

Strong and Weak Price Momentum Components: Evidence from 10 Arabic Market Indices

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Abstract *This paper examines the presence of momentum profits in the Arabic market indices for the period of January 1989 through August 2013. Also, momentum portfolios are divided into two components depending on past long-term performance produces early and late-stage momentum strategies. This paper confirms that the momentum profits are present and they are statistically or economically significant in 10 Arabic market indices over all formation periods. Thus, to reap the benefit of such profit opportunities, an investor has to sell and buy a past short-term loser portfolio and short-term winner portfolio, respectively. In regard to the relative merits of the pure and both early and late-stage momentum strategies, the late-stage momentum method consistently generates stronger evidence of momentum. It appears that the late-stage momentum strategy utilizes past long-term performance to better identify those indices that are continuing the short-term performances, while the early-stage momentum strategy doesn't provide any profits.*

Key words Momentum profits, late-stage, early-stage, Arabic market indices, strategy

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1. Introduction

The momentum effect is still a debatable topic for the academic researchers and challenges the efficient market hypothesis (EMH). Jegadeesh and Titman (1993, 2001) first documents the evidence of momentum profits in the US market. This strategy is based on buying stocks that have high returns over the past 3, 6, 9 and 12 months (winner stocks), and selling those that have low returns over the same period (loser stocks). Recent past winner will outperform recent past losers and provides significant profits. More recently, other researches apply this strategy and their results support the existence of momentum profits in the developed and developing market.

Generally, most investors in the stock market are under reacting to the new information so a smart investor can take advantage of this regular under reaction from other investors by buying current winners and selling current losers to achieve above average return (Chan *et al.*, 1996; N. Jegadeesh and Titman, 1993; 2001). Under reaction is based on analyst coverage and it could be resulting from herding behavior (Grinblatt *et al.*, 1995).

In a study of international market indices, Bornholt and Malin (2013) find that past long-term returns can be employed to improve the performance of momentum strategies. This paper adopts the same approaches either early or late-stage momentum strategies at the level of Arabic market indices. While the early-stage momentum strategy is based on buying short-term winners with relatively bad long-term returns and selling short-term losers with relatively excellent long-term returns, the late-stage momentum strategy is based on buying short-term winners with relatively excellent long-term returns and selling short-term losers with relatively bad long-term returns. The early-stage momentum strategy will be assisted by the presence of a reversal effect. In contrast, the late-stage momentum strategy doesn't depend on reversal feature of the contrarian effect. The result shown in this study is consistent with findings of Jegadeesh and Titman (1993), which show that return continuation occurs in intermediate horizons with sorting and holding periods from 3 to 12 months. The analysis also shows that the late-stage momentum strategy outperforms the pure momentum strategy; while the early-stage momentum strategy underperforms the pure momentum strategy.

This paper aims to investigate whether there is momentum profit on the 10 Arabic market indices. Although the existing literature has examined the momentum effect on the emerging market indices and some Arabic market stock exchanges. This study is different from previous studies in the following ways. First, this study employs the 10 Arabic market indices rather than using emerging market indices like Bornholt and Malin (2013). Second, this paper investigate the momentum effect at the level of 10 Arabic market indices rather than using seven stock markets of six countries from Middle East like Ejaz and Polak (2014). Third, this study considers the international two-factor model applied by Balvers and Wu (2006) to risk-adjust raw returns rather than using the capital asset pricing model (CAPM) like Ejaz and Polak (2014). Fourth, unlike the Gharaibeh and Al-Eitan (2015) this paper adopts momentum and modified momentum named early and late-stage momentum strategies used by Bornholt and Malin (2013) rather than momentum and 52wk high strategies. Finally, the sample period used in this study is relatively long extends from 1989 to 2014.

2. Literature review

In the international momentum evidence, Moskowitz and Grinblatt (1999) and Swinkels (2004) examine momentum effect in US, Europe and Japan at the level of industry. They find that there is a strong momentum effect in both US industry and European markets but not in the Japanese setting. Dijk and Huibers (2002) investigate European momentum in 15 countries. They find that momentum is separated from size and value effects. In the Australian market, Demir et al (2004) confirm the existence of momentum effect. Huang (2006) use the monthly index returns of 17 countries to test the source of momentum effect in an international context. He finds that the “up” market generates most of the momentum profits. Bhojraj and Swaminathan (2006) show significant momentum effect in a sample of 38 developed and emerging countries. Using seven major stock markets from the Middle East, Ejaz and Polak (2014) they investigate whether there is an evidence of short-term momentum effect in stock markets at the level of Middle East. They find that the momentum effect is presence in all seven stock markets.

Looking at the Arabic market region, Gharaibeh and Al-Eitan (2015) examine whether there is momentum and 52wk high strategies at the level of 10 Arabic market indices. They show that momentum effect is present and it economically significant while the 52wk high effect is unprofitable. They conclude that the 52wk high effect is not as regular as the momentum effect. In the Amman stock exchange market, Gharaibeh (2015) investigates whether there is a momentum effect on Jordan firm returns. He finds that momentum effect is only statistically significant for the large-sized portfolios at Jordan firm returns. Using data of Morocco Stock Exchange from 1995 through 2014, Gharaibeh (2016) finds strong evidence of momentum effect. He confirmed that the momentum effect is still statistically significant when applying to sub period sample.

