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Size effect in January and cultural influences in an emerging stock market: The perspective of behavioral finance

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ABSTRACT

This study aims to explain the size effect in January with the utilization of some theoretical arguments drawn from behavioral finance, such as mental accounting and house money, in a Chinese culture-oriented emerging stock market. Under Chinese tradition, employees are rewarded with a generous bonus before Lunar New Year, most often paid in January. This gain, analogous to the concept of house money, enhances the propensity to bear increased levels of risk, which in turn stimulates the demand for higher risk securities, particularly in a market that is mainly dominated by individual investors, as in Taiwan. The empirical results are consistent with our culture bonus hypothesis, that only small firms with higher risk in the Taiwanese stock market exhibit the apparent size effect in January, especially for the years when the bonus payments were in January and when the whole market had positive performance growth in the preceding year.

1. Introduction

The small firm anomaly, documented initially by Banz (1981), which states that small firms on average experience significantly higher returns than large firms, regardless of adjusting returns for estimated betas, has been extensively investigated and still puzzles researchers, because it defies rational explanation in an efficient market. Later, Keim (1983), Reinganum (1983), and Roll (1983a) found that almost half of the annual difference between the returns of small and large firms occurs in January. In other words, the size effect is significantly larger in January than in other months. Their studies are important, as the evidence seems to suggest an anomaly within an anomaly. These seasonal-size anomalies have been examined not

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only in sophisticated stock markets such as the US, UK, and Canada, but also in the Asia-Pacific emerging markets.[2]

Yates et al. (1997) documented that people living in Asian cultures tend to suffer from more behavioral biases than those in Western cultures. Kim and Nofsinger (2008) further indicated that it will be useful to understand the cognitive biases of Asians from the perspective of behavioral finance. Especially in an emerging market of mainly individual investors rather than institutional investors, such as Taiwan, the security market is a good place to look for anomalies, and learn why they exist.[3]

Moreover, in contrast to the numerous studies related to the pattern or relationship of stock returns and firm size, there has been very limited research related to the cause of the size effect in January, although risk mismeasurement, economic cycle, different information, and tax-loss selling hypotheses have been suggested. The purpose of this paper is thus to explore the cause of the small firm anomaly in January for Taiwan, from the interaction view of culture with behavioral finance. Under Chinese tradition, employees are rewarded with a generous bonus before Lunar New Year, most often paid in January, for working hard in the past year and to encourage them to work harder in the following year. For example, in 2006 China Steel Corporation, CPC Corporation, Chunghwa Telecom, and Fubon Financial Holding Company granted bonuses equivalent to 5, 4.6, 6.6, and 5 times monthly salaries, respectively. In the literature related to seasonality, several studies have exhibited the impact of Chinese culture on Asian stock markets, namely Chinese New Year effect, that there is a consistently up-moving trend prior to the Chinese Lunar New Year (Wong et al., 1990; Cadsby and Ratner, 1992; Tong, 1992; Lee et al., 1993; Yen and Shyy, 1993; Chan et al., 1996; Yen et al., 2001; McGuinness, 2005).

We posit that the implications of these culture bonuses on the size effect in January can be developed by incorporating important behavioral features, due to the limited processing ability, which are usually neglected in previous studies.[4] First, the concept of mental accounting states that most people behave as if they have a mental accounting system which violates the principle of fungibility (Thaler, 1985, 1999).[5] Specifically, some mental accounts, such as the house money account or the windfall income account, are less risk averse than others, such as the regular income account. Second, in contrast to monthly salaries, the Lunar New Year bonus should be analogous or closer to the house money or windfall income.[6] Notably, a larger bonus than expected is more likely to be viewed as house money by investors, and this increases rather than decreases their propensity to take risk.[7] Likewise, as the Chinese New Year is an auspicious and euphoriant holiday that people generally have more optimistic prospects for the future, and thus underestimate risks, these culturally driven bonuses should increase risk-taking and willingness to buy stocks when the money is received. Thus, we predict that the Lunar New Year bonus in the form of a lump sum will be treated differently from regular income, even if being paid the bonus is a sure thing, and so it should make individuals less risk averse in January. This will cause a surge in demand for higher risk securities in a market that is mainly dominated by individuals. Moreover, in general small firms have higher risk than large ones. Therefore, we propose a culture bonus hypothesis and expect that the demand

[2] See, Lamoureux and Sanger (1989), Leong and Zaima (1991), Carroll et al. (1992), Rathinasamy and Mantripragada (1996), and Haug and Hirschey (2006) for the US, L'Her et al. (2004) for Canada, Baker and Limmack (1998) for the UK. For the Asia-Pacific region, the results have been mixed. Huang (1997) showed that the size effect in Taiwan is not only in January but also in other months, using daily returns. Chui and Wei (1998) found that the size effect in January is insignificantly negative in Taiwan, while there is a January large firm anomaly in Hong Kong. Drew et al. (2003) and Wong et al. (2006) indicated that the significant size effect is unrelated to the January effect in Shanghai's market. Other recent studies examined the existence of the size effect without considering the impact of seasonality, and reported a small firm effect for Taiwan (De Groot and Verschoor, 2002), Hong Kong (Drew, 2003), China (Wang and Xu, 2004), and a large firm effect for Hong Kong (Lam and Spyrou, 2003).

[3] Individual investors constituted 73.61% of TSE and 83.13% of OTC for Taiwan's stock markets in 2006.

[4] The term limited processing ability means that people have limitations in processing information, and thus there is a trade-off between accuracy and speed, especially for more complex tasks, such as financial activities.

[5] Mental accounting, first described by Thaler (1985), attempts to describe the cognitive process whereby people and households code, categorize, and evaluate financial activities, and it is argued that people group their assets into a number of non-fungible accounts. Furthermore, as stated by Thaler (1999), studying mental accounting helps us understand the psychology of choice.

[6] Thaler and Johnson (1990) suggested that individuals appear to increase their risk tolerance as their wealth exceeds a reference point, and this is the house money effect. Likewise, the fact that people who have private money will choose to gamble is also described as the house money effect.

[7] Several surveys of public opinion showed that the bonuses were used mainly for financial investment, saving deposits, and offering money to parents or children, in that order.

for small-cap stocks, especially those with high volatility which are generally regarded as having higher risk, will increase and cause the size effect in January to appear in Taiwan's stock market.

We use the monthly stock returns data, and utilize the Fama–MacBeth method for empirical purposes. For completeness, we test the culture bonus hypothesis as well as alternative hypotheses offered in prior research. We also conduct exhaustive sensitivity tests for robustness. All the findings are consistent with the culture bonus hypothesis that the Taiwanese stock market, especially for firms with higher risk, exhibits the small-cap effect in January. Moreover, after taking into account the time and amount of the bonus payments, the results indicate more support for the culture bonus hypothesis. The major contribution of this research is to expand the existing literature into another dimension that incorporates cultural factors with behavioral finance, and fill the gap in the literature on the causes of seasonal-size anomalies for Pacific-Basin Chinese stock markets.

The next section describes all the hypotheses that have been tested for the size effect in January in previous studies. Section 3 describes the data and methodology. Section 4 presents the empirical results and analyses, and the final section concludes this paper.

2. Literature review

Since evidence for the size effect has been found, a number of hypotheses have been offered to explain it.[8] However, most of them merely focus on the size effect, and do not attempt to explain why it is especially apparent in January. In addition to the culture bonus hypothesis in the previous section, there are several hypotheses that have been proposed in prior research to explain why the size effect exists in January, namely, the risk mismeasurement hypothesis, the economic cycle hypothesis, the different information hypothesis, and the tax-loss selling hypothesis, and these are all outlined in the following discussion.

2.1. The risk mismeasurement hypothesis

Rogalski and Tinic (1986) suggested that the January small firm anomaly could be attributed to the higher risk of the small firm portfolios, particularly in January. However, Rathinasamy and Mantripragada (1996) showed that the small firm anomaly in January still exists, even adjusting for this with the Treynor and Sharpe risk measure.

2.2. The economic cycle hypothesis

This hypothesis, first proposed by Krueger and Johnson (1991), predicts that small young firms usually grow faster than large mature ones in the expansion phase of the economic cycle, but tend to have poorer performance in the contraction phase because of their lower productivity and higher financial leverage. In addition, Krueger and Johnson (1991) showed that firm size is more significant during bull rather than bear markets. However, Bhardwaj and Brooks (1993) took into account the effect of bull or bear market conditions on the size anomaly using a dual-beta market model, and still found the January small firm anomaly. This was also found by Kim and Burnie (2002), who indicated that although the small firm anomaly occurs in the expansion phase of the economic cycle and is not significant in the contraction phase, the size effect in January exists in both phases of the economic cycle.

2.3. The different information hypothesis

This hypothesis, proposed by Elfakhani and Zaher (1998), suggests that less publicized-small stocks are more sensitive to negative information, and thus would be more volatile. Firms with fewer specialized analysts are expected to observe gradual market adjustments to unexpected corporate news (the neglect

[8] In the literature, several hypotheses attempt to explain the anomaly, including the beta mismeasurement hypothesis, the liquidity hypothesis, the different information hypothesis, the omitted-risk factors hypothesis, the economic cycle hypothesis, the P/E ratio effect hypothesis, the tax-loss selling hypothesis, the delisting bias hypothesis, the default risk hypothesis, and the data-snooping hypothesis.

