Momentum Effect all over the World

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ABSTRACT

This study is intended to reaffirm the existence and profitability of momentum investment strategies in 40 countries around the world during the period 1996–2018. The contradictory findings of previous research on the existence and profitability of momentum strategies have raised a pertinent question on the validity of efficient market hypothesis. We documented the momentum effect in 90% of our sample countries of which 52.5% exhibited positive momentum effect while 37.5% exhibited negative momentum effect. The findings were robust to two distinct sub-period analyses. The clear rejection of efficient market hypotheses is valuable to momentum traders and stock market regulators.

1. Introduction

Finance literature carries substantial evidence on the existence and profitability of momentum returns since the seminal work of Jegadeesh and Titman (1993). Many studies have documented instances where stocks kept on outperforming (underperforming) for the next three to 12 months if they had outperformed (underperformed) during several previous months. Jegadeesh and Titman (1993)

analyzed the American Stock Exchange (AMEX) and New York Stock Exchange (NYSE) using post 1940 stock data. They reported a significant monthly average momentum profit of 1.49% when adopting a zero-cost momentum strategy of buying past winners and selling past losers. Similar results have also been documented in prominent cross-country studies such as Rouwenhorst (1998) who found momentum returns across all European stock markets. Rouwenhorst (1999) noted that 85% and 15% of the sample countries exhibited positive and negative momentum returns, respectively. Likewise, Griffin, Ji and Martin (2003) reported that 80% (18%) of their sample countries exhibited positive (negative) momentum returns, whereas 2% of their sample countries exhibited no momentum returns.

Researchers have been critical of the applicability of efficient market hypothesis (EMH) in conventional finance ever since the discovery of the momentum effect in finance literature. The mere existence of the momentum effect in stock returns has invalidated the notion of EMH and strengthened the view point of opponents of market efficiency. The presence of momentum effects implied that a stock's own past prices could be utilized to predict its future prices and could also lead investors to earn abnormal profits. This is contrary to EMH which articulates that investors cannot use information based on securities' own past prices to make an abnormal profit because stock future prices are random in nature and are not affected by previous events (Malkiel, 2003; Malkiel & Fama, 1970). The question arises then as to what extent are our financial markets informationally efficient and whether asset pricing models are reliable. This is because conventional asset pricing models are developed based on the assumption of market rationality, where chances of achieving excess returns are remote. If investors can beat the market through acquiring excess returns then the validity of conventional asset pricing model is highly questionable (Chen 2017).

Despite the fact that many studies have investigated momentum effects in stock markets around the world, there is no consensus among researchers on the existence and profitability of the momentum effect especially in developing stock markets. This contradictory evidence makes momentum profitability highly questionable in the literature and has been the subject of many empirical studies.

Hameed and Yuanto (2002) and Chui, Titman and Wei (2000), for instance, did not find any momentum effect in Asian stock markets in their samples. On the other hand, Griffin, Ji and Martin (2004) and Chui, Titman, and Wei (2010) documented the existence and profitability of the momentum effect in some of the Asian stock markets. Kang, Liu and Ni (2002) established the presence of positive momentum effect in the China stock market. A more recent study in China by Li, Qiu and Wu (2010) however, found no momentum profit. The presence of the momentum effect proved by Griffin, Ji and Martin (2004) in the Turkish stock market was also controversial as it was later denied by Ornelas and Fernandes (2008).

One may argue that emerging markets are subject to higher volatility and greater uncertainty which caused the momentum effect, but the momentum effect is not confined to emerging stock markets. There are some developed stock markets such as in Australia and Japan where the momentum effect is also subject to many contradictions. Chui, Titman and Wei (2010) and Hurn and Pavlov (2003) for instance detected strong momentum effect in Australia which was unsupported in a later study by Huynh et al. (2010). Similarly, findings by Hong, Lee and Swaminathan (2003) of the insignificant momentum effect in Japan contradicted findings by Griffin, Ji and Martin (2004) who perceived significant momentum effects in the Japanese stock market.

