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Overconfident Managers and External Financing Choice

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ABSTRACT

This study examines the relationship between managerial overconfidence and corporate financing decisions by constructing proxies for managerial overconfidence based on the track records of earnings forecasts in Japanese listed firms. We find that managers have the stable tendency to forecast overly upward earnings compared to actual ones and that their upward bias decreases the probability of issuing equity in the public market by about 4.7 percent per one standard error, which economically has the strongest impact on financing decisions. This tendency is observed when we employ alternative measures for managerial overconfidence and other model specifications. However, in private placements, the choice to offer equity is not always avoided by managers. This implies that managers place private equity with the expectation of the certification effect.

KEY WORDS managerial overconfidence; financing choice; behavioral corporate finance

JEL CLASSIFICATION G30; G32

INTRODUCTION

This study examines the effect of managerial overconfidence on managers' choice of external financing method. When overconfident managers have too favorable prospects about their firms' risk and future profitability, these managerial irrationalities are considered to cause distortions in corporate financing decisions as well as in their investment (such as mergers and acquisitions) decisions. Although there are many studies focusing on corporate investment distortions caused by managerial overconfidence, only a few analyze the relationship between managerial overconfidence and corporate financing behavior, particularly the choice of external financing. The main purpose of this paper is to conduct an empirical analysis of this relation, simultaneously taking account of other factors that are considered by the corporate finance literature to impact

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financing choices. More concretely, we analyze whether managers with overly positive outlooks of profitability are less likely to issue public equity than they would corporate bonds and private equity, employing the direct proxy of managerial overconfidence. We also measure and compare the economic significance of the impact of these factors on financing choices.

There are three major theories in the corporate finance literature that explain the firms' financing decisions: The tradeoff theory, the pecking order theory, and the market timing theory. The tradeoff theory suggests that firms determine their optimal capital structures by equating the marginal tax benefit of debt and the marginal cost of bankruptcy (Miller, 1977). According to the pecking order theory, the issuance of information-sensitive securities costs more when there exists information asymmetry between firms and investors. From this view, retained earnings are preferred the most, followed by safe debt, risky debt, and equity as financing methods (Myers and Majluf, 1984). The market timing theory outlined by Loughran and Ritter (1995) and Baker and Wurgler (2002) explains firms' incentive to issue equity by assuming market inefficiency. They explain that overvalued firms issue equity to exploit market investors.

Extensive empirical studies examine the predictions suggested by these theories. Collectively, while the marginal tax rate, the degree of information asymmetry, and the proxies of market mispricing have impacts on corporate financing decisions, the debate about the factors of corporate financing decisions is still ongoing.[1] In addition to these corporate factors, Bertrand and Schoar (2003) show that managerial personal characteristics are also important factors of corporate financing decisions. As a managerial characteristic, we focus on managerial overconfidence and analyze its impact on corporate financing choices. While these theories assume that corporate managers make financing decisions rationally, the psychological literature considers that they have biases of overconfidence or optimism. Therefore, we analyze whether the managerial irrationality has an important role in corporate finance decisions.

The typical characteristic of overconfident managers is that they would overestimate their future cash flows. When managers have an upward bias regarding their profitability, they perceive that their firms are undervalued in the capital market. According to previous studies, the perceptions of being undervalued cause distortions of managerial financial decisions in two ways. First, it induces distortions in the choice of security type. Heaton (2002) and Hackbarth (2008) theoretically shows that managers who overestimate their profitability will see equity issuance as a more expensive method of external financing than debt financing and prefer debt to equity because they feel severe undervaluation in equity. Second, distortions seem to occur in the choices between public equity and private equity. Managers who feel that their firm is undervalued have an incentive to place equity in the private market because they expect investors in the private market or private placement itself to convey information that they are undervalued. Hertzel and Smith (1993) document that private equity issuances work as a favorable signal of undervaluation in the context of information asymmetry, which is called the certification effect. We believe that the hope for the certification effect in private equity placement attracts overconfident managers even in the case that their firm is efficiently priced in the market. Combining these two predictions, we expect that public equity offering is the least preferred method in external financing for overconfident managers.

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[1]With their broad review of the literature on corporate financing decisions, Frank and Goyal (2008) conclude that the relative importance of various factors that are considered to have an effect on corporate financial decisions remains open to debate, with the exception of factors relating to transaction costs and bankruptcy costs of debt.

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One of the most difficult problems in examining the effect of managerial overconfidence on corporate behavior is how to measure managerial overconfidence. In this paper, we calculate the bias in the managerial forecast of earnings compared to its actual value from the track records of earnings forecasts in Japanese listed firms and construct the proxies of managerial overconfidence based on this calculation. In Japan, listed firms are substantially mandated to announce their earnings forecasts in financial statements according to the securities law. This allows us to construct a large dataset of managerial overconfidence. If managers are overconfident, they are more likely to provide a forecast that is upward-biased. Thus, earnings forecast bias is a more direct proxy of the managerial overconfidence than are other proxies employed in preceding research such as variables based on managerial stock and option holding, managers' compensation, and so on. We find that managerial earnings forecasts of Japanese firms show an upward bias on average. In the behavioral finance literature, one necessary condition for this tendency to be driven by a behavioral bias or irrationality is that this tendency is a stable and predictable attribute of a particular manager. The time-series averages of the Pearson correlation and the Spearman rank correlation of the managerial forecast bias between two periods show positive values, which implies that the forecasts bias is driven by managerial irrationality.

In spite of the time-series stability, each managerial forecast bias might include many other noisy components than managerial personal characteristics, as managers may have the strategic incentive to announce upward-biased forecasts in some situations such as in public equity offerings, financial distress, or insider trading. Considering the possibility of these noises, we construct our main proxy of managerial overconfidence by taking the time-series average of forecast bias to extract the stable component driven by managerial personal characteristics. To check the robustness of empirical results, we employ a dummy variable that takes the value one if averaged managerial forecast biases show positive values and zero if averaged managerial forecast biases show negative values. We also adopt the quintilized managerial forecast bias within each firm value quintile. Employing these proxies, we examine whether overconfident managers are unwilling to issue public equity compared to other methods. Four financing methods are considered in our empirical analysis: Public equity, private equity, publicly offered bonds, and private placement bonds.

The main results of our study are as follows. First, we find strong evidence that managers with greater upward forecast bias issue public equity less frequently compared to other financing methods. They prefer debt financing or private equity to public equity. This result is observed when we employ alternative measures of managerial overconfidence and different estimation models. In addition, we do not observe a clear relation between managerial upward forecast bias and the preference for debt financing in the context of the private market. These findings are consistent with the prediction proposed by Heaton (2002) and Hacbarth (2008) and the expectation of the certification effect in private equity placement. Second, we test the economic significance of factors that affect firms' financing decisions. As a result, we find that the proxy of managerial overconfidence has the strongest impact on the public equity issuance decision, although the factors predicted in the three major theories to influence the financing decisions also have significant effects. With a one-standard-deviation increase in managerial upward bias in managers' forecast, the probability of issuing public equity decreases by about 4.7 percent. Our findings indicate that managerial overconfidence is an important factor in corporate financing decisions.