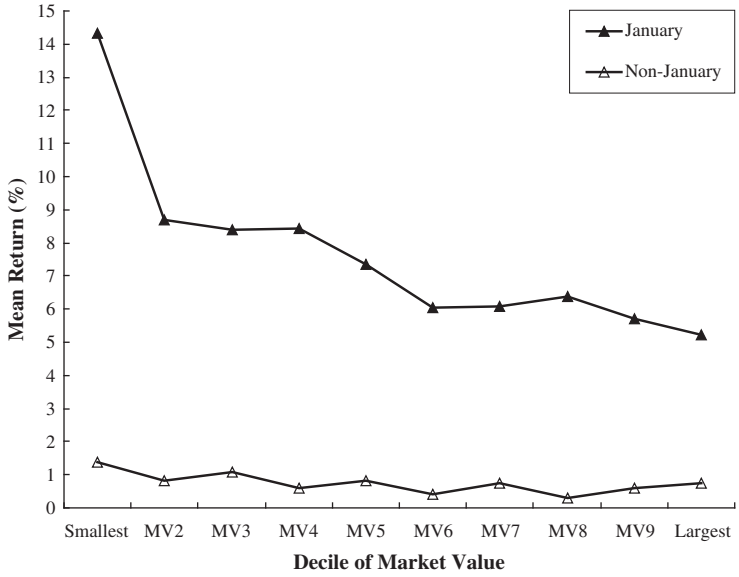

Fig. 1. The mean monthly returns on ten deciles of market value on equity. The lines show the general trend of stock raw returns for Taiwan, particularly in January.

effect), and therefore abnormal returns may be realized by informed investors. However, Elfakhani and Zaher (1998) found that the January size effect exists only for portfolios of large stocks.

2.4. The tax-loss selling hypothesis

This hypothesis, first proposed by Dyl (1977), suggests that investors sell their losing stocks before the year ends in order to obtain the tax savings from deducting these losses from the capital gains realized during the year. The selling pressure in late December is then followed by buying pressure in January. Because only individuals sell stocks for tax purposes, the stocks most affected are the smaller issues that institutions tend to avoid. Although this is the most profound theory to explain the January effect that appears in the literature, the empirical results are still inconclusive.[9] Reinganum (1983) first documented that the January size effect cannot be completely explained by the tax-loss selling hypothesis, and Brown et al. (1983) and Berges et al. (1984) also found similar results in the Australian and Canada markets, respectively.

3. Data and methodology

Following Roll (1981, 1983b) and Blume and Stambaugh (1983), we use monthly returns in this study to avoid the bias inherent in a daily rebalancing strategy from the TEJ database.[10] Taking into account the external validity, the delisted firms are also included in our sample to avoid the potential survivorship bias.[11] The sample period ranges from January 1972 to December 2006 for the Taiwan stock market, due to

[9] See, Brown et al. (1983), Roll (1983a), Jones et al. (1991), Eakins and Sewell (1993), Fant and Peterson (1995), Sias and Starks (1997), Poterba and Weisbenner (2001), and Chen and Singal (2004).

[10] Blume and Stambaugh (1983) indicated that the results for the size effect using daily returns data are statistically biased, and returns with a buy-and-hold strategy largely avoid overstating the magnitude of the size effect. If returns are measured monthly, it will reduce the potential problems associated with nonsynchronous trading.

[11] It is well known that there are potential problems with the use of the COMPUSTAT database. The use of COMPUSTAT data about equity market value induces a survivorship bias, because any given edition of the COMPUSTAT active tapes excludes firms that did not exist at the end of the period covered by that edition. Kothari et al. (1995) argued that the relationship between book-to-market equity and stock return shown in Fama and French (1992) was likely to be influenced by a sample selection bias due to using the COMPUSTAT database.

Table 1
The mean monthly returns on the ten size portfolios for each month.

Size groups	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Non-Jan.
Smallest	14.32	7.08	4.44	2.94	−2.62	−0.14	−1.58	−2.04	−2.60	−0.05	2.10	7.64	1.38
(MV1)	(15.0)	(10.1)	(6.8)	(4.1)	(−4.1)	(−0.2)	(−2.7)	(−3.4)	(−4.2)	(−0.1)	(3.1)	(10.4)	(7.0)
MV2	8.71	5.21	5.29	1.42	−2.90	−1.69	−1.26	−1.79	−2.23	−0.79	1.87	5.98	0.83
	(12.9)	(10.5)	(8.0)	(2.5)	(−5.7)	(−3.8)	(−2.8)	(−3.5)	(−4.3)	(−1.7)	(3.3)	(10.0)	(5.1)
MV3	8.41	5.07	5.02	0.39	−2.25	−1.53	−0.26	−1.69	−2.02	−0.89	3.68	6.44	1.09
	(13.0)	(11.2)	(8.9)	(0.8)	(−4.8)	(−3.4)	(−0.5)	(−3.5)	(−4.0)	(−1.9)	(7.1)	(11.0)	(7.1)
MV4	8.45	5.28	4.02	0.18	−3.37	−2.18	−1.50	−1.49	−2.03	−1.01	2.80	5.74	0.58
	(12.6)	(11.6)	(8.0)	(0.4)	(−7.7)	(−5.0)	(−3.2)	(−3.1)	(−4.0)	(−2.2)	(5.2)	(10.8)	(4.0)
MV5	7.36	4.41	4.32	0.26	−2.01	−1.87	−0.95	−1.02	−2.28	−1.37	3.51	6.00	0.82
	(11.7)	(9.6)	(9.4)	(0.6)	(−4.6)	(−4.5)	(−2.3)	(−2.2)	(−4.9)	(−3.1)	(7.4)	(11.5)	(5.8)
MV6	6.06	3.66	2.87	−0.53	−2.43	−1.59	−0.88	−1.13	−1.58	−1.30	2.79	4.76	0.42
	(10.5)	(8.9)	(6.6)	(−1.2)	(−6.0)	(−4.1)	(−2.1)	(−2.6)	(−3.3)	(−3.0)	(6.3)	(9.7)	(3.2)
MV7	6.09	3.75	3.44	−0.18	−1.32	−1.76	−0.90	−0.82	−1.66	−1.23	3.46	5.50	0.75
	(11.4)	(8.9)	(8.4)	(−0.4)	(−3.3)	(−4.3)	(−2.3)	(−2.0)	(−3.7)	(−2.9)	(8.0)	(10.9)	(5.7)
MV8	6.38	2.62	2.50	−0.80	−1.75	−1.77	−0.52	−0.78	−2.24	−1.42	2.79	4.79	0.31
	(11.2)	(7.0)	(6.1)	(−1.8)	(−4.6)	(−4.8)	(−1.3)	(−1.8)	(−5.4)	(−3.6)	(6.6)	(10.2)	(2.5)
MV9	5.71	2.26	2.33	−0.88	−1.20	−0.68	−0.65	0.10	−1.73	−0.64	2.82	4.81	0.60
	(10.7)	(6.0)	(6.2)	(−2.3)	(−3.4)	(−1.7)	(−1.7)	(0.2)	(−4.5)	(−1.6)	(7.6)	(10.6)	(5.0)
Largest	5.23	2.38	1.05	−0.42	−0.11	0.08	−0.36	0.98	−2.40	−0.84	3.31	4.36	0.73
(MV10)	(11.7)	(6.3)	(3.1)	(−1.0)	(−0.4)	(0.2)	(−0.9)	(2.3)	(−5.8)	(−2.3)	(9.2)	(8.6)	(6.1)
S−L	9.10	4.70	3.39	3.37	−2.51	−0.22	−1.22	−3.02	−0.20	0.79	−1.22	3.28	0.65
	(8.6)	(5.9)	(4.6)	(4.1)	(−3.5)	(−0.3)	(−1.7)	(−4.1)	(−0.3)	(1.2)	(−1.6)	(3.7)	(2.8)

This table shows the descriptive statistics of the entire sample of 132,972 firm-month observations in Taiwan for the period of 1972–2006. The ten market value portfolios were annually constructed based on the firm size, which is defined as the market value of equity at the end of the preceding year. The statistics reported are the average monthly returns as a percentage, and the S−L represents the difference in returns between the smallest and largest firms. The *t*-values relative to zero are shown in parentheses.

data availability. Generally, the cross-sectional regressions are sensitive to outliers, particularly for the returns on individual securities in less developed stock markets. We thus set the top and bottom 1% of observations for returns at the 1st and 99th percentiles to reduce the influence of extreme outliers.

In order to obtain an overall picture of the small firm effect in January, we classify our sample firms into ten portfolios according to their market values at the end of the preceding year. Firms in the top 10% of this ranking comprise the largest firm portfolio, MV10, while firms in the bottom 10% form the smallest firm

Table 2
The empirical analyses of testing the small firm anomaly.

