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Is Short-Term Momentum Profitable? No!: Evidence from Korean Stock Market

한국 주식시장에서의 단기 모멘텀 효과
실증분석

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Abstract

This paper investigates whether implementing the short-term momentum strategy generates significant excess return in Korean stock market as proven in other major stock markets. After analyzing whether buying past month's winner stocks and shorting loser stocks among heavily traded stocks generate significant profits in Korean stock market, I find that such strategy is not profitable in either KOSPI or KOSDAQ stock market between January 1987 and December 2021. Furthermore, examining by dividing the sample into sub-periods, applying alternative sorting methods such as independent sorting and reverse order dependent sorting, and constructing a different number of portfolios such as 10 by 10 portfolios and 5 by 5 portfolios do not change the outcome of the study. Controlling proxies for information asymmetry, which is a possible explanation for short-term momentum, do not provide statistically significant result as well.

keywords: Momentum, Turnover, Short-term, Korea

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Chapter 1. Introduction

1.1. Paper Development

Price momentum in stock market is a widely covered topic in the field of finance. In general, previous research claims that the price momentum show contradicting results depending on the time horizon. Research conducted by Jegadeesh (1990) and Lehmann (1990) examine the existence of short-term momentum reversals. They show that buying winner stocks and selling loser stocks based on past weekly or monthly return generate significant abnormal loss. However, according to Jegadeesh and Titman (1993), buying stocks that have performed well in the past and selling stocks that have performed poorly generate significant excess returns at longer horizons between 3 to 12 months. A more recent research paper written by Medhat and Schmeling (2021) examines whether price movement and the level of turnover are related. According to Medhat and Schmeling, when portfolios are formed by double sorting on previous month's return and turnover, buying winner stocks and shorting loser stocks generate contradicting monthly excess return depending on the level of turnover not only in US stock market, but in 22 international stock markets not including South Korea. More specifically, the excess return of momentum strategy increases monotonically as turnover increases. The excess return among the lowest and the highest turnover decile turns out to be at almost equal strengths with opposite sign at 1-month horizon.

Therefore, this paper examines whether the short-term momentum among high turnover stocks generate significant excess return in Korean stock market. Prior studies that covered momentum effect in Korean stock market show that momentum does not exist in Korean stock market. Kho (1997), Chae and Eom (2009), Lee and Cho (2014) indicate that momentum strategy leads to significant abnormal loss in Korean stock market. Furthermore, Chui et al. (2010) show that South Korea is one of the few countries for which positive momentum profits do not exist.

However, this is the first paper that empirically test the existence of short-term momentum with the level of trading volume using KOSPI and KOSDAQ data. In this paper, I make some adjustments when constructing portfolios but follow the general methodology used by Medhat and Schmeling (2021) when testing whether short-term momentum methodology is significantly profitable.

I first examine the excess portfolio return of each long-short portfolio in respective Korean stock market: KOSPI and KOSDAQ. Then I divide the full sample period into several sub-periods to account for sample selection problem. Additionally, I test the short-term momentum effect by controlling several variables such as size, illiquidity, and net purchase of individual investors, which can affect the outcome of the study.

Contrary to the result proven in 22 international stock markets, short-term momentum strategy, buying past month winner stocks and shorting loser stocks among heavily traded stocks in past month, is not profitable in Korean stock market. Examining by using sub-periods and controlling several proxies that are known to have possible impact on the

outcome of the study fail to generate significant excess return. Applying different sorting methods such as independent sorting, reverse conditional sorting, grouping into deciles rather than quintiles do not change the outcome of the study.

In this paper, I do not provide economic mechanism for non-profitability of short-term momentum strategy in Korean stock market. Therefore, providing economic mechanisms or testing this strategy in countries not covered by Medhat and Schmeling (2021) could be intriguing future research topics.

1.2. Data and Methodology

Our main sample consists of all stocks listed on KOSPI and KOSDAQ excluding financial firms. Using Dataguide, I obtain monthly data on key variables used in the paper: stock return, number of shares traded, price, shares outstanding and net purchase of individual investors. The main sample period is different depending on the stock market. For KOSPI stock market, the sample period covers from January 1987 to December 2021 while the sample period is from July 1996 to December 2021 for KOSDAQ stock market.

When calculating the excess portfolio return, the monetary stabilization bond rate is used as a monthly risk-free rate. Following Lo and Wang (2000), I obtain share turnover by dividing the total number of shares traded by the number of shares outstanding. Also, I use daily data on return and dollar volume of each stock obtained from Dataguide to calculate the

Amihud (2002) illiquidity measure of each stock. After excluding the stocks with missing values, the final data includes 279,784 firm-month observations for KOSPI listed stocks and 273,958 firm-month observations for KOSDAQ listed stocks. I proceed every test separately for each stock market to account for different characteristics in each market.

Following the methodology used in Medhat and Schmeling (2021), I construct portfolios using conditional sorting method, first on previous month's return and then on the level of turnover of each stock. I do not use independent sorting method to eliminate any empty portfolios during our sample period.[1] Although Medhat and Schmeling (2021) formed 10 by 10 portfolios each month using US stock market data, I construct 5 by 5 portfolios to account for the difference in number of listed stocks in respective stock market. By constructing 5 by 5 portfolios, the number of stocks included in each portfolio is similar to that in original study. The portfolios are value-weighted according to market capitalization and rebalanced at the end of each month.