There are some studies analyzing the effect of managerial overconfidence on corporate financing choices. A large portion of this literature focuses on its effect on leverage. However,

considering the preference for internal financing by overconfident managers, the relation between managerial overconfidence and leverages is not clear. To test the prediction about choice of external financing method derived from managerial overconfidence directly, we use security issuance data, that is, the flow data of corporate financing decisions. To our knowledge, only Malmendier, Tate, and Yan (2007) analyze the equity issuance decisions of overconfident managers by comparing equity issuers to non-issuers. Our study is different from Malmendier et al. (2007) in the respect that we compare public equity issuers to other security issuers. There are two reasons in this comparison. First, this is because security issuers rather than non-issuers are considered to face similar external financing needs to public equity issuers. Second, in analyzing corporate external financing decisions, there is a need to consider the particularity of private placements. In fact, Gomes and Phillips (2007) find firms' different tendencies to issue security in the private market than in the public market according to the degree of information asymmetry. Our main contribution is that we confirm the robust effect of managerial overconfidence on corporate financing behavior with broad observations by constructing a more direct indicator of managerial overconfidence. In addition, by comparing its economic significance to other factors predicted from financing literature, we find that the impact of managerial overconfidence is very strong.

The remainder of the paper is organized as follows. In Section 2, hypotheses about the effect of managerial overconfidence on corporate financing decisions are summarized from various theories and studies. Data and variables are presented in Section 3. In Section 4, we explain the methodologies employed in this paper to examine the determinants of the corporate financing choice and provide our empirical results. In the last section, the concluding remarks are documented.

BACKGROUNDS AND HYPOTHESES

In this section, we consider managerial overconfidence and its implications for corporate decisions regarding external financing. In the psychological literature, there is a prominent stylized fact called the ''better-than-average'' effect. When individuals assess their relative skill, they tend to overstate their acumen relative to the average (Larwood and Whittaker, 1977; Svenson, 1981; Alicke, 1985). Weinstein (1980) presents two factors that trigger this tendency: The illusion of control and a high degree of commitment to good outcomes. March and Shapira (1987) and Gilson (1989) show that these factors are pertinent in corporate managers' position. In fact, Cooper, Woo, and Dunkelberg (1988) find that entrepreneurs have overly optimistic opinions about their business survival. Based on these studies, we think that corporate managers are prone to be overconfident.[2]

When corporate managers are overconfident, their financing decisions may be distorted.[3] Heaton (2002) and Hackbarth (2008) analyze this problem theoretically.

[2]In the behavioral corporate finance literature, the managerial bias of too favorable prospects is often called managerial ''overconfidence'' or ''optimism.'' However, the distinction between these two expressions is not clear. Furthermore, the bias is sometimes interpreted as the overestimation of profitability and other times as the underestimation of risk. To avoid confusion, we express the managerial bias simply as ''overconfidence'' in this paper.

[3]Managerial overconfidence also distort corporate investment decisions. The investment distortions caused by managerial irrationality are analyzed thoroughly in the context of mergers and acquisitions (Roll, 1986; Hayward & Hambrick, 1997; Malmendier & Tate, 2008)

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Their first implication is that overconfident managers prefer internal financing to external financing because they feel that their companies are undervalued in the capital market. Malmendier and Tate (2005) and Lin, Hu, and Chen (2005) test this prediction empirically. They examine the relation between investment–cash flow sensitivity and proxies of managerial overconfidence, and they find a positive relation, which is consistent with the prediction.

The second implication of Heaton (2002) and Hackbarth (2008) is that debt is preferred to equity by managers who overestimate their profitability when they need external financing. This is because managers who overestimate their profitability perceive their companies' risky securities to be more undervalued by the capital market.[4] Malmendier et al. (2007) test this prediction by using new securities issuance data, and they find supporting results. Our main purpose is to test this prediction with more direct proxies of bias in managerial profitability expectations and broad observations.

In addition, we consider corporate financing decisions between private equity issuance and public equity issuance. In the traditional financing literature whose focus is on information asymmetry and the agency problem, the choice between private and public financing is an important theme, as is the choice of security type, since private financing differs dramatically from public financing with regard to the information environment.[5] In many studies, it is observed that the private placement of equity involves a large discount and a positive abnormal return around the announcement.[6] Hertzel and Smith (1993) point out that it can be explained by the certification effect of private equity placement; the commitment of funds to a firm by a private placement investor who can assess firm value, together with the acceptance of a discount by the firm, conveys to the market the management's belief that the firm is undervalued. In this sense, it is possible that overconfident managers have incentives to issue private equity as opposed to public issuance. Thus, we expect that public equity is less preferred by overconfident managers compared not only to debt financing but also to private equity.

In our empirical analysis, we allow for other factors considered by the finance literature to have an influence on the financing decisions. Moreover, we calculate and compare the marginal economic significance of these factors to evaluate the impact of behavioral factors on corporate decisions.

DATA

This section summarizes the data on security issuance and describes the proxy for managerial overconfidence and the control variables used in our analysis.

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[4]Hackbarth (2008) also gives an implication for the positive relationship between managerial overconfidence and corporate leverage. Oliver (2005), Mefteh and Oliver (2007), and Brettel, Kasch, and Mueller (2008) examine this prediction. However, taking account of biased managers' preference for the internal financing noted above, the relation between managerial overconfidence and leverages is not clear. Malmendier et al. (2007) find debt conservatism of overconfident managers.

[5]Contrary to these traditional views, little attention has so far been paid to private–public choice in the context of behavioral corporate financing.

[6]See Hertzel and Smith (1993), Hertzel and Rees (1998), Goh, Gombola, Lee, and Liu (1999), and Barclay, Holderness, and Sheehan (2007). Kato and Schallheim (1993) and Kang and Stulz (1996) analyze security issuance of Japanese firms and find similar results in private equity placement.

Securities issuance

We investigate the security issuance by firms listed in the Japanese stock markets from April 1998 to March 2008. The reason why we analyze firms' financing choices in this period is due to the legal change that occurred in 1996. Before 1996, many Japanese firms (particularly small firms) faced difficulty in issuing corporate bonds in public placements because they were required to satisfy rigid compliance standards. However, after the liberalization of corporate bond issuance in 1996, even small firms that have not satisfied the standard can issue corporate bonds. Accounting for the aspect, our sample period ranging from 1998 is expected to be the era in which most firms recognize the legal change and are poised to issue corporate bonds for their financing needs under the new legal environment.

