

Disposition Effect Heterogeneity in Lottery-Type Stocks in the Chinese A-Share Market

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Abstract. The research paper focuses on the relationship between selling asymmetry and lottery-like stocks in the Chinese A-share market. This study constructs a disposition effect proxy using the difference between average turnover on up days and average turnover on down days. It adopts publicly available daily trading data covering the period from January 2020 to December 2024 (stock-month frequency). Lottery-type stocks are characterized by high maximum daily returns, high turnover and low share prices and the empirical test includes mean comparison, fixed-effect regression, extension test and robustness analysis. The descriptive findings indicate that there exists a notable distinction in the type of lottery stock versus the normal one. The average selling asymmetry proxy is 0.8516 for lottery-type stocks and 0.3075 for conventional stocks and the t-test is highly significant. Nevertheless, after incorporating lagged control variables, board fixed effects and month fixed effects, the binary lottery dummy variable turns statistically insignificant. On the contrary, the lagged continuous lottery score shows a significantly positive coefficient. The extreme-lottery, bull-market interaction, strong-bull interaction, and ratio-based robustness test do not support the hypotheses initially proposed. Thus, it can be concluded that the characteristics of the lottery are important but only in terms of its intensity and not in terms of being either or.

Keywords: disposition effect, lottery-type stocks, A-share market, selling asymmetry, behavioral finance

1. Introduction

It is the assumption of traditional financial theory that investors are able to make a rational choice between the risk and expected return. According to behavioral finance theory, it can be demonstrated that the investment decision does not always follow the completely rational standards. The prospect theory proposes that people perceive losses and gains in terms of some sort of reference point and exhibit loss aversion, which can be used as an effective explanation of irrational behavior when it comes to selling on the financial market [1].

The disposition effect is a key factor in trading. It is the tendency to sell winning stocks too early and hold on to losing stocks [2]. The data of account trading also proves that it is easier for many investors to sell their profitable positions as compared to selling the unprofitable ones [3]. Recent evidence at the account level of Chinese A share market has also shown that there is a high disposition effect among retail investors and this can be influenced by when they enter the market

[4]. The issue is especially relevant to the Chinese market, where the A-share market is dominated by retail investors, high trading turnover and heterogeneous trading behaviors [5].

Another area of behavioral finance is the stocks lottery. These stocks exhibit payoff distributions similar to lottery tickets since featuring a small probability of extreme positive returns. Such stocks tend to be more demanded by individual investors [6]. One way of approximating the presence of lotteries in empirical studies is through the maximum daily rate of return in the last month, which is commonly known as the MAX measure [7]. Recent studies have also on how gambling and lottery-type demand have been associated with the investor attention, market conditions and reference-dependent preferences [8, 9].

The literature has focused on the lottery effect and the disposition effect. However, it is not known whether there are changes in the strength of selling asymmetry when investors buy a stock that is similar to a lottery stock. In this study, the paper use the Chinese A-share market as an example to test the hypothesis that a stock with lottery-like properties exhibits more asymmetric trading behavior than a normal stock. This paper construct a proxy for the degree of asymmetry at the account level by comparing the turnover of the up days and down days.

2. Literature review

2.1. The disposition effect and related research

The disposition effect has been used to explain the behavior of investors who sell their winning investments too soon and retain losing ones too long [2]. The model is based on the reference point theory, loss aversion, as well as the disposition effect, but the latter has also been shown to be non-mechanically linked to the prospect theory [1, 3]. Empirically, the disposition effect can be quantified by a comparison between realized gains and losses. This type of methods are restricted in the research that uses only the data available at the public market.

The recent studies on the Chinese market offer direct evidence that retail investors exhibit this bias. Zhang et al. employ account-level transaction data from a major Chinese broker and uncover strong evidence of the disposition effect in Chinese retail investors [4]. Tan et al. review the unique structure of the Chinese stock market, highlighting the significance of retail investor behaviour, institutional trading and government regulation in price formation [5]. These characteristics justify the application of the A-share market as a testbed for studying heterogeneous behavioural biases.

