CEO overconfidence and the informativeness of bank stock prices

Anh-Tuan Le
Department of Finance,
National Central University
tuanlechris@g.ncu.edu.tw

Anh-Tuan Doan
International School of Business,
University of Economics Ho Chi Minh City
tuandoan@isb.edu.vn

Kun-Li Lin[1]
Department of Business Management,
National Taichung University of Science and Technology
linkl@nutc.edu.tw

Abstract

This paper examines the effect of the overconfidence of chief executive officers (CEOs) on the informativeness of banks' stock prices. To do so, we use a large sample of US banks for the period from 1992Q1 – 2019Q4 and find that banks with overconfident CEOs have less informative stock prices. This finding is robust to alternative measures of overconfident CEOs and to addressing endogeneity with propensity score matching and an instrument variable approach. Further, we also observe that banking and financial market crises strengthen the negative effect of overconfident CEOs on the informativeness of stock prices, especially in larger banks. Additional analyses show that the adverse effect of overconfident CEOs on this informativeness is more pronounced for banks that turn over CEOs. The results are consistent with the idea that very overconfident CEOs are detrimental to firms in terms of the transparency of stock prices.

Keywords: CEO overconfidence, Stock price informativeness, Financial crisis, CEO turnover.

JEL classifications: G01, G21, G32.

[1] Correspondence: Kun-Li Lin, Department of Business Management National Taichung University of Science and Technology, No.129, Sec.3, Sanmin Rd, North Dist., Taichung City 404, Taiwan (R.O.C.). linkl@nutc.edu.tw.

1. Introduction

In the wake of the financial crisis of 2008, risk managers, regulators, and investors have all intensely debated the association between inadequate dissemination of bank-specific information to public investors during a financial crisis, particularly less bank-specific information in stock prices (i.e., informative stock prices). However, bank-specific information can arise from a variety of sources that range from internal corporate governance to external regulations. The academic literature has responded by considering the relationship between bank-specific information and some regulations, such as a country's capital stringency regulation and private-monitoring power (Francis et al., 2015).

Although much has been written on the country's regulation and supervision that could explain variations in the informativeness of banks' stock prices (e.g., Francis et al., 2015; Doan et al., 2020), no study has analyzed the informativeness of a bank's stock price in relation to their CEO's personality trait of "overconfidence". CEOs are frequently perceived to have an exaggerated opinion of their own abilities and the prospects of the firms they manage. Yet it is hard to dispute the influence that CEOs and their beliefs about future outcomes have on banks' policies. While Ho et al. (2016) examine whether optimistic bank CEOs pursued higher risk before the 2008 financial crisis, Huang et al. (2018) investigate the relationship between overconfident CEOs and the liquidity creation of banks. However, they do not examine the determinants of the informativeness of bank stock prices. Given the importance of bank-specific information for the stability of the whole financial system (Barth et al., 2012), the scarcity of research on the CEO's behavior and the determinants of informative stock prices is surprising and potentially consequential.

The motivation for our tests is based on the theory that posits that overconfident CEOs in the intermediation process provide uncertainty to outsiders about the inherent risks and performance of banks (Berlin and Loeys, 1988; Diamond, 1989, 1991; Fahlenbrach and Stulz, 2011). This theory hypothesizes that overconfident CEOs should also affect banks' decisions on the informativeness of stock prices. Because overconfident CEOs are likely to overestimate the value generated by liquidity creation and underestimate the risk it brings, banks with these CEOs should create more opacity (Liu et al., 2020). We specify that overconfident bank CEOs overestimate the prospects of future outcomes of risky activities which may expose banks to a systemic event, or they may overestimate their ability to deliver good outcomes from such activities that subsequently lead to banks being more likely to pursue those higher risk activities than their non-overconfident counterparts.[2] For example, Ho et al. (2016) postulate that overconfident CEOs place less weight on downside risk and consequently ease lending standards because they overvalue the prospects of their borrowers (i.e., good outcomes). They also find that instead of learning from their experience in the 1998 crisis, banks with overconfident CEOs in 1997 still had this type of CEO in 2006. Moreover, Black and Gallemore (2013) show that overconfident CEOs overestimate the prospects of loan recovery and thus recognize lower loan loss provisions. Huang et al. (2018) show that banks with overconfident CEOs create more liquidity, and their positive effect on liquidity creation was stronger during the financial crisis of 2007−2009. Lee et al. (2020a) find that banks with overconfident CEOs have higher systemic risks than banks with non-overconfident CEOs.

[2] For simplicity, we call banks with overconfident CEOs "overconfident banks" and those whose CEOs that are not overconfident "non-overconfident banks."

In this study, we conjecture that overconfident CEOs have an incentive to cover up the prospects of future outcomes of risky activities. They can do so by withholding unfavorable information or selectively disclosing such information. These actions help them camouflage their overconfidence by opportunistically timing the release of value-relevant, private information to the market. This opportunism can be the case if the uncertainty about the risk characteristics of projects is reduced by the availability of more information on related borrowers (Rajan, 1992). For example, overconfident CEOs are more likely to overestimate the gains of their investment projects that results in less accurate earnings forecasts for their firms (Hilary and Hsu, 2011). Schrand and Zechman (2012a) indicate that overconfident CEOs are more likely to issue financial restatements (Presley and Abbott, 2013) and to engage in real earnings managements (Hsieh et al., 2014). If overconfident CEOs create informational uncertainty, then bank stocks are less likely to reflect market-wide information. Similarly, our hypothesis posits that overconfident CEOs might adversely influence the ability of outsiders to accurately value banks which may lead to less informational efficiency in the stock prices of banks.

We test the relationship between bank-specific information and overconfidence by collecting data on CEOs from the ExecuComp database for the period from 1993Q1 to 2019Q4. Our focus is on banks because they are arguably more opaque than other types of firms; therefore, we explore how well bank stocks incorporate market-wide information. Specifically, other studies have examined the relation between various firm-specific information proxies and the synchronicity in stock returns. They measure synchronicity with the R-square that they derive from the standard market model. This measure reflects the amount of variation in systematic returns relative to that in firm-specific returns. There is

empirical evidence that supports the view that a low R-square is associated with greater information transparency (see, Durnev et al., 2003; Jin and Myers, 2006; Morck, et al., 2000; Piotroski and Roulstone, 2004). To identify overconfident CEOs, we use the stock option-based measure from Malmendier and Tate (2005, 2008) and Malmendier et al. (2010) in which overconfident CEOs are those who hold options very deep in the money. We treat a bank with an overconfident CEO as an overconfident bank. We use a sample of 6,767 bank-quarter observations of 160 listed banking holding companies and listed banks to show that overconfident CEOs are significantly and negatively associated with the informativeness of bank stock prices. Particularly, banks with overconfident CEOs, on average, have a 9.4% less informative stock price than non-overconfident banks. Our results are robust to using a variety of alternative tests such as alternative proxies for overconfident CEOs, instrumental variable regressions, and propensity score matching. Overall, these results show that banks with overconfident CEOs have less transparent information in their stock prices.

We further examine how overconfident CEOs have different effects on the informativeness of bank stock prices due to market conditions. Specifically, we show that their detrimental effect should have been more pronounced in the financial crisis in 2007 – 2009 and the banking crises of 1998 and 2000 to 2002. In addition, several studies indicate that the influence of overconfident CEOs may be heterogeneous due to the size of banks. For example, Huang et al. (2018) show that larger banks with overconfident CEOs increase liquidity creation during banking crises, while smaller banks with overconfident CEOs do not. Consistently, we find that overconfident CEOs are negatively associated with the informativeness of the stock prices of both large and small banks. However, this negative association is only stronger during the financial crisis for large banks.

