

Testing Short-Term Over/Underreaction Hypothesis: Empirical Evidence from the Egyptian Exchange

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Abstract

This paper investigates whether short-term over/underreaction appears in the Egyptian Exchange, over the period of January 1998 to December 2013, making this the first attempt to test this market anomaly in an Arab stock market. The analysis reveals that while short-term overreaction doesn't exist in the Egyptian Exchange, there is statistically significant evidence of underreaction for the holding periods of one to four weeks. This under-reaction is found to be concentrated in large firms. Tests to establish whether this evidence of underreaction can be profitable, show that while a momentum strategy can provide significant abnormal returns of up to 0.885% over a holding period of four weeks, when trading costs are taken into account, the profitability of the momentum strategy becomes insignificant.

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1 Introduction

Since the 1980s a large strand of academic literature has emerged to criticize the notion of capital market efficiency by citing evidence of various market anomalies. Supporters of the efficient market hypothesis (EMH) like Nobel laureate Eugene Fama [1] consider these anomalies as chance occurrences which vanish when the methodology of study is changed. On the other hand, behavioral economists consider these anomalies as natural occurrences arising from investor responses to market dynamics [2] [3]. They claim that human mind falls prey to many biases while making a decision which can cause markets to show a behavior that may not be in complete harmony with what the standard finance theories expect.

One such anomaly of interest to academic scholars involves the stock market over/underreaction hypothesis. Stock market overreaction (underreaction) implies that

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stocks that have underperformed (outperformed) the market over a period of time will outperform the market over a subsequent and similar time period. In the case of evidence of market overreaction (underreaction), a contrarian (momentum) trading strategy that buys losers (winners) and sells winners(losers) is profitable. DeBondt and Thaler [2] first note evidence of overreaction in their 1985 study of the US stock market. Overreaction can be explained by the tendency of investors to exaggerate and therefore stock prices rise (fall) too much in response to good (bad) news. On the other hand, Jegadeesh and Titman [4] were the first to show contrary evidence by revealing empirical evidence of underreaction patterns in a sample of stocks listed on the NYSE and AMEX, for the period between 1965 and 1989. Underreaction can be explained by investors being conservative and gradually adapting to the recent news flowing into the market to incorporate their expectations into prices. Both over and underreaction are important indicators of market inefficiency as they can lead to achieving abnormal profits.

The aim of this study is to examine whether patterns of short term over or underreaction appear in the Egyptian Stock Exchange (EGX) using weekly data of all stocks listed on the exchange. The test period is from January 1998 to December 2013, which is chosen to reflect most of the significant economic and political events Egypt experienced since the re-opening of the Egyptian Exchange in early 1990s. This study relies on a combination of standard methodologies in the literature and reveals consistent evidence of short-term underreaction in the Egyptian Exchange specifically in large size firms. Tests to establish whether this evidence of under-reaction can be profitable show that while a momentum strategy can provide significant abnormal returns of up to 0.885% over a holding period of four weeks. Yet when trading costs are taken into account, the profitability of the momentum strategy becomes insignificant. To the best of the authors' knowledge this is the first study to examine short-term over/under-reaction on the cross-section of any of the Arab stocks markets so far.

The rest of the paper is organized as follows. Section 2 will present a survey of the main studies on the over/underreaction hypothesis. Section 3 will present the data and methodology used in this paper. Section 4 will provide the results of our empirical analysis and section 5 concludes.

2 Related Literature

Despite the large strand of literature that studies the over/underreaction in various markets around the world, the results remain inconclusive. Most studies on the topic relied on monthly data to examine the over/underreaction hypothesis over long run horizons. More recent research make use of data availability to examine the question in the short term using weekly or daily data to explore whether patterns of over/under reaction appear in short term horizons. While the bulk of research is concentrated on US stock exchanges, there is a considerable and growing literature from around the world. In this section, we will summarize the main evidence on the question from the various markets.

