Price Effects After One-Day Abnormal Returns and Crises in the Stock Markets

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Abstract

We investigate price effects after one-day abnormal returns during crises in US, Japanese, Chinese, Russian and Brazilian stock markets, using the ANOVA, Mann-Whitney, t-tests, the modified cumulative abnormal return approach, regression analysis with dummy variables, and the trading simulation approach. The results suggest that the momentum effect is the most typical case of price behaviour after the days with positive abnormal returns, especially in emerging markets in pre and post crisis periods. Interestingly the momentum effect in developed markets changes into contrarian during crisis periods. However, in emerging markets the momentum effect prevails even in crisis periods. However, the power of the detected effects is weak. These effects do not provide opportunities to beat the market and might result from prevailing positive returns in these stock markets.

Keywords: Momentum Effect, Contrarian Effect, Abnormal Returns, Stock Market, Crisis.
JEL Codes: G12, C63

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1 Introduction

Historically, investors tend to "overreact" to shocks from unexpected or dramatic market news or events (De Bondt and Thaler, 1985; 1987). Overreactions can, therefore, impact the behaviour of stock prices rendering markets inefficient (see Fama, 1965, on market efficiency). For example, an overreaction can occur when investors overweight recent information and underweight previous beliefs or data on market events (Kahneman et al., 1982). In addition, Shiller et al. (1983) concluded that variations in dividends could not justify volatility in stock prices over the 19th century. However, other non-market behaviour factors such as market size and liquidity shortages were also linked to overreactions (Lasfer et al., 2003). Recent studies in emerging markets (for example, Zaremba et al., 2020; and Pokavattana et al., 2019) and in the crypto-currency markets (Caporale et al., 2019; and Caporale and Plastun, 2019a) continue to confirm the existence and relevance of overreactions.

An important result from De Bondt and Thaler (1987) is that overreaction is biased toward negative market events. Investors are more likely to overreact to negative market events where long term losers outweigh winners. Therefore, a question naturally arises about whether overreactions are driven by periods of extreme crisis? Or put differently, do price effects in a crisis behave differently from a non-crisis period? The literature on this question is limited (for example, Yildiz and Karan, 2019; Scherf et al., 2022) and it was only recently that Plastun et al. (2021) partially investigated it in the US stock market. We focus on this question by extending the analysis in Plastun et al. (2021) to Japanese, Chinese, Russian, and Brazilian stock markets (i.e., a mix of developed and emerging countries) during the pre-crisis, crisis, and post-crisis periods. These markets are then compared to the US stock market, also in specific pre-crisis, crisis, and post-crisis periods.

Interestingly Plastun et al. (2021) revealed that the price effect shifted from momentum to contrarian during the financial crisis. The shift was peculiar to the crisis and post-crisis periods. Historically, the Dow Jones Index had a momentum effect after one day of abnormal returns, which disappeared post the 1980s. From a policy-making perceptive, overreactions can be predictive of market volatility. However, it is relevant to understand differences in price effects caused by crises, including those specific to emerging markets compared to developed markets.

The results confirm a difference between non-crisis and crisis price effects after one day of abnormal returns. The momentum effect was more prevalent in the non-crisis periods, whilst the contrarian effect was more prevalent in crisis periods. However, the contrarian effect was unstable compared to the momentum effect. We also found differences in price effects after one day of abnormal returns between developed and developing markets, indicating less developing market efficiency. Overall, price effects adapt to market conditions with some exceptions.

To achieve this study's goals and avoid methodological bias, we employed several standard statistical techniques, which are average analysis, Student's t-test, ANOVA, and the Mann-Whitney test. In addition, we utilised the modified cumulative abnormal returns approach, regression analysis with dummy variables

and a trading simulation approach. Lastly, the structure of this paper is as follows. First, a literature review is conducted, followed by a discussion of the methodology, data, and results. We then draw some conclusions.

2 Literature Review

The literature has a long history of investigating the role of investor behaviour in stock price formation. Can investor behaviour be predictive of stock prices against the efficient market hypothesis (Fama, 1965)? Their seminal work De Bondt and Thaler (1985) suggests that investors are poor Bayesian decision markers who overweight recent information and underweight prior information (summarised as the cognitive psychology approach). As a result, investors tend to overreact to bad market news leading to excess volatility and other anomalies, such as price-earnings anomalies (Shiller et al., 1983).

The consequence of this investor overreaction, De Bondt and Thaler (1985) hypothesised, was that stock prices systematically overreact in two ways. First, extreme price movements will be followed by a reversal. Second the more extreme the initial price movement, the greater the subsequent adjustment. Empirically, price overreactions have multiple dimensions. On the one side is the winner-loser reversal effect (otherwise known as the contrarian effect), where after extreme price movements, previous loser stocks outperform previous winners (see Richards, 1997; and Bremer and Sweeney, 1991). And on another side, the momentum effect is where, after extreme price movements, winners (losers) continue to win (lose) based on past performance (Campbell and Limmack, 1997). However, the contrarian and momentum effects are not necessarily symmetrical. In some cases, there is a tendency for losers to become winners but not winners to become losers (for example, Pettengill and Jordan, 1990).

As a departure from the cognitive psychology approach, De Bondt and Thaler (1987) raised explanations on the role of firm size and differences in risk (as measured by Capital Asset Pricing Model betas) and found no predictive value. The alternative hypotheses ask if other factors can predict stock prices in the context of the contrarian and momentum effects. Furthermore, the departure from the cognitive psychology approach reflects a debate in the literature on the true cause of extreme price movements and the subsequent momentum or contrarian effect. Almost all the alternative price effect hypotheses in the literature are rooted in the Fama-French three-factor model (Fama and French, 1993). Fama and French (1993) showed that overall market factors (or market risk factors), size (or market value, or the stock price times the number of shares), and book to market equity ratio (or ratio of the book value of common stock to market value) explained average returns. The question is, however, can these same factors explain the contrarian and momentum effects?

This question is a point of focus in the literature. For example, in earlier work, using the CRSP data, Brown et al. (1988) found no clear, predictable patterns in stock returns following unanticipated market information. That is, investors' responses following the unanticipated market events were random. In another study, Lasfer et al. (2003) showed the role of market liquidity in explaining the difference in the

momentum effect between developed and developing markets. Developing markets showed less momentum effect in the 1990s than developed markets due to larger post-shock price changes in less liquid markets. However, the alternative explanations are limited compared to those from the cognitive psychology approach. For example, as recently as 2009, Clements et al. (2009) added an extra twenty years of data to the original De Bondt and Thaler (1985) to test a multi-factor explanation of contrarian returns and found no statistical significance. Recently authors such as Caporale et al. (2018), Zaremba et al. (2020), Pokavattana et al. (2019), Caporale and Plastun (2019b), and Plastun et al. (2021) continue to find evidence of the overreaction hypothesis in different markets, including the FOREX and cryptocurrency markets.

Applying the overreaction hypothesis to national stock markets and those during crises is more relevant to the study. Richards (1997) was amongst the first to conduct a country comparison. Richards (1997) found evidence of the winner-loser reversal effect in 16 countries, which the Fama and French (1993) factors could not explain. In addition, the results showed that these reversals in small markets were larger than in large markets but were not limited to large markets. However, it became apparent that this was related to market liquidity (Shieh et al., 2012). After finding evidence of overreaction in comparing 39 stock markets between 1989 and 1998 with a 10-day window, Lasfer et al. (2003) also showed that liquidity played a role in explaining differences in the momentum effect between developed and emerging markets.

Overreactions in national stock markets were subsequently well established (for example, Chen et al., 2018; Otchere and Chan, 2003; Lasfer et al., 2003; and Wu, 2011). Explanations for overreactions are mixed with support for the overreaction hypothesis and the Fama and French (1993) factors at the same time. For the Turkish Borsa Instanbul index between 2002 and 2016, Yildiz and Karan (2019) showed that the momentum effect after large stock price changes was prevalent during pre-crisis and post-crisis periods but less so during crisis periods. Furthermore, the momentum effect was more prevalent for large price declines in pre-crisis periods. Yildiz and Karan (2019) concluded that overreactions varied according to the crisis period. In the recent COVID-19 crisis, Scherf et al. (2022) showed that investors initially under-reacted to the news of lock-downs in the OECD and BRICS countries but then subsequently overreacted. The Scherf et al. (2022) results point to learning effects that are not typical in non-crisis periods. As discussed above, Plastun et al. (2021), historically showed differences in overreactions in the Dow-Jones during crisis periods, but studies of the overreaction hypothesis to national stock markets during crisis periods remain limited. This study contributes to this emerging evidence of crisis specific overreactions.

3 Data and Methodology

Daily data for Dow Jones Industrial Average (DJIA) Index, Morgan Stanley Capital International (MSCI) Japan, MSCI China, MSCI Russia, and MSCI Brazil were used for the specific crises. The longest sample period was for the Dow Jones Index from 1885-2 to 2020-11. The sample period for MSCI Japan is from 1970-01 to 20211, and the sample period for MSCI Brazil, China, and Russia is from 1995-01 to 2020-11.Each crisis-related data set is divided into three sub-periods: pre-crisis (3 years before the crisis), crisis (commonly recognized crisis period) and post-crisis (3 years after the crisis). We chose the length of the subperiod to include a sufficient number of abnormal price changes to construct a data set suitable for performing t-tests and other statistical tests and performing trading simulations without data snooping. The DJIA data was sourced from MeasuringWorth,[1] while the rest of the indexes were obtained from Bloomberg. In Table 1 is a list of the crises analysed in this study.

Table 1: Crises

Country	Crisis	Crisis period	Short description
USA	Great Depression	1929-1939	US recession after the conclusion of World War One.
	Dot-com bubble	2000-2002	Excessive growth in the Nasdaq Composite Index between 1995 and 2000 followed by a 78% fall which badly affected communications and technology companies.
	Global Financial Crisis	2007-2009	Worldwide economic crisis after the bursting of the US subprime housing market bubble
Japan	Japanese asset price bubble	1896-1992	A bubble in the Japaness real estate and stock markets, which burst in 1992 resulting in economic stagnation.
	Global Financial Crisis	2007-2009	Worldwide economic crisis after the bursting of the US subprime housing market bubble.
China	Global Financial Crisis	2007-2009	Worldwide economic crisis after the bursting of the US subprime housing market bubble.
	Chinese stock market crash	2015-2015	Bursting of a stock market bubble in June 2015, which resulted in a 30% decline in the Shanghai stock market.
Russia	Russian financial crisis or Russian flue	1998-1998	Resulted from declining productivity and a high fixed exchange rate, which eventually saw the Russian government devalue the ruble and default on foreign debt.
	Global Financial Crisis	2007-2009	Worldwide economic crisis after the bursting of the US subprime housing market bubble.
	2014 Russian financial crisis	2014-2014	A lack of confidence in the Russian economy resulted in a devaluation of the ruble, causing economic crisis.
Brazil	Global Financial Crisis	2007-2009	Worldwide economic crisis after the bursting of the US subprime housing market bubble.
	Brazilian economic crisis	2014-2017	A combination of political crisis and a significant drop in the external demand of Brazilian output, resulted in an economic crisis.