We are unaware of any comprehensive study, after Chui, Titman and Wei (2010) who examined and reaffirmed the profitability of the momentum effect around the world. The ongoing debate on market efficiency (Shiller 2003) and contradictory findings on the existence of the momentum effect served as motivation in the current study. Therefore the main objective of our study is to revisit the profitability of the momentum effect around the world to confirm whether stock markets are informationally efficient or not. This study also has implications for individual and institutional investors which adopted momentum investment strategies. Momentum based strategies are risky and are subject to huge losses. According to Barroso and Santa-Clara (2015), momentum strategies crash up to -91.59% in just two months and -73.42% in three months during the 1932 and 2009 financial crises, respectively. Such huge losses cannot be compensated through decades of momentum profits. Our study is important for policymakers to understand how far momentum effect prevails in stock markets and whether they should take a more proactive role in regulating the stock markets.

The remainder of this paper is organised as follows: Section 2 presents the literature review, Section 3 explains the data, Section 4 describes the methodology, Section 5 clarifies the empirical findings and Section 6 concludes the study.

2. Related Literature

Jegadeesh and Titman (1993) discovered short term momentum effect in the U.S. stock markets. They examined the U.S. stock market from 1965 to 1989 and documented momentum investment strategies which generated 1.49% average momentum profits per month. In other words, they found that winner stocks were outperforming loser stocks by 1.49% for the next three to 12 months. However, their study only focused on the U.S. stock markets and disregarded the European and Asian stock markets.

Subsequent studies on momentum returns confirmed the existence of momentum profits outside of the U.S. markets. Rouwenhorst (1998) for instance, analysed 12 European stock markets from 1978 to 1985 that included United Kingdom, Switzerland, Sweden, Spain, Norway, Netherlands, Italy, Germany,

France, Denmark, Belgium and Austria. He documented the past six months of winner stocks which outperformed the past six months of loser stocks by 1% per month in all the 12 European markets. A later study by Rouwenhorst (1999) who studied 1,750 firms in 20 emerging stock markets consisting of Argentina, Brazil, Chile, Colombia, Greece, Indonesia, India, Jordan, Korea, Malaysia, Mexico, Nigeria, Pakistan, Philippines, Portugal, Taiwan, Thailand, Turkey, Venezuela and Zimbabwe found that 17 out of the 20 emerging stock markets exhibited momentum effect.

Although there is ample evidence on the existence and profitability of the momentum effect, there are also numerous studies that contradicted the profitability and existence of the momentum effect. Chui, Titman and Wei (2001) examined eight stock markets in Asia which included Hong Kong, Malaysia, Indonesia, Taiwan, Korea, Thailand, Japan and Singapore. They found positive momentum effect in Hong Kong, Malaysia, Singapore and Thailand but no momentum effect in Indonesia, Japan, Taiwan and Korea. This study, however, lacked generalizability as they only considered eight Asian countries.

The existence of the momentum effect was also opposed by Hameed and Yuanto (2002) who studied 1,000 firms in six Asian stock markets comprising of Hong Kong, Malaysia, Singapore, South Korea, Taiwan and Thailand. They applied Jegadeesh and Titman's (1993) momentum methodology and concluded that all 16 momentum strategies were consistently insignificant in the six Asian stock markets. Moreover, Hameed and Yuanto (2002) argued that the momentum effect was the result of data snooping bias.[1] Ornelas and Fernandes (2008) also did not find evidence of momentum effect in Brazil, Indonesia, Australia, Pakistan, Poland, Romania and Turkey. They related their findings of insignificant momentum effects with the improvement in information technology and use of the Internet that helped channel information to investors with greater speed which in turn wiped out the momentum effect. If higher information technology and use of the Internet wiped out the momentum effect, then all else being equal, developed countries, should have a lower momentum effect as compared to developing countries. This contention was not supported by existing studies which found that developed countries exhibited higher momentum effect than their developing counterparts (Rouwenhorst 1999, 1998).