3. Methodology of research

3.1. Momentum strategy

The momentum portfolios have been formed as follows. At the beginning of each month t , the 10 Arabic indices in Table 1 are classified based on their past J -month returns ($J = 3, 6, 9$ and 12 months). For a given J , the short-term winner (SW) portfolio includes the 50% of indices that have the largest past J -month returns, while the short-term loser (SL) portfolio includes the 50% of indices that have the lowest past J -month returns. The momentum strategy (SW-SL) buys the short-term winner portfolio and sells the short-term loser portfolio. Portfolios are held for K -month holding periods, where $K = 1, 3, 6, 9$ and 12 months.

For this single-sort strategy, the current study maintains a 1-month gap between the end of the J -month formation period and start of the K -month holding period. A gap of one month is consistent with previous studies such as Jegadeesh and Titman (1993). Jegadeesh and Titman (1993) found that skipping the first one month after the end of the formation period improves the performance of the momentum strategy and provides stronger results since this practice helps avoid any short-term reversals being compensated by the short-term continuation of returns.

3.2. Late-stage and early-stage momentum strategies

The early-stage and late-stage strategies are a double dependent sort procedure, and are described as follows. The first sort is the same as the momentum strategy sort. The 10 indices are classified at the beginning of each month depend on their most recent past J -month returns. For a given J , the short-term winner portfolio (SW) includes the 50% of indices with the lowest past J -month returns, while the short-term loser portfolio (SL) contains the 50% of indices with the highest past J -month returns. The indices in the SW and SL portfolios are further classified in the second stage based on their component indices long-term past J_2 -month returns ($J_2 = 36, 48, \text{ or } 60$ months). This means that these J_2 -month returns are from the last J_2 months of the J -month formation period. For a given J and J_2 , the SWLW portfolio contains the 50% of SW indices with the largest long-term past J_2 -month returns. Similarly, the SLLL portfolio contains the 50% of SL indices with the lowest long-term past J_2 -month returns. For the early stage, the same process is used. The SWLL portfolio contains the 50% of SW indices with the lowest long-term past J_2 -month returns. Likewise, the SLLW portfolio contains the 50% of SL indices with the largest long-term past J_2 -month returns.

This procedure means that out of the total of 10 Arabic indices, the short-term winner and short-term loser portfolios of the momentum strategy each contain 5 indices, while the late-stage momentum strategy SWLW and SLLL portfolios each contain 2 indices. The late-stage momentum strategy (SWLW-SLLL) buys short-term winners with relatively good long-term past returns (SWLW) and sells short-term losers with relatively poor long-term returns (SLLL). The early-stage momentum strategy (SWLL-SLLW) is based on buying the short-term winners with relatively bad past long-term returns (SWLL) and selling the past short-term losers with relatively excellent long-term returns (SLLW). By construction, early-stage indices seem to have experienced a recent price contrarian, while late-stage indices seem to have experienced price momentum over a long period. Early-stage indices are 'early' in a price contrarian, while late-stage indices are 'late' in a price momentum. Figure 1 depicts a graphical representation of the two strategies.

An benefit of splitting the short-term winner and loser portfolios into just two sub-portfolios is that our late stage and early stage portfolios together cover all the components of the corresponding pure momentum portfolios. In other words, the traditional pure momentum winner (loser) portfolio is just the union of our late stage winner (loser) and the early stage winner (loser) portfolios. As with the momentum strategy, all portfolios in the late-stage and early-stage momentum strategies are held for a K -month holding period, where $K = 1, 3, 6, 9$ or 12 months. While a 1-month gap is employed at the beginning of the holding period for the momentum strategy, and both the late-stage and early-stage momentum strategies in this study follows the method of previous studies to increase the power of our tests. The current study uses Jegadeesh and Titman's (1993) overlapping portfolio method for the holding period returns of all strategies to evade overlapping returns, and to enhance test power. For expositional convenience, the 6-month holding period case ($K = 6$) will be the major focus of this paper comments about the empirical results in the next section.

In contrast, when seeking for evidence of price reversals subsequent to portfolio formation, this paper employs post-formation analyses that start at the end of the formation period and do not use overlapping portfolios. Therefore, for example, the Year 1 event time annual return indicates to the average 12-month return in the first year after the end of the formation period. In the post-formation analyses, statistical significance is determined using the Newey-West (1987) modification for serial autocorrelation with the appropriate number of lags (11 in this case).

