Lucky Number Premium: Numerological Superstition and Irrational Valuation on the Stock Market

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Abstract

This study shows that the firms with lucky listing codes on the Taiwan Stock market are traded at a premium compared to the firms with unlucky listing codes. The lucky number premium exists without interruption until the 44th month after IPO, and can still be found in the long run—at least nine years after IPO. We believe that this long-lasting premium for firms with lucky listing codes just represents investors' irrational preference for lucky numbers. This phenomenon can be viewed as evidence that cultural numerological superstition induces behavioral biases on the stock market. Further examination shows that the digits. 8 and 9 are particularly favored by investors. The lucky number premium is robust in different sub-periods from the 1990s to 2008, but has vanished in recent years. Interestingly, the lucky number premium only appears for firms with a low institutional holding, implying that individual investors are more likely to be affected by numerological superstition.

Keywords: Value Premium, Numerological Superstition, Behavioral Bias

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1. Introduction

In the last few decades there has been a tremendous wave of interest in *Behavioral Finance*. Daniel Kahneman was awarded the 2002 Nobel Memorial Prize in Economic Sciences for having integrated insights from psychological research into economic science, and this has inspired more researchers to study human judgment and decision-making under uncertainty from the viewpoint of behavioral biases.[1] Since 2002, psychology has become more and more influential in financial research, and particularly in explaining individual trading behavior. For instance, Barber, Lee, Liu, and Odean (2009) investigate how much an individual investor will lose in his or her trading, and note that, during 1995 to 1999, on average, individual investors in Taiwan lost about 187 million New Taiwan Dollar annually, which is about 2% of the GDP of Taiwan in the same period. Barber *et al*. (2009) attribute the dramatic losses of individual investors to the fact that investors in the Taiwan stock market, especially individual investors, often show irrational investment behavior and view their investments as a gamble. Similarly, Han, Lee, and Liu (2009) find that individual investors tend to perform poorly in the Taiwan option market. They argue that the disposition effect, a well-known behavioral bias explained by prospect theory, seriously distracts individual investors in their trading performance.[2]

Among the various kinds of behavioral biases, cultural superstition, which represents an

[1] http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2002/

[2] The theory was put forward in 1979 and developed in 1992 by Daniel Kahneman and Amos Tversky as a psychologically more accurate description of decision making than the expected utility theory. Their paper "Prospect Theory: An Analysis of Decision under Risk" (1979) has been called a "seminal paper in behavioral economics".

example of an affect heuristic, can frequently be observed in our daily life. In western superstition, for instance, Friday 13th is considered an unlucky day. According to the Stress Management Center and Phobia Institute in Asheville, North Carolina, an estimated 17 to 21 million people in the United States are affected by a fear of this day, making it the most feared day and date in history.[3] Some people are so paralyzed by fear that they avoid their normal routines in doing business, taking flights or even getting out of bed. Chinese superstition is similar, and although most people no longer have deep roots in traditional thinking, they are still susceptible to the culture, and behave accordingly. For instance, many people who are affected by Chinese culture believe in Feng Shui, a Chinese philosophical system according to which people should be concerned about the intangible influences of nature when they choose where they are to live or be buried, to avoid misfortune, even though there is no natural process linking the two events.[4] When the idea that Feng Shui causes bad luck is prevalent, people think that "it is better to believe that it exists than to believe that it does not", instead of relying on scientific evidence.

Numerological superstition is also a well-known superstition in Chinese culture. People believe that some numbers can be classified as "lucky" or "unlucky". For instance, Thompson gave the following classification and explanation (1996, p.71) "Six" sounds similar to the word

[3] This information is retrieved from John Roach "Friday the 13th Phobia Rooted in Ancient History". National Geographic News, 12 August 2004. The news is available at http://news.nationalgeographic.com/news/2004/02/0212_040212_friday13.html

[4] A more detailed description of Feng Shui can be found at https://en.wikipedia.org/wiki/Feng_shui

for “wealth”, making it an extremely popular number; 2) “Eight” sounds like the word for “multiply” and represents good luck, and so eight is considered to be a “fertile number”; 3) “Nine” is considered one of the luckiest numbers because it sounds like the word for “longevity” and “long life”; and 4) “Four” sounds like the word for “death” and is considered very unlucky unless it is combined with a favorable number. The superstition about numbers is also found in people’s manners in Taiwan, because of the social and cultural commonality between Taiwan and mainland China. For example, in Taiwan, when people purchase real estate, they sometimes try to avoid an address that contains the number “four” or is on the fourth floor; some hotels or hospitals also avoid the fourth floor, and name the floor above the third floor as the fifth floor. A similar phenomenon can be seen in Singapore. In the movie “Rogue Trader”, for example, the leading actor Nick Leeson accepts the recommendation of a local employee in Singapore (who said to him that “eight” is a lucky number) and creates an account with the number “88888” in order to cover up his investment losses. Since the influence of cultural superstition is so effective in individual behavior and decisions, would numerological superstition, for example, also affect investors? This question motivates our analysis.

In this paper, we focus on the irrational influence, if any, of the numerological superstition of market investors on the value of public companies on the Taiwan Stock Exchange (TWSE). We hypothesize that the preference for specific numbers should affect the stock selection made by investors. Since each listed company on the TWSE has a unique 4-digit code as its trading

symbol, companies with listing codes containing lucky digits such as 6, 8, or 9 should be favored by investors over companies with unlucky listing codes. Using Tobin's q, a proxy measuring the equity value, we examine the existence of a "lucky number premium", being the difference between the equity value of companies with a lucky listing code and that of companies with an unlucky listing code.

More specifically, our study consists of the following steps of analysis:

1. We examine thoroughly whether investors on the TWSE are numerologically superstitious. If investors believe that investing in a firm with a lucky listing code will bring them fortune in their investment, such firms should enjoy a "lucky number premium" in terms of a higher equity value.
2. Having been able to show the existence of a numerological superstition in relation to investments on the TWSE, we further investigate whether the value premium for this behavior will be resolved in the short-run or will last for the long term. Also, we study whether the numerological superstition occurs in specific periods or is a constant phenomenon across different time periods.
3. We examine whether individual trading is the main cause of the lucky number premium.

