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경제학석사 학위논문

**Transaction Proportion of
Individual/Foreign Investors as an
Explaining Factor in
Momentum/Contrarian Effect
in Korean Stock Market**

한국 주식시장에서 모멘텀/반전전략의 효과를
설명하는 요인으로서 개인/외국인 투자자의
거래비중

2013년 12월

서울대학교 대학원

경제학부

김 용 진

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in Korean Stock Market**

지도교수 안 동 현

이 논문을 경제학석사 학위논문으로 제출함
2013년 12월

서울대학교 대학원
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김용진의 석사 학위논문을 인준함
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Abstract

Transaction Proportion of Individual/Foreign Investors as an Explaining Factor in Momentum/Contrarian Effect in Korean Stock Market

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The time-series analysis of Korean stock market data from 1988 to 2012 revealed that since 1999/2000, strong momentum effect has become dominant. Around 1999/2000, there happened a drastic increase in foreign transaction proportion and decline in individual transaction proportion. The correlation and AR regression analyses between transaction proportion of individual/foreign investors and momentum profit show significant negative/positive coefficients. The results provide an implication that the transaction proportion of investor type can be an explanation factor in momentum or contrarian effect.

Keywords : Momentum, Contrarian Trading Strategy, Investor Type, Transaction Proportion, Individual investor, Foreign investor

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Chapter 1. Introduction

So far, there has existed the “momentum effect” in stock markets in the United States and European countries. Jegadeesh and Titman (1993, 2001) found that stocks with the best (worst) returns over the past 3 to 12 months continue to perform well (poorly) over the subsequent 3 to 12 months in the U.S. stock market. In the European equity markets, Rouwenhorst (1998) found the profitability of momentum strategies. Since Jegadeesh and Titman (1993) first discovered the existence of momentum effect, there have been lots of attempts to explain this phenomenon with various factors. It attracted a lot of attention from finance scholars, as it is one of a few anomalies which cannot be explained by CAPM or other standard classical asset-pricing models. Many empirical studies have shown that the momentum effect has had a strong presence in U.S. and European markets. However, in East Asian markets, these momentum strategies have not been successful (Chui, Titman, and Wei (2003)).

Before Jegadeesh and Titman (1993) argued the existence of momentum effect, DeBondt and Thaler (1985, 1987) already found that the contrarian portfolio, buying past losers and selling past winners, could bring excess profits. Using NYSE data from 1926 to 1982, they constructed portfolio with pre-portfolio formation periods of 3 years and 5 years and post-portfolio formation periods of 3 years and 5 years, and both of them were recognized to generate excess positive returns. After their paper, Shiereck, Debont, and Weber (1999) and Lee and Swaminathan (2000) have verified that portfolios with evaluation period less than one year and holding period less than one year showed significant momentum effect, and portfolios with both periods longer than one year (2, 3, 4, 5 years) produced significantly positive returns from contrarian strategies, using U.S. and German stock market data.

Many momentum or contrarian studies have found that these effects, which are dominant and strong in U.S. and many European countries' markets, have

not been witnessed in East Asian markets, including South Korea. Most of them used the data horizon until the early 2000s, hence I felt the necessity of making use of recent data for investigating momentum or contrarian effect in Korea. The time-series analysis results revealed that since 1999/2000, strong momentum effect has become dominant. Another data of monthly transaction proportion by investor type demonstrate the drastic increase in foreign proportion and decrease in individual proportion in equity transactions around the year 1999/2000, which coincide with the abolishment of the limit to foreign investment amount after 1998 Asian financial crisis. The change from insignificant momentum/contrarian effect and the sharp increase in foreign investors' transaction proportion in contrast with sharp decrease in individuals' transaction proportion happened almost simultaneously. In addition, a lot of prior studies have already shown that individual investors utilize contrarian strategies, while institutional and foreign investors employ momentum strategies. I checked whether each type of investor still displays these trading behaviors and confirmed that these trading patterns have not changed until recently.

These outcomes offer a strong conjecture that the momentum or contrarian effect has relation with the transaction proportion of each investor type. Therefore, I conducted correlation analysis, and further, AR process simple regression to control for the time dependence which arises from forming the momentum portfolio with past returns. The regression results show significant negative relation between individuals' transaction proportion and momentum profit, and significant positive relation between foreigners' transaction proportion and momentum profit, even after controlling for time dependence. The results provide an implication that the transaction proportion of investor type can be an explanation factor in momentum or contrarian effect.

My study begins with review of related prior articles in Chapter 2. Chapter 3 observes the momentum effect and its change over 1988 to 2012. Chapter 4 examines the significance of transaction proportion of investor type as a factor in momentum effect, through correlation and simple regression analyses. Chapter 5 concludes the article.

Chapter 2. Literature Review

2.1. Attempts to explain momentum effects

Studies have tried to analyze momentum effect with various factors, such as macroeconomic factors, industry factors, dispersion in expected returns, trading volume (turnover), etc. Chordia and Shivakumar (2002) showed that momentum profits can be explained by several lagged macroeconomic variables. They exhibited that the profit returns of momentum portfolios disappear when the stock returns are adjusted for their predictability based on these macroeconomic variables. One year later, however, Griffin, Ji, and Martin (2003) argued that the model of Chordia and Shivakumar (2002) cannot fully explain the momentum effect around the world.

Moskowitz and Grinblatt (1999) concluded that the industry factors can be main factors that can explain the momentum effect. They argued that after controlling for momentum across industries, the momentum disappeared in individual stock returns in most cases. Conrad and Kaul (1998) conjecture that the momentum effect might be attributable to cross-sectional dispersion in expected returns, but the effect of such dispersion is not strong enough to fully explain observed momentum.

Lee and Swaminathan (2000) have shown that past trading volume can predict the price momentum effect. Griffin, Nardari, and Stulz (2007) also demonstrated a strong and significant positive relation between turnover and past returns, using a trivariate vector autoregression (VAR). Especially, they found that this return-volume relation is stronger when short sales are not permitted, when markets are less efficient, when institutions supporting the functioning of the stock market are weaker, when an economy is more opaque, when an economy is riskier and less correlated with other economies, and when individual investors are relatively more important.

In addition, Hong, Lim, and Stein (2000) report that holding size fixed, the

momentum strategies work better for stocks with low analyst coverage. Next year, Hong, Lee, and Swaminathan (2001) examined the profitability of earnings momentum strategies based on analyst forecast revisions in eleven international equity markets, and argued that both price and earnings momentum are weaker in markets with high levels of corruption (low investor protection).

The momentum effect, unlikely to be explained by risk-based theories, gave rise to attempts of behavioral financial school as well to explain this phenomenon. Good example is Daniel, Hirshleifer, and Subrahmanyam (1998), who showed how the momentum effect can be generated by investors' overconfidence and self-attribution bias. Furthermore, in a recent study, Chui, Titman and Wei (2010) accepted the result of Daniel, Hirshleifer, and Subrahmanyam (1998) and further observed the difference of monthly momentum profit between more individualistic countries and less individualistic ones, and argued that stronger individualism can cause greater momentum effect.

2.2. Momentum/Contrarian Strategy and Investor Type

There have been also studies which indicate that domestic and foreign institutional investors make use of momentum strategies. Grinblatt, Titman, and Wermers (1995) analyzed the behavior of 155 mutual funds over 1975–1984 period and found that 77 percent of those funds were using momentum strategies, buying past winners, but not systematically selling past losers. According to them, funds that invested on momentum realized significantly better performance than other funds, on average. Falkenstein (1996) and Gompers and Metrick (2001) also indicate that institutional investors, in general, follow momentum (positive feedback) trading strategies, and prefer larger and more liquid stocks. Froot, O'Connell, and Seasholes (2001) explored daily international portfolio flows into and out of 44 countries from 1994 through 1998, and found that these flows were strongly influenced by past returns, which is consistent with positive feedback [momentum] trading by international investors.

Nofsinger and Sias (2002) observed that institutional herding is positively correlated with lag returns and stock return momentum. Badrinath and Wahal (2002) also found evidence of momentum strategies by institutional investors. Specifically, they documented the equity trading practices of approximately 1,200 institutions from the third quarter of 1987 through the third quarter of 1995 and found that institutions act as momentum traders when they enter stocks but as contrarian traders when they exit or make adjustments to ongoing holdings, and that there exist significant differences in trading practices among different types of institutions. Kamesaka, Nofsinger, and Kawakita (2003) studied the investment patterns and performance of foreign investors, individual investors, and five types of institutional investors in Japanese stock market. According to them, foreign investor trading is associated with positive feedback market timing [momentum] and that this trading earns high returns, but individual investors earn low returns, even though they also use positive feedback trading in their market timing. Consequently, they documented evidence consistent with information-based models (foreign investors) and behavioral-based models (individual investors) in Japanese market.

Contrary to institutional/foreign investors, it is widely accepted that individual investors behave like anti-momentum traders or contrarian investors and have a general disposition to sell winners too early and hold losers too long (Shefrin and Statman, 1985; Odean, 1998; Barber and Odean, 2000; Griffin, Harris, and Topaloglu, 2003).

2.3. Studies concerning Korean market

Similar studies have been performed in South Korea as well. Choe, Kho, and Stulz (1999) displayed that foreign investors had different trading behavior from local individual investors in Korean market during the 1997 Asian financial crisis. With Korean stock market data except financial firms from 1994 to 2001, 안영규, 이정도 (2004) constructed winner/loser portfolio with pre-portfolio formation periods of 3, 6, 9, 12 months and post-portfolio formation periods of 3,

6, 9, 12 months. They found that in the period of 1994-1997, before the Asian financial crisis, momentum strategy was effective and in the period of 1998-2001, after the crisis, contrarian strategy became significant. 김병준, 정호정 (2008) analyzed monthly returns of 9,615 firms listed in Korean stock market from April 1987 to April 2002. With portfolios with pre-portfolio formation periods of 12, 24, 36 months, they observed the existence of contrarian effect within time horizon of 1, 12, 24, 36 months, implying that there exist short-term and long-term contrarian effects in Korean market.

Bae, Min, and Jung (2011) analyzed momentum/contrarian strategies of foreigners, local institutions, and individual investors, and found evidence that foreigners and local institutions pursue momentum strategies, but individuals employed contrarian strategies in Korean stock market, from 1996 to 2002.

Chapter 3. Momentum/Contrarian Effects in South Korea during 1988–2012

3.1. Data and Methodology

Monthly returns, trading volume, and firm size data were provided by Fn Data Guide, one of South Korean database. I used all 2,641 firms listed on both KSE(KOSPI) and KOSDAQ stock markets, including firms delisted during the period from January 1985 to November 2013. There are two equity markets in South Korea, KSE(KOSPI) and KOSDAQ. This study included 1,083 firms listed on KSE market and 1,558 firms on KOSDAQ market. As Table 1 illustrates, for KOSDAQ market data, the data are available since Jul 1996, as KOSDAQ market did not exist before that time. For monthly net buy volume (in terms of market value) data of each stock by investor type, Fn Data Guide offers these data from Jan 1999.

Table 1
Data Horizon

	Return	Market Value	Net Buy Volume (Market Value)
KSE	Jan 1985 - Nov 2013	Jan 1985 - Nov 2013	Jan 1999 - Nov 2013
KOSDAQ	Aug 1996 - Nov 2013	Jul 1996 - Nov 2013	Jan 1999 - Nov 2013

I followed Chui, Titman, and Wei (2010) in forming the momentum portfolios, but added some changes. At the beginning of each month, all stocks are ranked from the highest based on the past k -month cumulative returns ($k \in (3, 6, 12, 24, 36)$; k refers to pre-portfolio formation period). Stocks in the bottom 33% belong to "L" (loser) portfolio, and those in the top 33% to "W" (winner) portfolio. Many studies concerning momentum effect, including Chui, Titman, and Wei (2010), assign equal weight to each stock in "W" and "L" portfolios, but here I additionally computed market-value weighted portfolio as

well. According to classical finance theory, every investor in market is supposed to follow market portfolio passively, and even in reality, it is widely accepted that it is difficult to beat the market. Following this point of view, I employed not only the return of equally weighted portfolio (EWP), but also the return of market-value weighted portfolio (VWP) to compute the momentum portfolio return and compare them. For VWP, the market value weight is calculated as

$$w_i = \frac{MV_i}{\sum_j MV_j} \quad (i, j : \text{stock in "W" or "L" portfolio; } MV : \text{market value})$$

i.e. the proportion of each stock's market value in the entire market value of "W" or "L" portfolio. The weight is calculated at the end of the pre-portfolio formation period, or the beginning of the post-portfolio period.

These momentum portfolios are held for n months ($n \in (3, 6, 12, 24, 36)$; n refers to post-portfolio formation period). Momentum strategy refers to buying "W" portfolio and (short-)selling "L" portfolio, and holding "W-L" portfolio for n months. Contrarian strategy refers to the opposite strategy, holding "L-W" portfolio for n months. The monthly geometric mean value of this portfolio's holding period return is the post-portfolio formation return of the momentum portfolio. These momentum/contrarian portfolios are not rebalanced over the n -month holding period.

For example, for portfolio with $k=24$ and $n=36$ in January 2000, each stock is assigned "W", "L", or nothing according to the cumulative return from January 1998 to December 1999, and if it belongs to "W" or "L" portfolio, its post-portfolio formation return is calculated as

$$\left(\text{the cumulative return from January 2000 to December 2002} \right)^{\frac{1}{36}},$$

given equal weight if EWP, or market-valued weight if VWP. For VWP, the weight is calculated using the market values as of the end of December 1999, since it is assumed that the "W" or "L" portfolio is formed at the end of December 1999, or the beginning of January 2000. In this way, the returns of portfolios "W" and "L" are computed for each month, and for 5-year horizon, there are sixty observations of "W" and "L" portfolio returns. For the arithmetic mean value of the sixty (or more) return values, I performed t-test against the null hypothesis

$$H_0 : \bar{r} = 0 \quad \text{vs.} \quad H_1 : \bar{r} \neq 0$$

where \bar{r} refers to the arithmetic mean of the return values of "W-L" portfolios. Significant positive value of \bar{r} of "W-L" portfolio indicates the existence of significant momentum effect, while significant negative value of "W-L" portfolio suggests the existence of significant contrarian effect.

In addition, this study tabulated the returns of momentum portfolios using each stock's returns without dividend. The untabulated result from stock returns with dividend shows that there exists no significant difference between the results from these two types of returns.

Table 2 displays how I constructed momentum/contrarian portfolios with k -month pre-portfolio formation period and n -month post-portfolio formation period for KSE market analyses. Portfolio forming dates vary from the beginning of January 1988 to the beginning of December 2012 for portfolios with post-formation periods of 3, 6, 12 months, from the beginning of January 1988 to the beginning of December 2011 for portfolios with post-formation period of 24 months, and from the beginning of January 1988 to the beginning of December 2010 for portfolios with post-formation period of 36 months. For the formation of these portfolios, I utilized the stock market data from January 1985 to November 2013. For portfolios with post-formation periods of 3, 6, 12 months, 300 "W-L" portfolios were generated; for portfolios with post-formation period of 24 months, 288 "W-L" portfolios were formed; and for portfolios with post-formation period of 36 months, 276 "W-L" portfolios were constructed.

For analyses of KOSDAQ market only, the portfolio forming dates vary from the beginning of November 1996 for portfolios with pre-formation period of 3 months, from the beginning of February 1997 for portfolios with pre-formation period of 6 months, and so on; to the beginning of December 2012 for portfolios with post-formation periods of 3, 6, 12 months, to the beginning of December 2011 for portfolios with post-formation period of 24 months, and to the beginning of December 2010 for portfolios with post-formation period of 36 months.

Table 2

Pre-Portfolio Formation Period and Post-Portfolio Formation Period for KSE market data

The momentum portfolio is constructed through the following process. First, at the beginning of each month (portfolio forming date), each stock's cumulative past return for the pre-formation period is calculated. If this past cumulative return belongs to the top/botton 33%, it is included in "W"/"L" portfolio. The "W" and "L" portfolios are held from the portfolio forming date for the post-formation period, and the geometric mean of cumulative return for this post-formation period is computed.

Pre-Formation Period	Post-Formation Period	Pre-Formation Period	Portfolio Forming Date	Post-Formation Period	Number of months	
3 months	3 months	Oct 1987 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Mar 1988	300	
		Nov 1987 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Apr 1988		
		⋮	⋮	⋮		
			Sep 2012 - Nov 2012	Beginning of Dec 2012	Dec 2012 - Feb 2013	
	6 months	Oct 1987 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Jun 1988	300	
		Nov 1987 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jul 1988		
		⋮	⋮	⋮		
			Sep 2012 - Nov 2012	Beginning of Dec 2012	Dec 2012 - May 2013	
	12 months	Oct 1987 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Dec 1988	300	
		Nov 1987 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jan 1989		
		⋮	⋮	⋮		
			Sep 2012 - Nov 2012	Beginning of Dec 2012	Dec 2012 - Nov 2013	
	24 months	Oct 1987 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Dec 1989	288	
		Nov 1987 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jan 1990		
		⋮	⋮	⋮		
			Sep 2012 - Nov 2012	Beginning of Dec 2011	Dec 2011 - Nov 2013	
	36 months	Oct 1987 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Dec 1990	276	
		Nov 1987 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jan 1991		
		⋮	⋮	⋮		
			Sep 2012 - Nov 2012	Beginning of Dec 2010	Dec 2010 - Nov 2013	

Table 2 (*continued*)

Pre-Formation Period	Post-Formation Period	Pre-Formation Period	Portfolio Forming Date	Post-Formation Period	Number of months	
6 months	3 months	Jul 1987 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Mar 1988	300	
		Aug 1987 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Apr 1988		
		⋮	⋮	⋮		
		Jun 2012 - Nov 2012	Beginning of Dec 2012	Dec 2012 - Feb 2013		
⋮	⋮	⋮	⋮	⋮	⋮	
36 months	3 months	Jan 1985 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Mar 1988	300	
		Feb 1985 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Apr 1988		
		⋮	⋮	⋮		
		Dec 2009 - Nov 2012	Beginning of Dec 2012	Dec 2012 - Feb 2013		
	6 months	6 months	Jan 1985 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Jun 1988	300
			Feb 1985 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jul 1988	
			⋮	⋮	⋮	
			Dec 2009 - Nov 2012	Beginning of Dec 2012	Dec 2012 - May 2013	
	12 months	12 months	Jan 1985 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Dec 1988	300
			Feb 1985 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jan 1989	
			⋮	⋮	⋮	
			Dec 2009 - Nov 2012	Beginning of Dec 2012	Dec 2012 - Nov 2013	
	24 months	24 months	Jan 1985 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Dec 1989	288
			Feb 1985 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jan 1990	
			⋮	⋮	⋮	
			Dec 2009 - Nov 2012	Beginning of Dec 2011	Dec 2011 - Nov 2013	
36 months	36 months	Jan 1985 - Dec 1987	Beginning of Jan 1988	Jan 1988 - Dec 1990	276	
		Feb 1985 - Jan 1988	Beginning of Feb 1988	Feb 1988 - Jan 1991		
		⋮	⋮	⋮		
		Dec 2009 - Nov 2012	Beginning of Dec 2010	Dec 2010 - Nov 2013		

3.2. Result of Momentum/Contrarian Effect in South Korea

Tables 3 to 5 illustrate momentum profit results in different equity markets. Specifically, Table 3 displays the momentum portfolio profit in the entire Korean equity market (KSE and KOSDAQ combined), Table 4 in KSE market only, and Table 5 in KOSDAQ market only.

