

## 經理人過度自信對公司融資順位的影響—— 以台灣電子公司為例

### CEO Overconfidence and Pecking Order Prediction— Evidence from Taiwanese Electronics Companies

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#### 摘要

國外研究發現，管理信念如過度自信或過度樂觀可以解釋公司融資順位行為的變化。然而，由於衡量國內過度樂觀指標有存續性的問題、過度樂觀與過度自信本質上的差異、以及跨國性過度自信程度上的不同，因此，我們認為以台灣經理人為主體的實證研究有其必要性。本篇論文以員工認股權證來衡量台灣電子公司經理人過度自信的程度，並重新測試過度自信與公司外部融資決策的關係。結果發現，在需要外部資金的情況下，過度自信經理人會比非過度自信經理人傾向於發行更多的債券，同時，也確認了管理信念在解釋公司融資順位的重要性。

關鍵詞：過度自信、融資順位理論、管理信念、員工認股權證、融資決策

#### Abstract

Previous studies suggest that managerial beliefs such as overconfidence and optimism help to explain variation in pecking-order behavior. Nevertheless, due to a limitation on the sustainability of the measure of optimism, the difference between optimism and overconfidence, and the cross-nation variation in overconfidence, we believe an additional test for CEO overconfidence in Taiwan is necessary. This paper uses employee stock options to measure the level of CEO overconfidence in Taiwanese electronics companies and tests the relationship between overconfidence and corporate external financing decisions. We find that, conditional on accessing external funds, overconfident CEOs issue more debt than non-overconfident ones, confirming the importance of managerial beliefs in explaining hierarchical financing.

Key words: Overconfidence, Pecking order theory, Managerial beliefs, Employee stock option, Financing decisions

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### I. Introduction

The driving force of pecking order in financing has been richly debated. Traditional theories suggest that the pecking order preference may arise from information asymmetry between firms and capital market (Myers, 1984), agency costs (e.g., Myers, 2003), and taxes (e.g., Hennessy and Whited, 2005). However, Fama and French (2005) argue that there are ways for firms to avoid these problems and to deviate from pecking order financing. Malmendier, Tate, and Yan (2010) further propose that these theories do not explain why firms with similar fundamentals make different financing decisions and that managerial beliefs explain a significant part of the residual variation. In their empirical study they find that, conditional on accessing public markets, overconfident Chief Executive Officers (CEOs) in the U.S. raise US\$0.33 more debt to cover every \$1 of financing deficit than their peers. Lin, Hu, and Chen (2008) present that optimistic CEOs in Taiwan exhibit a stronger relation between debt issuance and financing deficit, consistent with the prediction of Heaton's model (2002).

For the following reasons, we believe an additional test is necessary that focuses upon the effect of managerial overconfidence on pecking-order behavior. First, as local legislation covering statements of quantitative forecasts was abolished in 2002, causing the number of forecasts to fall dramatically since then, the measure of optimism proposed by Lin, Hu, and Chen (2008) may not be sustainable in Taiwan. Second, managerial overconfidence is closely related to optimism, but different in essence. While overconfident CEOs overvalue their ability to learn about a project, optimistic ones overvalue the project itself. Optimistic CEOs do not feel as

compelled as overconfident ones to gather information, and thus the difference has an impact on corporate decision-making and firm value (Gervais, Heaton, and Odean, 2010). Third, although there is no direct study comparing the level of overconfidence for Taiwanese CEOs with that for U.S. CEOs, a series of studies by Wright and Philips (1980, 1978) report that Asian subjects are significantly more overconfident than Western subjects, which is surprisingly opposite to typical expectations. Does the possible cross-national variation in overconfidence of Taiwanese CEOs also display pecking-order preference? If so, then the argument that managerial beliefs could lead to hierarchical financing choices can be further enhanced.

Our goal is to find a persuasive, sustainable measure of overconfidence for Taiwanese CEOs. Following Malmendier, Tate, and Yan's rationale, we propose a measure of overconfidence by examining CEOs' employee stock option holdings. The logic behind this measure is that if CEOs are overconfident in their prospects for their companies, then they are more likely to keep the holdings even though the employee stock options are highly valued. To our knowledge, this is the first article to use a more precise measurement of overconfidence and to test the relation between overconfidence and external financing decisions outside the U.S.