Our empirical results are briefly summarized as follows. First, we find that, on the TWSE, those companies with a listing code containing lucky digits tend to be traded at a distinct value

premium over those firms with a listing code containing an unlucky digit. Further examination shows that 8 and 9 are particularly favored by investors. Second, the lucky number premium exists without interruption until the 44th month after IPO, and can still be found in the long run—at least nine years after IPO. We believe that such a long-lasting premium for firms with lucky listing codes just represents investors' significant preference for lucky numbers. The phenomenon can also be viewed as evidence that cultural numerological superstition induces irrational investment preferences. Third, the lucky number premium is robust in different sub-periods from the 1990s to 2008, but has vanished in recent years. Finally, the lucky number premium is only seen for those firms with a low institutional holding, implying that individual investors are more likely to be affected by numerological superstition and to cause the lucky number premium on the TWSE.

The rest of this paper is structured as follows: Section 2 briefly reviews the prior literature, addressing both the empirical and the theoretical aspects of superstition and behavioral bias in investments. Section 3 describes the data and the methodology. Section 4 presents the empirical findings and Section 5 concludes the study.

2. Literature Review

In this section, we briefly review the relevant prior literature. In the first subsection, we discuss investors' behavioral biases in general, as presented in previous studies; investors' superstitions that have been examined in the literature are specifically introduced in the next

subsection.

2.1 Behavioral Bias

Several studies have noted that the irrationality of investors seems to be closely connected to investor sentiment and then to be reflected in stock price performance. Hirshleifer and Shumway (2003) find that from 1982 to 1997, across twenty-six countries, daily stock returns are affected to a large extent by morning sunshine. More specifically, sunshine affects the emotion, and investors are more optimistic when they are in a good mood than when they are in a bad mood, thereby affecting stock market performance. Kamstra, Kramer, and Levi (2003) investigate the role of seasonal affective disorder (SAD) in the seasonal time-variation of stock market returns, and find that the season affects investors' risk preferences and investment behavior. In the Taiwan market, Tsai, Wang and Chang (2009) employ principal component analysis to form a composite index of sentiment (including market turnover, the number of IPOs, the returns on IPOs, and the equity share in new issues) and show that the portfolio returns when investor sentiment is high are higher than when investor sentiment is low. From the studies discussed above, we can speculate that when an investor is undergoing emotional instability, his or her investment decisions will be affected.

2.2 Superstition

Early psychological theorization on superstitious beliefs can be traced back to Darke and Freedman (1997), who found that the causes of belief in good luck are closely related to feeling

fortunate or generally satisfied with one's life. Superstitious beliefs have also been considered in relation to investors indirectly. Jiang, Cho and Adaval (2009) find that if Asian consumers are subliminally primed with luck-related concepts, it makes them feel luckier. Similar examples abound in the literature. Heath, Huddart and Lang (1999) examine the relationship between psychological factors and the exercise of stock options, to investigate how 50,000 employees at seven corporations decide to exercise their stock options. The authors find that exercise during the preceding month is positively related to stocks; in contrast, over a longer period, exercise is negatively related to returns. These results are consistent with psychological models of beliefs.

There have been a number of studies that have investigated how numerological superstitions affect trading. Bhattacharya, Kuo, Lin and Zhao (2014) find that, on the Taiwan Futures Exchange, individual investors submit disproportionately more limit order's price at "8" than at "4". The study also points out that the main reason for losses suffered by individual investors is numerological superstition. Haggard (2015) examines the stock return impact of days with "lucky" numbers in markets dominated by Chinese participants, and demonstrates a "lucky" number date trading strategy for the Shenzhen market that produces risk-adjusted returns in excess of the market return. Hirshleifer, Jian, and Zhang (2014) show that the frequency of lucky numerical stock listing codes exceeds what would be expected by probability, due to superstition effects; and that firms with "lucky" number listing codes initially

trade at a premium that disappears within three years after IPO.

In addition to digital superstition in the securities markets, several studies also find similar phenomena for real estate. Ng, Chong and Du (2009) estimate the value of superstitions: a ‘‘lucky” (‘‘unlucky”) number can bring good (bad) luck, and the value of superstitions can be economically significant. The authors also suggest that people are even more likely to discount a bad number in bad times. Agarwal, He, Liu, Ping, Sing and Wong (2014) examine superstitious beliefs in the Singapore housing market, and find that the Singaporeans dislike buying buildings on floors with numbers ending in 4. In sum, numerological superstitious beliefs clearly influence aspects of investment behavior.

3. Data and Methodology

3.1 Data Source

The initial sample consists of all firms that issued shares on either the Taiwan Stock Exchange (TWSE) or the Taipei Exchange (OTC) from January 1990 through June 2015. We obtain all the data we need for the analysis from the database of the Taiwan Economic Journal (TEJ), in the categories of Finance DB, TEJ Equity and TEJ Company DB.

Following Hirshleifer *et al.* (2014), our sample was divided into three groups by listing code: 1) Lucky Listing Code: Firms with at least one lucky digit (6, 8 or 9) and no unlucky digit (4) in their listing code; 2) Unlucky Listing Code: Firms with at least one unlucky digit and no lucky digits; 3) Neutral Listing Code: Firms that do not fall into either of the Lucky or the

Unlucky categories. In order to observe and compare the companies' performances in the stock market, our study uses Tobin's q and the market-to-book ratio for each month after IPO. Since we wish to compare a cross-section, we use not calendar months but months after IPO as the benchmark. Just one example should suffice to illustrate this. Suppose a firm has issued shares in January 1990; this month is then denoted as the first month, February 1990 as the second month, and so on.

In addition, we are concerned with the difference in Tobin's q between firms, so we do an extreme-value adjustment. We keep each relatively of month of Tobin's q, between the 3rd and 97th percentiles as extreme value adjustment.

3.2 Variable Definitions

3.2.1 Firm Value

We wish to investigate whether companies with a listing code classified as Lucky have a premium in their issuing price. We use Tobin's q and the market-to-book ratio as firm value measures.