2.2. Lottery-type stocks

The lottery stocks are defined as the stocks that have a high chance of positive returns. Kumar is able to establish that the individual investors will favor those stocks which have characteristics of a lottery and the stock selection is associated with gambling behavior in financial markets [6]. Bali, Cakici and Whitelaw propose the measure MAX and it has been demonstrated that the cross section of expected return on the stock is highly correlated with the lagged extreme positive returns [7].

The recent literature expands this work to other market states and China-related contexts. Gong et al. look into the time when investors take risks in the stock market and demonstrate that demand of lotteries differs depending on market conditions [8]. Lu et al. offer new evidence based on China that preference of lottery is associated with social preference and firm characteristics in asset pricing [9]. These studies suggest that lottery-like features are not only price factors but also behavioral indicators which can affect trading decisions.

2.3. Lottery characteristics and behavioral deviations

The features of lottery are highly associated with reference-dependent preferences. An et al. demonstrate that the anomalies in relation to lotteries vary depending on the gain and loss areas of investors, which implies that the attitude of investors towards assets similar to lotteries is influenced by reference points [10]. The expression of behavioral bias can also be modified by market sentiment. According to Yang and Yang, the disposition effect is related to market conditions and investor mood in the Chinese stock market [11]. Du et al. also demonstrate that nominal prices influence the participation of retail investors in China, which is directly applicable as one of the factors of the definition of the lottery-stock applied in this paper is low price [12].

The current paper has the role of joining these two research areas. Rather than posing a question on whether lottery stocks are more preferred by investors, it asks how much of the asymmetry in selling is related to such characteristics as the lottery-like nature of the stock after holding them. The empirical design will thus be based on heterogeneity of disposition effect with respect to the properties of the stocks.

3. Theoretical analysis and hypotheses

This research has been founded on the notion that selling behavior can be affected by both reference dependence and lottery type of expectations. The investor may not sell a stock at loss as it is a psychological cost to realize the loss in the case of holding a stock at a loss. In the event that the stock also possesses some of the qualities of a lottery, the investors place higher expectations on price rebound. This expectation would cause hesitation to sell the losing positions and could result in stronger asymmetry of sales.

The anticipated trend at the stock level is that lottery-type stocks are expected to have relatively more turnover on up days than down days. This pattern is in line with the disposition effect as investors are more likely to trade when gains are available and less willing to trade when losses are implied. The interpretation is necessarily indirect since public market data do not indicate each investor's purchase price, account history or realized gains and losses.

The first hypothesis states that the selling-asymmetry proxy of lottery-type stocks is higher than that of normal stocks. The second hypothesis suggests that extreme lottery-type stocks have a greater selling asymmetry than ordinary lottery-type stocks. The third hypothesis predicts that the relationship between lottery-type stocks and selling asymmetry becomes stronger during bullish market conditions, when investors may form more optimistic expectations about future price increases.

4. Research design

4.1. Data source and sample selection

This study uses daily trading data of Chinese A-share companies available publicly in January 2020 to December 2024. The analysis is performed at the stock-month level. ST stocks are not included because it minimizes the effect of abnormal operating conditions and risk of delisting. Only when a stock has at least 15 valid trading days in the month does an observation of stock-month remain, which enhances the validity of the turnover-based proxy.

The dependent variable is the selling asymmetry proxy. This is because the authors cannot get a hold of the actual buying and selling records of retail investors, which means that the real-gain and

loss cannot be used. The difference between the average turnover in the up days and the average turnover in the down days is computed as follows: equation (1).

$$SellAsymmetry_{i,m} = UpTurnover_{i,m} - DownTurnover_{i,m} \quad (1)$$

4.2. Variable definitions

In equation (1), $UpTurnover_{i,m}$ is the average turnover rate of stock i on rising trading days in month m , and $DownTurnover_{i,m}$ is the average turnover rate of stock i on falling trading days in the same month. A higher value of $SellAsymmetry_{i,m}$ indicates that trading activity is stronger on up days than on down days, which is consistent with the selling-winners-and-holding-losers pattern.