Our main data resource is the firms' financing data provided by Nikkei NEEDS. The data provide us with information on securities issuance such as privately/publicly issued equity, convertibles, and bonds. A single record in our dataset includes the following variables: Financing date, stock ticker (Nikkei code), size of financing in yen, identification of public/private issue, and identification of equity/convertible/bond. In the analysis, we do not distinguish between convertible bonds and corporate bonds because our main implications rely on the relationship between public equity offerings and managerial overconfidence. However, when we treat issuance of convertible bonds distinctly from corporate bonds, our main results hold. In our dataset, we exclude short-term (maturity of less than 1 year) debt, which is driven by a decrease of working capital. This is because we focus on financing choices that are driven by needs due to real investments. Our dataset contains the cases where firms issue the same type of security at the same time. We aggregate issuances of the same securities within 3 months of each other in a given market. In our analysis, initial public offerings, multiple offerings that combine more than two security issuances, and offerings in foreign exchanges are excluded. The sample selection leaves us 9,555 observations.

Table 1 describes the firms' decisions to choose the type of securities to be issued in all observations and samples employed in the logit models. Furthermore, the description by year is also provided. The number of issues, average amount, and median amount of four security types (public equity, private equity, public corporate bonds, and private corporate bonds) are illustrated. Table 1 provides some interesting features. First, as can be seen in Panel A of Table 1, most firms choose public or private debt as their main financing method. In particular, public placements are raised when large-scale projects are proposed. Second, as illustrated in Panel B of Table 1, equity placements have played more important roles in financing in the recent period, in particular, private equity issuance.

We match the data with the market and financial data obtained from Nikkei NEEDS. As employed in many earlier studies, we exclude the financial firms and regulated utilities from our sample. After matching the financing data with the market and financial data, 9,555 observations are reduced to 6,570 observations, which are used in regressions. The number of firms that issue securities at least once during the sample period decreases from 2,757 to 2,011.

Proxy for managerial overconfidence

When we examine the effect of managerial overconfidence on financing choices, there is difficulty in measuring how managers are overconfident. Malmendier and Tate (2005, 2008) and Malmendier et al. (2007) employ CEOs' exercise decisions on company stock

Table 1. Data descriptions of securities choices. Panel A reports the number of issues, average amount, and median amount of each security issuance. All observations include all deals issued during the period of April 1998–March 2008. Observations in the analysis include only observations employed in the regressions; i.e., deals with insufficient data on market and financial are dropped. Panel B describes the number of issues for each year from April 1998 to March 2008. Pb, and Pr denote Public and Private, respectively. The number of firms that issue securities at least once is 2,757. The number of firms used in regressions (with sufficient financial and market data) is 2,011.

Panel A: Summary statistics on the choice of security type

	Pb equity	Pr equity	Pb bond	Pr bond
All observations				
Number	820	1,788	2,531	4,416
Average amount (million yen)	7,752	5,308	18,623	2,025
Median amount (million yen)	2,366	894	10,000	500
Observations in analysis				
Number	558	1,045	1,850	3,117
Average amount (million yen)	6,998	4,931	15,975	1,959
Median amount (million yen)	2,095	982	10,000	500

Panel B: Number of securities choices by year

Year	Pb equity	Pr equity	Pb bond	Pr bond	N (firms)
April1998–March1999	32	72	363	391	605
April1999–March2000	116	112	273	311	602
April2000–March2001	63	96	233	345	561
April2001–March2002	34	100	221	372	578
April2002–March2003	53	139	207	568	711
April2003–March2004	88	201	261	725	872
April2004–March2005	165	256	261	663	920
April2005–March2006	140	348	232	649	942
April2006–March2007	83	255	238	251	599
April2007–March2008	46	209	242	141	465

options to gauge their revealed beliefs. As CEOs are highly exposed to idiosyncratic risks due to the characteristics of stock options, risk-averse CEOs are reluctant to hold stock options and tend to exercise the options early. Thus, managers who own stock options for a longer period are regarded to be overconfident about future performance. Hayward and Hambrick (1997) use medias' reputations about managers and the CEOs' relative compensation as the measures for overconfidence. They expect that highly evaluated managers are apt to be overconfident. However, all of these measures are indirect ones for managers' beliefs, making it difficult to test the relationship between managerial overconfidence and firms' financing. In Japan, the securities exchange requires firms to disclose earnings forecasts voluntarily. However, according to the securities law, if firms fail to disclose and revise their forecasts in the case of accidents that strongly damage their profitability, firms have to pay penalties for the failure. In this sense, listed firms in Japan are substantially mandated to disclose their earnings forecasts to investors. In this study, to measure the degree to which managers are overconfident, we employ the difference between managerial forecasts of earnings per share (EPS) and the actual values. As the

managerial forecast is a more direct measure of managers' revealed beliefs, we believe that the measure is more appropriate than previous studies and that the examination using the variable provides us with more robust empirical evidence.

This study constructs proxies for managerial overconfidence from a database on managerial forecasts of EPS. The database on managerial forecasts is obtained from Nikkei NEEDS. The database contains track records of managerial forecasts and actual earnings, which consist of the following items: Identification ticker, accounting period, announcement date, consolidated/unconsolidated indicator, annual/interim flag, EPS, and other forecast items. Following Lin et al. (2005), we calculate the manager's forecast for earnings (EPS) minus the actual earnings standardized by the average of stock prices in last 6 months prior to the fiscal year end. We define the variable to measure the degree of managerial overconfidence, which is labeled as managerial forecast bias. Managers with higher managerial forecast biases are considered to be more overconfident. In empirical tests, we employ the forecast in the last reporting date, which is the farthest from the actual earnings release date. For example, when we calculate the value at May 2005 (reporting date) for a firm whose fiscal year end is March 2005, we employ the managerial forecast from May 2004 (the last reporting date). The reason why we use the farthest value of the managerial forecasts is that managers would know the rough value of the actual EPS as the reporting date nears.

Table 2 provides summary statistics on managerial forecast biases. As can be seen in Panel A, the mean of managerial forecast bias shows a positive value (6.5 percent) with a statistical significance. Furthermore, the percentage of managers with positive earnings forecasts is

Table 2. Data descriptions on managerial forecast bias. This table describes the time-series (semi-annual) average of cross-sectional mean (with its Newey-West adjusted *t*-statistic), median, standard deviation, the 20th percentile point, and the 80th percentile point of managerial forecast bias. The time-series (annual) average of percentage of stocks with positive managerial forecast biases (P(>0)), Pearson correlation between two periods (Prsn), and Spearman rank correlation between two periods (Sprmn) are also described. Managerial forecast bias is calculated as the managerial forecast of EPS (earnings per share) minus the actual EPS, which is divided by the average of stock prices in last 6 months prior to the fiscal year end. Positive (negative) managerial forecast bias indicates that the manager has upward (downward) bias. We employ the managerial forecast at the prior reporting date. Panel A reports the summary statistics on managerial forecast bias in the entire sample. Panel B reports the summary statistics on managerial forecast bias within each size quintile. Subsample period statistics are also reported in Panel C. The number of firms that announce earnings forecasts ranges from 2,921 to 3,597.