All the momentum portfolios in Tables 3 to 5 are "W-L" portfolio, where "W" portfolios include the top 33% of stocks and "L" include the bottom 33%. For each combination of pre-formation and post-formation periods, the returns of equally weighted portfolio (EWP) and of market-value weighted portfolio (VWP) are computed.

A lot of studies have analyzed the momentum/contrarian effect so far, and most of them, in general, set "W" and "L" portfolios to consist of top/bottom 33%, 20%, or 10%. However, it is difficult to find studies which analyzed the portfolios of 33%, 20%, and 10% at the same time. Hence, I added analyses of momentum/contrarian effect using 20% and 10% criteria for constructing momentum portfolios in KSE & KOSDAQ markets combined as well, and the results are shown in Tables A1 and A2, respectively, in Appendix. Readers can admit that there exist no significant differences among these criteria. As there is no significant differences, I tabulated only the results from the criterion of 33% throughout this paper.

Furthermore, for momentum studies in Korean market, it was not easy to find a paper which calculated the momentum effect with market-value weighted portfolios (VWP). Therefore, I added VWP into my analysis as well.

Table 3

Momentum profits in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) and market-value weighted portfolios (VWP) of which "W" portfolios include the top 33% of stocks and "L" include the bottom 33%. The left column indicates the pre-portfolio formation periods, and the upper row indicates the post-portfolio formation periods. According to the cumulative past returns of each stock for the pre-portfolio formation period, that stock is assigned to "W" or "L" if it belongs to the top or bottom 33%. These portfolios are held for the post-portfolio formation period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

		3 months	6 months	12 months	24 months	36 months
3 months	EWP	.19% (.7144)	.15% (.6995)	.26% (.3555)	.20% (.2488)	.22% (.1060)
	VWP	-.10% (.8340)	-.25% (.5535)	-.20% (.5117)	.15% (.4599)	.20% (.2189)
6 months	EWP	.11% (.8325)	.29% (.4533)	.18% (.5209)	.21% (.2298)	.24% (.0766)*
	VWP	-.09% (.8592)	.14% (.6875)	-.14% (.6186)	.28% (.1445)	.33% (.0374)**
12 months	EWP	.36% (.4988)	.27% (.5008)	.05% (.8522)	.20% (.2503)	.26% (.0541)*
	VWP	.76% (.1237)	.79% (.0273)**	.07% (.7893)	.27% (.1356)	.47% (.0015)***
24 months	EWP	.02% (.9648)	.15% (.7179)	.14% (.6196)	.24% (.1583)	.34% (.0147)**
	VWP	1.23% (.0097)***	.98% (.0044)***	.35% (.1434)	.04% (.7718)	.30% (.0218)**
36 months	EWP	.24% (.6682)	.34% (.3989)	.28% (.3254)	.38% (.0261)**	.43% (.0018)***
	VWP	1.33% (.0031)***	1.18% (.0003)***	.77% (.0006)***	.46% (.0017)***	.22% (.0636)*

Table 4
Momentum profits in KSE market only

This table displays the returns of equally weighted momentum portfolios (EWP) and market-value weighted portfolios (VWP) of which "W" portfolios include the top 33% of stocks and "L" include the bottom 33%. The left column indicates the pre-portfolio formation periods, and the upper row indicates the post-portfolio formation periods. According to the cumulative past returns of each stock for the pre-portfolio formation period, that stock is assigned to "W" or "L" if it belongs to the top or bottom 33%. These portfolios are held for the post-portfolio formation period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

		3 months	6 months	12 months	24 months	36 months
3 months	EWP	.12% (.8219)	.29% (.4584)	.30% (.2796)	.26% (.1148)	.25% (.0710)*
	VWP	-.26% (.5973)	-.40% (.3912)	-.30% (.3253)	.19% (.3540)	-.05% (.7707)
6 months	EWP	.26% (.6255)	.41% (.3021)	.26% (.3599)	.26% (.1221)	.25% (.0789)*
	VWP	-.03% (.9498)	.08% (.8135)	-.20% (.4706)	.38% (.0562)*	.15% (.3249)
12 months	EWP	.27% (.6194)	.27% (.4999)	.09% (.7388)	.19% (.2579)	.22% (.1171)
	VWP	.51% (.3363)	.70% (.0578)*	-.02% (.9469)	.37% (.0504)*	.32% (.0274)**
24 months	EWP	.01% (.9915)	.13% (.7434)	.10% (.7250)	.19% (.2541)	.30% (.0348)**
	VWP	1.12% (.0234)**	.89% (.0117)**	.19% (.4275)	.10% (.4959)	.20% (.1213)
36 months	EWP	.08% (.8898)	.19% (.6462)	.18% (.5380)	.34% (.0447)**	.38% (.0065)***
	VWP	1.04% (.0270)***	.91% (.0078)***	.49% (.0325)***	.43% (.0035)***	.30% (.0077)***

Table 5
Momentum profits in KOSDAQ market only

This table displays the returns of equally weighted momentum portfolios (EWP) and market-value weighted portfolios (VWP) of which "W" portfolios include the top 33% of stocks and "L" include the bottom 33%. The left column indicates the pre-portfolio formation periods, and the upper row indicates the post-portfolio formation periods. According to the cumulative past returns of each stock for the pre-portfolio formation period, that stock is assigned to "W" or "L" if it belongs to the top or bottom 33%. These portfolios are held for the post-portfolio formation period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

		3 months	6 months	12 months	24 months	36 months
3 months	EWP	.38% (.6583)	.16% (.7976)	.25% (.5902)	-.00% (.9888)	.06% (.7845)
	VWP	.56% (.5245)	.37% (.6258)	.14% (.8188)	.04% (.8989)	.18% (.3607)
6 months	EWP	.12% (.8868)	.20% (.7551)	.12% (.7902)	-.05% (.8627)	.06% (.7876)
	VWP	.61% (.4695)	.29% (.6728)	.23% (.6992)	.10% (.7663)	.21% (.3017)
12 months	EWP	.24% (.7999)	.07% (.9148)	-.10% (.8351)	-.06% (.8572)	.11% (.6525)
	VWP	1.21% (.1296)	1.10% (.1050)	-.08% (.8825)	-.06% (.8583)	.25% (.2148)
24 months	EWP	-.28% (.7685)	-.13% (.8489)	.07% (.8805)	.22% (.4672)	.30% (.2015)
	VWP	1.05% (.1262)	.93% (.0986)*	.63% (.1112)	-.48% (.1030)	.10% (.6096)
36 months	EWP	.70% (.3601)	.70% (.2040)	.62% (.0723)*	.61% (.0152)**	.64% (.0034)***
	VWP	1.29% (.0144)**	1.10% (.0074)***	1.04% (.0000)***	.08% (.6629)	-.33% (.0802)*

We can interpret the results shown in Tables 3 to 5 in various aspects. For both EWP and VWP, it is observed that the longer the pre-formation or post-formation periods, the more statistically significant the returns of "W-L" portfolios, and in most cases, "W-L" portfolio has positive returns. Additionally, momentum effects appear to be more significant in VWP than EWP, and in KSE market than KOSDAQ market.

In sum, we can observe the existence of momentum effect, rather than contrarian effect in South Korea during the period of 1988-2012. With period of less than a year, there exists weak momentum effect, but with period of more than a year, strong and statistically significant momentum effect is observed. More precisely, if either the pre-portfolio formation or the post-portfolio formation is long-term horizon, one can expect momentum profit from his/her "W-L" portfolio, especially for VWP in KSE market. This result is different from the results of prior studies; in prior studies with data until the early 2000s, South Korea has not shown significant momentum effect as shown in this study. Griffin, Ji, and Martin (2003) calculated momentum profit of -0.76% with $t=-0.80$ for EWP with pre-formation period of 6 months and post-formation period of 6 months in KSE & KOSDAQ markets combined, over the period from October 1987 to December 2000. Chui, Titman, and Wei (2010) estimated momentum profit of -0.337% with $t=-0.81$ for pre-formation period of 6 months and post-formation period of 6 months in KSE & KOSDAQ markets combined as well, over the period from August 1985 to June 2003. Comparing those results with Table 3, we can surmise that the inclusion of the recent ten or more years had an impact on the change in momentum profit. We will see the pattern of momentum effect over time in the next section 3.3. to investigate more thoroughly the momentum effect shown in this section.

3.3. 5-year Horizon Analysis

In this section, I analyzed the momentum profits during 1988-2012 in more

detail. To see the change in momentum/contrarian effect during this period, I performed 5-year horizon analysis for each year. Hence, there exist 21 horizons: 1988–1992, 1989–1993, 1990–1994, ..., 2006–2010, 2007–2011, 2008–2012. For every portfolio combination of pre-formation period and post-formation period, each horizon is comprised of five years, or sixty months, except for the horizons 2007–2011 and 2008–2012. As illustrated in Table 2, the portfolio forming date ends in December 2011 for portfolios with post-formation period of 24 months, and ends in December 2010 for portfolios with post-formation period of 36 months. Therefore, the horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. Similarly, the horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months.

Tables 6–10 exhibit the profits of equally weighted momentum profits (EWP returns) in KSE market only. Additionally, I calculated the profits of market-value weighted momentum profits (VWP returns) in KSE market as well. The results are demonstrated in Tables A3–A7 in Appendix. Table 11 summarizes the results of tables 6–10 and tables A3–A7. Every return result for each horizon is categorized in four letters: "C" for contrarian effect significant at 10% level, "c" for insignificant contrarian effect, "M" for momentum effect significant at 10% level, and "m" for insignificant momentum effect. One can see the change in momentum/contrarian effect over time with this one table. Similar analyses were performed for KSE & KOSDAQ markets combined, and these results are displayed in Tables A8–A18 in Appendix. Tables A8–A12 tell us the results of EWP, Tables A13–A17 tell us those of VWP, and Table A18 summarizes these results.

Table 6

Momentum Profits of EWP with Pre-Formation Period of 3 months in KSE market only

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (3 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
3	3	-.34% (.6881)	.04% (.9653)	.44% (.6146)	.29% (.7272)	.27% (.7327)	.35% (.7807)	-.44% (.8084)	-.80% (.6745)	-.97% (.6186)	-1.20% (.5500)	-1.19% (.5029)	-.16% (.8841)
	6	-.52% (.3891)	-.31% (.5757)	-.10% (.8610)	-.02% (.9711)	.19% (.6856)	.44% (.6421)	.04% (.9788)	-.12% (.9369)	-.03% (.9846)	-.37% (.8066)	-.34% (.7938)	.51% (.4938)
	12	-.25% (.5670)	-.35% (.3877)	-.46% (.1986)	-.56% (.0711)*	-.42% (.2242)	-.01% (.9856)	-.30% (.7691)	-.26% (.8080)	-.12% (.9119)	-.13% (.9024)	-.09% (.9043)	.79% (.0630)*
	24	-.16% (.5747)	-.24% (.4130)	-.27% (.2248)	-.35% (.0922)*	-.12% (.7859)	-.08% (.8386)	-.21% (.6308)	-.30% (.4758)	-.26% (.5317)	-.23% (.4285)	.07% (.8180)	.60% (.0588)*
	36	-.05% (.7944)	-.11% (.5649)	-.14% (.3870)	-.17% (.6362)	-.11% (.7467)	-.07% (.8242)	-.13% (.6779)	-.16% (.5768)	-.12% (.5461)	-.01% (.9534)	.16% (.4539)	.54% (.0659)*

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
3	3	.38% (.7007)	1.23% (.2146)	1.18% (.1764)	1.37% (.0985)*	.86% (.4150)	.63% (.5632)	.61% (.5445)	.65% (.5196)	.41% (.6434)
	6	.81% (.2171)	1.19% (.1087)	1.34% (.0533)*	1.47% (.0165)**	.79% (.3527)	.61% (.4790)	.58% (.4583)	.49% (.5247)	.40% (.5496)
	12	1.08% (.0364)**	1.36% (.0136)**	1.43% (.0133)**	1.46% (.0052)**	.93% (.0990)*	.72% (.1715)	.69% (.1468)	.53% (.1937)	.43% (.1635)
	24	.93% (.0188)**	1.24% (.0038)**	1.27% (.0007)**	1.15% (.0002)**	.86% (.0067)**	.69% (.0105)**	.55% (.0042)**	.40% (.0147)**	.35% (.0386)**
	36	.86% (.0189)**	1.08% (.0010)**	1.03% (.0001)**	.92% (.0003)**	.71% (.0045)**	.48% (.0039)**	.37% (.0004)**	.33% (.0032)**	.32% (.0096)**

Table 7

Momentum Profits of EWP with Pre-Formation Period of 6 months in KSE market only

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (6 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
6	3	-.93% (.2729)	-.57% (.4859)	-.27% (.7512)	-.17% (.8276)	.02% (.9752)	.69% (.5742)	-.20% (.9161)	-.25% (.8969)	-.28% (.8864)	-.41% (.8406)	-.67% (.7150)	.69% (.5566)
	6	-.74% (.2124)	-.67% (.2153)	-.63% (.2645)	-.47% (.3276)	-.21% (.6449)	.40% (.6667)	.09% (.9475)	.28% (.8463)	.27% (.8523)	.10% (.9445)	.02% (.9870)	1.03% (.1766)
	12	-.36% (.4116)	-.63% (.1214)	-.82% (.0208)**	-.93% (.0026)***	-.87% (.0120)**	-.24% (.7601)	-.55% (.5922)	-.49% (.6417)	-.32% (.7645)	-.30% (.7742)	-.20% (.8055)	.93% (.0305)**
	24	-.22% (.4431)	-.33% (.2541)	-.33% (.1247)	-.40% (.0553)*	-.13% (.7843)	-.09% (.8259)	-.22% (.6113)	-.33% (.4360)	-.37% (.3767)	-.39% (.1845)	.03% (.9196)	.67% (.0373)**
	36	-.09% (.6510)	-.15% (.4363)	-.19% (.2188)	-.19% (.6049)	-.11% (.7507)	-.04% (.9007)	-.09% (.7676)	-.12% (.6601)	-.14% (.4968)	-.06% (.7817)	.14% (.5016)	.57% (.0578)*

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
6	3	1.02% (.3156)	1.61% (.1073)	1.50% (.0869)*	1.69% (.0448)**	1.10% (.2955)	.49% (.6581)	.59% (.5656)	.67% (.5163)	.53% (.5606)
	6	1.20% (.0769)*	1.66% (.0274)**	1.72% (.0141)**	1.83% (.0032)***	1.08% (.2046)	.58% (.4982)	.64% (.4146)	.53% (.4962)	.52% (.4382)
	12	1.35% (.0096)***	1.59% (.0038)***	1.67% (.0039)***	1.58% (.0026)***	1.04% (.0655)*	.68% (.1895)	.72% (.1267)	.53% (.1906)	.51% (.0903)*
	24	1.07% (.0081)***	1.42% (.0010)***	1.45% (.0001)***	1.21% (.0001)***	.92% (.0036)***	.70% (.0093)***	.57% (.0024)***	.41% (.0122)**	.37% (.0282)**
	36	.92% (.0126)**	1.17% (.0004)***	1.10% (.0000)***	.90% (.0004)***	.70% (.0052)***	.43% (.0098)***	.33% (.0015)***	.32% (.0041)***	.35% (.0046)***

Table 8

Momentum Profits of EWP with Pre-Formation Period of 12 months in KSE market only

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (12 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
12	3	-.30% (.7207)	-.78% (.3582)	-1.09% (.2065)	-1.18% (.1433)	-1.32% (.0959)*	-.36% (.7727)	-.93% (.6259)	-.64% (.7469)	1.06% (.7499)	-.52% (.8023)	-.70% (.7055)	1.13% (.3233)
	6	-.26% (.6685)	-.83% (.1396)	-1.19% (.0434)**	-1.25% (.0154)**	-1.37% (.0049)***	-.51% (.5900)	-.64% (.6511)	-.59% (.6885)	-.50% (.7382)	-.46% (.7636)	-.36% (.7854)	.96% (.2027)
	12	-.40% (.3725)	-.72% (.0843)*	-1.03% (.0050)***	-1.10% (.0007)***	-1.35% (.0001)***	-.52% (.5164)	-.85% (.4128)	-.91% (.3941)	-.91% (.3926)	-.86% (.4147)	-.63% (.4314)	.67% (.1233)
	24	-.19% (.4943)	-.26% (.3520)	-.32% (.1247)	-.32% (.1213)	-.10% (.8387)	-.21% (.6197)	-.32% (.4854)	-.48% (.2795)	-.66% (.1314)	-.70% (.0163)**	-.15% (.6161)	.56% (.0795)*
	36	-.10% (.6250)	-.11% (.5591)	-.17% (.2926)	-.14% (.6918)	-.08% (.8074)	-.04% (.8798)	-.10% (.7571)	-.14% (.6269)	-.22% (.2907)	-.24% (.2511)	-.00% (.9846)	.45% (.1236)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
12	3	1.55% (.1260)	2.14% (.0329)**	1.96% (.0256)**	2.05% (.0155)**	1.32% (.2113)	.60% (.5895)	.63% (.5381)	.74% (.4766)	.65% (.4768)
	6	1.55% (.0216)**	1.93% (.0096)***	1.92% (.0057)***	1.86% (.0027)***	.84% (.0763)*	.59% (.4907)	.68% (.3866)	.55% (.4815)	.61% (.3626)
	12	1.23% (.0183)**	1.57% (.0041)***	1.76% (.0022)***	1.50% (.0042)***	.88% (.1141)	.63% (.2197)	.73% (.1228)	.50% (.2187)	.52% (.0845)*
	24	1.04% (.0099)***	1.49% (.0006)***	1.49% (.0001)***	1.19% (.0001)***	.77% (.0136)**	.60% (.0209)**	.49% (.0074)***	.36% (.0197)**	.34% (.0340)**
	36	.85% (.0201)**	1.15% (.0004)***	1.14% (.0000)***	.90% (.0004)***	.63% (.0124)**	.39% (.0149)**	.31% (.0017)***	.32% (.0016)***	.42% (.0002)***