3.3. Data

Monthly returns are calculated from monthly prices with reinvested gross dividend of 10 Morgan Stanley Capital International (MSCI) Arabic market indices downloaded from Datastream. The 10 Arabic market indices included in the current study are: Egypt, Lebanon, Morocco, Qatar, Kuwait, Jordan, Oman, UAE, Sudia Arabia and Bahrin. The sample period extends from February 1988 to September 2014. All monthly returns are in U.S. dollars. Table 1 shows descriptive statistics over the period February 1988 through September 2014 for the 10 Arabic indices, demonstrating average monthly returns, standard deviation, and the last two columns are Skewness and Kurtosis for each index. Table 1 reports big difference in the mean and standard deviation of average returns. Egypt and Lebanon have the biggest

monthly average (over 2% per month). On the other hand, the Bahrain has the lowest average at -0.33. The 10 Arabic indices have an average monthly return of 1.40% and an average standard deviation of 8.18%. The study compares and contrasts the pure momentum and both the late and early-stage momentum strategies applied to 10 Arabic indices. The next two sections detail the pure momentum and these late-stage and early-stage momentum strategies used in this paper.

Table 1. Summary statistics of stock index returns

Country	Mean	S.D.	Skewness	Kurtosis
Egypt	2.56	9.95	1.00	4.62
Lebanon	2.18	9.24	1.31	5.54
Morocco	1.89	5.77	0.46	2.55
Qatar	1.84	8.74	-0.13	1.66
Kuwait	1.37	7.06	-0.16	0.76
Jordan	1.33	5.21	-0.10	2.05
Oman	1.19	6.17	-1.31	5.01
UAE	1.09	11.00	0.19	1.40
Sudia Arabia	0.86	11.46	-0.08	-0.62
Bahrain	-0.33	7.18	-0.61	2.99
AVERAGE	1.40	8.18		

This table reports descriptive statistics of the return data of the 10 MSCI Arabic market indices from their first available months (January 1989) until September 2013, drawn from Datastream. The first column indicates to 10 Arabic countries, the second column “mean” indicates to the average monthly returns, followed by S.D. indicates to the standard deviation of monthly returns, while the last two columns Skewness and Kurtosis.

Table 2. Profitability of the pure momentum strategy

J	Portfolio	Holding Period Returns					Annual Event Time Returns				
		K = 1	K = 3	K = 6	K = 9	K = 12	Year 1	Year 2	Year 3	Year 4	Year 5
3	SW	1.33	1.38	1.21	1.06	0.91	15.07	13.53	12.23	12.36	9.17
		(2.93)	(3.13)	(2.86)	(2.58)	(2.21)	(2.39)	(1.98)	(1.96)	(1.74)	(1.23)
	SL	0.04	-0.20	-0.01	0.02	0.07	11.99	15.36	14.16	10.82	18.00
		(0.09)	(-0.44)	(-0.02)	(0.04)	(0.14)	(1.65)	(1.94)	(1.44)	(1.19)	(1.81)
	SW-SL	1.29	1.57	1.22	1.04	0.84	3.08	-1.83	-1.93	1.54	-8.83
		(2.53)	(3.66)	(3.32)	(3.31)	(2.9)	(0.97)	(-0.45)	(-0.49)	(0.35)	(-1.23)
6	SW	1.48	1.44	1.08	0.87	0.73	15.60	13.10	13.54	12.47	9.84
		(2.88)	(2.84)	(2.35)	(2.02)	(1.69)	(2.36)	(1.91)	(2.11)	(1.78)	(1.15)
	SL	-0.34	-0.30	-0.07	-0.02	-0.03	12.99	15.09	11.71	12.12	17.76
		(-0.73)	(-0.6)	(-0.14)	(-0.04)	(-0.05)	(1.74)	(1.83)	(1.22)	(1.28)	(1.76)
	SW-SL	1.82	1.74	1.16	0.90	0.76	2.61	-1.99	1.83	0.34	-7.92
		(3.45)	(3.48)	(2.6)	(2.37)	(2.1)	(0.69)	(-0.38)	(0.47)	(0.07)	(-0.82)
9	SW	1.16	0.95	0.69	0.56	0.42	14.90	13.40	12.89	10.85	10.60
		(2.21)	(2.03)	(1.62)	(1.31)	(0.97)	(2.22)	(1.97)	(2.01)	(1.54)	(1.11)
	SL	-0.25	-0.13	-0.01	0.04	-0.02	12.28	15.45	14.60	13.77	17.87
		(-0.46)	(-0.25)	(-0.02)	(0.07)	(-0.03)	(1.88)	(1.77)	(1.39)	(1.43)	(1.91)
	SW-SL	1.40	1.09	0.70	0.53	0.43	2.62	-2.05	-1.71	-2.92	-7.28
		(2.42)	(2.08)	(1.55)	(1.3)	(1.12)	(0.52)	(-0.37)	(-0.41)	(-0.51)	(-0.69)
12	SW	0.77	0.61	0.33	0.15	-0.04	14.23	10.63	13.09	10.57	10.18
		(1.38)	(1.21)	(0.71)	(0.33)	(-0.08)	(1.97)	(1.77)	(2.03)	(1.39)	(1)
	SL	-0.15	-0.11	0.06	0.02	-0.06	12.54	17.14	14.30	14.53	18.54
		(-0.29)	(-0.21)	(0.11)	(0.04)	(-0.1)	(1.97)	(1.75)	(1.41)	(1.51)	(2.03)
	SW-SL	0.91	0.72	0.27	0.13	0.02	1.69	-6.51	-1.21	-3.96	-8.36
		(1.49)	(1.25)	(0.51)	(0.27)	(0.04)	(0.23)	(-1.08)	(-0.29)	(-0.57)	(-0.72)