Although a substantial amount of literature on momentum effect favoured the existence and profitability of momentum strategies in many countries around the world, there are also many studies that contradicted these findings specifically in the context of emerging markets. The existence and profitability of the momentum effect in emerging markets is not unanimous in the literature. Moreover, there is no study examining momentum returns on a global scale after Chui, Titman and Wei (2010). Thus, it is important to reaffirm the existence of momentum effect around the world. Table 1 presents the list of countries, along with researchers who investigated the existence of momentum returns.

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[1]   Data snooping refers to statistical inference which researchers decide to perform after looking at related data.

Table 1. Countries and Momentum Returns

Panel A. List of Countries with Significant Momentum Returns	
Country	Author
Argentina	Rouwenhorst (1999); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Africa	Griffin, Ji and Martin (2003)
Australia	Griffin, Ji and Martin (2003)
Austria	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Bangladesh	Chui, Titman and Wei (2010)
Belgium	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Brazil	Rouwenhorst (1999); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Nigeria	Rouwenhorst (1999)
Jordan	Rouwenhorst (1999)
Korea	Rouwenhorst (1999)
Malaysia	Rouwenhorst (1999); Griffin, Ji and Martin (2003)
Mexico	Rouwenhorst (1999); Griffin, Ji and Martin (2003)
Netherlands	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
New Zealand	Griffin, Ji and Martin (2003)
Norway	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Pakistan	Rouwenhorst (1999); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Peru	Griffin, Ji and Martin (2003)
Philippines	Rouwenhorst (1999); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Poland	Chui, Titman and Wei (2010)
Portugal	Rouwenhorst (1999); Griffin, Ji and Martin (2003)
Singapore	Griffin, Ji and Martin (2003)
South Africa	Griffin, Ji and Martin (2003)
Spain	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)

Panel A. List of Countries with Significant Momentum Returns	
Country	Author
Sweden	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Taiwan	Rouwenhorst (1999); Griffin, Ji and Martin (2003)
Thailand	Griffin, Ji and Martin (2003)
Turkey	Rouwenhorst (1999); Griffin and Martin (2003)
United Kingdom	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Venezuela	Rouwenhorst (1999)
Zimbabwe	Rouwenhorst (1999)
Panel B. Countries with Controversial Momentum Returns	
Hong Kong	Hameed and Yuanto (2002)
Switzerland	Rouwenhorst (1998); Chui, Titman and Wei (2010); Griffin, Ji and Martin (2003)
Malaysia	Hameed and Yuanto (2002)
Singapore	Hameed and Yuanto (2002)
South Korea	Hameed and Yuanto (2002); Chui, Titman and Wei (2000)
Taiwan	Hameed and Yuanto (2002)
Thailand	Hameed and Yuanto (2002)
Japan	Chui, Titman and Wei (2000); Teplova and Mikova (2015)
Indonesia	Fernandes and Ornelas (2008); Chui, Titman and Wei (2000)
Australia	Henker, Henker and Huynh (2010)
Brazil	Fernandes and Ornelas (2008)
Pakistan	Fernandes and Ornelas (2008)
Poland	Fernandes and Ornelas (2008)
Romania	Fernandes and Ornelas (2008)
Turkey	Fernandes and Ornelas (2008)

3.   Data

The stock price data used to compute momentum returns was obtained from DataStream. The final sample consisted of 40 countries with complete stock

price data from 1996 to 2018. The initial sample consisted of 40,365 firms from the 40 countries but after the screening process, 9,332 firms were left. During the screening process, firms with incomplete monthly return values from 1996 to 2018 were dropped. Table 2 provides the list of countries included in our study along with the total number of firms.