We test these predictions on a panel dataset of Taiwanese electronics companies, choosing them as our sample, because most companies issuing employee stock options are electronics firms. These companies are publicly traded and issue employee stock options as compensation. Taiwan's stock market is also mainly composed of electronics companies and by focusing on this single industry, we are able to deepen our understanding of their external financial policies as this industry is perceived to be the most successful one in Taiwan. Furthermore, because self-attribution bias may boost individual confidence too much after a string of successes (Miller and Ross, 1975), it is worth it to further research whether overconfident Taiwanese electronics CEOs lead to the pecking-order behavior.

We focus on testing Malmendier, Tate, and Yan's debt versus equity model by using a framework of Shyam-Sunder and Myers (1999). We argue herein that the pattern can be explained by differences in managerial beliefs. Managers with overly confident views about the future performance of their company stock tend to perceive their firms as being undervalued by the market and thus view external financing as too costly. Therefore, they prefer to rely on internal funding rather than issuing securities to fund their financing needs. At the same time, they favor debt over equity, because equity is more sensitive to different opinions about future cash flows. As a result, overconfident managers display a pecking order of financing.

We find that, in a regression of net debt issues under a financing deficit, the estimated slope is 0.67, proving that Taiwanese electronics firms may display pecking-order behavior. When identified by managerial overconfidence, the result shows that overconfident CEOs issue more debt than their peers. Thus, we conclude that managerial overconfidence helps to explain the variation of external financing in Taiwanese electronics companies.

Our research contributes to the literature that tests pecking-order theories. For example, Shyam-Sunder and Myers (1999) interpret their result to imply that "pecking order is an excellent first order descriptor of corporate financing behavior" (page 242). However, Frank and Goyal (2003) conclude that the pecking-order theory does not explain broad patterns in the data. Their results prompt a further exploration of corporate financing decisions. Our analysis allows us to prove that pecking-order behavior may exist in Taiwanese electronics companies, among the most important suppliers in the world of electronics components and products.

Our results also add to the literature that explores the cause of pecking-order predictions through managerial beliefs (e.g., Graham and Harvey, 2001; Heaton, 2002; Malmendier, Tate, and Yan, 2010; Lin, Hu and Chen, 2008).

This paper demonstrates that managerial beliefs are able to explain the hierarchy of external financing behaviors. It appears that overconfident CEOs issue more debt than non-overconfident ones when facing financing needs.

Finally, a growing body of literature links managerial beliefs such as overconfidence or optimism to corporate financing choices. Aside from the articles mentioned above, Hackbarth (2008) shows that optimistic and overconfident managers choose higher debts levels and issue new debts more often, and these higher debt levels of mildly biased managers restrain them from diverting funds and increase firm value by overcoming the conflicts between managers and shareholders. Malmendier and Tate (2005) argue that managerial overconfidence can explain corporate investment distortion and find that investment decisions of overconfident CEOs, particularly in equity-dependent firms, are more sensitive to cash flow. Our empirical results allow for a specific relation between overconfidence and pecking-order behavior in the broad literature which relates managerial beliefs to corporate financial policies.

The remainder of the paper is organized as follows. In Section 2 we describe our overconfidence measure. Section 3 offers the empirical methodology and data. Section 4 presents the results. Section 5 concludes.

## **II. Overconfidence Measure**

### **2.1. Previous Methods**

To measure the overconfidence of CEOs or investors, previous researchers have proposed the following methods.

Malmendier, Tate, and Yan (2010) argue that, by examining CEOs' decisions to exercise or hold non-tradeable company stock options, they can

infer whether CEOs are overconfident. They also use characteristics in the business media to measure CEO beliefs by comparing the number of past articles that portray a CEO as confident with past articles that portray him as not confident. Their indicator is widely accepted in the field of behavioral finance, because their articles are published in prestigious financial journals. Therefore, we adopt their rationale in building a measure of overconfidence for Taiwanese CEOs.