The lottery type stocks are those that have three monthly features, which include a high maximum daily return, a high average turnover and a low average price. A stock is termed to be a lottery-type stock in case the maximum single-day gain in the month is higher than 80th percentile, the mean of the turnover in the month is higher than the 80 th percentile, and the average price in the month is less than 40 th percentile. In the event where the three indicators fall between the 30 th and 70 th percentiles then it is classified as a normal stock. The more stringent definition of the extreme lottery-type stocks is: the maximum daily rate of return per month over the 90 th percentile, the average turnover of the stock in the month over the 90 th percentile, and the average price of the stock in the month under the 30 th percentile.

There is also a continuous lottery score that is developed to measure the strength of lottery-like attributes. This score is a combination of standardized maximum daily return, standardized turnover and standardized price as illustrated in equation (2).

$$LotteryScore_{i,m} = z(MAX_{i,m}) + z(Turnover_{i,m}) - z(Price_{i,m}) \quad (2)$$

4.3. Model design and empirical strategy

The primary regression test is the binary lottery classification to explain selling asymmetry after controlling stock characteristics and fixed effects. The baseline specification is presented in equation (3).

$$SellAsymmetry_{i,m} = \alpha + \beta_1 Lottery_{i,m-1} + \Gamma Controls_{i,m-1} + \gamma_m + \delta_b + \varepsilon_{i,m} \quad (3)$$

In equation (3), $Lottery_{i,m-1}$ is the lagged lottery dummy. $Controls_{i,m-1}$ includes lagged stock-level control variables such as price, valuation ratios, return, and volatility. Month fixed effects absorb market-wide time shocks, and board fixed effects control for differences across major listing boards. The model is also estimated with the continuous lottery score, as shown in equation (4).

$$SellAsymmetry_{i,m} = \alpha + \beta_1 LotteryScore_{i,m-1} + \Gamma Controls_{i,m-1} + \gamma_m + \delta_b + \varepsilon_{i,m} \quad (4)$$

The long-run tests consider the extreme lottery stocks and market conditions. Equation (5) substitutes the base-line lottery dummy by the extreme-lottery dummy. Equation (6) introduces an interaction between the bull-month indicator and the lottery dummy. $BullMonth_m$ is one in case of positive monthly return of the CSI 300 Index. An alternative measure of market-state that is based

on high CSI 300 monthly returns is also a strong-bull indicator. Lastly, the ratio-based robustness check is used instead of the difference-based proxy with the ratio in equation (7).

$$SellAsymmetry_{i,m} = \alpha + \beta_1 ExtremeLottery_{i,m} - 1 \quad (5)$$

$$+ \Gamma Controls_{i,m} - 1 + \gamma_m + \delta_b + \varepsilon_{i,m}$$

$$SellAsymmetry_{i,m} = \alpha + \beta_1 Lottery_{i,m} - 1 + \beta_2 BullMonth_m + \beta_3 Lottery_{i,m} - 1 \quad (6)$$

$$\times BullMonth_m + \Gamma Controls_{i,m} - 1 + \gamma_m + \delta_b + \varepsilon_{i,m}$$

$$SellRatio_{i,m} = UpTurnover_{i,m} / DownTurnover_{i,m} \quad (7)$$

All empirical analyses are conducted at the stock-month level. Daily data is transformed into monthly variables first. It creates the lottery classification, selling-asymmetry proxy and control variables. The process starts with descriptive means comparison and t-tests that are independent samples. Then it goes on to lagged regressions controls, fixed effects on months and board fixed effect. This procedure will make a distinction between group differences and relationships which do not depend on the observable characteristics of stocks as well as market-wide shocks.