	Mean	*t*-statistic	Median	StDev	P20	P80	P(>0)	Prsn	Sprmn
Panel A: Time-series average									
Managerial forecast bias	0.065	4.70	0.010	0.313	−0.009	0.066	0.625	0.153	0.271
Panel B: Within firm size quintiles									
1 (Small)	0.081	6.32	0.024	0.224	−0.008	0.112	0.702	n.a.	n.a.
2	0.074	5.14	0.016	0.250	−0.009	0.084	0.673	n.a.	n.a.
3	0.063	3.71	0.010	0.340	−0.009	0.063	0.628	n.a.	n.a.
4	0.055	3.94	0.006	0.233	−0.009	0.053	0.586	n.a.	n.a.
5 (Large)	0.053	3.84	0.003	0.360	−0.007	0.028	0.537	n.a.	n.a.
Panel C: Subsample period									
April1998–March2003	0.083	6.34	0.016	0.350	−0.004	0.088	0.716	0.195	0.269
April2003–March2008	0.048	3.13	0.004	0.276	−0.013	0.044	0.535	0.111	0.274

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more than half (62.5 percent). This result holds in subsample descriptions in Panel B and Panel C. These descriptions show that managers have a tendency to overestimate their earnings forecasts. In the behavioral finance literature, one necessary condition for this tendency of being driven by a behavioral bias or irrationality is that this tendency is a stable and predictable attribute of a particular manager. The last two columns in Table 2 provide time-series averages of Pearson and Spearman rank correlations between two periods. As can be seen in the last two columns, the means of Pearson correlation and Spearman rank correlation show positive values. In particular, the Spearman rank correlation shows a value 0.271. These results imply that the tendency to overestimate earnings forecasts is driven by managerial irrationality. Thus, the managerial forecast bias is considered to be an appropriate proxy for managerial overconfidence. The number of firms that announce earnings forecasts ranges from 2,921 to 3,597.

In regressions, to remove outliers in regressions, we omit observations below the first percentile and above the 99th percentiles of the managerial forecast bias.[7] We then take the average of the managerial forecast biases in the last two periods. The time-series averaging of managerial forecast biases contributes to extracting a component driven by managerial personal characteristics. Many noisy components other than managerial personal characteristics might be included in the managerial forecast bias. For example, Chin, Lin, and Chang (1999) and Lang and Lundholm (2000) point out that managers who intend to make public equity offerings at more favorable prices than intrinsic values may overestimate earnings forecasts. In addition, managers would announce upwardly-biased forecasts to profit from insider trading (Noe, 1999). Managers of financially distressed firms may also release upwardly-biased forecasts to remain as managers of their companies for as long as possible (Irani, 2003). As these motivations to announce upwardly-biased forecasts are considered to be temporal, time-series averaging is useful to gauge manager characteristic, stable irrationality. In regressions, we employ the averaged managerial forecast biases at the latest reporting date prior to the security issuance date. To check the robustness of empirical results, we employ a dummy variable that takes one if averaged managerial forecast biases show positive values and zero if averaged managerial forecast biases show negative values. We also adopt the quintilized managerial forecast bias within each firm value quintile. As observed in Panel B of Table 2, the upward bias of managerial forecasts is more pronounced among smaller-sized firms. The tendency may not be driven by managerial overconfidence but rather by the information asymmetry or information uncertainty specific to smaller firms. To mitigate the effect of firm size, we also construct a quintilized managerial forecast bias. After attributing all available stocks to quintiles according to their firm size, we divide the stocks into quintiles according to the averaged managerial forecast bias within each firm size quintile.

Control variables

In this section, we describe control variables included in our regressions. We obtain firms' characteristics from the Nikkei NEEDS financial data, which contains similar items as those held by COMPUSTAT. Market data are also obtained from Nikkei NEEDS, which contain a

[7]Firms with significantly low share prices tend to have much larger values of managerial forecast bias than firms with higher share prices because firms with significantly low share prices have smaller denominators in EPS. We, thus, confine the sample to observations between the first and 99th percentiles.

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security ticker, date, a listing market indicator, close price, an adjustment multiplier for splits and dividends, and adjusted stock returns. The data on the firms' characteristics are obtained from these two data resources. Data on analyst coverage are obtained from the Institutional Brokers Estimates System (I/B/E/S).

Firm characteristics

A simple prediction of firms' financing behavior is derived from the pecking order theories, which predict that only firms that need funds above their capacity for internal financing and debt financing will generate public equity offerings. According to this prediction, there is a positive relation between equity issuance and the need for funds. Shyam-Sunder and Myers (1999) find strong support for this prediction, while Frank and Goyal (2003) observe inconsistent results from a broad dataset.[8] Another prediction from the pecking order theory can be attained by accounting for the degree of information asymmetry; this prediction states that seasoned equity offerings are more difficult for firms with severe information asymmetry because more severe information asymmetry increases the cost of equity. Bharath, Pasquariello, and Wu 2009 and Gomes and Phillips (2007) examine this hypothesis by using U S data, and the results are consistent with the prediction.[9] Following these studies, we include the proxy for information asymmetry, which is defined as the residual analyst coverage. After we run cross-sectional regressions of ln(number of analyst + 1) on ln(size) and square ln(size) every month, we calculate the residuals using the monthly estimates.

Some studies point out that firms often face the problems of asset substitution (Jensen and Meckling, 1976) and underinvestment (Myers, 1977). These two agency problems are more severe among the riskier firms (volatile and low-profitability firms) because these firms are more likely to be in distress. There are two ways to solve these problems. First, to avoid the agency costs related to debt issuance, firms simply choose equity issuance (Myers, 1977). Second, firms issue private debt because debt sold to a small number of private investors is advantageous for firms seeking to renegotiate the debt contracts when they face financial distress. As the agency problems affect corporate capital structure and financing decisions, we construct some proxies for the risk and investment opportunities. First, we include risk measured by the firm's cash flow (defined as operating income before depreciation) volatility, which is scaled by lagged total assets. We calculate the volatility as the standard deviation of cash flow. In the calculation, we use 5 years of cash flow observations prior to the deal date. We include Tobin's Q, defined as the market value of the firm divided by the book value of the asset, and a firm's growth opportunity, defined as the expenditure on research, development, and advertisement divided by the lagged property and equipment (RD/PPE). We also include capital expenditures plus change in working capital (scaled by lagged total asset) to capture a firm's demand for funds due to its real investments. These variables are expected to capture a firm's investment opportunities. To gauge the effect of profitability, operating income before depreciation divided by the lagged asset is included. To capture the effect of financial distress, we include a rank variable that equals zero if Altman's z-score is greater than 2.99, one if Altman's z-score is greater than 1.81 and less than 2.99, and two if Altman's z-score is less than 1.81.