Table 2. Total Numbers of Firms

No.	Country	Total Number of Firms	Number of Firms Retained
1	Bangladesh	348	97
2	Brazil	610	156
3	China	3706	366
4	Colombia	99	28
5	India	4860	1791
6	Indonesia	629	171
7	Kenya	69	39
8	Malaysia	965	303
9	Morocco	75	17
10	Pakistan	365	158
11	Philippines	312	159
12	South Africa	399	112
13	Sri Lanka	301	163
14	Thailand	1242	413
15	Turkey	394	142
16	Australia	2172	380
17	Belgium	154	46
18	Canada	3684	760
19	Chile	211	110
20	Denmark	162	86
21	Finland	172	52
22	France	860	236
23	Germany	876	231
24	Greece	194	74
25	Hong Kong	3336	453
26	Israel	414	190
27	Italy	462	72
28	Japan	1174	481
29	Korea	2378	473

No.	Country	Total Number of Firms	Number of Firms Retained
30	Netherlands	130	60
31	New Zealand	150	38
32	Norway	299	42
33	Poland	820	21
34	Singapore	522	113
35	Spain	275	51
36	Sweden	917	99
37	Switzerland	283	123
38	Taiwan	1970	284
39	United Kingdom	1507	373
40	United States	2869	369
Total Number of Firms		40,365	9,332

Source: Author's own calculations.

4. Methodology

This study adopted the momentum strategy J6K6 developed by Jegadeesh and Titman (1993). Their strategy stands as a benchmark to calculate momentum returns and has been used by subsequent researchers such as Chui, Titman, and Wei (2010), Griffin, Ji, and Martin (2003), Ji, Martin, and Yao (2017), and Rouwenhorst (1998). Stock returns are calculated through the following formula.

$$Returns = \left(\frac{P_t - P_{t-1}}{P_{t-1}}\right) * 100 \tag{1}$$

Where P_t is a closing price in month t and P_{t-1} is an opening price in month t-1. Next, stocks are ranked in ascending order based on their cumulative returns at the end of each month for the past six months. The top 10% of the stocks are classified as winner portfolios while the bottom 10% are loser portfolios. These winner and loser portfolios are held for the next six months. This strategy is known as J6K6 in the literature where J6 refers to the six months formation period while K6 refers to the six months holding period. For example, a J6K6 portfolio on 1st July 2016 will show the performance of a portfolio from 31 December 2015 to 30 June 2016 (J6) and will be held until 31 December 2016 (K6). To calculate winner minus loser portfolio, the average loser portfolio returns are deducted from the average winner portfolio returns. The average value of winner minus loser portfolio is the momentum return where t-statistics is used to measure the significance level of the momentum returns.

5.   Empirical Findings

This section discusses the momentum profitability in 40 countries around the world from 1996 to 2018. Table 3 shows the monthly average momentum returns for each of these countries along with their respective t-statistics. For robustness sake, the momentum results during the sub-periods of 1997 to 2006 and 2007 to 2018 are also reproduced. Table 3 groups the sample countries according to their respective momentum returns (full sample) whether they are positive and significant (Panel A), negative and significant (Panel B) or insignificant (Panel C). Panel D tabulates the average momentum returns of all countries according to full and sub-periods.

   As shown in Table 3, 21 and 15 countries exhibited positive and significant, and negative and significant momentum returns, respectively, during the full sample period. These findings were robust to the two sub-period analyses. The exceptions were Thailand, Netherlands, Israel, US and Italy where the momentum returns either turned insignificant or flipped during the sub-period analysis. Netherlands for instance had positive and significant momentum returns in the full sample period but turned insignificant during first sub-period (1996–2006). The U.S. and Italy experienced positive and significant momentum returns in the full sample period but turned negative and significant in the first sub sample period.

   Momentum returns were insignificant in Taiwan, Colombia, Spain and Greece for the full sample period as shown in Panel C of Table 3. Panel D shows the average momentum return of all countries. The average momentum returns were 0.25%, 0.18% and 0.24% during the full sample, first and second sub-periods, respectively.