Table 1 shows the portfolio characteristics for double sorted portfolios in respective stock market. It is worth noting that the range of time-series average return of portfolios in extreme quintile is greater in KOSPI market than that in KOSDAQ market. Furthermore, I observe that the monthly turnover of each portfolio is generally greater in KOSDAQ market. Due to stock market characteristics, the average market capitalization of each portfolio is larger for KOSPI market while the average number of

1) Although dependent sorting method is used in the paper, independent sorting does not change the outcome of the study.

stocks is greater for KOSDAQ market.

Table 1

Portfolio characteristics for double sorts on 1-month returns and turnover

Panel A. KOSPI stocks

	$r_{1,0}$ quintile				
$TO_{1,0}$ quintile	Low	2	3	4	High
			portfolio $r_{1,0}$		
Low	-12.21	-5.12	-0.37	5.07	17.86
2	-12.01	-5.19	-0.42	5.18	16.57
3	-12.78	-5.22	-0.39	5.29	18.96
4	-13.73	-5.25	-0.35	5.42	21.81
High	-16.78	-5.32	-0.34	5.53	32.20
			portfolio $TO_{1,0}$		
Low	0.03	0.02	0.02	0.03	0.05
2	0.07	0.05	0.05	0.06	0.11
3	0.14	0.09	0.09	0.11	0.21
4	0.25	0.16	0.16	0.19	0.39
High	0.80	0.40	0.41	0.49	1.30
			Average market capitalization (hundred million won.)		
Low	5,949	3,723	3,306	4,494	13,869
2	10,819	11,782	10,802	14,235	15,584
3	9,234	13,246	13,999	14,809	10,330
4	5,420	9,359	9,822	10,175	5,529
High	1,948	3,960	4,051	3,829	1,849
			Average number of stocks		
Low	26	26	26	26	26
2	27	27	27	27	27
3	27	27	27	27	27
4	27	27	27	27	27
High	26	27	27	27	26

Panel B. KOSDAQ stocks

$TO_{1,0}$ quintile	$r_{1,0}$ quintile				
	Low	2	3	4	High
			portfolio $r_{1,0}$		
Low	-16.97	-6.93	-0.73	6.51	29.84
2	-17.45	-7.06	-0.83	6.60	30.32
3	-18.13	-7.08	-0.85	6.52	33.66
4	-19.65	-7.16	-0.75	6.78	37.84
High	-23.10	-7.20	-0.85	6.88	50.43
			portfolio $TO_{1,0}$		
Low	0.07	0.04	0.03	0.04	0.09
2	0.18	0.10	0.09	0.11	0.23
3	0.32	0.18	0.17	0.21	0.45
4	0.60	0.34	0.32	0.39	0.86
High	1.78	0.98	0.95	1.13	2.61
			Average market capitalization (hundred million won.)		
Low	861	708	654	785	1,265
2	988	831	789	980	1,374
3	1,060	954	990	1,094	1,284
4	938	1,012	1,030	1,101	1,094
High	742	907	925	918	959
			Average number of stocks		
Low	35	36	37	36	36
2	36	36	36	36	36
3	36	36	36	36	36
4	36	36	36	36	36
High	35	36	36	36	36

This table shows summary statistics for portfolios double sorted on previous month's return and turnover. Portfolio $r_{1,0}$ is the time series-average of each portfolio's monthly value-weighted return, and portfolio $TO_{1,0}$ is the time-series average of each portfolio's monthly turnover. Average market capitalization is the portfolio's average market capitalization in hundred million won during the sample period. The average number of stocks shows average number of stocks included in each portfolio. Panel A shows the summary statistics for KOSPI stocks and Panel B shows the summary statistics for KOSDAQ stocks.

Chapter 2. Main Results

2.1. Double sorts on the previous month's return and share turnover during full sample period

Table 2 shows the excess monthly return of each portfolio, formed by double sorting on previous month's return and the level of turnover using full sample. The excess return of winner-minus-loser strategy in each turnover quintile is examined additionally using Fama-French (1993) three-factor model, as well as six-factor model, which consists of Fama-French (2015) five-factor model plus the momentum factor.

The panel A of Table 2 shows the monthly excess of each portfolio among stocks listed on KOSPI from January 1987 to December 2021. As shown, none of the short-term momentum strategy generates significant excess return. Therefore, the momentum strategy is not profitable among KOSPI listed stocks during the sample period. The Panel B shows the main result among stocks listed on KOSDAQ. The second turnover quintile and the fourth turnover quintile generate significant negative excess return. However, it is difficult to observe any striking pattern along the turnover quintiles. Therefore, there is a lack of evidence to conclude that the short-term momentum strategy generates significant abnormal loss in KOSDAQ market as well.

Table 2

Double sorts on the previous month's return and turnover using full sample

Panel A. Stocks listed on KOSPI stock market

	$r_{1,0}$ quintiles					$r_{1,0}$ Strategy		
	Low	2	3	4	High	$E[r^e]$	α_{FF3}	α_{FF6}
$TO_{1,0}$ quintiles			portfolio excess return					
Low	0.30	0.23	0.27	-0.21	0.34	0.04 (0.06)	-0.17 (-0.30)	-0.09 (-0.15)
2	0.65	0.45	0.43	0.17	0.24	-0.41 (-0.91)	-0.54 (-1.19)	-0.48 (-1.06)
3	0.64	0.69	0.37	0.10	0.23	-0.41 (-0.82)	-0.74 (-1.51)	-0.68 (-1.37)
4	0.24	0.45	0.20	0.45	-0.61	-0.85 (-1.71)	-1.16 (-2.35)	-1.15 (-2.33)
High	-0.62	-0.34	-0.17	-0.27	-1.31	-0.68 (-1.20)	-0.89 (-1.56)	-0.83 (-1.44)

