performance. This could be potentially explained by the notion that the hedging CEOs in my sample could also be primarily driven by the monetizing motive and would utilize PVFs as a form of an immunization strategy that would yield an improved LTV ratio.[27] A potential caveat to my results related to initiations of PVF transactions by CEOs is that they are based on only 15 observations.

[Table 5 here]

To summarize, I find that most CEOs initiate margin loans after periods in which their firms have done well. The rebalancing motive predicts that CEOs should have increased incentives

[27] According to Jagolinzer et al. (2007), financial institutions granting margin loans might reward immunized positions with a LTV ratio close to 80-90%.

to sell shares after their firms have appreciated in value especially once they reach a certain ownership level (see e.g., Ofek and Yermack (2000)). However, compared to an outright sale, pledging CEOs are able to access the funds tied up in the company stock and at the same time profit from future performance. I find return and excess return patterns suggesting that monetizing CEOs (irrespectively of the fraction pledged) initiate margin loans following good firm performance and that their companies continue to perform well also in the post-initiation period. There is no clear firm performance pattern in firms led by doubling-down CEOs. The performance pattern post pledging initiation in the hedging group of CEOs suggests that they might be just another subset of the monetizing group.[28]

What drives the positive post-initiation returns? Is the performance of the portfolio with pledging CEOs driven only by its riskiness? Or do pledging CEOs earn alpha? Because the majority of pledging CEOs belong to the monetizing group, for which the exact loan initiation date is unobservable, one cannot exclude the possibility that CEOs incorporate information in their decisions above and beyond the information contained in observable firm characteristics such as their exposure to the market factor, firm size, book-to-market ratio, and immediate past returns that have been shown to significantly forecast future returns (Fama and French (1993), Carhart (1997)).

But can an investor earn economically meaningful returns by following an investment strategy based on investing in firms led by pledging CEOs? If pledging matters and the information is fully incorporated by the market, the prices should adjust accordingly. However, if pledging matters but is not incorporated immediately into stock prices then realized returns would systematically differ from equivalent securities. Since every proxy statement contains the date it has been filed with the SEC and has been made accessible at EDGAR, the investment strategy is based on publicly available information and is fully implementable. The fact that the information about pledging is located in the footnotes of the beneficial ownership section of a possibly hundred page-long document and that the disclosure format is not entirely standardized might make this information relatively costly to access.

To examine the relation between pledging and subsequent returns on a risk- (or "style"-) adjusted basis, I form a portfolio consisting of firms in which the CEO is pledging shares and

[28] In Table C2 in Appendix C, I also reproduce the results under the assumption that the initiation takes place 180 days prior to the record date. In Table C3 in Appendix C, I also provide median returns to show that the results are not driven by a small number of extreme observations. The alternative specifications do not alter the presented conclusions. The only exception is the doubling-down group of CEOs, where median raw returns are strictly positive across all studied periods.

estimate a regression based on a four-factor model which includes three Fama-French factors (Fama and French, 1993) and a momentum factor (Carhart, 1997). The estimated intercept can be interpreted as the abnormal return in excess of what could have been achieved by an investment in the four factors. I calculate the returns to an equal-weigthed and value-weighted investment in the pledging-CEOs portfolio with one portfolio reset period per year. To construct the investment portfolio, I follow the method used by Gompers, Ishii, and Metrick (2003). Each July, starting in 2008 and up to 2016, I form a portfolio by buying all firms whose proxy statements indicate the presence of a pledging CEO and which were filed between July of year $t-1$ and June of year t.[29] The portfolio is reset yearly and is also subject to yearly rebalancing of portfolio weights. If a firm is delisted during the investment period, I include its delisting return. When forming the investment portfolio, to always have a formation period of equal length, I drop all firms which filed their proxy statements prior to June 2007. The final sample included in return regressions is thus based on 1,751 pledging-CEO firm-years, which include a total of 474 firms with a pledging CEO.

Results in Panel A of Table 6 show that the return to the equal-weighted as well as value-weighted strategy investing in firms with pledging CEOs is economically relatively small and statistically indistinguishable from zero. In Panels B and C, where I place the focus on the sample of monetizing CEOs split at the 75% threshold of the shares pledged, I find results leading to the same conclusion as for the full sample of pledging CEOs irrespectively of the extent of pledging.

[Table 6 here]

It remains unknown whether pledging CEOs earn alpha. However, from the investor perspective, I find that excess stock market performance (if any was achieved by pledging CEOs) is not achievable by investing in firms with pledging CEOs based on publicly available information. However, more importantly, the analysis shows that monetizing CEOs are able to access the funds tied up in the company stock and at the same time profit from future performance. This invalidates the concern that CEOs use pledging to access liquidity to purchase certain perquisites that could have a distracting effect and lead to inferior shareholder returns (see e.g., Yermack (2006)).

[29] Updating the strategy once a year also makes it very conservative. It is also viable to update the portfolio more frequently by adjusting the pledging-CEOs portfolio based on proxy materials and information statements filed throughout the year.

5. Understanding the shareholder value consequences of share pledging

In this section, I test two channels through which share pledging could have negative shareholder value consequences. The first tested channel is the risk-taking channel and the second channel is the crash risk channel. In the last part, I present results of the event study aimed at measuring the stock market's perception of pledging.

5.1. Change in corporate policies following industry downturns

5.1.1. Background

To measure the effect of an increased margin call pressure on firms' riskiness of corporate policies, I conduct an analysis in a setting in which firms experience an industry-specific shock. In a setting in which firms are in an industry downturn, I study the riskiness of corporate policies in firms with a *monetizing CEO* (treated firms) as compared to a sample of firms without a pledging CEO.[30] Because treated firms could significantly differ from firms without a pledging CEO, I construct a sample of "matched firms" that are similar to the treated firms, except for the fact that their CEOs are not pledging shares. I use the propensity score approach to address this concern. In the first stage of the analysis, I calculate each firm's propensity score, which is the conditional probability of treatment assignment given ex ante variables. In the second stage of the analysis, each firm with a *monetizing CEO* is matched with firms without a pledging CEO that have the closest propensity scores, but whose CEOs did not choose to pledge shares. I select matched firms based on characteristics one year before the industry downturn. I use matching with replacement and exclude observations without common support.

I focus on three measures that reflect the riskiness of corporate policies. I examine firm diversification, R&D intensity as well as capital expenditures. I use two measures of firm diversification. The first measure is known as segment Herfindahl–Hirschman Index (HHI). The measure is derived from business segment sales that I obtain from Compustat Segments database. For firm-years with missing segment information, I assume that all sales are from a single business segment. The second measure is the total number of segments in which a firm operates. Similarly to the segment HHI, I set the measure for firm-year observations with

[30] The focus of the analysis is placed on monetizing CEOs, but in an unreported robustness test, I perform the same analysis for the full group of pledging CEOs. The conclusions remain unchanged.

missing segment information equal to one. I measure R&D intensity via R&D expenditures which I normalize by dividing them by the book value of assets. I set the missing observations to zero. When measuring capital expenditures (CapEx), I also normalize them by the book value of assets. If monetizing CEOs alter the studied corporate policies in a way that would reflect a lowered risk-taking appetite, one should observe lower R&D expenditures, lower CapEx, as well as more diversification reflected in a lower segment HHI and a higher number of business segments in which their firms would operate.

5.1.2. Identifying industry downturns

To identify industry-year observations that experience negative shocks, I impose the same criteria as used in a study by Carvalho (2015).[31] First, I impose a negative median annual stock return of the industry's firms. Second, I impose an abnormally low median revenue growth compared with the overall distribution of the median industry revenue growth across industries and time. I use 30% of the overall distribution of the median industry revenue growth as the threshold. Similarly to Carvalho (2015), I classify firms into industries using the two-digit SIC code. The identifying assumption is that when choosing whether to pledge shares or not, CEOs do not successfully anticipate their exposure to future industry downturns. I identify 176 firm-year observations experiencing industry downturns in the sample of monetizing CEOs.

5.1.3. Empirical evidence

Panel A of Table 7 provides sample statistics for the set of treated and matched firms. I use paired t-tests to investigate the differences in ex ante firm characteristics between firms with monetizing CEOs and matched firms. As can be seen from Table 7, matched firms very closely resemble the group of firms with a monetizing CEO. However, slight differences in firm size, book leverage, as well as institutional ownership are still present. In Panel B of Table 7, I report results of a matched sample analysis of corporate policies following industry downturns. I find no evidence suggesting that firms with monetizing CEOs alter the studied corporate policies in a way that would suggest changes in the risk-taking appetite. This could be explained by either pledging not having any effect on the riskiness of the studied corporate policies or by monetizing CEOs equally representing diversifying and non-diversifying groups.[32]

[31] Past research on the effects of industry distress includes also e.g., Opler and Titman (1994), Mitchell and Mulherin (1996), and Acharya, Bharath, and Srinivasan (2007).

[32] The results are robust to varying the caliper size, which is the tolerance level on the maximum propensity score distance to avoid the risk of bad matches.

[Table 7 here]

In Appendix C, Table C5, I also provide results of an OLS regression in which I relate the riskiness of firm policies to an indicator variable denoting pledging by a monetizing CEO, an indicator variable denoting that a given industry was experiencing an industry downturn in a given year as well as their interaction term. The results do not alter the presented conclusions. I do not find that monetizing CEOs react to crisis times by implementing more conservative corporate policies. A potential explanation for this finding is that CEOs could be disciplined by internal or external governance mechanisms. It is also plausible that they could simply own sufficient collateral which they could use to cover possible shortfalls.

5.2. Change in stock returns during the financial crisis

5.2.1. Background

In this section, I test whether share pledging by CEOs leads to a greater share price decline in times of a crisis. As in Dou et al. (2019), I use the global financial crisis of 2007/2008 as a large negative shock to stock prices. I analyze firm stock returns between the end of May 2008 and the end of October 2008 to test whether pledging exacerbates the firm's stock price fall.[33]

A significant share price decline such as the one that occurred during the financial crisis of 2007/2008 likely triggers margin calls. In the event of a margin call, the CEO can add more company stock, substitute other collateral, or agree to reduce the loan amount. If the margin call is not satisfied, the lender sells the pledged shares in the open market.

