Trading volume and price pattern in China's stock market: A momentum life cycle explanation

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ABSTRACT

This paper analyzes the relation between trading volume and stock return in China's stock market using the Momentum Life Cycle theory. Examination of daily Chinese stock market data from the 1990 to 2007 period reveals that the explanatory power of the Momentum Life Cycle theory is the strongest in the winner portfolios and those portfolios with longer horizons. The results are robust to different volume classifications and winner/loser classifications.

Keywords: Momentum Life Cycle theory, trading volume, stock price pattern

INTRODUCTION

The failure of the traditional neoclassical finance model in explaining the lead-lag relation between trading volume and stock return has inspired several new behaviorally-based finance models. One notable stream of literature analyzes the relation between trading volume and stock return from the aspect of the profitability of momentum or contrarian strategies, such as Lee and Swaminathan's (2000) Momentum Life Cycle (MLC) theory, Daniel, Hirshleifer, and Subrahmanyam's (1998) overconfidence bias on glamour stocks, and Hong and Stein's (1999) information diffusion effect.

Ding, McInish, and Wongchoti (2007) investigate the lead-lag patterns between trading volume and stock returns in seven Asia-Pacific markets: Japan, Korea, Taiwan, Hong Kong, Malaysia, Singapore, and Thailand. They found that Lee and Swaminathan's (2000) MLC theory best explains the trading volume and stock return patternstrading volume could be used as a key variable to predict subsequent stock prices.

The current study explores the lead-lag relation between trading volume and stock return in China's A-share market using the MLC theory. China was selected as the target market for three reasons: First, China's stock market is usually independent of the markets in the United States (Lee and Rui, 2000) due to its unique market paradigm and institutional arrangements. The findings from U.S. and other eastern countries may not be necessarily generalized to China's stock market however. It also relieves the concern of data snooping biases. Second, although China's stock market has been experiencing rapid growth, little is known about the pricing behavior of its stock. To the authors' knowledge, no study has investigated the lead-lag relation between trading volume and stock return in China's stock market using the MLC theory. This paper focuses on the intra-market lead-lag patterns between the market trading volume and market return in China's A-share market. Only a few papers have investigated the *role of trading volume* in predicting stock returns in China's stock market (Chiang et al., 2007; and Chuang et al., 2012; and Lee and Rui, 2000). However, these studies looked at the inter-market causal relationship between trading volume and stock returns between China's A-share and B-share markets and U.S. and Hong Kong stock markets. Lastly, a better understanding of the relation between trading volume and stock return is likely to have pertinent implications for investment and diversification strategies. According to Zhu (2007), the strong negative relation between lagged trading volume and subsequent return only exists in China's A-share market; thus, the MLC explanation is only applicable to China's A share market. China's B-share market, on the other hand, exhibits a totally different price-volume pattern in which lagged returns can be used to predict subsequent trading volume. The strong positive relation between lagged market return and subsequent trading volume in China's B-share markets best fits the expectations of Statman, Thorley, and Vorkink's (2006) overconfidence bias hypothesis. Investors who are interested in investing in China should be aware of the different lead-lag patterns between volume and return in China's A-share and B-share markets.

Consistent with the findings from Ding, McInish, and Wongchoti (2007), the results of the current study indicate that the relation between trading volume and stock return in China's A-share market can be explained by the MLC theory. Specifically, late-stage momentum performers, including high (low) volume winners (losers), encounter price reversals, while early-stage momentum performers, including low (high) volume winners (losers), experience price momentum. Among 48 cases based on different horizons and classification methods for winners/losers and trading volume, the MLC theory explains 21 cases for the relations between

trading volume and profitability of momentum/contrarian strategies. Although the MLC theory somewhat justifies the high volume contrarian return and low volume momentum return of winner stocks in 15 of 24 cases, the low volume contrarian returns and high volume momentum profits of loser stocks are found in only 6 of 24 cases.

The rest of this paper is organized as follows. In section 2, we review the Momentum Life Cycle theory; Section 3 describes the data; Section 4 explains the methodology; Section 5 analyzes the results and Section 6 is the conclusion.

MOMENTUM LIFE CYCLE THEORY

Lee and Swaminathan (2000) propose the Momentum Life Cycle (MLC) theory to explain the interconnection between trading volumes and the stock return patterns of winner/loser stocks in US markets during the 1965 to 1995 period. Figure 1 in the Appendix demonstrates the framework of the theory from the aspect of momentum and contrarian profits for winner/loser stocks with different volume levels.

Figure 1 shows that stocks experience a dynamic life cycle of investor favoritism (high trading volume and number of participating analysts) and neglect (low trading volume and fewer analysts). During the period of favoritism, stocks are initially classified as high trading volume winners. The prices of stocks are bid up as more investors want to share the market gains. As a result, these stocks will be eventually become overvalued with return reversion on the horizon. When return reversion begins as popularity begins to fall, stocks become high volume losersdeclines in performance. Eventually these low-performing stocks will lose their popularity and end up as low volume losers. Over time, value investors may purchase these stocks due to their relatively lower prices and positive surprises may move stocks to the next phase: low trading volume winners. The trading volume continues to escalate until stocks are again high trading volume winners. This cycle then starts again. The MLC identifies high (low) trading volume winners (losers) as late stage momentum stocks that are likely to reverse, thus are profitable under the contrarian strategy. In a profitable momentum strategy, low (high) trading volume winners (losers) are viewed as early stage momentum stocks whose momentum is likely to continue, at least in the short term.