Panel B. Stocks listed on KOSDAQ market

	$r_{1,0}$ quintiles					$r_{1,0}$ Strategy		
	Low	2	3	4	High	$E[r^e]$	α_{FF3}	α_{FF6}
$TO_{1,0}$ quintiles			portfolio excess return					
Low	1.62	1.41	0.29	1.91	0.64	-0.97 (-1.13)	-1.22 (-1.41)	-1.11 (-1.28)
2	1.99	0.91	0.99	0.77	0.55	-1.44 (-1.71)	-1.91 (-2.32)	-1.67 (-1.94)
3	1.22	0.87	0.57	0.63	-0.07	-1.29 (-1.39)	-1.62 (-1.74)	-1.29 (-1.39)
4	0.77	-0.39	0.25	0.14	-0.37	-1.14 (-1.66)	-1.67 (-2.44)	-1.67 (-2.44)
High	-0.74	-0.69	-0.12	-0.87	-2.00	-1.26 (-1.17)	-0.97 (-0.88)	-1.00 (-0.90)

This table shows the excess return of each portfolio formed by double sorting on the previous month's return and turnover as Ill as performance of long-short strategies across the quintiles. I use conditional sorts into quintiles, first sorting on previous month's return and then on previous month's turnover. Portfolios are value-weighted and rebalanced at the end of each month. Panel A includes stocks listed on KOSPI market from January 1987 to December 2021. Panel B includes stocks listed on KOSDAQ market from July 1996 to December 2021. To obtain portfolio excess return, monetary stabilization bond rate is used as risk-free rate. Data are at the monthly frequency.

2.2. Double sorts on the previous month's return and turnover during sub-periods

I then examine whether the non-profitability of short-term momentum in Korean stock market is due to sample period selection. To do so, I divide the sample period into several sub-periods and compare the excess return of short-term momentum strategy in respective stock market. The sample period for KOSPI stocks is divided into three sub-periods: January 1987 to December 1999, January 2000 to December 2009, January 2010 to December 2021. For KOSDAQ stock market, the sample period is divided into two sub-periods: July 1996 to December 2009 and January 2010 to December 2021.

Table 3 shows the monthly excess return of each portfolio in each sub-period. The panel A shows that there is a somewhat monotonic movement of excess return from long-short strategy along the turnover quintile. However, since alphas from the momentum strategy do not have statistical significance, there is a lack of evidence to show that momentum strategy exists in KOSPI market from January 1987 to December 1999. Furthermore, the momentum strategy during January 2000 and December 2009 is not profitable among KOSPI stocks as shown in panel B. Lastly, the momentum strategy continues to be unprofitable in last 10 years among stocks listed on KOSPI as shown in panel C.

Panel D and E from Table 3 shows the excess return of each portfolio among KOSDAQ listed stocks during each sub-period. The first sub-period is from July 1996 to December 2009, and the last sub-period

covers from January 2010 to December 2021. Similar to the result from KOSPI stock market, the short-term momentum strategy is not profitable in both sub-periods in KOSDAQ stock market.

2.3 Factor exposures and excess return

Next, I examine the factor exposure of excess portfolio returns from short-term momentum strategy in each stock market. The explanatory variables are the Fama-French 5 factors, momentum factor (MOM), conventional 1-month short-term reversal factor (STREV) and the 60-13 month long-term reversal factor (LTREV). As shown in panel A, the short-term momentum strategy among high turnover stocks in KOSPI stock market has a positive significant loading on market factor, but not on the remaining factors. The intercept remains insignificant when other control variables are used. The short-term reversal strategy has significant positive loading only on market factor when it is the sole control variable. Unlike the result of panel A, the market factor has a positive significant loading on low turnover portfolios among KOSDAQ stocks. However, the intercepts remain insignificant when control variables are added to the regression model, ending up with same result as panel A. Lastly, the adjusted R^2 is very low for all models, indicating that the independent variables do not explain the variation of excess return of short-term momentum strategy.

Table 3. Double sorts on the previous month's return and turnover among during sub-periods

Panel A. Stocks listed on KOSPI stock market from 1987 to 1999

	$r_{1,0}$ quintiles					$r_{1,0}$ Strategy		
	Low	2	3	4	High	$E[r^e]$	α_{FF3}	α_{FF6}
$TO_{1,0}$ quintiles			portfolio excess return					
Low	0.09	0.37	-0.59	-0.56	1.45	1.36 (1.10)	1.10 (0.88)	1.37 (1.11)
2	0.48	0.43	0.50	-0.25	-0.05	-0.53 (-0.57)	-0.65 (-0.72)	-0.64 (-0.69)
3	-0.15	0.62	0.06	-0.20	-0.28	-0.13 (-0.13)	-0.50 (-0.51)	-0.56 (-0.55)
4	-0.22	-0.06	-1.00	-0.62	-1.15	-0.93 (-1.07)	-1.27 (-1.56)	-1.41 (-1.71)
High	0.23	-0.22	-0.90	-0.95	-1.11	-1.34 (-1.49)	-1.52 (-1.71)	-1.14 (-1.28)