5.2.2. Empirical evidence

A necessary condition for detecting whether margin-call-induced share sales by CEOs increase the downward price pressure, is the occurrence of a sale. The focus of the analysis is therefore placed on the group of all CEOs whose firms report to the SEC and who are net sellers over the studied period. A CEO is classified as a net seller, if the sum of sale transactions undertaken by him or her (transactions with a code "S") exceeds the sum of purchase transactions (transactions with a code "P"). In the sample of SEC's Form 4 filings, I find 562 insiders (after merging the data with Compustat) with the CEO title who are net sellers. Of the 70 pledging

[33] Dou et al. (2019) focus on stock returns between the end of May 2008 and the end of August 2008, but because in my sample more than 10% of margin calls occur in October, I use the extended period.

CEOs who were trading shares between the end of May and the end of October 2008, 45 CEOs belong to the net seller group. Given that there were 225 CEOs reporting pledging during the 2008 proxy season, the evidence suggests that most CEOs were able to meet margin calls through one of the channels available to them without having to resort to a sale of shares.[34]

The results of the analysis are shown in Table 8. In Column 1, I use an indicator variable that is equal to one if the firm has a pledging CEO, and zero otherwise. In Column 2, I use an indicator variable that is equal to one if the CEO pledged more than 75% of his or her shares. In Columns 3 to 4, I use continuous measures of pledging specified as the fraction of shares pledged over shares owned and the fraction of shares pledged over the total beneficial ownership of the CEO, respectively. In all analyses, I control for firm size, book leverage, number of analysts following the firm, institutional ownership, annualized stock volatility, stock liquidity, and CEO stock ownership and also include industry fixed effects.

[Table 8 here]

Even though most CEOs were able to meet margin calls via one of the means available to them, within a group of CEOs who are net sellers during the crisis times, I find evidence of a negative price pressure for firms with CEOs who pledged more than 75% of their shares (Column 2). Similarly, the results of continuous measures of pledging shown in Columns 3 and 4 indicate that heavily pledged CEOs contributed more to the downward price pressure. In particular, I find that a one standard deviation change in the fraction of shares pledged (corresponding to 13.9%) is associated with returns that are 2.9 percentage points lower.[35]

5.3. Event study evidence

5.3.1. Background

Several widely publicized cases of pledging by CEOs in the aftermath of the financial crisis have led proxy advisory firms to adopt policies related to pledging of stock by companies' insiders. One prominent case involved Aubrey McClendon, the former CEO of Chesapeake Energy, who owned more than 33 million shares as of September 2008 of which he lost 31 million shares in margin sales during just three days in October 2008 (Chesapeake Energy Corporation,

[34] I do not analyze the impact of the presence of the three groups of pledging CEOs separately, because 66 out of 70 CEOs belong to the monetizing group.

[35] The results are robust to using the Thomson Reuters Insiders Data instead of SEC's Form 4 filings to identify net sellers.

2008). On October 15, 2012, ISS, an influential proxy advisory firm, proposed an important pledging-related change to its 2013 U.S. proxy voting guidelines (2013 Policy Updates thereafter) (Institutional Shareholder Services, 2012a). In particular, ISS proposed to add *any* pledging of company stock to its list of problematic pay practices related to non-performance-based compensation elements that may result in a negative Say-on-Pay recommendation. During the policy review period, ISS received multiple comments from general counsels and corporate governance experts expressing their concern about the proposed treatment of pledging.[36] As a result, in the final 2013 Policy Updates, ISS removed pledging from the list of problematic pay practices in the Say-on-Pay evaluation section and instead added share pledging to the list of governance failures for which directors would be held accountable. Specifically, it amended its voting recommendation related to the elections of directors in that it explicitly included *significant* pledging of company stock in the list of material failures of risk oversight and recommended to (under extraordinary circumstances) vote against or withhold votes from directors or the entire board (Institutional Shareholder Services, 2012b).

I analyze the stock market reaction to the *proposed* as well as the amended *final* changes in ISS voting guidelines to gauge the market's perception of pledging. The two events are very different from each other. The proposed changes in the voting guidelines released on October 15, 2012 suggested that ISS would oppose pledging of stock by insiders seemingly in all cases regardless of the specific company circumstances or the CEO's financial situation. The second, final, changes released on November 16, 2012 changed the blanket opposition to the practice to only apply to significant pledging of company stock which would be evaluated on a case-by-case basis.

The first event thus allows me to test whether market participants welcome a prohibition of pledging. Interestingly, ISS based its initial recommendation on answers from 370 institutional and issuer respondents participating in its 2012-2013 Policy Survey. The analysis of the market reaction to the proposed 2013 Policy Updates can shed more light on whether the ISS recommendation is merely reflecting the view of a narrow group of the survey respondents or of a broader base of market participants.

[36] For example, the general counsel of Home Properties, Inc., a company led by a pledging CEO for multiple years, highlighted that pledging company stock is "[...] merely a method for directors and executives to access some of the current value of their stock without having to sell it" (Home Properties, Inc., 2012). In addition, Society of Corporate Secretaries and Governance Professionals (2012) expressed a concern about the proposed change on executive compensation to oppose pledging of stock by insiders regardless of the specific company circumstances. It also urged ISS to review pledging arrangements on a case-by-case basis as well as to provide more guidance on circumstances when pledging would be considered a "bad practice".

The second event allows me to test whether market participants are more concerned about pledging when it covers a significant amount of company stock. For example, if shareholders are mostly concerned about the negative price pressure that could occur as a result of margin-call-induced selling, one would expect to observe a stronger reaction on the day the guidelines were released for the group of CEOs that is pledging a significant amount of company stock.

This paragraph is aimed at alleviating concerns about pledging being the main issue addressed in the updates to the 2013 ISS proxy voting guidelines and the stock market reaction being convoluted by the reaction to other issues addressed in these documents. Pledging of shares is discussed on the first page of the proposed guidelines, both in the first subsection labelled "Background and Overview" as well as one of three items in the subsection labelled "Key Changes Under Consideration". The proposed 2013 Policy Updates were posted on ISS's website and constitute approximately a four-page document. The issue also takes a prominent place in the final updates which constitute a 21-page document with pledging being explicitly discussed on the first page. After a close inspection of the other changes listed in the document, I conclude that it is very unlikely that changes other than the change related to pledging impacted companies with and without pledging CEOs asymmetrically. [37]

5.3.2. Methodology

To measure the effect of pledging on firm value, I assign firms to the treatment or the control group, depending on whether a firm has a pledging CEO. I assign a firm to the control group if it does not have a pledging CEO during the 2012 proxy season. Since the announcement occurs on the same day for all firms, one cannot assume that the abnormal returns are cross-sectionally independent. To account for cross-correlation, I use the calendar-time portfolio approach developed by Jaffe (1974). I estimate normal performance over an estimation window

[37] The section titled "Pay-for-performance evaluation" contained in the 2013 Policy Updates is the most likely to raise concerns related to whether the measured stock market reaction could be attributed to the change in voting recommendation related to pledging or other updates listed in the document. It is related to the use of company's selected peers as an input to its peer group methodology and can be summarized as follows: "[...] when selecting peers, ISS will prioritize peers that maintain the company size near the median of the peer group, are in the company's own peer group, and that have chosen the company as one of their own peers." (Gibson, Dunn & Crutcher LLP, 2013). Since the "Pay-for-performance evaluation" section mainly discusses the changes in the methodology aimed at providing a more refined peer group definition, there is no reason to believe that the treatment and control companies would be impacted asymmetrically by such change. In addition, when I look for news coverage of the 2013 Policy Updates, the majority of articles focus on the inclusion of pledging company stock as a problematic practice suggesting that the most significant change in the guidelines very likely pertains to the issue of pledging. The following articles discuss share pledging as the major change in 2013 Policy Updates: Winston & Strawn LLP (2012) and Stinson Leonard Street LLP (2012). The following article discusses the pay-for-performance evaluation, as well as share pledging: Covington & Burling LLP (2012).

spanning over 250 trading days. I use the market model as the normal performance return model. The cumulative abnormal returns (CARs) are calculated over three different event window lenghts (a one-day window, a two-day window also including one day before the event, and a three-day window further containing one post-event day). The CAR for portfolio p is calculated as $TxAR_p$, where T corresponds to the length of the event window. The final sample of treated firms contains 175 firms, with 11 firms belonging to the doubling-down group, 160 firms to the monetizing group, and 4 firms to the hedging group.

5.3.3. Empirical evidence

Table 9 presents the results. Panel A shows the stock market reaction to the proposed 2013 Policy Updates. Panel B (Panel C) shows the reaction to the final 2013 Policy Updates for the group of CEOs who pledged more than (less than or equal to) 1% of the total shares outstanding, respectively. The threshold of 1% of the total shares outstanding is used as proxy for what might constitute significant pledging.[38] In Panels A.1, B.1, and C.1, a firm is assigned to the treatment group if it is led by a pledging CEO during the 2012 proxy season. In Panels A.2, B.2, and C.2, a firm is assigned to the treatment group if it is led by a pledging CEO who belongs to the monetizing group of pledging CEOs during the 2012 proxy season. The control group in all analyses consists of all firms without a pledging CEO during the 2012 proxy season. The first (second) column tests whether the abnormal returns for treatment (control) firms are different from zero. The third column tests the abnormal returns of a long-short portfolio of treatment minus control firms. The third column is necessary to be able to conclude that the abnormal returns are indeed driven by the policy change per se (Eckbo, Nygaard, and Thorburn, 2018) and it is, therefore, the focus of the following discussion. Because the control firms used in the analysis involve firms for which (significant) pledging might become relevant as well, it is possible that the presented CARs could be underestimating the true impact of the policy changes.