DATA

This study covers daily stock returns from December 12, 1990 to March, 2007 for the Shanghai A Index and from September 30, 1992 to March, 2007 for the Shenzhen A Index. The study examines the daily returns of individual stocks, share prices, market returns, shares outstanding, shares traded, and market capitalization from the Taiwan Economic Data Bank, TEJ Database of Taiwan Economic Journal Co. Ltd.

Table 1 summarizes the statistical characteristics of China's A-share market. A-shares are quoted in Chinese currency (RMB) and foreign investment is allowed through a regulated structure known as the Qualified Foreign Institutional Investor (QFII) system.

A-shares are listed on both the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) in China. SHSE is larger than SZSE in terms of the number of listings and market capitalization. The highest average return for the overall market was 5.9%. The number of stocks in our sample ranges from 7 in 1991 to 1,247 in March 2007.

METHODOLOGY

Classification of Trading Volume Levels

The stocks are classified into three groups based on Ding, McInish, and Wongchoti's (2007) method to test the MLC theory among stocks with different trading volume levels across diverse horizons in China's A-share market. For each year *t*, the sample stocks are divided into high, medium, or low volume according to their daily average turnover during the previous year, *t-1*. In order to minimize the potential effects of trading volume classification on the final results, three schemes (different cutoff points for classification) are used to classify the stocks into high, medium, or low levels. In the first scheme, the sample is divided equally: the top, medium, and bottom thirds are classified as high, medium, or low trading volume, respectively. In the second scheme, the extreme top and bottom of 20% and remaining medium 60% are classified as high, low, or medium trading volume, respectively. In the third scheme, the extreme top and bottom 10% and remaining 80% are classified as high, low, or medium trading volume, respectively. We then conduct a weighted relative strength scheme (WRSS) portfolio method to test the MLC hypothesis. Following Ding, McInish, and Wongchoti (2007), Hameed and Ting (2000), and Lee and Swaminathan (2000), turnover ratio is used as the proxy for trading volume, calculated as the number of shares traded divided by the number of shares outstanding. The turnover ratio is thought to be able to help determine the size effect of the firm that is incorporated in pure trading volume measures.

Weighted Relative Strength Scheme

Following Ding, McInish, and Wongchoti (2007), the stock return pattern is indicated by the trading profits on portfolios created using a weighted relative strength scheme (WRSS) (Lo and MacKinlay, 1990). Under the WRSS method, investors form their portfolios based on how well the stocks did in the ranking/formation period. During the ranking/formation period, they will typically buy stocks with positive excess returns with the expectation that the momentum will continue. Higher weights are then placed on the top performers. Likewise, investors will sell stocks with negative excess returns, with the worst performers given a higher weight. Unlike previous studies, this paper uses both value-weighted and equally-weighted market returns to classify the winner and loser stocks. Stocks that outperform (underperform) the market are classified as winners (losers). During each ranking/formation period *t*, an individual stock is allocated a weight in a WRSS portfolio as follows:

$$w_{i,t} = \frac{1}{N}(r_{i,t-1} - \overline{r_{t-1}}), \tag{1}$$

where $r_{i,t-1}$ is the return of stock *i* during the ranking/formation period *t-1*, $\overline{r_{t-1}}$ is the market return in period *t-1* either as a value-weighted or equal-weighted market return, and *N* is the number of stocks. Profit can be measured as:

$$\pi_t = \frac{1}{N}\sum_{i=1}^{N} r_{i,t}(r_{i,t-1} - \overline{r_{t-1}}). \tag{2}$$

If the calculated profit from equation (2) is positive (negative), it supports the momentum (contrarian) strategy and hence, price momentum (reversals). To be consistent with literature, the profits are multiplied by a factor of 1000. The performance of the WRSS momentum trading

strategy is examined for the eight subsequent periods (horizons that are monthly, quarterly, semi-annually, and annually). The momentum (contrarian) profit during the observation period k (k=8) is calculated as:

$$\pi_{j,t}(k) = \frac{1}{N}\sum_{i=1}^{N_j} W_{i,t} r_{i,t+k-1}, \quad (3)$$

where j=L, W, and A (loser, winner, and loser plus winner, respectively).

In addition, three methods of trading volume classification are employed, along with two winner/loser classifications (value- and equal-weighted); thus, there are six classifications of final results. A relative measure of profits is determined by averaging the portfolio results from the six classifications and then subtracting the corresponding averaged value from the absolute profits of winners and losers under each level of trading volume: high, medium, and low.

EMPIRICAL RESULTS

Profitability of Momentum/Contrarian Strategies under Different Horizons

Tables 2 to 7 illustrate the relation between the relative profitability of the WRSS contrarian/momentum strategies and trading volume based on different horizons (monthly, quarterly, semi-annually, and annually) in China's A-share market. Tables 2, 3, and 4 show the results of the three classification schemes with winners/losers classified based on value-weighted market returns and trading volumes. Likewise, Tables 5, 6, and 7 present the results of the three classification schemes when winners/losers are divided based on equal-weighted market return and trading volumes. Employing different classification methods of winners/losers and trading volumes permits a test of whether or not the results are sensitive to the different methods used, thus increasing the reliability and robustness of this study.

