Is the 52 week high effect as strong as momentum? Evidence from developed and emerging market indices

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Existing research shows that a strategy based on the 52 week high prices of individual stocks explains momentum and is able to forecast returns. Given that the momentum strategy based on international market indices is also known to be profitable, we investigate the profitability of the 52 week high strategy for both developed and emerging market indices. In each case we find that the momentum strategy is significantly more profitable than the corresponding 52 week high strategy. In general, our results indicate that the 52 week high effect is not as reliable or as robust as the momentum effect.

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I. Introduction

The occurrence of return continuation is well documented in the literature and research on the profitability of momentum strategies has attracted the attention of many academics. Their examination of momentum strategies has demonstrated that past returns of stocks can be used to predict future returns¹ and has confirmed the persistence of the momentum effect at company, industry and international index level². Various explanations for momentum have been proposed in the literature but its cause remains controversial. Three main behavioural models have been proposed to explain return predictability as a consequence of investor irrationality induced by psychological biases. Barberis, Shleifer and Vishny (1998) explain momentum as an underreaction to information as the result of conservatism bias. In contrast, Daniel, Hirshleifer and Subrahmanyam (1998) suggest that overreaction is the source of momentum. The third model, proposed by Hong and Stein (1999) explains momentum as a result of slow and gradual dissemination of information.

A different approach to return continuation is proposed by George and Hwang (2004). They use a stock's price levels to show that closeness to the 52 week high price (52wk high hereafter) explains a large part of stock price momentum. The closeness of a stock's price to its 52wk high is represented by the ratio of current price divided by the 52wk high price of the share. Their 52wk high strategy goes long in the portfolio of stocks that have high 52wk high ratios and shorts the portfolio of stocks with low 52wk high ratios. To assess the 52wk high strategy's profitability, their analysis compares this strategy with a pure momentum strategy based on Jegadeesh and Titman (1993) and with the industry momentum strategy of Moskowitz and Grinblatt (1999). Their findings reveal for US stocks and US industries that price levels are better determinants of return continuation effects than are past returns, and that the 52wk high

¹ Jegadeesh and Titman (1993), (2001), Fama and French (1996), Moskowitz and Grinblatt (1999), Grundy and Martin (2001), Lewellen (2002), Chan, Hameed and Tong (2000).

² Rouwenhorst (1998), Griffin, Ji and Martin (2003), Balvers and Wu (2006), Bhojraj and Swaminathan (2006)

measure has predictive power whether or not stocks have experienced extreme returns in the past.

While George and Hwang (2004) state that the 52wk high strategy dominates the corresponding momentum strategy, they provide a different explanation for the return continuation effect than the explanations given by the existing behavioural models. They believe that return continuation based on the 52wk high ratio is consistent with the 'adjustment and anchoring bias' whereby traders use the 52wk high as an anchor when adjusting stock values as new information arrives. In a similar fashion to earlier momentum studies, George and Hwang (2004) test whether the 52wk high strategy profits eventually reverse. Their results indicate no evidence of reversals, suggesting that the 52wk high effect is a distinct phenomenon from short-term continuation, and that this effect might be triggered by a different behavioural bias.

There have been two studies of the 52wk high effect in other markets. Marshall and Cahan (2005) investigate the 52wk high strategy in the Australian setting. Analysing all stocks listed on the Australian Stock Exchange (ASX) that were approved for short-selling for the period January 1990 to December 2003, their study finds that the 52wk high strategy is very profitable on both small and large stocks, and on both liquid and illiquid stocks. Furthermore, the strategy achieves better results after risk adjustment and outperforms both the original pure momentum strategy of Jegadeesh and Titman (1993) and the industry momentum strategy of Moskowitz and Grinblatt (1999) when applied to Australian stocks.

Du (2008) tests for a 52wk high effect in developed market indices rather than stocks. Using a sample of 18 developed countries that covers the period from December 1969 to July 2004, his study finds that price levels dominate past returns in terms of predictive power when the 52wk high strategy is compared with the momentum strategy. This result is consistent with the original findings of George and Hwang (2004) that are based on individual stocks. However, Du's (2008) Table 3 indicates that momentum profits are marginally larger than the 52wk high profits.

Motivated by the limited amount of research on the 52wk high effect, this article investigates the performance of the 52wk high strategy when applied to developed and emerging market indices. In the developed markets case we have an extended time frame compared with the sample in Du (2008), and this produces a powerful new result: The momentum strategy is significantly more profitable than the corresponding 52wk high strategy for developed markets. The differences between the two strategies are even starker for emerging market indices: The 52wk high strategy makes losses even though the corresponding momentum strategy is profitable. As with the developed markets case, we find that the momentum strategy is significantly more profitable than the corresponding 52wk high strategy for emerging markets. Overall, our results suggest that the 52wk high effect is not as pervasive and strong as momentum has proven to be.