[Table 9 here]

The CARs for a long-short portfolio for the full sample of pledging CEOs indicate a negative reaction to the *proposed* 2013 Policy Updates (Panel A.1). Since the proposed 2013 Policy Updates implicitly introduced a restriction on CEO's pledging activities, a net negative market

[38] ISS itself does not provide any guidance regarding the precise threshold.

reaction suggests that pledging is on average considered value-enhancing by market participants. It is likely that shareholders might be concerned that CEOs who pledged shares might sell them to meet their personal liquidity needs which would result in weakened incentives going forward. The evidence is consistent with that presented by Larcker et al. (2015) who find that adjustments to executive compensation programs performed by firms to comply with the recommendations of proxy advisory firms lead to statistically negative stock market reaction, meaning that these recommendations often induce companies to make choices that decrease shareholder value. The net reaction is negative also for the monetizing group of CEOs with CARs between -0.18% and -0.10% (Panel A.2). The evidence seems consistent with the idea that shareholders do not oppose pledging used by CEOs for accessing funds tied up in company stock.[39]

The stock market reaction to the *final* 2013 Policy Updates, where treated firms are those with CEOs pledging shares in excess of 1% of the total shares outstanding, shows that significant pledging of company stock is viewed as value-destroying (Panels B.1 and B.2). There exist multiple plausible interpretations of the observed reaction. First, this implicit restriction on significant pledging lowers the probability that CEOs might not be able to meet a margin call implying a higher probability of the preservation of existing incentives. Second, it also likely lowers the perceived potential negative effect of margin-call-induced sales on the stock price in case of a stock price drop. Third, shareholders might also expect CEOs who use pledging as part of a monetization strategy to renegotiate their employment contracts so as to maintain their access to liquidity which might result in increasing the fixed pay component and lowering the variable component. They might view the altered compensation package as more efficient for the company (assuming that the CEO has sufficient long-term incentives already in place) since there is often a premium demanded by executives for receiving equity compensation instead of cash (Larcker and Tayan (2010), Bae and Zhang (2019)).

The stock market reaction to the *final* 2013 Policy Updates, where treated firms are those with CEOs whose pledging activity does not exceed 1% of the total shares outstanding, yields mixed and relatively weak evidence. I find a weak positive reaction for the full sample of pledging CEOs as (Panel C.1) well as for the monetizing CEO group (Panel C.2) under the market model, but a negative reaction under the four-factor model (in an unreported robustness test). These findings are not surprising given that these firms are not currently impacted by the policy.

[39]The results which are based on the more strict sample of control firms, i.e. firms in which no director, officer, or large shareholder engages in pledging show quantitatively and qualitatively similar results.

6. Conclusion

Very little is known about the frequency, magnitude, and shareholder value consequences of share pledging among U.S. CEOs. I show that the phenomenon is quite widespread among CEOs and that the dollar value of margin loans is economically sizeable. I propose a classification of CEOs into those who double down, hedge, and those who pledge shares for purposes unrelated to changing their effective ownership. I show that slightly more than 90% of all CEOs use pledging to obtain liquidity while preserving their effective ownership.

My findings suggest that pledging can be especially valuable for CEOs who would want to access some portion of their wealth tied up in the company stock without having to sell their shares. While pledged shares in the vast majority of cases still preserve the economic exposure to company performance, sold shares do not.

But does allowing pledging by CEOs hurt shareholders during crisis times? My results show that the answer to this question depends on the extent of pledging. I find that firms with heavily pledged CEOs experience steeper stock price declines. The results of my event study analysis point in the same direction – stock market participants view pledging by CEOs as value-enhancing, but they become concerned when CEOs pledge a significant amount of shares. In addition, I find no evidence that pledging CEOs alter the riskiness of corporate policies.

The findings of my study are of interest to compensation committees and proxy advisory firms shaping the policies regarding the permissible transactions related to company stock. I argue that the current policy debate would benefit from considering that the uses of funds from pledging do not only involve hedging and doubling-down, but that there exists a third use of funds that does not alter CEOs' effective ownership (except under extreme market conditions for liquidity-constrained CEOs). Viewing any amount of pledging as an irresponsible use of company equity and adopting a one-size-fits-all approach might have unintended consequences that could be uncovered by future research.

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Figures

Figure 1: Fractions of shares pledged

The figure shows the percentage of the sample with the respective fractions of shares pledged in single class firms. The fractions pledged are calculated as shares pledged over total shares held. The total shares held represent shares beneficially owned by the CEO minus options that are presently exercisable or will become exercisable within 60 days (as well as warrants, rights, or conversion privileges).

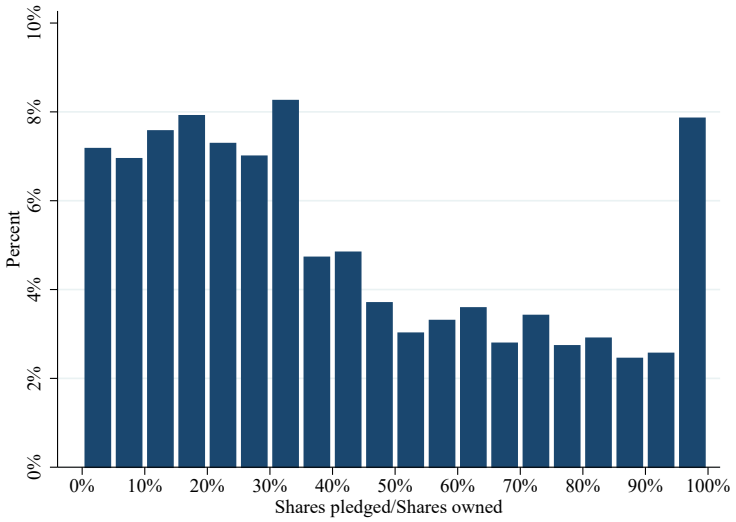
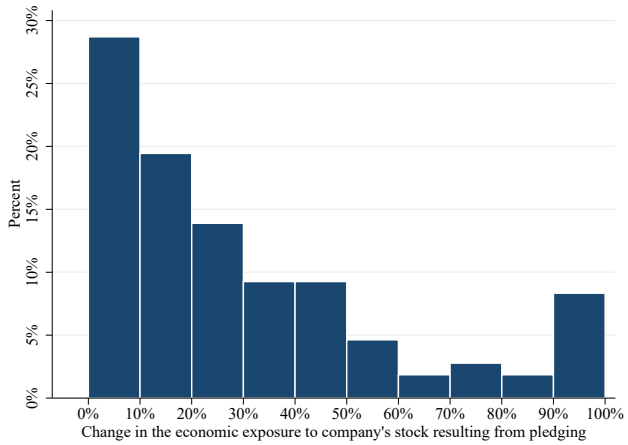
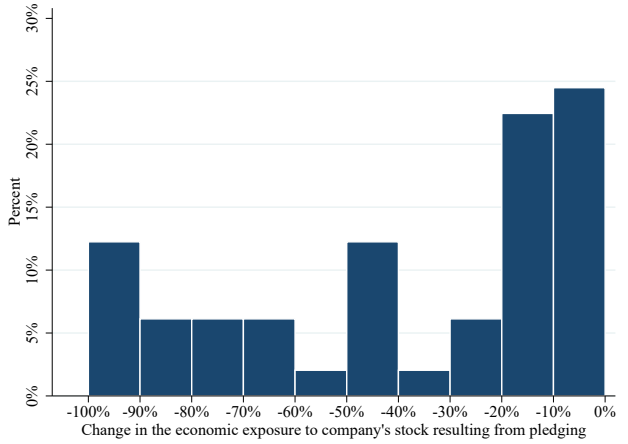


Figure 2: Change in exposure to company stock resulting from pledging

The figure shows the distribution of the exposure changes to company stock resulting from pledging by CEOs. Figure (a) shows the distribution of the exposure changes of doubling-down CEOs. Figure (b) shows the distribution of the exposure changes of hedging CEOs who enter into prepaid variable forwards (PVFs). The exposure changes in Figure (a) are expressed as the fraction of shares acquired using proceeds from pledging over shares owned. The exposure changes in Figure (b) are expressed as the negative of the fraction of shares pledged over shares owned.



(a) Doubling-down CEOs



(b) Hedging CEOs

Tables

Table 1: Sample of firms and frequency of pledging CEOs

The table reports the frequency of pledging-CEO observations for a sample of fiscal firm-years from 2006 to 2015. Pledging CEOs are CEOs who pledge company's shares as collateral for a loan. Panel A presents the number of firms and firm-year observations. In Panel A, a firm is considered to be a firm with a pledging CEO if over the entire sample period it has experienced at least one year during which its CEO pledged shares. Panel B presents the time-series distribution of pledging CEOs. In Panel B, a firm is considered to be a firm with a pledging CEO if in a given fiscal year its CEO pledged shares. The comparison is based on the intersection of CRSP and Compustat firms. The sample includes firms listed on NYSE, AMEX, or Nasdaq. I exclude investment funds and trusts (SIC codes 6722, 6726, 6798, and 6799).

Panel A: Full sample (2006-2015)			
	Total	Pledging CEOs	Frequency [%]
Firms	6,571	501	7.6
Firm-years	43,795	1,904	4.4
Panel B: Firm-years by fiscal year-end groups			
Fiscal year	Total	Pledging CEOs	Frequency [%]
2006	4,515	187	4.1
2007	4,464	222	5.0
2008	4,333	215	5.0
2009	4,250	198	4.7
2010	4,235	205	4.8
2011	4,235	206	4.9
2012	4,247	192	4.5
2013	4,350	169	3.9
2014	4,560	162	3.6
2015	4,606	148	3.2

Table 2: Summary statistics of the fraction of shares pledged by CEOs

The table reports summary statistics of shares pledged as a fraction of total shares owned by CEOs each fiscal year. For dual class firms, the fraction is defined as the sum of total shares pledged across all share classes over the total number of votes that the CEO's shares in these classes carry.

Shares pledged/shares owned [%]						
Fiscal year	Obs.	Mean	SD	25%	Median	75%
2006	187	34.8	30.5	8.7	28.1	55.0
2007	222	38.2	31.2	12.2	30.0	62.1
2008	215	38.8	30.7	13.4	31.9	62.5
2009	198	40.8	30.7	15.7	33.1	66.1
2010	205	39.2	31.4	14.9	30.2	62.3
2011	206	39.5	31.8	12.8	30.1	64.6
2012	192	39.2	30.1	14.8	31.3	60.5
2013	169	37.3	29.6	13.9	30.0	57.1
2014	162	38.2	30.2	13.6	29.6	61.0
2015	148	37.9	31.8	10.9	30.0	65.6
Total	1,904	38.4	30.8	13.2	30.2	61.3

Table 3: Sample summary statistics

This table presents summary statistics of sample firm and CEO characteristics. The sample covers fiscal years 2006-2015. The variables are constructed as described in Appendix B. In Panel A, the column labelled "Pledging CEOs" contains firms with CEOs who have pledged shares according to the filed proxy statements. The column labelled "Other CEOs" contains firms with CEOs who have not pledged any shares according to the filed proxy statements (for more details see Section 3). In Panel B, the column labelled "DD" contains firms in which the CEO has pledged shares for the purpose of doubling down. The column labelled "MN" contains firms in which the CEO used pledging to obtain liquidity while maintaining ownership. The column labelled "HG" contains firms in which the CEO has pledged shares as part of a hedging transaction. All continuous variables are winsorized at the 1% and 99% levels, respectively. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively (based on a t-test allowing for unequal variances, and a non-parametric Mann-Whitney-Wilcoxon rank-sum test of equality of distributions, respectively). In Panel B, the group of pledging CEOs that serves as a benchmark for comparison is the group of monetizing CEOs.