Lin, Hu, and Chen (2008) use a company's financial forecasts to identify whether CEOs in Taiwan are optimistic for the future. They define a forecast error as the difference between the CEO's forecast and the firm's actual (or realized) earnings. When the difference is larger than 50%, the CEO is optimistic or otherwise. The measure catches the meaning of optimism, which refers to overestimating the company's prospects. Additionally, one advantage is that there are sufficient records for them to analyze. However, since 2002 it has not been mandatory for publicly-traded Taiwanese companies to reveal financial forecasts, and thus the number of forecasts has gradually diminished following that date. This measure may not be as sustainable as before.

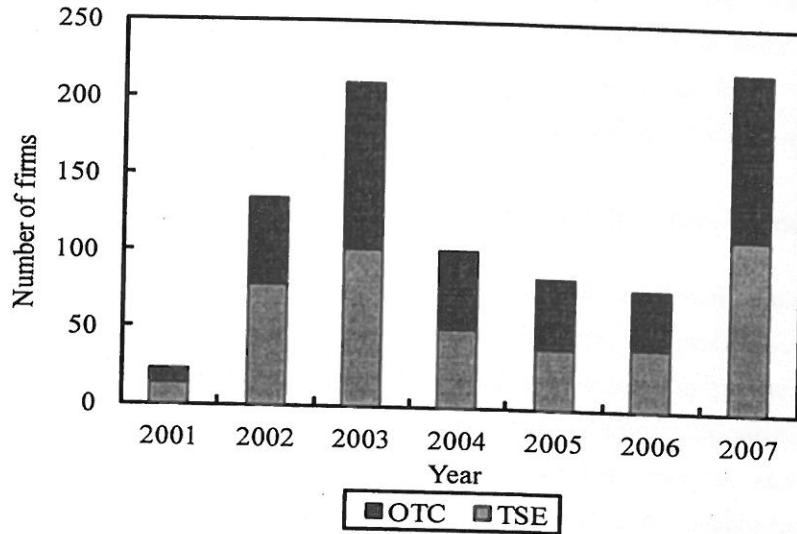
Li (2006) uses two measures to identify the overconfidence of managers in Taiwan and the design tries to follow Malmendier, Tate, and Yan's framework. One involves the variations in the proportion of stock holdings. They argue that managers are overconfident after obtaining internal information and will significantly increase their holdings. The other measure is the contrast between future stock prices and expectations. Since managers are supposed to have insider information, if the stock price of a company is contrary to the expectation of managers when they exercise stock options and increase their holdings, then this implies they tend to be overconfident toward their corporations. However, for the first measure, the number or ratio of stock holdings is not clearly defined. In fact, managers may increase their holdings on the basis of rational expectations. For the second measure, the

decreases in managers' holdings and the increases in stock prices are considered as signs of "overconfidence" when managers may actually be diffident or have made wrong judgments. In sum, even though the research attempts to build an overconfidence measure for CEOs in Taiwan, the measure is not clearly defined and convincing.

## 2.2. Managerial Overconfidence Measure

This research follows Malmendier, Tate, and Yan's logic for measuring CEOs' overconfidence. Corporations in Taiwan issue employee stock options in order to attract and retain the best and most elite employees whom they need for continued future development, to motivate employees to stay for longer periods of time, and to elevate the cohesion of companies so as to create shareholders' benefits. Figure 1 presents the number of firms in Taiwan issuing employee stock options. The number of firms issuing options soars from 23 in 2001 to 210 in 2003, falls afterwards, and climbs to another peak of 221 in 2007. It appears that, unlike financial forecasts, employee stock options do not have the problem of sustainability. Basically, both U.S. and Taiwan firms issue options as part of compensation, but they differ in restrictions on option holders, taxes for firms and employees, and executable prices, etc. For instance, in Taiwan employee stock options usually have a two-year lock-up period. Managers cannot exercise their employee stock options within two years after the release.

Figure 1: Number of public-traded firms issuing employee stock options in Taiwan



Data are from Market Observation Post System. TSE and OTC represent two main markets for trading stocks in Taiwan: Taiwan Stock Exchange and Over-the-Counter, respectively.