5. Empirical results

5.1. Descriptive results and mean comparison

The final sample contains 25,611 stock-month observations, including 7,649 lottery-type stock observations and 17,962 normal stock observations. Table 1 reports the descriptive comparison. The mean value of the selling-asymmetry proxy is 0.8516 for lottery-type stocks and 0.3075 for normal stocks. The independent-sample t-test produces a t-statistic of 33.2401 and a p-value of 8.19×10^{-229} . The descriptive evidence therefore shows that lottery-type stocks have higher selling asymmetry than normal stocks before adding controls and fixed effects.

Table 1. Descriptive comparison of selling asymmetry by stock type

Group	Observations	Mean selling asymmetry	t-statistic	p-value
Lottery-type stocks	7,649	0.8516		
Normal stocks	17,962	0.3075		
Mean difference	25,611	0.5441	33.2401	8.19×10^{-229}

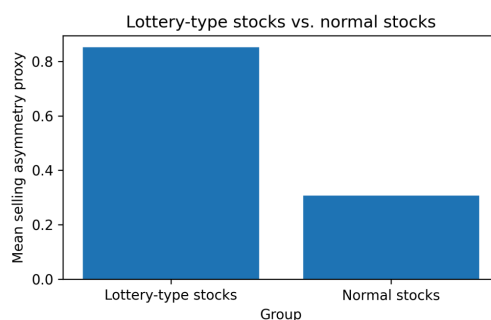


Figure 1. Mean selling asymmetry by stock type

Figure 1 visually confirms the descriptive pattern in Table 1. Lottery-type stocks show a higher average selling-asymmetry proxy than normal stocks before control variables and fixed effects are added.

5.2. Main regression results

The results of the main regression are shown in Table 2. The value of the coefficient of the dummy variable, which is a binary lottery, in model M1 is -0.0101 and p-value is 0.7485. This insignificant coefficient fails to support Hypothesis 1 (H1) even after the lagged controls, month fixed effects and board fixed effects have been added. Thus, the descriptive difference in table 1 is not a strong indicator that the category of the binary lottery-type is what leads to more asymmetry in selling.

The lagged continuous lottery score has a coefficient of 0.0314 in model M2 and is significant at the 5 percent level. This finding shows that greater lottery-like traits are linked to greater selling asymmetry when lottery characteristics are considered as a measure of intensity on a continuous scale. The result is more conservative than the initial binary hypothesis: there is evidence of an intensity-based relationship, but no evidence of a simple lottery-versus-normal classification after controls.

Table 2. Main regression results

Model	Key variable	Coefficient	Std. error	p-value	N	Adj. R ²
M1	lottery_dummy	-0.0101	(0.0315)	0.7485	25,611	0.159
M2	lag_lottery_score	0.0314**	(0.0139)	0.0243	25,611	0.159

Note: Standard errors are reported in parentheses. Both models include lagged control variables, month fixed effects, and board fixed effects. ** p < 0.05.

5.3. Extension tests and robustness checks

The extension tests and robustness checks are presented in Table 3. Model M3 is used to test whether extreme lottery-type stocks have more selling asymmetry. The coefficient of extreme_dummy is positive but not significant, therefore H2 is not supported. Models M4 and M5 are used to examine market-state heterogeneity. The interaction terms between the lottery dummy and bull-market indicators are negative and statistically insignificant. These results do not support H3 and do not show that bullish market conditions strengthen the association between lottery-type stocks and selling asymmetry.

The robustness test in model M6 substitutes the difference-based selling-asymmetry proxy by a ratio-based proxy. The dummy coefficient of the lottery is negative and marginally significant at the 10% significance level, which does not support the expected positive binary lottery effect. On the whole, the evidence on the robustness supports the main conclusion that the binary classification is unstable whereas the continuous lottery score offers the most convincing evidence of an association with selling asymmetry.