Panel A: Pledging CEOs vs. Other CEOs

	Means		Medians	
Variables	Pledging CEOs	Other CEOs	Pledging CEOs	Other CEOs
Compustat variables				
Total assets [MM$]	5,086.00	4,996.47	1,589.08	651.12***
Book leverage	0.27	0.21***	0.21	0.15***
CRSP variables				
Stock price appreciation > 25%	0.55	0.51***	-	-
Annualized stock volatility [%]	45.33	50.72***	38.62	43.29***
Amihud illiquidity measure	0.54	0.73***	0.00	0.01***
I/B/E/S variable				
Number of analysts	5.37	5.47	3.00	3.00*
GMI Ratings and ISS variables				
Board size	9.11	8.92***	9.00	9.00*
Board independence	0.65	0.67***	0.67	0.70***
Institutional ownership [%]	52.04	51.63	56.01	56.61
SDC Platinum variable				
Investment bank ties	1.77	1.48***	1.00	1.00***
Other variables				
Founder CEO	0.32	0.11***	-	-
CEO tenure [years]	12.74	8.47***	10.00	6.00***
CEO stock ownership [%]	11.43	5.71***	3.95	1.09***

Table 3: Continued

Panel B: Doubling-down (DD) CEOs, monetizing (MN) CEOs, and hedging (HG) CEOs						
	Means			Medians		
Variables	DD	MN	HG	DD	MN	HG
Compustat variables						
Total assets [MM$]	6,575.08	4,912.34	7,018.23	1,395.36	1,575.56	2,348.60***
Book leverage	0.28	0.27	0.18***	0.21	0.21	0.12***
CRSP variables						
Stock price appreciation > 25%	0.41***	0.55	0.66	-	-	-
Annualized stock volatility [%]	46.07	45.45	40.70	38.49	39.00	34.32
Amihud illiquidity measure	0.40	0.56	0.27	0.01	0.00	0.00***
I/B/E/S variable						
Number of analysts	5.17	5.33	6.63	3.00	3.00	5.00*
GMI Ratings and ISS variables						
Board size	9.08	9.07	9.96***	8.00	9.00	10.00***
Board independence	0.70***	0.65	0.59***	0.71***	0.67	0.60***
Institutional ownership [%]	45.11***	51.80	65.16***	47.38***	55.84	67.68***
SDC Platinum variable						
Investment bank ties	1.92	1.76	1.96	2.00	1.00	2.00
Other variables						
Founder CEO	0.36	0.31	0.34	-	-	-
CEO tenure [years]	9.82***	12.71	18.43***	7.50***	11.00	14.00***
CEO stock ownership [%]	9.82	11.36	14.20	2.71	3.98	5.65

Table 4: Determinants of the CEO's pledging decision

The table reports the mean marginal effects of a logistic regression of the determinants of the CEO's decision to pledge shares over fiscal years 2006-2015. The columns labelled "PL CEOs" contain firms in which the CEO has pledged shares according to the proxy statement filed and used it to obtain liquidity while maintaining ownership. The columns labelled "MN" contain firms in which the CEO has pledged shares according to the proxy statement filed and used it to obtain liquidity while maintaining ownership. The dependent variable in Columns 1 to 2 is equal to one if the CEO has pledged shares according to the proxy statement filed, and zero otherwise. The dependent variable in Columns 3 to 4 is equal to one if the CEO belongs to the monetizing group and has pledged less than or equal to 75% of the total number of shares owned, and zero otherwise. The dependent variable in Columns 5 to 6 is equal to one if the CEO belongs to the monetizing group and has pledged more than 75% of the total number of shares owned, and zero otherwise. The variables are constructed as described in Appendix B. All specifications include year fixed effects. The z-statistics are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Dependent variable	PL CEO		MN CEO (≤75%)		MN CEO (>75%)	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(book value of assets)	0.012***	0.013***	0.001***	0.002**	0.010***	0.010***
	(15.65)	(7.42)	(2.90)	(2.25)	(14.59)	(6.83)
Book leverage	0.033***	0.072***	0.010***	0.012***	0.022***	0.054***
	(6.73)	(8.24)	(5.44)	(3.66)	(5.31)	(7.61)
Number of analysts	-0.002***	-0.002***	-0.000	0.000	-0.001***	-0.002***
	(-6.72)	(-5.52)	(-0.44)	(0.21)	(-7.09)	(-5.61)
Institutional ownership [%]	-0.000***	-0.000	0.000	0.000	-0.000***	-0.000
	(-3.31)	(-0.80)	(0.24)	(1.24)	(-3.82)	(-1.36)
Annualized stock volatility	-0.022***	-0.018**	0.003	-0.000	-0.027***	-0.015**
	(-3.92)	(-1.97)	(1.52)	(-0.14)	(-5.40)	(-2.09)
Normalized high liquidity years	-0.019***	-0.014**	-0.005***	-0.006**	-0.012***	-0.010**
	(-4.80)	(-2.34)	(-3.14)	(-2.27)	(-3.55)	(-2.05)
Founder CEO		0.111***		0.007*		0.102***
		(7.79)		(1.90)		(7.26)
CEO stock ownership [%]		0.001***		0.000**		0.000***
		(5.55)		(2.39)		(4.30)
Investment bank ties		0.004***		0.001*		0.003***
		(3.82)		(1.79)		(2.91)
Log(CEO tenure)		0.011***		0.002**		0.006***
		(4.56)		(2.50)		(3.38)
Board size		0.003***		-0.000		0.003***
		(3.39)		(-0.21)		(3.88)
Board independence		-0.026**		-0.005		-0.014
		(-1.99)		(-1.10)		(-1.39)
Stock price appreciation > 25%		0.013***		0.000		0.011***
		(3.22)		(0.16)		(3.33)
Observations	32,313	7,420	31,015	7,028	31,936	7,312
Observed probability	0.047	0.126	0.008	0.021	0.036	0.099
Predicted probability	0.041	0.034	0.007	0.005	0.030	0.024
Pseudo R^2	0.037	0.178	0.023	0.109	0.042	0.187
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Returns surrounding the initial disclosure of the pledging transaction

The table reports the mean of the distribution of the sample firm cumulative return as well as the sample firm cumulative return minus the cumulative benchmark return. Cumulative returns are defined as the sum of the daily returns over the specified intervals. The pledging initiations are assumed to take place as of the record date. Column 1 shows the raw returns. Column 2 shows the abnormal returns surrounding the pledging initiation relative to the industry average measured as the mean return for other firms in the same industry according to the Fama and French 49 industry classification as the sample firm. Column 3 shows the abnormal returns surrounding the pledging initiation relative to the equal-weighted CRSP index. Column 4 shows the abnormal returns surrounding the pledging initiation relative to the value-weighted CRSP index. Panel A shows mean cumulative returns for the full sample of firms with pledging CEOs. Panel B shows mean cumulative returns for the subsample of firms led by doubling-down CEOs. Panel C shows mean cumulative returns for the subsample of firms led by monetizing CEOs who have pledged less than or equal to 75% of the total number of shares owned. Panel D shows mean cumulative returns for the subsample of firms led by monetizing CEOs who have pledged more than 75% of the total number of shares owned. Panel E shows mean cumulative returns for the subsample of firms led by hedging CEOs. Tests of significance are based on two-tailed probabilities against the null hypothesis that the (abnormal) return for the period is zero. The *p*-values are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Mean cumulative returns [%] - Pledging CEOs, N = 351				
	Raw return	Abnormal return		
Daily return interval	Firm	Industry average	Equal-weighted	Value-weighted
[-250 to -1]	11.64***	4.09*	3.61	6.13***
	(0.000)	(0.068)	(0.105)	(0.010)
[-60 to -1]	3.46**	0.40	0.73	2.91**
	(0.016)	(0.750)	(0.566)	(0.029)
[0 to +60]	7.43***	1.32	1.70	3.11**
	(0.000)	(0.308)	(0.189)	(0.017)
[0 to +250]	11.54***	0.25	1.48	6.02***
	(0.000)	(0.908)	(0.500)	(0.008)
Panel B: Mean cumulative returns [%] - Doubling-down CEOs, N = 45				
[-250 to -1]	3.12	0.16	-1.89	-1.32
	(0.642)	(0.978)	(0.736)	(0.828)
[-60 to -1]	3.32	-1.57	-0.78	1.75
	(0.471)	(0.675)	(0.843)	(0.673)
[0 to +60]	8.95**	4.06	3.72	4.79
	(0.035)	(0.299)	(0.333)	(0.217)
[0 to +250]	6.26	-3.77	-1.07	2.22
	(0.477)	(0.609)	(0.887)	(0.776)