Source: Wikipedia (2022)

[1] `https://www.measuringworth.com/datasets/DJA/index.php`.

We test the following hypotheses:

- H_0: The null is that the data on usual days and data on days after abnormal returns belong to the same population. A rejection of the null suggesting the presence of an anomaly.
- H_1: One-day abnormal returns cause-specific price effects (momentum/contrarian)[2] on the next day.
- H_2: Price effects differ between the pre, post and crisis periods.

We utilised the average analysis, parametrical tests (Student's t-tests, ANOVA analysis), non-parametrical tests (Mann-Whitney tests), the modified cumulative abnormal returns approach, regression analysis with dummy variables, and trading simulation approach to detect price effects. Using varying methods avoids methodological biases. We summarise the results and conclude based on the integral effect value. The average analysis provides preliminary evidence on whether there are differences between normal and abnormal returns. Parametric and non-parametric tests mitigate the effect of fat tails and kurtosis on the results.

We compute returns in the following manner:

$$R_i = (\frac{Close_i}{Close_{i-1}} - 1) \times 100\% \tag{1}$$

where returns on the i^{th} day in %; $Close_i$ close price on the $(i-1)^{th}$ day; and $Close_{i-1}$ close price on the i^{th} day.

First, student's t-tests are carried out for the null hypothesis that returns on usual days belong to the same population as data on days after abnormal returns; a rejection of the null implies a statistical anomaly in the price behaviour on days after abnormal returns. The student's t-test was carried out at the 95% confidence level, and the degrees of freedom are N–1 (N being equal to $N_1 + N_2$).

Second, a key issue is the calculation of threshold levels to determine the abnormal returns. For example, Bremer and Sweeney (1991) used a 10% price change to determine an overreaction. However, as shown by Cox and Peterson (1994), the use of a constant threshold level can lead to biased results as price volatility varies over time. To avoid this bias, the dynamic trigger approach, as outlined by Lasfer et al. (2003), amongst others, is used in this paper. This approach states that abnormal returns are related to the number of standard deviations added to the mean. We then split the data into positive abnormal returns, negative abnormal returns, and regular returns using *equation*s 2 and 3, which calculate overreactions as follows:

$$R_i > (\overline{R}_n + k \times \delta_n) \tag{2}$$

[2]The momentum effect is a tendency for rising asset prices to rise further and falling prices to keep falling. The contrarian effect is a tendency of asset prices' current direction to change.

$$R_i > (\overline{R}_n - k \times \delta_n) \tag{3}$$

where $\overline{R}_n$ is the average daily returns for period n; δ_n is the number of standard deviations used to identify abnormal returns and k is the overreaction identification parameter.

This paper follows the approach of Plastun et al. (2021) to avoid differences in results caused by methodological bias. We, therefore, will apply the same parameters, where the number of standard deviations is two, and the period is 50. Full motivation for these parameters is in Plastun et al. (2021).

Third, multiple regression analysis with dummy variables is used to provide additional evidence.It was implemented in the following manner:

$$R_i = a_0 + a_1 D_{it} + \epsilon_t \tag{4}$$

where R_i is the return in period t, a_0 is the mean return in a regular day, a_1 is the mean return on abnormal return day, D_i is a dummy variable equal to 1 on an abnormal return day and 0 in a normal day, and ϵ_t is the random error term of the i^{th} day. The sign and statistical significance of the dummy coefficients indicate the existence of price effects caused by abnormal returns.

Fourth, based on the cumulative abnormal returns approach by MacKinlay (1997) abnormal returns are defined as follows:

$$AR_t = R_t - E(R_t) \tag{5}$$

where R_t is the return at time t and $E(R_t)$ is corresponding average return computed over the whole sample period as follows:

$$E(R_t) = \left(\frac{1}{T}\right) \sum_{i=1}^{T} R_i \tag{6}$$

where T is the sample size.

The cumulative abnormal return denoted as CAR_i is simply the sum of the abnormal returns:

$$CAR_i = \sum_{i=1}^{T} AR_i \tag{7}$$

A simple time regression model is implemented on the CAR_i to determine a trend's presence. The presence of a trend in the CAR_i indicates abnormal returns. Therefore, a significant p-value on the trend term and a model significant (F test) confirm abnormal returns. A trading simulation approach was used to determine if an anomaly provides exploitable profit opportunities.

A trader's actions based on detected anomalies are simulated. Exploitable profit opportunities evidence against market efficiency. If a strategy results in more than 50 per cent profitable trades, and positive total profit, then a market anomaly is detected.The approach used here does not incorporate transaction costs (spread, fees to the broker or bank, swaps, etc.) and is only a proxy for actual trading. Nevertheless,

it is informative about real trading, given that transaction costs are not as essential.

Thanks to Internet development and high-frequency trading, spreads tend to be small (at least in liquid markets such as FOREX), typically ranging between 0.01% and 0.02%. Banking and broker fees can affect profitability in the case of a small number of trades. However, when there are dozens of trades (as in this paper), banking and broker fees become insignificant (the so-called scale effect in trading). Therefore, this analysis can shed light on the profitability of anomaly-based trading strategy, even though it overlooks transaction costs.

Lastly, we used the following procedure for the trading simulation approach. First, the %Result from each trade was defined as follows:

$$\%Result = \frac{100\% * P_{open}}{P_{close}} \tag{8}$$

Next, we calculate the sum of results from each deal. A positive total financial result of trading indicates exploitable profits based on that specific market anomaly. And a negative total financial result indicates the opposite. Still, these results could be a coincidence. Finally, we conducted a t-test to prove that generated results differ from random trading. It compares the means from two samples to test whether these means originate from the same population.

4 Results

4.1 US stock market

The full empirical results for the positive and negative abnormal returns are in the appendix. In this section, we summarise these results and their discussion. We start with the US stock market. Overall results for the one-day abnormal positive returns are presented in Table 2, for the abnormal negative returns in Table 3.

Table 2: Overall results for the one-day abnormal positive returns: the case of the US stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1929-1939	1926-1928	+	-	-	-	+	-	-	2
	1929-1939	+	-	-	-	+	-	-	2
	1940-1942	+	-	-	-	+	-	-	2
2000-2002	1997-1999	-	-	-	-	+	-	-	1
	2000-2002	+	-	-	-	-	-	-	1
	2003-2005	+	-	-	-	+	-	-	2
2007-2009	2004-2006	-	-	-	-	+	-	-	1
	2007-2009	+	-	-	-	-	-	-	1
	2010-2012	+	-	+	-	+	+	-	4

Note: This table presents the overall results for the case of positive abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed.

The average analysis confirms the anomaly if the mean return calculated for the day after abnormal

returns is much higher (lower) than the mean return related to usual day data. The statistical tests' (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant.

The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p-value<0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p-value<0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 3: Overall results for the one-day abnormal negative returns: the case of the US stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1929-1939	1926-1928	+	-	-	-	-	-	-	1
	1929-1939	+	-	-	+	+	-	-	3
	1940-1942	+	-	+	+	+	+	-	5
2000-2002	1997-1999	+	-	+	-	+	+	-	4
	2000-2002	+	-	-	+	+	-	-	3
	2003-2005	+	-	-	-	+	-	-	2
2007-2009	2004-2006	+	-	+	-	+	+	-	4
	2007-2009	+	-	+	-	+	+	-	4
	2010-2012	+	-	+	-	+	+	-	4

Note: This table presents the overall results for the case of negative abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p<0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p-value<0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

There is strong preliminary evidence favouring differences in returns for the usual days and days after abnormal returns (see Tables A.1 and B.1, Figures A.1 and A.2 for details). But in most cases, these differences are statistically insignificant. Also, they do not provide trading opportunities (statistically different from random trading). We use the following trading algorithm to find whether detected effects allowed market participants to "beat the market". Buy right at the start of the day after the positive abnormal returns in case of the momentum effect and sell in case of a contrarian effect (after the negative abnormal returns momentum effect leads to sell positions and contrarian to the long ones). Positions should be closed at the end of the day. A summary of results and typology of the price effects after one-day abnormal returns for the case of the US stock market is presented in Table 4.

Table 4: Typology of the price effects after one-day abnormal returns: the case of the US stock market

Crisis period	Period of analysis	Positive abnormal returns		Negative abnormal returns	
		Type of effect	Power	Type of effect	Power
1929-1939	1926-1928	contrarian	2	momentum	1
	1929-1939	momentum	2	contrarian	3
	1940-1942	momentum	2	momentum	5
2000-2002	1997-1999	No effect	1	contrarian	4
	2000-2002	contrarian	1	contrarian	3
	2003-2005	momentum	2	momentum	2
2007-2009	2004-2006	No effect	1	momentum	4
	2007-2009	contrarian	1	contrarian	4
	2010-2012	contrarian	4	contrarian	4

Note: This table presents a typology of the price effects in the US stock market after one- day abnormal returns for different crises. The first column reports values of the crisis period parameter being considered, the second reports sub-periods (pre-crisis, crisis, and post-crisis sub-periods), the third and fifth report types of effects (contrarian or momentum) for the cases of positive and negative overreactions respectively, and the fourth and the sixth report power of detected effects (the higher the parameter is, the stronger the evidence of the anomaly) for the cases of positive and negative abnormal returns, respectively.

Plastun et al. (2021) concluded that the momentum effect shifted into contrarian during the crisis and post-crisis periods during the Global Financial Crises. Therefore, one of the possible reasons for the evolution of anomalies in financial markets can be periods of crisis. However, the other crises examples in this paper showed that this conclusion is true only for the Global Financial Crisis. There is no regularity in price effects and evolution in the different sub-periods. The only observed regularity was the contrarian effect during crisis periods. Overall, effects after negative abnormal returns are much stronger than positive ones. Therefore, only price effects after negative abnormal returns can be the source of market anomalies in the US stock market.