For better interpretation, the findings from 2 to 7 are summarized in Table 8 to permit evaluation of whether or not the results are consistent with the MLC theory. The findings first show that in most cases there is a monotonic relation between trading volume and the profitability of the contrarian/momentum strategies. In Panel B of Table 2, high volume winners experience price reversals from K=2 to K=3, with returns from 0.0085 to -0.0400; low volume winners have an upward price trend. This pattern persists when different volume classifications and equal-weighted market return are used. The results indicate that the contrarian strategy works for high volume winners and low volume losers, while the momentum strategy favors low volume winners and high volume losers. This is consistent with the prediction from Figure 1. In general, the equal-weighted method to distinguish winners and losers yields better results than does the value-weighted method, with 13 of 24 cases being supported.

Second, the relation between trading volume and the profitability of contrarian/momentum strategies is more pronounced over the long horizon than over a short one. As longer periods were employed, more cases got supported. The findings reveal that late stage momentum performers, including high volume winners and low volume losers undergo price reversals, which is profitable when using a contrarian strategy, whereas early stage momentum performers, including low volume winners and high volume losers, experience price momentum, which is profitable under a momentum strategy. The MLC theory can be better supported over the longer horizon as it normally takes time for both the market and investors to assess new information. Empirical studies show that the market is at best weak-form efficient and the stocks will not likely be placed in different classifications over a short period of time.

Third, more cases are supported in winner portfolios than in loser portfolios. Six out of 24 cases are supported in the loser portfolios, while 15 of 24 cases are detected in the paring winner portfolios. Losers and winners exhibit different price patterns, implying there is an asymmetric reaction to news, either good or bad. Due to some market friction, information is incorporated more quickly into the prices of some stocks than others. For example, winner stocks may be held by investors with faster access to breaking news and the resources required to exploit it. Even with delayed price reaction, the winner stocks may benefit from contrarian/momentum strategies given different trading volumes. The MLC theory's ability to better explain winners than losers indicates that winner stocks react to market information faster than loser stocks in both up and down markets.

CONCLUSIONS

This study adds to the literature by explaining the strong negative relation between trading volume and stock price in China's A-share market using the Momentum Life Cycle theory. We found that the MLC theory does reasonably well in explaining the trading volume and price patterns in China's A-share market. In particular, late stage momentum performers, including high (low) volume winners (losers), will likely experience profits under a contrarian strategy, whereas early stage momentum performers, including low (high) volume winners (losers), will likely experience profits under a momentum strategy. The effect is more pronounced in winner portfolios with longer horizons. Our results are robust to different volume classifications and winner/loser classifications.

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APPENDIX

Figure 1
The Framework of Momentum Life Cycle Hypothesis (Source: Lee and Swaminathan, 2000)