The remainder of the article is organized as follows: Section II presents the data and the empirical methodology employed in this study. Section III presents the empirical results and robustness checks involving post-holding period analysis, subperiod analysis, and risk adjustment. Section IV concludes the study with a summary and discussion.

II. Data and Methodology

The monthly prices with reinvested gross dividends and the 52wk high price of 44 Morgan Stanley Capital International (MSCI) indices form our data set. To be consistent with other research performed at index level such as Balvers and Wu (2006) and Du (2008), the data has been downloaded from Datastream in US dollars. Returns are measured in US dollar to facilitate the interpretation of results across markets, and because the various strategy profits reflect the results that would be available to a US dollar-based investor. The time frame for the study extends from January 1970 to March 2009 with the number of observations for an index varying from 469 to 169.

Descriptive statistics for the distributions of returns for each of the countries included in the sample are provided in Table 1. To understand better the performance of indices in different

global settings, the countries in Table 1 are classified into two groups: Developed markets are presented in Panel A, while Emerging markets are listed in Panel B. The developed markets analysis performed in this study is conducted on the same set of 18 developed markets indices as in Du (2008), while the emerging markets sample is based on MSCI's own classification, and comprises 26 indices.

Panel A displays a large variation in average monthly returns for the developed markets, ranging from high values of 1.68% for Hong Kong and 1.23% for Sweden, to values of 0.72% for Italy and 0.81% for USA. In general, there is a tendency for negative skewness in the developed markets (the exceptions being Hong Kong, Italy, Japan, Singapore and UK), and a wide range of kurtosis values. Hong Kong and the UK have particularly 'fat-tailed' distributions.

Panel B of Table 1 presents the summary statistics for the emerging markets. As expected, there is a larger variation in the mean and standard deviation of returns. Argentina, Brazil, Russia and Turkey have the largest monthly averages (over 2% per month), while China has the lowest average at 0.27%. In terms of the distribution of returns, there is a wide range of skewness and kurtosis values, with Poland a stand-out case.

Table 1 Summary statistics of stock index returns

Panel A: Developed Countries				
Country	% Mean	% SD	Skewness	Kurtosis
Australia	0.90	7.01	-0.68	4.79
Austria	0.88	6.40	-0.26	5.24
Belgium	1.03	5.94	-0.62	5.76
Canada	0.91	5.67	-0.64	2.42
Denmark	1.14	5.58	-0.20	2.07
France	1.00	6.51	-0.13	1.57
Germany	0.95	6.27	-0.35	1.57
Hong Kong	1.68	10.47	0.92	11.09
Italy	0.72	7.27	0.18	1.00
Japan	0.96	6.35	0.24	0.62
Netherlands	1.09	5.47	-0.58	2.70
Norway	1.16	7.89	-0.43	1.72
Singapore	1.18	8.42	0.38	5.79
Spain	0.96	6.51	-0.20	1.91
Sweden	1.23	6.95	-0.25	0.95
Switzerland	1.02	5.32	-0.09	1.36
UK	0.97	6.49	1.26	11.86
USA	0.81	4.47	-0.41	1.96

Panel B: Emerging Countries				
Country	% Mean	% SD	Skewness	Kurtosis
Argentina	2.36	16.31	1.81	9.00
Brazil	2.70	15.64	0.36	4.25
Chile	1.62	7.19	-0.24	1.65
China	0.27	11.09	0.60	2.19
Colombia	1.25	9.56	-0.05	0.66
Czech Republic	1.38	8.50	-0.36	1.48
Egypt	1.78	9.77	0.59	2.37
Hungary	1.73	10.76	-0.32	3.55
India	0.95	8.79	-0.21	-0.07
Indonesia	1.65	15.12	1.71	9.88
Israel	0.72	7.25	-0.20	0.81
Jordan	0.56	5.48	-0.24	2.70
Korea	0.98	11.28	1.07	5.60
Malaysia	0.89	8.74	0.58	5.65
Mexico	1.96	9.39	-0.47	1.57
Morocco	1.21	5.70	0.24	1.66
Pakistan	0.77	11.60	-0.13	2.61
Peru	1.68	9.47	-0.24	2.19
Philippines	0.77	9.45	0.40	2.33
Poland	1.94	14.80	2.42	18.33
Russia	2.36	17.21	0.21	1.80
South Africa	1.09	8.09	-0.56	1.28
Sri Lanka	0.58	10.21	0.91	3.77
Taiwan	0.85	10.97	0.47	1.50
Thailand	1.00	11.46	0.15	1.99
Turkey	2.12	17.38	0.71	1.85

Notes: This table provides descriptive statistics for the returns data of the 44 indices in the sample obtained from Datastream. Mean refers to the average monthly returns. Panel presents the statistics for the Developed countries while Panel B shows the Emerging countries. SD refers to the standard deviation of returns. Skewness and Kurtosis represent measures of normal distribution.

The aim of this study is to investigate the strength of the 52wk high effect in both developed and emerging market indices, and to compare the profitability of 52wk high strategies with the corresponding momentum strategies. The two strategies are described in the next section.