This table provides the average monthly holding returns and the annual event-time returns of the long, short and arbitrage portfolios of the pure momentum strategy for the Arabic markets. Portfolios are formed as follows: At the beginning of each month t , 10 Arabic indices are ranked based on the compound return based on past $J=3, 6, 9$ and 12 formation months. The short-term winners (SW) contain the 50% of indices with the highest past return and the short-term losers (SL) contain the 50% of indices with the lowest past returns. These portfolios are equally weighted. The strategy SW-SL longs the short-term winner portfolio and shorts the short-term loser portfolio to be held for $K=1, 3, 6, 9$ or 12 months. Annual event-time returns (Year 1, Year 2, Year 3, Year 4 and Year 5) are the average annual returns for the first five years following the portfolio formation date. Holding period t -statistics are simple t -statistics, while annual event-time t -statistics are based on the Newey-West (1987) correction for autocorrelation up to lag 11.

4. Results

This section examines the empirical results for the pure, early-stage and late-stage momentum strategies in terms of raw and risk-adjusted results. In Subsection 4.1, pure momentum results are presented. Subsection 4.2 provides early and late stage momentum profitability. Subsection 4.3 investigates the long-horizon returns up to 5 years post-formation. Finally, Subsection 4.4 discusses the extent to which strategy can explain profits by a risk-adjustment model.

4.1 Pure Momentum

Table 2 reports results for the short (SL), long (SW), and long-short (SW-SL) pure momentum portfolios for 10 Arabic market indices for several (J, K) combinations. Table 2 contains the results for formation period lengths of $J=3, 6, 9$, and 12 months. We report results for the top 50 percent loser portfolio (SW), the bottom 50 percent winner portfolio (SL), and the pure momentum strategy SW-SL that is long SW and short SL. Table 2 provides the equal-weighted average monthly portfolio for K -month holding periods ($K=1, 3, 6, 9$ and 12 months) in columns 3 through 7, and the Year 1 to Year 5 annual event-time returns in columns 8 through 12.

The pure momentum results in Table 2 provide significant profits for all (J, K) combinations with the exception of ($J=9, K=6, 9$ and 12) and ($J=12, K=1, 3, 6, 9$ and 12). The reason is that in the Arabic markets in regard to winner (SW) portfolios achieve significant monthly returns. However, the strategy profits (SW-SL) are all positive over all K -month holding periods if $J=3, 6, 9$, or 12 months. For example, for the six-month (6-month) formation period and 6-month holding period ($K=6$) case, the variation between the average monthly returns of the SW portfolio and the SL portfolio is 1.16% per month (t -stat 2.60), which is statistically significant. In short, the holding period returns in Table 2 give indication of a momentum effect at the Arabic market indices level. Given that this initial momentum evidence may be strengthened by employing the late-stage and early-stage approaches, the next section reports the results of the late-stage and early-stage momentum strategies with 6-month formation period.

Table 3. Profitability of late-stage momentum strategy

J1	J2	Portfolio	Holding Period Returns					Annual Event Time Returns					
			K = 1	K = 3	K = 6	K = 9	K = 12	Year 1	Year 2	Year 3	Year 4	Year 5	
6	36	SWLW	0.88 (1.72)	0.57 (1.11)	0.49 (1.02)	0.41 (0.91)	0.24 (0.53)	19.58 (2.11)	10.36 (1.55)	13.38 (1.78)	12.56 (1.49)	16.73 (1.58)	
		SLLL	-1.76 (-1.96)	-1.93 (-2.11)	-1.21 (-1.7)	-0.64 (-1.63)	-0.73 (-1.94)	-2.95 (-0.72)	9.07 (0.93)	25.66 (1.7)	26.68 (2.88)	49.61 (3.54)	
		SWLW-SLLL	2.64 (3.21)	2.50 (3.24)	1.70 (2.53)	1.05 (2.09)	0.96 (1.95)	22.52 (3.26)	1.29 (0.15)	-12.28 (-2.51)	-14.11 (-1.21)	-32.87 (-1.67)	
	6	48	SWLW	0.82 (1.48)	0.83 (1.56)	0.40 (0.73)	0.06 (0.11)	-0.49 (-0.97)	17.44 (1.95)	8.96 (1.23)	15.43 (1.8)	15.94 (1.72)	15.91 (1.33)
			SLLL	-0.82 (-1.75)	-0.54 (-1.18)	-0.88 (-2.06)	-0.66 (-1.55)	-0.64 (-1.5)	-0.52 (-0.12)	14.19 (1.38)	36.20 (2.11)	62.65 (2.41)	54.69 (3.28)
			SWLW-SLLL	1.64 (2.55)	1.38 (2.21)	1.27 (2.02)	0.72 (1.2)	0.15 (0.27)	17.97 (2.38)	-5.22 (-0.59)	-20.77 (-1.73)	-46.71 (-2.39)	-38.78 (-1.6)