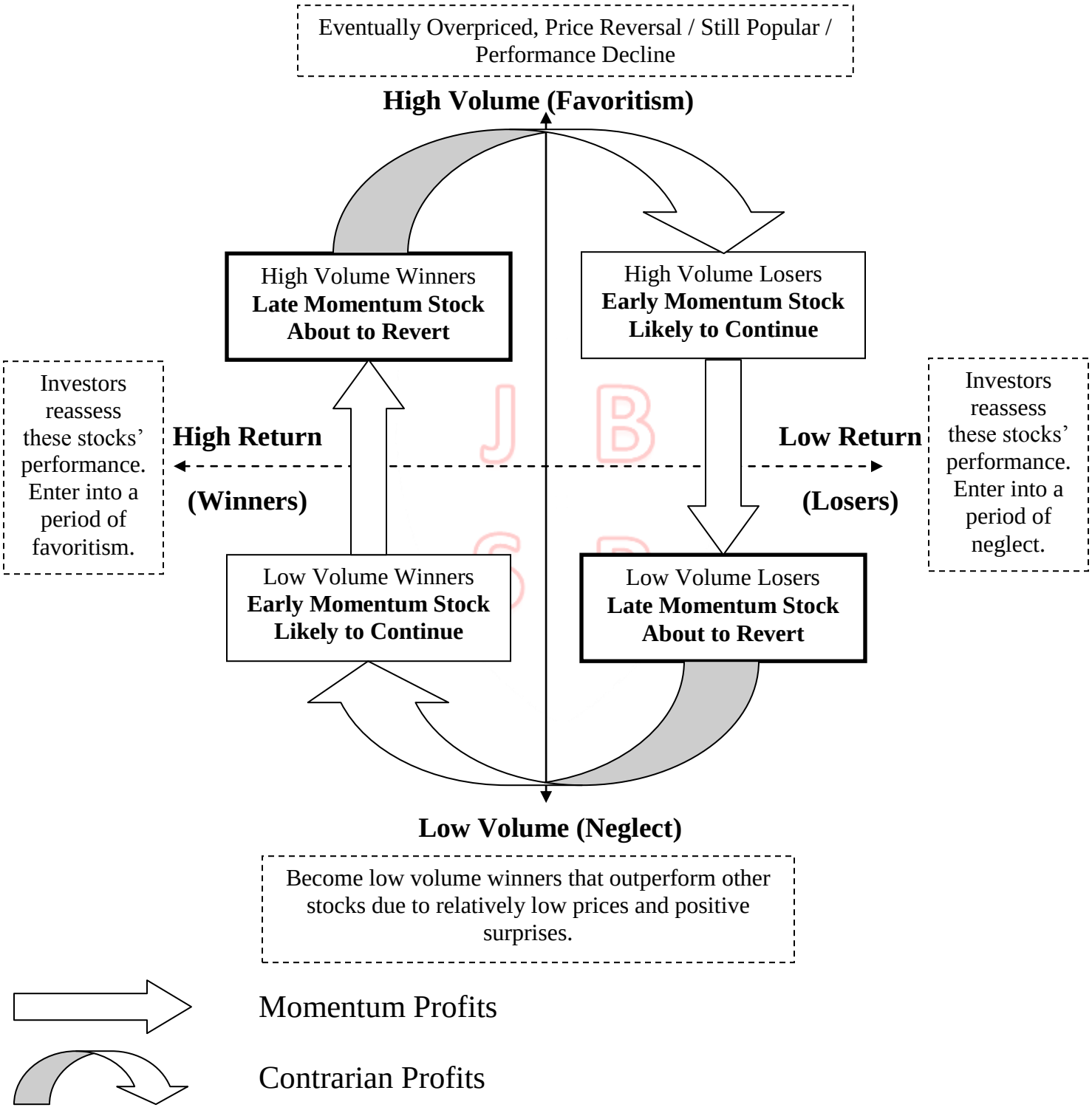

Table 1

Descriptive Statistics of China's A Share Market

The table provides the descriptive statistics of China's A-share market over the period from 1991 to 2007. The number of stocks refers to the total number of firms that have data available for our analysis. The return is the monthly average returns on the SHSE or SZSE composite index respectively, in percent. Market Capitalization is the monthly average market capital on the stock in each stock exchange.

	No. of Stocks			**Return**			**Market Capitalization**		
	SHSE	SZSE	Whole	SHSE	SZSE	Whole	SHSE	SZSE	Whole
1991	7	0	7	0.057	-	0.057	20630.45	-	20630.45
1992	7	4	11	0.046	0.076	0.057	41495.03	2394.34	27276.59
1993	29	22	51	0.023	-0.014	0.007	2376.87	2056.80	2238.80
1994	101	75	176	-0.009	-0.061	-0.031	1656.53	1071.49	1407.23
1995	168	115	283	-0.006	-0.024	-0.013	1465.08	761.64	1179.23
1996	183	124	307	0.029	0.103	0.059	1824.20	1289.50	1608.23
1997	286	224	510	0.008	-0.003	0.003	2390.06	2078.32	2253.14
1998	370	343	713	0.006	-0.003	0.001	2619.14	2286.69	2459.21
1999	423	395	818	0.022	0.019	0.021	2968.38	2449.02	2717.59
2000	468	447	915	0.031	0.033	0.032	4096.99	3676.72	3891.68
2001	554	496	1050	-0.024	-0.028	-0.026	4341.39	3721.56	4048.59
2002	630	495	1125	-0.010	-0.008	-0.009	3951.39	2903.71	3490.41
2003	699	489	1188	-0.016	-0.016	-0.016	3598.50	2610.92	3192.00
2004	761	486	1247	-0.023	-0.021	-0.022	3557.12	2459.09	3129.18
2005	818	481	1299	-0.007	-0.008	-0.008	2626.03	1819.57	2327.41
2006	813	474	1287	0.033	0.035	0.034	3372.56	2280.56	2970.38
2007	799	448	1247	0.216	0.234	0.223	5866.70	4136.04	5244.94

Table 2

Relative Relation between Trading Volume and Stock Return Patterns based on **Value-Weighted** Winner/Loser Division and **Equally Divided** High/Medium/Low Trading volume method