Our measure is like Malmendier, Tate, and Yan's approach who infer CEOs' beliefs from their decisions to exercise or hold employee stock options. CEOs in our sample receive large grants of company stock as compensation. Since their human capital is invested in their firms, they generally exercise their options early in order to diversify the risk. We propose that CEOs are regarded as overconfident if they do not exercise their options, provided that the exercise price is at least 40% of the stock market price during the exercise period. In other words, if a CEO does not exercise the options provided that the return rate is at least 150%, then he is referred to as being overconfident. The exact expression is represented as follows.

$$\text{Overconfidence} \equiv \frac{\text{The stock price} - \text{The exercise price}}{\text{The exercise price}} \geq 150\%$$



Overconfidence is a binary variable and set to 1 if a CEO has ever held an employee stock option and the above condition is met. The 40% threshold corresponds to a constant relative risk aversion of 3 and 67% of wealth in company stock in the rational option exercise model of Hall and Murphy (2002). Based on their results, setting an exercise price equal to 40% of the market price maximizes performance incentives for risk-averse, undiversified executives. In order to understand whether the threshold is feasible for Taiwanese CEOs, we examine the return distribution of CEOs who have exercised their options in Table 1. We find that about 43% of CEOs have exercised their employee stock options within the return rate of 150%.

Table 1: Distribution of return for CEOs who have exercised their employee stock options

Since we do not have the actual date of CEOs who exercised their employee stock options, but do have the year, we calculate the return by the difference between the average stock price in the exercise year and exercise price and then divide this by the exercise price.

Return (%)	Number of CEOs	Cumulative Percentage
< 50	18	16.82%
[50, 100)	19	34.58%
[100, 150)	9	42.99%
[150, 200)	12	54.21%
[200, 250)	9	62.62%
[250, 300)	4	66.36%
[300, 350)	8	73.83%
[350, 400)	3	76.64%
[400, 450)	4	80.37%
[450, 500)	6	85.98%
[500, 550)	1	86.92%
≥ 550	14	100.00%
Total	107	

We classify CEOs' managerial beliefs by examining whether they exercise or hold options and by checking the respective potential returns. For the execution part, we perceive these CEOs as being non-overconfident. For the non-execution options with a potential return of at least 150%, we consider these CEOs as being overconfident. As for the non-execution ones with a return below 150%, we are unable to classify whether they are overconfident since the incentive-maximization point is not reached or the stock price performance is weak. To keep the consistency of CEOs' personal characteristics, once a CEO is considered as overconfident, his or her managerial beliefs will be the same throughout the whole observation period. This is the same for non-overconfident CEOs. Therefore, we will not see a CEO who is overconfident in some years while being non-overconfident in other years.

### 2.3. Alternative Explanations

We consider several explanations for a late option exercise.

*Failure to Catch High Prices.* Some might argue that CEOs may not be able to catch high stock prices. Therefore, we count the number of days with a potential return of over 150% for the option-holding CEOs. Table 2 shows that the average number of days for these CEOs to catch this return is 208, which is enough time for them to exercise their employee stock options under such lucrative situations. The return rate threshold also removes the rational reason that CEOs do not exercise their options, such as underwater options.

Table 2: Number of days for CEOs who have not exercised their options, but who can exercise their options at least 40% in the money of market prices

Number of days	Number of CEOs	Percentage
< 30	12	18.18%
[30, 90)	12	18.18%
[90, 180)	13	19.70%
[180, 270)	12	18.18%
[270, 365)	14	21.21%
[365, 730)	10	15.15%
$\geq 730$	15	22.73%
Total	66	100.00%

*Personal Taxes.* CEOs may choose not to exercise in-the-money options, because of personal income taxes.<sup>1</sup> Assume the tax rate is about 40% for CEOs. If we examine the return distribution of early exercise, then the CEOs exercise their options even though the return is under 40%. Therefore, taxes may not be the reason to delay the early exercise. We must also not forget that the options are so valuable, that these CEOs are able to obtain a high return even after deducting taxes.

*Variations of CEO Positions.* CEOs may not be able to exercise their options if they leave, retire, or get laid off from their companies before the options are exercisable. For this reason, we check whether CEOs we classify as overconfident have left or been laid off before the exercise period begins. We find that those CEOs are still working for their companies. Therefore, the variations of positions may not be a problem for them to exercise at a later date.