6	60	SWLW	0.70 (1.19)	0.52 (0.94)	0.11 (0.21)	0.04 (0.11)	-0.20 (-0.45)	16.77 (1.64)	11.37 (1.25)	17.01 (1.95)	17.15 (1.73)	9.37 (0.84)
		SLLL	-0.31 (-0.66)	-0.11 (-0.24)	-0.47 (-1.15)	-0.40 (-0.99)	-0.23 (-0.54)	4.47 (0.74)	21.58 (1.58)	51.31 (2.11)	47.85 (2.66)	52.85 (2.73)
		SWLW-SLLL	1.01 (1.64)	0.63 (1.08)	0.58 (0.99)	0.45 (0.93)	0.03 (0.07)	12.30 (1.42)	-10.21 (-1.27)	-34.30 (-2.62)	-30.70 (-1.75)	-43.48 (-2.12)

This table provides the average monthly holding returns and the annual event-time returns of the long, short and arbitrage portfolios of the late stage momentum strategy for the Arabic markets. Late-stage portfolios are derived from the 6-month formation period pure momentum strategy ($J = 6$) short-term winner (SW) and short-term loser (SL) portfolios. The formation of the SW and SL portfolio is explained in Table 2. At the beginning of each month t , indices within the current SW and SL portfolios are further classified based on their $J2$ -month return from the last $J2$ -months of the 6-month formation period for $J2 = 36, 48$ or 60 . The 50% of SW indices with the best long-term performance $J2$ -month returns define the SWLW equal-weighted portfolio (short-term winner that are long-term winners) for that month. Similarly, the 50% of SL indices with the worst long-term performance $J2$ -month returns define the SLLL portfolio (short-term losers that are long-term losers). The late-stage momentum strategy SWLW-SLLL is held for $K = 1, 3, 6, 9$ and 12 months. Annual event-time returns (Year 1, 2, 3, 4 and 5) are the average annual returns for a portfolio for the first five years following the portfolio formation date. The t -statistics are presented in parentheses. Holding period t -statistics are simple t -statistics, while the annual event-time t -statistics are based on the Newey-West (1987) correction for autocorrelation up to lag 11. All the returns shown in Table 2 and in the next tables are in percentage.

4.2 Late-stage and early-stage momentum results

One of the objectives of this study is to investigate whether the late-stage and early-stage momentum approaches can produce stronger evidence of short-term momentum than does the traditional pure momentum strategy. The late-stage momentum strategy is based on buying those short-term winners with relatively good long-term performances and selling those short-term losers with relatively poor long-term performances. Late-stage momentum strategies are expected to be more profitable than pure momentum strategies because many indices that show no signs of being ready to reverse are included in the late-stage momentum portfolios. Given that the results in the last section showed significant pure momentum profits for formation periods $J = 3, 6$ and part of 9 months, to save space, this section reports late-stage momentum results for 6 months formation period lengths. On the other hand, the early-stage momentum strategy is based on buying those short-term winners with relatively bad long-term performances and selling those short-term losers with relatively poor long-term performances. Early-stage momentum strategies are another choice to be more profitable than pure momentum strategies because many indices that show no signs of being ready to reverse are not included in the early-stage momentum portfolios.

For the late-stage and early-stage strategies, each month the short-term winner and loser portfolios of the pure momentum strategy are split in half depend on the relative magnitude of their component indices' long-term past $J2$ -month returns ($J2 = 36, 48, \text{ or } 60$ months). The late-stage strategy (SWLW-SLLL) buys short-term winners with relatively good long-term performances (SWLW) and sells the short-term losers with relatively bad long-term performances (SLLL). The early stage strategy (SWLL-SLLW) buys the short-term winners with relatively bad long-term performances (SWLL) and sells the short-term losers with relatively long-term good performances (SLLW). The results for these strategies Arabic markets are reported in Tables 3 and 4. To conserve space, only combinations based on past $J = 6$ months' formation periods and for $J2 = 36, 48, \text{ or } 60$ months are presented.

Table 3 details the results of the Late-stage momentum strategy. The results in Table 3 show large and economically significant profits for the late-stage momentum strategy for all holding periods. For example, the late-stage momentum strategy with a six-month holding period ($K = 6$) provides a significant profit of 1.70 % per month (t -stat 2.53). In contrast, Table 4 presents the results of the early-stage momentum for the 10 Arabic market indices demonstrating negative average monthly returns for all K

months holding periods. In particular, the early-stage strategy with six month holding period does not improve the momentum strategy for the SWLL-SLLW strategies. For example, the early-stage $J/J_2 = 6/36$ and $K = 6$ strategy provides a return of -1.11% per month (t -stat -1.16). This return is negative and smaller than the corresponding pure momentum base case SW-SL return of 1.16% per month (t -stat 2.60) for the Arabic market indices reported in Table 2.