		Observation Intervals (K)						
		2	**3**	**4**	**5**	**6**	**7**	**8**
Panel A: Monthly								
Winner	High	-0.01166	-0.02002	-0.0016	-0.00908	-0.00514	-0.02239	-0.00908
	Medium	0.021401	0.018392	0.007806	0.024066	0.022612	0.029303	0.006639
	Low	-0.04131	-0.06277	-0.0092	-0.03815	-0.01713	-0.02039	-0.01569
Loser	High	-0.02777	-0.02655	-0.0392	-0.03252	-0.03349	-0.01713	-0.02294
	Medium	-0.00476	-0.00104	0.008427	-0.00755	-0.00561	-0.01432	-0.00021
	Low	-0.14137	0.000801	-0.05648	-0.01695	-0.06862	-0.03021	-0.02777
Panel B: Quarterly								
Winner	High	0.010848	0.008454	-0.04004	-0.00716	-0.03177	-0.02507	-0.02208
	Medium	0.00845	0.012038	-0.00447	-0.00316	-0.00609	-0.00858	-0.00695
	Low	-0.02625	-0.0207	-0.01609	0.007467	-0.00306	0.010636	-0.00139
Loser	High	-0.03397	-0.02826	-0.00728	-0.02183	-0.01229	-0.01516	-0.01247
	Medium	-0.01141	-0.01294	-0.00123	-0.00635	-0.00038	0.003249	0.003519
	Low	-0.09618	-0.02854	-0.00836	-0.02036	0.001809	-0.01496	-0.0016
Panel C: Semi-Annually								
Winner	High	-0.2392	-0.30458	-0.51793	-0.30915	-0.34706	-0.11894	-0.08125
	Medium	-0.12486	-0.09133	-0.23036	-0.08355	-0.02115	0.042166	0.030235
	Low	-0.11413	-0.16709	-0.01345	-0.0588	0.066395	0.012502	-0.05056
Loser	High	-0.19019	-0.12021	-0.10265	-0.00409	-0.13307	-0.1292	0.011313
	Medium	-0.10851	0.111334	0.299632	-0.00985	0.021553	-0.05648	0.017828
	Low	-0.25571	0.012399	-0.18689	0.04872	-0.0011	0.007785	-0.01536
Panel D: Annually								
Winner	High	0.296033	-0.53649	-0.91246	-0.17587	-0.19159	-0.18051	-0.10545
	Medium	-1.71205	-1.5971	-0.32648	-0.24352	-0.31475	-0.32137	-0.23025
	Low	-1.48617	-0.73768	0.294386	0.235502	-0.11804	0.081583	-0.37844
Loser	High	1.78395	0.410096	0.493323	0.108799	0.07179	0.196812	-0.06723
	Medium	0.05927	1.471349	-0.46082	0.199538	0.537921	0.555352	0.030104
	Low	2.055185	0.794458	0.69268	-0.86175	0.440085	-0.00894	-0.18915

*To better illustrate, the numbers are all scaled by 100 times.

This table presents the relation between trading volume and return patterns in horizons of monthly, quarterly, semi-annually and annually in China A-share market. Negative numbers represent relative WRSS contrarian profits (price reversal); Positive numbers represents relative WRSS momentum profits (price momentum).

Table 3

Relative Relation between Trading Volume and Stock Return Patterns based on **Value-Weighted** Winner/Loser Division and Divided High/Medium/Low Trading Volume by **20% Extreme Values**.

		Observation Intervals (K)						
		2	**3**	**4**	**5**	**6**	**7**	**8**
Panel A: Monthly:								
Winner	High	0.015564	0.006136	0.019531	0.019013	0.029988	-0.0011	0.022958
	Medium	0.009367	0.005864	0.005405	0.013475	0.008429	0.015458	0.003944
	Low	0.052243	-0.06811	0.025584	-0.039	0.014418	-0.01623	-0.01236
Loser	High	-0.01351	-0.00353	-0.02352	-0.02007	-0.02504	0.003115	-0.02232
	Medium	-0.0046	-0.00409	-0.00149	-0.00851	-0.00627	-0.00887	0.006778
	Low	-0.11401	0.034102	-0.05111	0.009611	-0.06653	-0.02777	-0.03023
Panel B: Quarterly:								
Winner	High	0.038319	0.029714	-0.02194	-0.00231	-0.01906	-0.00762	-0.00742
	Medium	0.008247	0.008133	-0.00973	0.005803	-0.00235	-0.00445	-0.00417
	Low	0.028856	-0.00566	8.94E-06	0.02072	-0.00168	0.02502	-0.00155
Loser	High	-0.03104	-0.00947	0.00858	-0.01562	-0.0006	-0.0016	-0.00048
	Medium	-0.01126	-0.01347	0.004153	-0.00247	0.005204	0.003085	0.00813
	Low	-0.06758	-0.01754	0.000713	-0.01731	0.007314	-0.01004	-0.01227
Panel C: Semi-Annually								
Winner	High	0.020564	-0.1059	-0.39987	-0.23102	-0.20777	0.041373	-0.09904
	Medium	0.022707	-0.14818	-0.20955	-0.06292	0.016501	0.029023	0.001282
	Low	-0.25274	-0.09152	0.181974	0.011114	-0.01951	0.028547	0.033382
Loser	High	-0.11137	0.146626	0.123857	0.268284	0.149359	-0.02388	0.052535
	Medium	0.001166	0.061335	0.180818	0.045169	0.002065	0.001564	0.01564
	Low	-0.18284	-0.02837	-0.22631	-0.0019	-0.01793	-0.01314	0.031026
Panel D: Annually								
Winner	High	6.05E-05	-0.41308	-0.44745	-0.18356	-0.19244	-0.07337	-0.21455
	Medium	-1.27813	-1.25897	-0.11015	-0.22005	-0.30478	-0.38877	-0.29251
	Low	-1.63794	-0.83268	-0.12528	1.353952	-0.21784	0.318377	0.165915
Loser	High	-0.8473	0.438385	0.796932	0.157392	0.057811	0.144506	0.088347
	Medium	1.532328	1.273928	0.408526	0.226452	0.375829	0.310513	0.121293
	Low	2.099447	-0.04908	-0.15006	-0.94972	0.276387	-0.06172	-0.56973

*To better illustrate, the numbers are all scaled by 100 times.

This table presents the relation between trading volume and return patterns in horizons of monthly, quarterly, semi-annually and annually in China's A-share market. Negative numbers represent relative WRSS contrarian profits (price reversal); Positive numbers represents relative WRSS momentum profits (price momentum).

Table 4

Relative Relation between Trading Volume and Stock Return Patterns based on **Value-Weighted** Winner/Loser Division and Divided High/Medium/Low Trading Volume by **10% Extreme Values**.