[8]Welch (2004) and Fama and French (2005) examine the pecking order theory focusing on the frequency in which firms issue equity. They observe inconsistent results with the pecking order theory.
[9]Bharath et al. (2009) focus on capital structures, and Gomes and Phillips (2007) focus on financing choices.

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Tax motivation also affects a firm's financing choices. A higher tax rate leads to the preference for debt over equity. To control for this effect, we include a firm's marginal tax rate, which is suggested by Graham (1996).[10] Other control variables, such as the logarithm of firm size, debt to asset ratio, and institutional holdings scaled by firms' outstanding shares, are also included.[11] All the variables from financial data are obtained at the nearest preceding date from the issuing securities date. Apart from the variables described in this section, we include industry dummies (based on 36 industry categories by Nikkei NEEDS) to control for industry-specific fixed effects.

Market conditions

Many recent works document that market timing affects firms' capital structures. Baker and Wurgler (2002) state that the main determinant of a firm's capital structure is mispricing in the equity or bond market, which implies that firms do not generally care whether they finance with debt or equity. Firms just choose the most overvalued financing market at that point of time. While Baker and Wurgler (2002) observe a long-term effect on capital structure, Kayhan and Titman (2007) demonstrate that the effect is short-lived. In our study, we include market timing variables to control for the effect of market timing on security issuance decisions: The 250-day return on the stock market index, the 250-day cumulative market model adjusted abnormal return of the firm, and the return on the corporate bond index. These three variables are obtained at the most recent date prior to the securities issuance date. We presume that the firms are more likely to issue public securities when the market condition is good. Time-series dummies are also included to control for other time-series specific effects that we cannot control with three market variables.

SECURITIES ISSUANCE BY OVERCONFIDENT MANAGERS

The first part of this section provides a methodology to examine the effect of managerial overconfidence on financing choices. Empirical results are presented in the later part of this section.

Econometric methodology

To examine the impact of managerial overconfidence on firms' financing choices, we employ a multinomial logit model. This model assumes the independence of irrelevant alternatives (IIA). That is, we presume that firms choose the security type among public equity, private

[10]We employ the statutory marginal tax rate, which takes the top statutory rate if the firm has neither a net operating loss carryforward nor negative taxable income, one-half the top statutory rate if the firm has either a net operating loss carryforward or negative taxable income, and zero if the firm has both a net operating loss carryforward and negative taxable income. Graham (1996) documents that this is an easy-to-calculate trichotomous variable and the best alternative for the simulated tax rate.

[11]Nagel (2005) shows that short sale constraints are most likely to bind in the case of stocks with low institutional ownership. Due to institutional constraints, informed investors simply never sell short and hence cannot trade against overpriced stocks they do not own. Furthermore, stock loan supply tends to be sparse and short selling more expensive when institutional ownership is low. Thus, short-sale constraints lead to overpricing in the stock market. To control the effect of overpricing, we include the residual institutional ownership in the regressions. Data on institutional holdings are obtained from financial data provided by Nikkei NEEDS. We calculate the residual by regressing $\ln\left(\frac{\text{inst}}{1-\text{inst}}\right)$ on ln(size) and square ln(size) every month.

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equity, public corporate bonds, and private corporate bonds and that the four choices are independent. This assumption is violated in some cases. To show that the robustness that our results are not driven by the structural problem in the econometric model assumption, we also run models that account for the dependence among the four choices.

Firms raise external money when they invest in a project that yields a positive net present value. Firms choose an optimal security issuance to maximize their value from their point of view. We assume that firms select the most optimal choice to maximize their linear value function of observable firm characteristics and random noise, which leads to the estimation of a multinomial model. First, we run a multinomial logit model in which firms choose the optimal security issuance among four choices. In this model, it is assumed that the four choices are exclusive. We estimate the coefficient of the following model:

$$P[y = i] = \frac{e^{b_i x}}{\sum e^{b_i x}} \tag{1}$$

where $i =$ pbe, pre, pbd, prd, and pbe, pre, pbd, and prd denote public equity, private equity, public corporate bonds, and private corporate bonds, respectively. Coefficients vary across alternatives. We set $b_{\text{pbe}} = 0$ (base outcome). This is because we intend to give a more logit-model-like interpretation to the multinomial logit model. To understand this reason in greater detail, we focus on the multinomial logit probability of issuing publicly placed corporate bonds compared to publicly placed equity. The probability is described below:

$$\begin{aligned} P[y = \text{pbd} | y = \text{pbe or pbd}] &= \frac{p_{\text{pbd}}}{p_{\text{pbe}} + p_{\text{pbd}}} \\ &= \frac{e^{b_{\text{pbd}} x}}{e^{b_{\text{pbe}} x} + e^{b_{\text{pbd}} x}} \\ &= \frac{e^{(b_{\text{pbd}} - b_{\text{pbe}}) x}}{1 + e^{(b_{\text{pbd}} - b_{\text{pbe}}) x}}. \end{aligned} \tag{2}$$

This model is a logit model with coefficient $(b_{\text{pbd}} - b_{\text{pbe}})$. If $b_{\text{pbe}} = 0$, then the model is specified as follows:

$$P[y = \text{pbd} | y = \text{pbe or pbd}] = \frac{e^{b_{\text{pbd}} x}}{1 + e^{b_{\text{pbd}} x}} \tag{3}$$

In this model, similarly to the binary logit model, we can interpret b_{pbd} in Equation (3) as the probability of choosing publicly placed bonds rather than publicly placed equity.

Simple description

Table 3 illustrates the average of the explanatory variables employed in regressions. It reports the average of the managerial forecast bias, risk, investment, profitability measures, other firm attributes, and cumulative abnormal stock returns. This table shows interesting implications for our prediction that managerial overconfidence induces firms to refrain from issuing publicly issued equity. As can be seen in the first row, firms that choose publicly issued equity have a lower positive value of the managerial forecast bias, 0.5 percent. On the other hand, firms that choose other financing decisions have higher positive values, 11.1 (private equity), 1.7 (public bond), and 6.3 (private bond) percent. This tendency is consistent with our prediction. In addition, firms that decide to issue equity in public placements tend to have higher values of analyst coverage, research and development cost, Tobin's Q, capital

Table 3. Data descriptions on explanatory variables. The averages of explanatory variables employed in regressions are reported in this table. The average of managerial forecast bias, residual analyst coverage, cash flow volatility (scaled by lagged total asset), the expenditure on research, development, and advertisement divided by the lagged property and equipment (RD/PPE), Tobin's Q, defined as the market value of the firm divided by the book value of the assets, capital expenditures plus change in capital working (scaled by lagged total asset), debt to asset ratio, operating income before depreciation divided by the lagged asset, Altman's *z*-score indicator, the marginal tax rate, the logarithm of firm size, residual institutional holdings scaled by firms' share outstanding, and the 250-day cumulative market-adjusted abnormal return are also reported. Pb and Pr denote Public and Private, respectively.