Tobin's q (*TQ*) is defined as:

$$\frac{(Market\ Value\ of\ Equity + Long\ term\ debt, inventory\ and\ current\ liabilities - Current\ assets)}{Total\ Assets}$$

Market-to-Book Ratio (*MB*) is defined as:

$$\frac{Market\ value\ of\ Equity}{Book\ Value\ of\ Equity}$$

3.2.2 Lucky Company Code

As mentioned above, we divide our firms into a lucky and an unlucky group. More specifically, "lucky" firms are defined as those with at least one lucky digit (6, 8 or 9) and no unlucky digit (4) in their listing code, and "unlucky" firms are defined as those with at least one unlucky digit and no lucky digits. We therefore set a dummy variable "*Lucky*", which takes the value 1 if the firm is in the lucky group and 0 if the firm belongs to the unlucky group. In order to make a distinction between 4, 6, 8 and 9, we also set these dummy variables separately. To take a case in point, the dummy variable "four" takes the value 1 if the firm's listing code contains 4 but does not include 6, 8 or 9, and is 0 otherwise, etc.

3.2.3 Control Variables in Regression

We use several company characteristics as control variables in the regression. *Size* is defined as the natural log of sales. *Cash ROA* is defined as firm's cash flow from operating activities divided by total asset. *Leverage* is the firm's total debts (short-term debts plus long-term liabilities due within one year plus long-term debts) divided by its total assets. *Tangibility* is the book value of the firm's tangible assets (total assets minus intangible assets) divided by its total sales. *Sales Growth* is the firm's current year sales growth ratio.

3.3 Regression Models

Using the variables mentioned above, we then set up two regression models as follows:

Model 1

$$Y = \beta_1 \boldsymbol{Lucky} + \beta_2 Size + \beta_3 Cash\ ROA + \beta_4 Lev + \beta_5 Sales\ Growth + \beta_6 Tangibility$$

Model 2

$$Y = \beta_1 \boldsymbol{Six} + \beta_2 \boldsymbol{Eight} + \beta_3 \boldsymbol{Nine} + \beta_4 Size + \beta_5 Cash\ ROA + \beta_6 Lev + \beta_7 Sales\ Growth + \beta_8 Tangibility$$

Where Y is the firm value variables—Tobin's q (TQ) or the market-to-book ratio (MB). We also control the industry effect in the regression by TWSE industry classification.

4. Empirical Results

4.1 Summary Statistic

Table 1 highlights the differences between the lucky and unlucky listing codes with descriptive statistics for the valuation measures during the seven years after the IPO. We present the mean, median values for each variable in Table 1. A *t*-test analysis indicates whether there is a significant difference between the means of two groups. An independent *t*-test was conducted to evaluate the hypothesis that a company with a lucky listing code has a premium over a company with an unlucky listing code. The test was significant, and the results can be also seen in our Figures 1. For both measures, Tobin's q and the market-to-book ratio, the phenomenon can be observed. In brief, the TQ averages 1.0728 for firms with lucky listing codes and 0.9829 for firms with unlucky listing codes, which indicates a 9% pricing premium for firms with lucky listing codes.

[Table 1 around here]

Similarly, the differences between the firms' fundamental variables: *Cash ROA*, Leverage *(Lev)*, *Tangibility* and *Size* are also significant, and only the differences for *Sales Growth* are not. One explanation for this is that a premium can be justified by the fundamental values, which suggests that both lucky listing codes and fundamental information will cause an overvaluation. We next investigate whether lucky firms are valued more highly than unlucky firms at the time of listing.

4.2 Time-series trends in Tobin's q

We plot the time-series trends of Tobin's q to investigate whether firms with lucky listing codes have a premium price. Figure 1 depicts the mean value of Tobin's q for firms with lucky listing codes and those with unlucky listing codes. Because our data are calculated from the financial statements, and include long-term accounting figures that are not immediately available at the time of an IPO, we start from the 12^{th} month after IPO, so that investors would have had sufficient time to consider the disclosed information.

[Figure 1 around here]

From the evidence shown in the graph, we find that firms with lucky listing codes did indeed enjoy a premium over firms with unlucky listing codes, and that this continued until the 60^{th} month after the IPO. Different from the result of Hirshleifer *et al.* (2014), Taiwanese

investors pay a premium for firms with lucky listing codes for more than two years, and this premium gradually disappears within the five years after IPO. To put it another way, the trend in Tobin's q between firms with lucky and unlucky listing codes converges around five years after IPO. Furthermore, consistent with Ritter's results (1991), several years after IPO the overvaluation of firms with lucky listing codes and the undervaluation of firms with unlucky codes will have disappeared. Ritter also documents that in the US market, in the three years after IPO, firms significantly underperform a set of comparable firms matched by size and industry. Ritter points to two reasons for this: (a) investors are over-optimistic about the growth of young firms; and (b) firms take advantage of the "hot issue". In an empirical result, Teoh, Wong and Rao (1998) show that in an accrual-based accounting system, on average, firms that have highly-positive abnormal earnings in the issue year have negative abnormal earnings in the long run. To put it succinctly, firms are more likely to show poor performance for a period of time after their IPO.

We further tested whether the difference in Tobin's q between the lucky and the unlucky groups exists for each month after IPO. The means are also presented in Table 2. It must be noted that the differences prior to the 44th month after IPO are the most significant, and that the difference is greatest for the period between the 27th and the 41st month after IPO; on the other hand, there was no significant difference between the lucky and the unlucky companies after the 45th month after IPO.The results are consistent with observations from the graph, and the

findings reflect the fact that investors would rather choose lucky listing codes than unlucky listing codes. However, after several years, their investment preference will be corrected.

[Table 2 around here]

4.3 Valuation analysis

The periods in Figure 1, which were presented previously, end with the 60th month after the IPO. We now divide the observations into three periods: (1) the 12th month to the 28th month after IPO; (2) the 29th month to the 44th month after IPO; and (3) the 45th month to the 60th month after IPO. We make this division in our sample period according to the evidence of Table 3, which shows that for the period after the 44th month after IPO, the difference in Tobin's q between lucky and unlucky companies is not significant. We further investigate this with a generalized linear model (GLM). We also believe that, as time goes by, the premiums of firms with lucky and unlucky listing codes will present different variations.

We regress Tobin's q and the market-to-book ratio on leverage (*Lev*), size (*Size*), sales growth rate (*Sales Growth*), tangible assets (*Tangibility*), and current operating performance (proxied by *Cash ROA*). In addition, we include industry dummies (as classified by the TWSE) to control for the industry fixed effects. The sample includes firms with lucky listing codes and firms with unlucky listing codes. In order to clarify the relative contribution of these variables in the different periods, we run the regression separately, as mentioned before.