The 52wk high strategy

The 52wk high strategy uses the 52wk high ratio of each index to measure the closeness of the current index price to its 52wk high. Strategy formation is based on George and Huang's (2004) methodology as follows: each month t , indices are ranked based on the magnitude of

each index i 's ratio of its price at the end of month $t-1$ to the highest price achieved by index i in the 12 months prior to $t-1$:

$$Ratio = \frac{P_{i,t-1}}{52wkhigh_{i,t-1}} \quad (1)$$

This ratio is calculated for each index from the raw monthly closing price and the raw monthly 52wk high price. Based on the ratio ranking, every month the High (H) portfolio contains that 25% of indices with the highest 52wk high ratios, and the Low (L) portfolio consists of that 25% of indices with the lowest 52wk high ratios. If the 52wk high effect applies at the international index level, then indices with prices near to their 52wk high will outperform those indices that are farther from their 52wk high. Therefore the 52wk high trading strategy buys the High portfolio and sells the Low portfolio to form the High minus Low (denoted H-L) arbitrage portfolio. We test this for holding periods of $K = 1, 3, 6, 9$ and 12 months.

The 52wk high strategy uses overlapping portfolios with K month holding periods according to the Jegadeesh and Titman (1993) methodology. This means that each month t the strategy's High (Low) portfolio is comprised of $1/K$ of the High (Low) portfolio selected in the current month as well as in the past $K-1$ months. The strategy's portfolios are revised every month t as the positions initiated in $t-K$ are closed. Following George and Hwang (2004), we allow a one month gap between the end of the ranking period and the beginning of the holding period. To facilitate comparisons between the two groups of indices and with the momentum strategy, the standard holding period of $K = 6$ months used in many momentum studies will represent the base case to be discussed in detail.

The momentum strategy

The momentum strategy applies the Jegadeesh and Titman (1993) formation methodology as follows: at the beginning of each month short term winner and short term loser portfolios are formed (each containing 25% of the indices), based on the past J -month returns, for $J = 3, 6, 9$ and 12 months. Each month t , the strategy buys the short term winner (SW)

portfolio consisting of the 25% of indices that have the highest past returns, and sells the short term loser (SL) portfolio comprised of the 25% of indices that have the lowest past returns. The SW-SL arbitrage portfolio is held for a K -month holding period for $K = 1, 3, 6, 9$ and 12 months. According to the momentum effect, short term winners over the past three to twelve months should continue to outperform short term losers over the following three to twelve months. Therefore, the momentum strategy buys the SW portfolio and sells the SL portfolio to form the SW-SL momentum arbitrage portfolio. To conserve space, only the strategy based on $J = 6$ months will be shown, while the $K = 6$ case will serve as the base case for detailed discussion.

The momentum strategy also employs the overlapping portfolio approach of Jegadeesh and Titman (1993), meaning that each month's strategy return is the average of the individual portfolio returns from previous months. For example, if we take the base case strategy where $K = 6$ months, the SW-SL arbitrage portfolio for a particular month contributes one-sixth of the strategy's return in each of the six following months. This approach has the advantage of reducing transaction costs and it avoids overlapping returns.

III. Results

The results of the 52wk high and momentum strategies for both the developed and emerging countries are presented next. The remainder of this section looks at the post-holding returns of the various 52wk high strategies, undertakes a subperiod analysis and reports risk-adjusted 52wk high results.

The 52wk high and momentum strategies

Table 2 presents the results of the 52wk high strategies in the developed and emerging countries. Panel A reports the average monthly US dollar returns of the Low, High and arbitrage portfolios of the 52wk strategy for the developed market indices. Since the 52wk high ratio is the basis of this strategy, the formation period is 12 months.

Table 2 Profitability of the 52wk high strategy

Panel A: Developed Countries					
Portfolio	K = 1	K = 3	K = 6	K = 9	K = 12
L	0.87 (3.01)	0.82 (2.95)	0.82 (3.03)	0.86 (3.22)	0.92 (3.47)
H	1.25 (5.17)	1.26 (5.29)	1.26 (5.30)	1.23 (5.23)	1.15 (4.91)
H-L	0.38 (1.63)	0.45 (2.07)	0.44 (2.20)	0.37 (1.99)	0.23 (1.33)
Panel B: Emerging Countries					
Portfolio	K = 1	K = 3	K = 6	K = 9	K = 12
L	1.77 (2.88)	1.82 (3.04)	1.74 (2.88)	1.58 (2.83)	1.76 (3.26)
H	1.13 (2.72)	1.26 (3.23)	1.47 (3.91)	1.31 (3.56)	1.17 (3.16)
H-L	-0.64 (-1.14)	-0.56 (-1.07)	-0.27 (-0.52)	-0.27 (-0.62)	-0.59 (-1.49)