The US markets have had the largest share of studies examining the over/underreaction hypothesis over various samples and time periods. Despite the extensive amount of studies, results on whether US markets exhibit overreaction, underreaction or neither is inconclusive. DeBondt and Thaler [2] inspired most research on overreaction after being able to document return reversals over long horizons ranging from 3 to 5 years. The authors found using US data that stocks which experienced poor performance over the

past three to five year period (losers) tend to outperform prior period winners over the following three to five years. This implies that investors using a contrarian investment strategy could earn a highly significant abnormal profit. In subsequent studies by DeBondt and Thaler [6] and Chopra et al [7] various factors such as firm size, seasonality and risk are controlled for and still results continue to support the prior evidence on overreaction. Zarowin [8] on the other hand found that while the losers outperform the winners for periods up to 36 months, he pointed out that when losers were matched with the winners of equal size, there was virtually no evidence of differential stock return performance. He therefore dismisses the overreaction phenomenon as a manifestation of the size effect.

Lehmann [9] and Lo and MacKinlay [10] find evidence of overreaction in the US exchanges in the short term using weekly returns and finds that short-term contrarian strategies yield statistically significant profits even after corrections for bid-ask spreads and plausible transactions costs. In another attempt to examine the short term overreaction in New York Stock Exchange using daily data, Atkins and Dyl [11] showed that stock prices overreact in the short run, especially to negative information, however the magnitude of this statistically significant overreaction is small compared to the bid-ask spreads observed for these stocks. Thus, this overreaction was no violation of the EMH as it could not be exploited because of bid-ask spreads. Cox & Peterson [12] also examined the US market trying to explore the role of the bid-ask bounce, market liquidity in explaining price reversals in the three-day period immediately following a large one-day decline. They concluded that price reversals in short term can be explained by “bid-ask bounce” and “degree of market liquidity”, and that overreaction vanishes with rising market liquidity. These results show that over-reaction cannot be utilized in a trading strategy to make significant profits.

Despite the large evidence on overreaction in the US markets, several studies show contrary results. Jegadeesh and Titman [4] study the period of 1965 to 1989 and show that a momentum strategy, that buys the winner stocks and sells the losers stocks in the U.S stock market will realize significant abnormal returns if held for a holding period of 3- to 12-month. In a follow up study Jegadeesh and Titman [13] examined the New York and American stock exchanges for the presence and possible sources of short-term contrarian profits and find that they are predominantly the result of an overreaction to firm specific information and not the result of lead/lag effects as suggested by Lo and MacKinlay[10]. Chan, Jegadeesh, and Lakonishok [14] further show that investors routinely underreact and, consequently, investors can exploit a momentum strategy at intermediate terms of 3 to 6 months by buying recent winners and selling recent losers to make abnormal profits. More recently, Schnusenberg& Madura [15] investigated investor short term over/underreaction to market shocks for six US indexes and reported evidence of underreaction. They argue that their results imply a model of investor psychology in which investors interpret extremely positive news releases pessimistically and extremely negative news releases optimistically. Similar evidence was found in Canadian equity markets by Kryzanowski and Zhang [16] who found that Canadian stocks have tended to show evidence of momentum as investors underreact to new information by failing to incorporate news in their transaction prices.

In the UK Clare and Thomas's [17] investigate the long-run overreaction and find evidence of limited economically insignificant difference in the performance of previous losers and previous winners over the period 1955 to 1990 but explain it as a result of the size effect. In a subsequent study, Spyrou, Kassimatis, and Galariotis [18] examine short-

term investor reaction to extreme events in the UK equity market for the period 1989 to 2004 using daily closing prices and reported that the market reaction to shocks for large capitalization stock portfolios is consistent with the EMH. However, for medium and small capitalization stock portfolios their results indicate significant underreaction to both positive and negative shocks for many days subsequent to a shock.

Outside the US and UK markets, various studies document evidence of overreaction in both developed and emerging markets. In developed markets, overreaction is found on the Spanish Stock Exchange [19] [20]; German Stock Exchange [21]; Japanese Stock Exchange [22] and Australian Stock Exchange [23]. In emerging markets, evidence of overreaction was found in Bursa Malaysia [24] especially in low volume stocks, the Brazilian stock exchange [25] and the Johannesburg Stock Exchange in South Africa [26].

On the other hand, evidence of stock market underreaction was found on the Indian stock market specifically in the medium and smaller capitalization stocks [27]; in eight Pacific Basin countries over the period 1975 to 2000 [28] as well as for 23 international equity markets from January 1980 to June 1995 that show the profitability of momentum investing in achieving short term profits for period up to 4 weeks [5].