In addition, we also consider the role of board monitoring by investigating the moderating role of CEOs' turnover on the link between their overconfidence and the informativeness of stock prices. To the extent that overconfident CEOs are more likely to be laid off due to worse performance (Campbell et al., 2011; Ho et al., 2016), replacing them creates a disincentive for informed trading that thereby lowers the informativeness of stock prices (Gorton et al., 2017). Consistent with our expectation, we find that the negative effect of overconfident CEOs on informativeness is more pronounced for banks that turn over their CEOs.

Our work contributes to the literature in three ways. First, it adds to the growing literature on the determinants of the informativeness of stock prices. As mentioned, because banks' performance is generally affected by a number of institutional factors such as regulation, supervision, audit quality, and investor protection, our empirical work sheds light on the differential effect of overconfident CEOs between nonfinancial and banking firms. Francis et al. (2015) use a sample of commercial banks to test how regulation and supervision affect the synchronicity among stock prices but fail to describe the influence of the incentives of overconfident CEOs on bank-specific information. Our results provide a greater understanding about the role of overconfident CEOs as it relates to the flow of information into stock prices.

Next, our study extends the literature by providing the effect of overconfident CEOs on real corporate activities. Recent studies have investigated how overconfident CEOs affect cash holdings and their value (Aktas et al., 2019; Chen et al., 2020), loan contracting (Lin et al., 2020), and corporate debt maturity (Huang et al., 2016). With respect to the banking industry, Lee et al. (2019) focus on the adverse influence of managerial overconfidence on

banks' systemic risk. Ho et al. (2016) find that a financial crisis boosts overconfident CEOs by weakening lending standards and increasing leverage. While Huang et al. (2018) show that banks with overconfident CEOs create more liquidity than their non-overconfident peers. However, Campbell and Kracaw (1980) argue that this uncertainty about the riskiness of banks reduces the ability of outsiders to properly access value-related information (Campbell and Kracaw,1980). Consistent with this argument, our findings show that overconfident CEOs can also influence the informational efficiency of stock prices.

Finally, we are interested in understanding the effect in banking industries which is a crucial issue that is still unexplored in the literature. Unlike past the studies that focus on nonfinancial firms, Morgan and Mehran (2002) argue that banks are relatively more opaque than other firms because they can keep information secret thanks to organizational complexity and obfuscation (Berger et al., 2000; Carlin, 2009). The results in Flannery et al. (2004 and 2013) and Jones et al. (2012) show that outsiders have difficulty assessing the true value of opaque banks that makes the tests of our hypothesis more compelling. Accordingly, our work sheds light on how different CEO behaviors determine the variation in banks' stock returns and is timely in exploring a new determinant of the informativeness of stock prices.

The remainder of the paper is organized as follows: In Section 2, we review the literature and build the hypotheses. Section 3 presents the data selection, research design, and summary statistics. Section 4 has the empirical results. Section 5 concludes.

2. Literature review and hypothesis development

2.1 Overconfident CEOs and the informativeness of stock prices

The theory of efficient markets posits that asset prices reflect all available information. However, what if information about the bank's stock associated with the CEO is relatively optimistic? The 2007-2009 financial crisis led regulators to consider the extent to which regulation and supervision arrangements can explain bank-specific information. The literature has shown that banks' stock returns are more informative in countries with more stringent capital regulations and more supervision that emphasizes private monitoring (Francis et al., 2015). To date, the literature has given limited attention to the relationship between bank-specific information and overconfident CEOs.

Research has shown that overconfidence is one of the most prominent behavioral biases. Moore and Schatz (2017) define three facets of overconfidence: (1) overestimation—thinking that you are better than you are; (2) overplacement—the exaggerated belief that you are better than others; (3) over-precision—the excessive faith that you know the truth. This cognitive bias shapes the interpretation of corporate information that is the primary contributor to decisions. The literature has shed light on how overconfident CEOs affect the policies, decisions, outcomes (Andreou et al., 2019), investments (Malmendier and Tate, 2005), social responsibility (Ng and Rezaee, 2020), board structure (Ferreira et al., 2011; Sila et al., 2017), ownership structure(Ben-Nasr and Cosset, 2014; Haggard et al., 2008), quality of financial report (Haggard et al., 2008; Presley and Abbott, 2013), earnings forecast (Hilary and Hsu, 2011), bank lending (Ho et al., 2016), bank systemic risk (Lee et al., 2020b), dividends (Deshmukh et al., 2013), capital structure (Huang et al., 2016), cash holdings (Chen et al., 2020), risk of stock crash (Kim et al., 2016), and the tax avoidance of banks. In this paper, we are motivated to understand the effect of overconfident CEOs on the informativeness of banks' stock prices.

Numerous studies also convey a robust message that CEO overconfidence may potentially induce agency problems. For instance, Malmendier and Tate (2005) argue that overconfident CEOs are more likely to be involved in value-destroying M&As by overpaying for target companies. Ferris et al. (2013) show that they are associated with more diversified acquisitions and a higher probability of using cash to pay for those targets that is detrimental to shareholder value. Hilary and Hsu (2011) show that CEOs are more likely to be overconfident after they have predicted earnings accurately in the previous four quarters. Andreou et al. (2019) show that diversified firms led by overconfident CEOs lose value compared to diversified firms led by their non-overconfident counterparts. This is due to the fact that overconfident CEOs overreact to the gains of profitable investment projects while underestimating the probability of failure. Consequently, they resort to overinvestment as their first-best choice that in turn reduces firm value (Malmendier and Tate, 2005; Campbell et al., 2011).

We conjecture that banks with overconfident CEOs have less informative stock prices because these banks are less transparent in information disclosure. Indeed, Schrand and Zechman (2012a) indicate that overconfident firms have lower quality reporting because they have higher misstated earnings. Overconfident CEOs are more likely to issue financial restatements (Presley and Abbott, 2013) and engage in real earnings managements (Hsieh et al., 2014). Kim et al. (2016) find that firms with overconfident CEOs have a higher risk of a crash in their stock prices because they misevaluate negative net present value projects, overestimate the return of profitable investments, and ignore observed negative feedback. The empirical literature (e.g., Morck et al., 2000; Jin and Myers, 2006) has found a significantly negative link between price informativeness and information asymmetry

because market prices cannot effectively transmit management information. Indeed, Blau et al. (2017) find that incomplete information shrinks the set of informed investors and thereby lowers trading activities; thereby stock prices do not fully impound all available firm-specific information. Recently, Abedifar et al. (2020) have found that Islamic banks have less informative stock prices because of inadequate financial disclosure that leads to higher opacity and complexity costs in lending that create higher information asymmetry. This asymmetry means that unknowledge investors cannot accurately evaluate the firm-specific information that is incorporated into stock prices. Taken together, we predict that the stock prices of banks with overconfident CEOs are less informative than those of banks with non-overconfident CEOs. This prediction enables us to propose our first empirical hypothesis:

Hypothesis 1. Banks with overconfident CEOs have less informative stock prices than banks with non-overconfident CEOs.

2.2 The role of a financial crisis

The literature has also shows that the influence of overconfident CEOs on corporate policy may be different during a financial crisis. For instance, Huang et al. (2018) find that banks provide more liquidity during banking crises than in non-crisis periods because CEOs are more overconfident about the future, thereby they are less reluctant to offer a screening service. In addition, Suntheim and Sironi (2013) provide robust evidence that overconfident CEO took higher risks that led to higher financial fragility in the banking industry during the 2008–2009 crisis. Ho et al. (2016) further support this view by showing that banks with overconfident CEOs were more vulnerable in the financial crisis. Compared to pre-crisis periods, these banks accepted weaker lending standards and higher leverage post-crisis. Recently, Lee et al. (2020b) argue that banks with overconfident CEOs experienced higher

systemic risk than banks with non-overconfident CEOs during the financial crisis. Hence, we posit that if overconfident CEOs are negatively associated with the informativeness of bank stock prices, then this effect should be more pronounced during a financial crisis. Therefore, our second hypothesis is:

Hypothesis 2. The negative effect of* overconfident *CEOs on the informativeness of stock prices is more pronounced during financial and banking crises.