Table 3. Extension tests and robustness checks

Model	Purpose	Key variable	Coefficient	Std. error	p-value	N	Adj. R ²
M3	Extreme lottery test	extreme_dummy	0.0262	(0.0723)	0.717	25,611	0.153
M4	Bull-market interaction	lottery_dummy × bull_month	-0.0200	(0.0297)	0.501	25,611	0.159

Table 3. (continued)

M5	Strong-bull interaction	lottery_dummy × strong_bull_month	-0.0495	(0.0318)	0.120	25,611	0.159
M6	Ratio-based robustness	lottery_dummy	-0.0132*	(0.0079)	0.096	25,611	0.147

Note: Standard errors are reported in parentheses. Models M3-M5 use the difference-based selling-asymmetry proxy. Model M6 uses the ratio-based proxy. All models include lagged control variables, month fixed effects, and board fixed effects. * $p < 0.10$.

6. Discussion

The findings of the empirical studies are contradictory. The analysis of the descriptive comparison indicates that lottery stocks have a greater tendency to sell as compared to the normal stocks. Nevertheless, it is not significant in the main regression where lagged controls and fixed effects are introduced. This means that H1 cannot be proved within the framework of the controlled regression. It is therefore important to note that the conclusion of the abstract and conclusion should focus on the fact that the evidence of H1 is not strong but rather descriptive.

Another possible explanation is that the binary lottery dummy is too coarse. It separates stocks into lottery-type and normal groups but does not maintain the strength of lottery-like characteristics. Stocks close to the percentile threshold may be grouped together with much more extreme lottery stocks, which reduces the explanatory power of the dummy. The continuous lottery score better captures variation in lottery intensity and is therefore more consistent with the regression evidence.

The insignificant extreme-lottery result is also worth caution. The stocks of extreme lottery-type can be less liquid, have higher bid-ask spreads or more speculative trading noise. These traits can diminish the capacity of turnover disparities to capture reluctance to sell explicitly. Besides that, the effective number of observations decreases with the extreme definition and this can decrease the statistical power.

The insignificant bull market interactions mean that the bullish markets do not have to be the ones which enhance the selling asymmetry in lottery type of stocks. The effect of a predicted interaction can be reduced by investors changing their reference point during the period of bullishness, or by selling winning positions more aggressively. There is also a chance that it is not accurate enough to indicate investor sentiments or heterogeneous expectations with a simple CSI 300 monthly return indicator.

This study has several limitations. First, the study is based on stock-level data in the form of public information and not individual account data, meaning that it cannot directly observe the purchase price of each investor, realized gains, or realized losses. Second, lottery-type stocks can overlap with speculative, small, low-priced, or high-volatility stocks, which complicates causal interpretation. Third, standard errors in the final tables were reconstructed using reported coefficients and p-values as full regression output files were not provided. Future research should employ investor-level trading records, alternative definitions for lotteries, and longer market cycles to confirm the mechanism more directly.

7. Conclusion

The paper will focus on the question of whether the selling asymmetry in the Chinese A share market is more intense when the lottery-like features are present. The descriptive findings indicate that a much larger proxy of selling-asymmetry exists with the stocks that are lotteries than normal

ones. Nevertheless, the binary hypothesis of lottery-stock does not hold under the controlled regression. It is only when the score of the characteristics of lottery is taken as a continuous score that there is a strong positive outcome. H2 and H3 also cannot be supported since the tests of extreme-lottery and bull-market interaction are statistically insignificant.

The overall conclusion is thus tentative: lottery-like features could be associated with selling asymmetry, but such an association is better characterized as an intensity relation than as a group difference between lottery-type and regular stocks. This study enriches behavioral finance research on lottery-type stocks by focusing on selling preferences, rather than traditional buying preferences. At the same time, it demonstrates that empirical assertions need to be brought into line with regression evidence and robustness tests.

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