Parameters	January–December (N = 132,972)				January (N = 11,081)				Non-January (N = 121,891)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Intercept	1.6604	1.73	0.0843	0.031	7.5582	2.01	0.0520	0.060	1.1242	1.14	0.2552	0.028
Size	−0.1660	−1.65	0.1003		−0.8280	−2.12	0.0418		−0.1060	−1.02	0.3085	

This table shows the results of investigating the firm size anomaly for firms in Taiwan with the following regression model.

$$(R_{it} - R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

Table 3
The empirical analyses of testing the small firm anomaly in January and non-January for the five volatility portfolios.

Parameters	January ($N=11{,}081$)				Non-January ($N=121{,}891$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The firms with the lowest volatility (RISK1)								
Intercept	0.9343	0.29	0.7729	0.043	−0.1690	−0.15	0.8800	0.06
Size	−0.2290	−0.60	0.5502		0.0977	0.77	0.4410	
Panel B: The firms with RISK2								
Intercept	−3.1220	−0.70	0.4912	0.051	0.9844	0.78	0.4335	0.040
Size	0.4864	0.82	0.4162		−0.0070	−0.05	0.9613	
Panel C: The firms with RISK3								
Intercept	9.8340	2.27	0.0298	0.067	1.5989	1.17	0.2426	0.041
Size	−1.2410	−2.13	0.0401		−0.1820	−1.03	0.3025	
Panel D: The firms with RISK4								
Intercept	20.6490	3.03	0.0046	0.036	1.8642	1.17	0.2429	0.037
Size	−2.6260	−2.41	0.0216		−0.2130	−0.94	0.3460	
Panel E: The firms with the highest volatility (RISK5)								
Intercept	15.6420	3.16	0.0033	0.053	1.3818	0.88	0.3775	0.037
Size	−1.5530	−2.47	0.0186		−0.1580	−0.66	0.5102	

This table shows the results of investigating the firm size anomaly with the following regression model.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

Table 4
The empirical analyses of testing the risk mismeasurement hypothesis for the small firm anomaly in January and non-January.

Parameters	January ($N=11{,}081$)				Non-January ($N=121{,}891$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Intercept	3.0379	1.64	0.1098	0.064	−0.5480	−0.86	0.3886	0.053
Size	−0.5490	−2.53	0.0160		−0.3850	−5.55	0.0001	

This table shows the results of investigating the firm size anomaly with the following regression model.

$$S_i = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the Sharpe measure of each firm defined as the raw stock return on each firm minus the risk-free return and divided by the standard deviation of daily stock returns for a given month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

portfolio, MV1. The remaining firms are placed into eight intermediate portfolios, MV9 through MV2. We repeat this process for each year so that the portfolio rankings can be updated annually. This method has been commonly employed in the literature for exploring this anomaly (Keim, 1983; Reinganum, 1983; Baker and Limmack, 1998; Elfakhani and Zaher, 1998).

Table 5
The empirical analyses of testing the economic cycle hypothesis for the small firm anomaly in January and non-January.

Parameters	January ($N=11{,}081$)				Non-January ($N=121{,}891$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: A market is defined as bullish in the month if the index return was higher than the return of the preceding month								
Intercept	7.9251	1.25	0.2269	0.066	−0.6010	−0.38	0.7048	0.047
Size	−0.9370	−1.54	0.1428		0.0312	0.19	0.8506	
Panel B: A market is defined as bearish in the month if the index return was lower than the return of the preceding month								
Intercept	7.1698	1.76	0.0978	0.054	2.8586	2.45	0.0150	0.035
Size	−0.7130	−1.42	0.1738		−0.2430	−1.96	0.0510	

This table shows the results of investigating the firm size anomaly with the following regression model.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

Table 6
The empirical analyses of testing the small firm anomaly in January and non-January.

Size groups	Risk	January ($N=11{,}081$)				Non-January ($N=121{,}891$)			
		Jensen alpha	*t*-statistic	*p* value	Adj R^2	Jensen alpha	*t*-statistic	*p* value	Adj R^2
Smallest (MV1)	3.1387	8.5189	9.63	0.0001	0.17	0.2449	1.21	0.2256	0.11
MV2	2.7355	3.2144	5.50	0.0001	0.28	−0.0364	−0.23	0.8176	0.19
MV3	2.6370	2.7411	5.02	0.0001	0.32	0.4722	3.25	0.0011	0.24
MV4	2.6447	2.9125	5.03	0.0001	0.28	−0.0431	−0.31	0.7535	0.27
MV5	2.5851	1.7815	3.38	0.0008	0.32	0.1890	1.47	0.1422	0.29
MV6	2.5454	0.6132	1.29	0.1970	0.35	−0.2713	−2.27	0.0234	0.31
MV7	2.6567	0.6492	1.54	0.1243	0.40	0.1791	1.55	0.1221	0.34
MV8	2.5823	0.8892	1.96	0.0498	0.38	−0.3038	−2.76	0.0058	0.35
MV9	2.5471	0.2865	0.69	0.4888	0.43	−0.1161	−1.13	0.2591	0.38
Largest (MV10)	2.4646	−0.1005	−0.30	0.7649	0.47	0.2406	2.45	0.0143	0.43

This table shows the results of investigating the firm size anomaly with the following regression model.

$$\left(R_{it}-R_{ft}\right) = \alpha + \beta * \left(R_{mt}-R_{ft}\right) + \varepsilon_t$$

The dependent variable is the risk premium of each firm defined as the raw stock return on each firm minus the risk-free return for a given month. The explanatory variable is *Market Premium*, defined as the value-weighted return on the market minus the risk-free return for a given month. The intercept is the Jensen alpha which represents the excess monthly return of each portfolio under the market model. Risk is measured by the median volatility for each portfolio, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

In addition, we also employ the Fama and MacBeth (1973) procedure to explore the size effect under different scenarios. The first step is to perform the following cross-sectional regression model[12]:

$$(R_{it} - R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t \quad (1)$$

[12] We employ this simple regression model because previous research indicates that there is no reliable relation between average returns and beta (Fama and French, 1992; Chui and Wei, 1998). This model is similar to that in De Groot and Verschoor (2002), but they did not adjust for the market return.

where R_{it} is the monthly return of firm i at month t, and R_{mt} is the value-weighted market return at month t. $R_{it} - R_{mt}$ represents the excess returns. *Size* is defined as the logarithm of the ith firm's market value at the end of the preceding year. The next step is to calculate the time-series means of the monthly regression slopes, and then provide standard tests of whether the size anomaly in January exists.

In order to explore whether the puzzle of size effect in January can be explained by the culture bonus hypothesis, we further partition our data into five sub-samples based on the volatility of the security at the end of the preceding year, where RISK5 represents a portfolio of the top 20% most volatile firms, and RISK1 represents a portfolio of the bottom 20% least volatile firms. The remaining firms are placed into three intermediate portfolios, RISK4 through RISK2. To test this hypothesis, we use the standard deviation of daily stock returns in the preceding year as a proxy for stock risk. We hypothesize that not all small firms, but only those judged as high risk, can experience significant excess returns in January. Accordingly, we expect that only the smaller firms with higher volatility will outperform the larger ones in January in a stock market that is mainly dominated by individual investors, who would become less risk averse once rewarded with a bonus before Lunar New Year. Finally, several robustness tests and other hypotheses are also employed and examined to strengthen the empirical results.

4. Empirical results and analyses

Fig. 1 shows the average monthly raw returns in January and non-January months for ten size-related portfolios in the Taiwanese stock market. It can be seen that there is an apparent small firm anomaly in January. The descriptive statistics of the ten portfolios for the twelve months are provided in Table 1. It shows an apparent small firm anomaly in January, with a mean return of 14.32% for the smallest portfolio and 5.23% for the largest portfolio. Moreover, the last row shows a significant small firm effect in January for Taiwan (with a t-statistic of 8.6 in January and 2.8 in non-January months).

Table 2 presents the time-series means of the slopes from the month-by-month Fama–MacBeth cross-sectional regressions of the excess returns on firm size. It indicates that Taiwan exhibits a significant small firm effect in January (with a t-statistic of −2.12 in January and −1.02 in non-January months). This paper not only reexamines the existence of the size effect in January, but also develops a testable explanation from behavioral finance, namely the culture bonus hypothesis. Table 3 reports the empirical results of performing the Fama–MacBeth procedure to test the size effect in January and non-January for the five volatility portfolios. If the individual investors become less risk averse with the receipt of their bonuses before Lunar New Year, then the demand for high risk stocks should increase. Generally, the smaller firms have higher risk than larger firms, so the demand for the smaller stocks, especially with high risk, will increase. We thus expect that the estimated coefficient of α_1 should be negatively significant for the higher volatility firms, and insignificant for the lower volatility firms in January and the firms in non-January months for Taiwan's stock market, if the hypothesis holds.