2.3 Effect of bank capital

Our next hypothesis concerns how the heterogeneities in capital ratios moderate the relationship between overconfident CEOs and the informativeness of stock prices. In line with the incentive-based theories (Holmstrom and Tirole, 1997; Thakor, 2014), some studies have shown that capital increases the bank's incentives to monitor its connection with borrowers (Holmström and Tirole, 1998). Boot and Schmeits (2000) indicate that the degree of transparency determines the likelihood that investors in bank liabilities will learn the extent of the monitoring effort invested by the bank. As effort is costly, the bank will choose low levels of monitoring in the absence of transparency. Higher capital ratios thus could improve the quality of the transparency and disclosure of the invested banks, which in turn could enhance price informativeness. We expect banks with high capital ratios to have higher transparency (the stock prices are more informative) than their low-capital peers. This transparency means that the negative effect of overconfident CEOs on the informativeness of stock prices should be less pronounced for banks with high capital ratios. We state our third hypothesis as follows:

Hypothesis 3. The negative effect of overconfident CEOs on the informativeness of stock prices is more pronounced for banks with low capital ratios.

2.4 Effect of CEO turnover

Considerable empirical evidence exists that shows that overconfident CEOs are more likely to be replaced due to bad performance (Goel and Thakor, 2008; Campbell et al., 2011). In the banking sector, Ho et al. (2016) argue that banks with overconfident CEOs performed more poorly than banks with non-overconfident CEOs during the financial crisis that thereby increased the probability of CEO turnover. Meanwhile, Gorton et al. (2017) build both theoretical and empirical models to show that the firing of a CEO leads to a reduction in the informativeness of stock prices of 17.9% due to the trade-off between market efficiency and economic efficiency. Despite the fact that information incorporated into the stock price may benefit firms in distributing resources more efficiently (e.g., replacing unqualified CEOs), the board's response to this information generates a disincentive for informed trading. Consequently, the stock price is less informative. This line of argument means that compared with banks with overconfident CEOs that do not experience turnover, banks with overconfident CEOs that do experience turnover should have less informative stock prices. Taken together, we propose our fourth hypothesis as follows:

Hypothesis 4. The negative effect of overconfident CEO on the informativeness of stock prices is more pronounced for banks with CEO turnover.

3. Data and Methodology

3.1 Data collection

To construct the sample, we collect data on stock returns from the Center for Research in Security Prices (CRSP), bank accounting data from Standard and Poor's Compustat, and CEO-related data from the ExecuComp. Following Ho et al. (2016), we start with all

depository institutions (commercial banks and savings institutions) and investment banks that have standard industrial classification (SIC) codes between 6000 and 6300. We then match with the data on overconfident CEOs from ExecuComp. After excluding observations with missing data on the variables, our final sample consists of 6,767 bank-quarter observations that cover the period from 1993Q1 – 2019Q4.[3] To lessen the influence of outliers, we winsorize all continuous variables at 1.5%.

3.2 Variable construction

3.2.1 Measurement of the informativeness of stock prices

In line with Roll (1988) and Morck et al. (2000), we use idiosyncratic volatility to gauge the informativeness of stock prices. This measure reflects the variation in bank-specific stock returns or in the returns from a stock that cannot be explained by the market return. Specifically, the informativeness of stock prices for a generic bank *i* in quarter *t* is defined as:

$$SPI_{i,t} = \log\left(\frac{1-R^2_{i,t}}{R^2_{i,t}}\right) \tag{1}$$

where $R^2_{i,t}$ is estimated from the regressions of individual stock returns on market and industry indexes (Piotroski and Roulstone, 2004; Brockman and Yan, 2009) for each bank-quarter as in the following equation:

$$\begin{aligned} Ret_{i,w} = {} & \alpha + \beta_1 Market\_Ret_{i,w-1} + \beta_2 Market\_Ret_{i,w} \\ & + \beta_3 Industry\_Ret_{i,w-1} + \beta_4 Industry\_Ret_{i,w} + \varepsilon_{i,w} \end{aligned} \tag{2}$$

[3] We start the sample from 1993Q1 due to the availability of data on the ExecuComp.

where $Ret_{w,t}$ denotes bank *i*'s return in week *w*. We consider Wednesday-to-Wednesday returns to avoid thin trading problems and potential seasonal effects. $Market\_Ret_{i,w}$ is the value-weighted market return for week *w*, and $Industry\_Ret_{i,w}$ is the banking industry's value-weighted return that excludes bank i's weekly return. Following Doan et al. (2020), we also use the lag returns due to the fact that information in the market and the banking industry may be incorporated into a stock price with a delay. In this measure, a higher value of *SPI* indicates a higher level of informativeness. This level can be interpreted as the stock price having a greater (smaller) level of firm-specific information content because the market return explains a smaller (greater) component of its volatility.

3.2.2 Measurement of overconfident CEOs

In the spirit of Hirshleifer et al. (2012), we measure overconfident CEOs based on their decisions to hold executive options. The idea here is that it is optimal for a risk-averse CEO to exercise their options early to diversify and thereby decrease their exposure to idiosyncratic risk if the option is sufficiently in the money. We follow Campbell et al. (2011) to calculate the moneyness of an executive option. First, we use ExecuComp to calculate the average realizable value as the estimated value of the unexercised options (item OPT_UNEX_EXER_EST_VAL) that is divided by their number (item OPT_UNEX_EXER_NUM). Second, we obtain the average price of the exercisable options held by the stock price at the fiscal year-end (item PRCC_F) minus the average realizable value. Third, the average percent of moneyness of CEOs' options is then calculated as the average realizable value that is divided by the average price of the exercisable options.

Following Hirshleifer et al. (2012), we define CEOs as overconfident if they hold vested options that are at least 67% in the money once (i.e., the stock price exceeds the exercise price by more than 67%). The variable *HO67* is a dummy variable that equals one if a bank is managed by an overconfident CEO and zero otherwise. In a robustness check, we use two alternative measures of overconfidence: *HIGHOC* and *NET BUYER.* We adopt the definitions of Campbell et al. (2011) to classify CEOs who hold exercisable options that have moneyness greater than 100% at least twice during their tenure as overconfident CEOs (*HIGHOC)*. As proposed by Malmendier and Tate (2005)*, NET BUYER* is an indicator variable that equals one if the CEOs were net buyers of stock in more years than they were net sellers during their first five years in the sample.

3.3 Basic model

$$SPI_{i,t} = \alpha_0 + \alpha_1 Overconfidence_{i,t} + \beta' Bank\ Control_{i,t} + \nu_i + \mu_t + \varepsilon_{i,j,t} \qquad (3)$$

where the dependent variable, $SPI_{i,t}$ is the informativeness of stock prices for bank i in quarter t. $Overconfidence_{i,t}$ is a dummy variable that equals one if a bank's CEO is defined as overconfident. $Bank\ control_{i,t}$ is a set of control variables to capture bank characteristics as suggested in the literature (Boyd et al., 1993; Laeven and Levine, 2009; Ho et al., 2016). We add *EQUITY* as the ratio of total equity capital to gross total assets (total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve). *SIZE* is the natural logarithm of gross total assets. We further control for factors related to default risks such as the standard deviation in a bank's quarterly return on assets over the previous 12 quarters (*SD12_ROA*), a bank's Basel I risk-weighted assets and off-balance-sheet activities scaled by

gross total assets (*TIER1*), and the inverse probability of insolvency (*ZSCORE*). The detailed definitions and sources of all variables are reported in Appendix A.