<sup>1</sup> Since 2004, Taiwan's Ministry of Finance has regulated employees who have exercised their options to report the difference between exercise price and stock price in their personal income tax filings. The profits are taxed by personal income tax rates.

*Adverse Effects on Stock Prices.* Some may argue that CEOs are less likely to exercise their employee stock options, because they are afraid that exercising options will increase the number of new shares outstanding and have adverse effects on stock prices. As a result, we classify them as being overconfident, not because of their managerial beliefs. However, the strings of limitation on exercising options regulate that any single option-holding person cannot be granted over 10% of the total employee stock options issued each time and cannot exercise more than 1% of the total stocks that have been issued by the firm at the end of year. The items usually rule that option-holding persons can exercise only 50%, 70%, and 100% of their options after being granted already 2, 3, and 4 years, respectively. Therefore, we see that the effect of exercising options on stock prices is small and diminishes gradually.

*Inside Information & Signaling.* CEOs may postpone their option exercise if they believe that their stocks will perform well and they intend to profit from the expected appreciation. Their beliefs could be correct, because CEOs may have constantly positive inside information that their stocks are undervalued, or they may be incorrect, because CEOs who do not exercise are overconfident.

Two tests help to distinguish information from overconfidence. First, if inside information keeps CEOs from early option exercise, then the returns from holding the options should be higher. We calculate the hypothetical return that overconfident CEOs could have realized if they had exercised their options one month before expiration or at the end of research period. To allow for maximum insider information, we assume that the hypothetical exercise and the actual exercise occur at the maximum stock price during this period. We conduct the Kruskal-Wallis non-parametric test and find that overconfident CEOs did not earn a higher return from holding options until expiration compared with the alternative strategy. The average return from exercising one month earlier is 365% significantly higher than the 310%

return from holding until expiration. We also replicate the test for a hypothetical exercise both three and six months before expiration or the end of the study period. On average, CEOs would have done better by exercising three and six months before expiration, with average respective returns of 437% and 480%, than by holding to expiration.

Second, if exercising or holding options signals corporate prospects, then firms with CEOs exercising their options may mean the firms' performance is not strong after their executions. We compute the hypothetical returns one month after CEOs actually exercised their options in certain fiscal years. We find the hypothetical return is 320%, but it is not significantly different from the actual 363%. We also repeat the test for a hypothetical exercise both three and six months after their actual exercise. The average returns to exercise three and six months after their actual exercise are respectively 333% and 355%, which are not significantly different from the actual one as well. These statistics demonstrate that firms with CEOs who exercised their options do not perform poorly after execution.

### III. Empirical Analysis

#### 3.1. Specification: Financing Deficit

This paper applies Shyam-Sunder and Myers' (1999) financing deficit framework to consider the debt versus equity choice, using data from cash flow statements. According to the pecking-order theory, financing deficit is supposed to drive debt. Tests of the pecking-order theory define financing deficit in a given firm for year  $t$  as follows:

$$DEF_t = DIV_t + I_t + \Delta W_t - C_t = \Delta D_t + \Delta E_t, \quad (1)$$

where DIV is cash dividends; I is net investment;  $\Delta W$  is the change in working capital; and C is operating cash flow after interest and taxes. A positive financing deficit represents that internal funds are exhausted while a negative number means a surplus. We test whether overconfident CEOs cover more of their financing deficits with debt than with equity. The hypothesis based on Malmendier, Tate, and Yan's model is as follows.

*Hypothesis: Conditional on a given financing deficit, overconfident CEOs issue more debt than do rational CEOs.*

We use the following regression specification:

$$\Delta D_{it} = \beta_1 + \beta_2 DEF_{it} + \beta_3 O_{it} + \beta_4 DEF_{it} \cdot O_{it} + \beta_5 X_{it} + \beta_6 DEF_{it} \cdot X_{it} + \beta_7 I_{it} + e_{it}, \quad (2)$$

where DEF denotes the financing deficit, and the O is the overconfidence proxy which is 1 if the CEO is classified as overconfident and 0 if not. Furthermore, DEF · O represents the interaction between financing deficit and overconfidence.