For January, the empirical results show that α_1 is −0.229% with a t-statistic of −0.6 for RISK1 (the lowest volatility firms portfolio), 0.4864% with a t-statistic of 0.82 for RISK2, −1.241% with a t-statistic of −2.13 for RISK3, −2.626% with a t-statistic of −2.41 in RISK4, and −1.553% with a t-statistic of −2.47 for RISK5 (the highest volatility firms portfolio). As expected, only the coefficients of RISK3 to 5 are significant at a 5% level. For the non-January months, the empirical results indicate that the estimated coefficients of α_1 are all insignificant. Evidently it is not all small firms that experience higher returns than large ones in January, but only those with higher volatility. This finding has important economic implications for investors who attempt to take advantage of this phenomenon.

For completeness, we utilize our research method to also test the mismeasurement and the economic cycle hypotheses. We do not test the tax-loss selling hypothesis, because no tax is imposed on capital gains from security trading in Taiwan, and nor do we test the different information hypothesis, because there is no such information system as the Institutional Brokers Estimate System Tape (IBES) for Taiwan. In short, the tax-loss selling hypothesis and the different information hypothesis should not be the major causes of the size effect in January for the Taiwanese stock market.

Table 7
The empirical analyses of testing the small firm anomaly in January and non-January for the five volatility portfolios.

Size groups	January ($N=11,081$)				Non-January ($N=121,891$)			
	Jensen alpha	*t*-statistic	*p* value	Adj R^2	Jensen alpha	*t*-statistic	*p* value	Adj R^2
Panel A: The firms with the lowest volatility (RISK1)								
Smallest (MV1)	2.7884	1.07	0.2878	0.17	−0.3254	−0.54	0.5911	0.09
MV2	1.0419	0.82	0.4154	0.13	0.0873	0.26	0.7984	0.14
MV3	−0.8618	−1.03	0.3023	0.29	0.3052	1.11	0.2679	0.20
MV4	0.6219	0.55	0.5812	0.16	−0.6989	−2.85	0.0045	0.19
MV5	−0.4711	−0.59	0.5534	0.28	0.0069	0.03	0.9770	0.26
MV6	−1.6181	−1.85	0.0660	0.21	−0.7491	−3.46	0.0005	0.23
MV7	−0.6554	−0.94	0.3465	0.30	−0.3946	−1.95	0.0507	0.33
MV8	−2.4650	−4.94	0.0001	0.39	−0.5289	−3.16	0.0016	0.34
MV9	−1.7911	−3.32	0.0010	0.38	−0.2907	−1.73	0.0829	0.43
Largest (MV10)	−1.2022	−2.44	0.0150	0.47	−0.2501	−1.77	0.0762	0.49
Panel B: The firms with RISK2								
Smallest (MV1)	3.5445	2.24	0.0269	0.32	0.2542	0.59	0.5521	0.17
MV2	0.5912	0.56	0.5780	0.30	0.3065	0.92	0.3559	0.16
MV3	−0.1414	−0.16	0.8701	0.34	−0.0836	−0.30	0.7615	0.22
MV4	−0.2285	−0.35	0.7261	0.40	0.0504	0.19	0.8478	0.27
MV5	−0.0379	−0.04	0.9656	0.31	−0.0886	−0.38	0.7037	0.29
MV6	−1.2701	−1.69	0.0929	0.39	0.0912	0.41	0.6855	0.37
MV7	0.0374	0.05	0.9630	0.38	0.3877	1.69	0.0918	0.35
MV8	1.0855	1.32	0.1894	0.38	0.0691	0.30	0.7616	0.38
MV9	−0.3162	−0.43	0.6683	0.45	−0.1941	−0.98	0.3275	0.42
Largest (MV10)	−0.0955	−0.16	0.8757	0.53	0.1386	0.80	0.4209	0.49
Panel C: The firms with RISK3								
Smallest (MV1)	4.1126	2.74	0.0068	0.21	−0.1173	−0.27	0.7886	0.10
MV2	3.8386	3.01	0.0029	0.28	−0.7248	−2.25	0.0243	0.18
MV3	2.6867	2.61	0.0096	0.38	0.5689	1.81	0.0702	0.25
MV4	1.9910	1.57	0.1183	0.29	−0.0714	−0.25	0.8037	0.31
MV5	1.0972	1.09	0.2788	0.39	−0.3446	−1.23	0.2201	0.27
MV6	0.7240	0.82	0.4124	0.45	−0.0106	−0.04	0.9692	0.32
MV7	−0.3917	−0.46	0.6458	0.38	0.3763	1.62	0.1050	0.38
MV8	−0.2294	−0.28	0.7829	0.42	−0.3523	−1.44	0.1511	0.39
MV9	0.2386	0.29	0.7738	0.54	−0.5752	−2.67	0.0076	0.38
Largest (MV10)	−0.9513	−1.20	0.2315	0.50	0.2153	0.99	0.3245	0.41
Panel D: The firms with RISK4								
Smallest (MV1)	6.2632	4.96	0.0001	0.23	0.7542	1.98	0.0474	0.16
MV2	4.2790	3.60	0.0004	0.31	0.0759	0.23	0.8199	0.26
MV3	4.5169	3.27	0.0012	0.29	0.0730	2.27	0.0235	0.30
MV4	4.7390	4.23	0.0001	0.41	0.1287	0.45	0.6561	0.30
MV5	3.5686	2.86	0.0046	0.41	0.7223	2.36	0.0186	0.31
MV6	2.6689	2.31	0.0218	0.51	−0.3189	−1.10	0.2702	0.34
MV7	2.0229	2.09	0.0376	0.51	0.6808	2.42	0.0157	0.35
MV8	1.1080	0.99	0.3230	0.45	−0.6202	−2.43	0.0151	0.34
MV9	0.5195	0.46	0.6471	0.46	0.9142	3.33	0.0009	0.34
Largest (MV10)	−0.4301	−0.45	0.6538	0.49	0.9652	2.91	0.0037	0.39
Panel E: The firms with the highest volatility (RISK5)								
Smallest (MV1)	14.3211	7.93	0.0001	0.17	0.1599	0.43	0.6688	0.08
MV2	6.5849	4.36	0.0001	0.37	−0.2191	−0.54	0.5905	0.18
MV3	8.2586	4.94	0.0001	0.40	0.6226	1.44	0.1487	0.22
MV4	7.8997	3.78	0.0002	0.25	0.2408	0.54	0.5903	0.25
MV5	6.0415	3.02	0.0030	0.30	0.8634	2.09	0.0363	0.32
MV6	5.6906	3.06	0.0026	0.28	−0.2923	−0.76	0.4502	0.29
MV7	4.2879	3.08	0.0025	0.50	−0.1951	−0.51	0.6125	0.32
MV8	6.4172	3.43	0.0008	042	0.3519	0.88	0.3796	0.36
MV9	4.2755	2.46	0.0152	0.46	0.3316	0.84	0.4009	0.36
Largest (MV10)	6.3668	3.52	0.0007	0.20	2.5666	4.91	0.0001	0.44

Table 8
The empirical analyses of testing the small firm anomaly in January and non-January under different bonus payment times.

Parameters	January ($N=11{,}081$)				Non-January ($N=121{,}891$)			
	Parameter estimate	t-statistic	p value	Adj R^2	Parameter estimate	t-statistic	p value	Adj R^2
Panel A: The sub-period in which the bonuses were paid in January								
Intercept	10.1900	2.13	0.0435	0.069	1.7819	1.48	0.1391	0.040
Size	−1.1560	−2.34	0.0282		−0.1800	−1.45	0.1484	
Panel B: The sub-period in which the bonuses were paid in February								
Intercept	0.9779	0.19	0.8549	0.037	−0.5200	−0.31	0.7606	0.043
Size	−0.0100	−0.02	0.9855		0.0796	0.42	0.6718	

This table shows the results of investigating the firm size anomaly under two sub-periods in which the bonus payments were in January or February, with the following regression model.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The t-statistic is the average coefficient divided by its time-series standard error, and N denotes the number of firm-month observations for the period from 1972 to 2006.

Table 4 reports the empirical results of testing the risk mismeasurement hypothesis. If this hypothesis works, the size effect in January is expected to disappear when the stock returns are adjusted for individual risk. We follow Rathinasamy and Mantripragada (1996) by using the Sharpe measure as the risk-adjusted return. The coefficient of firm size shown in Table 4 is −0.549% with a t-statistic of −2.53 in January and −0.385% with a t-statistic of −5.55 in non-January months. Both are significant at the 5 and 1% levels, respectively. The t-statistic in non-January is more significant than in January, and this could be attributed to the asymmetry of sample number between January and non-January, which in turn induces a smaller standard deviation and higher t value. Larger sample size tends to induce a smaller standard deviation and higher t value, as suggested by Leamer (1978). In addition, the Sharpe measure in Table 4 is adjusted by individual risk, whereas the excess return in Tables 2 and 3 is adjusted by market return. Based on the fact that the market risk is undiversifiable, examining market-adjusted excess return should be a reasonable approach to explore stock behavior. It is evident that the small firm anomaly in January for Taiwan cannot be explained by the risk mismeasurement hypothesis.