4.2 Japanese stock market

Next, we analyze the Japanese stock market results. The overall results for the one-day abnormal positive returns are presented in Table 5 for the abnormal negative returns in Table 6. The average analysis provided preliminary evidence in favor of differences in returns for the normal days and days after abnormal returns (see Tables C.1 and D.1, Figures C.1 and D.1 for details). But these differences are statistically significant for 2 cases of 12 analyzed.

Table 5: Overall results for the one-day abnormal positive returns: the case of the Japanese stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1986-1992	1983-1985	+	+	+	+	+	-	+	6
	1986-1992	+	-	+	-	+	-	-	3
	1993-1995	+	-	-	-	-	-	-	1
2007-2009	2004-2006	+	-	-	-	-	-	-	1
	2007-2009	+	-	+	-	+	+	-	4
	2010-2012	-	-	-	-	-	-	-	0

Note: This table presents the overall results for the case of positive abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p - value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 6: Overall results for the one-day abnormal negative returns: the case of the Japanese stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1986-1992	1983-1985	-	-	-	-	+	-	-	1
	1986-1992	+	-	-	-	+	-	-	2
	1993-1995	+	-	-	-	+	-	-	2
2007-2009	2004-2006	+	-	-	-	+	-	-	2
	2007-2009	+	+	+	+	+	+	+	7
	2010-2012	+	-	-	-	+	-	-	2

Note: This table presents the overall results for the case of negative abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p - value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

The trading simulation approach showed that these differences provide trading opportunities and results are statistically different from random trading. We show the typology of the price effects after one-day abnormal returns for the case of the Japanese stock market in Table 7.

Table 7 revealed some regularities. After positive abnormal returns in the Japanese stock market, prices demonstrate a momentum effect. The opposite occurred for days after abnormal negative returns. However, during crisis periods, prices tend to demonstrate a contrarian effect after negative abnormal returns; this was the case for the Global financial crisis.

Table 7: Typology of the price effects after one-day abnormal returns: the case of the Japanese stock market

Crisis period	Period of analysis	Positive abnormal returns		Negative abnormal returns	
		Type of effect	Power	Type of effect	Power
1986-1992	1983-1985	momentum	6	No effect	1
	1986-1992	momentum	3	contrarian	-2
	1993-1995	momentum	1	contrarian	-2
2007-2009	2004-2006	momentum	1	momentum	2
	2007-2009	contrarian	-4	contrarian	-7
	2010-2012	No effect	0	momentum	2

Note: This table presents a typology of the price effects in the stock market after one- day abnormal returns for different crises. The first column reports values of the crisis period parameter being considered, the second reports sub-periods (pre-crisis, crisis, and post-crisis sub-periods), the third and fifth report types of effects (contrarian or momentum) for the cases of positive and negative overreactions respectively, and the fourth and the sixth report power of detected effects (the higher the parameter is, the stronger the evidence of the anomaly) for the cases of positive and negative abnormal returns, respectively.

4.3 China stock market

Next, we analyze results for the Chinese stock market. Summary of the one-day abnormal positive returns results are presented in Table 8 (for the abnormal negative returns in Table 9). According to the average analysis results returns after abnormal returns days differ from the normal days (see Tables I.1and J.1, Figures I.1 and J.1 for details), but these differences are statistically insignificant (see Tables J.2-J.7 and I.2-I.6) and cannot be exploited to generate abnormal profits (see Tables J.7 and I.7. The typology of the price effects after one-day abnormal returns is presented in Table 10.

Table 8: Overall results for the one-day abnormal positive returns: the case of the Chinese stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
2007-2009	2004-2006	+	-	-	-	+	-	-	2
	2007-2009	+	-	-	-	-	-	-	1
	2010-2012	+	-	-	-	+	-	-	2
2015	2012-2014	+	-	-	-	+	-	-	2
	2015-2015	+	-	-	-	-	-	-	1
	2016-2018	+	-	-	-	+	-	-	2

Note: This table presents the overall results for the case of positive abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p-value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 9: Overall results for the one-day abnormal negative returns: the case of the Chinese stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
2007-2009	2004-2006	-	-	-	-	-	-	-	0
	2007-2009	+	-	-	-	-	-	-	1
	2010-2012	+	-	-	-	+	-	-	2
2015	2012-2014	-	-	-	-	-	-	-	0
	2015-2015	+	-	-	-	-	-	-	1
	2016-2018	+	-	-	-	+	-	-	2

Note: This table presents the overall results for the case of negative abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p-value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 10: Typology of the price effects after one-day abnormal returns: the case of the Chinese stock market

Crisis period	Period of analysis	Positive abnormal returns		Negative abnormal returns	
		Type of effect	Power	Type of effect	Power
2007-2009	2004-2006	Momentum	2	Contrarian	0
	2007-2009	Momentum	1	Contrarian	-1
	2010-2012	Momentum	2	Momentum	2
2015	2012-2014	Momentum	2	Contrarian	0
	2015-2015	Momentum	1	Contrarian	-1
	2016-2018	Momentum	2	Momentum	2

Note: This table presents a typology of the price effects in the stock market after one- day abnormal returns for different crises. The first column reports values of the crisis period parameter being considered, the second reports sub-periods (pre-crisis, crisis, and post-crisis sub-periods), the third and fifth report types of effects (contrarian or momentum) for the cases of positive and negative overreactions respectively, and the fourth and the sixth report power of detected effects (the higher the parameter is, the stronger the evidence of the anomaly) for the cases of positive and negative abnormal returns, respectively.

After positive abnormal returns, the most typical price behaviour is price growth (or a momentum effect) on the next day. This effect is extremely stable and is observed on each of the observed sub-period. The contrarian effect is typical for the crisis periods. However, prices tend to demonstrate growth after the days with negative abnormal returns. Therefore, the most rational action of the trader in the Chinese

stock market after the day of abnormal returns is to buy.

4.4 Russian stock market

A summary of the one-day abnormal positive returns results is presented in Table 11, and Table 12 shows the abnormal negative returns . The average analysis provides evidence in favor of differences between returns after abnormal returns days and the usual days (see Tables E.1 and F.1, Figures E.1 and F.1 for details). However, these differences were statistically significant in only 2 of 18 analyzed cases (see Tables E.2-E.6 and F.2-F.6). In 4 of 18 cases the use of detected anomalies generated abnormal profits (see Tables E.7 and F.7). A typology of the price effects after one-day abnormal returns for the case of the Russian stock market is presented in Table 13.

Table 11: Overall results for the one-day abnormal positive returns: the case of the Russian stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1998	1995-1997	+	+	+	+	+	+	+	7
	1998-1998	+	-	-	-	+	-	-	2
	1999-2001	+	-	-	-	+	-	-	2
2007-2009	2004-2006	+	-	-	-	+	-	-	2
	2007-2009	+	-	-	-	+	-	-	2
	2010-2012	+	-	-	-	+	-	-	2
2014-2015	2011-2013	+	-	-	-	+	-	-	2
	2014-2015	+	-	-	-	+	-	-	2
	2016-2018	+	-	-	-	+	-	+	3

Note: This table presents the overall results for the case of positive abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p-value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 12: Overall results for the one-day abnormal negative returns: the case of the Russian stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1998	1995-1997	+	-	-	-	+	-	-	2
	1998-1998	+	-	-	-	+	-	-	2
	1999-2001	+	+	+	+	+	+	+	7
2007-2009	2004-2006	-	-	-	-	+	-	-	1
	2007-2009	+	-	-	-	+	-	-	2
	2010-2012	+	-	-	-	-	-	-	1
2014-2015	2011-2013	+	-	-	-	+	-	-	2
	2014-2015	+	-	-	-	-	-	-	1
	2016-2018	+	+	-	-	-	-	+	3

Note: This table presents the overall results for the case of negative abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p-value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 13: Typology of the price effects after one-day abnormal returns: the case of the Russian stock market

Crisis period	Period of analysis	Positive abnormal returns		Negative abnormal returns	
		Type of effect	Power	Type of effect	Power
1998	1995-1997	Momentum	7	Contrarian	-2
	1998-1998	Momentum	2	Contrarian	-2
	1999-2001	Momentum	2	Contrarian	-7
2007-2009	2004-2006	No effect	2	Contrarian	-1
	2007-2009	Momentum	2	Momentum	2
	2010-2012	Momentum	2	Momentum	1
2014-2015	2011-2013	Momentum	2	Momentum	2
	2014-2015	Momentum	2	Contrarian	-1
	2016-2018	Momentum	3	Momentum	3

Note: This table presents a typology of the price effects in the Russian stock market after one- day abnormal returns for different crises. The first column reports values of the crisis period parameter being considered, the second reports sub-periods (pre-crisis, crisis, and post-crisis sub-periods), the third and fifth report types of effects (contrarian or momentum) for the cases of positive and negative overreactions respectively, and the fourth and the sixth report power of detected effects (the higher the parameter is, the stronger the evidence of the anomaly) for the cases of positive and negative abnormal returns, respectively.

The results for the Russian stock market are very similar to those for the Chinese stock market. After positive abnormal returns, prices also tend to demonstrate growth on the next day. Growth is also prevailing price behaviour after negative abnormal returns, especially during crises. However, the power of detected patterns is low.

4.5 Brazilian stock market

Finally, we analyze the Brazilian stock market. A summary of the results for the one-day abnormal positive returns is presented in Table 14 and the abnormal negative returns in Table 15. As in previous markets, the average analysis revealed differences between returns after abnormal returns days and the normal days (see Tables G.1 and H.1, Figures G.1 and H.1 for details). The detected differences are statistically significant only for most of the cases (see Tables G.2-G.6 and H.2-H.6). Trading simulation shows that the use of these differences for the trading purpose gives no advantages compared with random trading (see Tables G.7 and H.7). A typology of the price effects after one-day abnormal returns for the case of the Brazilian stock market and overall results is presented in Table 16.