Notes: This table presents the average monthly returns of the low, high and arbitrage portfolios of the 52wk high strategy. Portfolios are constructed based on George and Hwang (2004) methodology where each month t , indices are ranked based on the Ratio of current price at the end of month $t-1$ to the highest price achieved by the index i in the previous 12 months prior to $t-1$ month ($P_{i,t-1}/52wkhigh_{i,t-1}$). The top 25% of indices are those with the highest 52wk high ratio and are grouped in the High H portfolio, and the bottoms 25% are indices with the lowest 52wk high ratio grouped in the Low L portfolio. These portfolios are equally weighted. The $H-L$ strategy goes long the High portfolio and short the Low portfolio to be held for $K=1, 3, 6, 9$ and 12 months. The monthly return for each K comes from employing Jegadeesh and Titman (1993) overlapping portfolio methodology defined by the value of K . The t -statistics are presented parentheses

The base case ($K = 6$ months) figures show that the High portfolio outperforms the Low portfolio and that the H-L strategy delivers a profit of 0.44% per month (t -value 2.20) which is significant at the 5% level. More generally, each arbitrage portfolio profit in Panel A is positive and the $K = 3, 6$ and 9 cases are all statistically significant at the 5% level.

Although these profits are significant, we also wish to compare them with the corresponding momentum strategy profits. Panel A of Table 3 contains the momentum strategy results for developed market indices. Each momentum profit in Panel A of Table 3 is significant, and each is larger than the corresponding 52wk high profit in Panel A of Table 2. For example, comparing the $K = 6$ base case 52wk high profit of 0.44% per month (t -value 2.20) from Panel A of Table 2 with the corresponding pure momentum return of 0.81% per month (t -value 4.02) shown in Panel A of Table 3, we can see that the pure momentum strategy is the more profitable. We conducted a paired two-sample test of this difference in profitability

and found that the momentum strategy is significantly more profitable than the 52wk high strategy (t -value is 3.13, significant at the 1% level).

Table 3 Profitability of pure momentum strategy

Panel A: Developed Countries					
Portfolio	K = 1	K = 3	K = 6	K = 9	K = 12
SL	0.81 (3.05)	0.76 (3.02)	0.67 (2.72)	0.69 (2.84)	0.79 (3.22)
SW	1.47 (5.46)	1.48 (5.55)	1.48 (5.67)	1.37 (5.28)	1.20 (4.72)
SW-SL	0.66 (2.69)	0.72 (3.27)	0.81 (4.02)	0.68 (3.62)	0.42 (2.43)
Panel B: Emerging Countries					
Portfolio	K = 1	K = 3	K = 6	K = 9	K = 12
SL	1.10 (2.03)	1.23 (2.42)	1.09 (2.22)	1.20 (2.45)	1.31 (2.75)
SW	1.90 (3.87)	1.91 (3.95)	1.93 (4.16)	1.72 (3.680)	1.51 (3.24)
SW-SL	0.79 (1.38)	0.68 (1.26)	0.84 (1.87)	0.53 (1.29)	0.20 (0.54)

Notes: This table presents the average monthly returns of the short, long and arbitrage portfolios of the pure momentum strategy. Portfolios are constructed based on Jegadeesh and Titman (1993) methodology where each month t , indices are ranked based on the compound return based on past $J = 6$ formation months. The top 25% of indices are those with the highest past return and grouped in the short term winner *SW* portfolio, and the bottom 25% are indices with the lowest past returns and grouped in the short term loser *SL* portfolio. These portfolios are equally weighted. The momentum strategy *SW-SL* goes long the winner portfolio and short the loser portfolio to be held for $K = 1, 3, 6, 9$ and 12 months. The t -statistics are presented in parentheses.

Next consider the profitability of these strategies when applied to the emerging markets indices. Panel B of Table 2 presents the results of the 52wk high strategy applied on the emerging markets indices. The figures indicate that the strategy is not profitable. The $K = 6$ base case loses 0.27% per month, although this figure is not significantly different from zero. More generally, the results in Panel B of Table 2 show that in all cases the strategy earns negative returns that are not significantly different from zero. This indicates that the 52wk high strategy does not work in emerging markets.

In contrast, the momentum strategy for the $K = 6$ base case in Panel B of Table 3 shows positive returns (0.84% per month) although only weakly significant at the 10% level (t -value 1.87). More importantly, the difference in profitability between the two strategies (0.84% versus 0.27%) is highly significant (the paired two-sample test t -value is 3.14).

In short, these findings show that the 52wk high strategy is not profitable for emerging market indices. For both developed and emerging market indices, the momentum strategy is significantly more profitable than the 52wk high strategy when $K = 6$. Thus, the 52wk high strategy does not dominate the conventional momentum strategy in terms of profitability when these strategies are applied to international market indices.

Post-holding returns of 52wk high portfolios

According to George and Hwang (2004), profits from the 52wk high strategy applied to stocks did not reverse in the long run. In order to see the extent to which the 52wk high strategy's profitability continues or reverses after the start of the portfolio holding period, Table 4 contains the post-holding period average returns for the 52wk high strategy with $K = 1$ for the first four quarters and the first five years following the start of the holding period.