The results are reported in Table 3. The first two columns, (1a) and (1b) under "12th ~ 28th

month after IPO", report the results for observations from the 12th month to the 28th month after IPO. These results are compatible with our graphical evidence that firms with lucky listing codes have a much greater premium in the period immediately after IPO. These results appear to be consistent with those of Hirshleifer *et al.* (2014). The coefficient on leverage (*Lev*) is negative, while the coefficient on sales growth rate (*Sales Growth*) is positive. Our dummy variable (*Lucky*), which is equal to 1 for firms with lucky listing codes and 0 for firms with unlucky listing codes, may be of crucial importance for our conclusions about numerological superstition. The coefficient on Tobin's q (TQ) is equal to 0.1608, indicating that, on average, the TQ is higher by 0.1608 for firms with lucky listing codes. Compared to the average TQ of 1.0728 for firms with unlucky listing codes as shown in Table 1, 0.1608 indicates a premium of 14.99%. This suggests that the lucky number premium is significant not only in economics but also statistically. The second two columns, (2a) and (2b) under "29th ~ 44th month after IPO", report the results for observations from the 29th month to the 44th month after IPO. We find that the premium for firms with lucky listing codes still exists, and becomes slightly stronger.

[Table 3 around here]

This seems to indicate that investors will continue with their prior preferences, and that they are more likely to invest in companies with codes with lucky digits. The last period of the evidence is represented in the third two columns, (3a) and (3b) under "45th ~ 60th month after

IPO", and reports the results for observations from the 44th month to the 60th month after IPO. As we have seen with the graphical result, we find no evidence of a difference in Tobin's q. This confirms the truth that in the medium-term after IPO, the premium for a company with a lucky listing code does not exist; or, in the column for the regression on MB, the premium tends to weaken.

4.4 Valuation analysis for specific number

As mentioned previously, in order to investigate the premium for each digit clearly, four dummies are distinguished. In Table 4, the first two columns, (1a) and (1b) under "12th ~ 28th month after IPO", we are concerned with our unlucky digit (4). Whether the regression is carried out for Tobin's q or the market-to-book ratio, companies with listing codes containing the lucky digits (6, 8 and 9) earned a higher premium, and this was especially so for the digit 8. The two sets of digits (4 versus 6, 8 and 9) are related but in opposite directions. This indicates that in the early period of an IPO, investors seem to pay a higher premium for a lucky digit, and this also confirms that the phenomenon of superstition exists.

[Table 4 around here]

The second two columns, (2a) and (2b) under "29th ~ 44th month after IPO", show that when compared with the results for the first phase, the effect of 6, 8 and 9 becomes weak. Although the trend in the premium was contrary to that for the same period in Table 4, we still

have an effect of superstition and it is also statistically significant. The third two columns, (3a) and (3b) under "45th ~ 60th month after IPO", show that the dummies for 6, 8 and 9 are not only statistically insignificant, but also that the lowest premium is paid. In addition, we exclude the first listing code when we distinguish between the lucky and unlucky groups, and get similar results.

4.5 Long-term lucky number premium

Until now, we have been discussing the premium of companies with a lucky listing code in the short- and medium-term after IPO, but what about their long-term performance? We next investigate the periods from the 61th to 84th month and the 85th to the 108th month after IPO, and present results in Table 5. Contrary to our expectations, the premium for companies with a lucky listing code reappears in the long run. In Table 5, under "61th ~ 84th month after IPO" and "85th ~ 108th month after IPO", for the regression on Tobin's q, a lucky listing code earned a premium of about 4% to 9.98%; however, the regression on market-to-book ratio showed that a lucky listing code and a premium on the company were not significantly related.

[Table 5 around here]

Similarly, we investigate the premium for each digit in the long-run. Table 6 reports the results. By Tobin's q, the lucky number premium can be seen in all digitals. The results by market-to-book ratio are somewhat different. Under "61th ~ 84th month after IPO", the second

column, where we regress on the market-to-book ratio, we get opposite results: companies with the digits 8 and 9 had a negative premium; however, under "85^{th} ~ 108^{th} month after IPO", there was almost no evidence for a premium for companies with codes with these digits.

[Table 6 around here]

4.6 Valuation analysis – Sub-period regression

So far, all of the results are based on periods after IPO. In order to review our findings more carefully, and to take into account the effects of microeconomic factors, we split our observations for different periods. These periods are 1990 to 1996, 1997 to 2003, 2004 to 2008 and 2009 to 2015. As a result, in the samples in this section there are varying periods after IPO. To put it briefly, there are different periods since IPO in the same year. We also include lucky and unlucky listing codes in our samples.

We present the results for the regressions in Table 7. Interestingly, in the 1990s, the premium for a lucky listing code is relatively higher than in other periods. The result is possibly because in the early days in Taiwan, people's mindsets were more traditional, leading to more irrationality in investments. On the other hand, it is noteworthy that in the 1990s in Taiwan, when the economy was taking off (during that time, the stock index broke the 10,000 level), people perhaps invested blindly in stocks, leading to overpricing and mispricing. In 2007 and 2008, in the global financial crisis, the "prospect theory" of Kahneman and Tversky (1979) suggests that people would show a tendency to be superstitious because of the state of

uncertainty. These reasons may have contributed to the dummy variable "*Lucky*" having positive significance. In contrast to other periods, this effect disappears after 2009; one possible reason for the consistent results of the previous research may be related to "market efficiency", with the share price being corrected to its intrinsic value.

[Table 7 around here]

4.7 Valuation analysis—Institutional investor's holding

Intuitively, institutional investors are more rational than individual investors. We therefore add institutional shareholding information to our sample (including foreign investment institutions, domestic institutions and dealers), and subdivide our observations into two groups; one has firms with above forty percent institutional shareholding, and the other has firms whose institutional shareholding is below forty percent. In this section, the period of our observation is from December 2000 onwards, so that we can associate the sample with the holdings of institutional investors.