Table 3. Country Wise Average Monthly Momentum Returns (%)

S. No	Country	Average Monthly Momentum Profits (%)	T-Stat
		Panel A: Positive Monthly Momentum Returns	
1	Bangladesh		
	Full Sample (1996–2018)	1.81***	21.75
	First Sub-Sample (1996–2006)	1.99***	16.65
	Second Sub-Sample (2007–2018)	1.65***	25.99
2	China		
	Full Sample (1996–2018)	1.72***	52.09
	First Sub-Sample (1996–2006)	2.25***	58.10
	Second Sub-Sample (2007–2018)	1.28***	47.08

<div align="right">(continued)</div>

S. No	Country	Average Monthly Momentum Profits (%)	T-Stat
	Panel A: Positive Monthly Momentum Returns		
3	Kenya		
	Full Sample (1996–2018)	0.47***	4.25
	First Sub-Sample (1996–2006)	0.56***	4.50
	Second Sub-Sample (2007–2018)	0.41***	4.05
4	Morocco		
	Full Sample (1996–2018)	0.98***	5.42
	First Sub-Sample (1996–2006)	1.29***	6.61
	Second Sub-Sample (2007–2018)	0.67***	4.22
5	South Africa		
	Full Sample (1996–2018)	1.56***	22.56
	First Sub-Sample (1996–2006)	2.14***	27.44
	Second Sub-Sample (2007–2018)	0.97***	17.22
6	Thailand		
	Full Sample (1996–2018)	0.12***	5.51
	First Sub-Sample (1996–2006)	0.25***	10.48
	Second Sub-Sample (2007–2018)	0.01	1.37
7	Belgium		
	Full Sample (1996–2018)	2.39***	24.86
	First Sub-Sample (1996–2006)	2.05***	15.35
	Second Sub-Sample (2007–2018)	2.68***	32.78
8	Chile		
	Full Sample (1996–2018)	0.82***	24.19
	First Sub-Sample (1996–2006)	0.64***	14.25
	Second Sub-Sample (2007–2018)	0.97***	32.47

Level of significance, * $p<0.01$, ** $p<0.05$, *** $p<0.1$

Table 3 (Continued)

S. No	Country	Average Monthly Momentum Profits (%)	T-Stat
9	Denmark		
	Full Sample (1996–2018)	1.24***	22.29
	First Sub-Sample (1996–2006)	1.2***	19.31
	Second Sub-Sample (2007–2018)	1.28***	24.79
10	Finland		
	Full Sample (1996–2018)	3.20***	27.05
	First Sub-Sample (1996–2006)	3.9***	25.54
	Second Sub-Sample (2007–2018)	2.62***	28.30
11	Germany		
	Full Sample (1996–2018)	2.04***	72.20
	First Sub-Sample (1996–2006)	2.63***	73.32
	Second Sub-Sample (2007–2018)	1.55***	71.27
12	Italy		
	Full Sample (1996–2018)	0.24***	5.45
	First Sub-Sample (1996–2006)	-0.9***	-5.62
	Second Sub-Sample (2007–2018)	1.18***	14.66
13	Netherlands		
	Full Sample (1996–2018)	0.41***	5.20
	First Sub-Sample (1996–2006)	-0.35	-0.64
	Second Sub-Sample (2007–2018)	1.03***	10.06
14	New Zealand		
	Full Sample (1996–2018)	1.44***	11.15
	First Sub-Sample (1996–2006)	1.97***	10.91
	Second Sub-Sample (2007–2018)	1.01***	11.35
15	Norway		
	Full Sample (1996–2018)	2.76***	21.24
	First Sub-Sample (1996–2006)	3.49***	22.99
	Second Sub-Sample (2007–2018)	2.14***	19.78
16	Poland		
	Full Sample (1996–2018)	1.53***	6.86
	First Sub-Sample (1996–2006)	2.14***	9.59
	Second Sub-Sample (2007–2018)	1.03***	4.60