Table 14: Overall results for the one-day abnormal positive returns: the case of the Brazilian stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1999	1996-1998	+	-	-	-	-	-	-	1
	1999-1999	+	-	-	-	+	-	-	2
	2000-2002	-	-	-	-	-	-	-	0
2007-2009	2004-2006	-	-	-	-	-	-	-	0
	2007-2009	+	-	-	-	+	-	-	2
	2010-2012	+	-	-	-	-	-	-	1
2014-2017	2011-2013	+	-	-	-	+	-	-	2
	2014-2017	-	-	-	-	-	-	-	0
	2018-2019	+	-	-	-	+	-	-	2

Note: This table presents the overall results for the case of positive abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p - value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 15: Overall results for the one-day abnormal negative returns: the case of the Brazilian stock market

Crisis period	Period of analysis	Average analysis	Students t-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
1999	1996-1998	+	-	-	-	+	-	-	2
	1999-1999	+	-	+	+	-	+	+	5
	2000-2002	+	-	-	-	-	-	-	1
2007-2009	2004-2006	+	+	+	+	+	+	+	7
	2007-2009	+	-	-	-	+	-	-	2
	2010-2012	+	-	-	-	-	-	-	1
2014-2017	2011-2013	+	-	-	-	+	-	-	2
	2014-2017	+	-	-	-	+	-	-	2
	2018-2019	+	-	-	-	+	-	-	2

Note: This table presents the overall results for the case of positive abnormal returns. + indicates that the anomaly is confirmed and indicates that the anomaly is not confirmed. The average analysis confirms the anomaly if the mean return calculated for the day after abnormal returns is much higher (lower) compared with the mean return related to usual day data. The statistical tests (both parametrical and non-parametrical) rejection of the null hypothesis (data for the day after abnormal returns and usual day data belong to the same general population) also confirms the anomaly if it is statistically significant. The regression analysis with dummy variables gives evidence in favour of anomaly presence if a_1 (slope of the dummy variable) is statistically significant ($p < 0.05$). The MCAR approach confirms the anomaly if the trend model based on cumulative abnormal returns data has high multiple R, passes the F test and the regression coefficients are statistically significant ($p - value < 0.05$). The higher the overall rating, the stronger the evidence of the anomaly.

Table 16: Typology of the price effects after one-day abnormal returns: the case of the Brazilian stock market

Crisis period	Period of analysis	Positive abnormal returns		Negative abnormal returns	
		Type of effect	Power	Type of effect	Power
1999	1996-1998	momentum	1	contrarian	-2
	1999-1999	contrarian	-2	momentum	5
	2000-2002	No effect	0	momentum	1
2007-2009	2004-2006	momentum	0	momentum	7
	2007-2009	momentum	2	contrarian	-2
	2010-2012	contrarian	-1	momentum	1
2014-2017	2011-2013	momentum	2	momentum	2
	2014-2017	momentum	0	contrarian	-2
	2018-2019	momentum	2	contrarian	-2

Note: This table presents a typology of the price effects in the Brazilian stock market after one- day abnormal returns for different crises. The first column reports values of the crisis period parameter being considered, the second reports sub-periods (pre-crisis, crisis, and post-crisis sub-periods), the third and fifth report types of effects (contrarian or momentum) for the cases of positive and negative overreactions respectively, and the fourth and the sixth report power of detected effects (the higher the parameter is, the stronger the evidence of the anomaly) for the cases of positive and negative abnormal returns, respectively.

After the days with abnormal returns in the Brazilian stock market, price behaviour is typical for emerging markets. The momentum effect dominates after positive abnormal returns. Prices also tend to increase after the days with negative abnormal returns during the crisis periods. However, the power of detected patterns is low.

4.6 Discussion

A summary of price effects distribution for different sub-periods in each market is presented in Table 17. In the pre-crisis period for all markets (developed and emerging), the momentum effect is the most typical price behaviour after one-day abnormal returns. That is, prices tend to move in the direction typical for the day of abnormal return. The crisis period results are different for the developed and emerging markets. For example, in the developed markets, the momentum effect changes contrarian during crisis periods. This means during the crisis in the developed stock market prices tend to move in the opposite direction after a day of abnormal returns. However, for the emerging market momentum effect still prevails. For the post-crisis period, differences between developed and emerging markets disappear, and the momentum effect is the most common.

Table 17: Price effects and sub-periods

Country	Case	Pre-crisis	Crisis	Post-crisis
USA	Overall	50%/17%**	17%/83%	67%/33%
	Positive	0%/33%	33%/67%	67%/33%
	Negative	67%/33%	0%/100%	67%/33%
Japan	Overall	75%/0%	25%/75%	50%/25%
	Positive	100%/0%	50%/50%	50%/0%
	Negative	50%/0%	0%/100%	50%/50%
China	Overall	50%/50%	50%/50%	100%/0%
	Positive	100%/0%	100%/0%	100%/0%
	Negative	0%/100%	0%/100%	100%/0%
Russia	Overall	50%/33%	67%/33%	83%/17%
	Positive	67%/0%	100%/0%	100%/0%
	Negative	33%/67%	33%/67%	67%/33%
Brazil	Overall	83%/17%	50%/50%	50%/33%
	Positive	100%/0%	67%/33%	33%/33%
	Negative	67%/33%	33%/67%	67%/33%

Note: This table presents a typology of the price effects in the stock markets after one-day abnormal returns for different sub-periods (pre-crisis, crisis, and post-crisis) and types of abnormal returns (positive, negative, overall). The first column reports countries, the second - types of abnormal returns, the third, the fourth and the fifth report proportion of contrarian/momentum effects for the cases of pre-crisis, crisis and post-crisis periods respectively. momentum/contrarian % of all. for some cases no effects were detected.

Price effects differ not only for developed and emerging markets but also for types of abnormal returns. The momentum effect is the most typical price behaviour for all markets and periods for the positive abnormal returns, except the US stock market. Price behaviour after negative abnormal returns is typically unstable. Furthermore, the momentum effect is the most typical for the pre-crisis and post-crisis periods, but the contrarian effect is the most frequent one for the crisis period. Overall, these results are in line with those obtained by Plastun et al. (2021). However, the power of detected effects is usually very weak and might result from the prevailing positive returns over the negative ones. Lastly, in some cases, the use of detected anomalies allows abnormal profits, but these cases are rather an exception to the rule.

5 Conclusion

We investigated the price effects after one day of abnormal returns during crisis periods in US, Japanese, Chinese, Russian and Brazilian stock markets. This paper added to Plastun et al. (2021), which briefly investigated how price effects in crisis periods differed from normal periods. Understanding how investors overreact in crisis compared to normal markets is a growing area in the literature which adds a new dimension to the overaction hypothesis (see Yildiz and Karan, 2019; Scherf et al., 2022). Our results agree with Plastun et al. (2021) that, in the main, after one day of abnormal returns, the momentum effect is typical in pre-crisis and post-crisis periods. However, during crisis periods, the momentum effect turns contrarian in developed markets. Contrarily, this was not the case in developing markets in which the momentum effect remained prevalent even in crisis periods. The literature points to a lack of liquidity in developing markets to explain this difference (see Lasfer et al., 2003). However, this remains an open question which we do not address in this paper and can be a subject of future investigation. Finally, our results are symptomatic of the literature in that although we find clear evidence of the overreaction hypothesis, it is not absolute. For example, the evidence for the US stock market was mixed, and the statistical tests unstable. Therefore, further studies with different methodologies remain necessary.

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Appendices

A USA: The case of positive abnormal returns

Table A.1: Average returns for the usual days and days after positive abnormal returns: the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Usual day	Day after positive abnormal returns
1929-1939	1926-1928	0.1%	-0.07%
	1929-1939	0.01%	0.13%
	1940-1942	0.02%	0.15%
2000-2002	1997-1999	0.10%	0.00%
	2000-2002	-0.03%	-0.22%
	2003-2005	0.01%	0.11%
2007-2009	2004-2006	0.03%	0.00%
	2007-2009	0.06%	-0.04%
	2010-2012	0.04%	-0.28%

Figure A.1: Average returns for the usual days and days after positive abnormal returns: the case of the Dow Jones Index during different crises

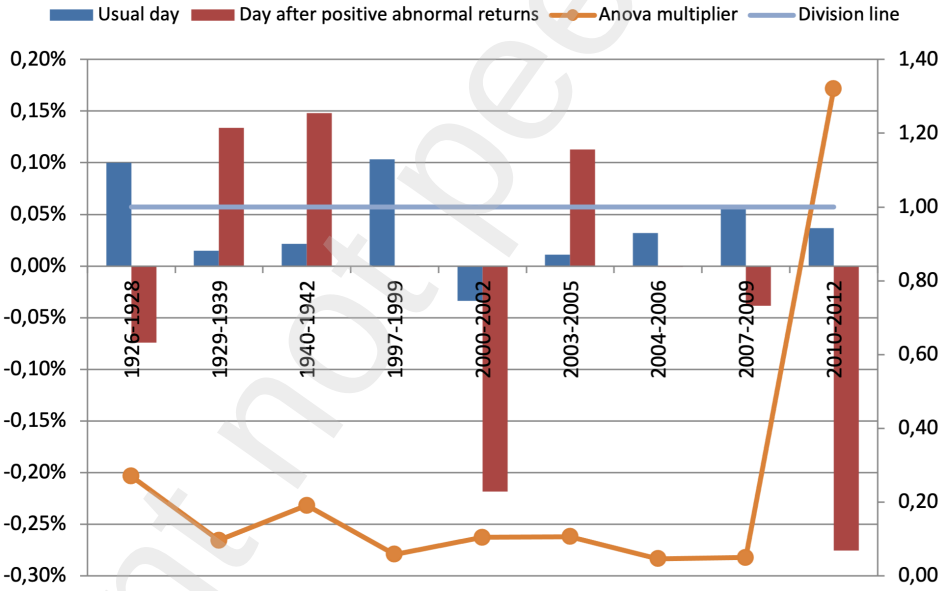


Table A.2: ANOVA test of the price effects after positive abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1929-1939	1926-1928	1.04	0.31	3.85	not rejected	not confirmed	0.27
	1929-1939	0.37	0.54	3.84	not rejected	not confirmed	0.1
	1940-1942	0.73	0.39	3.85	not rejected	not confirmed	0.19
2000-2002	1997-1999	0.22	0.64	3.85	not rejected	not confirmed	0.06
	2000-2002	0.4	0.53	3.85	not rejected	not confirmed	0.1
	2003-2005	0.41	0.52	3.85	not rejected	not confirmed	0.11
2007-2009	2004-2006	0.18	0.67	3.86	not rejected	not confirmed	0.05
	2007-2009	0.19	0.66	3.86	not rejected	not confirmed	0.05
	2010-2012	5.09	0.02	3.86	rejected	confirmed	1.32

Table A.3: Mann-Whitney test of the price effects after positive abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1929-1939	1926-1928	1.46	1	0.23	3.84	not rejected	not confirmed
	1929-1939	0.21	1	0.65	3.84	not rejected	not confirmed
	1940-1942	1.10	1	0.28	3.84	not rejected	not confirmed
2000-2002	1997-1999	0.14	1	0.7	3.84	not rejected	not confirmed
	2000-2002	0.53	1	0.47	3.84	not rejected	not confirmed
	2003-2005	0.62	1	0.43	3.84	not rejected	not confirmed
2007-2009	2004-2006	0.01	1	0.91	3.84	not rejected	not confirmed
	2007-2009	0.26	1	0.61	3.84	not rejected	not confirmed
	2010-2012	1.02	1	0.31	3.84	not rejected	not confirmed