Table 5: Continued

Panel C: Mean cumulative returns [%] - Monetizing CEOs (≤75%), N = 227				
	Raw return	Abnormal return		
Daily return interval	Firm	Industry average	Equal-weighted	Value-weighted
[-250 to -1]	13.45***	5.21*	5.00*	7.71***
	(0.000)	(0.056)	(0.060)	(0.006)
[-60 to -1]	4.01**	1.81	2.06	3.97**
	(0.018)	(0.229)	(0.177)	(0.012)
[0 to +60]	7.32***	1.58	1.86	3.23**
	(0.000)	(0.289)	(0.210)	(0.028)
[0 to +250]	9.35***	-0.87	0.29	4.98**
	(0.003)	(0.724)	(0.906)	(0.047)
Panel D: Mean cumulative returns [%] - Monetizing CEOs (>75%), N = 64				
[-250 to -1]	14.93*	6.61	6.38	8.86
	(0.063)	(0.261)	(0.306)	(0.177)
[-60 to -1]	2.47	-2.00	-1.73	0.83
	(0.463)	(0.522)	(0.574)	(0.792)
[0 to +60]	6.15	-1.64	-1.19	0.65
	(0.128)	(0.640)	(0.743)	(0.862)
[0 to +250]	21.68***	7.63	6.79	11.43**
	(0.001)	(0.110)	(0.203)	(0.035)
Panel E: Mean cumulative returns [%] - Hedging CEOs, N = 15				
[-250 to -1]	26.97**	2.75	6.22	13.81*
	(0.022)	(0.715)	(0.309)	(0.077)
[-60 to -1]	9.68	3.99	5.68	6.86
	(0.111)	(0.333)	(0.154)	(0.105)
[0 to +60]	1.62	-2.68	0.94	3.10
	(0.725)	(0.656)	(0.846)	(0.425)
[0 to +250]	12.55	3.81	5.14	10.22
	(0.285)	(0.651)	(0.602)	(0.273)

Table 6: Performance-attribution regressions (July 2008 - December 2016)

The table reports estimates from a regression based on a four-factor model for a portfolio of firms in which the CEO is pledging shares. The dependent variable is the equal- and value-weighted monthly return in excess of the T-bill rate. The portfolio is reset each July when I form a portfolio by buying all firms whose proxy statements indicate the presence of a pledging CEO and which were filed between July of year $t-1$ and June of year t. Panel A shows the results for the full sample of pledging CEOs. Panel B (Panel C) shows the results for the sample of monetizing CEOs who have pledged less than or equal to (more than) 75% of the total number of shares owned. The factors are as defined in Fama and French (1993) and Carhart (1997). RMRF is the value-weighted return on all NYSE, AMEX, and Nasdaq stocks in excess of the T-bill rate. HML, SMB, and UMD are the value, size, and momentum factors, respectively. The portfolios are reset yearly with yearly rebalancing of weights. The t-statistics are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Pledging CEOs		
	Equal-weighted	Value-weighted
Monthly Alpha	0.0017	-0.0007
	(1.17)	(-0.48)
RMRF	0.9055***	0.9878***
	(18.97)	(19.09)
SMB	0.7094***	0.2101***
	(9.05)	(3.03)
HML	0.3636***	0.0015
	(6.14)	(0.02)
UMD	0.1088***	0.0143
	(3.68)	(0.66)
Adj. R^2	0.934	0.918
Panel B: Monetizing CEOs ($\leq$75%)		
	Equal-weighted	Value-weighted
Monthly Alpha	0.0015	0.0002
	(1.00)	(0.11)
RMRF	0.8746***	0.9467***
	(17.62)	(14.65)
SMB	0.6186***	0.2256**
	(9.68)	(2.59)
HML	0.3992***	0.0735
	(8.42)	(0.94)
UMD	0.0954***	0.0309
	(3.17)	(0.98)
Adj. R^2	0.938	0.881

Table 6: Continued

Panel C: Monetizing CEOs (>75%)		
	Equal-weighted	Value-weighted
Monthly Alpha	0.0034	-0.0037
	(0.99)	(-0.96)
RMRF	1.0433***	1.1803***
	(12.49)	(10.64)
SMB	1.1039***	0.1874
	(5.60)	(1.19)
HML	0.2150	-0.3397*
	(1.45)	(-1.96)
UMD	0.1549**	-0.0012
	(2.12)	(-0.01)
Adj. R^2	0.768	0.687

Table 7: Corporate policies following industry downturns

The table reports the sample statistics for the treatment and the control group based on a propensity-score matched sample and the results of a matched sample analysis of variables proxying for the riskiness of corporate policies. In Panel A, in addition to the mean and median, the table reports the p-values from a t-test of the difference in means and sign test of the difference in medians. In the year before industry downturn, each firm with a pledging CEO is matched on firm size, book leverage, number of analysts following the firm, institutional ownership, stock volatility, firm liquidity with firms from the same industry in a given year. In Panel B, I report results of a matched sample analysis of corporate policies following industry downturns. The variables are constructed as described in Appendix B. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Matched sample comparison

		Treatment		Control		Diff. test p-value	
Variables	Obs.	Mean	Median	Mean	Median	Mean	Median
Log(book value of assets)	2911	7.68	7.67	7.04	6.98	0.000***	0.136
Book leverage	2911	0.21	0.14	0.20	0.15	0.728	0.000***
Number of analysts	2911	6.23	5.00	6.21	4.00	0.976	0.102
Institutional ownership [%]	2911	45.51	48.41	48.77	52.46	0.160	0.588
Annualized stock volatility	2911	0.56	0.51	0.56	0.48	0.962	1.000
Normalized high liquidity years	2911	0.26	0.00	0.25	0.00	0.738	0.000***

Panel B: Matched sample analysis of corporate policies following industry downturns

Variables	Sample	Treated	Control	Difference	S.E.	t-stat
Segment HHI	Unmatched	0.868	0.822	0.046	0.023	2.02
	ATT	0.868	0.876	-0.007	0.022	-0.33
Number of Segments	Unmatched	1.979	2.163	-0.184	0.159	-1.15
	ATT	1.979	1.847	0.132	0.166	0.8
R&D Intensity	Unmatched	0.007	0.018	-0.011	0.006	-1.71
	ATT	0.007	0.006	0.001	0.003	0.49
CapEx	Unmatched	0.019	0.032	-0.012	0.005	-2.36
	ATT	0.019	0.017	0.002	0.006	0.34

Table 8: CEO share pledging and the global financial crisis returns

The table reports estimates of OLS regressions of stock return between the end of May 2008 and the end of October 2008 on CEO pledging variables and additional control variables. All financial variables are measured as of fiscal year 2007. The variable "Pledging CEO" is equal to one if the CEO has pledged shares according to the proxy statement filed, and zero otherwise. The variable "Pledging > 75%" is equal to one if the CEO has pledged more than 75% of the total number of shares owned, and zero otherwise. The variable "Shares pledged/shares owned" is defined as shares pledged divided by the total shares owned by the CEO. The variable "Shares pledged/total owned" is defined as shares pledged divided by the total beneficial ownership of the CEO. Additional variables include the natural logarithm of the book value of assets, book leverage, number of analysts, institutional ownership, annualized stock volatility, Amihud illiquidity measure, and CEO stock ownership. The variables are constructed as described in Appendix B. Firms are classified into industries based on their two-digit SIC codes. The *t*-statistics (reported in parentheses) are computed using standard errors robust to both clustering at the industry level and heteroskedasticity. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Stock return	Stock return	Stock return	Stock return
	(1)	(2)	(3)	(4)
Pledging CEO [0,1]	-0.097			
	(-1.79)			
Pledging > 75% [0,1]		-0.171*		
		(-1.86)		
Shares pledged/shares owned [%]			-0.002**	
			(-2.87)	
Shares pledged/total owned [%]				-0.003**
				(-3.06)
Log(book value of assets)	-0.005	-0.007	-0.007	-0.008
	(-0.76)	(-1.19)	(-1.19)	(-1.32)
Book leverage	-0.074	-0.088	-0.069	-0.067
	(-1.48)	(-1.34)	(-1.37)	(-1.37)
Number of analysts	-0.002	-0.001	-0.002	-0.002
	(-1.02)	(-0.81)	(-0.89)	(-0.85)
Institutional ownership [%]	-0.000	-0.001	-0.000	-0.000
	(-0.61)	(-0.75)	(-0.71)	(-0.72)
Annualized stock volatility	-0.379***	-0.393***	-0.391***	-0.391***
	(-6.34)	(-6.32)	(-6.40)	(-6.39)
Amihud illiquidity measure	0.012*	0.013*	0.013*	0.013*
	(1.80)	(2.07)	(1.94)	(1.93)
CEO stock ownership [%]	0.001	0.001	0.001	0.001
	(0.78)	(0.53)	(0.65)	(0.65)
Observations	442	442	442	442
Control variables	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 9: Announcement returns following the ISS's 2013 Policy Updates

The table reports cumulative abnormal returns (CARs) of the ISS's 2013 Policy Updates announcement measured over one-, two-, and three-day event window. The CAR for portfolio p is calculated as $TxAR_p$, where T corresponds to the length of the event window. In Panel A, the event date corresponds to October 15, 2012. In Panel B (Panel C), the event date corresponds to November 16, 2012 and the panel shows the reaction for the group of CEOs who pledged more than (less than or equal to) 1% of shares outstanding during the 2012 proxy season. In Panels A.1, B.1, and C.1, a firm is assigned to the treatment group if it is led by a pledging CEO during the 2012 proxy season. In Panels A.2, B.2, and C.2, a firm is assigned to the treatment group if it is led by a pledging CEO who belongs to the monetizing group of pledging CEOs during the 2012 proxy season. The control group in all analyses consists of all firms without a pledging CEO during the 2012 proxy season. The return-generation process is based on the market model. The first (second) column tests whether the abnormal returns for treatment (control) firms are different from zero. The third column tests the abnormal returns of a long-short portfolio of treatment minus control firms. I estimate normal performance over an estimation window spanning over 250 trading days. The t-statistics reported in parentheses are calculated based on robust standard errors. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Event date - October 15, 2012			
Panel A.1: $N_{\text{treatment (Pledging CEOs)}} = 175$, $N_{\text{control (No pledging CEO)}} = 4{,}190$			
Event window	Treatment	Control	Treatment-Control
[0;0]	-0.0037***	-0.0026***	-0.0011***
	(-14.50)	(-13.41)	(-6.52)
[-1;0]	-0.0064***	-0.0039***	-0.0025***
	(-7.04)	(-3.78)	(-7.10)
[-1;1]	-0.0103***	-0.0063***	-0.0040***
	(-8.46)	(-5.34)	(-7.34)
Panel A.2: $N_{\text{treatment (Monetizing CEOs)}} = 160$, $N_{\text{control (No pledging CEO)}} = 4{,}190$			
Event window	Treatment	Control	Treatment-Control
[0;0]	-0.0037***	-0.0026***	-0.0010***
	(-13.83)	(-13.41)	(-5.72)
[-1;0]	-0.0057***	-0.0039***	-0.0019***
	(-4.69)	(-3.78)	(-5.02)
[-1;1]	-0.0082***	-0.0063***	-0.0018*
	(-5.83)	(-5.34)	(-1.92)