The results of Table 8 show a clear and strong difference between firms with individual investors and those with institutional investors. Whether we carry out the regression on TQ or MB, with a smaller institutional shareholding (less than 40%), the dummy variable "Lucky" is positive and significant (the coefficient is 0.1118 in column (2a) and 0.2547 in column (2b)), indicating that a lucky listing code still has a value premium; by comparison, there is no significance for companies with a higher institutional shareholding (above 40%). This suggests

that the value premium for firms with a high institutional shareholding does not exist. Overall, the investors who prefer companies with lucky listing codes are individuals. This result is significant and is consistent with our expectations.

[Table 8 around here]

4.8 Probability of obtaining lucky and unlucky telephone/fax numbers for firms with lucky listing codes and firms with unlucky listing codes

We believe that when people decide on things that have no effect on important essentials, they do so in the light of their cognitive thoughts or preferences. In Taiwan, although managers are not able to determine the listing code for their company, they are able to choose the company's telephone number. Thus, in addition to investor superstition, we investigate whether people such as managers are superstitious.

In Panel A of Table 9, we show, for firms with lucky and unlucky listing codes, the selected telephone or fax number. These results suggest that if the firm's listing code is originally in the unlucky group, there is a strong demand for a lucky phone number. Do managers' superstitions affect the company's performance? We used "Return on Assets, (ROA)" and "Return on Equity, (ROE)" as proxies for the company's performance. In Panel B, we show that regardless of whether a firm has a lucky or an unlucky listing code, if it chooses a lucky telephone number it will perform poorly three to five years after its IPO. These results demonstrate that superstitious beliefs are reflected in how companies operate.

[Table 9 around here]

5. Conclusions

In this paper, we examine investors' numerological superstitions and their influence on firm value for firms listed on the TWSE from 1990 to 2015. The numerological superstition in the study results in market investors having a preference for companies whose listing code contains lucky digits (6, 8, or 9) over companies whose listing code contains an unlucky digit (4). We trace the short-run and long-run results after IPO by looking at Tobin's q for two groups of companies listed on the market, and examine whether "lucky code" companies can enjoy a relatively higher equity value.

We find that firms with lucky listing codes on the TWSE are indeed traded at a significant premium compared to firms with unlucky listing codes. The value premium appears without interruption for companies with lucky listing codes until the 44th month after IPO, which is almost four years. Furthermore, after a disappearance of around one and a half years, the lucky number premium reappears and lasts in the long run—for at least 9 years after the IPO. In addition, among three lucky digits, 8 and 9 tend to be more common than 6 in representing investors' superstitions. The lucky number premium is also examined by using an alternative measure (the market-to-book ratio), different sub-period samples, and different definitions of lucky listing codes and unlucky listing codes. Except for the period from 2009 to 2015, all these findings point to the existence of a value premium arising from investors' preferences for

companies with lucky listing codes. Our regression analysis controls for financial features, industry effect, and year effect, but all these variables do not fully explain the higher equity value of companies with lucky listing codes. We believe that the numerological superstition of market investors causes the irrational value premium. We also perform a further analysis to examine whether the lucky number premium is caused by all traders on the Taiwan stock market or can be attributed to specific traders. We divide the sample companies into a high institutional holdings group and a low institutional holdings group, and re-estimate our major regression. Interestingly, although the value premium can be found in the low institutional holdings companies, the same cannot be said of the high institutional holdings group. The results indicate that individual investors are more likely to be the traders who cause the irrational value premium, which also confirms the argument in the literature that individuals are more likely to be subject to behavioral biases than institutional investors.

Further to our findings, we suggest that follow-on studies focus on the numerological superstition of the managers of companies. Our final brief test shows that, in the period from three to five years after the IPO, those companies that show a high preference for “lucky telephone numbers” or “lucky fax numbers” tend to perform worse, according to their ROA and ROE figures, than companies that show a lower preference. Can the poor post-IPO performance reflect managerial superstition? We believe that a solid conclusion can be reached with more empirical tests. The analysis is left for future research.

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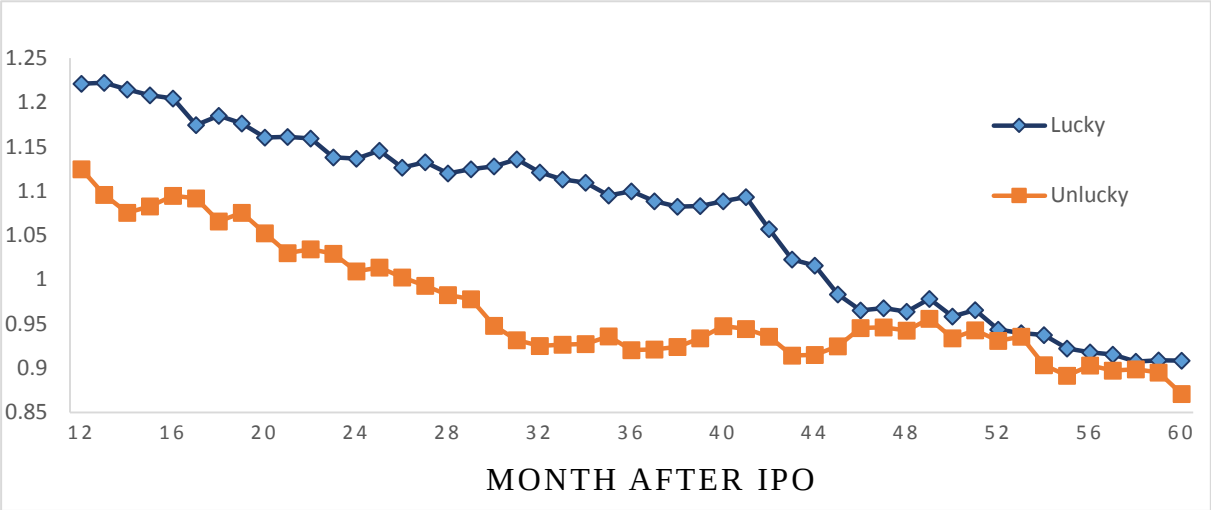

Figure 1 Tobin's q for firms with lucky listing codes and firms with unlucky listing codes