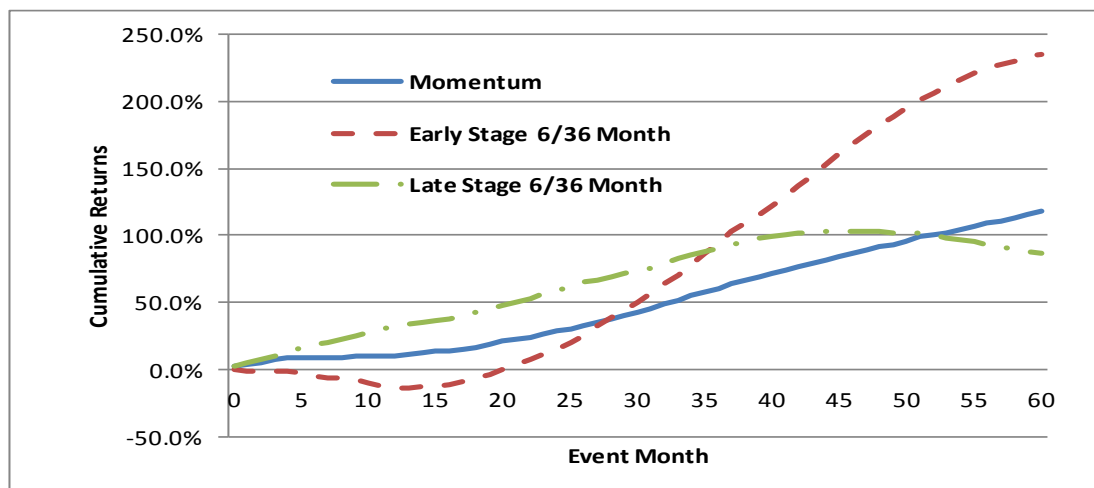
The post-formation behaviors of the pure momentum and both early and late-stage momentum strategies' profits are also illustrated in Figure 1. This figure displays the graphs for the 10 Arabic market indices over the 1989 to 2013 sample period. Figure 1 depicts the post-formation cumulative returns of the pure momentum strategy (SW-SL) with $J = 6$, the early-stage momentum strategy (SWLL-SLLW) with $J/J_2 = 6/36$, and the late-stage momentum strategy (SWLW-SLLL) with $J/J_2 = 6/36$ for the 60 months following the end of the formation period. While the early-stage momentum 6/36 strategy graph begin in the reversal towards the end of the 16 months, neither the pure momentum nor the 6/36 late-stage strategy graphs show any signs that the reversal of past performances is slowing down by the end of the first 36 months post-formation. It is clearly that the late-stage momentum strategy graph provides larger cumulative profits rather both pure momentum and early-stage momentum strategies over the first 36 months.

Table 4. Profitability of early-stage momentum strategy

J1	J2	Portfolio	Holding Period Returns					Annual Event Time Returns				
			K = 1	K = 3	K = 6	K = 9	K = 12	Year 1	Year 2	Year 3	Year 4	Year 5
6	36	SWLL	-0.07	-0.31	-0.52	-0.37	-1.08	24.53	25.58	10.32	5.14	-0.13
			(-0.05)	(-0.23)	(-0.44)	(-0.43)	(-1.58)	(1.87)	(1.39)	(1.21)	(0.58)	(-0.02)
		SLLW	0.53	0.24	0.59	1.02	0.49	10.53	9.72	10.16	18.86	18.60
			(0.81)	(0.37)	(0.97)	(1.61)	(0.97)	(1.52)	(1.61)	(1.14)	(1.4)	(2.09)
		SWLL-SLLW	-0.60	-0.55	-1.11	-1.39	-1.57	14.00	15.86	0.16	-13.72	-18.73
			(-0.55)	(-0.53)	(-1.16)	(-1.63)	(-2.27)	(1.6)	(1.35)	(0.02)	(-1.53)	(-1.48)
6	48	SWLL	1.20	0.31	0.50	0.71	0.56	31.21	30.81	8.43	5.88	6.02
			(1.6)	(0.46)	(0.79)	(1.23)	(1.02)	(2.14)	(1.69)	(1.05)	(0.58)	(0.7)
		SLLW	0.77	0.25	0.72	0.95	0.57	11.47	7.20	12.13	11.62	19.99
			(1.04)	(0.32)	(1)	(1.44)	(1.04)	(1.64)	(1.07)	(1.35)	(1.85)	(2.11)
		SWLL-SLLW	0.43	0.06	-0.22	-0.25	-0.02	19.74	23.61	-3.71	-5.74	-13.97
			(0.57)	(0.09)	(-0.35)	(-0.39)	(-0.03)	(1.86)	(2.43)	(-0.55)	(-0.78)	(-1)
6	60	SWLL	0.79	0.19	0.16	0.60	0.40	30.42	28.40	12.72	1.35	11.24
			(1)	(0.24)	(0.23)	(0.91)	(0.6)	(2.15)	(1.89)	(1.14)	(0.13)	(1.03)
		SLLW	0.57	0.09	0.61	1.06	0.41	9.29	7.61	9.88	21.51	22.25
			(0.68)	(0.1)	(0.68)	(1.3)	(0.69)	(1.32)	(1.35)	(1.31)	(1.99)	(2.19)
		SWLL-SLLW	0.22	0.10	-0.45	-0.47	-0.02	21.14	20.79	2.84	-20.16	-11.01
			(0.26)	(0.12)	(-0.56)	(-0.57)	(-0.03)	(1.79)	(2.56)	(0.55)	(-2.33)	(-0.61)