3.4 Descriptive statistics

Panel A of Table 1 presents the descriptive statistics for our sample. The mean and standard deviation in the SPI are 0.776 and 1.083, respectively. Regarding our main measure (*HO67*), overconfident CEOs account for 64.1% of the whole sample. The mean of the total equity capital ratio to gross total assets is 6.5% with a maximum of 12.4%. The means of *SIZE* and *SD12_ROA* are 10.03 and 0.147, respectively. Consistent with Huang, Chen, and Chen (2018), we find that the means of *SD12_ROA*, *TIER1*, and *ZSCORE* are much higher than their medians due to a heavy right skewness. Specifically, the means of *TIER1* and *ZSCORE* are 11.7% and 4.467 with corresponding medians of 9.3% and 3.956, respectively. In Panel B, we show the correlations among variables in our analysis. The correlation between *SPI* and *HO67* is negative and significant at the 10% level (Pearson correlation of -0.021). However, the other correlations between the explanatory variables are relatively low (absolute value < 0.524). Hence, multicollinearity is less likely to be a big concern in our model.[4]

[Insert Table 1 about here]

3.5 Univariate analysis

Table 2 shows the univariate comparisons of bank characteristics for the full sample in Columns (1) to (3) and for the PSM sample in Columns (4) to (6). We conduct one-to-one nearest neighbor propensity score matching with replacement by estimating a logistic

[4] We perform multicollinearity diagnostic tests for all the explanatory variables and review the VIFs for each explanatory variable. There is no sign of multicollinearity that would affect our results.

regression model with a set of bank characteristics as the baseline regression: *EQUITY*, *SIZE*, *SD12_ROA*, *TIER1*, and *ZSCORE.* We define overconfident banks as treated banks that have an overconfident CEO. We then match those banks to control banks (non-overconfident banks without overconfident CEOs) in the same industry and year. With this method, we can eliminate the biases in the findings due to a misspecification of the model. Specifically, some omitted factors that influence the hiring of overconfident or non-overconfident CEOs by banks are likely to affect the informativeness of stock prices, which translates into the confounding of our results.

Our main interest in Table 2 is the difference in the *SPI* between overconfident banks and non-overconfident banks. We show that overconfident banks have less informative stock prices. These differences are statistically significant at the 10% level for the full sample and the 1% level for the PSM sample. These findings give preliminary evidence that supports Hypothesis 1. In addition, the remaining results of Table 2 show the mean characteristics of banks with overconfident CEOs and banks without them and their differences. We find that before matching, equity ratio, size, capital ratio, and volatility of returns are different and statistically significant at the conventional level between the two groups. In the PSM sample, there are no statistical differences in the characteristics between the two groups of banks that means the matching was effectively implemented.

[Insert Table 2 about here]

4. Empirical results

4.1 Baseline results

Table 3 shows the estimation results from testing Hypothesis 1 for the full sample in Models (1) and (2) and the matched sample in Models (3) and (4). We only use our main independent variable (*HO67*) in Models (1) and (3). We add all control variables and bank and year fixed effects to the other models. To save space, we do not provide the coefficients for the bank and year dummies. In Table 3, the coefficients for *HO67* are always significantly negative, even when we capture all the other potential factors that may influence it. For example, in Model (1), the coefficient for *HO67* is −0.094 and is statistically significant at the 1% level. In other words, over the sample period, overconfident banks on average have a 9.4% less informative stock prices, which supports Hypothesis 1. When we control for bank characteristics in the model, the coefficient for *HO67* in Model (2) of Table 3 yields a similar finding in terms of sign and statistical significance (beta = -0.041, t-statistic = -2.106).

Next, we reestimate the regression in Model (3) for the PSM sample. As Models (3) and (4) in Table 3 show, the coefficients for *HO67* are -0.075 and -0.052 and both are statistically significant at least at the 5% level. This significance means that overconfident banks have 5.2% – 7.5% less informative stock prices, even after controlling for endogeneity concerns due to omitted variables. Again, the results from the PSM sample support Hypothesis 1.

For bank characteristics, we find that the size, ratio of Basel I risk-weighted assets, and the off-balance-sheet activities to gross assets are positively associated with the informativeness of bank stock prices. In contrast, the *ZSCORE* reduces the informativeness of stock prices. These findings are supported by recent studies (Lee et al., 2019; Doan et al., 2020).

[Insert Table 3 about here]

4.2 Endogeneity

Admittedly, we use bank fixed effects in all specifications to eliminate the bias in the findings due to omitted variables. A potential endogeneity concern for our regression is that banks that have less informative stock prices may be inclined to hire overconfident CEOs. We adopt a 2SLS model to deal with this reverse-causality problem. Following Ho et al., (2016), we use the age of the CEO as the instrumental variable (*CEO AGE*). It is widely accepted that older CEOs are more likely to be overconfident (Ho et al., 2016; Huang et al., 2018) while the age does not seem to be correlated to the informativeness.

Table 4 shows the results of the 2SLS regression model for the full sample and the PSM sample. For each sample in the first stage, we use a logit model to regress *HO67* on the age of the CEO (*CEO AGE*) and all control variables as in Eq. (3). As Columns (1) and (3) show, the coefficients for *CEO AGE* are 0.007 and 0.008 for the full sample and PSM sample, respectively. These positive associations are statistically significant at the 1% level. Notably, Cragg and Donald's (1993) F-statistics are 62.863 and 60.671 and are much higher than the approximate cut-off of 10 (Wooldridge, 2016). Hence, our instrumental variable is not weak. In the second stage, we regress SPI on the fitted *HO67* and control variables. The results are similar to those in Table 3. The coefficients for *HO67* are significantly negative that indicates the banks with overconfident CEOs have less informative stock prices.

[Insert Table 4 about here]

4.3 The effects of market and financial crises

To understand how banking and financial crises affect the link between overconfident CEOs and the informativeness of stock prices, we consider the following model specifications:

$$SPI_{i,t} = \alpha_0 + \alpha_1 Overconfidence_{i,t} + \alpha_2 Overconfidence_{i,t} \times BANK\_CRISIS_t + \alpha_3 Overconfidence \times MARKET\_CRISIS_t + \beta' Bank\ Control_{i,t} + \nu_i + \mu_t + \varepsilon_{i,j,t} \quad (4)$$

where *BANK_CRISIS* and *MARKET_CRISIS* are the dummy variables for the financial crisis 2007Q3 to 2009Q4) and financial market crises (1998Q3 to 1998Q4 and 2000Q2 to 2002Q3), respectively. We adopt the definitions of Berger and Bouwman (2013) for the crises. Our main interests are the coefficients for the interactions, α_2 and α_3. Notably, the coefficients for the interaction terms will explain whether *BANK_CRISIS* or *MARKET_CRISIS* along with the level of overconfidence enhance or impede the level of informativeness. If these crises strengthen the adverse influence of overconfident CEOs on the informativeness of stock prices, then the coefficients for the interaction terms should be negative.