Table 3 (Continued)

S. No	Country		Average Monthly Momentum Profits (%)	T-Stat
17	Singapore			
		Full Sample (1996–2018)	1.53***	6.85
		First Sub-Sample (1996–2006)	2.14***	9.56
		Second Sub-Sample (2007–2018)	1.03***	4.59
18	Sweden			
		Full Sample (1996–2018)	3.69***	51.16
		First Sub-Sample (1996–2006)	4.66***	46.57
		Second Sub-Sample (2007–2018)	2.87***	54.98

Level of significance, * $p<0.01$, ** $p<0.05$, *** $p<0.1$

S. No	Country		Average Monthly Momentum Profits (%)	T-Stat
19	Switzerland			
		Full Sample (1996–2018)	2.84***	57.90
		First Sub-Sample (1996–2006)	3.50***	63.78
		Second Sub-Sample (2007–2018)	2.28***	53.00
20	United Kingdom			
		Full Sample (1996–2018)	1.46***	96.10
		First Sub-Sample (1996–2006)	1.90***	102.71
		Second Sub-Sample (2007–2018)	1.10***	90.58
21	United States			
		Full Sample (1996–2018)	0.17***	8.04
		First Sub-Sample (1996–2006)	-0.14**	-2.07
		Second Sub-Sample (2007–2018)	0.43***	16.46
	Panel B: Negative Monthly Momentum Returns			
22	Brazil			
		Full Sample (1996–2018)	-0.89***	-22.07
		First Sub-Sample (1996–2006)	-1.19***	-21.30
		Second Sub-Sample (2007–2018)	-0.46***	-22.72
23	India			
		Full Sample (1996–2018)	-2.34***	-28.62
		First Sub-Sample (1996–2006)	-3.20***	-30.02
		Second Sub-Sample (2007–2018)	-1.54***	-27.00
24	Indonesia			
		Full Sample (1996–2018)	-6.23***	-52.64

Table 3 (Continued)

S. No	Country	Average Monthly Momentum Profits (%)	T-Stat
	First Sub-Sample (1996–2006)	-10.72***	-37.06
	Second Sub-Sample (2007–2018)	-2.50***	-65.63
25	Malaysia		
	Full Sample (1996–2018)	-2.32***	-45.40
	First Sub-Sample (1996–2006)	-3.35***	-33.70
	Second Sub-Sample (2007–2018)	-1.463***	-55.15
26	Pakistan		
	Full Sample (1996–2018)	-1.08***	-18.85
	First Sub-Sample (1996–2006)	-2.19***	-36.78
	Second Sub-Sample (2007–2018)	-0.15***	-3.91

Level of significance, * $p<0.01$, ** $p<0.05$, *** $p<0.1$

S. No	Country	Average Monthly Momentum Profits (%)	T-Stat
27	Philippines		
	Full Sample (1996–2018)	-2.19***	-23.03
	First Sub-Sample (1996–2006)	-0.95***	-13.95
	Second Sub-Sample (2007–2018)	-3.23***	-30.60
28	Sri Lanka		
	Full Sample (1996–2018)	-1.13***	-20.41
	First Sub-Sample (1996–2006)	-2.12***	-36.43
	Second Sub-Sample (2007–2018)	-0.29***	-7.07
29	Turkey		
	Full Sample (1996–2018)	-1.98***	-33.22
	First Sub-Sample (1996–2006)	-2.31***	-34.68
	Second Sub-Sample (2007–2018)	-1.71***	-32.00
30	Australia		
	Full Sample (1996–2018)	-0.38***	-10.15
	First Sub-Sample (1996–2006)	-0.81***	-19.25
	Second Sub-Sample (2007–2018)	-0.03***	-2.58
31	Canada		
	Full Sample (1996–2018)	-1.62***	-10.68
	First Sub-Sample (1996–2006)	-1.54***	-21.58
	Second Sub-Sample (2007–2018)	-1.68	-1.59