Table A.4: T-test of the price effects after positive abnormal returns for the case of the Dow Jones Index during different crises

					1929-1939				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
1926-1928	Mean,%	0.1%	-0.07%	1929-1939	0.01%	0.13%	1940-1940	0.02%	0.15%
	Stand. Dev., %	0.74%	0.64%		1.52%	2.57%		0.62%	0.72%
	Number of values	850	18		3111	64		855	18
	t-criterion	1.14			0.37			0.74	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
					2000-2002				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
1997-1999	Mean,%	0.1%	0	2000-2002	-0.03%	-0.22%	2003-2005	0.01%	0.11%
	Stand. Dev., %	0.92%	0.67%		1.2%	1.93%		0.72%	0.51%
	Number of values	717	18		713	18		725	21
	t-criterion	0.65			0.4			0.89	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
					2007-2009				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2004-2006	Mean,%	0.03%	0	2007-2009	0.06%	-0.04%	2010-2012	0.04%	-0.28%
	Stand. Dev., %	0.37%	0.52%		0.94%	1.31%		0.58%	1.18%
	Number of values	552	24		558	20		565	20
	t-criterion	0.3			0.32			1.18	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table A.5: Modified CAR approach: results of the price effects after positive abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1929-1939	1926-1928	0.83	35,01 (0,00)	-0,0011 (0,74)	-0,0018 (0,00)	confirmed
	1929-1939	0.36	9,46 (0,00)	-0,0039 (0,72)	0,0009 (0,00)	confirmed
	1940-1942	0.83	36,47 (0,00)	-0,0025 (0,31)	0,0014 (0,00)	confirmed
2000-2002	1997-1999	0.74	19,10 (0,00)	0,0093 (0,01)	-0,0013 (0,00)	confirmed
	2000-2002	0.41	3,24 (0,09)	0,0436 (0,00)	-0,0017 (0,09)	not confirmed
	2003-2005	0.69	17,15 (0,00)	0,0071 (0,03)	0,0001 (0,00)	confirmed
2007-2009	2004-2006	0.5	7,33 (0,01)	0,0105 (0,00)	-0,0005 (0,01)	confirmed
	2007-2009	0.21	0,80 (0,38)	0,0089 (0,22)	-0,0005 (0,38)	not confirmed
	2010-2012	0.89	72,38 (0,00)	0,0026 (0,64)	-0,0039 (0,00)	confirmed

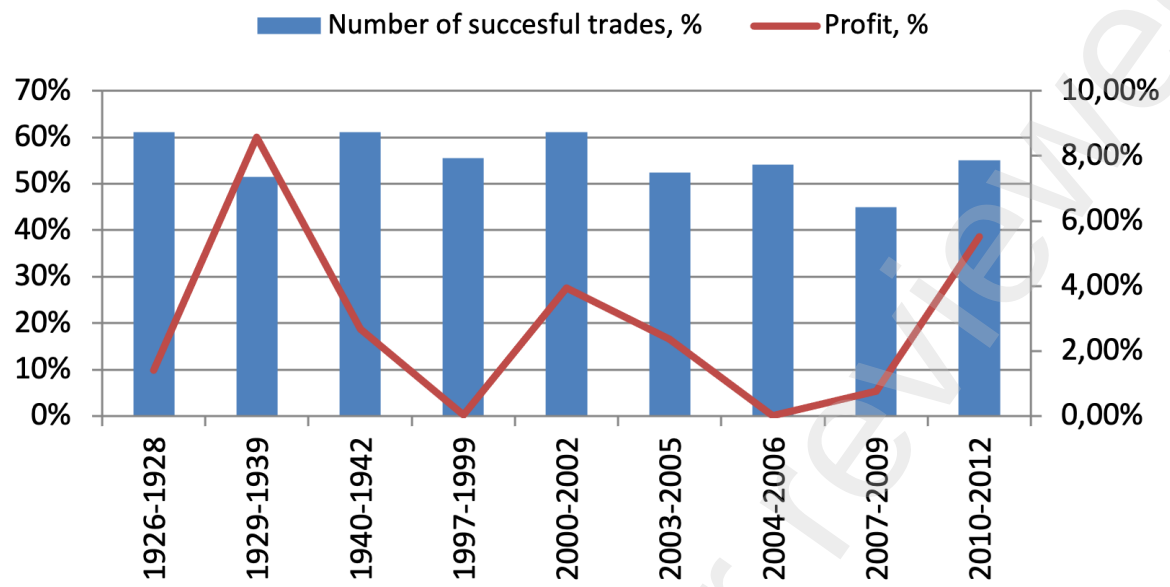
Table A.6: Regression analysis with dummy variables: results of the price effects after positive abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1929-1939	1926-1928	0.03	1,039 (0,31)	0,0010 (0,00)	-0,0018 (0,31)	not confirmed
	1929-1939	0.01	0,3689 (0,54)	0,0001 (0,60)	0,0012 (0,54)	not confirmed
	1940-1942	0.03	0,73 (0,39)	0,0002 (0,31)	0,0012 (0,39)	not confirmed
2000-2002	1997-1999	0.02	0,2238 (0,63)	0,0010 (0,00)	-0,0010 (0,63)	not confirmed
	2000-2002	0.02	0,40 (0,52)	-0,0003 (0,46)	-0,0018 (0,52)	not confirmed
	2003-2005	0.02	0,41 (0,52)	0,0001 (0,68)	0,0010 (0,52)	not confirmed
2007-2009	2004-2006	0.02	0,18 (0,67)	0,0003 (0,04)	-0,0003 (0,67)	not confirmed
	2007-2009	0.02	0,1924 (0,66)	0,0005 (0,16)	-0,0009 (0,66)	not confirmed
	2010-2012	0.09	5,09 (0,02)	0,0003 (0,15)	-0,0031 (0,02)	confirmed

Table A.7: Trading simulation results of the price effects after positive abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1929-1939	1926-1928**	18	11	61%	1.41%	0.47%	0.08%	0.52	not rejected
	1929-1939*	64	33	52%	8.57%	0.78%	0.13%	0.42	not rejected
	1940-1942*	18	11	61%	2.67%	0.89%	0.15%	0.87	not rejected
2000-2002	1997-1999***	18	10	56%	0.02%	0.01%	0.00%	0.01	not rejected
	2000-2002**	18	11	61%	3.93%	1.31%	0.22%	0.48	not rejected
	2003-2005*	21	11	52%	2.37%	0.79%	0.11%	1.02	not rejected
2007-2009	2004-2006***	24	13	54%	0.02%	0.01%	0.00%	0.01	not rejected
	2007-2009**	20	9	45%	0.77%	0.26%	0.04%	0.13	not rejected
	2010-2012**	20	11	55.0%	5.5%	1.8%	0.28%	1.04	not rejected

Figure A.2: Trading simulation results of the price effects after positive abnormal returns for the case of the Dow Jones Index during different crises



B USA: The case of negative abnormal returns

Table B.1: Average returns for the usual days and days after negative abnormal returns: the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Usual day	Day after negative abnormal returns
1929-1939	1926-1928	0.01%	-0.15%
	1929-1939	0.01%	0.28%
	1940-1942	0.02%	-0.45%
2000-2002	1997-1999	0.10%	0.56%
	2000-2002	-0.03%	0.40%
	2003-2005	0.01%	-0.44%
2007-2009	2004-2006	0.03%	-0.33%
	2007-2009	0.06%	0.62%
	2010-2012	0.04%	0.34%

Figure B.1: Average returns for the usual days and days after negative abnormal returns: the case of the Dow Jones Index during different crises

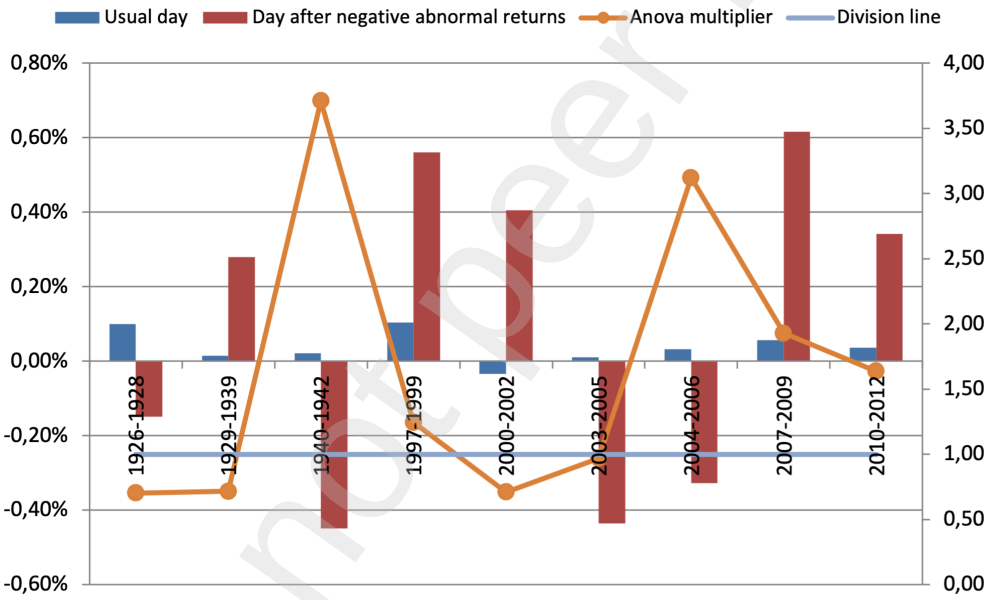


Table B.2: ANOVA test of the price effects after negative abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1929-1939	1926-1928	2.71	0.1	3.85	not rejected	not confirmed	0.7
	1929-1939	2.75	0.1	3.84	not rejected	not confirmed	0.72
	1940-1942	14.29	0	3.85	rejected	confirmed	3.71
2000-2002	1997-1999	4.8	0.03	3.85	rejected	confirmed	1.24
	2000-2002	2.74	0.1	3.85	not rejected	not confirmed	0.71
	2003-2005	3.73	0.05	3.85	not rejected	not confirmed	0.97
2007-2009	2004-2006	12.04	0	3.86	rejected	confirmed	3.12
	2007-2009	7.44	0.01	3.86	rejected	confirmed	1.93
	2010-2012	6.32	0.01	3.86	rejected	confirmed	1.64