Observation intervals (K)								
		2	**3**	**4**	**5**	**6**	**7**	**8**
Panel A: Monthly								
Winner	High	0.060021	0.060792	0.062504	0.044853	0.042496	0.016952	0.068896
	Medium	0.006328	0.001474	0.005522	0.013231	0.00922	0.012887	0.00498
	Low	0.303941	-0.06694	0.115453	-0.02127	0.126826	0.015282	0.015103
Loser	High	-0.00011	0.001671	0.00573	0.012018	0.0074	0.03435	-0.00563
	Medium	-0.00469	-0.00046	-0.00659	-0.01149	-0.00937	-0.00774	0.003737
	Low	-0.0222	0.133021	-0.01171	0.096539	-0.0495	0.002348	-0.00971
Panel B: Quarterly								
Winner	High	0.079436	0.033297	-0.00099	0.011543	-0.01475	-0.01483	0.019674
	Medium	0.008505	0.012439	-0.00827	0.008661	0.000233	0.009776	-0.00475
	Low	0.191745	0.037344	0.039765	0.051704	0.018024	0.008335	0.019197
Loser	High	-0.04044	-0.02237	0.026243	0.008112	0.036014	0.033082	0.018939
	Medium	-0.00839	-0.00848	0.010722	-0.00219	0.009736	0.002846	0.006746
	Low	-0.00193	0.028631	0.006293	-0.01038	-0.0086	0.002962	-0.00579
Panel C: Semi-Annually								
Winner	High	0.322043	0.000919	0.027271	-0.00588	-0.02069	0.202363	-0.02533
	Medium	0.022898	-0.13829	-0.23548	-0.05213	0.018527	0.058961	-0.01584
	Low	0.116299	0.265949	0.798558	0.120975	0.004061	0.035367	0.189882
Loser	High	-0.00095	0.102351	0.669008	0.349034	0.64058	0.209214	0.185249
	Medium	0.024029	0.088914	0.117846	0.134165	0.012502	0.02401	0.017969
	Low	0.177831	0.236012	-0.09671	-0.10282	0.02272	-0.06977	0.093282
Panel D: Annually								
Winner	High	-1.58867	-0.22732	-0.86747	-0.10222	-0.06333	-0.05845	-0.30694
	Medium	-1.05729	-1.24339	0.006722	-0.05395	-0.34952	-0.2506	-0.20107
	Low	-1.84548	-0.21732	0.019167	2.786458	-0.21551	-0.11217	0.459251
Loser	High	-0.33663	0.208683	0.743007	0.070758	0.395543	0.323563	0.48474
	Medium	1.289076	0.906674	0.602679	0.263036	0.276753	0.173287	0.011315
	Low	0.763576	0.612759	-0.81517	-1.18475	-0.11379	-0.01244	-0.41705

*To better illustrate, the numbers are all scaled by 100 times

This table presents the relation between trading volume and return patterns in horizons of monthly, quarterly, semi-annually and annually in China's A-share market. Negative numbers represent relative WRSS contrarian profits (price reversal); Positive numbers represents relative WRSS momentum profits (price momentum).

Table 5

Relative Relation between Trading Volume and Stock Return Patterns based on **Equal-Weighted** Winner/Loser Division and **Equally Divided** High/Medium/Low Trading Volume Method

		Observation Intervals (K)						
		2	**3**	**4**	**5**	**6**	**7**	**8**
Panel A: Monthly								
Winner	High	-0.01194	-0.01646	-0.00237	-0.01027	-0.01193	-0.03073	-0.01577
	Medium	0.028202	0.011502	0.004522	0.021547	-0.00104	0.017904	-0.00169
	Low	-0.02709	-0.07012	-0.03327	-0.05506	-0.01394	-0.03129	-0.01764
Loser	High	-0.03782	-0.0384	-0.04573	-0.03938	-0.03287	-0.02048	-0.03377
	Medium	-0.02265	-0.00895	-0.0007	-0.01509	0.003259	-0.01875	-0.012
	Low	-0.16214	0.005819	-0.04218	-0.01032	-0.05156	-0.00142	-0.00396
Panel B: Quarterly								
Winner	High	0.008094	0.010663	-0.02612	-0.00802	-0.02284	-0.02558	-0.0207
	Medium	0.016143	0.012054	-0.01069	-0.00676	-0.01211	-0.01339	-0.00583
	Low	-0.06343	-0.01762	-0.02107	-0.00389	-0.01761	0.000425	-0.00715
Loser	High	-0.02938	-0.02662	-0.00636	-0.00785	-0.0047	-0.00526	-0.0108
	Medium	-0.00957	-0.00825	0.0066	-0.00105	-0.00074	0.001574	0.00369
	Low	-0.06625	-0.0293	-0.01249	-0.02337	0.003779	-0.01699	-0.00481
Panel C: Semi-Annually								
Winner	High	-0.15857	-0.11424	-0.43222	-0.28598	-0.44742	-0.10653	-0.01169
	Medium	0.013953	0.056885	-0.24218	-0.11713	-0.01514	-0.02462	-0.01758
	Low	0.212681	-0.17851	-0.05531	-0.08111	0.025883	0.059284	-0.08662
Loser	High	-0.26325	-0.11725	-0.15084	-0.01416	-0.14019	-0.22118	-0.06703
	Medium	-0.03831	-0.00254	0.286045	-0.0403	0.007798	-0.06687	-0.03707
	Low	-0.36044	-0.06561	-0.2041	0.019321	0.006844	-0.01307	-0.05037
Panel D: Annually								
Winner	High	0.711603	-0.70082	-0.93738	-0.14708	-0.37746	-0.29211	-0.03817
	Medium	-1.37213	-1.74175	-0.3201	-0.33038	-0.45298	-0.39872	-0.05513
	Low	-1.13861	-0.6988	0.390802	0.165935	-0.18381	0.026982	-0.02216
Loser	High	1.875296	0.648929	0.244102	-0.01004	-0.0411	0.017619	-0.06664
	Medium	-0.12138	1.401223	-0.55279	0.065637	0.369668	0.238403	0.149321
	Low	1.594518	0.865723	0.722855	-1.10163	0.369239	0.141962	0.17034