Table 9

Momentum Profits of EWP with Pre-Formation Period of 24 months in KSE market only

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (24 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
24	3	-.70% (.4077)	-.82% (.3398)	-.82% (.3470)	-.79% (.3349)	-.91% (.2621)	-.01% (.9910)	-.88% (.6506)	-.65% (.7480)	-1.29% (.5344)	-1.71% (.4210)	-1.59% (.4001)	.35% (.7648)
	6	-.83% (.1716)	-.67% (.2339)	-.75% (.2008)	-.70% (.1704)	-.72% (.1413)	.19% (.8407)	-.48% (.7426)	-.41% (.7834)	-.79% (.6036)	-1.27% (.4127)	-1.00% (.4521)	.44% (.5619)
	12	-.91% (.0419)**	-.38% (.3681)	-.46% (.2093)	-.40% (.2287)	-.44% (.2367)	.51% (.5352)	-.63% (.5511)	-.65% (.5473)	-.89% (.4100)	-1.21% (.2616)	-.96% (.2275)	.51% (.2424)
	24	-.49% (.0818)*	-.06% (.8213)	.00% (.9916)	.06% (.7643)	.29% (.5415)	.25% (.5614)	-.19% (.6689)	-.28% (.5192)	-.46% (.2780)	-.65% (.0214)**	-.19% (.5009)	.50% (.1059)
	36	-.36% (.0888)*	-.03% (.8877)	.19% (.2241)	.45% (.2234)	.41% (.2425)	.55% (.0672)	.26% (.4036)	.31% (.2754)	-.01% (.9765)	-.08% (.7133)	.06% (.7732)	.49% (.0912)*

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
24	3	.70% (.4938)	1.46% (.1422)	1.81% (.0389)**	1.84% (.0272)**	1.00% (.3408)	.44% (.6933)	.76% (.4566)	.77% (.4590)	.50% (.5910)
	6	.96% (.1551)	1.46% (.0488)**	1.91% (.0057)***	1.77% (.0039)***	.92% (.2737)	.52% (.5466)	.83% (.2885)	.65% (.4055)	.52% (.4427)
	12	1.00% (.0554)*	1.38% (.0119)**	1.78% (.0019)***	1.41% (.0071)***	.77% (.1719)	.54% (.2991)	.73% (.1245)	.48% (.2486)	.46% (.1399)
	24	.81% (.0399)**	1.21% (.0045)***	1.35% (.0003)***	1.04% (.0007)***	.59% (.0614)*	.51% (.0573)*	.44% (.0195)**	.32% (.0487)**	.38% (.0272)**
	36	.70% (.0537)*	1.03% (.0015)***	1.18% (.0000)***	.91% (.0003)***	.57% (.0226)**	.36% (.0341)**	.29% (.0081)***	.20% (.0805)*	.33% (.0108)**

Table 10

Momentum Profits of EWP with Pre-Formation Period of 36 months in KSE market only

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (36 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
36	3	-.86% (.3121)	-.73% (.3936)	-.37% (.6699)	-.42% (.6157)	-.60% (.4584)	.32% (.7966)	-.86% (.6631)	-.74% (.7167)	-1.19% (.5719)	-1.26% (.5584)	-1.15% (.5521)	.83% (.4688)
	6	-.98% (.1060)	-.57% (.3246)	-.31% (.5957)	-.35% (.4993)	-.48% (.3274)	.42% (.6617)	-.46% (.7518)	-.39% (.7947)	-.56% (.7117)	-.74% (.6362)	-.43% (.7511)	.90% (.2297)
	12	-1.05% (.0186)**	-.40% (.3533)	-.25% (.4971)	-.16% (.6245)	-.21% (.5694)	.61% (.4551)	-.52% (.6210)	-.37% (.7294)	-.53% (.6178)	-.69% (.5193)	-.37% (.6387)	.92% (.0315)**
	24	-.66% (.0209)**	-.16% (.5671)	.01% (.9732)	.33% (.1156)	.76% (.1241)	.65% (.1409)	.26% (.5672)	.28% (.5343)	.21% (.6405)	-.17% (.5404)	.31% (.2689)	.90% (.0027)***
	36	-.38% (.0754)*	-.04% (.8461)	.24% (.1384)	.54% (.1390)	.60% (.0803)*	.65% (.0300)**	.39% (.2039)	.47% (.0947)*	.47% (.0274)**	.36% (.0908)*	.53% (.0150)**	.94% (.0011)***

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
36	3	1.17% (.2457)	1.76% (.0704)*	1.92% (.0269)**	1.88% (.0232)**	.87% (.4032)	.23% (.8345)	.48% (.6406)	.49% (.6379)	.19% (.8397)
	6	1.31% (.0465)**	1.59% (.0305)**	1.86% (.0068)***	1.70% (.0049)***	.80% (.3335)	.27% (.7481)	.60% (.4421)	.39% (.6153)	.22% (.7462)
	12	1.17% (.0226)**	1.42% (.0096)***	1.78% (.0021)***	1.39% (.0081)***	.74% (.1909)	.43% (.4128)	.64% (.1818)	.31% (.4585)	.31% (.3163)
	24	1.06% (.0070)***	1.29% (.0027)***	1.51% (.0001)***	1.20% (.0001)***	.69% (.0325)**	.50% (.0704)*	.35% (.0781)*	.17% (.3109)	.16% (.3563)
	36	1.04% (.0035)***	1.14% (.0003)***	1.28% (.0000)***	1.00% (.0001)***	.58% (.0223)**	.26% (.1449)	.09% (.4157)	-.10% (.4081)	-.05% (.6807)

Table 11

Summary of Tables 6 - 10 & A3 - A7 : Change in Momentum/Contrarian Effect in KSE market over Time

This table summarizes the results of tables 6-10 and A3-A7. Every return result for each horizon is categorized in four letters: "C" for contrarian effect significant at 10% level, "c" for insignificant contrarian effect, "M" for momentum effect significant at 10% level, and "m" for insignificant momentum effect. For each horizon and for each combination of pre-formation period and post-formation period, a combination of two letters is reported: the first letter for EWP and the second letter for VWP. For example, "mC" refers to insignificant momentum effect for EWP and significant contrarian effect for VWP. The left two columns indicate the pre-portfolio formation and the post-portfolio formation periods. 201x designates that the horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. 201y signifies that the horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months.

Pre	Post	1988 1992	1989 1993	1990 1994	1991 1995	1992 1996	1993 1997	1994 1998	1995 1999	1996 2000	1997 2001	1998 2002	1999 2003	2000 2004	2001 2005	2002 2006	2003 2007	2004 2008	2005 2009	2006 2010	2007 201x	2008 201y	
3	3	cc	mc	mm	mm	mm	mm	cc	cc	cc	cc	cc	cc	mc	mc	mm	Mm	mm	mm	mm	mm	mm	mc
	6	cC	cC	cc	cc	mc	mc	mc	cc	cc	cc	cc	mm	mc	mm	MM	MM	mm	mm	mm	mm	mc	mc
	12	cc	cc	cc	CC	cc	cc	cc	cc	cc	cc	cc	Mm	Mm	Mm	Mm	Mm	Mc	mc	mc	mc	mc	mc
	24	cc	cc	cc	Cc	cc	cm	cm	cm	cm	cm	mm	Mm	Mm	Mm	MM	MM	Mm	Mm	Mm	Mm	Mm	Mm
	36	cm	cc	cc	cc	cc	cc	cc	cc	cc	cc	cm	mc	Mm	Mm	Mm	Mm	MM	Mm	Mm	Mm	Mm	Mm
6	3	cc	cc	cc	cc	mm	mm	cm	cm	cm	cc	cc	mc	mc	mc	Mm	Mm	mm	mm	mm	mm	mm	mm
	6	cC	cC	cC	cC	cc	mm	mm	mm	mm	mm	mc	mm	Mc	Mm	MM	MM	mm	mm	mm	mm	mm	mc
	12	cc	cc	CC	CC	CC	cc	cc	cc	cc	cc	cc	Mm	Mm	Mm	Mm	MM	Mc	mc	mm	mc	Mm	
	24	cc	cc	cc	Cc	cc	cm	cm	cm	cm	cm	mm	Mm	MM	MM	MM	MM	MM	Mm	MM	Mm	Mm	
	36	cm	cm	cc	cm	cc	cc	cc	cc	cc	cc	cc	mc	Mm	Mm	MM	MM	MM	MM	Mm	MM	MM	MM
12	3	cc	cc	cc	cc	CC	cc	cm	cm	mm	cm	cm	mm	mc	Mm	Mm	MM	mm	mm	mm	mm	mm	mm
	6	cc	cc	CC	CC	CC	cc	cm	cM	cm	cm	cm	mm	Mm	MM	MM	MM	Mm	mm	mm	mm	mm	mm
	12	cc	CC	CC	CC	CC	cc	cc	cc	cc	cc	cc	mm	Mm	Mm	MM	MM	mm	mm	mm	mm	mm	Mm
	24	cc	cc	cc	cc	cc	cc	cm	cM	cm	Cm	cM	MM	MM	MM	MM	MM	MM	Mm	MM	Mm	Mm	Mm
	36	cm	cm	cm	cm	cm	cc	cm	cm	cc	cm	cm	mm	Mm	MM	MM	MM	MM	MM	MM	MM	MM	MM
24	3	cc	cc	cc	cc	cc	cm	cm	cM	cM	cM	cM	mM	mm	mm	MM	MM	mm	mM	mM	mM	mM	mm
	6	cC	cC	cC	cC	cc	mm	cm	cM	cM	cM	cM	mM	mm	MM	MM	MM	mM	mM	mm	mm	mm	mm
	12	CC	cC	cC	cc	cc	mc	cc	cm	cm	cm	cm	mM	MM	MM	MM	MM	mM	mM	mm	mm	mm	mm
	24	CC	cc	mc	mm	mm	mm	cm	cm	cm	Cm	cM	mM	Mc	MM	MM	MM	Mm	Mm	Mm	Mc	Mc	Mc
	36	Cc	cm	mM	mM	mm	mm	mm	mm	mm	cc	cm	mm	Mm	Mm	MM	MM	MM	Mm	Mm	Mm	MM	MM
36	3	cc	cc	cc	cc	cc	mm	cm	cM	cm	cM	cm	mm	mm	MM	MM	MM	mm	mm	mm	mm	mm	mm
	6	cc	cC	cc	cc	cc	mm	cm	cM	cm	cM	cm	mm	Mm	MM	MM	MM	mM	mm	mm	mm	mm	mm
	12	CC	cc	cc	cm	cc	mm	cc	cm	cm	cm	cm	MM	Mm	MM	MM	MM	mM	mM	mM	mM	mM	mM
	24	CC	cc	mc	mM	mM	mM	mM	mM	mM	mM	cM	mM	MM	Mm	MM	MM	MM	MM	MM	MM	MM	mm
	36	Cc	cm	mM	mM	MM	MM	mM	MM	MM	MM	MM	Mm	Mm	MC	Mc	Mm	Mm	Mc	mm	mm	cm	cm

According to results summarized in Table 11, we can witness that there has been a significant change in momentum/contrarian effect in Korean stock market. Until the mid-1990s, insignificant contrarian effect had been dominant in most horizons, and only a few horizons report significant contrarian effect, or insignificant/significant momentum effect. Since the late 1990s, momentum effect has become dominant and most horizons have shown significant momentum effect. It indicates that there happened a significant change in momentum/contrarian effect around the year 1998-1999. Table A18 in Appendix with the results in KSE & KOSDAQ markets combined also displays similar results.

Concerning South Korean economic situation around the late 1990s, it is probable to conjecture that the Asian financial crisis had an impact on this change. More specifically, South Korea was enforced to open its capital market completely to foreigners by International Monetary Fund (IMF), and since January 1999, the limit to amount of foreign investment was abolished. As it became possible for foreign investors to purchase Korean stocks with few limitations, foreign investment has played more and more important role in South Korean stock market so far.

In the next chapter, we will investigate more thoroughly the relation between momentum/contrarian effect and the transaction proportion of each investor type in Korean stock market.

Chapter 4. Relation between Momentum/Contrarian Effect and Investor Type

4.1. Momentum/Contrarian Strategies by Investor Type

In this section, I analyzed which trading strategy each investor type uses. For this analysis, I followed the methodology which Bae, Min, and Jung (2011) employed. For each portfolio forming date (monthly), they computed cumulative sum of net buy volume in terms of market value for six months by each investor type: individual, local institution, and foreigner. Based on the cumulative net buy volume amount for six months, they formed an equally weighted "Buy" portfolio with (approximately) top 10% stocks (stocks with the highest net buy volumes), and equally weighted "Sell" portfolio with (approximately) bottom 10% stocks (stocks with the lowest net buy volumes). They observed the sign and significance of the return of "Buy-Sell" portfolio for past six months and for past twelve months. If the return is positive (negative), it indicates momentum (contrarian) profit, and that that investor type employs momentum (contrarian) trading strategy.

I followed their methodology, but added some changes. First, they constructed portfolios with the combinations of six months of "net buy volume estimation period" and six and twelve months of "pre-portfolio formation period", but I constructed portfolios with more combinations. I calculated the cumulative sum of net buy volumes for 3, 6, and 12 months. For these portfolios, I computed the pre-portfolio formation period return for the corresponding net buy volume estimation period. For example, for portfolios with net buy volume estimation period of 12 months, I computed the monthly geometric mean value of cumulative portfolio return for 12 months. Hence, if we set b as the net buy volume estimation period, where $b \in (3, 6, 12)$, and k as the pre-portfolio formation period, the combinations of (b, k) that Bae, Min, and Jung (2011) analyzed are $(6, 6)$ and $(6, 12)$, and the combinations that I analyzed are $(3, 3)$,

(6, 6), and (12, 12).

Second, Bae, Min, and Jung (2011) calculated only the return of equally weighted portfolio (EWP), but I calculated the return of market-value weighted portfolio (VWP) as well. In VWP, the weight was computed based on the market value as of the previous month, as the portfolio forming date is the beginning of each month, or the end of the previous month, throughout this paper.

In addition, Bae, Min, and Jung (2011) analyzed only KSE market, but I analyzed KSE & KOSDAQ markets combined as well.

Table 12 shows the pre-portfolio formation returns of individual investors, Table 13 the trading pattern of local institutional investors, and Table 14 that of foreign investors, in KSE market only. Similar analyses were performed for KSE & KOSDAQ markets combined. Tables A19 to A21 describe the results in KSE & KOSDAQ markets combined.

Table 12

Returns of Buy–Sell Portfolios of Individual Investors in KSE market only

Based on the cumulative net buy volume amount of individual investors for "net buy volume estimation period", "Buy" portfolio is comprised of top 10% stocks (stocks with the highest net buy volumes), and "Sell" portfolio is comprised of bottom 10% stocks (stocks with the lowest net buy volumes). Reported in the table below are the monthly geometric mean values of cumulative return of "Buy–Sell" portfolios held for "pre-portfolio formation period." Analyses of three combinations of "net buy volume estimation period" and "pre-portfolio formation period" were performed: (3, 3), (6, 6), and (12, 12). The left column indicates the (identical) net buy volume estimation period and pre-portfolio formation period. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Net& Pre		1999–2012	1999–2003	2000–2004	2001–2005	2002–2006	2003–2007	2004–2008	2005–2009	2006–2010	2007–2011	2008–2012	2009–2013
3	EWP	-7.00% (.0000)***	-8.24% (.0000)***	-8.18% (.0000)***	-7.46% (.0000)***	-6.75% (.0000)***	-6.12% (.0000)***	-5.98% (.0000)***	-6.08% (.0000)***	-6.64% (.0000)***	-6.78% (.0000)***	-7.13% (.0000)***	-6.79% (.0000)***
	VWP	-5.78% (.0000)***	-6.69% (.0001)***	-6.57% (.0000)***	-5.49% (.0000)***	-5.07% (.0000)***	-4.86% (.0000)***	-5.07% (.0000)***	-5.21% (.0000)***	-5.82% (.0000)***	-5.95% (.0000)***	-6.05% (.0000)***	-5.57% (.0000)***
6	EWP	-4.91% (.0000)***	-6.41% (.0000)***	-6.38% (.0000)***	-5.71% (.0000)***	-4.86% (.0000)***	-4.10% (.0000)***	-3.71% (.0000)***	-3.61% (.0000)***	-4.19% (.0000)***	-4.34% (.0000)***	-4.71% (.0000)***	-4.61% (.0000)***
	VWP	-3.29% (.0000)***	-3.77% (.0012)***	-3.99% (.0000)***	-3.17% (.0000)***	-2.76% (.0000)***	-2.71% (.0000)***	-2.64% (.0000)***	-2.74% (.0000)***	-3.25% (.0000)***	-3.37% (.0000)***	-3.63% (.0000)***	-3.46% (.0000)***
12	EWP	-3.44% (.0000)***	-4.81% (.0000)***	-5.36% (.0000)***	-4.83% (.0000)***	-3.92% (.0000)***	-3.06% (.0000)***	-2.44% (.0000)***	-1.88% (.0010)***	-2.31% (.0000)***	-2.68% (.0000)***	-2.88% (.0000)***	-3.06% (.0000)***
	VWP	-2.05% (.0000)***	-2.38% (.0066)***	-2.85% (.0000)***	-2.00% (.0000)***	-1.68% (.0001)***	-1.94% (.0000)***	-1.80% (.0000)***	-1.64% (.0001)***	-1.94% (.0000)***	-2.02% (.0000)***	-2.02% (.0000)***	-1.98% (.0000)***