Table 1 Summary Statistics

The table presents the mean and median values of the variables measuring the firm characteristics within seven years of IPO for firms with lucky listing codes and firms with unlucky listing codes. A lucky listing code contains at least one lucky digit (6, 8, or 9) and no unlucky digit (4); an unlucky listing code contains at least one unlucky digit (4) and no lucky digits (6, 8, or 9). *TQ* is Tobin's q, the price per share multiplied by the total number of shares, plus the book value of long-term debt, inventory, and current liabilities, minus the book value of current assets, divided by the book value of total assets. *MB* is the market-to-book ratio, the firm's price per share multiplied by the total number of shares divided by the book value of equity. *Cash ROA* is the firm's cash flow from operating activities divided by its total assets. *Lev* is the firm's total debts (short-term debts plus long-term liabilities due within one year plus long-term debts) divided by its total assets. *Tangibility* is the book value of the firm's tangible assets (total assets minus intangible assets) divided by its total sales. *Sales Growth* is the firm's current year sales growth ratio. *Size* is the natural log of sales. The asterisks following t indicate the significance level of the t-statistics for the difference between the two subsamples. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	Lucky		Unlucky			
Variables	Mean	Median	Mean	Median	*t*	
TQ	1.0728	0.831	0.9829	0.8321	-10.23	***
MB	1.9091	1.5068	1.6618	1.4098	-11.72	***
Cash ROA	0.0254	0.0222	0.0231	0.0211	-3.96	***
Lev	0.4268	0.4238	0.4152	0.4105	-7.39	***
Tangibility	0.0561	0.004	0.1219	0.0008	4.03	***
Sales Growth	0.1876	0.0618	0.2134	0.0771	1.44	
Size	13.5473	13.4169	13.4496	13.3363	-7.47	***

Table 2 Distribution of Tobin's q

This table presents the mean of Tobin's q for firms with lucky / unlucky listing codes for the 12th to the 60th month after IPO.The *t*-statistics are calculated after allowing double-clustering by month. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Month after IPO	Lucky Mean	Unlucky Mean	*t*		Month after IPO	Lucky Mean	Unlucky Mean	*t*	
12	1.2210	1.1247	1.47		37	1.0884	0.9212	3.11	***
13	1.2221	1.0957	1.94	*	38	1.0825	0.9244	3.01	***
14	1.2148	1.0755	2.18	**	39	1.0833	0.9341	2.69	***
15	1.2081	1.0827	2.01	**	40	1.0884	0.9477	2.57	***
16	1.2045	1.0948	1.81	*	41	1.0932	0.9443	2.65	***
17	1.1746	1.0917	1.46		42	1.0573	0.9358	2.32	**
18	1.1850	1.0659	2.05	**	43	1.0229	0.9146	2.07	**
19	1.1762	1.0757	1.70	*	44	1.0158	0.9150	1.86	*
20	1.1605	1.0524	1.88	*	45	0.9834	0.9249	1.08	
21	1.1613	1.0301	2.24	**	46	0.9652	0.9457	0.35	
22	1.1595	1.0344	2.09	**	47	0.9679	0.9461	0.36	
23	1.1381	1.0292	1.87	*	48	0.9638	0.9427	0.35	
24	1.1367	1.0093	2.25	**	49	0.9784	0.9558	0.36	
25	1.1455	1.0139	2.21	**	50	0.9584	0.9341	0.41	
26	1.1265	1.0028	2.26	**	51	0.9656	0.9431	0.38	
27	1.1326	0.9930	2.45	***	52	0.9436	0.9310	0.22	
28	1.1199	0.9826	2.49	***	53	0.9396	0.9357	0.07	
29	1.1247	0.9780	2.65	***	54	0.9374	0.9037	0.60	
30	1.1281	0.9480	3.10	***	55	0.9222	0.8917	0.55	
31	1.1358	0.9319	3.55	***	56	0.9180	0.9031	0.26	
32	1.1212	0.9251	3.49	***	57	0.9156	0.8975	0.33	
33	1.1131	0.9266	3.38	***	58	0.9076	0.8988	0.16	
34	1.1095	0.9276	3.25	***	59	0.9091	0.8954	0.24	
35	1.0949	0.9362	2.89	***	60	0.9088	0.8712	0.70	
36	1.0999	0.9207	3.26	***					

Table 3 Valuation analysis

This table reports the multivariate regression results for the samples consisting of firms with lucky listing codes and firms with unlucky listing codes. The results are based on observations for the 12th to the 28th month after IPO in the first two columns, the 29th to the 44th month after IPO in the second two columns, and the 45th to the 60th month after IPO in the third two columns. The dependent variables of the regressions are the firm's market valuation, measured by TQ and MB, as defined in Table 2. The independent variables are defined as follows: *Lucky* is a dummy variable that equals 1 if the firm's listing code contains one or more of the lucky digits 6, 8 or 9, but not the unlucky digit 4, and 0 otherwise. Other control variables are as defined in Table 2. Industry dummies are included in the regressions to control for industry fixed effects. The *t*-statistics are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	12th ~ 28th month after IPO		**29th ~ 44th month after IPO**		**45th ~ 60th month after IPO**	
	TQ	MB	TQ	MB	TQ	MB
	(1a)	**(1b)**	**(2a)**	**(2b)**	**(3a)**	**(3b)**
Lucky	0.1608 ***	0.2946 ***	0.1631 ***	0.3278 ***	0.0016	0.0972 ***
	-8.2	-9.45	-8.03	-9.81	-0.08	-2.96
Tangibility	-0.0873 *	-0.2299 ***	0.0014	-0.2946 ***	0.08 ***	-0.0071
	(-1.66)	(-2.74)	-0.03	(-3.91)	-3.92	(-0.21)
Lev	-1.885 ***	-1.6326 ***	-1.6064 ***	-1.2905 ***	-0.9642 ***	-0.4119 ***
	(-31.52)	(-17.17)	(-26.8)	(-13.08)	(-18.81)	(-4.75)
Size	0.1469 ***	0.2509 ***	0.1149 ***	0.223 ***	0.0682 ***	0.1192 ***
	(20.43)	(21.94)	(16.32)	(19.23)	(11.25)	(11.61)
Sales Growth	0.0082 ***	0.0124 ***	0.0787 ***	0.1776 ***	0.1691 ***	0.2827 ***
	(3.08)	(2.93)	(8.37)	(11.48)	(10.97)	(10.84)
Cash ROA	0.8675 ***	1.1084 ***	1.2115 ***	1.7071 ***	1.5084 ***	2.6034 ***
	(6.66)	(5.36)	(8.65)	(7.41)	(11.64)	(11.87)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
N	9,367	9,367	8,832	8,832	8,963	8,963
R square	0.213	0.1625	0.216	0.1796	0.1638	0.1199