	Pb equity	Pr equity	Pb bond	Pr bond
Managerial forecast bias	0.005	0.111	0.017	0.063
Residual analyst coverage	0.149	0.001	0.068	−0.042
Cash flow volatility	0.096	0.091	0.013	0.029
RD/lagged PPE	0.717	0.406	0.124	0.219
Tobin's Q	1.550	1.362	1.073	1.003
CAPEX plus change in WC	0.074	0.049	0.014	0.040
Debt/asset ratio	0.137	0.116	0.146	0.126
Profitability	0.108	0.032	0.044	0.044
Altman's *z*-score indicator	0.133	0.435	0.565	0.534
Marginal tax rate	0.388	0.271	0.366	0.333
Logarithm of firm size	10.445	10.030	13.323	10.152
Residual institutional ownership	−0.342	−0.311	0.195	−0.220
Cumulative abnormal stock return	0.520	0.216	0.110	0.169

expenditures, profitability, *z*-score (lower values of *z*-score indicator), and abnormal returns compared to firms that depend on other financing choices. Although these patterns have prospects of lending support for the traditional three theories and other related studies, we discuss the details in the next section.

The effect of managerial overconfidence

In this section, we present and discuss the results of coefficients in the multinomial choice model among four security types: Public equity, private equity, public corporate bonds, and private corporate bonds. Table 4 reports the coefficients of choosing private equity, public corporate bonds, and private corporate bonds compared to public equity. At first, we focus on the probability of choosing privately issued equity compared to publicly placed equity. The results are described in the first column. As our main focus is on the relationship between financing decisions and managerial overconfidence, we predominantly present the coefficients of the managerial forecast bias. As can be seen in the first column, the coefficient of the managerial forecast bias shows 7.071 with a *t*-statistic of 5.97. This means that firms with higher managerial forecast biases tend to issue equity in the private market. In the analogous logic documented in Hertzel and Smith (1993), because more overconfident managers tend to feel that firms under their management are undervalued, the overconfident managers place equity in private markets with the expectation that funds convey managerial beliefs of being undervalued. The result that private placement is preferred to public placement by more overconfident managers in the equity market is consistent with this prediction. The second column in Table 4 reports the coefficient of the managerial forecast

Table 4. Multinomial logit model. This table describes the results of multinomial logit models in which firms choose the most optimal among four security types; public equity, private equity, public corporate bonds, and private corporate bonds. We set the choice of public equity as the base outcome. The coefficients from multinomial logit regressions are presented in the table. In addition to the explanatory variables described in Table 3, we also include the market index return prior to the deal date, the average 3-month return on the corporate bond index, 36 industry dummies, and 9 time-series dummies. Returns on the market index and bonds are calculated in percent. All the firm-specific explanatory variables are obtained at the reporting date prior to the deal date. Market variables are also obtained before the deal date. The sample period ranges from April 1998 to March 2008. The *t*-statistics are reported in parentheses.

	Private equity vs. public equity	Public bond vs. public equity	Private bond vs. public equity
Managerial focast bias	7.071 (5.97)	3.149 (2.43)	5.566 (4.73)
Residual analyst coverage	−0.397 (−1.90)	0.186 (0.79)	−1.222 (−6.43)
Cash flow volatility	0.019 (0.31)	−3.890 (−1.71)	−0.946 (−2.49)
RD/lagged PPE	0.029 (0.98)	0.026 (0.20)	0.027 (0.75)
Tobin's Q	0.072 (1.93)	−0.449 (−6.72)	0.003 (0.09)
CAPEX plus change in WC	1.092 (3.10)	0.754 (1.40)	0.991 (2.92)
Debt/asset ratio	−1.619 (−3.26)	−1.898 (−3.10)	−1.045 (−2.40)
Profitability	−5.627 (−6.58)	−4.063 (−2.82)	−5.973 (−7.12)
Altman's *z*-score indicator	0.750 (5.00)	0.236 (1.51)	0.725 (5.12)
Marginal tax rate	−4.984 (−5.10)	−2.284 (−2.09)	−2.648 (−2.75)
Logarithm of firm size	−0.201 (−4.04)	1.182 (22.23)	−0.133 (−3.03)
Residual institutional ownership	0.053 (0.77)	0.402 (4.92)	−0.038 (−0.61)
Cumulative abnormal stock return	−0.604 (−5.63)	−0.657 (−4.77)	−1.056 (−10.47)
Cumulative market return	−0.978 (−1.68)	−0.839 (−1.34)	−0.810 (−1.57)
Bond index return	3.294 (0.09)	−7.070 (−0.19)	6.716 (0.21)

bias when we compare publicly issued bonds to publicly issued equity. It shows 3.149 with a *t*-statistic of 2.43. The result implies that managers with higher managerial forecast biases are less likely to choose equity issuance in public markets, which accords with our main prediction that more overconfident managers tend to refrain from equity issuance. In the same manner, the last column presents the coefficient of the managerial forecast bias when we compare privately placed bonds to publicly issued equity, which is 5.566 with a *t*-statistic of 4.73. In any comparison, financing choices other than publicly issued equity are preferred by more overconfident managers.

Other implications

So far, we report the effect of managerial overconfidence on financing decisions. However, it remains unclear how information asymmetry between managers and market participants, variables related to the tradeoff theory, and the market condition relate to financing decisions. We briefly discuss the effect of traditional factors on corporate financing decisions.

Information asymmetry

First, we present and discuss the results of information asymmetry on corporate financing decisions. As can be seen in Table 4, the sensitivities to the choice of private equity and bonds compared to publicly issued equity show negative values with statistical significance. This

result implies that firms with lower information asymmetry are more likely to refrain from privately placed equity and corporate bonds compared to publicly placed equity. The former result is consistent with that of Chemmanur and Fulghieri (1999), who show that firms with severe information asymmetry may prefer a private placement to public placement in the context of initial public offerings.[12] As reported in the second column in Table 4, the coefficient of issuing public bonds shows a positive and statistically insignificant value. This result is inconsistent with the pecking order theory that firms with higher information asymmetry tend to issue more information-insensitive securities such as corporate bonds. When comparing the sensitivity to placing private equity described in the first column to the sensitivity to placing private bonds, as shown in the third column, the latter shows a lower value with higher statistical significance. This is consistent with the pecking order theory described above.

Risk and tax motivation

Second, we present and discuss the effect of risk and marginal tax rate on corporate financing decisions. As described in the first column in Table 4, firms with higher Tobin's Q, capital expenditures, Altman's *z*-score indicator, and lower profitability tend to resort to private placement equity. As reported in the second column in Table 4, firms with lower growth and profitability are more likely to issue publicly placed corporate bonds compared to publicly issued equity. As in the last column, firms with higher capital expenditures and Altman's *z*-score indicators tend to choose privately placed bonds compared to publicly placed equity. When we focus on the effect of taxation, higher marginal tax rates encourage equity placement. The coefficients of marginal tax rate are -4.984 with a *t*-statistic of -5.10, -2.284 with a *t*-statistic of -2.09, and -2.648 with a *t*-statistic of -2.75. This result implies that bonds are not preferred to equity even in the case of higher marginal tax rates in public markets. However, in private markets, we can observe that corporate bonds are preferred to equity when the marginal tax rate is higher by comparing the sensitivity to place private equity with the sensitivity to place private bonds.