Table 13

Returns of Buy–Sell Portfolios of Institutional Investors in KSE market only

Based on the cumulative net buy volume amount of institutional investors for "net buy volume estimation period", "Buy" portfolio is comprised of top 10% stocks (stocks with the highest net buy volumes), and "Sell" portfolio is comprised of bottom 10% stocks (stocks with the lowest net buy volumes). Reported in the table below are the monthly geometric mean values of cumulative return of "Buy–Sell" portfolios held for "pre-portfolio formation period." Analyses of three combinations of "net buy volume estimation period" and "pre-portfolio formation period" were performed: (3, 3), (6, 6), and (12, 12). The left column indicates the (identical) net buy volume estimation period and pre-portfolio formation period. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Net& Pre		1999–2012	1999–2003	2000–2004	2001–2005	2002–2006	2003–2007	2004–2008	2005–2009	2006–2010	2007–2011	2008–2012	2009–2013
3	EWP	4.29% (.0000)***	4.42% (.0062)***	4.05% (.0006)***	3.21% (.0047)***	2.90% (.0060)***	2.90% (.0005)***	3.22% (.0018)***	3.90% (.0005)***	4.67% (.0000)***	5.29% (.0000)***	5.46% (.0000)***	5.23% (.0000)***
	VWP	3.07% (.0000)***	2.12% (.1856)	2.26% (.0557)*	1.84% (.0535)*	2.16% (.0135)**	2.34% (.0007)***	2.92% (.0005)***	3.34% (.0003)***	3.91% (.0000)***	4.74% (.0000)***	4.68% (.0000)***	4.17% (.0000)***
6	EWP	2.83% (.0000)***	3.38% (.0067)***	2.94% (.0004)***	2.28% (.0044)***	1.90% (.0142)**	1.62% (.0112)**	1.74% (.0191)**	2.13% (.0123)**	2.70% (.0009)***	3.11% (.0001)***	3.37% (.0000)***	3.35% (.0000)***
	VWP	1.65% (.0005)***	.64% (.5747)	.86% (.2650)	1.41% (.0458)**	1.25% (.0617)*	1.32% (.0203)**	1.62% (.0062)***	1.85% (.0083)***	2.20% (.0015)***	2.74% (.0001)***	2.89% (.0000)***	2.69% (.0000)***
12	EWP	1.64% (.0000)***	2.19% (.0080)***	2.05% (.0007)***	1.63% (.0026)***	1.08% (.0250)**	.78% (.1117)	.67% (.1548)	.80% (.1434)	1.12% (.0355)**	1.64% (.0012)***	1.84% (.0001)***	2.07% (.0000)***
	VWP	.57% (.0856)*	-.33% (.6971)	.18% (.7667)	.79% (.0672)*	.48% (.2379)	.45% (.2944)	.71% (.0574)*	.63% (.1205)	.78% (.0569)*	1.20% (.0017)***	1.31% (.0005)***	1.32% (.0001)***

Table 14

Returns of Buy–Sell Portfolios of Foreign Investors in KSE market only

Based on the cumulative net buy volume amount of foreign investors for "net buy volume estimation period", "Buy" portfolio is comprised of top 10% stocks (stocks with the highest net buy volumes), and "Sell" portfolio is comprised of bottom 10% stocks (stocks with the lowest net buy volumes). Reported in the table below are the monthly geometric mean values of cumulative return of "Buy–Sell" portfolios held for "pre-portfolio formation period." Analyses of three combinations of "net buy volume estimation period" and "pre-portfolio formation period" were performed: (3, 3), (6, 6), and (12, 12). The left column indicates the (identical) net buy volume estimation period and pre-portfolio formation period. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Net& Pre		1999–2012	1999–2003	2000–2004	2001–2005	2002–2006	2003–2007	2004–2008	2005–2009	2006–2010	2007–2011	2008–2012	2009–2013
3	EWP	2.96% (.0000)***	4.81% (.0023)***	4.90% (.0000)***	4.64% (.0000)***	4.10% (.0001)***	3.07% (.0002)***	2.41% (.0135)**	1.79% (.0758)*	1.76% (.0632)*	1.66% (.0785)*	1.81% (.0274)**	1.65% (.0085)***
	VWP	2.47% (.0000)***	4.72% (.0024)***	4.95% (.0000)***	4.15% (.0000)***	3.48% (.0001)***	2.48% (.0006)***	1.71% (.0257)**	.89% (.2488)	.88% (.2344)	.41% (.5804)	.79% (.2525)	.99% (.0781)*
6	EWP	2.35% (.0000)***	3.95% (.0012)***	3.91% (.0000)***	3.70% (.0000)***	3.06% (.0000)***	2.37% (.0003)***	1.76% (.0160)**	1.26% (.1098)	1.31% (.0853)*	1.27% (.0852)*	1.42% (.0227)**	1.34% (.0083)***
	VWP	1.60% (.0005)***	3.13% (.0076)***	3.14% (.0001)***	2.45% (.0005)***	1.89% (.0038)***	1.63% (.0030)***	.93% (.0848)*	.62% (.2951)	.61% (.2941)	.35% (.5446)	.51% (.3377)	.74% (.1110)
12	EWP	1.91% (.0000)***	3.21% (.0001)***	3.34% (.0000)***	3.09% (.0000)***	2.64% (.0000)***	2.03% (.0001)***	1.47% (.0030)***	1.04% (.0512)*	1.04% (.0413)**	.96% (.0397)**	.99% (.0173)**	1.04% (.0008)***
	VWP	1.22% (.0002)***	2.01% (.0221)**	2.45% (.0001)***	1.86% (.0000)***	1.71% (.0000)***	1.67% (.0001)***	1.32% (.0002)***	.92% (.0152)**	.81% (.0295)**	.61% (.0765)*	.45% (.1810)	.34% (.2439)

Throughout all the horizons, individuals have shown a very strong and significant contrarian trading behaviors until recently, both in KSE market only and in KSE & KOSDAQ markets combined. On the contrary, institutional and foreign investors have shown strong and significant momentum trading behaviors in most horizons. Both of them have exhibited stronger momentum effect in KSE market only. And for all three types of investors, returns of EWP were more significant than those of VWP in most occasions.

These results are in line with prior studies' results that individual investors employ contrarian strategy and institutional and foreign investors show momentum trading behavior. We can confirm that the trading strategy of each investor type has not changed since then, and the results of prior studies are unwavering.

4.2. Trends in transactions in Korean stock market by Investor Type

Table 15 displays the changes in transactions in Korean stock market (KSE market only) over time by each investor type. These data were obtained from Bank of Korea, and are available from July 1991 to October 2013 (as of December 2013). They offer monthly buy volume and sell volume by each investor type in terms of market value, and I added up these two figures to compute the transaction amount. Then I added the monthly transaction amounts by year.

Graph 1 also displays the trends in transaction amount in KSE market by each investor type, using the same data from Bank of Korea. The difference lies, however, in that Table 34 shows annual figures, while Graph 1 employed the monthly data.

Table 15

Annual trends in transactions in KSE market by Investor Type

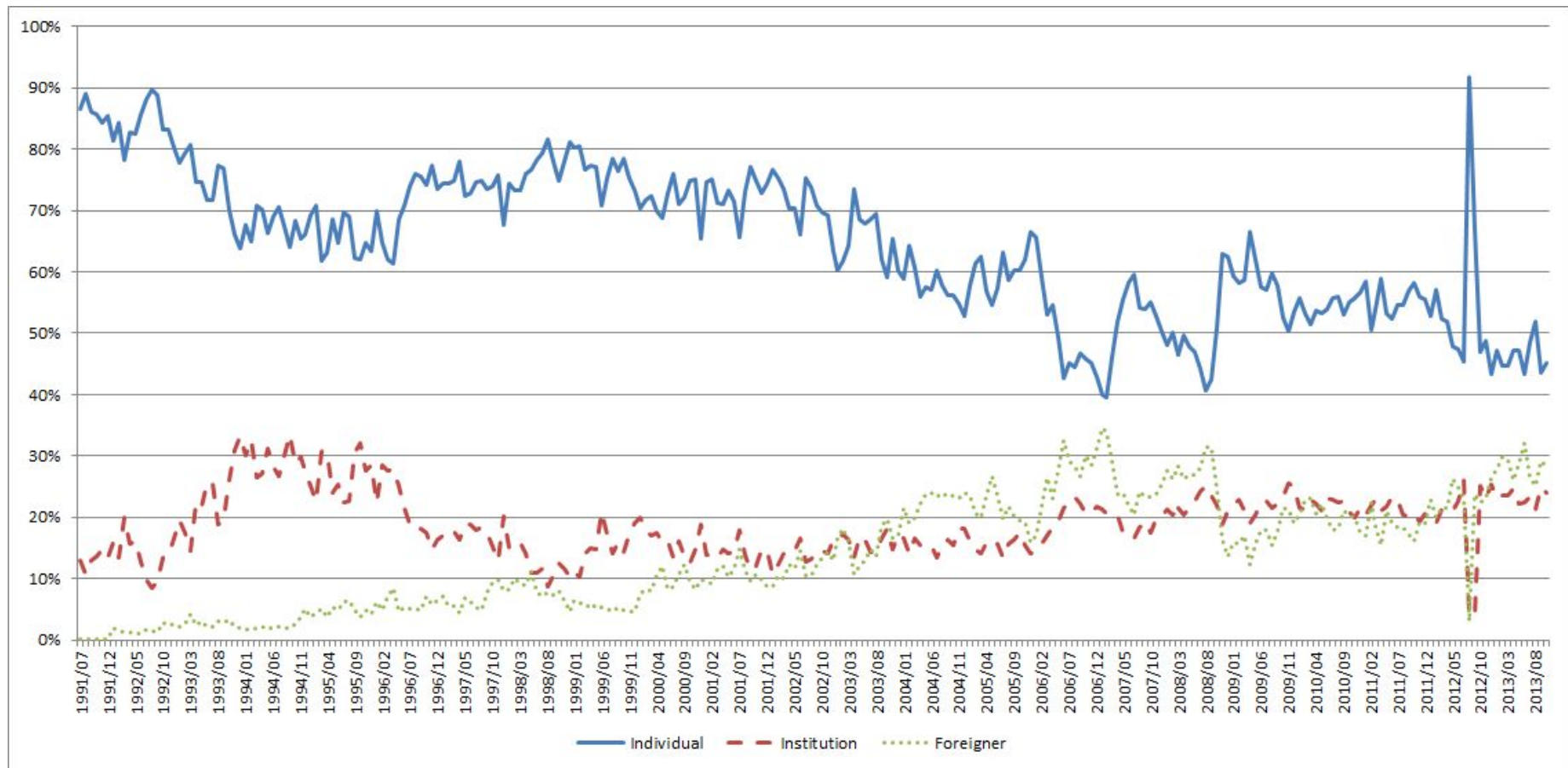
This table displays the annual changes in transactions in KSE market over time by each investor type. These data were obtained from Bank of Korea, and are available from July 1991 to October 2013 (as of December 2013). The year 1991 includes only the data from July, and the year 2013 includes the data until October. The transaction amounts were calculated by adding up the buy volume and sell volume in terms of market value by each investor type. All transaction amounts are in million Korean won, and in parentheses are the proportions of transaction amount by each investor type relative to total transaction amount.

Year	Individual	Institution	Foreigner	Others	Total
1991	74,678,486 (86.69%)	10,898,827 (12.65%)	103,126 (0.12%)	- (0.00%)	86,147,961 (100.00%)
1992	150,934,228 (83.28%)	26,005,527 (14.35%)	3,261,687 (1.80%)	- (0.00%)	181,246,157 (100.00%)
1993	245,137,153 (72.13%)	83,862,251 (24.68%)	8,507,927 (2.50%)	- (0.00%)	339,832,748 (100.00%)
1994	309,564,017 (67.38%)	135,018,144 (29.39%)	11,273,860 (2.45%)	- (0.00%)	459,426,314 (100.00%)
1995	188,492,758 (65.95%)	76,468,887 (26.75%)	13,886,257 (4.86%)	- (0.00%)	285,812,802 (100.00%)
1996	200,003,451 (70.11%)	62,259,300 (21.83%)	17,173,139 (6.02%)	- (0.00%)	285,251,760 (100.00%)
1997	239,960,272 (73.93%)	56,575,176 (17.43%)	21,698,209 (6.69%)	- (0.00%)	324,562,867 (100.00%)
1998	298,480,353 (77.39%)	47,349,220 (12.28%)	28,815,772 (7.47%)	- (0.00%)	385,690,482 (100.00%)
1999	1,320,282,313 (76.15%)	278,513,532 (16.06%)	89,414,031 (5.16%)	- (0.00%)	1,733,846,921 (100.00%)
2000	902,168,921 (71.93%)	205,038,474 (16.35%)	114,950,337 (9.16%)	- (0.00%)	1,254,265,831 (100.00%)
2001	719,478,473 (73.21%)	138,305,061 (14.07%)	102,969,617 (10.48%)	- (0.00%)	982,730,744 (100.00%)
2002	1,065,645,850 (71.79%)	204,160,593 (13.75%)	170,531,713 (11.49%)	- (0.00%)	1,484,300,011 (100.00%)
2003	714,989,698 (65.29%)	173,707,786 (15.86%)	169,415,371 (15.47%)	92,539 (0.01%)	1,095,018,133 (100.00%)
2004	642,388,110 (57.79%)	176,552,881 (15.88%)	249,899,987 (22.48%)	1,200,744 (0.11%)	1,111,590,157 (100.00%)
2005	956,942,913 (60.85%)	240,278,081 (15.28%)	322,387,241 (20.50%)	2,744,137 (0.17%)	1,572,515,672 (100.00%)
2006	869,651,817 (51.25%)	324,514,416 (19.12%)	438,706,056 (25.85%)	2,303,542 (0.14%)	1,696,979,044 (100.00%)
2007	1,448,977,515 (53.16%)	507,227,469 (18.61%)	666,535,330 (24.45%)	5,268,666 (0.19%)	2,725,754,093 (100.00%)
2008	1,275,045,790 (49.64%)	559,075,290 (21.77%)	654,192,079 (25.47%)	3,847,623 (0.15%)	2,568,465,183 (100.00%)
2009	1,711,698,076 (58.37%)	646,681,738 (22.05%)	498,873,148 (17.01%)	6,184,128 (0.21%)	2,932,549,461 (100.00%)
2010	1,540,111,061 (54.59%)	613,919,388 (21.76%)	569,087,042 (20.17%)	4,810,204 (0.17%)	2,821,123,626 (100.00%)
2011	1,887,765,356 (55.46%)	724,012,982 (21.27%)	624,200,689 (18.34%)	5,978,747 (0.18%)	3,404,120,656 (100.00%)
2012	1,198,698,764 (52.75%)	457,033,728 (20.11%)	506,047,823 (22.27%)	4,117,426 (0.18%)	2,272,364,383 (100.00%)
2013	786,482,822 (46.41%)	394,071,920 (23.25%)	477,735,861 (28.19%)	2,791,938 (0.16%)	1,694,804,539 (100.00%)

Graph 1

Monthly trends in transactions in KSE market by Investor Type

This graph shows the monthly changes in transactions in KSE market over time by each investor type. These data were obtained from Bank of Korea, and are available from Jul 1991 to Oct 2013 (as of Dec 2013). The year 1991 includes only the data from July, and the year 2013 includes the data until October. The transaction amounts were calculated by adding up the buy volume and sell volume in terms of market value by each investor type, and the proportions of transaction amount by each investor type relative to total transaction amount were utilized for this graph.



Both Table 15 and Graph 1 show us that the proportion of individual investors has declined and that of foreign investors has increased over time. Individual investors had formed a great part in stock market in the early 1990s, over 80%. It maintained over 60% until the early 2000s, but since 2003/2004, the figure has gone below 60% and fluctuated between 40% and 60%. Especially in 2005, it has fallen drastically to 40%. On the contrary, the proportion of foreign investors has increased consistently. It had stayed below 10% during the 1990s, but it rose over 10% in the early 2000s, and drastically increased to more than 20% in a few years. It could possibly be caused by the abolishment of enforced limit to the amount of foreign investment. Foreign investors' proportion reached its peak during the years 2006 and 2007 and remained over 20% until 2008 global financial crisis. The 2008 crisis decreased the foreign transaction amounts, but recently it has recovered to its previous level. It appears that no great change in the proportion of institutional investors has been witnessed during this period.

As we have already been informed in the Chapter 3, the weak contrarian effect, which had been dominant over the 1990s, has been replaced by strong momentum effect since the years around 1999 and 2000. In the section 4.1, we confirmed the results of prior studies that individuals behave like contrarian traders and institutions and foreigners behave like momentum traders. In this section, we have witnessed decreased proportion of individual investors and increased proportion of foreign investors. Now, from all the information above, we can conjecture that investor type can be a critical factor in momentum/contrarian effect. More precisely, it is probable that the significant momentum effect which has been dominant since 1999/2000 could have relation with the increased proportion of foreign investors in South Korean stock market. We will investigate directly the relation between these two variables in next two sections.

4.3. Correlation Analysis

Using the monthly proportions of transaction amount by each investor type relative to total transaction amount from July 1991 to December 2012 (or 2011 or 2010), I calculated the correlation coefficients between the transaction proportions of investor types and monthly returns of momentum portfolios in KSE market. For momentum portfolios with post-portfolio formation periods of 3, 6, and 12 months, the monthly data until December 2012 were used; for momentum portfolios with post-portfolio formation period of 24 months, the monthly data until December 2011 were used; and for momentum portfolios with post-portfolio formation period of 36 months, the monthly data until 2010 were used. The results are tabulated in Table 16.

Table 16

Correlation Coefficients between Transaction Proportions of Each Investor Type and Momentum Portfolio Returns in KSE market

In this table are tabulated the correlation coefficients between the transaction proportions of investor types and monthly returns of momentum portfolios, both EWP and VWP, with various combinations of pre-formation periods and post-formation periods, in KSE market. The transaction proportions were calculated by using the monthly proportions of transaction amount by each investor type relative to total transaction amount from July 1991 to December 2012 (or 2011 or 2010), For momentum portfolios with post-portfolio formation periods of 3, 6, and 12 months, the monthly data until December 2012 were used; for momentum portfolios with post-portfolio formation period of 24 months, the monthly data until December 2011 were used; and for momentum portfolios with post-portfolio formation period of 36 months, the monthly data until 2010 were used.