Table 4 Valuation analysis – The specific number

This table reports the multivariate regression results for the samples consisting of firms with lucky listing codes and firms with unlucky listing codes. The results are based on observations for the 12th to the 28th month after IPO in the first two columns, the 29th to the 44th month after IPO in the second two columns, and the 45th to the 60th month after IPO in the third two columns. The dependent variables of the regressions are the firm's market valuation measured by TQ and MB, as defined in Table 1. The independent variables are defined as follows: *Six* is a dummy variable that equals 1 if the firm's listing code contains one or more instances of the lucky digit 6 but none of the other digits 4, 8, and 9; and is 0 otherwise. *Eight* is a dummy variable that equals 1 if the firm's listing code contains one or more instances of the lucky digit 8 but none of the other digits 4, 6, and 9; and is 0 otherwise. *Nine* is a dummy variable that equals 1 if the firm's listing code contains one or more instances of the lucky digit 9 but none of the other digits 4, 6, and 8; and is 0 otherwise. Other control variables are as defined in Table 1. Industry dummies are included in the regressions to control for industry fixed effects. The *t*-statistics are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	12th ~ 28th month after IPO		**29th ~ 44th month after IPO**		**45th ~ 60th month after IPO**	
	TQ	MB	TQ	MB	TQ	MB
	(1a)	**(1b)**	**(2a)**	**(2b)**	**(3a)**	**(3b)**
Six	0.0650 ***	0.1523 ***	0.0571 ***	0.1134 ***	0.0266	0.0614 *
	(3.14)	(4.61)	(2.68)	(3.23)	(1.38)	(1.88)
Eight	0.2509 ***	0.3418 ***	0.1881 ***	0.2814 ***	0.1234 ***	0.1426 ***
	(10.06)	(8.6)	(7.54)	(6.83)	(5.41)	(3.68)
Nine	0.2286 ***	0.3410 ***	0.1323 ***	0.1797 ***	0.1349 ***	0.1987 ***
	(8.63)	(8.08)	(4.86)	(4)	(5.36)	(4.66)
Tangibility	-0.0985 *	-0.2442 ***	-0.0264	-0.3414 ***	0.0818 ***	-0.0055
	(-1.87)	(-2.91)	(-0.58)	(-4.52)	(4.01)	(-0.16)
Lev	-1.8301 ***	-1.5490 ***	-1.5845 ***	-1.2584 ***	-0.9702 ***	-0.4047 ***
	(-30.55)	(-16.22)	(-26.27)	(-12.64)	(-18.85)	(-4.64)
Size	0.1337 ***	0.2339 ***	0.1103 ***	0.2175 ***	0.0661 ***	0.1151 ***
	(18.39)	(20.18)	(15.57)	(18.6)	(10.93)	(11.22)
Sales Growth	0.0085 ***	0.0126 ***	0.0782 ***	0.1766 ***	0.1750 ***	0.2852 ***
	(3.21)	(2.98)	(8.3)	(11.35)	(11.38)	(10.94)
Cash ROA	0.9262 ***	1.1983 ***	1.2689 ***	1.8113 ***	1.5357 ***	2.6299 ***
	(7.14)	(5.8)	(9.06)	(7.84)	(11.87)	(11.99)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
N	9,367	9,367	8,832	8,832	8,963	8,963
R square	0.2196	0.1648	0.2163	0.1757	0.1864	0.122

Table 5 Long-term lucky number premium

This table reports the multivariate regression results based on observations for the 61st to the 84th month after IPO in the first two columns, and the 85th to the 108th month after IPO in the second two columns. The dependent variables of the regressions are the firm's market valuation measured by TQ and MB, as defined in Table 1. The independent variables are defined as follows: *Lucky* is a dummy variable that equals 1 if the firm's listing code contains one or more of the lucky digits 6, 8 or 9, but not the unlucky digit 4, and is 0 otherwise. Other control variables are as defined in Table 1. Industry dummies are included in the regressions to control for industry fixed effects. The *t*-statistics are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	61st ~ 84th month after IPO		**85th ~ 108th month after IPO**	
	TQ	MB	TQ	MB
	(1a)	**(1b)**	**(2a)**	**(2b)**
Lucky	0.0414 *	0.0911	0.0998 ***	0.1402
	(1.82)	(1.52)	(5.31)	(1.56)
Tangibility	-0.0734 **	-0.4781 ***	0.1163 ***	0.2876 **
	(-3.08)	(-7.63)	(4.41)	(2.28)
Lev	-0.6231 ***	1.0606 ***	-0.5041 ***	2.4146 ***
	(-10.55)	(6.84)	(-9.77)	(9.79)
Size	-0.0137 **	-0.1891 ***	0.0468 ***	-0.1518 ***
	(-1.97)	(-10.33)	(7.9)	(-5.36)
Sales Growth	0.1689 ***	0.4211 ***	0.0157 ***	0.0190
	(40.27)	(38.24)	(3.25)	(0.82)
Cash ROA	-1.0737 ***	-4.1218 ***	0.4188 ***	0.9300
	(-6.84)	(-10.01)	(3.11)	(1.44)
Industry Effect	Yes	Yes	Yes	Yes
N	13,796	13,796	10,510	10,510
R square	0.1635	0.1604	0.1184	0.0262