Table 4 Quarterly and yearly returns for the 52wk high strategy

Panel A: Developed Countries									
Portfolio	Q = 1	Q = 2	Q = 3	Q = 4	Year 1	Year 2	Year 3	Year 4	Year 5
L	2.53 (3.25)	2.54 (3.32)	2.84 (3.63)	3.64 (4.57)	13.87 (4.34)	15.40 (5.00)	15.51 (4.36)	16.77 (5.36)	17.38 (4.63)
H	3.92 (5.48)	3.97 (5.57)	3.64 (5.41)	2.86 (4.18)	16.68 (5.44)	14.17 (4.03)	12.28 (4.06)	13.45 (4.65)	14.69 (4.95)
H-L	1.39 (2.26)	1.43 (2.30)	0.81 (1.45)	-0.78 (-1.36)	2.81 (1.55)	-1.24 (-0.58)	-3.24 (-2.12)	-3.32 (-1.99)	-2.69 (-1.55)
Panel B: Emerging Countries									
Portfolio	Q = 1	Q = 2	Q = 3	Q = 4	Year 1	Year 2	Year 3	Year 4	Year 5
L	5.39 (3.11)	5.67 (3.02)	5.79 (3.37)	7.27 (4.28)	29.33 (3.85)	25.59 (3.56)	18.08 (2.85)	23.96 (3.37)	16.86 (2.57)
H	4.07 (3.30)	5.40 (3.99)	3.69 (3.00)	2.60 (1.99)	20.42 (3.44)	16.20 (3.10)	17.24 (3.09)	13.99 (2.20)	13.54 (2.07)
H-L	-1.31 (-1.03)	-0.27 (-0.17)	-2.10 (-1.72)	-4.67 (-3.77)	-8.91 (-1.42)	-9.39 (-2.26)	-0.84 (-0.34)	-9.97 (-3.47)	-3.32 (-1.04)

Notes: This table presents the average compound returns for the low L , high H and arbitrage $H-L$ portfolios based on the $K = 1$ month holding period returns for the next four quarters and next five years following the start of the holding period. The t -statistics presented in parenthesis have their Newey-West standard errors adjusted with appropriate lags (two lags for quarterly returns and eleven lags for annual returns).

The results for the developed countries presented in Panel A of Table 4 show that the strategy's profitability begins to reverse in Quarter 4 of Year 1 and that this reversal continues

for four more years. The negative results for Years 3 and 4 are significant at the 5% level. This outcome differs from what George and Hwang (2004) find when using the 52wk high strategy at the individual company level. They report that the profits of the 52wk high strategy did not reverse in the long run.

The post-holding period evidence for the emerging markets presented in Panel B of Table 4 is provided for completeness only, since the strategy's holding period losses make its post-holding period results of little interest. Fig. 1 presents the cumulative post-holding period returns of the 52wk high strategy with $K=1$ for the developed and emerging indices for the first 60 months following the beginning of holding period. The graph tells a similar story to Table 4. The developed countries show reversal within one year, while the losses in the emerging markets continue for the whole period.

Fig. 1. Cumulative returns of the 52wk high strategies

Notes: The graph presents the cumulative raw profits of the 52wk high strategy for the non-overlapping holding period $K=1$ month, for the two groups of indices, developed (DEV) and emerging (EM) for a period of 60 months following the beginning of holding period.

Subperiod analysis

Next we split the samples into two subperiods of approximately equal size to check the consistency of the 52wk high effect over time. For the developed countries, the first subperiod covers January 1970 to December 1989 while for the emerging countries it extends from January 1988 to December 1998. The second subperiod covers January 1990 to March 2009 for the developed indices and January 1999 to March 2009 for the emerging indices. Table 5 presents the profitability of the 52wk high strategy in the two subperiods.

Panel A of Table 5 reports the first subperiod results for both groups of indices. It shows positive returns for the strategy in the developed setting and negative returns for the emerging region. Although the arbitrage portfolio yields positive profits for the developed markets, only the $K = 3$ case is significant at the 5% level. As is the case with the full sample results, the 52wk high strategy profits in the first subperiod are all negative for emerging markets indices.