Panel B. Stocks listed on KOSPI stock market from 2000 to 2009

	$r_{1,0}$ quintiles					$r_{1,0}$ Strategy		
	Low	2	3	4	High	$E[r^e]$	α_{FF3}	α_{FF6}
$TO_{1,0}$ quintiles			portfolio excess return					
Low	0.24	0.35	1.74	0.16	-0.87	-1.11 (-1.21)	-1.13 (-1.14)	-1.09 (-1.08)
2	1.31	1.08	0.82	0.61	0.41	-0.90 (-1.06)	-1.24 (-1.37)	-1.10 (-1.22)
3	1.41	0.98	0.78	0.46	0.37	-1.03 (-1.15)	-1.06 (-1.11)	-0.88 (-0.91)
4	0.62	0.65	1.52	1.63	-0.89	-1.51 (-1.44)	-1.78 (-1.61)	-1.71 (-1.51)
High	-2.15	-0.57	0.32	0.26	-2.57	-0.42 (-0.35)	-0.66 (-0.51)	-0.75 (-0.57)

Panel C. Stocks listed on KOSPI stock market from 2010 to 2021

	$r_{1,0}$ quintiles					$r_{1,0}$ Strategy		
	Low	2	3	4	High	$E[r^e]$	α_{FF3}	α_{FF6}
$TO_{1,0}$ quintiles			portfolio excess return					
Low	0.59	-0.03	-0.02	-0.13	0.14	-0.45 (-0.93)	-0.52 (-1.03)	-0.62 (-1.24)
2	0.28	-0.05	0.05	0.26	0.41	0.13 (0.28)	-0.08 (-0.17)	-0.13 (-0.26)
3	0.85	0.51	0.36	0.12	0.67	-0.18 (-0.33)	-0.43 (-0.80)	-0.47 (-0.85)
4	0.43	0.84	0.40	0.63	0.21	-0.22 (-0.32)	-0.43 (-0.60)	-0.52 (-0.72)
High	-0.27	-0.27	0.21	0.03	-0.46	-0.19 (-0.21)	-0.24 (-0.27)	-0.35 (-0.38)

Panel D. Stocks listed on KOSDAQ stock market from 1996 to 2009

	$r_{1,0}$ quintiles					$r_{1,0}$ Strategy		
	Low	2	3	4	High	$E[r^e]$	α_{FF3}	α_{FF6}
$TO_{1,0}$ quintiles			portfolio excess return					
Low	2.37	2.22	0.74	3.29	0.23	-2.14 (-1.40)	-2.37 (-1.53)	-2.36 (-1.51)
2	3.17	0.85	0.91	0.75	0.06	-3.12 (-2.08)	-3.91 (-2.58)	-3.57 (-2.29)
3	1.67	0.61	0.35	0.73	-1.18	-2.84 (-1.73)	-3.35 (-2.00)	-2.65 (-1.57)
4	1.18	-0.64	-0.26	0.01	-0.93	-2.11 (-1.86)	-2.79 (-2.44)	-2.61 (-2.23)
High	-0.88	-0.92	0.31	-1.44	-2.17	-1.29 (-0.68)	-0.65 (-0.34)	-0.79 (-0.40)

Panel E. Stocks listed on KOSDAQ stock market from 2010 to 2021

	$r_{1,0}$ quintiles					$r_{1,0}$ Strategy		
	Low	2	3	4	High	$E[r^e]$	α_{FF3}	α_{FF6}
$TO_{1,0}$ quintiles			portfolio excess return					
Low	0.76	0.49	-0.20	0.38	1.11	0.36 (0.60)	-0.06 (-0.10)	-0.11 (-0.19)
2	0.64	0.97	1.07	0.80	1.10	0.46 (0.80)	0.14 (0.25)	0.19 (0.33)
3	0.72	1.17	0.81	0.51	1.19	0.47 (0.74)	0.11 (0.16)	0.04 (0.07)
4	0.31	-0.10	0.83	0.29	0.28	-0.03 (-0.05)	-0.51 (-0.75)	-0.41 (-0.60)
High	-0.58	-0.43	-0.62	-0.24	-1.81	-1.22 (-1.45)	-1.37 (-1.57)	-1.41 (-1.57)

This table shows portfolios formed by double sorting on the previous month's return and turnover during sub-periods. We use conditional sorts into quintiles, first sorting on previous month's return and then on previous month's turnover. Portfolios are value-weighted and rebalanced at the end of each month. The table also shows the performance of long-short strategies across the quintiles. To obtain portfolio excess return, monetary stabilization bond rate is used as risk-free rate. Data are at the monthly frequency. Panel A includes stocks listed on KOSPI from January 1987 to December 1999. Panel B includes stocks listed on KOSPI from January 2000 to December 2009. Panel C includes stocks listed on KOSPI from January 2010 to December 2021. Panel D includes stocks listed on KOSDAQ from July 1996 to December 2009. Panel E includes stocks listed on KOSDAQ from January 2010 to December 2021.