Table 7 Variation analysis – Sub-period regression

This table reports multivariate regression results for the samples consisting of firms with lucky listing codes and firms with unlucky listing codes. The results are based on observations from the 1990 to 1996 calendar years in the first two columns, the 1997 to 2003 calendar years in the second two columns, the 2004 to 2008 calendar years in the third two columns, and the 2009 to 2015 calendar years in the fourth two columns. The dependent variables of the regressions are the firm's market valuation measured by TQ and MB, as defined in Table 2. The independent variables are defined as follows: Lucky is a dummy variable that equals 1 if the firm's listing code contains one or more of the lucky digits 6, 8 or 9, but not the unlucky digit 4, and is 0 otherwise. Other control variables are as defined in Table 2. Industry dummies are included in the regressions to control for industry fixed effects. The t-statistics are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	1990 ~ 1996		**1997 ~ 2003**		**2004 ~ 2008**		**2009 ~ 2015**	
	TQ	MB	TQ	MB	TQ	MB	TQ	MB
	(1a)	**(1b)**	**(2a)**	**(2b)**	**(3a)**	**(3b)**	**(4a)**	**(4b)**
Lucky	0.2462 ***	0.4283 ***	0.2238 ***	0.3867 ***	0.1722 ***	0.3603 ***	0.0292	0.066
	(5.56)	(6.21)	(15.69)	(16.17)	(11.02)	(11.31)	(0.89)	(0.83)
Tangibility	-1.57 ***	-2.1743 ***	-0.0519 *	-0.1165 **	0.0059 ***	0.0028	-0.2167 ***	-1.0412 ***
	(-14.52)	(-12.91)	(-1.67)	(-2.24)	(2.71)	(0.61)	(-8.71)	(-17.28)
Lev	-0.839 ***	0.3028 *	-1.2247 ***	-0.5057 ***	-1.3216 ***	-0.256 ***	-0.3885 ***	1.123 ***
	(-7.96)	(1.85)	(-30.21)	(-7.44)	(-29.68)	(-2.82)	(-5.13)	(6.12)
Size	-0.1186 ***	-0.2255 ***	0.1695 ***	0.2857 ***	0.0763 ***	0.1176 ***	-0.0629 ***	-0.2514 ***
	(-8.03)	(-9.8)	(32.43)	(32.6)	(15.55)	(11.74)	(-7.12)	(-11.75)
Sales Growth	0.0532 ***	0.0743 ***	0.0121 ***	0.028 ***	0.056 ***	0.067 ***	0.1031 ***	0.2553 ***
	(5.42)	(4.85)	(3.11)	(4.29)	(10.56)	(6.19)	(29.28)	(29.94)
Cash ROA	2.2636 ***	3.2824 ***	0.3621 ***	0.6756 ***	1.2983 ***	2.281 ***	-1.8161 ***	-6.8234 ***
	(9.21)	(8.58)	(3.56)	(3.97)	(13.96)	(12.03)	(-8.95)	(-13.89)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,375	3,375	14,946	14,946	17,374	17,374	11,511	11,511
R square	0.3172	0.2408	0.2374	0.229	0.1717	0.0831	0.157	0.1927

Table 8 Valuation analysis – Institutional investors' holdings

This table reports the multivariate regression results for the samples consisting of firms with lucky listing codes and firms with unlucky listing codes. The observations are subdivided into two groups: the first are firms with more than forty percent institutional shareholding; and the other are firms with an institutional shareholding below forty percent. The period of our observation is from December 2000 onwards, so that we can associate the sample with institutional investors' holdings. The dependent variables of the regressions are the firm's market valuation measured by TQ and MB, as defined in Table 2. The independent variables are defined as follows: *Lucky* is a dummy variable that equals 1 if the firm's listing code contains one or more of the lucky digits 6, 8 or 9, but not the unlucky digit 4, and is 0 otherwise. Other control variables are as defined in Table 2. Industry dummies are included in the regressions to control for industry fixed effects. The *t*-statistics are shown in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	TQ		MB	
	High (>= 40%)	Low (< 40%)	High (>= 40%)	Low (< 40%)
	(1a)	(1b)	(2a)	(2b)
Lucky	-0.1246	0.1118 ***	-0.1236	0.2547 ***
	(-1.22)	(9.72)	-0.81	9.71
Lev	-1.5848 ***	-0.9652 ***	-0.0675	-0.0173
	(-5.25)	(-29.43)	-0.15	-0.23
Sales Growth	0.1777 ***	0.0831 ***	0.2308 **	0.2002 ***
	(2.51)	(36.53)	2.18	38.62
Tangibility	0.1460	-0.0835 ***	0.2291	-0.3077 ***
	(0.72)	(-7.16)	0.75	-11.58
Op Profit Margin	1.3762 ***	-0.0196 ***	3.0360 ***	-0.0684 ***
	(5.73)	(-7.46)	8.43	-11.43
Cash ROA	5.6713 ***	0.2987 ***	7.4725 ***	-0.3032 *
	(8.48)	(3.98)	7.45	-1.77
Size	0.0779 ***	0.0336 ***	0.0877	0.0132
	(2.11)	(8.89)	1.58	1.53 ***
Industry Effect	Yes	Yes	Yes	Yes
N	1,322	36,912	1,322	36,912
R square	0.3189	0.1252	0.3208	0.0876

Table 9 Probability of having lucky and unlucky telephone/fax numbers for firms with lucky listing codes and firms with unlucky listing codes

Panel A of this Table 8 reports the frequency of having a lucky or unlucky telephone/fax number, separately for firms with lucky listing codes and firms with unlucky listing codes in the IPO year. A firm is deemed to have a lucky telephone/fax number if the last four digits of the firm's telephone number contain one or more instances of the lucky digits 6, 8 and 9, but no instances of the unlucky digit 4; a firm has an unlucky telephone/fax number if the last four digits of the firm's telephone number include one or more instances of the unlucky digit 4, but not the lucky digits 6, 8 or 9.

Panel A

Listing Code	Pr (Lucky Tel)	Pr (Unlucky Tel)	Pr (Lucky Fax)	Pr (Unlucky Fax)	N
Lucky	64.81%	4.12%	55.56%	5.97%	486
Unlucky	66.67%	1.09%	66.67%	7.65%	183
Lucky - Unlucky	-1.85%	3.02%	-11.11%	-1.68%	

Panel B of this Table reports the performance (measured by Return on Assets, ROA and Return on Equity, ROE) after three to five years following IPO, with the firms have lucky/unlucky telephone numbers separately. Lucky/unlucky telephone numbers are defined in the same way as in Panel A. The *t*-statistics are after allowing for double-clustering. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Panel B

Performance	Lucky Telephone number	Unlucky Telephone Number	*t*	
ROA	2.03%	5.78%	-2.7	***
ROE	-0.84%	8.52%	-3.66	***