[Insert Table 5 about here]

For clarity, we regress the three specifications for each sample. In Columns (1) and (2) in Table 5, we use interaction terms between *HO67* and *MARKET_CRISIS* and *BANK CRISIS,* respectively. In Column (3), we use both in the model. The coefficients for *HO67*× *MARKET_CRISIS* and *HO67*× *BANK_CRISIS* are negative and statistically significant at the conventional level. Furthermore, the coefficients for these interactions are relatively large compared to those for *HO67* that means the effect of overconfident CEOs on the informativeness of stock prices became bigger during the subprime crisis. We also replicate our analysis by using the PSM sample and find results that support Hypothesis 2. That is, the

negative effect of overconfident CEOs on the informativeness of bank stock prices was more pronounced during the financial crisis and the financial market crisis in particular.

4.4 Effect of bank size

The size of the bank has different heterogeneous effects. Huang et al. (2018) show that larger banks with overconfident CEOs create more liquidity during banking crises, while smaller banks with overconfident CEOs do not. We posit that the effect on the informativeness of stock prices also should differ with the bank size. To examine this prediction, we split our sample into large and small banks by using the cut-off of US$10 billion of total assets as in Huang et al. (2018). The results are reported in Table 6. We observe that overconfident CEOs are negatively associated with the informativeness of stock prices for both large and small banks. However, this negative effect was only stronger during the financial crisis for large banks. For example, as suggested in Column (6), the coefficients for *HO67*MARKET_CRISIS HO67*BANK_CRISIS* are -0.272 and -0.168 and both are statistically significant at the 5% level. By contrast, none of the coefficients for the interaction terms is significant, even for the PSM sample.

[Insert Table 6 about here]

4.5 Effect of bank capital

In this subsection, we consider the strength of the relationship between overconfident CEOs and the informativeness of stock prices for banks with high versus low capital ratios. We construct a dummy variable that equals one for banks with a low capital ratio (*LOW CAPITAL*) if a bank's capital ratio is lower than the sample median in a given year-quarter.

We then add the interaction term between *Overconfidence* and *LOW CAPITAL* to estimate the following equation that uses an OLS with bank and time fixed effects:

$$SPI_{i,t} = \alpha_0 + \alpha_1 Overconfidence_{i,t} + Overconfidence_{i,t}\left(\varphi_2 + \varphi_3 LOW\ CAPITAL_{i,t}\right) + \beta' Bank\ Control_{i,t} + \nu_i + \mu_t + \varepsilon_{i,j,t} \quad (5)$$

Table 7 presents the results from estimating equation (5). The results show that the coefficients for *HO67×LOW CAPITAL* are negative and significant in both the full sample and the PSM sample. In terms of economic significance, Column (1) of Table 7 shows that the coefficient for *HO67× LOW CAPITAL* is -0.178. This coefficient means that overconfident banks with low capital ratios are associated with an approximately 0.178% less informative stock price compared to overconfident banks with high capital ratios. The results support Hypothesis 3 and indicate that the negative effect of overconfident CEOs on the informativeness of stock prices is more pronounced for banks with low capital. Our findings complement Huang et al. (2018) who show that overconfident CEOs are likely to encourage banks with high capital ratios to create liquidity. We reason that the better informativeness of stock prices is a plausible mechanism that leads to these effects.

[Insert Table 7 about here]

4.6 Effect of CEO turnover

Studies have generated significant evidence about the relationship between the overconfidence and turnover of CEOs (Ho et al., 2016; Gorton et al., 2017). Ho et al. (2016) show that banks with overconfident CEOs are more likely to replace them than banks with non-overconfident CEOs in crisis years. Gorton et al. (2017) show that a forced turnover of a CEO leads to a decrease in the informativeness of stock prices because the board's

monitoring intensity and the informed trader's informed decision are endogenously determined. Hence, the informativeness of stock prices is negatively related to the board's monitoring effort. Developing this idea further, we expect that the negative effect of overconfident CEOs on the informativeness of stock prices is more pronounced for banks with CEO turnover. To test this prediction, we modify Eq. (3) by adding the interaction term *Overconfidence x TURNOVER*. We specify our empirical model as follows:

$$SPI_{i,t} = \alpha_0 + \alpha_1 Overconfidence_{i,t} + Overconfidence_{i,t}\left(\varphi_2 + \varphi_3\, CEO\,turnover_{i,t}\right) + \beta' Bank\ \ Control_{i,t} + \nu_i + \mu_t + \varepsilon_{i,j,t} \quad (5)$$

Following Ho et al. (2016) and Gorton et al. (2017), we define *TURNOVER* as a dummy variable that equals one for banks that turn over their CEO and zero otherwise. The interaction term indicates the difference in the effect of overconfident CEOs between banks with and without their turnover. If overconfident banks' stock price with CEO turnover is less informative than those without turnover events, the interaction terms of *Overconfidence x TURNOVER* should be negative and significant.

Table 8 presents the regression results for the full and the PSM samples. Across all model specifications, we find that the coefficients for interaction terms are negative and significant at the conventional level. The findings support Hypothesis 4 that means the negative effect of overconfident CEOs on the informativeness of stock prices is more pronounced for banks with CEO turnover. This evidence complements the findings in Gorton et al. (2017), who show that although the information content incorporated into the stock price may benefit from allocating resources more efficiently (e.g., replacing incompetent CEOs), the board's response to this information generates a disincentive for informed trading and makes the stock price less informative.

[Insert Table 8 about here]

4.7 Robustness check

To check the robustness of our findings, we use two alternative proxies for overconfident CEOs. Following Malmendier and Tate (2005), *NET BUYER* is an indicator variable for a CEO who is a net buyer if they buy stock a net in more years than they sell at net during the first five years of their tenures.[5] The second proxy is *OPTIMIST* that is an indicator variable that equals one if a CEO delays the exercising of 100% or higher in-the-money options at least twice during their tenure and is assigned to the overconfident category from the first time they exhibit this behaviour during their tenure (Campbell et al., 2011).

We then reestimate Eq. (4) to Eq. (5) and report the results in Table 9. Overall, the main results are qualitatively unchanged and are consistent with the results reported in Table 4. In addition, we also show that the coefficients for *CO*MARKET_CRISIS*, *CO *BANK_CRISIS*, and *CO*TURNOVER* are significantly negative that indicates our previous findings are unlikely to change with the alternative measure of overconfident CEOs. The evidence from the robustness check again confirms that the negative effect of overconfident CEOs is more pronounced during banking and market crises, especially for larger banks as well as for those with CEO turnover.

[Insert Table 9 about here]

5 Conclusion

[5] However, only the CEOs whose tenures are no lower than five years are included, and the first five years' data of their tenures are dropped.

In this paper, we investigate whether and how overconfident CEOs affect the informativeness of banks' stock prices. Using an extensive sample of US banks from 1993Q1 to 2019Q4, our results show that banks with overconfident CEOs have less informative stock prices. Our findings are robust to alternative measures of overconfident CEOs. To address endogeneity concerns, we use a firm fixed effects model, an instrumental variable regression, and propensity score matching, and the findings remain unchanged.

Further, we show that the negative influence of overconfident CEOs on the informativeness of stock prices is more pronounced during financial and banking crises, especially in large banks. In addition, we show that banks with CEO turnover strengthen the detrimental effect of overconfident CEOs on the informativeness of stock prices. Overall, our results highlight the importance of CEO characteristics to bank transparency regarding the content information in stock prices.

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Table 1. Descriptive statistics

This table shows the summary statistics (Panel A) and the correlation coefficient matrix (Panel B) for all variables. The sample comprises 6,767 bank-quarter observations (160 listed banking holding companies and listed banks) from 1993Q1 to 2019Q4. The definitions of the variables are provided in Appendix A.