Table 4

Short term momentum's factor exposures and abnormal returns

Panel A. KOSPI market

Intercepts, slopes, and test statistics (in parentheses) from time-series regressions of the form $y_t=\alpha+\beta' X_t+\epsilon_t$

Independent Variable	Short-term momentum [WML, high turnover]				Short-term reversal [WML, low turnover]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	-0.68 (-1.20)	-0.80 (-1.48)	-0.83 (-1.44)	-0.79 (-1.32)	0.04 (0.06)	-0.06 (-0.10)	-0.09 (-0.15)	0.07 (0.12)
MKT		0.22 (2.86)	0.22 (2.80)	0.21 (2.65)		0.18 (2.16)	0.13 (1.36)	0.15 (1.56)
SMB			0.12 (1.10)	0.13 (1.17)			0.01 (0.11)	0.02 (0.18)
HML			0.04 (0.20)	0.08 (0.44)			0.13 (0.80)	0.12 (0.73)
RMW			-0.10 (-1.13)	-0.13 (-1.21)			-0.21 (-1.14)	-0.25 (-1.44)
CMA			0.11 (0.64)	0.09 (0.52)			0.34 (1.68)	0.31 (1.57)
MOM			-0.01 (-0.12)	-0.02 (-0.31)			-0.11 (-1.22)	-0.12 (-1.27)
STREV				0.06 (0.80)				-0.14 (-1.00)
LTREV				-0.11 (-0.90)				-0.07 (-0.45)
adj. R^2		2.2%	3.3%	3.7%		1.6%	5.2%	5.9%

Panel B. KOSDAQ market

Intercepts, slopes, and test statistics (in parentheses) from time-series regressions of the form $y_t=\alpha+\beta' X_t+\epsilon_t$

Independent Variable	Short-term momentum [WML, high turnover]				Short-term reversal [WML, low turnover]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	-1.26 (-1.17)	-1.23 (-1.42)	-1.00 (-1.02)	-0.94 (-0.89)	-0.97 (-1.13)	-1.25 (-1.56)	-1.11 (-1.24)	-1.06 (-1.14)
MKT		-0.47 (-0.26)	-0.12 (-0.60)	-0.18 (-0.83)		0.39 (2.58)	0.34 (2.38)	0.43 (2.69)
SMB			-0.74 (-0.04)	-0.04 (-0.02)			0.14 (0.54)	0.14 (0.64)
HML			-0.24 (-0.80)	-0.10 (-0.35)			0.00 (0.00)	-0.15 (-0.59)
RMW			0.01 (0.04)	-0.06 (-0.29)			-0.11 (-0.85)	-0.06 (-0.50)
CMA			0.55 (1.30)	0.55 (1.22)			0.65 (1.86)	0.61 (1.79)
MOM			-0.22 (-1.17)	-0.28 (-1.30)			-0.09 (-0.56)	-0.05 (-0.32)
STREV				0.23 (1.20)				-0.32 (-1.90)
LTREV				-0.22 (-1.25)				0.17 (1.05)
adj. R^2		1.1%	2.6%	3.6%		4.6%	7.2%	9.9%

This table shows time-series regressions for the Winner-minus-loser strategy among high turnover stocks and low turnover stocks. Panel A includes stocks listed on KOSPI while Panel B includes stocks listed on KOSDAQ. The explanatory variables are the factors from Fama and French's (2015) five-factor model in addition to the momentum factor (MOM), the two reversal factors (STREV and LTREV). Test statistics are adjusted for heteroscedasticity and autocorrelation. Data are at monthly frequency.

2.4 Short-term momentum and size

Wang (1994) and Llorente et al. (2002) suggest that short-term momentum among high turnover can be explained by information asymmetry mechanism. They contend that stocks with high information asymmetry should exhibit momentum because it takes time for all private information to eventually become public. Therefore, I use several proxies for information asymmetry to examine whether controlling these variables can create alternative results. First, I control the size of the firm.

In order to explain the short-term momentum among high turnover stocks by the mechanism of information asymmetry, the magnitude of excess return should turn out to be greater in smaller stocks. Table 5 shows the performance of size-controlled short-term momentum and reversal strategies. In order to control size, I use conditional sorts on the previous month's size (market capitalization), return, and turnover, in that order. In panel A, the breakpoint for size of the first group is the median for KOSPI stocks, while the breakpoints for returns and turnover are the 20th and 80th percentiles for KOSPI stocks. Each portfolio is value-weighted and rebalanced at the end of each month. The short-term momentum strategy yields –1.38% per month among small-cap stocks, while it yields –1.24% for large-cap stocks with statistical significance when we compare the alphas from FF6 model. However, when I sort according to KOSPI market capitalization quintiles, the alphas lose statistical significance and I do not find any monotonic relationship along size quintiles. Lastly, I examine the performance of the strategy exclusively using the largest 50 stocks and smallest 50 stocks. The only significant observation is that for 50 largest stocks, the short-momentum strategies yields –0.65% per month with statistical significance. However, it does not provide much support to the information asymmetry mechanism since other observations are insignificant. For KOSDAQ stock market, almost all observation is statistically insignificant as shown in panel B.