Table 5 presents the results of testing the economic cycle hypothesis. Taking into account the economic cycle, as presented in Kim and Burnie (2002), we define the market as bullish/bearish if the return is higher/lower than the preceding month. If the size effect in January is related to the economic cycle, the anomaly should be more apparent in a bullish than bearish market. For January, Panel A shows that the α_1 is −0.937% with a t-statistic of −1.54 in a bullish market, while Panel B shows that α_1 is −0.713% with a t-statistic of −1.42 in a bearish one. The estimates of α_1 are both insignificant. For non-January months,

Notes to Table 7:
This table shows the results of investigating the firm size anomaly for Taiwanese firms over the period 1972–2006 with the following regression model.

$$\left(R_{it}-R_{ft}\right) = \alpha + \beta * \left(R_{mt}-R_{ft}\right) + \varepsilon_t$$

The dependent variable is the risk premium of each firm defined as the raw stock return on each firm minus the risk-free return for a given month. The explanatory variable is *Market Premium*, defined as the value-weighted return on the market minus the risk-free return for a given month. The intercept is the Jensen alpha, which represents the excess monthly return of each portfolio under the market model, and N denotes the number of firm-month observations for the period from 1972 to 2006.

Table 9
The empirical analyses of testing the small firm anomaly in January and non-January for the five volatility portfolios under different bonus payment times.

Parameters	January ($N=11,081$)				Non-January ($N=121,891$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-period in which the bonuses were paid in January								
Panel A1: The firms with the lowest volatility (RISK1)								
Intercept	−1.5120	−0.39	0.7022	0.045	0.2943	0.23	0.8194	0.054
Size	−0.0160	−0.03	0.9736		0.0019	0.01	0.9895	
Panel A2: The firms with RISK2								
Intercept	−3.3080	−0.55	0.5853	0.073	1.8012	1.16	0.2479	0.046
Size	0.4764	0.61	0.5502		−0.1390	−0.80	0.4252	
Panel A3: The firms with RISK3								
Intercept	9.7615	2.56	0.0172	0.050	2.2540	1.45	0.1472	0.046
Size	−1.1800	−2.66	0.0137		−0.2730	−1.46	0.1467	
Panel A4: The firms with RISK4								
Intercept	25.9170	2.88	0.0082	0.027	2.7188	1.35	0.1775	0.033
Size	−3.3020	−2.25	0.0339		−0.3080	−1.06	0.2887	
Panel A5: The firms with the highest volatility (RISK5)								
Intercept	21.2620	3.51	0.0018		1.6062	0.87	0.3827	0.040
Size	−2.0530	−2.59	0.0160	0.055	−0.1320	−0.45	0.6511	
Panel B: The sub-period in which the bonuses were paid in February								
Panel B1: The firms with the lowest volatility (RISK1)								
Intercept	7.0510	1.31	0.2211	0.040	−1.3270	−0.59	0.5534	0.082
Size	−0.7620	−1.41	0.1912		0.3371	1.29	0.2005	
Panel B2: The firms with RISK2								
Intercept	−2.6590	−0.50	0.6258	0.003	−1.0580	−0.52	0.6060	0.015
Size	0.5114	0.72	0.4872		0.3235	1.15	0.2507	
Panel B3: The firms with RISK3								
Intercept	10.0150	0.81	0.4368	0.110	−0.0390	−0.01	0.9889	0.020
Size	−1.3940	−0.78	0.4527		0.0469	0.12	0.9068	
Panel B4: The firms with RISK4								
Intercept	7.4783	1.10	0.2997	0.057	−0.2720	−0.11	0.9105	0.047
Size	−0.9370	−0.97	0.3570		0.0272	0.09	0.9301	
Panel B5: The firms with the highest volatility (RISK5)								
Intercept	1.5923	0.23	0.8244	0.049	0.8208	0.27	0.7843	0.027
Size	−0.3040	−0.34	0.7409		−0.2220	−0.53	0.5940	

This table shows the regression results of investigating the firm size anomaly under two sub-periods in which the bonus payments were in January or February.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

firm size is still insignificant at a 5% level in a bullish or bearish market.[13] Thus, the economic cycle hypothesis also fails to explain the size effect in January for Taiwan.

For robustness purposes, we perform several sensitivity tests. First, the proxy of stock risk is considered by the beta, Altman's *Z*-score, and financial leverage, instead of volatility. Second, the daily log returns are summed to yield the monthly returns instead of using monthly return data. The empirical results are still consistent, even if taking into account the proxy of risk and the data frequency. In addition, we utilize the estimates of Jensen alpha as the proxy of the excess return, and report the results in Tables 6 and 7.

[13] The *t*-statistic on firm size in non-January for bearish market periods is very close to significance at the 5% level. This could be due to the behavioral bias of the disposition effect for individual investors (Shefrin and Statman, 1985; Odean, 1998; Shu et al., 2005). Thus, small stocks owned mainly by individuals tend to have higher average returns than large stocks held by institutions in bearish markets.

Table 10
The empirical analyses of testing the small firm anomaly in January and non-January under different market growth directions.

Parameters	January ($N = 10{,}581$)				Non-January ($N = 116{,}391$)			
	Parameter estimate	t-statistic	p value	Adj R^2	Parameter estimate	t-statistic	p value	Adj R^2
Panel A: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was higher than the year before last								
Intercept	14.0850	3.51	0.0023	0.057	−0.3650	−0.30	0.7661	0.035
Size	−1.4520	−3.57	0.0020		0.0624	0.53	0.5969	
Panel B: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was lower than the year before last								
Intercept	−3.8050	−0.23	0.8281	0.096	2.4215	0.61	0.5449	0.036
Size	0.1903	0.13	0.9056		−0.1480	−0.37	0.7124	

This table shows the results of investigating the firm size anomaly under two sub-periods in which the sum of earnings before tax per employee of all firms in the preceding year was higher or lower than the year before last, with the following regression model.

$$(R_{it} - R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The t-statistic is the average coefficient divided by its time-series standard error, and N denotes the number of firm-month observations for the period from 1982 to 2006 due to the availability of the earnings data.

Table 6 shows that the Jensen alpha of the smallest firm portfolio is 8.5189% with a t-statistic of 9.63 for January, which is significant at a 1% level. The Jensen alpha appears to decrease as the firm size increases, and becomes insignificant once the firm size is greater than MV5. It is thus evident that the small firms experience a higher excess monthly return in January. For non-January months, the Jensen alpha does not exhibit any systematic pattern. The results are consistent with Table 2 in showing that the small firm effect in January exists in Taiwan. Moreover, Table 6 also reports that the smallest and largest firm portfolios have the highest and lowest risk, which is 3.1387% and 2.4646%, respectively. The risk tends to decline as the firm size increases, which suggests that smaller firms have higher risk.

Table 7 further presents the results of using Jensen alpha to measure the excess return for ten size portfolios with different volatilities for Taiwan. The Jensen alpha of the smallest portfolio (MV1) is 2.7884% with a t-statistic of 1.07 in Panel A, 3.5445% with a t-statistic of 2.24 in Panel B, 4.1126% with a t-statistic of 2.74 in Panel C, 6.2632% with a t-statistic of 4.96 in Panel D, and 14.3211% with a t-statistic of 7.93 in Panel E for January. As expected, the coefficients are almost all significant at a 1% level for the smallest firms, particularly for the sub-sample with the highest volatility (RISK5). In addition, the excess return appears to decrease as the firm size increases. For non-January months, there is no systematic pattern for the excess returns in Panels A to E, and these results are consistent with Table 3.

To enhance the internal validity of the culture bonus hypothesis, this paper further takes into account the time and magnitude of the bonus payments, respectively. First, the Chinese Lunar New Year is at different times in the Western calendar, in either January or February. In practice, government employees and teachers are paid bonuses on the tenth day before Lunar New Year in Taiwan. In addition, most Taiwanese firms also reward employees with bonuses during the period of the seventh to the fourteenth day before Lunar New Year. Thus, we assume that the tenth day before Lunar New Year is the bonus payment date, and divide our sample into two sub-periods in which the bonus payments were in January and February, respectively. Under the culture bonus hypothesis, the size effect in January should be more apparent for the sub-period when the bonus payments were in January than for the sub-period when the bonus payments were in February for Taiwan. On the other hand, the magnitude of the bonus payments should also have an impact on the small firm anomaly in January for Taiwan. In practice, enterprises reward their employees with bonuses according to their performance in the preceding year, though we cannot obtain the detailed data for individual incomes in Taiwan. Generally, employees receive a larger bonus when their firm has positive performance growth, while they may receive less or even no bonus when there is negative performance growth. We thus assume that earnings before tax is the performance index

and control for the number of the firms and their employees in each firm, and then divide our sample into two sub-periods in which the sum of the earnings before tax per employee of all firms in the preceding year was higher and lower than the year before last, respectively. Under the culture bonus hypothesis, the size effect in January should be more apparent for the sub-period in which the total earnings before tax of the whole market has positive growth in the preceding year than for the sub-period in which the growth of earnings before tax of the whole market was negative. These results are reported in Tables 8–11.

Table 8 indicates the results for different bonus payment times. Panel A shows that the coefficient of firm size in January is −1.156% with a *t*-statistic of −2.34 for the sub-period in which the bonuses were paid in January, which is significant at a 5% level, and is lower than the coefficient (−0.828%) shown in Table 2, as anticipated. Also, as expected, the coefficient of firm size in January for the sub-period in which

Table 11
The empirical analyses of testing the small firm anomaly in January and non-January for the five volatility portfolios under different market growth directions.