Table 5 Profitability of 52wk high strategy in subperiods

Panel A: Subperiod 1										
Portfolio	Developed countries 1970-1989					Emerging countries 1988-1998				
	K = 1	K = 3	K = 6	K = 9	K = 12	K = 1	K = 3	K = 6	K = 9	K = 12
L	1.15 (2.82)	1.10 (2.79)	1.18 (3.08)	1.26 (3.36)	1.34 (3.59)	2.04 (1.97)	2.04 (2.02)	1.99 (1.93)	1.65 (1.78)	1.88 (2.11)
H	1.86 (4.99)	1.83 (5.03)	1.76 (4.86)	1.71 (4.68)	1.59 (4.46)	1.34 (2.15)	1.51 (2.66)	1.80 (3.31)	1.41 (2.68)	1.19 (2.22)
H-L	0.71 (1.83)	0.73 (1.98)	0.58 (1.68)	0.44 (1.36)	0.25 (0.81)	-0.70 (-0.71)	-0.53 (-0.56)	-0.19 (-0.20)	-0.25 (-0.30)	-0.69 (-0.92)
Panel B: Subperiod 2										
Portfolio	Developed countries 1990-2009					Emerging Countries 1999-2009				
	K = 1	K = 3	K = 6	K = 9	K = 12	K = 1	K = 3	K = 6	K = 9	K = 12
L	0.60 (1.42)	0.52 (1.29)	0.51 (1.28)	0.51 (1.29)	0.55 (1.38)	1.08 (1.59)	1.19 (1.77)	1.18 (1.77)	1.33 (1.99)	1.56 (2.33)
H	0.76 (2.44)	0.78 (2.51)	0.85 (2.73)	0.83 (2.68)	0.77 (2.42)	0.61 (1.09)	0.75 (1.31)	1.07 (1.87)	1.30 (2.25)	1.40 (2.39)
H-L	0.16 (0.61)	0.27 (1.15)	0.35 (1.62)	0.32 (1.55)	0.23 (1.15)	-0.47 (-0.95)	-0.43 (-0.94)	-0.10 (-0.26)	-0.03 (-0.09)	-0.16 (-0.56)

Notes: The table presents the average monthly returns in percentages of the low, high and arbitrage portfolios of the 52wk high strategy in subperiods. Panel A presents the results of Subperiod 1 which for the Developed countries is from 1970 – 1989 and for Emerging countries is from 1988 – 1998. Panel B shows the results of Subperiod 2 which is from 1990 – 2009 for the Developed countries and 1999 – 2009 for the Emerging countries. The way these portfolios are formed is described in Table 2.

Panel B reports the results for the second subperiod. In the developed countries the 52wk high strategy displays positive but statistically insignificant returns, while in the emerging countries the strategy, again, earns negative returns (because the *L* portfolio outperforms the *H* portfolio for all holding periods). Figs 2 and 3 chart the subperiod post-holding cumulative monthly returns of the 52wk high strategy with $K = 1$ for the developed and emerging markets. Fig. 2 shows that although developed markets returns in subperiod 1 eventually reverse, the returns in subperiod 2 display a flat trend consistent with the ‘adjustment and anchor bias’ proposed by George and Hwang (2004). Fig. 3 indicates that the emerging markets’ 52wk high losses continue into the post-holding period for both subperiods.

Fig. 2. Cumulative returns of the developed 52wk high strategies in subperiods

Notes: The graph presents the cumulative raw profits of the 52wk high strategy for the non-overlapping holding period $K = 1$ month, for the Developed groups of indices, for a period of 60 months following the beginning of holding period. Subperiod 1 ranges from January 1970 – December 1989 and subperiod 2 extends from January 1990 – March 2009.

Fig. 3. Cumulative returns of the emerging 52wk high strategies in subperiods

Notes: The graph presents the cumulative raw profits of the 52wk high strategy for the non-overlapping holding period $K = 1$ month, for the Emerging groups of indices, for a period of 60 months following the beginning of holding period. Subperiod 1 ranges from January 1988 – December 1998 and subperiod 2 extends from January 1999 – March 2009.

Risk-adjusted 52wk high profits

In this section we investigate whether the profits of the 52wk high portfolios and strategies should be considered as simply compensation for risk. The raw returns of the 52wk high strategy in this article are risk-adjusted using the two-factor and three-factor time-series regression models employed by Balvers and Wu (2006).

The two-factor model contains a world market factor and a value minus growth factor (VMG) as follows:

$$R_{p,t} - R_{f,t} = a_p + b_{p,wld}(R_{wld,t} - R_{f,t}) + b_{p,vmg}VMG_t + e_t \quad (2)$$

The second model used for risk adjustment is the international version of the Fama and French three-factor model:

$$R_{p,t} - R_{f,t} = a_p + b_{p,wld}(R_{wld,t} - R_{f,t}) + b_{p,smb}SMB_t + b_{p,hml}HML_t + e_t \quad (3)$$

The dependent variable $R_{p,t} - R_{f,t}$ is the monthly excess return of an equally-weighted portfolio of interest, whether it's the High, Low or arbitrage portfolio of a strategy, where $R_{p,t}$ represents

the monthly US dollar return of portfolio p at time t and $R_{f,t}$ is the monthly risk-free rate at time t represented by the 1-month US T-bill return. The independent variables or factors for the two models are as follows: $R_{wld,t} - R_{f,t}$ corresponds to the excess return on the MSCI World market portfolio R_{wld} at time t ; SMB_t and HML_t are the monthly Fama-French size and book-to-market factors³ at time t ; VMG_t or Value minus Growth is the return on the MSCI World Value Index minus the return on the MSCI World Growth Index at time t .