Table 5

Short-term momentum controlling for size

Panel A. KOSPI market

	Short-term momentum [WML, high turnover] controlling for size			Short-term reversal [WML, low turnover] controlling for size		
Size group	$E[r^e]$	α_{FF3}	α_{FF6}	$E[r^e]$	α_{FF3}	α_{FF6}
A. Size breakpoint is KOSPI median						
Small-cap	-1.02 (-1.69)	-1.43 (-2.17)	-1.38 (-2.09)	-0.04 (-0.06)	-0.20 (-0.30)	-0.03 (-0.05)
Large-cap	-1.21 (-1.22)	-1.34 (-1.59)	-1.24 (-2.09)	-0.56 (-0.90)	-0.67 (-1.07)	-0.77 (-1.22)
B. Size quintiles						
Small	0.13 (0.13)	0.14 (0.14)	0.05 (0.06)	1.63 (1.47)	1.47 (1.30)	1.44 (1.27)
2	-0.75 (-0.96)	-0.95 (-1.20)	-0.67 (-0.84)	-1.72 (-2.36)	-2.18 (-2.98)	-2.13 (-2.90)
3	-1.67 (-2.34)	-2.00 (-2.76)	-1.83 (-2.52)	-0.10 (-0.12)	-0.09 (-0.10)	-0.10 (-0.12)
4	-1.19 (-1.93)	-1.42 (-2.25)	-1.42 (-2.23)	-0.45 (-0.87)	-0.64 (-1.22)	-0.50 (-0.95)
Large	-0.40 (-0.61)	-0.85 (-1.31)	-0.74 (-1.13)	-0.27 (-0.44)	-0.30 (-0.35)	-0.31 (-0.36)
C. 50 largest stocks						
Largest 50	-0.65 (-2.02)	-0.95 (-3.02)	-0.94 (-3.01)	-0.27 (-0.78)	-0.38 (-1.10)	-0.29 (-0.82)
D. 50 Smallest stocks						
Smallest 50	0.91 (1.48)	0.90 (1.44)	0.71 (1.13)	-0.79 (-1.41)	-0.88 (-1.54)	-0.77 (-1.34)

Panel B. KOSDAQ market

	Short-term momentum [WML, high turnover] controlling for size			Short-term reversal [WML, low turnover] controlling for size		
Size group	$E[r^e]$	α_{FF3}	α_{FF6}	$E[r^e]$	α_{FF3}	α_{FF6}
A. Size breakpoint is KOSDAQ median						
Small-cap	-1.11 (-1.12)	-1.28 (-1.26)	-1.04 (-1.01)	0.07 (0.08)	-0.56 (-0.67)	-0.33 (-0.38)
Large-cap	-1.22 (-1.26)	-1.24 (-1.26)	-1.28 (-1.27)	-1.32 (-1.41)	-1.52 (-1.59)	-1.47 (-1.52)
B. Size quintiles						
Small	-0.97 (-0.66)	-0.80 (-0.53)	-0.83 (-0.54)	0.74 (0.45)	0.79 (0.52)	0.84 (0.60)
2	-0.75 (-0.43)	-1.26 (-0.70)	-1.19 (-0.66)	-0.28 (-0.26)	-0.37 (-0.79)	-0.39 (-0.81)
3	-1.94 (-1.31)	-2.47 (-1.65)	-2.04 (-1.37)	-0.81 (-0.79)	-0.88 (-0.63)	-0.91 (-0.65)
4	-2.40 (-2.54)	-2.64 (-2.19)	-2.67 (-2.19)	-0.98 (-0.86)	-1.07 (-1.31)	-1.11 (-1.37)
Large	-0.69 (-0.54)	-1.36 (-1.04)	-1.38 (-1.04)	-2.07 (-1.37)	-1.30 (-1.55)	-1.27 (-1.59)
C. 50 largest stocks						
Largest 50	0.31 (0.49)	0.18 (0.27)	0.27 (0.40)	-0.21 (-0.37)	-0.23 (-0.40)	-0.04 (-0.06)
D. 50 Smallest stocks						
Smallest 50	-1.00 (-1.29)	-1.03 (-1.31)	-0.97 (-1.18)	-0.13 (-0.15)	-0.63 (-0.72)	-0.64 (-0.73)

This table shows the excess return of Winner-minus-Loser strategy among high turnover decile and low turnover decile with a control for size (market capitalization in respective stock market. Panel A includes stocks listed on KOSPI market while Panel B includes stocks listed on KOSDAQ market. In each panel, The first two size groups use N×3×3 conditional sorts on size and previous month's return and turnover where the breakpoints for returns and turnovers are the 20th percentile and 80th percentiles for respective stock market. In size group A, the breakpoint for size is the median of corresponding stock market. In size group B, the size is sorted into quintiles based on size. In size group C, the strategies are from 2×2 independent sorts on returns and turnovers among 50 largest stocks, where the breakpoint for returns and turnovers is median. In size group D, same strategy is applied as that of panel C, except the smallest 50 stocks are used to obtain the result. Data are obtained monthly.

2.5 Short-term momentum and illiquidity

I use another proxy for information asymmetry to examine whether short-term momentum is stronger among stocks with high information asymmetry: illiquidity. According to Wang (1994) and Llorente et al. (2002), high-information-asymmetry stocks should be illiquid. Table 6 shows the performance of short-term momentum with a control for illiquidity, using Amihud (2002) illiquidity measure. The strategies are from 5 by 3 by 3 conditional sorts on previous month's illiquidity, return, and turnover. Panel A of table 6 shows the performance of short-term momentum strategy among KOSPI listed stocks for each illiquidity level. Within short-term momentum strategy, the excess return from the third highest liquidity group is the only group with statistical significance. This group yields –1.89% per month, which is also the strongest among all quintiles. However, this result is not meaningful as there is no monotonic relationship among illiquidity level. Moreover, the 50 most illiquid KOSPI stocks from each month does not generate significant excess return. Panel C shows the excess return of illiquidity quintiles among KOSDAQ stocks. As shown, the short-term momentum strategy from the most illiquid quintile records a strong reversal effect in the following month. This finding does not provide any support to the information asymmetry mechanism in explaining the short-term momentum phenomenon among high turnover stocks.