Parameters	January (N = 10,581)				Non-January (N = 116,391)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was higher than the year before last								
Panel A1: The firms with the lowest volatility (RISK1)								
Intercept	5.1325	1.50	0.1503	0.040	0.1505	0.11	0.9124	0.062
Size	−0.6860	−2.03	0.0563		0.0307	0.22	0.8231	
Panel A2: The firms with RISK2								
Intercept	4.9482	1.26	0.2233	0.038	0.7475	0.47	0.6388	0.026
Size	−0.5710	−1.43	0.1685		−0.0520	−0.32	0.7477	
Panel A3: The firms with RISK3								
Intercept	12.2540	3.31	0.0037	0.039	0.3057	0.20	0.8455	0.033
Size	−1.3250	−3.46	0.0026		−0.0570	−0.35	0.7265	
Panel A4: The firms with RISK4								
Intercept	16.2220	3.30	0.0038	0.025	0.0604	0.04	0.9703	0.054
Size	−1.5410	−2.85	0.0103		−0.0330	−0.19	0.8512	
Panel A5: The firms with the highest volatility (RISK5)								
Intercept	19.6110	2.73	0.0134	0.082	0.3844	0.21	0.8338	0.032
Size	−1.7520	−2.16	0.0441		−0.0400	−0.18	0.8578	
Panel B: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was lower than the year before last								
Panel B1: The firms with the lowest volatility (RISK1)								
Intercept	−3.5390	−0.30	0.7814	0.058	−1.6380	−0.42	0.6768	0.003
Size	0.3233	0.27	0.7979		0.3155	0.85	0.3999	
Panel B2: The firms with RISK2								
Intercept	−5.3070	−0.37	0.7330	0.023	3.2869	0.82	0.4163	0.004
Size	0.2653	0.20	0.8531		−0.2730	−0.68	0.4983	
Panel B3: The firms with RISK3								
Intercept	2.7831	0.17	0.8710	0.112	0.8570	0.22	0.8273	0.006
Size	−0.1270	−0.06	0.9556		0.0458	0.10	0.9229	
Panel B4: The firms with RISK4								
Intercept	7.0629	2.07	0.1070	0.020	5.6514	1.30	0.2004	0.004
Size	−0.4120	−0.71	0.5177		−0.5790	−1.05	0.2977	
Panel B5: The firms with the highest volatility (RISK5)								
Intercept	12.6600	2.05	0.1091	0.030	0.6221	0.12	0.9011	0.008
Size	−1.5700	−1.69	0.1661		−0.0380	−0.06	0.9563	

This table shows the regression results of investigating the firm size anomaly under two sub-periods in which the sum of earnings before tax per employee of all firms in the preceding year was higher or lower than the year before last.

$$(R_{it} - R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1982 to 2006 due to the availability of the earnings data.

the bonuses were paid in February, which is −0.01% with a *t*-statistic of −0.02, is insignificant, as shown in Panel B. For non-January months, the coefficients in Panels A and B are also insignificant.

Table 9 further reports the results for five risk portfolios under different bonus payment times in which the bonuses were paid in January or February. It is evident that only the coefficients of firm size for RISK3 to 5 portfolios in January are significantly negative at a 5% level in the sub-period in which the bonuses were paid in January. Notably, the coefficients for RISK4 and 5 in January, which are −3.302% and −2.053%, are also lower than those in Table 3, which are −2.626% and −1.553%, respectively. As expected, the coefficients for the non-January months and the sub-period in which the bonuses were paid in February are all insignificant.

In addition, we employ the directions of market growth to test the impact of different sizes of bonus payment on the size effect in January. Table 10 indicates the results for different magnitudes of bonus payment, which was assumed to change along with the market growth based on earnings before tax in the preceding year. The results for Taiwan show that the coefficient of firm size in January is −1.452%, with a *t*-statistic of −3.57 for the sub-period in which the earnings before tax growth of the whole market was positive, which is significant at a 1% level, as shown in Panel A, and is lower than the coefficient for the sub-period in which the growth was negative, which is 0.1903% with a *t*-statistic of 0.13, as shown in Panel B. For non-January months, the coefficients in Panels A and B are also insignificant.

Table 11 further reports the results of the five risk portfolios with regard to different directions of market growth in Taiwan. Panels A and B represent the sub-period in which the earnings before tax growth of the whole market was positive and negative in the preceding year, respectively. Panel A shows that the coefficients for higher risk portfolios in January are significantly negative at a 1 or 5% level, and insignificant in non-January months for the sub-period in which the market growth was positive. As expected, the coefficients of firm size are insignificant for the sub-period in which the market growth was negative. Notably, the coefficient for RISK5 in January in Panel A, which is −1.752% with a *t*-statistic of −2.16, is lower than that in Panel B, which is −1.57% with a *t*-statistic of −1.69. Evidently, the results in Tables 10 and 11 are also consistent with those in Tables 2 and 3, and exhibit similarly important evidence of the relationship between the culture bonus and size effect in January for Taiwan. Moreover, when the operating revenue is defined as the performance index, instead of the earnings before tax, the results are all still consistent.

On the other hand, we switch the perspective from a macro view to a micro view, and thus explore whether the size effect in January for Taiwan is different for firms with positive and negative growth. For this purpose, we divide our sample into two sub-samples based on whether the amount and growth rate of earnings before tax of individual firms in the preceding year were both positive or not. Generally, the firms

Table 12
The empirical analyses of testing the small firm anomaly in January and non-January under different firm growth directions.

Parameters	January (N = 10,581)				Non-January (N = 116,391)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-sample in which the amount and growth rate of earnings before tax were both positive in the preceding year								
Intercept	11.7250	2.41	0.0262	0.044	3.0322	1.78	0.0767	0.039
Size	−1.3110	−2.90	0.0092		−0.2960	−1.78	0.0759	
Panel B: The sub-sample in which the amount and growth rate of earnings before tax were not both positive in the preceding year								
Intercept	13.4130	1.65	0.1155	0.065	3.2598	1.63	0.1052	0.037
Size	−1.4620	−1.84	0.0812		−0.3690	−1.87	0.0631	

This table shows the results of investigating the firm size anomaly under two sub-samples in which whether the amount and growth rate of earnings before tax were both positive or not in the preceding year, with the following regression model.

$$(R_{it} - R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1982 to 2006 due to the availability of the earnings data.

with positive growth are more attractive to investors, and thus the size effect in January should be more apparent for the sub-sample with both positive earnings amount and growth in the preceding year for Taiwan. Table 12 shows the results are consistent with our expectations. In addition, after taking into account the volatility of firms, the findings are all still consistent, as shown in Table 13.

To better understand the size effect in January, we further investigate whether this anomaly has weakened over the 1972–2006 period. Taking into account the liberalization of capital controls from the early 1990s onwards, and the fact that the Taiwanese stock market is much more international now than it was in the 1970s or 1980s, we divide our sample into two sub-periods: the 1972–1989 period with the economic stream of traditional industries and the 1990–2006 period with the economic stream of high-technology industries, and use both of these for robustness checks. The results are reported in Tables 14–17. Generally speaking, per capita income increases over time and a system of bonus payments is very common in high-technology

Table 13
The empirical analyses of testing the small firm anomaly in January and non-January for the five volatility portfolios under different firm growth directions.

Parameters	January ($N=10{,}581$)				Non-January ($N=116{,}391$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-sample in which the amount and growth rate of earnings before tax were both positive in the preceding year								
Panel A1: The firms with the lowest volatility (RISK1)								
Intercept	6.6833	1.18	0.2508	0.042	3.2257	1.35	0.1780	0.053
Size	−0.9960	−1.71	0.1045		−0.3000	−1.31	0.1917	
Panel A2: The firms with RISK2								
Intercept	4.7921	0.85	0.4084	0.036	3.1308	1.56	0.1205	0.045
Size	−0.6380	−1.16	0.2597		−0.3150	−1.52	0.1297	
Panel A3: The firms with RISK3								
Intercept	12.8280	3.98	0.0008	0.016	0.2306	0.08	0.9333	0.052
Size	−1.4200	−4.09	0.0006		−0.0460	−0.16	0.8763	
Panel A4: The firms with RISK4								
Intercept	21.3140	2.62	0.0170	0.085	11.6790	3.21	0.0015	0.046
Size	−2.2350	−2.23	0.0382		−1.3150	−3.33	0.0010	
Panel A5: The firms with the highest volatility (RISK5)								
Intercept	25.8820	3.01	0.0073	0.040	8.5977	1.59	0.1137	0.076
Size	−2.5850	−2.48	0.0229		−0.8880	−1.51	0.1313	
Panel B: The sub-sample in which the amount and growth rate of earnings before tax were not both positive in the preceding year								
Panel B1: The firms with the lowest volatility (RISK1)								
Intercept	5.0665	0.91	0.3718	0.055	0.1891	0.09	0.9280	0.018
Size	−0.7450	−1.18	0.2515		−0.0100	−0.04	0.9645	
Panel B2: The firms with RISK2								
Intercept	−4.6700	−0.25	0.8055	0.015	3.4491	1.69	0.0922	0.008
Size	0.3468	0.19	0.8528		−0.3760	−1.83	0.0688	
Panel B3: The firms with RISK3								
Intercept	11.6400	1.53	0.1420	0.091	1.2978	0.47	0.6384	0.022
Size	−0.8790	−1.10	0.2850		−0.1350	−0.44	0.6588	
Panel B4: The firms with RISK4								
Intercept	18.7840	2.23	0.0376	0.013	3.8496	1.44	0.1506	0.022
Size	−1.7610	−1.95	0.0661		−0.4570	−1.48	0.1401	
Panel B5: The firms with the highest volatility (RISK5)								
Intercept	28.3510	1.99	0.0611	0.089	4.9915	1.35	0.1793	0.042
Size	−2.3530	−1.26	0.2214		−0.4920	−1.05	0.2943	

This table shows the regression results of investigating the firm size anomaly under two sub-samples in which whether the amount and growth rate of earnings before tax were both positive or not in the preceding year.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1982 to 2006 due to the availability of the earnings data.