Table 9: Continued

Panel B: Event date - November 16, 2012; Firms with significant pledging			
Panel B.1: $N_{\text{treatment (Pledging CEO)}} = 82$, $N_{\text{control (No pledging CEO)}} = 4{,}190$			
Event window	Treatment	Control	Treatment-Control
[0;0]	0.0018***	-0.0034***	0.0052***
	(5.69)	(-18.74)	(22.34)
[-1;0]	0.0023**	-0.0063***	0.0086***
	(2.14)	(-14.09)	(6.57)
[-1;1]	0.0018	-0.0087***	0.0104***
	(0.90)	(-9.15)	(4.12)
Panel B.2: $N_{\text{treatment (Monetizing CEO)}} = 75$, $N_{\text{control (No pledging CEO)}} = 4{,}190$			
Event window	Treatment	Control	Treatment-Control
[0;0]	-0.0002	-0.0034***	0.0032***
	(-0.60)	(-18.74)	(13.00)
[-1;0]	0.0006	-0.0063***	0.0069***
	(0.64)	(-14.09)	(12.37)
[-1;1]	-0.0014	-0.0087***	0.0073***
	(-0.63)	(-9.15)	(2.76)
Panel C: Event date - November 16, 2012; Firms without significant pledging			
Panel C.1: $N_{\text{treatment (Pledging CEO)}} = 93$, $N_{\text{control (No pledging CEO)}} = 4{,}190$			
Event window	Treatment	Control	Treatment-Control
[0;0]	-0.0035***	-0.0034***	-0.0001
	(-13.05)	(-18.74)	(-0.30)
[-1;0]	-0.0047***	-0.0063***	0.0016
	(-2.95)	(-14.09)	(1.25)
[-1;1]	-0.0056***	-0.0087***	0.0031**
	(-2.60)	(-9.15)	(2.03)
Panel C.2: $N_{\text{treatment (Monetizing CEO)}} = 85$, $N_{\text{control (No pledging CEO)}} = 4{,}190$			
Event window	Treatment	Control	Treatment-Control
[0;0]	-0.0028***	-0.0034***	0.0006**
	(-10.14)	(-18.74)	(2.38)
[-1;0]	-0.0063***	-0.0063***	0.0000
	(-9.58)	(-14.09)	(0.05)
[-1;1]	-0.0074***	-0.0087***	0.0012
	(-3.85)	(-9.15)	(0.86)

Appendix

A. Sample construction

A.1. Treatment sample construction

A.1.1. Pledging CEOs sample

I download all proxy statements from the SEC's EDGAR.[40] I then run an algorithm designed to identify whether the CEO has pledged company shares. The algorithm starts by looking up the beneficial ownership section in the proxy statement. The beneficial ownership section is most commonly labelled as: "Beneficial ownership", "Amount and nature of beneficial ownership", "Stock ownership", "Common stock ownership", "Ownership of securities", or "Security ownership of management". I subsequently parse footnotes in the beneficial ownership section. I look for the following phrases: pledge + loan, pledge + indebtedness, pledge + as + security, pledge + as + collateral, pledge + margin + account, margin + loan, pledge + shares, shares + pledged, margin + call, involuntary + sale, forced + sale, brokerage + margin, collateral + for, where the plus sign indicates that the algorithm was set to allow for several characters and/or words to appear between the specified expressions. By first finding the beneficial ownership section, I can limit the parsing to expressions mentioned in this section. If the beneficial ownership section is not found, then the algorithm searches the entire file and returns all sentences containing these phrases for manual check. To minimize the manual search needed, I also compile a list of CEOs' names (based on title information listed in the SEC's Form 3 and Form 4, complemented by the GMI Ratings data). In cases when the CEO's name is known, I check whether the footnote attached to his or her name in the beneficial ownership section contains expressions indicating that he or she is pledging shares, or if it refers to a potential pledging activity by some other director or officer. If the CEO's name is not listed in the CEO file, the algorithm returns all sentences that indicate that there is a pledging activity in the company for manual check. In the last step, the algorithm extracts the number of shares pledged by the CEO. I use a number of regular expressions that allow me to extract the number of shares pledged when the word "pledge" appears in the footnote that discloses the number of shares pledged by the CEO. In this part, I use a standard tagger in named entity recognition (NER), the "Stanford NER tagger" provided by the Stanford Natural Language Processing Group. If the disclosure is non-standard, or if there are multiple numbers surrounding the "pledge" phrase, I still need to perform a manual check. To summarize, in an ideal case when the file contains a clearly labelled beneficial ownership section, the name of the CEO is known and the footnote disclosure contains the word "pledge", I am able to directly extract the exact number of shares pledged by the CEO. In all other cases, I have to manually check the proxy statement. Figure A1 provides an example of a pledging disclosure.

[40]The filings downloaded include the following 12 form types: DEFA14A, DEF 14A, PRE 14A, DEFC14A, DFAN14A, PREC14A, DEFN14A, DEFR14A, PREM14A, PREN14A, DEFM14A, and DFRN14A. A description of these forms can be found at https://www.sec.gov/info/edgar/forms/edgform.pdf.

Figure A1: Example of pledging disclosure

The figure illustrates an example of pledging disclosure in the beneficial ownership section of a proxy statement. Source of the example filing:
https://www.sec.gov/Archives/edgar/data/1318605/000119312514157075/d710266ddef14a.htm.

Beneficial Owner Name	Shares Beneficially Owned	Percentage of Shares Beneficially Owned
5% Stockholders		
Elon Musk (1)	35,001,294	27.0%
FMR LLC (2)	11,625,539	9.4%
Named Executive Officers & Directors		
Elon Musk (1)	35,001,294	27.0%
Deepak Ahuja (3)	184,164	*
Jeffrey B. Straubel (4)	567,251	*
Jerome Guillen (5)	38,482	*
Greg Reichow (6)	17,291	*
George Blankenship (7)	5,880	*
Gilbert Passin (8)	72,782	*
Brad W. Buss (9)	81,205	*
Ira Ehrenpreis (10)	37,995	*
Antonio J. Gracias (11)	469,088	*
Stephen T. Jurvetson (12)	66,146	*
Harald Kroeger (6)(13)	9,722	*
Kimbal Musk (14)	236,642	*
All current executive officers and directors as a group (11 persons) (7)(8)(15)	36,709,280	28.4%

* Represents beneficial ownership of less than 1%.

(1) Includes 28,288,622 shares held of record by the Elon Musk Revocable Trust dated July 22, 2003; and 6,712,672 shares issuable to Mr. Musk upon exercise of options exercisable within 60 days after December 31, 2013. Includes 10,024,899 shares pledged as collateral to secure certain personal indebtedness.

In the next stage, to limit the number of filings to be searched by hand, I link the firms to the Compustat database using the Central Index Key (CIK) and subsequently to CRSP. This represents the only initial filter I apply to the raw filings before collecting the data. My final sample can therefore be considered representative of the universe of CRSP-Compustat firms. In the last step, I hand-collect the following information about each pledging CEO: (1) total number of shares owned, (2) shares that may be acquired under options that are presently exercisable or will become exercisable within 60 days, and (3) the total number of shares pledged. For dual class firms I also collect the name of the share class, the total number of shares outstanding in a given class, and the number of votes to which the holders of the stock in a given class are entitled. Altogether, I go over 7,440 firm-year filings that have been flagged by my algorithm to potentially contain information about CEO's pledging activity. Even in cases when the algorithm is able to extract the exact number of shares pledged by the CEO, I manually check its accuracy.

A.1.2. Hedging CEOs subsample

To identify pledging CEOs who entered into prepaid variable forwards, I search Form 4 filings filed by them for the following phrases: "prepaid variable forward", "variable-forward", "variable forward", "prepaid-variable", "prepaid variable", "pre-paid variable", "variable prepaid", "forward", "VPF", and "PVF". I manually search for the transaction date whenever a match is found.

Solely for the purpose of providing summary statistics in Table 3, I search Form 4 filings filed by pledging CEOs for the additional phrases: "collar", "swap", "equity fund", or "exchange fund". In all other tables presented in the paper, the hedging subsample of pledging CEOs is exclusively comprised of CEOs who entered into prepaid variable forwards.

A.2. Control sample construction

A.2.1. Control sample construction (Other CEOs)

To construct the baseline control sample, I use the same initial set of filings that I use to construct the treatment sample. The control sample contains all firm-year observations that do not indicate any pledging activity by the CEO for which I have CRSP and Compustat information available.

A.2.2. Control sample construction (No sign of pledging activity)

To construct the stricter control sample, I proceed analogously as in the case of the baseline control sample, but include only firms that do not mention any pledging activity in their proxy materials. I classify a filing to be "without any sign of pledging activity" whenever my parsing algorithm fails to find any of the following expressions: pledge + loan, pledge + indebtedness, pledge + as + security, pledge + as + collateral, pledge + margin + account, margin + loan, pledge + shares, shares + pledged, margin + call, involuntary + sale, forced + sale, brokerage + margin, collateral + for, where the plus sign indicates that the algorithm was set to allow for several characters and/or words to appear between the specified expressions. For calculating the total number of firms without any sign of pledging activity in firm-year subsamples with multiple filings per year, I classify a given firm-year observation as "without any sign of pledging activity" if the above-mentioned expressions are not found in any of the filings in a given firm-year. Interestingly, around 79% of firms each year do not mention any pledging activity in their proxy statements. After merging the data to CRSP and Compustat, this fraction drops to 69%, on average.

A.3. Prohibition of pledging

I classify a firm as prohibiting pledging if its proxy statement contains one the following phrases: prohibit + pledg, pledg + prohibit, anti-pledg, where the plus sign indicates that the algorithm was set to allow for several characters and/or words to appear between the specified expressions. To limit the number of false positives, I also look for not + prohibit + pledg, as well as, pledg + not + prohibit. I classify a firm as prohibiting pledging in the presence of either of the first three phrases and in the absence of both negative formulations. This allows me to avoid misclassifying firms that do not have any uniform anti-pledging policy, but rather allow pledging by insiders on a case-by-case basis.