Panel A. Summary statistics

Variables	N	Mean	Std.Dev.	Min	Median	Max
SPI	6,767	0.776	1.083	-2.074	0.801	3.269
HO67	6,767	0.641	0.480	0.000	1.000	1.000
NET BUYER	6,767	0.416	0.493	0.000	0.000	1.000
HIGHOC	6,767	0.463	0.499	0.000	0.000	1.000
EQUITY	6,767	0.065	0.017	0.033	0.063	0.124
SIZE	6,767	10.03	1.459	7.659	9.695	14.91
SD12_ROA	6,767	0.147	0.228	0.011	0.064	1.304
TIER1	6,767	0.117	0.031	0.060	0.093	0.212
ZSCORE	6,767	4.467	1.119	1.234	3.956	6.468
CEO AGE	6,717	57.92	6.825	34.00	58.00	82.00
MARKET_CRISIS	6,767	0.076	0.265	0.000	0.000	1.000
BANK_CRISIS	6,767	0.134	0.342	0.000	0.000	1.000
TURNOVER	6,767	0.168	0.373	0.000	0.000	1.000

Panel B. Pairwise correlations

Variables	SPI	HO67	EQUITY	SIZE	SD12_ROA	TIER1	ZSCORE
SPI	1.000						
HO67	-0.021*	1.000					
EQUITY	0.137***	0.041***	1.000				
SIZE	0.173***	-0.137***	0.103***	1.000			
SD12_ROA	-0.149***	0.035***	-0.017	-0.128***	1.000		
TIER1	0.054***	0.066***	0.464***	-0.177***	0.135***	1.000	
ZSCORE	0.196***	0.012	0.194***	0.125***	-0.524***	-0.021*	1.000

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

Table 2. Univariate analysis

This table presents the mean firm characteristics for two subsamples of banks with overconfident CEOs and non-overconfident CEOs. Columns (1) through (3) have the statistics for the full sample while Columns (4) to (6) have the statistics for the sample from propensity score matching. The variables are defined in Appendix A. The sample period is 1993Q1−2019Q4.

	Full sample			*Matched sample*		
	HO67=0	HO67=1	Difference	HO67=0	HO67=1	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
SPI	0.793	0.746	0.047*	0.793	0.821	-0.029***
EQUITY	0.064	0.066	-0.001***	0.064	0.065	-0.001
SIZE	10.29	9.882	0.415***	10.29	10.39	-0.096
SD12_ROA	0.137	0.153	-0.017***	0.137	0.140	-0.003
TIER1	0.114	0.118	-0.004***	0.114	0.115	-0.001
ZSCORE	4.449	4.477	-0.028	4.449	4.494	-0.045
Observation	2,429	4,338		2,429	2,429	

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

Table 3. Overconfident CEOs and the informativeness of stock prices

This table presents the regression results of the OLS in Eq. (1) for the full sample in Columns (1) to (2) and the PSM sample in Columns (3) to (4) from 1993Q1 to 2019Q4. We match each treated bank-quarter observation (bank with an overconfident CEO) with a control bank-quarter observation (bank without an overconfident CEO) in the same year by using *HO67*. Each matched sample comprises treated observations and their matched peers with a similar propensity score, which is computed based on *EQUITY, SIZE, SD12_ROA,* and *ZSCORE*. The dependent variable is *SPI* that is defined as the value of stock price synchronicity that is measured by *R2* in the market model and is estimated for a particular bank in a particular quarter. The t-statistics (in parentheses) are based on standard errors robust to clustering by bank. All variables are defined in Appendix A.

	Dependent variable: SPI			
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
HO67	-0.094***	-0.041**	-0.075**	-0.052***
	(-3.559)	(-2.106)	(-2.464)	(-2.751)
EQUITY		-0.173		2.216**
		(-0.206)		(2.058)
SIZE		0.095***		0.103***
		(11.653)		(10.436)
SD12_ROA		-0.146		0.045
		(-1.589)		(0.345)
TIER1		1.332***		2.985***
		(2.994)		(5.182)
ZSCORE		0.078***		0.147***
		(4.038)		(5.829)
CONSTANT	0.638***	-0.413	0.821***	-1.405***
	(2.968)	(-0.971)	(38.251)	(-8.490)
Bank fixed effects	No	Yes	No	Yes
Time fixed effect	No	Yes	No	Yes
Observations	6,767	6,767	4,858	4,858
Adjusted R^2	0.136	0.308	0.112	0.259

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

Table 4. Instrument variable approach.

This table presents the results of the effect of overconfident CEOs on the informativeness of stock prices from a 2SLS regression. In the first stage (Columns (1) and (3)), we regress HO67 on the instrumental variable (*CEO AGE*). Columns (2) and (4) show the results of the second-stage regression in which the dependent variable is *SPI*. Columns (1) through (4) give the basic regression results for each subsample (e.g., full and matched sample). The t-statistics (in parentheses) are based on standard errors robust to clustering by bank. All variables are defined in Appendix A.

	Full sample		Matched sample	
	1st stage	2nd stage	1st stage	2nd stage
	HO67	*SPI*	*HO67*	*SPI*
	(1)	(2)	(3)	(4)
CEO AGE	0.007***		0.008***	
	(7.928)		(7.346)	
Fitted HO67		-0.047*		-0.059***
		(-1.745)		(-2.998)
EQUITY	-1.372***	-0.236	-1.686***	-0.438
	(-3.241)	(-0.250)	(-3.150)	(-0.685)
SIZE	-0.055***	0.091***	-0.005	0.080***
	(-13.460)	(9.867)	(-1.138)	(8.331)
SD12_ROA	0.110**	-0.105	0.051	0.002
	(2.368)	(-1.029)	(0.797)	(0.001)
TIER1	-0.536**	1.057**	-0.885***	1.521**
	(-2.392)	(2.095)	(-3.062)	(2.597)
ZSCORE	0.019*	0.099***	-0.004	0.103***
	(1.930)	(4.538)	(-0.318)	(4.087)
CONSTANT	0.452***	-0.801***	0.199	-0.632***
	(3.637)	(-3.169)	(1.512)	(-2.598)
Bank fixed effects	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes
Observations	6,717	6,717	4,820	4,820
Pseudo/Adjusted R^2	0.095	0.163	0.078	0.150
Cragg-Donald F statistic	62.863		60.671	
LM statistic	62.733***		61.024***	

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

Table 5. The effect of market and financial crises

This table presents the effect of overconfident CEOs on the informativeness of stock prices conditional on the financial crisis as estimated by bank fixed effects model. *BANK_CRISIS* is the dummy variable for the financial crisis (2007Q3 to 2009Q4). *MARKET_CRISIS* is the dummy variable for market crises (1998Q3 to 1998Q4 and 2000Q2 to 2002Q3). Columns (1) through (4) give the basic regression results for each subsample (e.g., full and matched samples). The t-statistics (in parentheses) are based on standard errors robust to clustering by bank. All variables are defined in Appendix A.