Table 14
The empirical analyses of testing the small firm anomaly in January and non-January under different calendar year periods.

Parameters	January ($N=11,081$)				Non-January ($N=121,891$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-period for 1972–1989								
Intercept	4.6020	0.94	0.3626	0.073	2.2547	1.56	0.1192	0.049
Size	−0.5930	−0.96	0.3504		−0.2180	−1.30	0.1935	
Panel B: The sub-period for 1990–2006								
Intercept	14.3530	2.01	0.0611	0.045	0.6509	0.40	0.6878	0.006
Size	−1.4700	−2.25	0.0386		−0.0600	−0.40	0.6893	

This table shows the results of investigating the firm size anomaly under two calendar year sub-periods, with the following regression model.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

industries in the later period of our sample. Consequently, it can be logically induced from our earlier arguments that the small firm anomaly in January may be more apparent over the period of 1990–2006.

Panel A of Table 14 shows that there was no size effect in January for the period of 1972–1989; while Panel B shows the existence of size effect in January for the period of 1990–2006. Table 15 also shows that the size effect in January is apparent for the period of 1990–2006, especially for firms with higher risk, implying that the role that the bonus culture plays in the size effect is important after the 1990s.

Table 16 presents the results of two sub-periods in which the bonus payments were made in January or February for 1972–1989 and 1990–2006, respectively. As expected, Panel A shows that the coefficients of firm size are significant in January for RISK3 to 5 portfolios over the 1990–2006 period when the bonuses were paid in January, while Panel B shows that there was no size effect in January when the bonuses were paid in February.

Table 17 provides robustness checks about the impact of bonus size on the size effect in January. Panel A reports the sample years when the firms made more profit than the preceding ones, and shows that the size effect in January exists for RISK3 to 5 portfolios for 1990–2006 only, with no evidence for it in the 1982–1989 period. Moreover, Panel B shows no size effect in January over these two sub-periods when firms made less profit than the preceding years. Evidently, the results in Tables 14–17 tend to support those in the previous tables.

Finally, the turn-of-the-year effect (or Western New Year effect) has also been documented. For example, Keim (1983) found that most of the January effect occurs during the first days of January. Under Chinese tradition, bonuses are paid before the Lunar New Year, generally between the later weeks of January and the first weeks of February. Consequently, we predict that the small firm anomaly in January should be more apparent in the later weeks of January, and not in the first week. The results are reported in Tables 18–20. As expected, the small firm anomaly exists in other weeks closer to the Lunar New Year in January, especially for the sub-periods in which the bonuses were paid in January and in which the market performance index was positive. The findings are robust to those in Tables 2, 8 and 10, and demonstrate that the cultural tradition of giving employees a generous bonus in profitable years is a crucial factor with regard to the small firm anomaly in January for the Taiwanese stock market.

5. Conclusions

The small firm anomaly in January has been examined extensively for several decades and still puzzles researchers as well as practitioners. This paper attempts to explore this issue in an emerging stock market of mainly individual investors with a Chinese cultural orientation from the perspective of behavioral

Table 15
The empirical analyses of testing the small firm anomaly in January and non-January for the five volatility portfolios under different calendar year periods.

Parameters	January ($N=11,081$)				Non-January ($N=121,891$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-period for 1972–1989								
Panel A1: The firms with the lowest volatility (RISK1)								
Intercept	−2.1930	−0.51	0.6199	0.044	0.0689	0.04	0.9665	0.014
Size	0.0976	0.16	0.8725		0.1213	0.58	0.5653	
Panel A2: The firms with RISK2								
Intercept	−6.7840	−0.95	0.3558	0.086	0.5569	0.31	0.7536	0.019
Size	1.0224	0.97	0.3470		0.1181	0.50	0.6211	
Panel A3: The firms with RISK3								
Intercept	7.2412	0.96	0.3493	0.107	3.6389	1.52	0.1292	0.044
Size	−1.1600	−1.07	0.2979		−0.3960	−1.21	0.2266	
Panel A4: The firms with RISK4								
Intercept	25.1030	1.85	0.0821	0.041	3.0227	1.13	0.2605	0.007
Size	−3.6760	−1.67	0.1135		−0.3280	−0.80	0.4218	
Panel A5: The firms with the highest volatility (RISK5)								
Intercept	9.9419	1.37	0.1873	0.043	2.8013	1.02	0.3100	0.019
Size	−1.2630	−1.28	0.2193		−0.2850	−0.64	0.5231	
Panel B: The sub-period for 1990–2006								
Panel B1: The firms with the lowest volatility (RISK1)								
Intercept	6.0653	1.12	0.2773	0.042	0.1549	0.09	0.9296	0.109
Size	−0.7560	−1.44	0.1683		0.0120	0.07	0.9408	
Panel B2: The firms with RISK2								
Intercept	1.0495	0.19	0.8513	0.014	1.7228	0.89	0.3746	0.062
Size	−0.1100	−0.22	0.8257		−0.1660	−0.88	0.3777	
Panel B3: The firms with RISK3								
Intercept	14.0100	2.93	0.0097	0.025	0.5041	0.29	0.7709	0.038
Size	−1.4600	−3.16	0.0061		−0.0750	−0.43	0.6681	
Panel B4: The firms with RISK4								
Intercept	21.6140	3.76	0.0017	0.031	0.7108	0.37	0.7151	0.069
Size	−2.2160	−3.85	0.0014		−0.0830	−0.41	0.6836	
Panel B5: The firms with the highest volatility (RISK5)								
Intercept	31.8870	2.71	0.0156	0.064	0.1491	0.58	0.5598	0.056
Size	−2.9790	−2.37	0.0307		−0.1620	−0.74	0.4602	

This table shows the regression results of investigating the firm size anomaly under two calendar year sub-periods.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 2006.

finance. As stated by Kim and Nofsinger (2008), the topic of behavioral finance in Asia is important and interesting, and will be useful in understanding the cognizance of Asians and the impact of the participants' decision-making on financial markets.

We analyze how the tradition of rewarding employees based on a generous bonus before Chinese Lunar New Year can change attitudes toward risk, and how this change can affect the individuals' decision making in choosing the targeted shares. Taiwan's stock market is mainly dominated by individual investors, and is thus more likely to be affected by changes in investor attitudes toward risk when they are awarded their bonuses. The individual investors become less risk averse and prefer high risk shares, as represented by small-cap stocks, especially those with a higher volatility. Thus, if the small firm anomaly in January can be explained by concepts from behavioral finance, then we would find this phenomenon in Taiwan, particularly for small-cap stocks with higher risk.

Table 16
The empirical analyses of testing the small firm anomaly in January for the five volatility portfolios under different calendar year periods and bonus payment times.