A.4. Minimum stock ownership requirements

I classify a firm to be "without minimum stock ownership requirements" whenever my parsing algorithm fails to find any of the following expressions: ownership + requirement, maintain + own, require + own, minimum + own, target ownership, ownership target, at least + times/x + salary/salaries/retainer, expected/required + to + own/reach/attain + ownership, where the plus sign indicates that the algorithm was set to allow for several characters and/or words to appear between the specified expressions, and the or symbol indicates that alternative words were allowed.

B. Variable description

Table B1: Firm- and CEO-level variables

Variable	Description
Annualized stock volatility	The annualized standard deviation of daily stock returns from CRSP.
Amihud illiquidity measure	For each stock i in year y the measure is defined as $Amihud_{iy} = \frac{1}{D_{iy}} \sum_{t=1}^{D_{iy}} \frac{\lvert R_{it} \rvert}{VOLD_{it}}$, where D_{iy} is the number of days for which data are available for stock i in year y, R_{it} is the return on stock i on day t, and $VOLD_{it}$ is the respective daily dollar volume (Amihud, 2002).
Board independence	The proportion of the board represented by independent directors, i.e., directors who do not have any material connection to the company other than a board seat.
Board size	The total number of board members.
Book leverage	The ratio of total debt in current liabilities plus total long-term debt to total book assets; $(dlc + dltt)/at$.
CapEx	The ratio of capital expenditures to total book assets; $capx/at$.
CEO stock ownership [%]	The fraction of the firm's outstanding shares beneficially owned by the CEO.
CEO tenure [years]	The number of years that the CEO has been with the company.
Doubling-down CEO	An indicator variable equal to one if the firm's CEO has pledged shares as collateral and belongs to the doubling-down group, and zero otherwise.
Founder CEO	An indicator variable equal to one if the CEO is the company's founder, and zero otherwise.
Hedging CEO	An indicator variable equal to one if the firm's CEO has pledged shares as collateral and belongs to the hedging group, and zero otherwise.
Institutional ownership [%]	The fraction of the firm's outstanding shares owned by institutional investors.
Investment bank ties	The sum of mergers and acquisitions (M&As) and equity offerings (initial and seasoned equity offerings) undertaken by a firm in the three years prior to the occurrence of the pledging transaction.
Log(book value of assets)	(Firm size) The logarithm of total book assets; $ln(at)$.
Log(CEO tenure)	The logarithm of CEO tenure.
Monetizing CEO	An indicator variable equal to one if the firm's CEO has pledged shares as collateral and belongs to the monetizing group, and zero otherwise.
Net seller	An indicator variable equal to one if the firm's CEO is a net seller between the end of May 2008 and the end of October 2008, and zero otherwise.
Normalized high liquidity years	The relative number of high liquidity years accumulated over the past ten years. A given firm-year observation is categorized as "high liquidity" if the value of its Amihud measure is in the bottom quartile of the respective illiquidity measure relative to the entire CRSP universe of firms in a given year.
Number of analysts	The average number of analysts that issue forecasts about the firm's earnings during the fiscal year.
Number of segments	The the total number of segments in which a firm operates. For firm-years with missing segment information, I assume that all sales stem from a single business segment.
R&D intensity	The ratio of research and development expenses to book assets; xrd/at.
Pledging CEO	An indicator variable equal to one if the firm's CEO has pledged shares as collateral, and zero otherwise.
Pledging $>$ 75%	An indicator variable equal to one if the firm's CEO has pledged more than 75% of the total number of shares owned, and zero otherwise.
Segment HHI	Segment Herfindahl-Hirschman Index is calculated by summing the squares of the ratios of individual business segment sales to the firm's total sales. For firm-years with missing segment information, I assume that all sales stem from a single business segment.
Shares pledged/Shares owned	The fraction of shares pledged by the CEO over total shares held. The total shares held represent shares beneficially owned by the CEO minus options that are presently exercisable or will become exercisable within 60 days (as well as warrants, rights, or conversion privileges).
Shares pledged/Total owned	The fraction of shares pledged by the CEO over his or her total beneficial ownership.

Variable	Description
Stock price appreciation $> 25\%$	An indicator variable equal to one if the firm's stock price has appreciated by more than 25% since the beginning of CEO's tenure, and zero otherwise.
Total assets	The total book assets; *at*.

Table B2: Stock market variables

Variable	Description
Alpha	The return in excess of a benchmark model.
HML	The value factor as defined in Fama and French (1993).
$RMRF$	The value-weighted return on all NYSE, AMEX, and Nasdaq stocks in excess of the T-bill rate.
SMB	The size factor as defined in Fama and French (1993).
UMD	The momentum factor as defined in Carhart (1997).

C. Additional analyses

Table C1: Determinants of the CEO's pledging decision

The table reports the estimates of OLS regressions of the determinants of the CEO's decision to pledge shares over fiscal years 2006-2015. The dependent variable in Columns 1 to 2 is equal to one if the CEO has pledged shares according to the proxy statement filed, and zero otherwise. The dependent variable in Columns 3 to 4 is equal to one if the CEO belongs to the monetizing group and has pledged less than or equal to 75% of the total number of shares owned, and zero otherwise. The dependent variable in Columns 5 to 6 is equal to one if the CEO belongs to the monetizing group and has pledged more than 75% of the total number of shares owned, and zero otherwise. The variables are constructed as described in Appendix B. All specifications include year and industry fixed effects. The t-statistics (reported in parentheses) are computed using standard errors robust to both clustering at the firm level and heteroskedasticity. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Dependent variable	PL CEO		MN CEO (≤75%)		MN CEO (>75%)	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(book value of assets)	0.006**	-0.004	0.001	0.000	0.004**	-0.005
	(2.38)	(-0.98)	(0.95)	(0.17)	(1.97)	(-1.16)
Book leverage	0.044***	0.139***	0.013**	0.029***	0.032**	0.121***
	(2.93)	(5.76)	(2.49)	(2.66)	(2.45)	(5.39)
Number of analysts	-0.001	-0.001	-0.000	0.000	-0.001	-0.001
	(-1.49)	(-1.29)	(-0.45)	(0.13)	(-1.56)	(-1.40)
Institutional ownership [%]	-0.000	0.000	0.000	0.000	-0.000	0.000
	(-0.25)	(0.51)	(0.29)	(1.16)	(-0.51)	(0.25)
Annualized stock volatility	-0.017**	-0.033**	0.003	-0.003	-0.021***	-0.031**
	(-2.04)	(-2.18)	(1.27)	(-0.46)	(-2.91)	(-2.08)
Normalized high liquidity years	-0.004	0.028*	-0.005	-0.004	0.002	0.026*
	(-0.32)	(1.76)	(-1.01)	(-0.66)	(0.16)	(1.84)
Founder CEO		0.115***		0.015**		0.107***
		(6.60)		(2.29)		(6.33)
CEO stock ownership [%]		0.002***		0.000		0.002***
		(4.38)		(1.15)		(3.86)
Investment bank ties		0.008***		0.002		0.006**
		(2.93)		(1.37)		(2.48)
Log(CEO tenure)		0.008*		0.002		0.004
		(1.92)		(1.50)		(1.00)
Board size		0.003		-0.000		0.004
		(1.26)		(-0.32)		(1.48)
Board independence		-0.052**		-0.008		-0.039*
		(-2.13)		(-0.77)		(-1.76)
Stock price appreciation > 25%		0.019**		-0.001		0.019***
		(2.56)		(-0.28)		(2.92)
Observations	32,313	7,977	31,015	7,116	31,936	7,733
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table C2: Returns surrounding the initial disclosure of the pledging transaction

The table reports the mean of the distribution of the sample firm cumulative return as well as the sample firm cumulative return minus the cumulative benchmark return. Cumulative returns are defined as the sum of the daily returns over the specified intervals. The pledging initiations are assumed to take place 180 days prior to the record date. Column 1 shows the raw returns. Column 2 shows the abnormal returns surrounding the pledging initiation relative to the industry average measured as the mean return for other firms in the same industry according to the Fama and French 49 industry classification as the sample firm. Column 3 shows the abnormal returns surrounding the pledging initiation relative to the equal-weighted CRSP index. Column 4 shows the abnormal returns surrounding the pledging initiation relative to the value-weighted CRSP index. Panel A shows mean cumulative returns for the full sample of firms with pledging CEOs. Panel B shows mean cumulative returns for the subsample of firms led by doubling-down CEOs. Panel C shows mean cumulative returns for the subsample of firms led by monetizing CEOs who have pledged less than or equal to 75% of the total number of shares owned. Panel D shows mean cumulative returns for the subsample of firms led by monetizing CEOs who have pledged more than 75% of the total number of shares owned. Tests of significance are based on two-tailed probabilities against the null hypothesis that the (abnormal) return for the period is zero. The *p*-values are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Mean cumulative returns [%] - Pledging CEOs, N = 336				
	Raw return	Abnormal return		
Daily return interval	Firm	Industry average	Equal-weighted	Value-weighted
[-250 to -1]	10.75***	-0.04	1.73	6.01**
	(0.000)	(0.986)	(0.498)	(0.023)
[-60 to -1]	-0.75	0.50	1.00	0.79
	(0.640)	(0.698)	(0.469)	(0.568)
[0 to +60]	3.22**	-0.62	-0.84	1.25
	(0.015)	(0.591)	(0.485)	(0.310)
[0 to +250]	15.71***	-1.49	-0.73	5.27**
	(0.000)	(0.537)	(0.778)	(0.045)
Panel B: Mean cumulative returns [%] - Doubling-down CEOs, N = 55				
[-250 to -1]	4.95	-5.52	-2.77	0.41
	(0.611)	(0.504)	(0.749)	(0.963)
[-60 to -1]	-0.23	-0.18	1.57	1.04
	(0.947)	(0.948)	(0.614)	(0.740)
[0 to +60]	0.18	-2.77	-2.93	-1.09
	(0.952)	(0.297)	(0.264)	(0.676)
[0 to +250]	13.33	-0.07	0.27	5.29
	(0.127)	(0.992)	(0.972)	(0.470)