Market conditions

Lastly, we focus on the variable induced from the market timing theory. Asquith and Mullins (1986) document that issuers in the public equity and convertible markets issue after a period of high cumulative abnormal returns. We include the cumulative abnormal returns, from which we expect to capture market timing. As described in the coefficients on cumulative abnormal return, in any comparison, the issuance of equity in public markets is preferred to any other financing choice when stock prices are experiencing favorable valuation. This result suggests that firms issue public equity to time their good valuation.[13]

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[12]This is because private investors can produce additional information and reduce the information asymmetry in the market, which is not present when shares are sold to dispersed investors.

[13]In addition, as documented in Frank and Goyal (2008), we find that larger firms tend to issue public bonds and to refrain from issuing private equity compared to public equity. The effect of short-sale constraints on corporate financing decisions is important when firms choose to issue bonds or equity in public markets. It is found that firms with higher residual institutional ownership, that is, less short-sale constraint, are more likely to prefer corporate bonds to equity.

Economic significance

Table 5 presents the economic significance of the results in Table 4. To compute the economic effects, we use the estimated model and associated coefficients from our results in Table 4. For each variable, we compute the predicted probability of each of four firm-level choices at two points, one-half standard deviation above and below each individual sample value. All other variables are held at their observation values. We then take the average of these probabilities over all firms in the sample. The difference in the average probability between two points is interpreted as the marginal economic significance of the multinomial logit model specified in Table 4.

As described in the first column in Table 5, with the one standard error increase in managerial forecast bias, the probability of issuing equity in public markets decreases by about 4.7 percent. The value has the strongest impact in comparison to other major factors. A one standard deviation increase in cash flow volatility leads to an increase in the probability of issuing publicly placed equity by about 3.4 percent, which is the second-largest impact. In terms of economic significance, the effect of managerial forecast bias has the strongest impact on financing decisions, compared to variables that are induced from the pecking order theory, the tradeoff theory, the market timing theory, and other related studies. Our result suggests the importance of accounting for managerial characteristics in corporate financing decisions.

With private placement equity, managerial forecast bias, cash flow volatility, and marginal tax rate have the greatest effect. With the one standard error increase in managerial forecast bias, cash flow volatility, and marginal tax rate, the probability of placing equity in private markets increases by about 3.7, 5.7 percent, and decreases by about 3.7 percent, respectively. With public bond issuance, operating risk (cash flow volatility) and growth opportunities (Tobin's Q) have the greatest effect. With the one standard error increase in cash flow volatility and Tobin's Q, the probability of issuing corporate bonds in public markets

Table 5. Economic significance. This table reports the economic significance of the results in Table 4. To compute the economic effects, we use the estimated model and associated coefficients from our results in Table 4. For each variable, we compute the predicted probability of each of four firm-level choices at two points, one-half standard deviation above and below each individual sample value. All other variables are held at their observation values. We then average these probabilities over all firms in the sample. The difference in the average probability between two points is interpreted as the marginal economic significance of the multinomial logit model specified in Table 4. We report the marginal economic significance in percent.

	Public equity	Private equity	Public bond	Private bond
Managerial focast bias	−4.675	3.718	−2.012	2.969
Residual analyst coverage	1.526	1.650	2.651	−5.827
Cash flow volatility	3.412	5.679	−10.995	1.903
RD/lagged PPE	−0.375	0.130	0.035	0.209
Tobin's Q	0.520	1.795	−4.760	2.444
CAPEX plus change in WC	−1.388	0.635	−0.200	0.953
Debt/asset ratio	1.142	−0.890	−0.978	0.726
Profitability	2.785	−0.563	0.620	−2.842
Altman's *z*-score indicator	−3.058	1.472	−2.323	3.910
Marginal tax rate	2.463	−3.746	0.393	0.890
Cumulative abnormal stock return	3.019	1.579	0.713	−5.311

decreases by about 11.0 and 4.8 percent, respectively. With private bond placement, information asymmetry and market conditions prior to the issuance data are the important factors. With the one standard error increase in residual analyst coverage and cumulative abnormal return, the probability of placing corporate bonds in private markets decreases by about 5.8 percent and by about 5.3 percent, respectively.

Robustness

Subsample analysis and alternative measures

In previous sections, we show that managerial overconfidence statistically and economically has the strongest impact on corporate financing decisions compared to other variables used in the traditional theories and other related studies on financing decisions. This section examines the robustness of our results by omitting the choice of convertible bonds and constructing alternative measures that account for the noise included in managerial forecast bias. Table 6 reports the coefficients on managerial forecast bias in the multinomial logit model. We employ the explanatory variable used in Table 4. As can be seen in Panel A, our results do not change even when we exclude the choice of convertible bonds. In any comparison, public equity offerings are avoided by overconfident managers. In addition, we estimate a multinomial logit model including random effect components to control for unobserved heterogeneity. The results are presented in Panel A of Table 6. As can be seen in the row labeled as ''Model with random effects'', the results in Table 4 do not change. Panel B reports the results when we employ alternative measures described in subsection 3.2. In any comparison with any alternative measure for managerial forecast bias, we find results similar to those in Table 4. Therefore, our results do not seem to be driven by the failure to omit irrelevant observations, unobserved heterogeneity, or by errors in the proxy.

Nested logit model

Up to this section, we have assumed the independence of irrelevant alternatives in the firms' financing choice. However, this assumption is sometimes violated because of the dependent structure among choices. It remains possible that the assumption is invalid in our setting and that the violation of IIA affects our results. To check the robustness of our results, we also consider some nested logit models. In this study, we estimate three nested logit models. In conducting nested logit models, we simply intend to examine whether the independence assumption among financing choices affects our results; we do not intend to find an obvious nesting structure. In the first model, we assume that firms choose the security type after choosing the market type. In this model, we estimate the unconditional sensitivity of the probability of choosing the market type to managerial forecast bias, firm characteristics, and market conditions and the sensitivity of the probability of choosing the security type to managerial forecast bias, firm characteristics, and market conditions, setting conditions based on market choice. In this model, the choice of security type is correlated conditionally on the choice of market type, while the choice of market type is independent. Panel A of Table 7 reports the coefficients of proxies for managerial forecast bias in the first model. In any measure, the coefficients of the probability to choose corporate bonds in the public markets show positive values, as described by $\Pr(\text{Bond} = 1/\text{Private} = 0)$. This result accords with the one reported in Table 4. The preference for corporate bonds disappears in the private market,

Table 6. Robustness. This table describes the results of multinomial logit models in which firms choose the most optimal among four security types; public equity, private equity, public corporate bonds, and private corporate bonds. We set the choice of public equity as the base outcome. The coefficients from multinomial logit regressions are presented in the table. In the regressions, we employ the same firm-specific and market variables used in Table 4. Panel A reports the regression results when we omit the choice of convertibles. Panel A also presents the results when we estimate a multinomial logit model including random effect components to control for unobserved heterogeneity. Panel B reports results when we employ two alternative measures: The dummy variable, which takes one if managerial forecast biases show positive values and zero if managerial forecast biases show negative values, and the quintilized managerial forecast bias within each firm value quintile. The sample period ranges from April 1998 to March 2008. The *t*-statistics are reported in parentheses.