Table B.3: Mann-Whitney test of the price effects after negative abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1929-1939	1926-1928	0	1	0.97	3.84	not rejected	not confirmed
	1929-1939	4.15	1	0.04	3.84	rejected	confirmed
	1940-1942	6.06	1	0.01	3.84	rejected	confirmed
2000-2002	1997-1999	1.94	1	0.16	3.84	not rejected	not confirmed
	2000-2002	3.97	1	0.05	3.84	rejected	confirmed
	2003-2005	1.9	1	0.17	3.84	not rejected	not confirmed
2007-2009	2004-2006	3.09	1	0.08	3.84	not rejected	not confirmed
	2007-2009	2.12	1	0.15	3.84	not rejected	not confirmed
	2010-2012	1.43	1	0.23	3.84	not rejected	not confirmed

Table B.4: T-test of the price effects after negative abnormal returns for the case of the Dow Jones Index during different crises

					1929-1939				
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
1926-1928	Mean,%	0.1%	-0.15%	1929-1939	0.01%	0.28%	1940-1940	0.02%	-0.45%
	Stand. Dev., %	0.74%	1.55%		1.52%	2.9%		0.62%	1.66%
	Number of values	850	27		3111	103		855	31
	t-criterion	0.83			0.91			1.58	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
					2000-2002				
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
1997-1999	Mean,%	0.1%	0.56%	2000-2002	-0.03%	0.40%	2003-2005	0.01%	-0.44%
	Stand. Dev., %	0.93%	1.70%		1.2%	1.21%		0.72%	1.06%
	Number of values	717	22		713	21		725	10
	t-criterion	1.25			1.63			1.33	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
					2007-2009				
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2004-2006	Mean,%	0.03%	-0.33%	2007-2009	0.06%	0.62%	2010-2012	0.04%	0.34%
	Stand. Dev., %	0.37%	0.83%		0.94%	1.73%		0.58%	1.26%
	Number of values	552	14		558	24		565	28
	t-criterion	1.61			1.56			1.26	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table B.5: Modified CAR approach: results of the price effects after negative abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1929-1939	1926-1928	0.02	0,01 (0,92)	-0,0373 (0,00)	-0,0000 (0,00)	not confirmed
	1929-1939	0.85	265,78 (0,00)	0,0708 (0,00)	0,0033 (0,00)	confirmed
	1940-1942	0.85	74,36 (0,00)	-0,0336 (0,00)	-0,0035 (0,00)	confirmed
2000-2002	1997-1999	0.93	121,26 (0,00)	-0,0145 (0,05)	0,0058 (0,00)	confirmed
	2000-2002	0.9	77,96 (0,00)	0,0212 (0,01)	0,0053 (0,00)	confirmed
	2003-2005	0.83	17,36 (0,00)	-0,0104 (0,00)	-0,0029 (0,00)	confirmed
2007-2009	2004-2006	0.94	84,31 (0,00)	-0,0057 (0,10)	-0,0035 (0,00)	confirmed
	2007-2009	0.87	69,30 (0,00)	-0,0234 (0,02)	0,0057 (0,00)	confirmed
	2010-2012	0.85	66,78 (0,00)	-0,0272 (0,00)	0,0043 (0,00)	confirmed

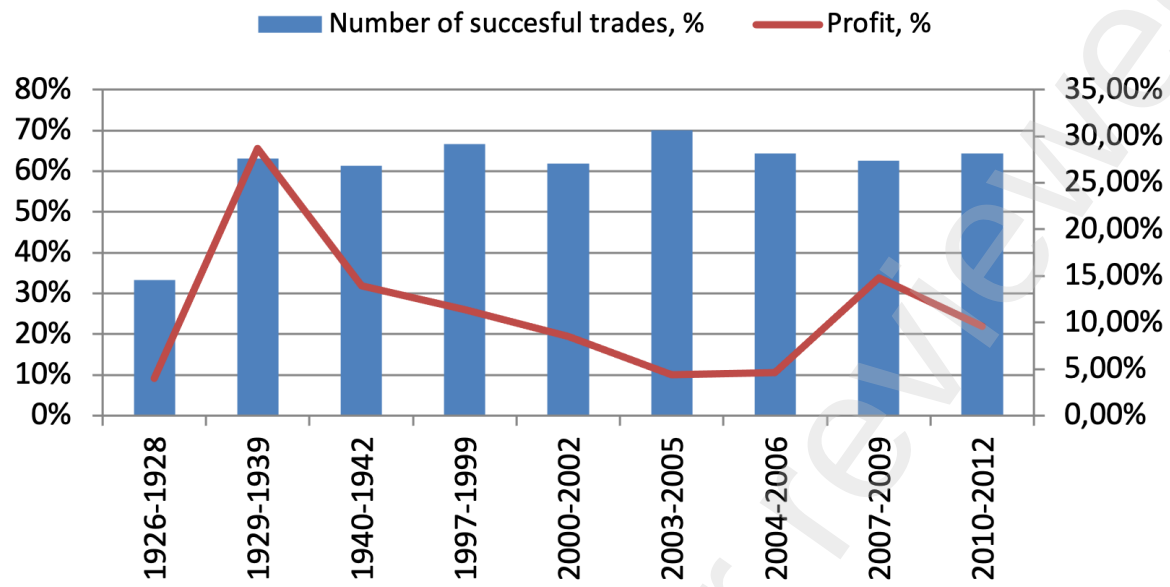
Table B.6: Regression analysis with dummy variables: results of the price effects after negative abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1929-1939	1926-1928	0.06	2,71 (0,10)	0,0010 (0,00)	-0,0025 (0,10)	not confirmed
	1929-1939	0.03	2,75 (0,09)	0,0001 (0,61)	0,0026 (0,09)	not confirmed
	1940-1942	0.13	14,29 (0,00)	0,0002 (0,36)	-0,0047 (0,00)	confirmed
2000-2002	1997-1999	0.08	4,79 (0,03)	0,0010 (0,00)	0,0045 (0,03)	confirmed
	2000-2002	0.06	2,74 (0,10)	-0,0003 (0,45)	0,0044 (0,10)	not confirmed
	2003-2005	0.07	3,73 (0,05)	0,0001 (0,68)	-0,0044 (0,05)	not confirmed
2007-2009	2004-2006	0.14	12,04 (0,00)	0,0003 (0,05)	-0,0036 (0,00)	confirmed
	2007-2009	0.11	7,44 (0,00)	0,0005 (0,17)	0,0056 (0,00)	confirmed
	2010-2012	0.1	6,31 (0,01)	0,0003 (0,16)	0,0030 (0,01)	confirmed

Table B.7: Trading simulation results of the price effects after negative abnormal returns for the case of the Dow Jones Index during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1929-1939	1926-1928*	27	9	33%	4.01%	1.34%	0.15%	0.5	not rejected
	1929-1939**	103	65	63%	28%	2.87%	0.28%	0.97	not rejected
	1940-1942*	31	19	61%	13%	4.63%	0.45%	1.51	not rejected
2000-2002	1997-1999**	21	14	67%	11.37%	3.79%	0.54%	1.42	not rejected
	2000-2002**	21	13	62%	8.50%	2.82%	0.40%	1.53	not rejected
	2003-2005*	10	7	70%	4.36%	1.45%	0.44%	1.31	not rejected
2007-2009	2004-2006*	14	9	64%	4.59%	1.52%	0.33%	1.47	not rejected
	2007-2009**	24	15	63%	14.79%	4.92%	0.62%	1.73	not rejected
	2010-2012**	28	18	64%	9.56%	3.18%	0.34%	1.42	not rejected

Figure B.2: Trading simulation results of the price effects after negative abnormal returns for the case of the Dow Jones Index during different crises



C Japan: The case of positive abnormal returns

Table C.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Usual day	Day after positive abnormal returns
1986-1992	1983-1985	0.03%	0.66%
	1986-1992	0.03%	0.46%
	1993-1995	0.05%	0.22%
2007-2009	2004-2006	0.06%	0.20%
	2007-2009	-0.01%	-0.83%
	2010-2012	0.02%	0.00%

Figure C.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI Japan Index during different crises

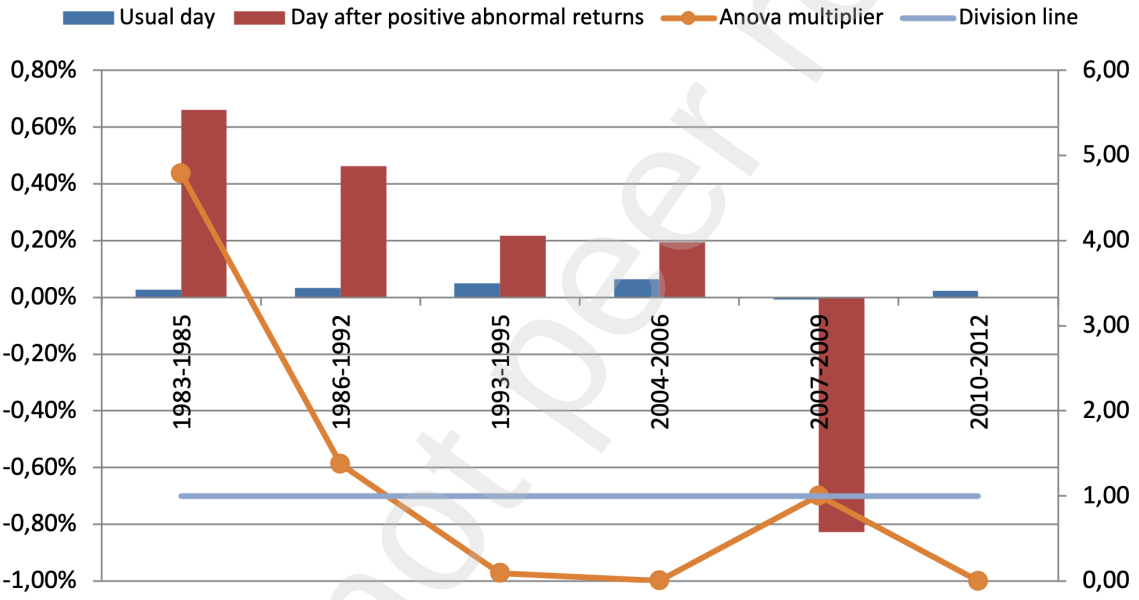


Table C.2: ANOVA test of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1986-1992	1983-1985	18.47	0	3.86	rejected	confirmed	4.79
	1986-1992	5.29	0.02	3.85	rejected	confirmed	1.37
	1993-1995	0.36	0.55	3.85	not rejected	not confirmed	0.09
2007-2009	2004-2006	0.33	0.56	3.85	not rejected	not confirmed	0.01
	2007-2009	3.86	0.05	3.85	rejected	confirmed	1
	2010-2012	0.01	0.93	3.85	not rejected	not confirmed	0