*To better illustrate, the numbers are all scaled by 100 times.

This table presents the relation between trading volume and return patterns in horizons of monthly, quarterly, semi-annually and annually in China A-share market. Negative numbers represent relative WRSS contrarian profits (price reversal); Positive numbers represents relative WRSS momentum profits (price momentum).

Table 6
Relative Relation between Trading Volume and Stock Return Patterns based on **Equal-Weighted** Winner/Loser Division and Divided High/Medium/Low Trading Volume by **20% Extreme Values**.

		Observation Intervals (K)						
		2	**3**	**4**	**5**	**6**	**7**	**8**
Panel A: Monthly								
Winner	High	0.011553	0.016659	0.020385	0.019604	0.021962	-0.00981	0.01734
	Medium	0.014646	0.000772	-8.9E-05	0.01055	-0.00785	0.006092	-0.0044
	Low	0.075004	-0.08116	-0.00565	-0.06519	0.025858	-0.03049	-0.01
Loser	High	-0.01865	-0.02402	-0.02959	-0.0228	-0.02213	0.000634	-0.03381
	Medium	-0.02164	-0.01232	-0.01038	-0.01685	-0.00245	-0.01362	-0.00182
	Low	-0.13892	0.054716	-0.02064	0.024431	-0.03669	0.023986	0.009022
Panel B: Quarterly								
Winner	High	0.037496	0.030392	-0.00863	-0.00017	-0.01399	-0.00652	-0.00876
	Medium	0.004426	0.009366	-0.01314	-0.00018	-0.00405	-0.00928	-0.0062
	Low	-0.01261	-0.00121	0.001441	0.010137	-0.02104	0.01251	0.000419
Loser	High	-0.035	-0.00985	0.013738	0.001972	0.013532	0.009174	-0.00094
	Medium	-0.00292	-0.01029	0.009334	0.001697	0.002003	0.004082	0.004184
	Low	-0.02805	-0.01741	-0.01228	-0.02027	0.018134	-0.01348	-0.00224
Panel C: Semi-Annually								
Winner	High	0.121241	0.078267	-0.29749	-0.19591	-0.32645	0.037927	-0.0424
	Medium	0.168784	-0.04283	-0.22159	-0.08435	-0.01147	0.012795	-0.01583
	Low	0.118785	-0.04644	0.169338	-0.01413	-0.04173	0.068006	0.004281
Loser	High	-0.04416	0.127671	0.049501	0.068397	0.12851	-0.12511	-0.04274
	Medium	-0.07485	0.002174	0.166437	0.068824	0.007695	-0.01881	-0.02665
	Low	-0.2018	-0.14729	-0.24076	0.009893	-0.03621	-0.05653	-0.02735
Panel D: Annually								
Winner	High	0.022384	-0.76465	-0.47691	-0.11355	-0.37221	-0.20108	-0.19748
	Medium	-0.7989	-1.33922	-0.07563	-0.19246	-0.45496	-0.45622	-0.07
	Low	-1.2591	-0.68879	-0.06892	0.98986	-0.23716	0.243166	0.480515
Loser	High	-0.82264	0.633528	0.770069	0.004344	-0.00442	-0.03505	0.074235
	Medium	1.38942	1.122964	0.186368	0.088236	0.214813	0.191933	0.257329
	Low	1.589379	0.6119	0.024932	-1.2033	0.235941	-0.10147	-0.16664

*To better illustrate, the numbers are all scaled by 100 times.

This table presents the relation between trading volume and return patterns in horizons of monthly, quarterly, semi-annually and annually in China's A-share market. Negative numbers represent relative WRSS contrarian profits (price reversal); Positive numbers represents relative WRSS momentum profits (price momentum).

Table 7

Relative Relation between Trading Volume and Stock Return Patterns based on **Equal-Weighted** Winner/Loser Division and Divided High/Medium/Low Trading Volume by **10% Extreme Values**.