	Private equity vs. public equity	Public bond vs. public equity	Private bond vs. public equity
Panel A: Robustness check			
Excluding convertibles	7.227 (6.01)	2.966 (2.21)	5.551 (4.62)
Model with random effects	9.554 (6.36)	3.659 (2.71)	6.125 (5.08)
Panel B: Alternative measures			
Dummy(MFB ≥ 0)	0.513 (3.85)	0.422 (2.93)	0.633 (5.43)
Quintilized MFB within size quintiles	0.276 (5.54)	0.202 (3.79)	0.307 (6.80)

as observed in the coefficients described in Pr(Bond = 1/Private = 1). More overconfident managers show a strong reluctance to issue equity only in public placement.

Similarly, in the second model, we assume that firms choose the market type after choosing the security type, in which the choice of market type is conditionally correlated on the choice of security type. In this model, we estimate the unconditional sensitivity of the probability of choosing the security type and the sensitivity of the probability of choosing the market type, setting conditions based on security choice. The result is observed in Panel B of Table 7. More overconfident managers do not show any coherent preference for security type when they face the choice between equity and bonds. In the following stage, they show strong preference for the private market, which is robust in the equity market. Also in this analysis, we can find the tendency to prefer private placement over public placement in equity markets.

In the third model, we assume that firms make the best financing decisions among public equity, private equity, and corporate bonds and that firms choose whether they place privately or not conditional on the choice of corporate bonds. In this model, we estimate the unconditional sensitivity of the probability of choosing corporate bonds or private equity, as well as the conditional sensitivity of the probability of choosing the market type for bonds. The result is presented in Panel C of Table 7. In the first stage regressions, we find that more overconfident managers are more likely to refrain from publicly issued equity compared to privately issued equity and corporate bonds. This result is consistent with the results reported in Table 4.

On the whole, the results in this section show us that our results are not driven by model misspecifications. In any model, it is shown that public equity is the least preferred security type for overconfident managers among the four. In addition, we also show that overconfident managers prefer private placement in equity markets and that the equity reluctance by overconfident managers disappears in private placement. Our results in the previous sections hold when we employ other models accounting for the dependence structure of alternative choices.

Table 7. Nested logit models. This table illustrates the coefficients from three nested logit models. In the first model (Panel A), we assume that firms choose the security type after choosing the market type. In the second model (Panel B), we assume that firms choose the market type after choosing the security type. In the third model (Panel C), we assume that firms make the best financing decisions among public equity, private equity, and corporate bonds and that firms choose whether or not they go to the public market in the case of bond financing. In the regressions, we employ the same firm-specific and market variables used in Table 4. The coefficients on managerial forecast bias are reported in the table. The sample period ranges from April 1998 to March 2008. The *t*-statistics are reported in parentheses.

	MFB	Dummy (MFB $\geq$ 0)	QuintMFB
Panel A: Market-security choice			
First: Pr(Private = 1)	5.056 (5.04)	0.655 (5.62)	0.323 (7.14)
Second: Pr(Bond = 1/Private = 0)	4.340 (2.72)	0.629 (3.61)	0.278 (4.27)
Second: Pr(Bond = 1/Private = 1)	−1.481 (−5.21)	0.069 (0.71)	0.031 (0.95)
Panel B: Security-market choice			
First: Pr(Bond = 1)	−4.744 (−5.57)	0.072 (0.67)	−0.004 (−0.09)
Second: Pr(Private = 1/Bond = 0)	5.474 (4.37)	0.483 (3.43)	0.251 (4.73)
Second: Pr(Private = 1/Bond = 1)	2.209 (3.16)	0.193 (1.69)	0.096 (2.39)
Panel C: Public equity vs. bond			
First: Pr(Bond = 1)	3.680 (2.93)	0.496 (3.72)	0.275 (5.50)
First: Pr(Private equity = 1)	7.091 (6.00)	0.213 (1.91)	0.109 (2.80)
Second: Pr(Private = 1/Bond = 1)	2.503 (3.91)	0.456 (3.44)	0.219 (4.36)

CONCLUSION

In traditional frameworks, which focus on corporate financing policy and capital structure, it is assumed that managers make financing and investment decisions rationally. However, accounting for much evidence in the psychological literature that managers tend to be overconfident or optimistic, we should consider managerial irrationality to be an important factor in corporate financing decisions. This study examines the effect of managerial overconfidence on corporate financing decisions by constructing a more direct measure for managerial revealed belief, which is defined as the manager's forecast for earnings minus the actual earnings standardized by the average of stock prices. As documented in previous studies, we find that managers tend to forecast their firms' prospects too highly and that this tendency is time-series stable, which are consistent with managerial overconfidence or optimism. We find that our measure is suitable to capture managerial belief that is driven by overconfidence or optimism.

Employing the proxy for managerial overconfidence, we test whether firms with greater upward biases show a reluctance to issue equity in the public market. As Heaton (2002) and Malmendier et al. (2007) theoretically and empirically show that managerial overconfidence leads to withholding equity offerings, we find that managers who have upward forecast biases are more likely to refrain from public equity offerings and to resort to other financing choices. The economic significance test provides us with evidence that the effect of managerial overconfidence is the most important factor in public equity offerings, compared to other variables used in previous studies such as information asymmetry, profitability, growth options, bankruptcy risk, and market timing. With a one standard deviation increase in managerial upward bias in their forecast, the probability

of issuing publicly placed equity decreases by about 4.7 percent. In some robustness tests, we show that our results do not rely on the failure to omit irrelevant observations, errors in the proxy for managerial overconfidence, or model misspecifications. However, we cannot find the reluctance of managers with upward forecast bias to place equity in the private market. It is thought that since more upwardly biased managers tend to feel that firms under their management are undervalued, these managers place equity in private markets with the expectation that funds convey the managerial belief of being undervalued.

Our finding that the behavioral factor is the important factor compared to factors used in traditional frameworks suggests that we should also consider the behavioral effect of management in the context of corporate governance and other related corporate finance literature. For future research, accounting for managerial behavioral effects could help our understanding of anomalous behaviors in the corporate finance literature.

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