Table C.3: Mann-Whitney test of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1986-1992	1983-1985	5.91	1	0.02	3.84	rejected	confirmed
	1986-1992	1.04	1	0.31	3.84	not rejected	not confirmed
	1993-1995	1.71	1	0.19	3.84	not rejected	not confirmed
2007-2009	2004-2006	0.36	1	0.55	3.84	not rejected	not confirmed
	2007-2009	1.79	1	0.18	3.84	not rejected	not confirmed
	2010-2012	0	1	0.97	3.84	not rejected	not confirmed

Table C.4: T-test of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises

1986-1992									
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
1983-1985	Mean,%	0.03%	0.66%	1986-1992	0.03%	0.46%	1993-1995	0.05%	0.22%
	Stand. Dev., %	0.77%	1.31%		1.23%	1.78%		1.04%	2.14%
	Number of values	495	30		1742	46		748	15
	t-criterion	2.63			1.62			0.3	
	Null hypothesis	rejected			not rejected			not rejected	
	Anomaly	confirmed			not confirmed			not confirmed	
2007-2009									
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2004-2006	Mean,%	0.06%	0.20%	2007-2009	-0.01%	-0.83%	2010-2012	0.02%	0
	Stand. Dev., %	1.01%	1.47%		1.54%	1.95%		0.98%	0.83%
	Number of values	748	17		749	14		751	14
	t-criterion	0.37			1.57			0.11	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table C.5: Modified CAR approach: results of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1986-1992	1983-1985	0.95	248,56 (0,00)	-0,0016 (0,85)	0,0076 (0,00)	confirmed
	1986-1992	0.83	95,06 (0,00)	-0,0431 (0,00)	0,0033 (0,00)	confirmed
	1993-1995	0.06	0,04 (0,84)	-0,0141 (0,30)	0,0003 (0,84)	not confirmed
2007-2009	2004-2006	0.3	1,44 (0,25)	0,0176 (0,02)	0,0008 (0,25)	not confirmed
	2007-2009	0.94	87,05 (0,00)	0,01074 (0,30)	-0,0109 (0,00)	confirmed
	2010-2012	0.39	2,20 (0,16)	-0,0102 (0,02)	0,0006 (0,16)	not confirmed

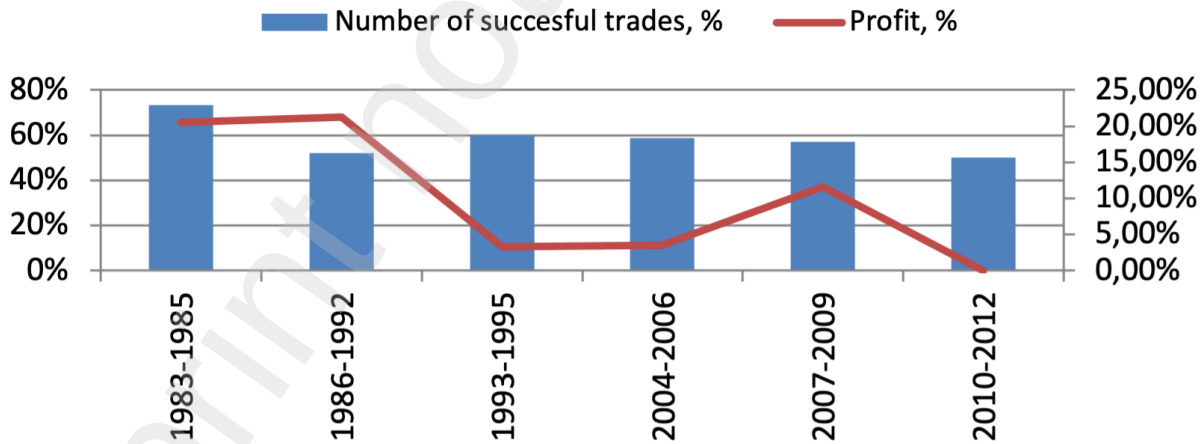
Table C.6: Regression analysis with dummy variables: results of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1986-1992	1983-1985	0.01	0,022 (0,88)	0,0003 (0,46)	-0,0004 (0,88)	not confirmed
	1986-1992	0.01	0,11 (0,74)	0,0003 (0,28)	0,0007 (0,74)	not confirmed
	1993-1995	0.05	2,10 (0,15)	0,0005 (0,20)	0,0029 (0,15)	not confirmed
2007-2009	2004-2006	0.03	0,72 (0,40)	0,0006 (0,09)	-0,0021 (0,40)	not confirmed
	2007-2009	0.08	5,19 (0,02)	-0,0001 (0,90)	0,0078 (0,02)	confirmed
	2010-2012	0.04	1,10 (0,29)	0,0002 (0,55)	-0,0027 (0,29)	not confirmed

Table C.7: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1986-1992	1983-1985*	30	22	73%	20.49%	6.83%	0.68%-	2.86	rejected
	1986-1992*	46	24	52%	21.27%	7.09%	0.46%	1.76	not rejected
	1993-1995*	15	9	60%	3.23%	1.08%	0.22%	0.39	not rejected
2007-2009	2004-2006*	17	10	59%	3.52%	1.17%	0.21%	0.57	not rejected
	2007-2009**	14	8	56%	0.11%	3.86%	0.83%	-1.59	not rejected
	2010-2012***	14	7	50%	0.01%	0.00%	0.00%	0.00	not rejected

Figure C.2: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises



D Japan: The case of negative abnormal returns

Table D.1: Average returns for the usual days and days after negative abnormal returns: the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Usual day	Day after positive abnormal returns
1986-1992	1983-1985	0.03%	-0.01%
	1986-1992	0.03%	0.10%
	1993-1995	0.05%	0.34%
2007-2009	2004-2006	0.06%	-0.15%
	2007-2009	-0.01%	0.77%
	2010-2012	0.02%	-0.25%

Figure D.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI Japan Index during different crises

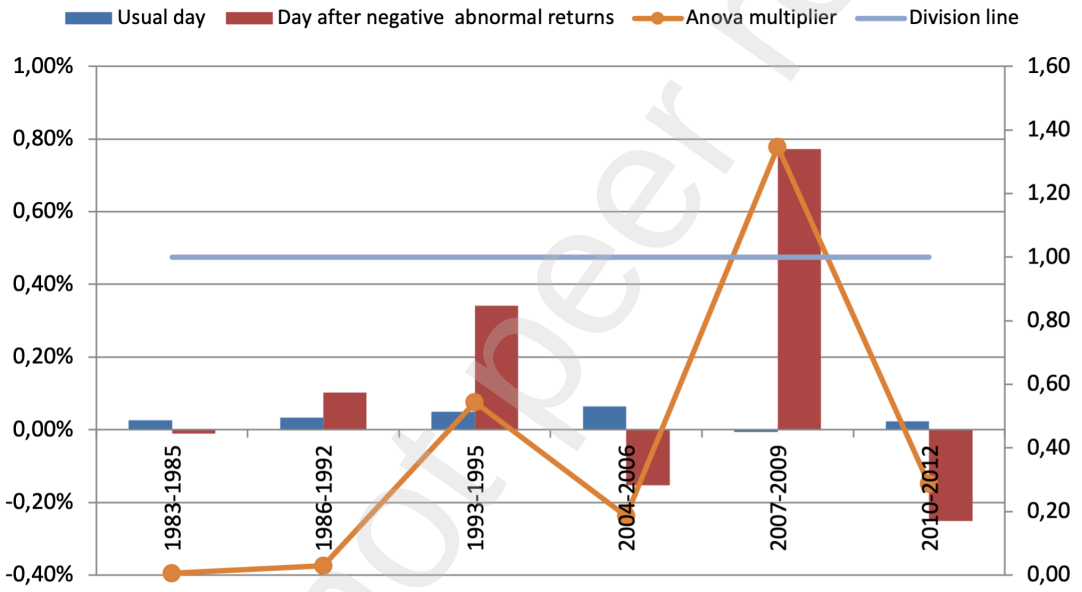


Table D.2: ANOVA test of the price effects after negative abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1986-1992	1983-1985	0.02	0.88	3.86	not rejected	not confirmed	0.01
	1986-1992	0.11	0.74	3.85	not rejected	not confirmed	0.03
	1993-1995	2.1	0.15	3.85	not rejected	not confirmed	0.54
2007-2009	2004-2006	0.72	0.4	3.85	not rejected	not confirmed	0.19
	2007-2009	5.19	0.02	3.85	rejected	confirmed	1.35
	2010-2012	1.10	0.28	3.85	not rejected	not confirmed	0.28

Table D.3: Mann-Whitney test of the price effects after negative abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1986-1992	1983-1985	0.03	1	0.86	3.84	not rejected	not confirmed
	1986-1992	0.34	1	0.56	3.84	not rejected	not confirmed
	1993-1995	0.86	1	0.35	3.84	not rejected	not confirmed
2007-2009	2004-2006	0.16	1	0.69	3.84	not rejected	not confirmed
	2007-2009	4.04	1	0.04	3.84	rejected	confirmed
	2010-2012	1.32	1	0.25	3.84	not rejected	not confirmed

Table D.4: T-test of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises

1986-1992									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
1983-1985	Mean,%	0.03%	-0.01%	1986-1992	0.03%	0.1%	1993-1995	0.05%	0.34%
	Stand. Dev., %	0.77%	1.23%		1.23%	2.62%		1.04%	1.26%
	Number of values	495	10		1742	39		748	28
	t-criterion	0.09			0.16			1.2	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
2007-2009									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2004-2006	Mean,%	0.06%	-0.15%	2007-2009	-0.01%	0.77%	2010-2012	0.02%	-0.25%
	Stand. Dev., %	1.01%	2.12%		1.54%	1.67%		0.98%	3.02%
	Number of values	748	17		749	21		751	17
	t-criterion	0.42			2.1			0.38	
	Null hypothesis	not rejected			rejected			not rejected	
	Anomaly	not confirmed			confirmed			not confirmed	