Pre	Post	EWP			VWP		
		Individual	Institution	Foreigner	Individual	Institution	Foreigner
3	3	-0.0945	0.0108	0.1158	-0.0630	0.1031	0.0205
	6	-0.1682	0.0332	0.1791	-0.1871	0.1200	0.1593
	12	-0.3058	-0.0456	0.3716	-0.1716	0.1099	0.1356
	24	-0.3717	-0.0312	0.4517	-0.0488	-0.0209	0.0705
	36	-0.2927	-0.0625	0.3782	-0.0606	-0.0300	0.0909
6	3	-0.1075	-0.0277	0.1542	-0.0763	0.0779	0.0350
	6	-0.2153	-0.0168	0.2587	-0.1825	0.1007	0.1548
	12	-0.3756	-0.0591	0.4589	-0.2405	0.0877	0.2240
	24	-0.3794	-0.0342	0.4629	-0.0989	-0.0227	0.1282
	36	-0.2670	-0.1076	0.3710	-0.0942	-0.0126	0.1231
12	3	-0.1665	-0.0792	0.2461	-0.0261	-0.0843	0.0506
	6	-0.2919	-0.0393	0.3629	-0.0511	-0.1711	0.1281
	12	-0.4155	-0.0303	0.4933	-0.2720	0.0005	0.2942
	24	-0.3698	-0.0648	0.4582	-0.0873	-0.1425	0.1613
	36	-0.3447	-0.0910	0.4328	-0.0982	-0.0472	0.1264
24	3	-0.1659	0.0320	0.1882	0.0398	-0.1034	-0.0122
	6	-0.2637	0.1044	0.2583	0.0103	-0.1811	0.0632
	12	-0.3447	0.1418	0.3260	-0.0871	-0.1231	0.1514
	24	-0.2813	0.0722	0.2945	0.0218	0.0132	-0.0498
	36	-0.1501	0.0877	0.1289	0.0959	-0.0676	-0.0831
36	3	-0.1252	0.0432	0.1319	0.0436	-0.0762	-0.0309
	6	-0.1866	0.0854	0.1778	0.0210	-0.1488	0.0385
	12	-0.2679	0.1075	0.2512	-0.1467	-0.0304	0.1764
	24	-0.1026	0.0149	0.1077	0.0170	0.0133	-0.0408
	36	0.1026	-0.0973	-0.0738	0.2509	0.1369	-0.3684

From the correlation analysis, we can observe that the proportion of individual investors have significantly negative relation with momentum portfolio return ("Winner-Loser" return), while the proportion of foreign investors have strong positive relation with momentum profits. The proportion of institutional investors have shown no significant relation with momentum effect. In addition, EWP is witnessed to have more strong correlation coefficients than VWP.

4.4. Simple Regression Analysis with AR Process

For more thorough investigation between transaction proportion and momentum effect, I performed simple regression analysis between these two variables. The dependent variable is momentum portfolio return, and the exogenous variable is the transaction proportion of each investor type. To deal with time dependence concern, I employed autoregressive (AR) process methodology. Specifically, the regression equation is as follows:

$$r_t = \alpha + \beta x_t + \gamma_1 r_{t-1} + \gamma_2 r_{t-2} + \dots + \gamma_n r_{t-n} + \epsilon$$

where r_t refers to momentum portfolio return at time t , x_t refers to transaction proportion of each investor type at time t , and α refers to intercept. The momentum profit is regressed on the transaction proportion and lagged variables of momentum profit. I set the number of lagged variables identical to the pre-portfolio formation period of the momentum portfolio, as the past cumulative return for the pre-portfolio formation period affects the momentum portfolio return at time t . For example, for momentum portfolios with pre-formation period of 12 months, the regression is performed based on the equation

$$r_t = \alpha + \beta x_t + \gamma_1 r_{t-1} + \gamma_2 r_{t-2} + \dots + \gamma_n r_{t-12} + \epsilon,$$

including twelve lagged dependent variables.

I performed this AR regression only for equally weighted portfolios (EWP),

as the correlation analysis result in the previous section exhibited weak significant relation between the transaction proportion and VWP returns. Table 17 reports the coefficients on the exogenous variable, the transaction proportion, its p-value, and R-Squared.

Table 17
Results from the Simple Regression of EWP Momentum Profits on Transaction Proportion with AR Process in KSE Market

The coefficients on x_t from regression equation $r_t = \alpha + \beta x_t + \gamma_1 r_{t-1} + \gamma_2 r_{t-2} + \dots + \gamma_n r_{t-n} + \epsilon$ are reported in this table, where r_t refers to momentum portfolio return at time t , x_t refers to transaction proportion of each investor type at time t , and α refers to intercept. The number of lagged variables, n , equals to the pre-portfolio formation period months. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively. The R^2 are reported in the squared brackets.

Pre	Post	Individual	Institution	Foreigner
3	3	-.0155 (.285) [.2296]	.0072 (.820) [.2263]	.0220 (.242) [.2302]
	6	-.0142 (.106) [.4393]	.0030 (.875) [.4337]	.0200 (.082)* [.4402]
	12	-.0131 (.026)** [.5000]	-.0060 (.618) [.4908]	.0222 (.005)*** [.5056]
	24	-.0106 (.006)*** [.6204]	-.0009 (.906) [.6087]	.0172 (.001)*** [.6258]
	36	-.0093 (.004)*** [.5873]	.0005 (.934) [.5727]	.0141 (.001)*** [.5919]
6	3	-.0202 (.208) [.3234]	-.0106 (.758) [.3195]	.0380 (.070)* [.3278]
	6	-.0123 (.173) [.5489]	-.0117 (.537) [.5463]	.0233 (.052)* [.5522]
	12	-.0058 (.282) [.6956]	-.0077 (.462) [.6949]	.0126 (.096)* [.6975]
	24	-.0055 (.082)* [.7824]	.0034 (.574) [.7800]	.0077 (.074)* [.7826]
	36	-.0044 (.089)* [.7392]	.0013 (.798) [.7361]	.0067 (.054)* [.7401]

Table 17 (continued)

Pre	Post	Individual	Institution	Foreigner
12	3	-.0322 (.055)* [.5080]	.0048 (.898) [.5010]	.0591 (.013)** [.5125]
	6	-.0167 (.066)* [.6991]	.0060 (.759) [.6953]	.0291 (.028)** [.7008]
	12	-.0081 (.114) [.7951]	-.0038 (.708) [.7933]	.0165 (.027)* [.7970]
	24	-.0017 (.551) [.8383]	-.0012 (.829) [.8380]	.0033 (.407) [.8385]
	36	-.0024 (.279) [.7888]	.0024 (.592) [.7880]	.0029 (.354) [.7885]
24	3	-.0312 (.070)* [.6150]	.0350 (.320) [.6116]	.0442 (.069)* [.6150]
	6	-.0150 (.090)* [.7846]	.0164 (.353) [.7829]	.0192 (.128) [.7841]
	12	-.0049 (.291) [.8654]	.0000 (.997) [.8648]	.0075 (.236) [.8655]
	24	-.0022 (.424) [.8311]	-.0010 (.834) [.8306]	.0038 (.296) [.8314]
	36	-.0004 (.825) [.8317]	-.0011 (.772) [.8317]	.0009 (.723) [.8317]
36	3	-.0352 (.043)** [.6720]	.0462 (.181) [.6691]	.0428 (.078)* [.6708]
	6	-.0146 (.116) [.7818]	.0166 (.356) [.7804]	.0181 (.177) [.7812]
	12	-.0052 (.313) [.8389]	.0004 (.966) [.8383]	.0071 (.339) [.8388]
	24	-.0002 (.944) [.8151]	-.0015 (.777) [.8152]	.0005 (.895) [.8151]
	36	.0006 (.761) [.8338]	-.0012 (.740) [.8338]	-.0007 (.787) [.8338]

The results in Table 17 demonstrate that even after controlling for the time dependence, significant relations can be witnessed between the momentum portfolio returns and the transaction proportions of different investor types.

The transaction proportion of individual investors is shown to have significant regression coefficients with returns of 10 equally weighted momentum portfolios (EWP) out of 25 portfolios: those portfolios with the combinations of pre-formation and post-formation periods of (3, 12), (3, 24), (3, 36), (6, 24), (6, 36), (12, 3), (12, 6), (24, 3), (24, 6), and (36, 3). More importantly, all of the significant coefficients are negative, and all the coefficients have negative values, except for coefficient for portfolio of (36, 36).

The transaction proportion of foreign investors is witnessed to have more significant coefficients than that of individual investors; it has significant coefficients with 14 portfolios out of 25 portfolios: those portfolios with the combinations of pre-formation and post-formation periods of (3, 6), (3, 12), (3, 24), (3, 36), (6, 3), (6, 6), (6, 12), (6, 24), (6, 36), (12, 3), (12, 6), (12, 12), (24, 3), and (36, 3). In contrast with the coefficients of individuals' transaction proportion, all the coefficients of foreigners' transaction proportion, including the 14 significant ones, have positive values, except for coefficient for portfolio of (36, 36).

Comparing the significant coefficients of individuals' and foreigners' transaction proportions, lots of the portfolios which show significant regression coefficients are in common between the transaction proportions of individuals and foreigners. The individual proportion has ten significant portfolios and the foreign proportion has fourteen, of which nine portfolios are identical: (3, 12), (3, 24), (3, 36), (6, 24), (6, 36), (12, 3), (12, 6), (24, 3), and (36, 3). We can say that for the portfolios with the combinations of these pre-formation and post-formation periods, the transaction proportion of individual/foreign investors can be expected to be a significant explaining factor for contrarian/momentum effect.

In addition, the transaction proportion of institutional investors has displayed no significant coefficients with momentum portfolio returns.

The regression results provide more concrete evidence of relationship

between the momentum/contrarian effect and transaction proportions of foreign/individual investors. More specifically, individual investors' transactions strengthen the contrarian effect, while foreign investors' transactions strengthen the momentum effect in the stock market. As mentioned earlier in Chapter 2, the Literature Review, there has been a lot of studies attempting to explain the momentum effect with various factors, including macroeconomic factors, industry factors, trading volume, etc. The result of my study has an implication that as well as these factors, the transaction proportion of individual/foreign investors also can be a significant factor for explaining the contrarian/momentum effect.

Furthermore, it has been generally known that there has appeared short-term (less than a year) momentum effect and long-term (more than a year) contrarian effect across the U.S. and European markets, but in East Asian markets these phenomena were not dominant, as Chui, Titman, and Wei (2003) has already pointed out. Seven years later, they attempted to explain this phenomenon with some behavioral financial concepts such as overconfidence and individualism, and argued that the individualism has significant positive relation with momentum effect (Chui, Titman, and Wei (2010)). However, the results of Table 17, using the time-series data over more than 20 years, revealed the possibility that the transaction proportion of individual/foreign investors, other than individualism, can be a more convincing factor for explaining this phenomenon.

Chapter 5. Conclusion

We have so far investigated the explanation power of transaction proportion as a factor for explaining the momentum or contrarian effect. We first examined the trends of momentum/contrarian portfolio returns over 25 years, 1988–2012. Here we found that weak contrarian effect in the 1990s had weakened and has been replaced with strong momentum effect since 1999/2000. It is already well accepted from prior studies that the individual investors employ contrarian strategies while institutional and foreign investors employ momentum strategies, and I confirmed that those patterns have not changed until recently. We then witnessed the decline in transaction proportion of individual investors and the increase in that of foreign investors since 1999/2000. Hence I performed the correlation and simple AR regression analyses to examine the existence of significant relationship between the transaction proportion and momentum/contrarian effect, and I could show that the transaction proportion of individual/foreign investors can be a factor in contrarian/momentum effect.

Many studies concerning the momentum effect have witnessed weak momentum effect in East Asian countries including South Korea, using data until the early 2000s. However, it was difficult to find a study which analyzed the change in momentum effect over time with recent data. My paper, using stock market data of 25 years until recent years, discovered that there happened a change in the significance and magnitude of momentum/contrarian effect, with 5-year horizon time-series analysis, various combinations of pre-portfolio and post-portfolio formation periods, and recent data. Further, I found a factor, the transaction proportion of individual/foreign investors, which can explain the movement from weak contrarian effect to strong momentum effect observed in Korean stock market, by correlation and AR regression analyses.

For more robust verification, similar analyses for other countries would be necessary and meaningful. Unfortunately, this kind of data is not available in

the U.S. stock market, but there exist other countries whose stock markets provide the data about transaction proportions of different investor types.

We can examine the impact of institutional investor on the momentum effect more in-depth. As mentioned above, Badrinath and Wahal (2002) found evidence of momentum strategies by institutional investors, and the existence of significant differences in trading practices among different types of institutions. Kamesaka, Nofsinger, and Kawakita (2003) studied the investment patterns and performance of five types of institutional investors in Japanese stock market, using weekly aggregate investment flow from Japan. Similar analysis was performed by 조장은 (2013), who studied the trading pattern and performance of each type of institutional investors. He found some significant changes according to different type of institutional investor. As institutional investors include some heterogeneous members, it might be a fruitful study to investigate the explanation power of the transaction proportion of each institutional investor type as a factor in momentum effect.

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Appendix

Table A1
Momentum profits of top/bottom 20% of stocks
for "W"/"L" portfolios in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) and market-value weighted portfolios (VWP) of which "W" portfolios include the top 20% of stocks and "L" include the bottom 20%. The left column indicates the pre-portfolio formation periods, and the upper row indicates the post-portfolio formation periods. According to the cumulative past returns of each stock for the pre-portfolio formation period, that stock is assigned to "W" or "L" if it belongs to the top or bottom 33%. These portfolios are held for the post-portfolio formation period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

		3 months	6 months	12 months	24 months	36 months
3 months	EWP	.16% (.7669)	.23% (.5674)	.40% (.1624)	.31% (.0851)*	.33% (.0181)**
	VWP	-.21% (.6900)	-.37% (.2785)	-.25% (.2410)	.13% (.3158)	.16% (.1390)
6 months	EWP	.10% (.8596)	.44% (.2836)	.35% (.2404)	.34% (.0570)*	.39% (.0064)***
	VWP	-.04% (.9092)	.15% (.6862)	-.12% (.5764)	.19% (.1519)	.26% (.0236)**
12 months	EWP	.53% (.3526)	.51% (.2296)	.23% (.4356)	.38% (.0352)**	.48% (.0009)***
	VWP	.42% (.2563)	.48% (.1017)	.16% (.5250)	.26% (.0602)*	.38% (.0003)***
24 months	EWP	.32% (.5877)	.50% (.2496)	.47% (.1194)	.53% (.0028)***	.62% (.0000)***
	VWP	.87% (.0147)**	.63% (.0231)**	.31% (.1071)	.13% (.3649)	.31% (.0039)***
36 months	EWP	.56% (.3417)	.70% (.0939)*	.59% (.0470)**	.68% (.0001)***	.74% (.0000)***
	VWP	.87% (.0084)***	.60% (.0147)**	.50% (.0052)***	.39% (.0020)***	.26% (.0348)**

Table A2
Momentum profits of top/bottom 10% of stocks
for "W"/"L" portfolios in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) and market-value weighted portfolios (VWP) of which "W" portfolios include the top 10% of stocks and "L" include the bottom 10%. The left column indicates the pre-portfolio formation periods, and the upper row indicates the post-portfolio formation periods. According to the cumulative past returns of each stock for the pre-portfolio formation period, that stock is assigned to "W" or "L" if it belongs to the top or bottom 33%. These portfolios are held for the post-portfolio formation period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

		3 months	6 months	12 months	24 months	36 months
3 months	EWP	.19% (.7487)	.38% (.3867)	.68% (.0276)**	.54% (.0059)***	.57% (.0002)***
	VWP	.04% (.9446)	-.21% (.4650)	-.30% (.0722)*	.08% (.3354)	.10% (.1594)
6 months	EWP	.14% (.8236)	.63% (.1623)	.55% (.0828)*	.55% (.0058)***	.62% (.0001)***
	VWP	.01% (.9782)	.38% (.3802)	-.10% (.6105)	.14% (.1382)	.13% (.1250)
12 months	EWP	.75% (.2240)	.82% (.0710)*	.57% (.0740)*	.71% (.0005)***	.83% (.0000)***
	VWP	.30% (.3512)	.44% (.0780)*	.27% (.3453)	.18% (.0749)*	.32% (.0000)***
24 months	EWP	.91% (.1549)	1.11% (.0151)**	1.08% (.0010)***	1.04% (.0000)***	1.15% (.0000)***
	VWP	.83% (.0047)***	.75% (.0006)***	.25% (.1744)	.29% (.0696)*	.29% (.0016)***
36 months	EWP	1.12% (.0803)*	1.26% (.0053)***	1.21% (.0002)***	1.25% (.0000)***	1.33% (.0000)***
	VWP	.65% (.0138)**	.51% (.0088)***	.22% (.1397)	.30% (.0072)***	.41% (.0019)***

Table A3

Momentum Profits of VWP with Pre-Formation Period of 3 months in KSE market only

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (3 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
3	3	-.52% (.5501)	-.15% (.8604)	.28% (.7480)	.33% (.6853)	.41% (.6162)	.29% (.7873)	-.57% (.7069)	-.38% (.8243)	-.62% (.7328)	-1.77% (.3456)	-1.91% (.2728)	-1.11% (.4151)
	6	-1.46% (.0761)*	-1.59% (.0923)*	-1.21% (.1850)	-1.16% (.1684)	-.11% (.8862)	-.05% (.9602)	-1.22% (.4014)	-.83% (.5922)	-1.56% (.3590)	-2.07% (.2271)	-1.93% (.2406)	.13% (.9137)
	12	-.64% (.2961)	-.99% (.1697)	-.88% (.1479)	-1.02% (.0777)*	-.56% (.3184)	-.31% (.6327)	-.66% (.5120)	-.89% (.3911)	-.95% (.3801)	-1.07% (.3311)	-1.01% (.3396)	.10% (.8759)
	24	-.21% (.6328)	-.26% (.5871)	-.25% (.5103)	-.25% (.5431)	-.22% (.6525)	.28% (.6016)	.62% (.3391)	.47% (.4954)	.17% (.7944)	.29% (.6219)	.16% (.7578)	.16% (.6542)
	36	.14% (.6779)	-.02% (.9636)	-.01% (.9720)	-.12% (.7570)	-.69% (.1076)	-.45% (.3004)	-.28% (.5524)	-.41% (.3611)	-.47% (.1969)	.11% (.7148)	-.09% (.7518)	.17% (.5777)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
3	3	-1.32% (.2316)	-.45% (.6493)	.20% (.8007)	1.00% (.1483)	.42% (.6060)	.40% (.6426)	.14% (.8628)	.35% (.6719)	-.16% (.8278)
	6	-.22% (.8355)	1.01% (.2051)	1.21% (.0946)*	1.73% (.0079)***	.82% (.2979)	.29% (.7405)	.18% (.8278)	-.02% (.9832)	-.29% (.7031)
	12	.01% (.9837)	.29% (.5852)	.47% (.3429)	.44% (.3023)	-.23% (.6349)	-.25% (.6272)	-.06% (.9008)	-.30% (.5591)	-.00% (.9968)
	24	.30% (.4447)	.48% (.1780)	.70% (.0376)**	.67% (.0166)**	.38% (.1833)	.16% (.5362)	.40% (.1263)	.08% (.7496)	.03% (.9268)
	36	.36% (.2840)	.44% (.1103)	.36% (.1631)	.45% (.0566)*	.26% (.2363)	.15% (.4525)	.25% (.2156)	.24% (.3069)	.26% (.3625)