The monthly values for the MSCI world market index as well as the world value and growth indices have been downloaded from the MSCI website⁴. The monthly return values for the Fama and French factors and the Ibbotson and Associates Inc. 1-month T-bill risk-free rate covering the full sample period from January 1970 to March 2009 have been downloaded from Kenneth French's website⁵. For the Developed (Emerging) indices the three-factor model risk-adjustment covers the period 1970-2009 (1988-2009) and the two-factor model covers the period 1975-2009 (1988-2009) since the value and growth indices' price history starts in 1975. The (beta) coefficients $b_{p,wld}$, $b_{p,smb}$, $b_{p,hml}$, and $b_{p,vmg}$ are the regression loadings corresponding to the factors of the models while the intercept a_p (or simply alpha) represents the risk-adjusted abnormal returns of the portfolios over the estimation period. If alpha is significantly different from zero, then this is evidence of abnormal profits. The regression t -values are corrected for heteroskedasticity using the White (2000) test.

The regression coefficients of the two models and the corresponding White-corrected t -statistics for the Low, High and arbitrage portfolios for the $K = 6$ base case for both the developed and emerging indices are presented in Table 6. Column 2 of the table presents the unadjusted annualized raw average return of each portfolio, while the annualized alpha of the two-factor and three-factor models is reported in columns 3 and 7, respectively.

³ Downloaded from Kenneth French website

⁴ <http://www.msibarracom/products/indices/stindex>

⁵ http://www.mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library

Table 6 Risk adjusted 52wk high profits

Panel A: Developed Countries										
Two-factor Model						Three-factor Model				
Portfolio	Return	a	bwld	bvmg	Adj R ²	a	bwld	bsmb	bhml	Adj R ²
L	0.098	-0.010 (-0.517)	1.077 (15.869)	0.263 (2.753)	62.3%	-0.012 (-0.597)	1.061 (16.455)	0.001 (1.776)	0.002 (1.682)	61.2%
H	0.151	0.039 (2.445)	0.965 (19.107)	0.052 (0.816)	73.0%	0.051 (2.925)	0.975 (20.643)	0.001 (1.615)	0.001 (1.606)	6.76%
H-L	0.053	0.049 (2.195)	-0.112 (-1.259)	-0.211 (-2.006)	1.6%	0.063 (2.640)	-0.086 (-0.991)	-0.001 (-0.501)	-0.001 (-0.598)	0.3%
Panel B: Emerging Countries										
Two-factor Model						Three-factor Model				
Portfolio	Return	a	bwld	bvmg	Adj R ²	a	bwld	bsmb	bhml	Adj R ²
L	0.209	0.149 (2.040)	1.024 (6.075)	0.243 (0.808)	18.4%	0.144 (2.206)	1.002 (7.283)	0.003 (1.602)	-0.001 (-0.459)	24.3%
H	0.176	0.132 (3.389)	0.789 (8.400)	0.010 (0.076)	34.1%	0.110 (3.286)	0.886 (11.598)	0.004 (4.518)	0.001 (1.389)	47.5%
H-L	-0.032	-0.017 (-0.238)	-0.236 (-1.551)	-0.233 (-0.840)	0.6%	-0.034 (-0.537)	-0.116 (-0.935)	0.001 (0.498)	0.002 (1.150)	0.0%

Notes: This table presents the two-factor and three-factor regression results for monthly returns of the $K = 6$ holding period for the 52wk high strategy. L represents the portfolio of the 25% of indices that have the lowest 52wk high ratios and H represents the portfolio of the 25% of indices with the highest 52wk high ratios. The two-factor regression is as follows:

$$R_{p,t} - R_{f,t} = a_p + b_{wld}(R_{wld,t} - R_{f,t}) + b_{vmg}VMG_t + e_t$$

where $R_{wld,t}$ is the market factor represented by the return on the MSCI World market portfolio, and VMG_t is the value-growth factor represented by the return on the MSCI World Value Index minus the return on the MSCI World Growth Index. The three-factor regression is as follows:

$$R_{p,t} - R_{f,t} = a_p + b_{wld}(R_{wld,t} - R_{f,t}) + b_{smb}SMB_t + b_{hml}HML_t + e_t$$

where $R_{wld,t}$ is the market factor represented by the return on the MSCI World market portfolio, SMB_t is the size factor and HML_t is the book-to-market factor. *Return* is the annualized unadjusted return for the respective portfolio. The t -statistics presented in parenthesis are corrected for heteroskedasticity using the White (2000) test.

Panel A contains the developed markets regression results for the two models.

Depending on the model employed, the regression alphas indicate either a 4.9% or 6.3% annualized risk-adjusted return for the arbitrage portfolio. Both alphas are significant at the 5% level (t -values 2.19 and 2.64). Compared to the unadjusted return of 5.3% per year, the regression results clearly indicate that the 52wk high strategy average return is not a reward for bearing risk. The marginally-higher adjusted returns for the Fama and French model are in line with the findings of George and Hwang (2004) who report stronger risk-adjusted than raw returns for the 52wk high strategy applied at company level.