Table 6

Short-term momentum controlling for monthly illiquidity

Illiquidity group	Short-term momentum [WML, high turnover] controlling for illiquidity			Short-term reversal [WML, low turnover] controlling for illiquidity		
	$E[r^e]$	α_{FF3}	α_{FF6}	$E[r^e]$	α_{FF3}	α_{FF6}
Panel A. Illiquidity quintiles among KOSPI stocks						
Liquid	-0.54	-0.46	-0.43	-0.82	-0.91	-0.73
	(-0.75)	(-0.63)	(-0.58)	(-1.50)	(-1.67)	(-1.35)
2	-1.29	-1.60	-1.32	-1.08	-1.46	-1.33
	(-1.46)	(-1.80)	(-1.47)	(-1.88)	(-2.54)	(-2.29)
3	-1.89	-1.78	-1.79	-0.45	-0.69	-0.66
	(-2.26)	(-2.07)	(-2.08)	(-0.68)	(-1.03)	(-0.97)
4	-1.19	-1.27	-1.01	-0.37	-0.74	-0.82
	(-1.36)	(-1.43)	(-1.12)	(-0.58)	(-1.17)	(-1.28)
Illiquid	-0.11	-0.44	-0.48	-0.06	0.22	0.38
	(-0.10)	(-0.33)	(-0.35)	(-0.06)	(0.20)	(0.35)
Panel B. 50 Most illiquid KOSPI stocks						
50 most illiquid	0.16	0.47	0.73	-1.27	-1.23	-1.29
	(0.22)	(0.63)	(1.00)	(-1.46)	(-1.39)	(-1.43)
Panel C. Illiquidity quintiles among KOSDAQ stocks						
Liquid	-4.19	-4.28	-4.01	1.16	1.27	1.28
	(-2.76)	(-2.75)	(-2.72)	(0.89)	(0.95)	(0.94)
2	-1.54	-1.33	-1.33	-0.65	-0.81	-0.99
	(-0.91)	(-0.77)	(-0.75)	(-0.54)	(-0.64)	(-0.78)
3	-0.86	-1.08	-1.06	0.68	0.82	0.69
	(-0.5)	(-0.61)	(-0.58)	(0.39)	(0.46)	(0.38)
4	-4.17	-4.67	-4.79	-2.06	-2.51	-2.58
	(-2.87)	(-2.77)	(-2.82)	(-1.15)	(-1.37)	(-1.38)
Illiquid	-5.85	-5.98	-6.01	-1.37	-1.51	-1.24
	(-2.99)	(-2.45)	(-2.97)	(-0.40)	(-0.43)	(-0.35)
Panel D. 50 Most illiquid KOSDAQ stocks						
50 most illiquid	-1.10	-0.93	-1.09	0.96	0.94	0.90
	(-1.17)	(-0.98)	(-1.11)	(1.30)	(1.25)	(1.17)

This table shows the time-series average excess return of Winner-minus-Loser strategy among high turnover decile and low turnover decile with a control for illiquidity. Amihud (2002) illiquidty measure is used to obtain the level of illquidity. In panel A and C, the strategies are from N×3×3 conditional sorts on size and previous month's return and turnover where the breakpoints for returns and turnovers are the 20th percentile and 80th percentiles for KOSPI and KOSDAQ stocks, respectively. In panels A and C, stocks are sorted into quintiles based on monthly illiquidity measure In panels B and D, the strategies are from 2×2 independent sorts on returns and turnovers among 50 most illiquid stocks in each stock market, where the breakpoint for returns and turnovers is median.

2.6 Short-term momentum and net purchase of individual investors

Lastly, I control the net purchase of individual investors to see if stocks that are purchased by investors who are considered at information disadvantage would exhibit momentum reversal among high turnover stocks in the following month due to overreaction.

Table 7 shows the excess return of momentum strategy among high turnover stocks when stocks are sorted by net purchase of individual investors group. The net purchase of individual investors is calculated by dividing the net purchase stocks of individual investors by the number of shares traded in each month. Panel A shows the result of stocks listed on KOSPI market while panel C shows the result among KOSDAQ listed stocks. For those panels, stocks are sorted into two groups by the net purchase median breakpoint of respective stock market, and then on previous month's return and turnover, in that order. For both KOSPI and KOSDAQ, controlling net purchase of individual investors does not generate any significant profits from short-term momentum strategy.

2.7 Additional Tests

To examine the profitability of short-term momentum strategy in Korean stock market, I conduct additional tests. First, I try different sorting methods when constructing portfolios to see if short-term momentum strategy would generate significant profits. However, the result does not change when portfolios are constructed by independent quintile sorting or dependent sorting in reverse order: first on turnover and then on return. Constructing 10 by 10 portfolios each month based on previous month's return and turnover generate significant positive excess return in the lowest turnover decile and significant excess loss in the highest decile in KOSPI stock market. However, this method is not appropriate considering the number of listed stocks in the stock market as each portfolio contains less than 10 stocks on average.