Table C2: Continued

Panel C: Mean cumulative returns [%] - Monetizing CEOs (≤75%), N = 207				
	Raw return	Abnormal return		
Daily return interval	Firm	Industry average	Equal-weighted	Value-weighted
[-250 to -1]	9.38***	0.17	2.06	6.24**
	(0.009)	(0.957)	(0.494)	(0.044)
[-60 to -1]	-2.07	-0.24	0.36	0.29
	(0.333)	(0.885)	(0.843)	(0.873)
[0 to +60]	3.06*	-0.66	-0.84	1.18
	(0.060)	(0.643)	(0.570)	(0.435)
[0 to +250]	16.28***	-2.36	-1.46	5.20*
	(0.000)	(0.387)	(0.625)	(0.089)
Panel D: Mean cumulative returns [%] - Monetizing CEOs (>75%), N = 59				
[-250 to -1]	16.18**	2.69	1.76	6.29
	(0.017)	(0.616)	(0.758)	(0.288)
[-60 to -1]	4.06	5.19*	4.12	3.39
	(0.228)	(0.074)	(0.173)	(0.266)
[0 to +60]	7.67**	2.46	2.40	4.88
	(0.033)	(0.430)	(0.475)	(0.151)
[0 to +250]	15.74**	-0.52	0.82	5.41
	(0.048)	(0.941)	(0.909)	(0.460)

Table C3: Returns surrounding the initial disclosure of the pledging transaction

The table reports the median of the distribution of the sample firm cumulative return as well as the sample firm cumulative return minus the cumulative benchmark return. Cumulative returns are defined as the sum of the daily returns over the specified intervals. The pledging initiations are assumed to take place as of the record date. Column 1 shows the raw returns. Column 2 shows the abnormal returns surrounding the pledging initiation relative to the industry average measured as the mean return for other firms in the same industry according to the Fama and French 49 industry classification as the sample firm. Column 3 shows the abnormal returns surrounding the pledging initiation relative to the equal-weighted CRSP index. Column 4 shows the abnormal returns surrounding the pledging initiation relative to the value-weighted CRSP index. Panel A shows median cumulative returns for the full sample of firms with pledging CEOs. Panel B shows median cumulative returns for the subsample of firms led by doubling-down CEOs. Panel C shows median cumulative returns for the subsample of firms led by monetizing CEOs who have pledged less than or equal to 75% of the total number of shares owned. Panel D shows median cumulative returns for the subsample of firms led by monetizing CEOs who have pledged more than 75% of the total number of shares owned. Panel E shows median cumulative returns for the subsample of firms led by hedging CEOs. Tests of significance are based on two-tailed probabilities against the null hypothesis that the (abnormal) return for the period is zero. The *p*-values are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Median cumulative returns [%] - Pledging CEOs, N = 351				
	Raw return	Abnormal return		
Daily return interval	Firm	Industry average	Equal-weighted	Value-weighted
[-250 to -1]	7.19***	1.38	-0.14	1.49
	(0.003)	(0.273)	(1.000)	(0.381)
[-60 to -1]	3.50***	-0.35	-0.10	1.99**
	(0.000)	(0.673)	(0.916)	(0.045)
[0 to +60]	5.13***	0.88	1.07	2.09
	(0.000)	(0.373)	(0.228)	(0.128)
[0 to +250]	11.20***	4.11*	4.53**	6.42***
	(0.000)	(0.067)	(0.024)	(0.001)
Panel B: Median cumulative returns [%] - Doubling-down CEOs, N = 45				
[-250 to -1]	7.73***	4.51	-1.10	2.23
	(0.000)	(0.761)	(1.000)	(1.000)
[-60 to -1]	3.56***	-1.58	-1.17	0.80
	(0.000)	(0.272)	(0.272)	(0.784)
[0 to +60]	7.23***	3.50	3.18	3.10
	(0.000)	(0.590)	(0.788)	(0.590)
[0 to +250]	7.95***	0.11	0.75	2.26
	(0.000)	(1.000)	(0.788)	(0.788)

Table C3: Continued

Panel C: Median cumulative returns [%] - Monetizing CEOs (≤75%), N = 227				
	Raw return	Abnormal return		
Daily return interval	Firm	Industry average	Equal-weighted	Value-weighted
[-250 to -1]	8.54***	1.37	0.76	1.74
	(0.006)	(0.254)	(0.840)	(0.383)
[-60 to -1]	4.45***	1.54	0.89	3.15**
	(0.000)	(0.555)	(0.325)	(0.010)
[0 to +60]	4.98***	1.96	1.23*	2.13
	(0.000)	(0.214)	(0.077)	(0.102)
[0 to +250]	9.62***	1.28	4.33	6.83**
	(0.000)	(0.636)	(0.198)	(0.012)
Panel D: Median cumulative returns [%] - Monetizing CEOs (>75%), N = 64				
[-250 to -1]	9.25	2.25	0.14	1.00
	(0.193)	(0.603)	(1.000)	(0.603)
[-60 to -1]	2.12	-2.90	-1.35	-0.18
	(0.620)	(0.321)	(0.620)	(1.000)
[0 to +60]	3.47	-1.79	-1.68	-1.48
	(0.109)	(0.389)	(0.268)	(0.539)
[0 to +250]	21.02***	9.25***	6.63**	10.35**
	(0.000)	(0.005)	(0.043)	(0.043)
Panel E: Median cumulative returns [%] - Hedging CEOs, N = 15				
[-250 to -1]	22.40	10.91	13.81**	12.57**
	(0.039)	(1.000)	(0.039)	(0.039)
[-60 to -1]	11.69	7.48	9.52	11.70
	(0.039)	(0.146)	(0.146)	(0.146)
[0 to +60]	0.97	3.52	5.43	3.44
	(1.000)	(0.774)	(0.388)	(1.000)
[0 to +250]	13.76	16.83	6.75	4.86
	(0.774)	(0.388)	(0.774)	(0.388)

Table C4: Changes in volatility surrounding the initial disclosure of the pledging transaction

The table reports the change in volatility from before to after pledging initiations by CEOs for the sample firms and a sample of firms matched by industry, size, and prior volatility. I use the market capitalization for the size match and the Fama and French 49 industry classification for the industry match. Volatility is the annualized standard deviation of daily stock returns computed over 60 and 250 trading days before and after the pledging initiation event. All statistics are shown separately for the sample of firms with pledging CEOs, and for the subsamples of firms led by doubling-down, monetizing, and hedging CEOs. The subsample of monetizing CEOs is split into two groups at the 75% threshold. The p-values are reported in parentheses. MWW stands for the Mann-Whitney-Wilcoxon rank-sum test. The pledging initiations are assumed to take place as of the record date. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

		Mean				Median				Kolmogorov-		Observations	
	Trading Days	Sample Firms	Matched Firms	t-Test for Difference		Sample Firms	Matched Firms	MWW Test for Difference		Smirnov Test		Sample Firms	Matched Firms
Pledging CEOs	60	0.07%	-0.11%	1.17	(0.24)	-0.03%	-0.15%	-1.37	(0.17)	0.02	(0.86)	310	1,518
	250	0.24%	0.25%	-0.04	(0.97)	0.16%	0.04%	-0.97	(0.33)	0.03	(0.70)	270	1,327
Doubling-down CEOs	60	0.04%	-0.34%	0.97	(0.33)	-0.41%	-0.14%	-0.10	(0.92)	0.11	(0.33)	51	247
	250	0.36%	0.35%	0.04	(0.97)	0.59%	0.23%	-1.02	(0.31)	0.06	(0.77)	41	202
Monetizing CEOs (≤75%)	60	0.02%	-0.05%	0.34	(0.73)	0.03%	-0.15%	-0.90	(0.37)	0.05	(0.49)	191	934
	250	0.27%	0.33%	-0.36	(0.72)	0.08%	0.07%	-0.21	(0.83)	0.03	(0.75)	167	818
Monetizing CEOs (>75%)	60	0.23%	-0.05%	0.75	(0.45)	0.40%	-0.09%	-1.31	(0.19)	0.04	(0.89)	53	264
	250	-0.02%	-0.18%	0.74	(0.46)	0.16%	-0.23%	-1.10	(0.27)	0.04	(0.89)	47	234
Hedging CEOs	60	0.30%	-0.33%	0.89	(0.39)	-0.33%	-0.42%	-0.63	(0.53)	0.04	(0.96)	15	73
	250	0.46%	0.49%	-0.06	(0.95)	0.04%	0.07%	0.06	(0.95)	0.11	(0.76)	15	73

Table C5: Corporate policies following industry downturns

The table reports the estimates of OLS regressions of corporate policies following industry downturns. Monetizing CEO is a CEO who has pledged shares to obtain liquidity while maintaining ownership. The dependent variable in Column 1 equal to Segment HHI. In Column 2, it is equal to Number of Segments. In Column 3, it is equal to R&D Intensity. In Column 4, it is equal to CapEx. The variables are constructed as described in Appendix B. The t-statistics are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Segment HHI (1)	Number of Segments (2)	R&D Intensity (3)	CapEx (4)
Monetizing CEO	0.010	-0.019	0.002	0.005*
	(0.71)	(-0.21)	(0.46)	(1.90)
Industry downturn	0.001	-0.010	-0.002**	-0.006***
	(0.15)	(-0.36)	(-2.22)	(-4.35)
Monetizing CEO x Industry downturn	-0.032	0.188	0.009**	-0.002
	(-1.63)	(1.32)	(2.02)	(-0.63)
Log(book value of assets)	-0.043***	0.380***	-0.023***	-0.003***
	(-11.60)	(13.58)	(-15.77)	(-3.15)
Book leverage	0.024	-0.046	-0.037***	-0.001
	(1.24)	(-0.35)	(-5.95)	(-0.16)
Number of analysts	0.006***	-0.045***	0.004***	0.001***
	(7.21)	(-7.24)	(14.28)	(4.14)
Institutional ownership [%]	0.000*	-0.004***	0.000***	0.000*
	(1.82)	(-3.72)	(4.23)	(1.67)
Annualized stock volatility	0.019	-0.429***	0.072***	-0.012***
	(1.40)	(-5.04)	(12.42)	(-3.11)
Normalized high liquidity years	-0.008	0.016	0.027***	-0.013***
	(-0.46)	(0.13)	(5.27)	(-3.81)
Observations	29,795	29,795	29,795	28,670
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes