REEXAMINATION OF LOTTERY PREMIUM: EMPIRICAL EVIDENCE IN TAIWAN

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ABSTRACT

This paper adopts the cross-sectional regression approach of Fama and MacBeth to examine the lottery premium phenomenon in Taiwan. With the inclusion of various risk measures, both systematic and unsystematic, in the pricing equation, a significantly negative relationship between the lottery premium and stock returns is documented. Furthermore, the study shows that the lottery premium differs between the up and down markets and it is higher in the recent past than in the remote past. The lottery premium is actually more prevalent when the market as a whole performs worse.

Introduction

It is well known that a lottery ticket costs more than the expected value of its payoff due to the fact that the probability of winning the lottery is so remote. One would not expect individuals to participate in this activity based on a simple expected value analysis that measures the price of the investment relative to its risk and expected return. However, lotteries do exist in society and there is no shortage of willing participants. This implies that something more than simple expected value is present in the decision of an individual to purchase a lottery ticket – this additional factor is the attraction of an abnormally large reward. As shown in [4], risk-averse investors rationally sacrifice average return for the chance to win an extreme return.

Evidence in [1] reveals that extreme equity returns are associated with low-priced stocks. Their empirical results further document a persistent and significant lottery premium in the U.S. stock market. By their definition, the lottery premium is the sacrifice in average return that investors pay for a remote chance to earn an abnormally positive return. Thus, unlike the systematic and diversifiable risk associated with which the premiums are positive as demanded by risk-averse, utility maximization investors, the lottery premium is negative.

This study investigates if the lottery premium exists in the Taiwan stock market and, if so, to detect any trend in its existence. This is an important issue from at least two perspectives. To date, little research has been devoted to the investigation of lottery premium in developed markets, not to mention any for developing markets. At the same time, the popularity of lottery has become ever more prevalent than before and literature addressing investors' irrational behavior has received unprecedented attention (see Irrational Exuberance [5]). This research intends to shed more light on investor buying behavior and valuation process of financial securities in the Taiwan stock market. Methodology is briefly covered next. Empirical findings are summarized after that. The final section concludes this study.

Methodology

Following [3], we conduct month-by-month cross-sectional regressions of monthly stock returns over the time period of July 1982 to June 2003 on their post-ranking beta, firm size, book-to-market equity ratio, earnings-to-price ratio for positive EPS firms, and two dummy variables, *EPSdum* and *PDUM*. *EPSdum* is equal to one when EPS is negative and zero when EPS is positive; *PDUM* is equal to one when the stock price is under a pre-specified critical value (NT$10 for example) and zero otherwise.

To investigate the robustness of the lottery premium phenomenon, we cover a wide rage of critical values, varying from as low as NT$3 to as high as NT$140, for the price dummy, *PDUM*. To examine the stability of the lottery premium over time and in various market settings, we also run cross-sectional regressions over three seven-year sub-sample periods and in four market performance environments.

Empirical results

Empirical results over the entire sample period show that while the three pricing factors identified by [2]-beta, size, and book-to-market equity ratio-are generally statistically insignificant, the earnings-price ratio for positive EPS firms and the two dummy variables are all significantly related to stock returns. Notably, the test results, in line with [1], support a strong and persistent presence of a lottery premium over various stock price levels. To be more specific, the average coefficient on the price dummy is statistically significantly negative for all critical values ranging from NT$3 to NT$120. Thus, investors are willing to sacrifice their returns in the amount of lottery premium.

When the entire sample period of July 1982-June 2003 is divided into three seven-year sub-sample periods, empirical work depicts that the significance of earnings-price ratio is persistent throughout the three sub-sample periods while the *EPSdum*'s significance appears only in the most recent sub-sample period. Noticeably, the lottery premium is significantly negative over the last two sub-sample periods. Furthermore, evidence suggests that the lottery premium is higher in the recent past than in the remote past. This finding, once again, is consistent with [1]. They detect a clear upward trend over time in the lottery premium and the size of the premium over their study period of 1987-1999 is twice as big as that of 1963-1975.

Cross-sectional regression results derived from partitioning the 252 sample months into market performance quartiles support a conditional CAPM. The relationship between beta and stock returns is significant and positive during the up markets (highest quartile) and turns significant and negative during the down markets (lowest quartile). Except for the highest quartile, the earnings-price ratio has maintained its significance. When the market performs extremely well, the effect of ratio seems to be overshadowed by the effect of beta and *EPS* dummy. During this time period, the market index and the positive or negative sign carried by *EPS* play a more important role in explaining stock returns than the earnings-price ratio.

The EPS dummy only shows its significance in the top two market performance quartiles. Firms with negative earnings appear to get punished only when the majority of stocks are able to deliver high, positive returns. When the market is down and presumably most stocks, regardless of their positive and negative EPS, are performing poorly with negative returns, investors are not able to effectively differentiate quality (positive-EPS) stocks from inferior (negative-EPS) stocks and, as a result, fail to price them accordingly. At the same time, investors become more pessimistic and desperate as the market performance continues to deteriorate. In this market setting, investors' propensity to gamble is likely to

be greatly enhanced. This conjecture is fully supported by the fact that the average regression coefficient of the price dummy (with a NT$10 critical value) is significantly negative in the lower three market quartiles with its size and *t*-statistic reaching their highest when the market performs the worst.

Further investigation leads to the detection of a persistently significant lottery premium across market performance quartiles in the most recent sub-sample period of July 1996-June 2003. On the other hand, lottery premium is absent in the market over the first sub-sample period of July 1982-June 1989. The significance of the lottery premium during the second sub-sample period of July 1989-June 1996 is only observed when the market performed the worst. The empirical evidence reinforces findings presented earlier that the lottery premium has increased significantly over time and become most noticeable over the most recent past. It suggests that before this most recent time period of July 1996-June 2003, investors in Taiwan were more hesitant to gamble unless the market environment deteriorated to a point to trigger their desperation to pay a price to bet on a remote chance of winning. Thus, it appears that investors' propensity to gamble in Taiwan has intensified over this recent past.

Conclusion

This research examines the empirical relationship between stock returns and stock price level in Taiwan in order to see if a lottery premium exists in the country's stock market. The study produces profound evidence to support a strong, ever growing presence of a lottery premium. Empirical results generated show that investors in Taiwan are willing to sacrifice average return to exchange for a remote chance to earn an abnormal return. As an example, a lottery premium of -2.19%, significant at the 1% significance level, is identified when the critical price level in this study is set at NT$10.

Robustness of the lottery premium is conducted against various critical price levels. A significant lottery premium is detected when the critical value is switched to as low as NT$3 and as high as NT$120. There is also strong evidence suggesting that the lottery premium has more than doubled in the recent past. Thus, the lottery premium is higher in the recent past than in the remote past. These findings are consistent with previous empirical work. Furthermore, we find that the lottery premium is more prevalent in down markets than in up markets for the case of Taiwan.

REFERENCES

[1] Downs, T.W. & Wen, Q. Is there a lottery premium in the stock market? *Journal of Portfolio Management*, 2001, 28, 112-119.

[2] Fama, E.F. & French, K.R. The cross-section of expected stock returns. *Journal of Finance*, 1992, 47, 427-465.

[3] Fama, E. & Macbeth, J. Risk, return, and equilibrium: empirical tests. *Journal of Political Economy*, 1973, 81, 607-636.

[4] Golec, J. & Tamarkin, M. Bettors love skewness, not risk, at the horse track. *Journal of Political Economy*, 1998, 106, 205-225.

[5] Shiller, R. *Irrational Exuberance*, 2nd Ed., Princeton University Press, 2005.