Table 3 (Continued)

S. No	Country	Average Monthly Momentum Profits (%)	T-Stat
32	France		
	Full Sample (1996–2018)	-0.39***	-11.22
	First Sub-Sample (1996–2006)	-0.16***	-5.03
	Second Sub-Sample (2007–2018)	-0.59***	-16.38
33	Hong Kong		
	Full Sample (1996–2018)	-0.59***	-29.76
	First Sub-Sample (1996–2006)	-0.52***	-22.14
	Second Sub-Sample (2007–2018)	-0.66***	-34.94
34	Israel		
	Full Sample (1996–2018)	-0.33***	-5.69
	First Sub-Sample (1996–2006)	-0.73***	-12.76
	Second Sub-Sample (2007–2018)	0.01	0.21

Level of significance, * p<0.01, ** p<0.05, *** p<0.1

S. No	Country	Average Monthly Momentum Profits (%)	T-Stat
35	Japan		
	Full Sample (1996–2018)	-0.34***	-32.85
	First Sub Sample (1996–2006)	-0.15***	-18.92
	Second Sub Sample (2007–2018)	-0.49***	-44.92
36	Korea		
	Full Sample (1996–2018)	-0.36***	-12.18
	First Sub-Sample (1996–2006)	-0.44***	-9.77
	Second Sub-Sample (2007–2018)	-0.29***	-14.19
	Panel C: No Momentum Returns Based on Full Sample Period		
37	Greece		
	Full Sample (1996–2018)	-0.42	-0.23
	First Sub-Sample (1996–2006)	-0.98	-1.99
	Second Sub-Sample (2007–2018)	0.06	1.23
38	Taiwan		
	Full Sample (1996–2018)	0.05	-1.35
	First Sub-Sample (1996–2006)	0.74***	14.03
	Second Sub-Sample (2007–2018)	-0.52***	-14.17

Table 3 (Continued)

S. No	Country	Average Monthly Momen-tum Profits (%)	T-Stat
39	Colombia		
	Full Sample (1996–2018)	0.08	1.15
	First Sub-Sample (1996–2006)	0.34***	3.33
	Second Sub-Sample (2007–2018)	-0.14	-0.67
40	Spain		
	Full Sample (1996–2018)	-0.08	-0.48
	First Sub-Sample (1996–2006)	0.21	-0.17
	Second Sub-Sample (2007–2018)	-0.32	-0.74
	Panel D: Overall Average Monthly Momentum Returns in 40 Countries		
	All Countries		
	Full Sample (1996–2018)	0.25***	4.86
	First Sub-Sample (1996–2006)	0.18***	4.78
	Second Sub-Sample (2007–2018)	0.24***	4.93

Level of significance, * $p<0.01$, ** $p<0.05$, *** $p<0.1$

Table 4 compares findings of the current study with five main international studies on momentum returns. Rouwenhorst (1999) found that the J6K6 momentum strategy produced 0.39% monthly average momentum returns in Asian stock markets where 85% and 15% of the sample countries exhibited positive and negative significant momentum returns, respectively. Hameed and Yuanto (2002) examined 16 momentum strategies in six Asian stock markets and observed that none of the sample countries were generating momentum returns. Griffin et al. (2003) studied momentum effects in 39 countries around the world. They discovered that the J6K6 investment strategy produced 0.49% monthly average momentum returns across the countries in their sample. A total of 80% and 18% of the countries had positive and negative momentum returns, respectively. Whereas, 2% of the sample countries did not exhibit momentum returns. Fernandes and Ornelas (2008) found positive momentum returns and negative momentum returns in 20% and 80% of their sample countries, respectively. Chui et al. (2010) examined momentum returns across 40 countries and perceived that 62.5% of their sample countries showed insignificant momentum returns. Meanwhile, momentum returns were positive (negative) in 52.5% (10%) of the sample countries. The overall monthly average momentum returns were 0.73% across 40 countries. The findings of the current study were also in line with the five international studies mentioned. We studied 40 countries across the world and found 0.25% monthly average momentum returns.