Parameters	1972–1989 ($N=1331$)				1990–2006 ($N=9750$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-period in which the bonuses were paid in January								
Panel A1: The firms with the lowest volatility (RISK1)								
Intercept	−4.3000	−0.72	0.4857	0.069	2.8497	0.46	0.6543	0.023
Size	0.2925	0.34	0.7392		−0.4690	−0.77	0.4560	
Panel A2: The firms with RISK2								
Intercept	−8.1270	−0.80	0.4390	0.131	1.4049	0.20	0.8458	0.019
Size	1.2105	0.81	0.4378		−0.2240	−0.35	0.7304	
Panel A3: The firms with RISK3								
Intercept	7.2490	1.24	0.2403	0.074	13.0990	2.30	0.0405	0.028
Size	−1.0530	−1.36	0.2015		−1.3790	−2.50	0.0281	
Panel A4: The firms with RISK4								
Intercept	37.1400	1.95	0.0773	0.015	22.1440	3.04	0.0103	0.038
Size	−5.3190	−1.69	0.1195		−2.2630	−3.10	0.0091	
Panel A5: The firms with the highest volatility (RISK5)								
Intercept	18.2480	2.01	0.0693	0.036	35.7150	2.38	0.0348	0.073
Size	−1.9920	−1.52	0.1579		−3.3680	−2.10	0.0474	
Panel B: The sub-period in which the bonuses were paid in February								
Panel B1: The firms with the lowest volatility (RISK1)								
Intercept	2.0198	0.37	0.7300	0.008	16.5160	1.57	0.2151	0.088
Size	−0.2920	−0.47	0.6552		−1.6880	−1.67	0.1936	
Panel B2: The firms with RISK2								
Intercept	−4.0980	−0.50	0.6408	0.005	−0.1060	−0.02	0.9874	0.001
Size	0.6463	0.54	0.6095		0.2591	0.59	0.5958	
Panel B3: The firms with RISK3								
Intercept	7.2255	0.35	0.7409	0.174	16.9700	1.79	0.1715	0.014
Size	−1.3760	−0.45	0.6701		−1.7240	−1.88	0.1568	
Panel B4: The firms with RISK4								
Intercept	1.0297	0.10	0.9257	0.088	19.8920	2.62	0.0791	0.011
Size	−0.3890	−0.24	0.8178		−2.0640	−2.65	0.0771	
Panel B5: The firms with the highest volatility (RISK5)								
Intercept	−6.6700	−0.71	0.5119	0.057	19.4470	1.60	0.2080	0.037
Size	0.1963	0.15	0.8879		−1.7150	−1.32	0.2786	

This table shows the regression results of investigating the firm size anomaly under two sub-periods in which the bonus payments were in January or February for 1972–1989 and 1990–2006 respectively.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1972 to 1989 and from 1990 to 2006.

We utilize the Fama–MacBeth method to test our hypothesis, named the culture bonus hypothesis, as well as several alternative hypotheses offered in previous studies. We do not test the tax-loss selling hypothesis, because no tax is imposed on capital gains from security trading in any of the three markets. We also do not test the different information hypothesis, because there is no such information system as the Institutional Brokers Estimate System Tape (IBES) in Taiwan. However, we test the risk mismeasurement and the economic cycle hypotheses for completeness. Our hypothesis is supported by the finding that only the higher risk firms experience a strong small firm effect in January for Taiwan. Notably, this effect is more evident when the bonus payments were made in January, and when the market had positive performance growth in the preceding year. Moreover, the risk mismeasurement and the economic cycle hypotheses were not confirmed for Taiwan. Our findings suggest that a relationship exists

Table 17
The empirical analyses of testing the small firm anomaly in January for the five volatility portfolios under different calendar year periods and market growth directions.

Parameters	1982–1989 ($N=831$)				1990–2006 ($N=9750$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was higher than the year before last								
Panel A1: The firms with the lowest volatility (RISK1)								
Intercept	0.3682	0.06	0.9544	0.035	7.1744	1.73	0.1075	0.042
Size	−0.2280	−0.35	0.7421		−0.8820	−2.23	0.0443	
Panel A2: The firms with RISK2								
Intercept	4.7160	0.50	0.6413	0.099	5.0477	1.21	0.2468	0.012
Size	−0.7590	−0.73	0.4993		−0.4900	−1.26	0.2292	
Panel A3: The firms with RISK3								
Intercept	10.9290	1.85	0.1233	0.067	12.8220	2.68	0.0188	0.027
Size	−1.5550	−2.21	0.0780		−1.2260	−2.60	0.0220	
Panel A4: The firms with RISK4								
Intercept	6.3313	0.74	0.4906	0.001	20.4600	3.51	0.0038	0.035
Size	−0.5620	−0.53	0.6194		−1.9600	−3.18	0.0072	
Panel A5: The firms with the highest volatility (RISK5)								
Intercept	11.9290	0.73	0.4985	0.150	22.9030	2.93	0.0117	0.053
Size	−1.4720	−0.74	0.4934		−1.8720	−2.21	0.0460	
Panel B: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was lower than the year before last								
Panel B1: The firms with the lowest volatility (RISK1)								
Intercept	5.3326	0.50	0.7074	0.071	−9.4530	−0.48	0.6799	0.049
Size	−0.5220	−0.38	0.7692		0.8869	0.47	0.6870	
Panel B2: The firms with RISK2								
Intercept	13.4970	6.07	0.1039	0.038	−17.8400	−0.80	0.5097	0.013
Size	−1.8580	−5.80	0.1087		1.6806	0.90	0.4625	
Panel B3: The firms with RISK3								
Intercept	−8.4020	−0.19	0.8806	0.259	10.2400	0.87	0.4772	0.014
Size	2.0102	0.34	0.7930		−1.5530	−1.54	0.2629	
Panel B4: The firms with RISK4								
Intercept	35.8590	11.02	0.0576	0.020	14.2990	1.68	0.2348	0.020
Size	−5.0530	−3.15	0.1956		−2.1460	−3.74	0.0648	
Panel B5: The firms with the highest volatility (RISK5)								
Intercept	1.2647	18.19	0.0003	0.008	20.2570	2.75	0.1110	0.045
Size	0.0516	0.03	0.9834		−2.6510	−7.83	0.0159	

This table shows the regression results of investigating the firm size anomaly under two sub-periods in which the sum of earnings before tax per employee of all firms in the preceding year was higher or lower than the year before last for 1982–1989 and 1990–2006 respectively.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess monthly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each month. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with monthly cross sections. A coefficient in the regression is the average of the coefficients in the monthly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1982 to 1989 and 1990 to 2006.

between the size effect and cultural influences, and that behavioral finance remains a rich field for future research.

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Table 18
The empirical analyses of testing the small firm anomaly in January for the first week and other weeks in January.

Parameters	The first week in January ($N=10,989$)				Other weeks in January ($N=36,291$)			
	Parameter estimate	t-statistic	p value	Adj R^2	Parameter estimate	t-statistic	p value	Adj R^2
Intercept	2.8711	1.83	0.0766	0.029	1.8211	2.18	0.0314	0.041
Size	−0.2890	−1.74	0.0911		−0.2050	−2.21	0.0292	

This table shows the results of investigating the firm size anomaly for two sub-periods in January, with the following regression model.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess weekly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each week. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with weekly cross sections. A coefficient in the regression is the average of the coefficients in the weekly cross sections. The t-statistic is the average coefficient divided by its time-series standard error, and N denotes the number of firm-month observations for the period from 1972 to 2006.

Table 19
The empirical analyses of testing the small firm anomaly in January for the first week and other weeks in January under different bonus payment times.

Parameters	The first week in January ($N=10,989$)				Other weeks in January ($N=36,291$)			
	Parameter estimate	t-statistic	p value	Adj R^2	Parameter estimate	t-statistic	p value	Adj R^2
Panel A: The sub-period in which the bonuses were paid in January								
Intercept	2.9878	1.47	0.1554	0.035	2.5677	2.53	0.0133	0.039
Size	−0.2950	−1.37	0.1846		−0.2960	−2.61	0.0109	
Panel B: The sub-period in which the bonuses were paid in February								
Intercept	2.5793	1.15	0.2791	0.014	0.0720	0.05	0.9608	0.046
Size	−0.2740	−1.18	0.2693		0.0102	0.07	0.9476	

This table shows the results of investigating the firm size anomaly under two sub-periods in which the bonus payments were in January or February, with the following regression model.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess weekly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each week. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with weekly cross sections. A coefficient in the regression is the average of the coefficients in the weekly cross sections. The t-statistic is the average coefficient divided by its time-series standard error, and N denotes the number of firm-month observations for the period from 1972 to 2006.

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Table 20
The empirical analyses of testing the small firm anomaly in January for the first week and other weeks in January under different market growth directions.

Parameters	The first week in January ($N=10{,}508$)				Other weeks in January ($N=34{,}649$)			
	Parameter estimate	*t*-statistic	*p* value	Adj R^2	Parameter estimate	*t*-statistic	*p* value	Adj R^2
Panel A: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was higher than the year before last								
Intercept	4.1132	1.94	0.0678	0.028	3.2346	3.08	0.0031	0.038
Size	−0.3970	−1.81	0.0858		−0.3400	−3.21	0.0021	
Panel B: The sub-period in which the sum of earnings before tax per employee of all firms in the preceding year was lower than the year before last								
Intercept	2.6927	0.46	0.6662	0.045	−0.0590	−0.03	0.9797	0.037
Size	−0.3640	−0.72	0.5118		−0.0110	−0.05	0.9624	

This table shows the results of investigating the firm size anomaly under two sub-periods in which the sum of earnings before tax per employee of all firms in the preceding year was higher or lower than the year before last, with the following regression model.

$$(R_{it}-R_{mt}) = \alpha_0 + \alpha_1 * Size_{it} + \varepsilon_t$$

The dependent variable is the excess weekly return of each firm defined as the raw stock return on each firm minus the value-weighted return on the market in each week. The explanatory variable is *Firm Size*, defined as the logarithm of market value of equity at the end of the preceding year. The estimates are obtained from the Fama and MacBeth (1973) regression with weekly cross sections. A coefficient in the regression is the average of the coefficients in the weekly cross sections. The *t*-statistic is the average coefficient divided by its time-series standard error, and *N* denotes the number of firm-month observations for the period from 1982 to 2006 due to the availability of the earnings data.

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