This survey of the literature shows that only few studies focus on emerging markets, and that no study tackles the question on Arab stock exchanges like the EGX. In this paper we will test whether over/under reaction exist on the EGX and subsequently examine whether a trading strategy can be applied to make profits.

3 Research Methodology

3.1 Sample Data

The Egyptian Exchange is one of the oldest stock markets and traces its origins to 1883. The EGX has received increased attention in the last decade, especially since it was considered one of the world's best performing stock exchanges in 2005. By the end of June 2013, the total market capitalization of the listed stocks was around USD 50 billion.

In this study, our sample involves all stocks listed on Egyptian Exchange as of 31st of March 2014. We focus on weekly prices, as well as volume, market capitalization and number of outstanding shares. Data of 16 years from January 1998 to December 2013 is used in this study and was compiled from Reuters Eikon 2013 database. Unlike previous studies that focus on sample cross-section of stocks listed on an exchange that are only part of an index, this study takes into consideration all stocks listed in the Egyptian Exchange. To ensure that we have the most active stocks out of the sample, a second filtering criterion is used which is the turnover ratio of the stocks. Turnover ratio is the trading volume divided by the number of shares outstanding. Stocks with average annual turnover ratio less than 80 % (lowest decile) are excluded.

We further exclude observations around political events (the post-revolution closure of EGX for two months in 2011). This gives us 827 weekly observations of 184 stocks representing 84.40 percent of the entire universe of listed securities. For market benchmarking, the index employed in this study is the EGX 30. The start date of the index was January 2nd 1998, with a base value of 1000 points. The EGX 30 Index is weighted by market capitalization and adjusted by the free float.

3.2 Methodology

In order to test over/under reaction, we first measure each stock’s weekly abnormal returns as follows:

$$AR_{i,t-1} = R_{i,t-1} - R_{m,t-1} \tag{1}$$

where $R_{i,t-1}$ is the return for stock i at week $t-1$, and $R_{m,t-1}$ is the return for the EGX30 market index at week $t-1$.

Stocks are then ranked in each week based on past week’s abnormal returns. In case of finding stocks with the same abnormal return, a second ranking criterion is considered. It ranks stocks based on their past week’s trading volume. Stocks are assigned accordingly to one of two portfolios, either a winner portfolio or a loser portfolio. The winner portfolio is made up of the top one third of stocks while the loser portfolio is made up of the bottom one third of stocks. We took the top and bottom one third of stocks to construct the portfolios instead of deciles and quintiles due to the smaller number of stocks compared to studies in other markets [24].

We construct weekly equally weighted winner and loser portfolios based on the above ranking. The portfolios are then held for H weeks, where H takes the value of 1,2,3,4,12,24,36, or 52 weeks. These specific horizon bins are meant to account for investors with different time horizons and are in line with holding periods used in prior studies. Holding periods’ returns are calculated using the cumulative average returns (CARs), which is the sum of abnormal returns over H weeks:

$$CAR_{pt} = \sum_{i=1}^H E(R_i)_p \tag{2}$$

Finally, the average cumulative abnormal return (ACAR) is computed for the winner and loser portfolios as follows:

$$ACAR_{pt} = \left(\frac{1}{N}\right) \sum_{N=1}^N CAR_{pt} \tag{3}$$

where $ACAR_p$ is the average CAR for portfolio p , and N represents the test periods.

We use these ACARs of the various portfolios to test for the over/under-reaction hypothesis on the EGX using two standard methodologies. In the first methodology, we calculate the ACAR for an arbitrage portfolio as the difference between the ACAR for the loser and that of the winner (i.e. $ACAR_{L-W} = ACAR_{Loser} - ACAR_{winner}$) and check the ACAR for the arbitrage portfolio over the holding periods, where a statistically significant positive difference indicates overreaction, and a statistically significant negative difference indicates underreaction [24]. In the case of results of overreaction (underreaction) we use our results to test the profitability of a contrarian (momentum) strategy in achieving significant profits for investors.

In the second methodology, we follow Clare and Thomas [17] and compare the means of the winner and loser portfolio returns by regressing the return of the difference portfolio against a constant once (Test 1):

$$ACAR_{l-w} = ACAR_p^L - ACAR_p^W = \alpha_1 + n_t \tag{4}$$

where α_1 is a constant and n_t is a white noise error term.