These variables are adopted from previous studies (e.g., Malmendier, Tate, and Yan, 2010; Lin, Hu, and Chen, 2008). The set of X includes the controls from Frank and Goyal (2003): tangibility of assets, market-to-book ratio, log sales, and profitability. The absolute levels of and changes in these control variables are proposed to be able to explain the amount of leverage. We also include their interactions with DEF as do Malmendier, Tate, and Yan in their specification. Since there may exist differences between companies within the same electronics industry, we include a control I for more detailed electronics groups classified by the Taiwan Stock Exchange.<sup>2</sup> The coefficient  $\beta_2$  considers the effect of financing deficits on net debt issuance. The coefficient  $\beta_3$  represents the sensitivities of the overconfident measure alone

<sup>2</sup> Taiwan Stock Exchange further classifies the electronics industry into more detailed groups such as electric machinery, computer and peripheral equipment, and semiconductor industry, etc.

to debt issuance. The coefficient  $\beta_4$  measures the difference in sensitivities between overconfident CEOs and non-overconfident CEOs when they face financial needs. We expect it to be positive based on our hypothesis.

### 3.2. Data Description

The sample herein focuses on Taiwanese electronics firms that have issued employee stock options as compensation. These companies are publicly traded and compiled by the Taiwan Stock Exchange (TSE) and the Over-the-Counter (OTC) markets. We choose the electronics industry, because over 90% of companies issuing employee stock options are in this industry. The observation period is between 2001 and 2007, because the regulation requires managers to reveal employee stock options holdings only after the 2001. The majority of the duration of employee stock options in Taiwan is between 5 and 7 years, compared to 10 years in the U.S. The observation period should be reasonable in measuring the overconfidence of CEOs in Taiwanese electronics firms.

For corporate financing policies, we collect financial statements from the Taiwan Economic Journal (TEJ) database. After identifying CEOs' beliefs, we examine their tenure and have 554 observations in our sample. Table 3 details the summary statistics of the full sample's financial data. As shown in Table 3, the average amount of financing deficits is NT\$337.60 million. The major source of the deficits comes from investment activities, and the needs are mostly covered by net equity issues, but after normalization, net debt issues outweigh net equity issues. The minimum financing deficit of -NT\$14.315 billion happens to be minimum net debt issues, because a firm with a minimum net debt issue did not issue any equity in that particular year.

Table 3: Summary statistics of the full sample

The sample period is 2001-2007. For the definitions of variables, please refer to the Appendix. The variables from the book value of total assets to internal cash flow are in millions of New Taiwan dollars.

Variable	Obs.	Mean	Median	SD	Min.	Max.
Book value of total assets	554	7,908.40	2,752.57	17,354.17	225.65	137,784.59
Net debt issues	554	73.94	0.00	1714.63	-14,315.20	13,678.80
Net equity issues	554	263.66	0.00	2,040.57	-1,197.08	43,530.40
Financing deficit (DEF)	554	337.60	40.80	2,280.23	-14,315.20	30,430.70
Cash dividends	554	175.38	53.18	438.27	0.00	7,776.04
Change in working capital	554	124.76	42.45	1089.47	-8,542.51	13,005.44
Net investment	554	664.96	167.26	2,212.23	-2,663.66	35,839.95
Internal cash flow	554	627.50	205.69	2,032.95	-15,849.93	23,303.99
Net debt issues/net assets	554	0.06	0.00	0.20	-0.64	1.36
Net equity issues/net assets	554	0.04	0.00	0.12	-0.63	1.04
Financing deficit/net assets	554	0.10	0.03	0.23	-0.69	1.40
Profitability	554	0.11	0.11	0.12	-0.75	0.46
Tangibility	554	0.20	0.15	0.17	0.00	0.75
Q	554	1.86	1.54	1.20	0.64	11.53
Log sales	554	14.75	14.64	1.40	11.22	19.44

Taiwanese companies have different titles for CEOs. We take a president as a CEO, as defined in Hung (2004). Because some chairmen of the board in Taiwanese companies also assume the position of CEO, we examine the annual reports of each company year by year to confirm the list of CEOs. To understand a CEO's personal investments, we use data from the Market Observation Post System which provides us with a CEO's personal employee stock option information including exercise price, exercisable duration, and number of employee stock options.