This table provides the average monthly holding returns and the annual event-time returns of the long, short and arbitrage portfolios of the early stage momentum strategy for the Arabic markets. early-stage portfolios are derived from the 6-month formation period pure momentum strategy ($J = 6$) short-term winner (SW) and short-term loser (SL) portfolios. The formation of the SW and SL portfolio is explained in Table 2. At the beginning of each month t , indices within the current SW and SL portfolios are further classified based on their J_2 -month return from the last J_2 -months of the 6-month formation period for $J_2 = 36, 48$ or 60 . The 50% of SW indices with the worst long-term performance J_2 -month returns define the SWLL equal-weighted portfolio (short-term winner that are long-term losers) for that month. Similarly, the 50% of SL indices with the best long-term performance J_2 -month returns define the SLLW portfolio (short-term losers that are long-term winners). The late-stage momentum strategy SWLL-SLLW is held for $K = 1, 3, 6, 9$ and 12 months. Annual event-time returns (Year 1, 2, 3, 4 and 5) are the average annual returns for a portfolio for the first five years following the portfolio formation date. The t -statistics are presented in parentheses. Holding period t -statistics are simple t -statistics, while the annual event-time t -statistics are based on the Newey-West (1987) correction for autocorrelation up to lag 11.

Figure 1. Cumulative strategy returns



The graph depicts the cumulative returns of the late-stage portfolio SWLW-SLLL and the early-stage portfolio SWLL-SLLW (with $J/J2 = 6/36$) and the cumulative returns of the pure momentum portfolio SW-SL (with $J = 6$) using non-overlapping portfolios ($K = 1$) for the 60 months following the end of the formation period.

The pure momentum results don't display a reversal of returns in the second through fifth years. Cumulative returns increase monotonically until the end of Month 60. The late stage momentum cumulative returns increase monotonically at the end of Month 47, then after a small dip to the end of month 60. In contrast, the early-stage strategy profits decline by month 18 then moved up after month 18.

4.3. Long-horizon returns

Annual event time returns for each portfolio are demonstrated in columns 9 to 13 of Table 2 (pure momentum), Table 3 (late-stage) and Table 4 (early-stage) with the associated t -statistics calculated employing the Newey-West (1987) correction for autocorrelation up to 11 lags. Year 1, Year 2, Year 3, Year 4, and Year 5 indicate to the annual returns of each strategy in the five 12-month periods following the formation date. Table 2 shows that the momentum strategy portfolio SW-SL generates positive profits of between 1.69% and 3.08% for Year 1 which are all economically large. In contrast, the SW-SL returns for Years 2 to 5 are universally negative for all J formation periods with the exception of $J = 3$ strategy in Year 4 and $J = 6$ in Year 3 and 4 which are positive. Although none of these losses are significant, the sum of the Years 2 to 5 losses in each case either offsets or almost offsets the corresponding gains from Year 1. These results are consistent with the evidence from a number of prior momentum studies that indicate that the price movements generating momentum profits frequently reverse.

The late-stage and early-stage strategy annual event time returns for the Arabic market indices reported in Table 3 and 4 are based on short-term performance over the previous six months ($J = 6$), and long-term performance over the past $J2 = 36, 48,$ and 60 months. The Year 1 late-stage returns in Table 3 are significant at the 1% level except of post formation period 6/60. On the other hand, none of the early-stage strategy annual event time returns are significant at the level of 1 or 5. These results suggest that late-stage momentum and early-stage momentum have considerably different post-formation evidence of reversal of returns. This findings are not consistent with (Bornholt and Malin, 2013) study of developed and emerging market indices. The late-stage momentum strategy constantly generates higher profits than both the early-stage momentum and pure momentum strategy. This means that the investors are not overreaction and the reversal feature is not present at the level of Arabic market indices.

To better illustrate the long-term behavior of the strategies' profits for the 10 Arabic market indices, Figure 2 presents the post-formation cumulative returns of the pure momentum SW-SL (for the $J = 6$ case), late-stage SWLW-SLLL and early-stage SWLL-SLLW strategies (for the $J1/J2 = 6/36$ case) using non-overlapping portfolios ($K = 1$) for the 60 months following the end of the formation period.