This regression is done for $t=1,2,3,4,12,24,36$, or 52 weeks, which represents all the holding periods we have in this study. A significant and positive (negative) value for α_1 can be seen as confirmation of the overreaction (underreaction) hypothesis.

The second test (Test 2) is done by regressing the arbitrage portfolios against the market return. This test, allows us to control for possible different exposures to systematic risk which may explain the differential returns between the winner and loser portfolios.

$$ACAR_{L-W} = \alpha_2 + \beta(RM_t) + \epsilon_t \quad (5)$$

where α_2 is the Jensen performance index, β represents the difference between the market beta of $ACAR_P^L$ and $ACAR_P^W$, R_M is cumulative return on the EGX30 index $t=1,2,3,4,12,24,36$, or 52 holding periods.

As postulated by Clare and Thomas, a significantly positive value for α_2 can be seen as confirmation of the Overreaction Hypothesis. If β is significantly different from zero then differences in systematic risk explain some of the difference in returns. A significantly positive value for β means that losers bear more systematic risk than winners.

We finally also examine whether our results hold across different size categories by investigating the over/underreaction hypothesis within each market-capitalization category. The market capitalization at the end of each previous week is used to sort stocks into large-market capitalization stocks and small-market capitalization stocks. Following this, stocks within each market-capitalization category are sorted again based on past week excess returns to form winner and loser portfolios.

4 Main Results

Our final sample consists of 184 stocks listed in the Egyptian exchange over the period of January 1998 to December 2013. The study therefore covers 827 weeks and 152,168 observations. The average weekly return for an equally weighted portfolio of all stocks in the sample is 0.124%, which translates to 6.67% annualized.

Table 1 presents the result of testing the overreaction hypothesis for the whole sample. The table shows the one week average abnormal return during the formation period for the winner, loser and arbitrage (loser-winner) portfolios and the average cumulative abnormal returns (ACAR) for the three portfolios for 8 holding periods (1,2,3,4,12,24,36, or 52). For the winner portfolio, it is obvious that weekly winners exhibit price momentum. There is a strong positive return in week $t-1$, followed by statistically significant positive returns for the holding periods from 1 to 52 weeks, except for the holding period of 24 weeks, where the return is significant. The returns for the winner portfolios are gradually increasing along the holding periods, until a maximum return of 3.44% is reached at the holding period of 52 weeks. Hence, a return momentum appears to gradually increase for the winner stocks along the 8 holding periods.

Table 1: Average cumulative abnormal return (ACAR) for the whole period for the winner (W), loser (L) and loser-winner portfolio (L-W)

		Formation Period	Holding Period (weeks)							
			1	2	3	4	12	24	36	52
Portfolio	Winners									
	ACAR (%)	6.459**	0.404**	0.616**	0.858 **	0.884**	1.367**	1.441	2.322**	3.443**
	t-stat	24.917	3.330	3.442	3.407	3.114	2.590	1.965	2.591	3.008
	Losers									
	ACAR (%)	-5.541**	-0.016	0.044	0.007	0.053	0.522	1.185	1.088	0.908
	t-stat	-50.575	-0.102	0.188	0.027	0.176	1.025	1.631	1.200	0.787
	Arbitrage Portfolio									
	ACAR (%)	-11.999**	-0.420**	-0.572**	-0.850**	-0.831**	-0.845	-0.256	-1.233	-2.534*
	t-stat	-46.74	-2.727	-2.557	-3.073	-2.845	-1.759	-0.389	-1.500	-2.495

** and * indicate significance at the 1% and 5% levels respectively

In contrast to the winner portfolios, the loser ones exhibit price reversals. They showed a strong negative return in the portfolio formation period that slightly increases at the holding period of 1 week, and continued in this increasing trend till the holding period of 24 weeks then starts to decline for the holding periods of 36 and 52 weeks. However, the return for the loser portfolios is positive for all the holding periods except for the holding period of 1 week, though the returns are not statistically significant.