		Observation Intervals (K)						
		2	**3**	**4**	**5**	**6**	**7**	**8**
Panel A: Monthly								
Winner	High	0.053242	0.076099	0.065098	0.039866	0.03754	0.005047	0.066918
	Medium	0.010103	-0.00224	-0.00065	0.010031	-0.00495	0.003847	-0.00367
	Low	0.349749	-0.08813	0.068541	-0.05941	0.154336	-0.0026	0.029731
Loser	High	-0.00801	-0.0179	-0.00751	0.002699	0.010055	0.033481	-0.02167
	Medium	-0.0189	-0.00862	-0.01228	-0.01818	-0.00776	-0.01225	-0.00438
	Low	-0.063	0.168784	0.042468	0.133448	0.023432	0.109294	0.075194
Panel B: Quarterly								
Winner	High	0.07584	0.050244	0.017616	0.008196	0.005142	-0.00677	0.02085
	Medium	0.006713	0.010525	-0.01021	0.004184	-0.00287	0.003153	-0.00682
	Low	0.102037	0.053315	0.045634	0.038079	-0.01586	0.001463	0.023711
Loser	High	-0.04135	-0.02883	0.027215	0.034608	0.046326	0.054105	0.02306
	Medium	-0.00454	-0.00533	0.010451	0.001525	0.010078	0.003149	0.007226
	Low	0.089419	0.028492	0.022939	-0.01234	0.009063	0.000195	-0.01829
Panel C: Semi-Annually								
Winner	High	0.618042	0.189849	0.210403	0.045432	-0.14388	0.240454	0.087441
	Medium	0.122057	-0.02798	-0.20263	-0.07165	-0.01922	0.050519	-0.00903
	Low	0.849685	0.286096	0.460266	0.117889	-0.01952	0.040329	-0.02524
Loser	High	0.01211	0.147447	0.659341	0.376579	0.607991	0.094092	0.062923
	Medium	0.004525	0.02222	0.092657	0.090059	0.015204	-0.01013	-0.03103
	Low	-0.03874	0.093803	-0.14992	-0.0115	-0.01078	-0.09289	0.046541
Panel D: Annually								
Winner	High	-1.53739	-0.01244	-1.01116	-0.09538	-0.23753	-0.22121	-0.27928
	Medium	-0.73784	-1.39266	0.057115	-0.07232	-0.48842	-0.32653	0.006348
	Low	-0.76459	-0.1456	0.019801	2.487411	-0.22916	-0.15322	0.766154
Loser	High	-0.3243	0.266198	0.500661	-0.04545	0.315815	0.129028	0.443446
	Medium	1.171146	0.988755	0.492309	0.103013	0.147679	0.058354	0.150959
	Low	-0.12512	0.704823	-0.72439	-1.42922	-0.17154	-0.04819	0.099224

*To better illustrate, the numbers are all scaled by 100 times.

This table presents the relation between trading volume and return patterns in horizons of monthly, quarterly, semi-annually and annually in China's A-share market. Negative numbers represent relative WRSS contrarian profits (price reversal); Positive numbers represents relative WRSS momentum profits (price momentum).

Table 8

Summary Findings on Whether the Relations between Trading Volume and Stock Return Patterns are Consistent with the Momentum Life Cycle Hypothesis

	Value-Weighted Method to Distinguish Winner/Loser		Equal-Weighted Method to Distinguish Winner/Loser	
	Winner	**Loser**	**Winner**	**Loser**
Panel A: Equally Divided for High, Low and Medium Trading Volumes				
Monthly Horizon	High Volume Continue Low Volume Convert [Inconsistent]	High Volume Convert Low Volume Continue [Inconsistent]	High Volume Continue Low Volume Convert [Inconsistent]	High Volume Continue Low Volume Convert **[Consistent]**
Quarterly Horizon	High Volume Convert Low Volume Continue **[Consistent]**	Mixed Result [Inconsistent]	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]
Semi-annually Horizon	High Volume Convert Low Volume Continue **[Consistent]**	Mixed Result [Inconsistent]	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Continue Low Volume Convert **[Consistent]**
Annually Horizon	Mixed Result [Inconsistent]	High Volume Continue Low Volume Convert **[Consistent]**	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Continue Low Volume Convert **[Consistent]**
Panel B: Use Extreme 20% for High and Low Trading Volumes				
Monthly Horizon	High Volume Continue Low Volume Convert [Inconsistent]	Mixed Result [Inconsistent]	High Volume Continue Low Volume Convert [Inconsistent]	High Volume Continue Low Volume Convert **[Consistent]**
Quarterly Horizon	High Volume Convert Low Volume Continue **[Consistent]**	Mixed Result [Inconsistent]	Mixed Result [Inconsistent]	High Volume Convert Low Volume Continue [Inconsistent]
Semi-annually Horizon	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]
Annually Horizon	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]

(Continue with Table 8)

	Value-Weighted Method to Distinguish Winner/Loser		Equal-Weighted Method to Distinguish Winner/Loser	
	Winner	**Loser**	**Winner**	**Loser**
Panel C: Use Extreme 10% for High and Low Trading Volumes				
Monthly Horizon	Mixed Result [Inconsistent]	Mixed Result [Inconsistent]	Mixed Result [Inconsistent]	High Volume Continue Low Volume Convert **[Consistent]**
Quarterly Horizon	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]
Semi-annually Horizon	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]
Annually Horizon	Mixed Result [Inconsistent]	High Volume Convert Low Volume Continue [Inconsistent]	High Volume Convert Low Volume Continue **[Consistent]**	High Volume Convert Low Volume Continue [Inconsistent]