Table 4. Percentage of Positive and Negative Momentum Returns Across Countries

Author	Number of countries	Same period	Monthly Average Momentum Profits	Countries with Momentum Profit (%)	Countries with Momentum Loss (%)	Countries with No Momentum (%)	Momentum strategies
Rouwenhorst (1999)	20	1982–1997	0.39%	85%	15%		J6K6
Hameed and Yuanto (2002)	6	1981–1994	0.53 %			100%	16 strategies
Griffin et al. (2003)	39	1975–2000 1990–2000	0.49% World 1.63% Africa 1.82% South Africa	80%	18%	2%	J6K6
Fernandes and Ornelas (2008)	15	1995–2004		20%	80%		J3K3, J6K6, J12K12, J24K24
Chui et al. (2010)	40	1981–2003	0.73%	60%	10%	30%	J6K6
Current study	40	1996–2018	1.49%	57.5%	37.5%	5%	J6K6

Source: Authors' own tabulation.

Our findings confirmed the existence of the momentum effect in 36 (90%) countries out of 40 countries where 52.5% of the countries had positive and significant momentum returns and 37.5% of the countries had negative and significant momentum returns. A total of 10% of the sample countries had insignificant momentum returns for the full sample period. One noteworthy difference between our study and studies by Rouwenhorst (1998, 1999), Hameed and Yuanto (2002) and Chui et al. (2010) was the existence of a significant number of countries with negative momentum returns which implied the existence of return reversals, i.e. past losers outperformed past winners and vice versa. The significant number of countries with negative momentum returns was however consistent with Fernandes and Ornelas (2008) who obtained reversals in 10 out of 15 emerging stock markets.

As suggested by De Bondt and Thaler (1985, 1987), contrarian investment strategies of buying past loser stocks and selling past winner stocks could produce abnormal profits due to the overreaction of investors. Both return momentum and reversals invalidated the notion of efficient market hypothesis. Jegadeesh and Titman (1993) also showed that return reversals could take place after 12 months.

Another possible reason why our results were different from previous studies was because of the sample selection criteria. Rouwenhorst (1999) excluded 5% of the stocks based on their extreme past performance during the ranking (formation) period. Moreover, Rouwenhorst (1999) used the 30% cut-off point in determining winner and loser stocks. Whereas, we applied a 10% cut-off and did not apply any data filtering technique except deleting stocks that did not have values to full length.

6. Conclusion

This study revisited the existence and profitability of momentum returns on a global scale. This is necessary since 16 years have passed since the study by Chui et al. (2010) with a sample period which ended in 2003. It is important to identify the magnitude of momentum returns across countries so that policymakers are aware of the validity of EMH in their respective stock markets. Our findings offered a clear rejection of the notion of EMH as 90% of the sample countries exhibited significant momentum returns.

Our study has implications for practitioners and policymakers. The main findings of the current study offer guidance to individual investors, investment houses and institutional investors as to which country(s) the J6K6 momentum investment strategies tend to be profitable. On the other hand, investors should also be aware of the losses associated with momentum strategies as supported by our findings on return reversals in 37.5% of our sample countries. In addition, investors should implement momentum strategies with caution due to the rapid speed of information diffusion in stock prices in recent years. This could

eradicate momentum profits a lot sooner than what investors have predicted. Policymakers should take into consideration the behavioural aspects of investors when designing regulations to curb excessive volatility in the market. They need to identify investor psychological biases that cause stock prices to deviate from their fundamental values for a prolonged period.

Further research can be conducted to identify the determinants of momentum profits and losses by analysing risk factors such as liquidity and book-to-market value. Moreover, the effect of information technology and speed of information diffusion can also be explored to find out the source(s) of momentum effect.

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