The emerging markets regression results in Panel B indicate negative and insignificant arbitrage alphas for both models. Considering how weak and insignificant the unadjusted profits are, it is not surprising that the risk-adjusted results are inferior as well. Interestingly, Panel B

reveals that the returns of the individual low (L) and high (H) portfolios remain high and significant after their raw returns are adjusted for risk. This suggests that investors can derive annualized abnormal returns of over 14% from the L portfolios and over 11% on the H portfolios. One justification for this result could be that emerging markets as a group have abnormally high returns. To discount this explanation we risk-adjusted the MSCI emerging market value-weighted market index (results not shown in Panel B). Both risk-adjustment models produced insignificant alphas in this case (0.029 and 0.036 with corresponding t -values 0.77 and 0.93, respectively). Thus, we can rule out the idea that the emerging market's High and Low portfolios only produce abnormal returns because emerging markets as a group produce abnormal returns.

The source of the problem with the 52wk high strategy for the emerging markets is that emerging indices that are either near to or far from their 52wk highs earn abnormally high returns. However those near to their 52wk highs do earn a little less than those far from their 52wk highs, so the 52wk high H-L strategy loses money in the emerging markets case. It should be noted that the alphas of the High portfolio for both the developed and emerging groups are significantly different from zero at the 1% level. This suggests that irrespective of the market type (developing or emerging), purchasing a portfolio of indices that have a high 52wk high ratio may produce superior risk-adjusted returns.

In summary, only the developed markets case produces significant and positive risk-adjusted returns for the 52wk high strategy. In contrast to these results, the risk-adjusted returns for the $K = 6$ momentum strategy are much superior. Specifically, the momentum strategy in the developed markets case produces an annualized risk-adjusted return in excess of 8% that is significant at the 1% level. The momentum strategy in the emerging markets case produces an annualized risk-adjusted return in excess of 10% (although it is not significant).⁶

⁶ The risk-adjusted results for the momentum strategy are available on request.

IV. Discussion and Conclusion

In this study we have investigated whether the 52wk high strategy can be profitably applied to international equity market indices. The analysis has revealed that the strategy provides mixed results with conflicting outcomes between the developed and emerging groups. This is most evident in the results of the emerging markets strategy which show that price levels are not useful in explaining future returns in the way predicted by the 52wk high effect. In fact, the strategy loses money, as the arbitrage portfolio returns are negative in the emerging markets. Indices with prices that are farthest from their 52wk high are the ones that derive the highest profits economically and statistically, contradicting the result of previous research at the company level. In contrast, the strategy earns positive and significant – although not very strong – returns in the developed markets.

The 52wk high trading strategy has not been investigated extensively, with only two known studies at the company level [George and Hwang (2004) in the US market and Marshall and Cahan (2005) in the Australian market] and one at the international index level [Du(2008)]. The important contribution of this study is the finding that the superiority of the 52wk high strategy over momentum strategies reported by others at the company level does not extend to the international index level. Rather, the results in this study show that the momentum strategy earns a significantly larger profit than the corresponding 52wk high strategy for both the developed and emerging market cases.

Du (2008) also investigates the profitability of a 52wk high strategy at the international index level but only for developed markets. While his Table 3 indicates that the momentum strategy is marginally more profitable than the 52wk high strategy, our extended sample is sufficient to produce a significantly larger momentum profit than the corresponding 52wk high profit.

In the case of individual stocks, George and Hwang (2004) adopt an ‘adjustment and anchoring bias’ explanation for the 52wk high effect in which traders use the 52wk high price as an anchor when adjusting stock values as new information arrives. As good (bad) news pushes

the price of a stock closer to (farther from) a new high, investors are initially reluctant to bid the price up (down) sufficiently. Eventually the information pushes through causing the prices to move up (down) appropriately. This short term underreaction causes a continuation in prices which the market corrects without causing long-term reversals.

This theory cannot be successfully applied to international market indices. Although the 52wk high strategy is moderately profitable in the developed markets case, the cumulative profits of the strategy shown in Table 4 have a reversal pattern. Such reversals contradict the anchoring and adjustment bias explanation. However, when the strategy's results are analysed over two subperiods the situation is less clear-cut: The first subperiod has a reversal pattern while the second subperiod displays a continuing trend. Of course, the problems with the theory are worse for the emerging markets because the 52wk high strategy is not even profitable in this case. The evidence suggests that the 52wk high price level of an emerging international index does not provide the same anchor to international index investors as George and Hwang (2004) claim a stock's 52wk high does to share investors.

This article has shown that the 52wk high effect is not consistently present at the international market index level, and that the profitability of 52wk high strategies are inferior to the corresponding momentum strategies for both developed and emerging market indices. The conflicting results between the developed and emerging markets are currently a puzzle, but international index investors are unlikely to use the 52wk high strategy in either case.

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