Table A4

Momentum Profits of VWP with Pre-Formation Period of 6 months in KSE market only

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (6 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
6	3	-.93% (.3071)	-.82% (.3430)	-.43% (.6328)	-.26% (.7521)	.18% (.8242)	.64% (.5658)	.34% (.8274)	.39% (.8289)	.02% (.9925)	-.83% (.6735)	-1.07% (.5550)	-.25% (.8620)
	6	-1.21% (.0359)**	-1.27% (.0205)**	-1.17% (.0290)**	-.78% (.0850)*	-.44% (.3701)	.50% (.4127)	.06% (.9577)	.81% (.5079)	.35% (.7837)	.07% (.9549)	-.31% (.8060)	.69% (.4503)
	12	-.43% (.4239)	-.93% (.1140)	-1.04% (.0302)**	-1.16% (.0096)***	-1.03% (.0299)**	-.58% (.3034)	-.63% (.5193)	-.81% (.4284)	-.67% (.5225)	-.93% (.3800)	-.94% (.3485)	.10% (.8672)
	24	-.18% (.6727)	-.35% (.4244)	-.39% (.2699)	-.28% (.4653)	-.33% (.4638)	.26% (.6107)	1.03% (.1105)	.92% (.1725)	.52% (.4345)	.74% (.2110)	.66% (.2041)	.46% (.1857)
	36	.27% (.4345)	.14% (.6764)	-.00% (.9989)	.02% (.9652)	-.52% (.2198)	-.48% (.2612)	-.13% (.7789)	-.32% (.4748)	-.50% (.1736)	-.05% (.8850)	-.00% (.9960)	.11% (.7170)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
6	3	-.81% (.4792)	-.27% (.7835)	.23% (.7740)	1.06% (.1361)	.24% (.7786)	.54% (.5416)	.62% (.4504)	.60% (.4820)	.15% (.8500)
	6	-.12% (.8706)	.83% (.2260)	1.12% (.0547)*	1.68% (.0012)***	.89% (.1905)	.53% (.4664)	.33% (.6266)	.14% (.8406)	-.25% (.6830)
	12	.02% (.9737)	.20% (.6880)	.66% (.1577)	.85% (.0324)**	-.10% (.8050)	-.04% (.9274)	.09% (.8261)	-.11% (.7850)	.08% (.8219)
	24	.65% (.0882)*	.76% (.0297)**	1.01% (.0019)***	.86% (.0023)***	.56% (.0339)**	.30% (.2059)	.62% (.0073)***	.23% (.3324)	.30% (.2702)
	36	.45% (.1761)	.53% (.0472)**	.55% (.0266)**	.48% (.0338)**	.41% (.0479)**	.27% (.1303)	.48% (.0072)***	.45% (.0266)**	.70% (.0040)***

Table A5

Momentum Profits of VWP with Pre-Formation Period of 12 months in KSE market only

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (12 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
12	3	-.74% (.4512)	-1.30% (.1760)	-1.38% (.1713)	-1.51% (.1016)	-1.73% (.0644)*	-.18% (.8575)	1.80% (.2912)	2.69% (.1399)	1.68% (.3901)	2.14% (.2937)	1.43% (.4588)	.70% (.6052)
	6	-.24% (.6952)	-.78% (.1805)	-1.32% (.0170)**	-1.30% (.0040)***	-1.36% (.0055)***	-.03% (.9586)	1.84% (.1236)	2.76% (.0320)**	1.95% (.1543)	2.27% (.1030)	1.48% (.2785)	.50% (.5700)
	12	-.66% (.1155)	-.72% (.0953)*	-.98% (.0042)***	-.77% (.0158)**	-.89% (.0121)**	-.42% (.3895)	-.67% (.4259)	-.24% (.7854)	-.48% (.5967)	-.37% (.6861)	-.21% (.8044)	.37% (.4379)
	24	-.17% (.6503)	-.19% (.6252)	-.45% (.1336)	-.22% (.5165)	-.40% (.1609)	-.58% (.1845)	.64% (.3016)	1.07% (.0990)*	.34% (.5996)	.84% (.1511)	1.40% (.0084)***	.58% (.0736)*
	36	.25% (.4203)	.34% (.2566)	.11% (.6726)	.40% (.2294)	.03% (.9215)	-.44% (.2192)	.20% (.6345)	.46% (.2594)	-.18% (.6186)	.04% (.8994)	.45% (.1322)	.10% (.7045)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
12	3	-.19% (.8738)	.86% (.3779)	.50% (.5065)	1.67% (.0225)**	.00% (.9994)	.28% (.7561)	.66% (.4359)	.75% (.4032)	.35% (.6603)
	6	.18% (.8023)	1.22% (.0561)*	1.32% (.0181)**	2.18% (.0001)***	.94% (.1879)	.50% (.5069)	.64% (.3706)	.40% (.5868)	.09% (.8855)
	12	.07% (.8789)	.66% (.1034)	.95% (.0193)**	.94% (.0098)***	.54% (.1891)	.44% (.2793)	.28% (.4599)	.08% (.8310)	.27% (.4188)
	24	.77% (.0487)**	1.17% (.0009)***	1.23% (.0001)***	.94% (.0008)***	.85% (.0027)***	.28% (.1757)	.46% (.0242)**	.14% (.5337)	.26% (.3279)
	36	.38% (.2267)	.69% (.0041)***	.73% (.0011)***	.62% (.0026)***	.65% (.0018)***	.43% (.0125)**	.61% (.0003)***	.60% (.0024)***	.94% (.0000)***

Table A6

Momentum Profits of VWP with Pre-Formation Period of 24 months in KSE market only

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (24 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
24	3	-.64% (.4169)	-1.02% (.1810)	-.59% (.4623)	-.62% (.4051)	-.77% (.3065)	.02% (.9840)	1.63% (.2606)	4.21% (.0180)**	3.55% (.0617)*	3.32% (.0885)*	3.13% (.0996)*	2.58% (.0870)*
	6	-1.09% (.0327)**	-1.22% (.0089)***	-1.16% (.0113)**	-.96% (.0100)***	-.72% (.0792)	.08% (.8805)	1.40% (.1939)	3.17% (.0165)**	2.55% (.0649)*	2.71% (.0538)*	2.56% (.0656)*	2.16% (.0363)**
	12	-1.44% (.0003)***	-.89% (.0318)**	-.61% (.0586)*	-.47% (.1328)	-.36% (.3003)	-.06% (.8889)	-.61% (.4449)	.01% (.9915)	.09% (.9191)	.31% (.7336)	.73% (.3828)	1.49% (.0054)***
	24	-.73% (.0167)**	-.16% (.6115)	-.06% (.8181)	.13% (.6300)	.31% (.3696)	.18% (.6338)	.09% (.8490)	.58% (.2430)	.29% (.5508)	.18% (.6658)	.79% (.0327)**	.68% (.0123)**
	36	-.27% (.3174)	.14% (.5914)	.46% (.0303)**	.70% (.0193)**	.22% (.5093)	.02% (.9478)	.04% (.9156)	.23% (.5171)	-.07% (.7967)	.17% (.4887)	.23% (.3387)	.33% (.1447)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
24	3	.10% (.9281)	1.14% (.1968)	1.43% (.0432)**	2.19% (.0014)***	1.07% (.1962)	1.59% (.0648)*	1.55% (.0614)**	1.47% (.0948)*	.91% (.2535)
	6	1.04% (.1363)	2.25% (.0004)***	2.25% (.0000)***	2.50% (.0000)***	1.60% (.0130)**	1.17% (.0865)*	.89% (.1663)	.65% (.3280)	.42% (.4823)
	12	1.23% (.0062)***	1.89% (.0000)***	1.72% (.0000)***	1.29% (.0008)***	.87% (.0390)**	.72% (.0803)*	.27% (.4664)	.15% (.7023)	.43% (.1630)
	24	-.01% (.9637)	.49% (.0676)**	.74% (.0033)***	.34% (.0842)*	.11% (.5919)	.24% (.2232)	.08% (.6424)	-.21% (.2616)	-.12% (.6074)
	36	.24% (.3373)	.64% (.0038)***	.62% (.0032)***	.57% (.0024)***	.17% (.3229)	.23% (.1205)	.18% (.2312)	.37% (.0232)**	.58% (.0028)***

Table A7

Momentum Profits of VWP with Pre-Formation Period of 36 months in KSE market only

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (36 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
36	3	-.54% (.4556)	-.83% (.2231)	-.24% (.7371)	-.00% (.9958)	-.51% (.4776)	.47% (.5778)	1.31% (.3384)	3.24% (.0388)**	2.31% (.1931)	3.26% (.0794)*	2.50% (.1730)	2.19% (.1398)
	6	-.68% (.1451)	-.83% (.0573)*	-.44% (.3139)	-.17% (.6454)	-.44% (.3156)	.38% (.4750)	1.19% (.2500)	2.69% (.0259)**	2.02% (.1183)	2.96% (.0270)**	2.07% (.1218)	1.63% (.1065)
	12	-.79% (.0253)**	-.48% (.2158)	-.14% (.6290)	.00% (.9870)	-.14% (.6747)	.29% (.5052)	-.15% (.8409)	.47% (.5760)	.47% (.5862)	.97% (.2577)	.69% (.4001)	1.09% (.0452)**
	24	-.92% (.0010)***	-.31% (.2949)	-.01% (.9668)	.46% (.0687)*	.61% (.0559)*	.65% (.0649)*	.84% (.0660)*	1.32% (.0077)***	1.06% (.0263)**	1.05% (.0113)**	1.24% (.0014)***	.82% (.0027)***
	36	-.13% (.5621)	.31% (.1523)	.60% (.0010)***	1.09% (.0000)***	1.05% (.0002)***	1.15% (.0001)***	1.06% (.0015)***	1.23% (.0001)***	.68% (.0052)***	.51% (.0249)**	.12% (.5778)	.07% (.7196)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
36	3	.39% (.7580)	1.72% (.0757)*	1.25% (.0895)*	2.30% (.0001)***	1.20% (.1356)	1.03% (.1994)	1.01% (.1911)	.94% (.2456)	.48% (.5157)
	6	.63% (.4327)	1.81% (.0104)**	1.43% (.0117)**	2.38% (.0000)***	1.65% (.0087)***	.90% (.1677)	.84% (.1748)	.66% (.2923)	.39% (.4906)
	12	.65% (.1675)	1.17% (.0078)***	1.28% (.0027)***	1.47% (.0000)***	1.27% (.0011)***	1.01% (.0086)***	.87% (.0156)**	.58% (.0975)*	.78% (.0071)***
	24	.26% (.2365)	.66% (.0070)***	1.06% (.0000)***	.84% (.0001)***	.68% (.0018)***	.61% (.0069)***	.48% (.0132)**	.14% (.4254)	.32% (.1119)
	36	-.43% (.0393)**	-.09% (.5926)	.06% (.7339)	.16% (.2857)	-.02% (.9010)	.13% (.3452)	.12% (.3415)	.04% (.7972)	.13% (.4785)

Table A8

Momentum Profits of EWP with Pre-Formation Period of 3 months in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (3 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
3	3	-.34% (.6881)	.04% (.9653)	.44% (.6146)	.29% (.7272)	.33% (.6833)	.41% (.7054)	-.63% (.6847)	-.63% (.7203)	-.24% (.8972)	-.54% (.7789)	-.38% (.8320)	.68% (.6248)
	6	-.52% (.3891)	-.31% (.5757)	-.10% (.8610)	-.02% (.9711)	.20% (.6720)	.39% (.6412)	-.33% (.7921)	-.49% (.7232)	-.49% (.7276)	-.80% (.5798)	-.63% (.6363)	.36% (.6949)
	12	-.25% (.5670)	-.35% (.3877)	-.46% (.1986)	-.56% (.0711)*	-.39% (.2318)	-.02% (.9797)	-.56% (.5702)	-.48% (.6346)	-.35% (.7342)	-.36% (.7290)	-.26% (.7606)	.78% (.0804)*
	24	-.16% (.5747)	-.24% (.4130)	-.27% (.2248)	-.35% (.0922)*	-.10% (.8267)	-.06% (.8774)	-.32% (.5061)	-.49% (.3261)	-.40% (.4102)	-.42% (.2930)	-.02% (.9557)	.53% (.0962)*
	36	-.05% (.7944)	-.11% (.5649)	-.14% (.3870)	-.17% (.6362)	-.09% (.7871)	-.04% (.9000)	-.17% (.6117)	-.27% (.4012)	-.21% (.4274)	-.11% (.6885)	.12% (.7004)	.48% (.1282)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
3	3	.83% (.4637)	.84% (.4619)	.82% (.4161)	.72% (.4300)	.56% (.6169)	.45% (.6934)	.69% (.4907)	.70% (.4867)	.55% (.5541)
	6	.66% (.3731)	.95% (.2585)	1.03% (.1876)	1.00% (.1349)	.71% (.4366)	.62% (.4912)	.74% (.3467)	.64% (.4137)	.50% (.4797)
	12	.97% (.0760)*	1.16% (.0641)*	1.19% (.0564)*	1.17% (.0448)**	.96% (.1226)	.90% (.1093)	.99% (.0406)**	.82% (.0628)*	.64% (.0575)*
	24	.89% (.0456)**	1.08% (.0222)**	1.11% (.0075)***	.93% (.0096)***	.81% (.0261)**	.71% (.0173)**	.58% (.0082)***	.42% (.0402)**	.31% (.0599)*
	36	.84% (.0345)**	.96% (.0068)***	.92% (.0017)***	.77% (.0048)***	.70% (.0080)***	.51% (.0052)***	.42% (.0026)***	.39% (.0042)***	.33% (.0092)***

Table A9

Momentum Profits of EWP with Pre-Formation Period of 6 months in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (6 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
6	3	-.93% (.2729)	-.57% (.4859)	-.27% (.7512)	-.17% (.8276)	.02% (.9752)	.51% (.6369)	-.66% (.6767)	-.71% (.6946)	-.76% (.6851)	-1.14% (.5637)	-1.06% (.5678)	.41% (.7782)
	6	-.74% (.2124)	-.67% (.2153)	-.63% (.2645)	-.47% (.3276)	-.21% (.6449)	.31% (.7109)	-.35% (.7775)	-.10% (.9395)	-.43% (.7624)	-.64% (.6610)	-.47% (.7252)	.74% (.4426)
	12	-.36% (.4116)	-.63% (.1214)	-.82% (.0208)**	-.93% (.0026)***	-.87% (.0120)**	-.29% (.6906)	-.99% (.3233)	-1.02% (.3241)	-.99% (.3452)	-.93% (.3712)	-.71% (.4059)	.72% (.1230)
	24	-.22% (.4431)	-.33% (.2541)	-.33% (.1247)	-.40% (.0553)*	-.13% (.7843)	-.12% (.7623)	-.32% (.5078)	-.56% (.2584)	-.69% (.1641)	-.68% (.0882)*	-.08% (.8466)	.54% (.1116)
	36	-.09% (.6510)	-.15% (.4363)	-.19% (.2188)	-.19% (.6049)	-.11% (.7507)	-.03% (.9274)	-.09% (.7704)	-.25% (.4416)	-.34% (.1939)	-.21% (.4599)	.11% (.7285)	.48% (.1362)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
6	3	.72% (.5321)	1.12% (.3329)	1.27% (.2036)	1.20% (.1907)	.95% (.4002)	.69% (.5471)	.96% (.3434)	1.02% (.3128)	.84% (.3709)
	6	.86% (.2484)	1.47% (.0835)*	1.54% (.0495)**	1.47% (.0290)**	1.17% (.1981)	.93% (.2989)	1.13% (.1522)	1.06% (.1743)	.89% (.2131)
	12	1.17% (.0338)**	1.45% (.0203)**	1.51% (.0152)**	1.42% (.0157)**	1.22% (.0505)*	1.11% (.0503)*	1.25% (.0097)***	1.04% (.0193)**	.85% (.0128)**
	24	1.01% (.0269)**	1.37% (.0040)***	1.37% (.0012)***	1.08% (.0030)***	.95% (.0101)**	.86% (.0045)***	.74% (.0010)***	.55% (.0090)***	.42% (.0140)**
	36	.93% (.0198)**	1.20% (.0009)***	1.10% (.0002)***	.85% (.0023)***	.79% (.0036)***	.57% (.0019)***	.47% (.0008)***	.48% (.0006)***	.45% (.0007)***

Table A10

Momentum Profits of EWP with Pre-Formation Period of 12 months in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (12 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
12	3	-0.30% (.7207)	-.78% (.3582)	-1.09% (.2065)	-1.18% (.1433)	-1.32% (.0959)*	-.29% (.7919)	-1.22% (.4564)	-1.09% (.5535)	-.97% (.6112)	-.80% (.6898)	-.78% (.6760)	1.27% (.3705)
	6	-.26% (.6685)	-.83% (.1396)	-1.19% (.0434)**	-1.25% (.0154)**	-1.37% (.0049)***	-.46% (.6120)	-1.10% (.4049)	-1.28% (.3722)	-1.36% (.3523)	-1.22% (.4154)	-.97% (.4712)	.80% (.3837)
	12	-.40% (.3725)	-.72% (.0843)*	-1.03% (.0050)***	-1.10% (.0007)***	-1.35% (.0001)***	-.53% (.4887)	-1.27% (.2219)	-1.65% (.1219)	-1.82% (.0892)*	-1.61% (.1291)	-1.26% (.1357)	.48% (.2963)
	24	-.19% (.4943)	-.26% (.3520)	-.32% (.1247)	-.32% (.1213)	-.10% (.8387)	-.23% (.6007)	-.30% (.5450)	-.66% (.1891)	-1.08% (.0307)**	-1.02% (.0077)***	-.26% (.5269)	.44% (.2021)
	36	-.10% (.6250)	-.11% (.5591)	-.17% (.2926)	-.14% (.6918)	-.08% (.8074)	-.01% (.9635)	-.03% (.9295)	-.21% (.5205)	-.50% (.0569)*	-.41% (.1493)	-.03% (.9168)	.41% (.2052)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
12	3	1.80% (.1176)	2.03% (.0786)*	1.86% (.0646)*	1.73% (.0618)*	1.46% (.1969)	1.31% (.2545)	1.61% (.1141)	1.74% (.0894)*	1.45% (.1261)
	6	1.56% (.0347)**	1.94% (.0219)**	1.87% (.0175)**	1.75% (.0104)**	1.45% (.1151)	1.39% (.1264)	1.64% (.0383)**	1.56% (.0479)**	1.28% (.0757)*
	12	1.26% (.0235)**	1.68% (.0069)***	1.71% (.0059)***	1.53% (.0098)***	1.22% (.0532)*	1.29% (.0238)**	1.43% (.0031)***	1.22% (.0066)***	.93% (.0071)***
	24	1.01% (.0271)**	1.63% (.0006)***	1.52% (.0003)***	1.19% (.0014)***	.93% (.0126)**	.97% (.0014)***	.83% (.0002)***	.70% (.0008)***	.55% (.0017)***
	36	.89% (.0250)**	1.40% (.0001)***	1.28% (.0000)***	.99% (.0004)***	.84% (.0020)***	.69% (.0002)***	.55% (.0000)***	.61% (.0000)***	.61% (.0000)***