	Dependent variable: SPI					
	Full sample			Matched sample		
	(1)	(2)	(3)	(4)	(5)	(6)
HO67	-0.043*	-0.091***	-0.097***	-0.044	-0.068**	-0.070*
	(-1.638)	(-3.324)	(-2.590)	(-1.523)	(-2.234)	(1.853)
HO67 × MARKET_CRISIS	-0.352***		-0.357***	-0.237**		-0.178
	(-4.202)		(-3.694)	(-2.252)		(-1.208)
HO67 × BANK_CRISIS		-0.126***	-0.137*		-0.130**	-0.120**
		(-2.598)	(-1.778)		(-1.970)	(-2.021)
EQUITY	-0.336	3.305***	3.234***	-0.068	2.543**	2.561
	(-0.368)	(3.593)	(3.510)	(-0.063)	(2.344)	(0.997)
SIZE	0.093***	0.115***	0.113***	0.079***	0.095***	0.094***
	(10.444)	(12.546)	(12.368)	(8.238)	(9.616)	(3.938)
SD12_ROA	-0.108	-0.082	-0.074	0.021	0.020	0.026
	(-1.079)	(-0.800)	(-0.722)	(0.162)	(0.151)	(0.149)
TIER1	1.183**	1.672***	1.703***	1.127*	2.378***	2.382**
	(2.441)	(3.402)	(3.460)	(1.920)	(4.069)	(2.010)
ZSCORE	0.099***	0.142***	0.146***	0.100***	0.132***	0.133***
	(4.697)	(6.696)	(6.843)	(3.993)	(5.251)	(3.202)
	-0.836***	-1.429***	-1.448***	-0.609**	-1.241***	-1.240***
	(-3.304)	(-9.655)	(-9.704)	(-2.464)	(-7.341)	(-3.381)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,767	6,767	6,767	4,858	4,858	4,858
Adjusted R^2	0.165	0.078	0.080	0.151	0.062	0.062

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

Table 6. The role of bank size

This table presents the effect of overconfident CEOs on the informativeness of stock prices as well as this effect conditional on the financial crisis using alternative measures of overconfident CEOs. Columns (1) through (4) show the estimated results for small banks and Columns (5) to (8) shows those for large banks. The t-statistics (in parentheses) are based on standard errors robust to clustering by bank. All variables are defined in Appendix A.

	Dependent variable: SPI							
	Small banks				Large banks			
	Full sample		Matched		Full sample		Matched	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HO67	-0.072*	-0.030	-0.066**	-0.053	-0.116***	-0.149***	-0.103**	-0.136***
	(-1.869)	(-0.725)	(-2.450)	(-1.085)	(-3.015)	(-3.737)	(-2.528)	(-3.147)
HO67 × MARKET_CRISIS		-0.107		-0.052		-0.272**		-0.226*
		(-0.978)		(-0.379)		(-2.430)		(-1.778)
HO67 × BANK_CRISIS		0.089		0.158		-0.168**		-0.165*
		(1.028)		(1.358)		(-2.056)		(-1.730)
EQUITY	-0.060	-3.292**	-3.947**	-6.540***	5.591***	5.261***	5.780***	5.514***
	(-0.044)	(-2.434)	(-2.371)	(-4.016)	(4.414)	(4.143)	(3.873)	(3.681)
SIZE	0.573***	0.474***	0.536***	0.421***	0.032**	0.030**	0.069***	0.065***
	(16.153)	(12.985)	(11.299)	(8.428)	(2.209)	(2.067)	(4.297)	(4.034)
SD12_ROA	0.222*	0.037	0.613***	0.467***	-0.197	-0.220	-0.080	-0.118
	(1.782)	(0.299)	(3.596)	(2.746)	(-1.065)	(-1.189)	(-0.361)	(-0.528)
TIER1	3.415***	2.783***	4.555***	3.243***	1.254	0.972	1.919**	1.647*
	(5.475)	(4.423)	(6.119)	(4.210)	(1.633)	(1.258)	(2.120)	(1.802)
ZSCORE	0.196***	0.129***	0.279***	0.209***	0.090***	0.079**	0.132***	0.121***
	(6.728)	(4.339)	(7.477)	(5.647)	(2.874)	(2.503)	(3.703)	(3.353)
CONSTANT	-5.785***	-4.922***	-5.772***	-4.939***	-0.278	-0.117	-0.995***	-0.818***
	(-16.860)	(-8.813)	(-12.728)	(-7.322)	(-1.190)	(-0.489)	(-4.009)	(-3.142)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,424	3,424	2,160	2,160	3,343	3,343	2,698	2,698
Adjusted R^2	0.124	0.212	0.110	0.220	0.033	0.036	0.050	0.052

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

Table 7. The effect of bank capital

This table presents the effect of overconfident CEOs on the informativeness of stock prices conditional on bank capital ratios as estimated with the bank fixed effects model. *LOW CAPITAL* is an indicator variable that equals one if a bank's *EQUITY* is lower than the sample median in a given quarter, and zero otherwise. Columns (1) through (2) give the basic regression results for each subsample (e.g., full and matched samples). The t-statistics (in parentheses) are based on standard errors robust to clustering by bank. All variables are defined in Appendix A.

	Dependent variable: SPI	
	Full sample	Matched sample
	(1)	(2)
HO67	-0.076**	-0.034**
	(-2.310)	(-2.503)
HO67 × LOW CAPITAL	-0.178***	-0.137*
	(-2.876)	(-1.916)
LOW CAPITAL	0.067	0.096*
	(1.242)	(1.693)
EQUITY	-0.340	-2.911
	(-0.204)	(-1.429)
SIZE	0.157***	0.029
	(3.742)	(0.582)
SD12_ROA	-0.130	0.166
	(-1.156)	(1.110)
TIER1	-0.934	-1.104
	(-1.172)	(-1.135)
ZSCORE	0.026	0.073**
	(1.042)	(2.418)
CONSTANT	-0.790*	0.392
	(-1.680)	(0.674)
Bank fixed effects	Yes	Yes
Time fixed effect	Yes	Yes
Observations	6,767	4,858
Adjusted R^2	0.260	0.276

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

Table 8. The effect of CEO turnover

This table presents the effect of overconfident CEOs on the informativeness of stock prices conditional on the event of a CEO turnover as estimated by bank fixed effects model. *TURNOVER* is an indicator variable that equals one if a bank experiences a CEO turnover in a given year, and zero otherwise. Columns (1) through (2) report the basic regression results for each subsample (e.g., full and matched samples). The t-statistics (in parentheses) are based on standard errors robust to clustering by bank. All variables are defined in Appendix A.

	Dependent variable: SPI	
	Full sample	Matched sample
	(1)	(2)
HO67	-0.012	-0.016**
	(-0.433)	(-2.507)
HO67 × TURNOVER	-0.360***	-0.230**
	(-4.137)	(-2.237)
TURNOVER	-0.129*	-0.115
	(-1.732)	(-1.414)
EQUITY	-0.192	-1.000
	(-0.212)	(-0.889)
SIZE	0.069***	0.081***
	(7.531)	(7.831)
SD12_ROA	-0.205**	0.165
	(-2.061)	(1.232)
TIER1	0.274	0.695
	(0.560)	(1.117)
ZSCORE	0.078***	0.152***
	(3.710)	(5.730)
CONSTANT	-0.405	-0.671***
	(-1.587)	(-2.672)
Bank fixed effects	Yes	Yes
Time fixed effect	Yes	Yes
Observations	6,767	4,858
Adjusted R^2	0.176	0.172

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

Table 9. Robustness check. Alternatives measures of overconfident CEOs.

This table presents the effect of overconfident CEOs on the informativeness of stock prices as well as this effect conditional on a financial crisis and CEO turnover by using alternative measures of overconfident CEOs. We use *NET BUYER* in Panel A and Panel B presents the estimation results for *OPTIMIST*. The t-statistics (in parentheses) are based on standard errors robust to clustering by bank. All variables are defined in Appendix A.