Table 7

Short-term momentum controlling for monthly net purchase of individual investors

Panel A. KOSPI market

	Short-term momentum [WML, high turnover] controlling for net purchase of individual investors			Short-term reversal [WML, low turnover] controlling for net purchase of individual investors		
	$E[r^e]$	α_{FF3}	α_{FF6}	$E[r^e]$	α_{FF3}	α_{FF6}
A. Breakpoint is net purchase median						
Low	-0.70	-0.59	-0.58	-0.26	-0.20	-0.09
	(-0.93)	(-0.76)	(-0.74)	(-0.43)	(-0.32)	(-0.14)
High	-1.44	-1.44	-1.42	-0.09	-0.52	-0.67
	(-1.60)	(-1.58)	(-1.53)	(-0.12)	(-0.64)	(-0.84)
B. Net purchase quintiles						
Low	-0.01	-0.20	-0.29	-0.97	-0.67	-0.58
	(-0.01)	(-0.28)	(-0.39)	(-1.50)	(-1.01)	(-0.87)
2	-0.03	0.14	0.11	-1.26	-1.37	-1.10
	(-0.03)	(0.13)	(0.10)	(-1.51)	(-1.54)	(-1.31)
3	-2.40	-2.71	-2.54	-0.57	-1.44	-1.44
	(-2.06)	(-2.25)	(-2.09)	(-0.52)	(-1.30)	(-1.30)
4	0.20	0.06	0.00	0.31	0.26	0.07
	(0.18)	(0.05)	(0.00)	(0.36)	(0.28)	(0.07)
High	-0.49	-0.65	-0.58	-0.29	-0.60	-0.59
	(-0.51)	(-0.67)	(-0.58)	(-0.36)	(-0.72)	(-0.72)

Panel B. KOSDAQ market

	Short-term momentum [WML, high turnover] controlling for net purchase of individual investors			Short-term reversal [WML, low turnover] controlling for net purchase of individual investors		
	$E[r^e]$	α_{FF3}	α_{FF6}	$E[r^e]$	α_{FF3}	α_{FF6}
A. Breakpoint is net purchase median						
Low	-0.39	-0.84	-0.79	-1.10	-1.16	-1.02
	(-0.35)	(-0.73)	(-0.68)	(-0.93)	(-0.95)	(-0.83)
High	-1.23	-1.32	-1.22	-1.86	-1.52	-1.40
	(-0.74)	(-0.76)	(-0.70)	(-1.80)	(-1.40)	(-1.29)
B. Net purchase quintiles						
Low	0.99	0.49	0.28	-1.21	-1.53	-1.38
	(0.82)	(0.40)	(0.23)	(-1.28)	(-1.57)	(-1.41)
2	-1.67	-2.02	-1.80	-0.75	-0.69	-0.63
	(-1.51)	(-1.76)	(-1.54)	(-0.28)	('-1.01)	(-0.98)
3	-1.60	-1.42	-1.49	-1.14	-0.99	-0.82
	(-1.88)	(-1.47)	(-1.48)	(-0.96)	(1.20)	(-0.68)
4	-0.28	-0.30	-0.41	-1.52	-1.27	-0.91
	(-0.15)	(-0.16)	(-0.22)	(-1.35)	(-1.08)	(-0.79)
High	-1.24	-1.09	-1.35	-1.87	-1.80	-1.55
	(-1.19)	(-1.06)	(-1.26)	(-1.38)	(-1.29)	(-1.10)

This table shows the excess return of Winner-minus-Loser strategy among high turnover quintile and low turnover quintile with a control for net purchase of individual investors in respective stock market. Panel A includes stocks listed on KOSPI stock market while Panel B includes stocks listed

on KOSDAQ stock market. The net purchase of individual investors is obtained by dividing the net purchase stocks of individual investors by the shares traded in each month. In panels A and B, the strategies are from N×3×3 conditional sorts on size and previous month's return and turnover where the breakpoints for returns and turnovers are the 20th percentile and 80th percentiles for corresponding stocks. In panel A, the breakpoint is the net purchase of individual investors among corresponding stocks. In panel B, the group is sorted into quintiles based on net purchase of individual investors. Data are obtained monthly, and the sample period is from January 1999 to December 2021.

Chapter 3. Conclusion

Unlike the findings from Medhat and Schmeling (2021), neither the short-term momentum nor the short-term reversal strategy generates significant abnormal return in Korean stock market at the 1-month horizon between January 1987 and December 2021. I test the short-term momentum effect by constructing portfolios based on previous month's return and the level of turnover. The result holds even after dividing the sample periods into sub-periods, trying alternative sorting method, such as independent sorting and reverse conditional sorting on previous month's turnover and return. This paper further examines whether the short-term momentum effect can be discovered among high information asymmetry stocks by using several proxies. After controlling size, illiquidity, and net purchase of individual stocks, I do not find evidence that short-term momentum effect exists among high information asymmetric stocks. It is still unknown why the short-term momentum effect does not exist in Korean stock market unlike other global market. Therefore, providing reasons for non-existence of short-term momentum should be an intriguing future research question.

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요약(국문초록)

한국 주식시장에서의 단기 모멘텀 효과 실증분석

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본 연구는 지난 한달간의 수익률과 회전율을 바탕으로 포트폴리오를 구성하여 수익률이 좋았던 주식을 매수하고 수익률이 부진했던 주식을 매도하는 전략을 취했을때 회전율이 높은 주식에서 초과 수익률을 기록하는 단기 모멘텀 효과가 한국 주식시장에서도 유의미하게 발생하는지 연구하였다. 연구 결과, 한국 주식시장에서는 이러한 전략이 유의미한 수익률을 기록하지 못한다는 점을 발견하였다. 본 연구에서는 코스피와 코스닥 시장을 따로 분석하였고, 여러 방식으로 포트폴리오를 구성하였지만 유의미한 결과는 얻지 못하였다. 또한, 정보 불균형이 심한 주식에서는 거래량이 높으면 모멘텀 현상이 단기적으로 유지될 수 있다는 과거 연구결과를 참고하여, 여러 가지 변수를 컨트롤 하여 연구를 진행하였지만 유의미한 초과 수익률은 발견하지 못하였다.

주요어 : 단기, 모멘텀, 한국, 주식시장, 정보불균형

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