Table A11

Momentum Profits of EWP with Pre-Formation Period of 24 months in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (24 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
24	3	-.70% (.4077)	-.82% (.3398)	-.82% (.3470)	-.79% (.3349)	-.91% (.2621)	-.01% (.9910)	-1.12% (.5479)	-1.01% (.6191)	-1.76% (.4020)	-2.33% (.2796)	-2.05% (.2887)	.13% (.9230)
	6	-.83% (.1716)	-.67% (.2339)	-.75% (.2008)	-.70% (.1704)	-.72% (.1413)	.19% (.8407)	-.77% (.5862)	-.69% (.6510)	-1.27% (.4124)	-1.99% (.2067)	-1.61% (.2373)	.23% (.7969)
	12	-.91% (.0419)**	-.38% (.3681)	-.46% (.2093)	-.40% (.2287)	-.44% (.2367)	.51% (.5352)	-.69% (.5183)	-.69% (.5262)	-1.11% (.3105)	-1.67% (.1232)	-1.37% (.0907)	.38% (.3895)
	24	-.49% (.0818)*	-.06% (.8213)	-.00% (.9916)	.06% (.7643)	.29% (.5415)	.25% (.5614)	-.13% (.7733)	-.24% (.6033)	-.69% (.1248)	-1.06% (.0008)***	-.43% (.2139)	.35% (.2775)
	36	-.36% (.0888)*	-.03% (.8877)	.19% (.2241)	.45% (.2234)	.41% (.2425)	.55% (.0672)*	.28% (.3855)	.26% (.4019)	-.28% (.2512)	-.53% (.0392)**	-.24% (.3701)	.29% (.3608)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
24	3	.66% (.5556)	1.32% (.2390)	1.89% (.0575)*	1.68% (.0686)*	1.26% (.2659)	1.01% (.3765)	1.67% (.0997)*	1.56% (.1250)	1.21% (.1984)
	6	.78% (.2993)	1.32% (.1184)	2.02% (.0100)**	1.75% (.0110)**	1.31% (.1515)	1.15% (.2027)	1.71% (.0291)**	1.49% (.0549)*	1.24% (.0846)*
	12	.82% (.1561)	1.28% (.0437)**	1.88% (.0027)***	1.53% (.0113)**	1.06% (.0948)*	1.10% (.0524)*	1.43% (.0026)***	1.16% (.0077)***	.96% (.0045)***
	24	.66% (.1427)	1.29% (.0060)***	1.63% (.0001)***	1.23% (.0009)***	.86% (.0205)**	.95% (.0016)***	.85% (.0001)***	.70% (.0005)***	.72% (.0000)***
	36	.60% (.1311)	1.22% (.0006)***	1.58% (.0000)***	1.23% (.0000)***	.95% (.0006)***	.75% (.0001)***	.57% (.0000)***	.51% (.0001)***	.61% (.0000)***

Table A12

Momentum Profits of EWP with Pre-Formation Period of 36 months in KSE & KOSDAQ markets combined

This table displays the returns of equally weighted momentum portfolios (EWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (36 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
36	3	-.86% (.3121)	-.73% (.3936)	-.37% (.6699)	-.42% (.6157)	-.60% (.4584)	.32% (.7966)	-.86% (.6631)	-.46% (.8221)	-.77% (.7151)	-1.23% (.5691)	-1.25% (.5177)	.68% (.5651)
	6	-.98% (.1060)	-.57% (.3246)	-.31% (.5957)	-.35% (.4993)	-.48% (.3274)	.42% (.6617)	-.46% (.7518)	-.07% (.9618)	-.31% (.8366)	-.90% (.5623)	-.76% (.5727)	.64% (.3931)
	12	-1.05% (.0186)**	-.40% (.3533)	-.25% (.4971)	-.16% (.6245)	-.21% (.5694)	.61% (.4551)	-.52% (.6210)	-.21% (.8455)	-.49% (.6419)	-.98% (.3488)	-.84% (.2818)	.64% (.0948)*
	24	-.66% (.0209)**	-.16% (.5671)	.01% (.9732)	.33% (.1156)	.76% (.1241)	.65% (.1409)	.26% (.5672)	.34% (.4477)	-.01% (.9744)	-.62% (.0300)**	-.30% (.3084)	.41% (.1657)
	36	-.38% (.0754)*	-.04% (.8461)	.24% (.1384)	.54% (.1390)	.60% (.0803)*	.65% (.0300)**	.39% (.2040)	.47% (.0944)*	.20% (.3665)	-.13% (.5585)	-.09% (.7077)	.42% (.1615)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
36	3	.88% (.4170)	1.14% (.2974)	1.65% (.0905)*	1.67% (.0661)*	1.23% (.2754)	.84% (.4660)	.72% (.3978)	1.62% (.1113)	1.31% (.1623)
	6	.87% (.2237)	1.07% (.1927)	1.74% (.0230)**	1.75% (.0100)**	1.31% (.1483)	1.02% (.2562)	1.69% (.0301)**	1.53% (.0483)**	1.29% (.0696)*
	12	.78% (.1583)	1.07% (.0821)*	1.75% (.0045)**	1.64% (.0058)**	1.20% (.0564)*	1.15% (.0427)**	1.55% (.0012)**	1.20% (.0061)**	1.05% (.0016)**
	24	.54% (.2118)	1.05% (.0228)**	1.56% (.0001)**	1.57% (.0000)**	1.19% (.0016)**	1.17% (.0001)**	1.00% (.0000)**	.74% (.0003)**	.66% (.0001)**
	36	.61% (.1163)	1.10% (.0017)**	1.60% (.0000)**	1.58% (.0000)**	1.25% (.0000)**	.93% (.0000)**	.64% (.0000)**	.40% (.0034)**	.37% (.0025)**

Table A13

Momentum Profits of VWP with Pre-Formation Period of 3 months in KSE & KOSDAQ markets combined

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (3 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
3	3	-.52% (.5501)	-.15% (.8604)	.28% (.7480)	.33% (.6853)	.43% (.6003)	.25% (.8111)	-.61% (.6799)	-.14% (.9355)	-.61% (.7362)	-1.21% (.5207)	-1.11% (.5317)	-.21% (.8844)
	6	-1.46% (.0761)*	-1.59% (.0923)*	-1.21% (.1850)	-1.16% (.1684)	-.11% (.8851)	-.04% (.9658)	-.80% (.5032)	.02% (.9853)	-.67% (.6440)	-.87% (.5553)	-.80% (.5782)	.84% (.4338)
	12	-.64% (.2961)	-.99% (.1697)	-.88% (.1479)	-1.02% (.0777)*	-.54% (.3419)	-.40% (.5370)	-.60% (.5620)	-.63% (.5561)	-.62% (.5769)	-.75% (.5000)	-.54% (.6114)	.31% (.6041)
	24	-.21% (.6328)	-.26% (.5871)	-.25% (.5103)	-.25% (.5431)	-.20% (.6779)	.14% (.7863)	.26% (.6832)	.12% (.8569)	-.06% (.9205)	.06% (.9194)	-.01% (.9913)	.16% (.6299)
	36	.14% (.6779)	-.02% (.9636)	-.01% (.9720)	-.12% (.7570)	-.69% (.1099)	-.45% (.3190)	-.32% (.5162)	-.34% (.4602)	-.35% (.3586)	.24% (.4821)	.16% (.5759)	.52% (.0757)*

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
3	3	-.83% (.4662)	.11% (.9098)	.20% (.7950)	.81% (.2391)	.14% (.8664)	.27% (.7564)	.23% (.7751)	.54% (.5195)	.04% (.9546)
	6	.02% (.9850)	1.19% (.1165)	1.17% (.0791)*	1.65% (.0030)***	.58% (.4465)	.08% (.9289)	.05% (.9476)	-.31% (.7101)	-.62% (.4213)
	12	.07% (.9099)	.26% (.6185)	.57% (.2673)	.53% (.2022)	.06% (.9054)	-.03% (.9526)	.21% (.6682)	-.15% (.7546)	.05% (.9116)
	24	.38% (.3200)	.43% (.2501)	.64% (.0635)**	.73% (.0084)***	.58% (.0324)**	.19% (.4659)	.47% (.0651)*	.16% (.5279)	.07% (.8247)
	36	.79% (.0189)***	.81% (.0045)***	.79% (.0029)***	.83% (.0007)***	.71% (.0021)***	.33% (.1039)	.47% (.0188)**	.41% (.0720)*	.34% (.1976)

Table A14

Momentum Profits of VWP with Pre-Formation Period of 6 months in KSE & KOSDAQ markets combined

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (6 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
6	3	-.93% (.3071)	-.82% (.3430)	-.43% (.6328)	-.26% (.7521)	.18% (.8294)	.23% (.8262)	-.50% (.7232)	-.02% (.9883)	-.64% (.7134)	-.96% (.5929)	-.85% (.6057)	.34% (.8029)
	6	-1.21% (.0359)**	-1.27% (.0205)**	-1.17% (.0290)**	-.78% (.0850)*	-.44% (.3701)	.43% (.4787)	-.04% (.9669)	.87% (.4718)	.13% (.9217)	-.00% (.9984)	-.01% (.9934)	1.10% (.2462)
	12	-.43% (.4239)	-.93% (.1140)	-1.04% (.0302)**	-1.16% (.0096)***	-1.03% (.0292)**	-.69% (.2245)	-.51% (.6101)	-.51% (.6234)	-.49% (.6474)	-.56% (.5973)	-.42% (.6752)	.29% (.5819)
	24	-.18% (.6727)	-.35% (.4244)	-.39% (.2699)	-.28% (.4653)	-.32% (.4725)	.13% (.7865)	.67% (.2826)	.48% (.4601)	.17% (.7831)	.44% (.4377)	.42% (.3898)	.37% (.2577)
	36	.27% (.4345)	.14% (.6764)	-.00% (.9989)	.02% (.9652)	-.51% (.2210)	-.45% (.2873)	-.12% (.7977)	-.19% (.6819)	-.30% (.4248)	.18% (.6031)	.36% (.2210)	.57% (.0471)**

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
6	3	-.67% (.5547)	-.15% (.8748)	-.11% (.8925)	.85% (.2441)	.13% (.8790)	.54% (.5258)	.92% (.2456)	.89% (.2846)	.27% (.7202)
	6	.17% (.8237)	1.31% (.0618)*	1.46% (.0189)**	1.72% (.0009)***	.96% (.1676)	.54% (.4583)	.47% (.4991)	.24% (.7389)	-.23% (.7190)
	12	.08% (.8745)	.23% (.6512)	.64% (.1871)	.77% (.0561)*	.03% (.9387)	.02% (.9681)	.31% (.4656)	-.07% (.8741)	.07% (.8334)
	24	.68% (.0564)*	.63% (.0700)*	.80% (.0111)**	.74% (.0046)***	.65% (.0095)***	.26% (.2752)	.62% (.0076)***	.26% (.2710)	.29% (.2954)
	36	.99% (.0027)***	.98% (.0006)***	1.01% (.0002)***	.85% (.0008)***	.88% (.0003)***	.44% (.0363)*	.65% (.0009)***	.62% (.0067)***	.81% (.0042)***

Table A15

Momentum Profits of VWP with Pre-Formation Period of 12 months in KSE & KOSDAQ markets combined

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (12 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
12	3	-.74% (.4512)	-1.30% (.1760)	-1.38% (.1713)	-1.51% (.1016)	-1.73% (.0635)*	-.25% (.7898)	1.57% (.3064)	2.74% (.0954)*	2.12% (.2206)	2.67% (.1374)	1.81% (.2994)	1.45% (.2496)
	6	-.24% (.6952)	-.78% (.1805)	-1.32% (.0170)**	-1.30% (.0040)***	-1.36% (.0055)***	-.05% (.9346)	1.48% (.1898)	2.56% (.0350)**	1.94% (.1360)	2.26% (.0866)*	1.42% (.2794)	1.02% (.2476)
	12	-.66% (.1155)	-.72% (.0953)*	-.98% (.0042)***	-.77% (.0158)**	-.89% (.0121)**	-.47% (.3263)	-.90% (.2941)	-.36% (.6889)	-.43% (.6436)	-.21% (.8193)	.23% (.7929)	1.16% (.0210)**
	24	-.17% (.6503)	-.19% (.6252)	-.45% (.1336)	-.22% (.5165)	-.56% (.1644)	-.70% (.0978)*	.36% (.5499)	.69% (.2692)	.10% (.8683)	.63% (.2487)	1.27% (.0104)**	.58% (.0353)**
	36	.25% (.4203)	.34% (.2566)	.11% (.6726)	.40% (.2294)	.03% (.9320)	-.46% (.1880)	.12% (.7733)	.40% (.3254)	-.18% (.6129)	.09% (.7994)	.70% (.0254)**	.53% (.0510)*

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
12	3	.30% (.7791)	1.08% (.2718)	.65% (.4150)	2.20% (.0034)***	.47% (.6013)	1.00% (.2768)	1.29% (.1419)	1.39% (.1291)	.80% (.3250)
	6	.54% (.4712)	1.65% (.0164)**	1.71% (.0056)***	2.76% (.0000)***	1.20% (.1047)	.89% (.2450)	.79% (.2781)	.52% (.4814)	.08% (.9016)
	12	.64% (.1975)	1.07% (.0194)**	1.24% (.0064)***	.97% (.0084)***	.43% (.2912)	.44% (.2913)	.31% (.4306)	.05% (.8981)	.26% (.4542)
	24	.74% (.0345)**	.94% (.0036)***	.90% (.0019)***	.65% (.0088)***	.66% (.0100)***	.20% (.3323)	.45% (.0312)**	.19% (.4037)	.31% (.2255)
	36	.88% (.0103)***	1.22% (.0000)***	1.17% (.0000)***	.97% (.0001)***	1.07% (.0000)***	.70% (.0002)***	.80% (.0000)***	.88% (.0000)***	1.17% (.0000)***

Table A16

Momentum Profits of VWP with Pre-Formation Period of 24 months in KSE & KOSDAQ markets combined

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (24 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
24	3	-.64% (.4169)	-1.02% (.1810)	-.59% (.4623)	-.62% (.4051)	-.78% (.3043)	.10% (.9049)	1.34% (.3087)	3.75% (.0222)**	3.43% (.0503)*	3.23% (.0716)*	2.68% (.1227)	2.67% (.0625)*
	6	-1.09% (.0327)**	-1.22% (.0089)***	-1.16% (.0113)**	-.96% (.0100)***	-.72% (.0792)*	.09% (.8583)	1.08% (.2756)	2.97% (.0153)**	2.57% (.0476)**	2.38% (.0702)*	2.13% (.1021)	2.19% (.0294)**
	12	-1.44% (.0003)***	-.89% (.0318)**	-.61% (.0586)*	-.47% (.1328)	-.36% (.3003)	-.06% (.8848)	-.39% (.6134)	.27% (.7473)	.35% (.6883)	.28% (.7436)	.77% (.3469)	1.35% (.0100)***
	24	-.73% (.0167)**	-.16% (.6115)	-.06% (.8181)	.13% (.6300)	.31% (.3696)	.18% (.6338)	.05% (.9181)	.51% (.3019)	.29% (.5359)	.19% (.6438)	.85% (.0214)**	.60% (.0343)**
	36	-.27% (.3174)	.14% (.5914)	.46% (.0303)**	.70% (.0193)**	.22% (.5024)	.02% (.9456)	.04% (.9073)	.30% (.4146)	.02% (.9579)	.24% (.3607)	.46% (.0716)*	.54% (.0336)**

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
24	3	.39% (.7013)	1.43% (.1076)	1.73% (.0238)**	2.75% (.0002)***	1.40% (.1034)	2.31% (.0117)**	1.91% (.0248)**	1.76% (.0489)**	1.23% (.1324)
	6	.95% (.1849)	2.41% (.0004)***	2.76% (.0000)***	3.14% (.0000)***	1.96% (.0055)***	1.85% (.0113)**	1.11% (.0902)*	.89% (.1810)	.65% (.2919)
	12	1.01% (.0304)**	1.99% (.0000)***	2.13% (.0000)***	1.58% (.0001)***	1.32% (.0026)***	1.35% (.0019)***	.64% (.0725)*	.78% (.0000)***	.88% (.0030)***
	24	-.07% (.8166)	.24% (.4336)	.43% (.1279)	-.06% (.7686)	-.09% (.6481)	.11% (.5750)	.07% (.6753)	-.19% (.2761)	-.05% (.7979)
	36	.46% (.1179)	.88% (.0008)***	.87% (.0004)***	.66% (.0034)***	.49% (.0264)**	.45% (.0066)***	.34% (.0138)**	.57% (.0002)***	.86% (.0000)***

Table A17

Momentum Profits of VWP with Pre-Formation Period of 36 months in KSE & KOSDAQ markets combined