The last row in Table 1 provides the ACAR for the arbitrage portfolio for each of the 8 holding periods, which is defined as the difference in the ACAR between the loser and winner portfolios. Although, we have positive returns for the loser portfolios for the holding periods from 2 to 52 weeks, the ACAR for the arbitrage portfolio is negative which gives a sign of underreaction. These negative returns for the arbitrage portfolio for all the holding periods can be attributed to the price continuation (momentum) of the winner portfolio. The result for the arbitrage portfolio is significant at the 1% level for the holding periods from 1 to 4 weeks and for the holding period of 52 weeks it is significant at the 5%. The results for remaining holding periods of 12, 24 and 36 weeks are not significant.

To corroborate our results, we apply Clare and Thomas’s [17] methodology of testing the over/under-reaction presented in Equations (4) and (5). Results of the regression of the ACAR against a constant (Test1) and against the market (Test 2) are presented in Table 2.

Table 2: Regression results for testing the over/under-reaction hypothesis

		Holding Period (Weeks)							
		1	2	3	4	12	24	36	52
ACAR _w (%)		0.404	0.616	0.858	0.884	1.367	1.441	2.322	3.443
ACAR _L (%)		-0.016	0.044	0.007	0.053	0.522	1.185	1.088	0.908
ACAR _{L-w} (%)		-0.420	-0.572	-0.850	-0.831	-0.845	-0.256	-1.233	-2.534
Test1	α_1	-0.004**	-0.006**	-0.009**	-0.008**	-0.008	-0.003	-0.012	-0.025*
	t-stat	-2.727	-2.557	-3.074	-2.845	-1.759	-0.389	-1.500	-2.495
Test 2	α_2	-0.005**	-0.006**	-0.009**	-0.009**	-0.010*	-0.004	-0.011	-0.021
	t-stat	-2.934	-2.751	-3.264	-2.951	-2.021	-0.550	-1.253	-1.872
	β	0.096**	0.069	0.059	0.030	0.038	0.015	-0.012	-0.026
	t-stat	2.700	1.956	1.686	0.952	1.379	0.639	-0.504	-1.152
R ²		0.009	0.005	0.003	0.001	0.002	0.0005	0.0003	0.002

** and * indicate significance at the 1% and 5% levels respectively

The results confirm our original findings of evidence of significant under-reaction in the Egyptian Exchange for the holding periods of 1 to 4 weeks as being clear from the significant negative value for α_1 . Controlling for risk, using Test 2, the significantly negative value for α_2 can be seen as confirmation of the under-reaction hypothesis. The significantly positive value for β for the holding period of 4 weeks means that losers may embody more systematic risk than winners.

Our evidence of underreaction motivates us to test whether momentum traders can profit by trend-chasing. Table 3 presents our analysis on whether a momentum strategy that buys winner stocks and sells loser stocks³ is profitable for the holding period from 1 to 4 weeks where significant underreaction is observed resulting in significant abnormal returns of 0.885% for a holding period of 4 weeks. We also test the profitability of the momentum trading strategy when trading costs are taken into account. The trading costs on the EGX consist of commissions on transactions levied by the exchange as well as brokerage fees which result in a 30 basis points each side of the transaction. When trading costs are involved, we find that implementing a momentum strategy will not yield significant profits. This result supports that of Fung, et al (1999) when they found that momentum profits disappeared when transaction costs were taken into account in six Pacific Basin markets.

Table 3: Momentum Strategy of buying Winner portfolios before and after applying a 0.6% round-trip Transaction costs on periods when significant under-reaction exists

		Holding Period (Weeks)			
ACAR		1	2	3	4
Before Trading Costs					
ACAR(%)		0.404**	0.616**	0.859**	0.885**
T-test		3.33	3.442	3.407	3.114
After Trading Costs					
ACAR(%)		-0.196	0.016	0.259	0.285
T-test		-1.61	0.092	1.026	1.003

** and * indicate significance at the 1% and 5% levels respectively

³Selling loser stocks is not considered here because short-selling is not allowed in Egypt

We finally test whether our results differ across different firm size categories. The sample is divided into small and large market capitalization where the top one third of stocks constitutes the large market capitalization stocks and the bottom one third constructs the small market capitalization stocks. The results for the large market capitalization stocks are presented in Table 4 and for the small capitalization stocks in Table 5.