4.4. Risk-adjusted returns

This paper uses the international two-factor model applied by Balvers and Wu (2006) to risk-adjust raw returns. This model has been used to assess whether strategy profits are simply a reward for bearing risk. The two-factor model involves a market factor and a value minus growth factor (VMG) as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{p,mkt}(R_{mt} - R_{ft}) + \beta_{p,vmg}VMG_t + \varepsilon_{pt} \quad (1)$$

where the dependent variable $R_{p,t} - R_{f,t}$ is the monthly excess return of a portfolio of interest (whether it's the long, short or the arbitrage portfolio of a strategy), $R_{p,t}$ indicates to the monthly return of portfolio p at time t and $R_{f,t}$ the monthly risk free rate at time t represented by the one-month US T-bill return. The independent 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 at time t and 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 of the MSCI world market index and the MSCI world value and growth indices were obtained from Datastream. The monthly returns for the Ibbotson and Associates one-month treasury-bill risk free rate were downloaded from Kenneth French's website. The two-factor model risk adjustment covers the period from their first available months January 1989 until September 2013. The coefficients β_p and ν_p are the regression loadings corresponding to the factors of the model, while the intercept α_p or (alpha) refers to the risk-adjusted abnormal profits of the portfolio over the estimation period. The t -values corresponding to the regression coefficients are corrected for heteroskedasticity using White's (1980) test.

Table 5 provides the regression coefficients for the long, short and arbitrage portfolios and their associated t -values for the pure momentum case with $J = 6$ and for the late-stage and early-stage cases with $J1/J2 = 6/36$ based on six month holding periods ($K = 6$). For comparison purposes, the table also reports the corresponding unadjusted (raw) average monthly returns for these strategies taken from Tables 2, 3 and 4. Consider the momentum and either early or late-stage results of Table 5. The risk-adjusted returns of the arbitrage for momentum SW-SL or early-stage SWLL-SLLW and late-stage SWLW-SLLL strategies are insignificant alphas -0.045%, 0.091% and 0.715% per month (t -stat -0.09, 0.13 and 0.75), respectively. Overall, Table 5 shows that the returns of the late-stage strategy marginally outperform the pure momentum and the early-stage strategies' returns. However, the two-factor model can explain the abnormal returns.

Table 5. Adjusted pure momentum, early-stage and late-stage momentum profits

Strategy	Portfolio	Raw Returns	α	β	ν	Adj R ²
Early	SWLL-SLLW	-0.55	0.091 (0.13)	-0.537 (-2.64)	0.348 (1.26)	9.66%
Late	SWLW-SLLL	1.70	0.715 (0.75)	0.089 (0.32)	-0.094 (-0.25)	-3.79%
Mom	SW-SL	1.16	-0.045 (-0.09)	0.177 1.52	-0.119 -0.61	13.97%

This table presents the two-factor regression results for the monthly returns of the momentum portfolios with $J = 6$ and $K = 6$ and the early-stage and late-stage portfolios with $J/J2 = 6/36$ and $K = 6$. For the pure momentum strategy, SW is the portfolio of short-term winners and SL is the portfolio of short-term losers (as described in Table 2). For the early-stage strategy, SLLW is the portfolio of short-term losers that have the best long-term performance, and SWLL is the portfolio of short-term winners that have the worst long-term performance. For the late-stage strategy, SLLL is the portfolio of short-term losers that have the worst long-term performance and SWLW is the portfolio of short-term winners with the best long-term performance (as described in Tables 3 and 4). The two-factor regression is as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p(R_{wt} - R_{ft}) + \nu_pVMG_t + \varepsilon_{pt} \quad (2)$$

Where $R_{wt} - R_{ft}$ is the excess return on the MSCI World Market portfolio and VMGt is the value growth factor represented by the return on the MSCI World Value Index minus the return on the MSCI World Growth Index. Raw Return is the unadjusted monthly return for the respective portfolio. The t-statistics presented in parentheses are corrected for heteroskedasticity using White's (1980) test.

5. Conclusions

Early studies have shown that stock return movements are random and therefore they are unpredictable. Literature in the beginning 1980s and 1990s has confirmed the presence of various forms of return regularities in stock returns. One of the most well-known return regularity is momentum profits. This study, using monthly data for the period 1989 through 2013, examines the existence of momentum profits in the Arabic market indices. The paper follows the methodology of Jegadeesh and Titman (1993, 1995) to decompose the momentum profits.

The results of the current study provide the evidence of significant momentum profits for the holding period of one through twelve months during the whole period. In addition, the late-stage momentum strategy proposed by Malin and Bornholt (2013) is applied to indices in the current study and is shown to consistently provide stronger evidence than does the traditional pure momentum strategy. This result is not consistent with Bornholt and Malin (2013) study of international market indices. The return momentum and late-momentum effects in the Arabic market indices portfolios are relatively large. For example, the 6 momentum strategy and 6/36 late-stage momentum strategy with a six-month holding period provides a significant returns of 1.16% and 1.70% per month on average, respectively. The Fama-French three-factor model alphas for either momentum or late-stage momentum strategies are not significant. Thus, the momentum and late-stage momentum returns can be explained by two factor model.

This study provides a simple way to modify momentum strategies to earn larger profits. The pure momentum and late-stage momentum strategies should be of direct utilize to both researchers and practitioners. The results of this study show that the future performance of Arabic market indices can be predicted by understanding the indices that have experience extremes in past short-term performance. While the momentum and late-stage momentum strategies are of direct benefits to investors, practitioners and researchers. This study suggest to do further research into whether other anomalies such as, size and value effects could improve the momentum strategy by taking past returns into account.

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