This table displays the returns of market-value weighted momentum portfolios (VWP) for all 5-year horizons. The left column indicates the pre-portfolio formation period (36 months), and the second left column indicates the post-portfolio formation periods (3, 6, 12, 24, 36 months). The horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. The horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. These portfolios are held for the post-portfolio period, and the monthly geometric mean values of the cumulative returns are on the table. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Pre	Post	1988-1992	1989-1993	1990-1994	1991-1995	1992-1996	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003
36	3	-.54% (.4556)	-.83% (.2231)	-.24% (.7371)	-.00% (.9958)	-.52% (.4720)	.48% (.5593)	1.34% (.3097)	3.15% (.0352)**	2.65% (.1105)	3.33% (.0517)*	2.71% (.1026)	2.54% (.0522)*
	6	-.68% (.1451)	-.83% (.0573)*	-.44% (.3139)	-.17% (.6454)	-.44% (.3156)	.37% (.4771)	1.16% (.2340)	2.75% (.0146)**	2.30% (.0590)*	2.78% (.0241)**	2.24% (.0663)*	1.94% (.0325)**
	12	-.79% (.0253)**	-.48% (.2158)	-.14% (.6290)	.00% (.9870)	-.14% (.6747)	.28% (.5104)	.29% (.6973)	.95% (.2367)	.84% (.3163)	1.06% (.2039)	1.07% (.1760)	1.05% (.0388)**
	24	-.92% (.0010)***	-.31% (.2949)	-.01% (.9668)	.46% (.0687)*	.61% (.0559)*	.65% (.0649)*	.91% (.0468)**	1.37% (.0053)***	1.10% (.0186)**	1.07% (.0081)***	1.28% (.0006)***	.62% (.0194)**
	36	-.13% (.5621)	.31% (.1523)	.60% (.0010)***	1.09% (.0000)***	1.05% (.0002)***	1.15% (.0001)***	1.10% (.0010)***	1.28% (.0001)***	.79% (.0020)***	.60% (.0130)**	.24% (.2939)	-.03% (.8873)

Pre	Post	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011/2010	2008-2012/2011/2010
36	3	.79% (.4714)	2.15% (.0146)**	1.98% (.0063)***	2.96% (.0000)***	1.68% (.0525)*	2.16% (.0136)**	1.75% (.0331)**	1.63% (.0532)*	1.04% (.1751)
	6	.76% (.2897)	2.24% (.0005)***	2.27% (.0001)***	2.92% (.0000)***	2.07% (.0026)***	2.01% (.0042)***	1.54% (.0159)**	1.37% (.0347)**	1.05% (.0744)*
	12	.60% (.1850)	1.61% (.0002)***	2.04% (.0000)***	1.89% (.0000)***	1.89% (.0000)***	1.93% (.0000)***	1.53% (.0000)***	1.13% (.0015)***	1.42% (.0000)***
	24	.14% (.5194)	.53% (.0313)**	.93% (.0001)***	.66% (.0013)***	.75% (.0004)***	.79% (.0002)***	.74% (.0001)***	.36% (.0291)**	.64% (.0007)***
	36	-.67% (.0060)***	-.53% (.0093)***	-.34% (.0885)*	-.31% (.0879)*	-.33% (.0596)*	-.04% (.7669)	.08% (.5478)	-.04% (.7730)	.08% (.6749)

Table A18

Summary of Tables A8 - A17 : Change in Momentum/Contrarian Effect in KSE & KOSDAQ markets over Time

This table summarizes the results of tables A8 - A17. Every return result for each horizon is categorized in four letters: "C" for contrarian effect significant at 10% level, "c" for insignificant contrarian effect, "M" for momentum effect significant at 10% level, and "m" for insignificant momentum effect. For each horizon and for each combination of pre-formation period and post-formation period, a combination of two letters is reported: the first letter for EWP and the second letter for VWP. For example, "mC" refers to insignificant momentum effect for EWP and significant contrarian effect for VWP. The left two columns indicate the pre-portfolio formation and the post-portfolio formation periods. 201x designates that the horizon starting in 2007 ends in 2011 for portfolios with post-formation periods of 3, 6, 12, and 24 months, and ends in 2010 for portfolios with post-formation period of 36 months. 201y signifies that the horizon starting in 2008 ends in 2012 for portfolios with post-formation periods of 3, 6, and 12 months, ends in 2011 for portfolios with post-formation period of 24 months, and ends in 2010 for portfolios with post-formation period of 36 months.

Pre	Post	1988 1992	1989 1993	1990 1994	1991 1995	1992 1996	1993 1997	1994 1998	1995 1999	1996 2000	1997 2001	1998 2002	1999 2003	2000 2004	2001 2005	2002 2006	2003 2007	2004 2008	2005 2009	2006 2010	2007 201x	2008 201y	
3	3	cc	mc	mm	mm	mm	mm	cc	cc	cc	cc	cc	cc	mc	mc	mm	mm	mm	mm	mm	mm	mm	mm
	6	cC	cC	cc	cc	mc	mc	cc	cm	cc	cc	cc	mm	mm	mm	mM	mM	mm	mm	mm	mm	mc	mc
	12	cc	cc	cc	CC	cc	cc	cc	cc	cc	cc	cc	Mm	Mm	Mm	Mm	Mm	mm	mc	Mm	Mc	Mm	Mm
	24	cc	cc	cc	Cc	cc	cm	cm	cm	cc	cm	cc	Mm	Mm	Mm	MM	MM	MM	MM	Mm	MM	Mm	Mm
	36	cm	cc	cc	cc	cc	cc	cc	cc	cc	cc	cm	cm	mM	MM	MM	MM	MM	MM	Mm	MM	MM	MM
6	3	cc	cc	cc	cc	mm	mm	cc	cc	cc	cc	cc	mm	mc	mc	mc	mm	mm	mm	mm	mm	mm	mm
	6	cC	cC	cC	cc	cc	mm	cc	cm	cm	cc	cc	mm	mm	MM	MM	MM	mm	mm	mm	mm	mm	mc
	12	cc	cc	CC	CC	CC	cc	cc	cc	cc	cc	cc	mm	Mm	Mm	Mm	MM	Mm	Mm	Mm	Mm	Mc	Mm
	24	cc	cc	cc	CC	cc	cm	cm	cm	cm	cm	cm	mm	MM	MM	MM	MM	MM	MM	Mm	MM	Mm	Mm
	36	cc	cc	cc	cc	cc	cc	cc	cc	cc	cc	cm	mm	mM	MM	MM	MM	MM	MM	MM	MM	MM	MM
12	3	cc	cc	cc	cc	CC	cc	cm	cM	cm	cm	cm	mm	mm	Mm	Mm	MM	mm	mm	mm	mm	Mm	mm
	6	cc	cc	CC	CC	CC	cc	cm	cM	cm	cM	cm	mm	Mm	MM	MM	MM	mm	mm	Mm	Mm	Mm	Mm
	12	cc	CC	CC	CC	CC	cc	cc	cc	Cc	cc	cm	mM	Mm	MM	MM	MM	Mm	Mm	Mm	Mm	Mm	Mm
	24	cc	cc	cc	cc	cc	cC	cm	cm	Cm	Cm	cM	mM	MM	MM	MM	MM	MM	MM	Mm	MM	Mm	Mm
	36	cm	cm	cm	cm	cm	cc	cm	cm	Cc	cm	cM	mM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
24	3	cc	cc	cc	cc	cc	cm	cm	cM	cM	cM	cm	mM	mm	mm	MM	MM	mm	mM	MM	mM	mm	mm
	6	cC	cC	cC	cC	cC	mm	cm	cM	cM	cM	cm	mM	mm	mM	MM	MM	mM	mM	MM	Mm	Mm	Mm
	12	CC	cC	cC	cc	cc	mc	cc	cm	cm	cm	cm	mM	mM	MM	MM	MM	MM	MM	MM	MM	MM	MM
	24	CC	cc	cc	mm	mm	mm	cm	cm	cm	Cm	cM	mM	mc	Mm	Mm	Mc	Mc	Mm	Mm	Mc	Mc	Mc
	36	Cc	cm	mM	mM	mm	Mm	mm	mm	cm	Cm	cM	mM	mm	MM	MM	MM	MM	MM	MM	MM	MM	MM
36	3	cc	cc	cc	cc	cc	mm	cm	cM	cm	cM	cm	mM	mm	mM	MM	MM	mM	mM	mM	mM	mM	mm
	6	cc	cC	cc	cc	cc	mm	cm	cM	cM	cM	cM	mM	mm	mM	MM	MM	mM	mM	MM	MM	MM	MM
	12	CC	cc	cc	cm	cc	mm	cm	cm	cm	cm	cm	MM	mm	MM	MM	MM	MM	MM	MM	MM	MM	MM
	24	CC	cc	mc	mM	mM	mM	mM	mM	mM	mM	cM	CM	cm	mM	mm	MM	MM	MM	MM	MM	MM	MM
	36	Cc	cm	mM	mM	MM	MM	mM	MM	MM	mM	cM	cm	mc	mC	MC	MC	MC	MC	MC	Mc	Mm	Mc

Table A19

Returns of Buy–Sell Portfolios of Individual Investors in KSE & KOSDAQ markets combined

Based on the cumulative net buy volume amount of individual investors for "net buy volume estimation period", "Buy" portfolio is comprised of top 10% stocks (stocks with the highest net buy volumes), and "Sell" portfolio is comprised of bottom 10% stocks (stocks with the lowest net buy volumes). Reported in the table below are the monthly geometric mean values of cumulative return of "Buy–Sell" portfolios held for "pre-portfolio formation period." Analyses of three combinations of "net buy volume estimation period" and "pre-portfolio formation period" were performed: (3, 3), (6, 6), and (12, 12). The left column indicates the (identical) net buy volume estimation period and pre-portfolio formation period. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Net& Pre		1999–2012	1999–2003	2000–2004	2001–2005	2002–2006	2003–2007	2004–2008	2005–2009	2006–2010	2007–2011	2008–2012	2009–2013
3	EWP	-6.43% (.0000)***	-7.02% (.0001)***	-7.98% (.0000)***	-7.16% (.0000)***	-6.83% (.0000)***	-6.14% (.0000)***	-5.95% (.0000)***	-5.85% (.0000)***	-6.32% (.0000)***	-6.23% (.0000)***	-6.30% (.0000)***	-6.33% (.0000)***
	VWP	-5.39% (.0000)***	-5.77% (.0005)***	-6.20% (.0000)***	-5.33% (.0000)***	-5.05% (.0000)***	-4.82% (.0000)***	-5.04% (.0000)***	-5.07% (.0000)***	-5.66% (.0000)***	-5.77% (.0000)***	-5.80% (.0000)***	-5.38% (.0000)***
6	EWP	-4.93% (.0000)***	-6.03% (.0000)***	-6.74% (.0000)***	-6.20% (.0000)***	-5.61% (.0000)***	-4.72% (.0000)***	-4.27% (.0000)***	-3.96% (.0000)***	-4.27% (.0000)***	-4.24% (.0000)***	-4.38% (.0000)***	-4.50% (.0000)***
	VWP	-3.13% (.0000)***	-3.41% (.0047)***	-3.65% (.0000)***	-3.07% (.0000)***	-2.87% (.0000)***	-2.79% (.0000)***	-2.70% (.0000)***	-2.71% (.0000)***	-3.19% (.0000)***	-3.24% (.0000)***	-3.42% (.0000)***	-3.29% (.0000)***
12	EWP	-3.71% (.0000)***	-4.62% (.0000)***	-5.49% (.0000)***	-5.48% (.0000)***	-4.75% (.0000)***	-4.03% (.0000)***	-3.30% (.0000)***	-2.74% (.0000)***	-2.89% (.0000)***	-3.11% (.0000)***	-2.94% (.0000)***	-3.21% (.0000)***
	VWP	-2.05% (.0000)***	-2.40% (.0065)***	-2.87% (.0000)***	-2.00% (.0000)***	-1.79% (.0000)***	-1.98% (.0000)***	-1.82% (.0000)***	-1.62% (.0001)***	-1.91% (.0000)***	-1.99% (.0000)***	-1.94% (.0000)***	-1.93% (.0000)***

Table A20

Returns of Buy–Sell Portfolios of Institutional Investors in KSE & KOSDAQ markets combined

Based on the cumulative net buy volume amount of institutional investors for "net buy volume estimation period", "Buy" portfolio is comprised of top 10% stocks (stocks with the highest net buy volumes), and "Sell" portfolio is comprised of bottom 10% stocks (stocks with the lowest net buy volumes). Reported in the table below are the monthly geometric mean values of cumulative return of "Buy–Sell" portfolios held for "pre-portfolio formation period." Analyses of three combinations of "net buy volume estimation period" and "pre-portfolio formation period" were performed: (3, 3), (6, 6), and (12, 12). The left column indicates the (identical) net buy volume estimation period and pre-portfolio formation period. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Net& Pre		1999–2012	1999–2003	2000–2004	2001–2005	2002–2006	2003–2007	2004–2008	2005–2009	2006–2010	2007–2011	2008–2012	2009–2013
3	EWP	4.30% (.0000)***	3.78% (.0243)**	4.30% (.0005)***	3.52% (.0033)***	3.49% (.0012)***	3.57% (.0001)***	3.81% (.0005)***	4.14% (.0006)***	4.75% (.0000)***	5.03% (.0000)***	5.16% (.0000)***	5.30% (.0000)***
	VWP	3.09% (.0000)***	2.41% (.1309)	2.42% (.0543)*	1.86% (.0524)*	2.12% (.0161)**	2.26% (.0012)***	2.77% (.0009)***	3.20% (.0005)***	3.76% (.0000)***	4.52% (.0000)***	4.51% (.0000)***	4.09% (.0000)***
6	EWP	3.12% (.0000)***	2.99% (.0208)**	3.24% (.0001)***	3.01% (.0004)***	2.80% (.0003)***	2.65% (.0001)***	2.68% (.0005)***	2.94% (.0011)***	3.25% (.0002)***	3.43% (.0000)***	3.55% (.0000)***	3.70% (.0000)***
	VWP	1.67% (.0005)***	.70% (.5470)	.86% (.2711)	1.45% (.0397)*	1.34% (.0432)**	1.42% (.0114)**	1.66% (.0052)***	1.90% (.0070)***	2.24% (.0013)***	2.71% (.0001)***	2.81% (.0000)***	2.64% (.0000)***
12	EWP	2.12% (.0000)***	2.06% (.0184)**	2.31% (.0001)***	2.43% (.0000)***	2.21% (.0000)***	1.94% (.0004)***	1.82% (.0003)***	1.86% (.0008)***	1.99% (.0002)***	2.22% (.0000)***	2.32% (.0000)***	2.47% (.0000)***
	VWP	.70% (.0322)**	-.05% (.9522)	.53% (.3494)	.88% (.0404)**	.67% (.0944)*	.63% (.1374)	.83% (.0230)**	.77% (.0573)*	.93% (.0220)**	1.26% (.0011)***	1.32% (.0005)***	1.33% (.0001)***

Table A21

Returns of Buy–Sell Portfolios of Foreign Investors in KSE & KOSDAQ markets combined

Based on the cumulative net buy volume amount of foreign investors for "net buy volume estimation period", "Buy" portfolio is comprised of top 10% stocks (stocks with the highest net buy volumes), and "Sell" portfolio is comprised of bottom 10% stocks (stocks with the lowest net buy volumes). Reported in the table below are the monthly geometric mean values of cumulative return of "Buy–Sell" portfolios held for "pre-portfolio formation period." Analyses of three combinations of "net buy volume estimation period" and "pre-portfolio formation period" were performed: (3, 3), (6, 6), and (12, 12). The left column indicates the (identical) net buy volume estimation period and pre-portfolio formation period. In the parentheses are reported the p-values with the null hypothesis of whether these values are equal to zero. The asterisks ***, **, and * indicate the statistical significance at 1%, 5%, and 10% level, respectively.

Net& Pre		1999–2012	1999–2003	2000–2004	2001–2005	2002–2006	2003–2007	2004–2008	2005–2009	2006–2010	2007–2011	2008–2012	2009–2013
3	EWP	3.54% (.0000)***	5.43% (.0016)***	5.93% (.0000)***	5.44% (.0000)***	5.10% (.0000)***	3.96% (.0000)***	3.15% (.0044)***	2.37% (.0429)**	2.13% (.0500)**	1.84% (.0774)*	1.78% (.0567)*	2.03% (.0028)***
	VWP	2.61% (.0000)***	5.03% (.0022)***	5.21% (.0000)***	4.09% (.0000)***	3.46% (.0001)***	2.51% (.0006)***	1.78% (.0231)**	.91% (.2508)	.85% (.2629)	.47% (.5355)	.80% (.2452)	1.02% (.0677)*
6	EWP	3.01% (.0000)***	4.71% (.0003)***	4.95% (.0000)***	4.62% (.0000)***	4.14% (.0000)***	3.21% (.0000)***	2.54% (.0018)***	1.73% (.0518)*	1.63% (.0523)*	1.53% (.0560)*	1.55% (.0261)**	1.77% (.0016)***
	VWP	1.74% (.0002)***	3.38% (.0051)***	3.22% (.0000)***	2.50% (.0005)***	1.99% (.0026)***	1.74% (.0018)***	1.09% (.0469)**	.70% (.2427)	.64% (.2792)	.42% (.4665)	.54% (.3063)	.75% (.1039)
12	EWP	2.62% (.0000)***	4.02% (.0000)***	4.36% (.0000)***	4.24% (.0000)***	3.84% (.0000)***	3.06% (.0000)***	2.38% (.0000)***	1.56% (.0073)***	1.49% (.0064)***	1.44% (.0037)***	1.26% (.0039)***	1.47% (.0000)***
	VWP	1.18% (.0004)***	1.81% (.0379)**	2.10% (.0005)***	1.72% (.0001)***	1.67% (.0001)***	1.63% (.0002)***	1.33% (.0002)***	1.00% (.0096)***	.84% (.0249)**	.68% (.0517)*	.51% (.1285)	.39% (.1708)

국문초록

1988년부터 2012년까지의 한국 주식시장 자료를 바탕으로 한 시계열 분석에 따르면 1999-2000년부터 한국 시장에서 강한 모멘텀 효과가 지배적으로 나타났다. 1999-2000년 즈음해서 나타난 또다른 현상은 외국인 거래비중의 급격한 증가와 개인투자자 비중의 감소이다. 개인/외국인 투자자의 거래비중과 모멘텀 이익 간의 상관관계 분석과 AR 회귀분석을 실시한 결과, 모멘텀 포트폴리오의 수익률은 개인의 거래비중과는 유의한 음의 계수를, 외국인의 거래비중과는 유의한 양의 계수를 보이는 것으로 나타났다. 이는 투자자 유형별 거래비중이 모멘텀 또는 반전전략의 효과를 설명하는 요인으로서 기능할 수 있음을 보여준다.

주요어 : 모멘텀, 반전투자전략, 투자자유형, 거래비중, 개인투자자, 외국인투자자

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