Table 4: Testing under-reaction hypothesis within large capitalization stocks

		Formatio n Period	Holding Period (weeks)								
			1	2	3	4	12	24	36	52	
		Winners									
Portfolio	ACAR (%)	5.171**	0.087	-0.412	-0.668	-1.028	3.001	5.713	8.089	10.714	
	t-stat	9.697	0.919	-0.823	-0.963	-1.164	1.151	1.326	1.385	-1.546	
	Losers										
	ACAR (%)	-4.232**	-0.199*	-0.877	-1.19	-1.454	3.975	6.723	9.507	12.505	
	t-stat	-46.399	-2.239	-1.77	-1.763	-1.669	1.571	1.602	1.646	-1.827	
	Arbitrage Portfolio										
ACAR (%)	-9.403**	0.286**	0.466**	0.522**	0.425*	0.974	-1.01	1.419	1.792*		
t-stat	-17.542	-2.761	-3.309	-2.963	-2.117	1.567	1.414	1.824	-2.06		

** and * indicate significance at the 1% and 5% levels respectively

As shown in Table 4, for the large winner stocks, a strong highly significant positive return appears in the formation period, it starts to decline showing notable price reversals along each of the 8 holding periods. However, these price reversals are not significant statistically. On the other hand, large losers continue to have negative returns for all the holding periods. A strongly significant under-reaction can be noticed for the holding period of 1, 2 and 3 weeks, but is only slightly significant at the 4 and 52 weeks and insignificant otherwise.

Table 5 shows the results for small firms. Winners exhibit price reversals starting from the holding period of 2 weeks up to that of 52 weeks, but none of which are statistically significant. Small losers exhibit price momentum for all of the holding periods except for the holding period of 1 week, but the results are not significant exactly the same as for the small winners. This yield a negative difference between the ACARs of the small loser and small winner stocks for the holding period from 1 to 12 weeks, which can be interpreted as under-reaction, however it is not statistically significant, and a positive difference between ACARs of the small loser and small winner stocks for the holding period from 24 to 52 week that is also not significant statistically.

Table 5: Testing under-reaction hypothesis within small capitalization stocks

		Formation Period	Holding Period (weeks)								
			1	2	3	4	12	24	36	52	
		winners									
Portfolio	ACAR (%)	5.322**	0.334	-	-	-	-	-	-	-	
	t-stat	27.909	2.010	0.157	0.247	0.440	2.092	3.539	5.330	5.113	
			*	0.184	0.193	0.255	0.433	0.453	0.493	0.405	
			Losers								
	ACAR(%)	-5.367**	0.223	-	-	-	-	-	-	-	
	t-stat	-39.713	1.467	0.346	0.620	0.898	2.352	3.369	4.568	4.671	
			0.407	0.495	0.522	0.492	0.437	0.425	0.376		
		Arbitrage Portfolio									
ACAR(%)	-10.689**	-0.111	-	-	-	-	-	-	-		
t-stat	-63.864	-0.853	0.188	0.374	0.458	0.260	0.169	0.762	0.441		
			0.951	1.527	1.660	0.562	0.276	1.027	0.493		

** and * indicate significance at the 1% and 5% levels respectively

Overall, the evidence indicates that for large capitalization stock portfolios, there is a significant under-reaction to market shocks for a number of days subsequent to a shock up to 21 days (3 weeks). Hence, large capitalization stocks tend to under-react more than small capitalization stocks and exhibit correspondingly higher return momentum.

5 Conclusion

The purpose of this study is to examine whether short term over/under reaction exists in the Egyptian Exchange. We find no evidence of the presence of the overreaction effect for the specified test period, but on the contrary, our results seem to be supportive of the under-reaction hypothesis, that is robust to risk and non-risk controls. It finds evidence of under-reaction hypothesis for the holding periods ranging from 1 to 4 weeks which is found to be concentrated in large size firms. This result is consistent with evidence in Chan, Hammed and Tong [5] who find that underreaction is significant in their sample of 23 international equity markets for periods up to 4 weeks and result in statistically significant momentum profits. We find that this anomaly could hardly be exploited to obtain abnormal returns after accounting for the round-trip transaction costs levied by the Egyptian Exchange.

One possible explanation of our results on evidence of under-reaction, specifically in large sized stocks, might be attributed to institutional trading. Institutions on the Egyptian Stock Exchange concentrate their trading in large sized companies. It is also well documented that institutional investors are momentum traders [29] and therefore under-reaction evidence might be attributed to institutional momentum trading strategies.

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