Panel A. NET BUYER

	Dependent variable: SPI							
	Full sample				Matched sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NET BUYER	-0.148***	-0.194***	-0.060	-0.087*	-0.108***	-0.137***	-0.104*	-0.032
	(-5.597)	(-7.010)	(-0.784)	(-1.646)	(-3.771)	(-4.546)	(-1.686)	(-0.317)
NET BUYER × MARKET_CRISIS		-0.630***				-0.490***		
		(-5.752)				(-4.271)		
NET BUYER × BANK_CRISIS		-0.159***				-0.093*		
		(-3.430)				(-1.747)		
LOW CAPITAL			0.025				0.025	
			(0.515)				(0.429)	
NET BUYER × LOW CAPITAL			-0.111**				-0.147***	
			(-1.987)				(-3.071)	
TURNOVER				0.356***				0.224***
				(6.809)				(3.493)
NET BUYER × TURNOVER				-0.077**				-0.047*
				(-2.463)				(-1.746)
EQUITY	3.638***	3.250***	0.067	-0.153	3.875***	3.454***	-0.963	-1.003
	(3.785)	(3.415)	(0.040)	(-0.169)	(3.509)	(3.148)	(-0.472)	(-0.916)
SIZE	0.118***	0.113***	0.135***	0.071***	0.120***	0.117***	0.069	0.081***
	(12.760)	(12.184)	(3.241)	(7.703)	(12.426)	(12.070)	(1.349)	(7.775)
SD12_ROA	-0.002	-0.046	-0.121	-0.187*	0.011	-0.019	0.074	0.190
	(-0.017)	(-0.448)	(-1.073)	(-1.878)	(0.091)	(-0.156)	(0.519)	(1.431)
TIER1	1.692***	1.528***	-1.012	0.366	1.547***	1.520***	-1.083	0.782
	(3.382)	(3.053)	(-1.276)	(0.745)	(2.707)	(2.664)	(-1.089)	(1.312)
ZSCORE	0.164***	0.154***	0.030	0.079***	0.142***	0.136***	0.041**	0.155***
	(7.699)	(7.211)	(1.233)	(3.725)	(6.027)	(5.776)	(2.385)	(6.052)
CONSTANT	-1.514***	-1.319***	-0.654	-0.799***	-1.473***	-1.353***	-0.031**	-0.933***
	(-10.347)	(-8.829)	(-1.390)	(-3.153)	(-9.310)	(-8.280)	(-2.053)	(-3.832)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,767	6,767	6,767	6,767	5,626	5,626	5,626	5,626
Adjusted R^2	0.075	0.082	0.261	0.174	0.068	0.072	0.260	0.171

Panel B. OPTIMIST

	Dependent variable: SPI							
	Full sample				Matched sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OPTIMIST	-0.092***	-0.089***	-0.077*	0.117	-0.074***	-0.067**	-0.167***	-0.068*
	(-3.533)	(-3.155)	(-1.860)	(1.542)	(-2.797)	(-2.327)	(-3.317)	(-1.831)
OPTIMIST × MARKET_CRISIS		-0.098**				-0.108**		
		(-2.382)				(-2.521)		
OPTIMIST × BANK_CRISIS		-0.029*				-0.011***		
		(-1.645)				(-3.246)		
LOW CAPITAL			-0.127***				-0.176***	
			(-2.725)				(-2.999)	
OPTIMIST × LOW CAPITAL			-0.113**				-0.152**	
			(-2.188)				(-2.459)	
TURNOVER				-0.257***				-0.311
				(-5.103)				(-1.428)
OPTIMIST × TURNOVER				-0.415*				-0.359***
				(-1.754)				(-2.863)
EQUITY	3.935***	3.802***	0.365	-0.121	4.303***	4.168***	-0.180	-1.111
	(4.124)	(3.970)	(0.217)	(-0.133)	(4.337)	(4.187)	(-0.089)	(-1.148)
SIZE	0.117***	0.118***	0.149***	0.069***	0.100***	0.100***	0.073	0.072***
	(12.661)	(12.697)	(3.573)	(7.548)	(11.277)	(11.288)	(1.418)	(8.199)
SD12_ROA	-0.011	-0.019	-0.126	-0.195*	-0.213**	-0.224**	0.079	-0.055
	(-0.109)	(-0.184)	(-1.116)	(-1.948)	(-2.063)	(-2.155)	(0.553)	(-0.538)
TIER1	1.821***	1.788***	-1.011	0.425	1.995***	1.936***	-1.071	0.657
	(3.667)	(3.567)	(-1.269)	(0.864)	(3.868)	(3.723)	(-1.075)	(1.264)
ZSCORE	0.155***	0.154***	0.029	0.077***	0.104***	0.102***	0.045	0.130***
	(7.217)	(7.090)	(1.176)	(3.659)	(4.703)	(4.558)	(1.501)	(5.982)
CONSTANT	-1.513***	-1.502***	-0.810*	-0.870***	-1.144***	-1.122***	-0.190	-0.791***
	(-10.297)	(-10.051)	(-1.720)	(-3.454)	(-7.566)	(-7.290)	(-0.327)	(-3.350)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,767	6,767	6,767	6,767	6,270	6,270	6,270	6,270
Adjusted R^2	0.073	0.073	0.260	0.174	0.065	0.066	0.263	0.185

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

Appendix A. Regression variable definitions

Variables	Definition	Sources
SPI	The value of stock price synchronicity is measured by R2 in the market model estimated for a particular bank in a particular quarter. A higher value of R2 indicates higher synchronicity among stock prices and less variation in bank-specific returns.	CRSP
HO67	A dummy variable for overconfident CEOs. A CEO is defined as overconfident if they delay the exercise of 67% or higher in-the-money options at least twice during their tenure and is assigned to the overconfident category from the first time they exhibit this behaviour during their tenure. HO67 equals one if a bank's CEO is overconfident, and zero otherwise.	ExecuComp
NET BUYER	A dummy variable for overconfident CEOs. A CEO is a net buyer if they buy stock on net in more years than they sell on net during the first five years of their tenures. NET_BUYER equals one if a bank's CEO is a net buyer, and equals zero otherwise. Only the CEOs whose tenures are no shorter than five years are included, and the first five years' data of their tenures are dropped.	Thomson Reuters Insiders Data
OVERCONFIDENT	A dummy variable for overconfident CEOs. A CEO is defined as an overconfident CEO if they delay the exercising of 100% or higher of in-the-money options at least twice during their tenure and is assigned to the overconfident category from the first time they exhibit this behaviour during their tenure. OVERCONFIDENT equals one if a bank's CEO is overconfident, and zero otherwise.	ExecuComp
EQUITY	The ratio of total equity capital to gross total assets (total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve).	Compustat Bank
SIZE	The natural logarithm of gross total assets	Compustat Bank
SD12_ROA	The standard deviation in a bank's quarterly return on assets over the previous 12 quarters multiplied by 100	Compustat Bank
TIER1	The ratio of Basel I risk-weighted assets and off-balance-sheet activities to gross total assets	Compustat Bank
ZSCORE	Natural logarithm of [1 + (*ROA* + total equity/total asset) / SD12_ROA]. The *ROA* represents the return on assets.	Compustat Bank
BANK_CRISIS	A dummy variable for the banking crisis. Following Berger and Bouwman (2013), BANK_CRISIS equals one during the subprime lending crisis (2007Q3 to 2009Q4).	Compustat Bank
MARKET_CRISIS	A dummy variable for market crises. Following Berger and Bouwman (2013), MARKET_CRISIS equals one during the Russian debt crisis and Long-Term Capital Management bailout in 1998 (1998Q3 to 1998Q4) and the bursting of the dot.com bubble and September 11 (2000Q2 to 2002Q3).	Compustat Bank
LOW CAPITAL	A dummy variable that equals one if a bank's *EQUITY* is lower than the sample median in a given quarter, and zero otherwise	Compustat Bank
TURNOVER	A dummy variable that equals one if the bank experienced a CEO turnover, and zero otherwise.	ExecuComp
CEO AGE	Age of CEO	ExecuComp