Table D.5: Modified CAR approach: results of the price effects after negative abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1986-1992	1983-1985	0.78	12,23 (0,01)	0,0337 (0,00)	-0,0034 (0,01)	confirmed
	1986-1992	0.49	11,97 (0,00)	0,0273 (0,04)	0,0020 (0,00)	confirmed
	1993-1995	0.84	62,89 (0,00)	-0,0272 (0,00)	0,0042 (0,00)	confirmed
2007-2009	2004-2006	0.94	84,31 (0,00)	-0,0057 (0,10)	-0,0035 (0,00)	confirmed
	2007-2009	0.91	87,20 (0,00)	-0,0329 (0,00)	0,0069 (0,00)	confirmed
	2010-2012	0.86	42,27 (0,00)	0,0465 (0,00)	-0,0063 (0,00)	confirmed

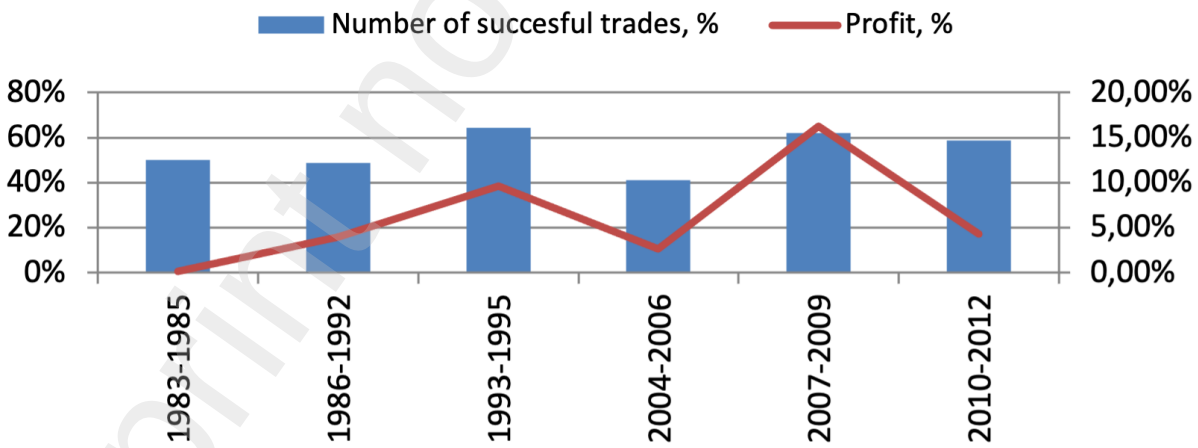
Table D.6: Regression analysis with dummy variables: results of the price effects after negative abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1986-1992	1983-1985	0.01	0,022 (0,88)	0,0003 (0,46)	-0,0004 (0,88)	not confirmed
	1986-1992	0.01	0,11 (0,74)	0,0003 (0,28)	0,0007 (0,74)	not confirmed
	1993-1995	0.05	2,10 (0,15)	0,0005 (0,20)	0,0029 (0,15)	not confirmed
2007-2009	2004-2006	0.03	0,72 (0,40)	0,0006 (0,09)	-0,0021 (0,40)	not confirmed
	2007-2009	0.08	5,19 (0,02)	-0,0001 (0,90)	0,0078 (0,02)	confirmed
	2010-2012	0.04	1,10 (0,29)	0,0002 (0,55)	-0,0027 (0,29)	not confirmed

Table D.7: Trading simulation results of the price effects after negative abnormal returns for the case of the MSCI Japan Index during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1986-1992	1983-1985***	10	5	50%	0.11%	0.04%	0.01%	-0.03	not rejected
	1986-1992**	39	19	49%	3.98%	1.32%	0.01%	0.24	not rejected
	1993-1995**	28	18	64%	9.56%	3.18%	0.34%	1.42	not rejected
2007-2009	2004-2006*	17	7	41%	2.59%	0.87%	0.15%	-0.3	not rejected
	2007-2009**	21	13	62%	16.2%	5.41%	0.77%	2.1	rejected
	2010-2012*	17	10	59%	4.27%2	1.42%2	0.25%	-0.34	not rejected

Figure D.2: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI Japan Index during different crises



E Russia: The case of positive abnormal returns

Table E.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Usual day	Day after positive abnormal returns
1998	1995-1997	0.05%	1.43%
	1998-1998	-0.46%	2.07%
	1999-2001	0.19%	1.36%
2007-2009	2004-2006	0.21%	-0.04%
	2007-2009	0.08	0.71%
	2010-2012	0.09%	0.37%
2014-2015	2011-2013	0.06%	0.21%
	2014-2015	-0.09%	0.52%
	2016-2018	0.07%	0.57%

Figure E.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI Russia during different crises

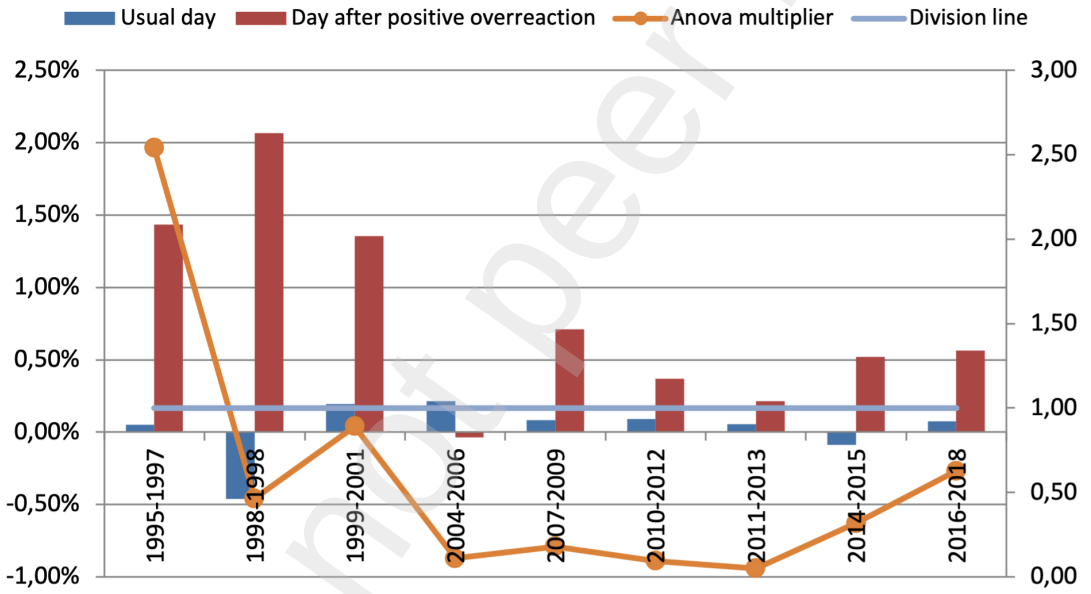


Table E.2: ANOVA test of the price effects after positive abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1998	1995-1997	9.80	0	3.85	rejected	confirmed	2.54
	1998-1998	1.8	0.18	3.88	not rejected	not confirmed	0.46
	1999-2001	3.43	0.06	3.85	not rejected	not confirmed	0.89
2007-2009	2004-2006	0.42	0.52	3.85	not rejected	not confirmed	0.11
	2007-2009	0.69	0.41	3.85	not rejected	not confirmed	0.18
	2010-2012	0.37	0.55	3.85	not rejected	not confirmed	0.09
2014-2015	2011-2013	0.19	0.66	3.85	not rejected	not confirmed	0.05
	2014-2015	1.23	0.27	3.86	not rejected	not confirmed	0.32
	2016-2018	2.42	0.12	3.85	not rejected	not confirmed	0.63

Table E.3: Mann-Whitney test of the price effects after positive abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1998	1995-1997	4.96	1	0.03	3.84	rejected	confirmed
	1998-1998	0.2	1	0.66	3.84	not rejected	not confirmed
	1999-2001	1.34	1	0.25	3.84	not rejected	not confirmed
2007-2009	2004-2006	0.44	1	0.51	3.84	not rejected	not confirmed
	2007-2009	0.88	1	0.35	3.84	not rejected	not confirmed
	2010-2012	0.2	1	0.66	3.84	not rejected	not confirmed
2014-2015	2011-2013	0.57	1	0.45	3.84	not rejected	not confirmed
	2014-2015	0.56	1	0.46	3.84	not rejected	not confirmed
	2016-2018	3.53	1	0.06	3.84	not rejected	not confirmed

Table E.4: T-test of the price effects after positive abnormal returns for the case of the MSCI Russia during different crises

					1998-1998				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
1995-1997	Mean,%	0.05%	1.43%	1998-1998	-0.46%	2.07%	1999-2001	0.19%	1.35%
	Stand. Dev., %	2.48%	3.15%		4.80%	8.05%		2.80%	3.96%
	Number of values	693	32		244	7		741	21
	t-criterion	2.45			0.83			1.33	
	Null hypothesis	rejected			not rejected			not rejected	
	Anomaly	confirmed			not confirmed			not confirmed	
					2007-2009				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2004-2006	Mean,%	0.21%	-0.04%	2007-2009	0.08%	0.71%	2010-2012	0.09%	0.37%
	Stand. Dev., %	1.55%	1.45%		2.81%	1.6%		1.59%2	1.72%
	Number of values	743	16		745	14		747	12
	t-criterion	0.68			1.43			0.56	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
					2014-2015				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2011-2013	Mean,%	0.06%	0.2%	2014-2015	-0.09%	0.52%	2016-2018	0.07%	0.57%
	Stand. Dev., %	1.47%	1.01%		1.77%	2.47%		1.29%	1.03%
	Number of values	744	14		495	11		748	17
	t-criterion	0.56			0.81			1.93	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table E.5: Modified CAR approach: results of the price effects after positive abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1998	1995-1997	0.96	330,71 (0,00)	0,0534 (0,00)	0,0136 (0,00)	confirmed
	1998-1998	0.83	11,41 (0,02)	-0,0430 (0,44)	0,0392 (0,02)	confirmed
	1999-2001	0.91	88,99 (0,00)	0,0302 (0,12)	0,0140 (0,00)	confirmed
2007-2009	2004-2006	0.71	14,47 (0,00)	0,0370 (0,00)	-0,0030 (0,00)	confirmed
	2007-2009	0.86	34,67 (0,00)	0,0250 (0,00)	0,0039 (0,00)	confirmed
	2010-2012	0.78	15,24 (0,00)	-0,0157 (0,19)	0,0059 (0,00)	confirmed
2014-2015	2011-2013	0.75	15,02 (0,00)	-0,0147 (0,04)	0,0029 (0,00)	confirmed
	2014-2015	0.76	12,30 (0,00)	-0,0372 (0,02)	0,0071 (0,00)	confirmed
	2016-2018	0.98	371,90 (0,00)	-0,0354 (0,00)	0,0071 (0,00)	confirmed

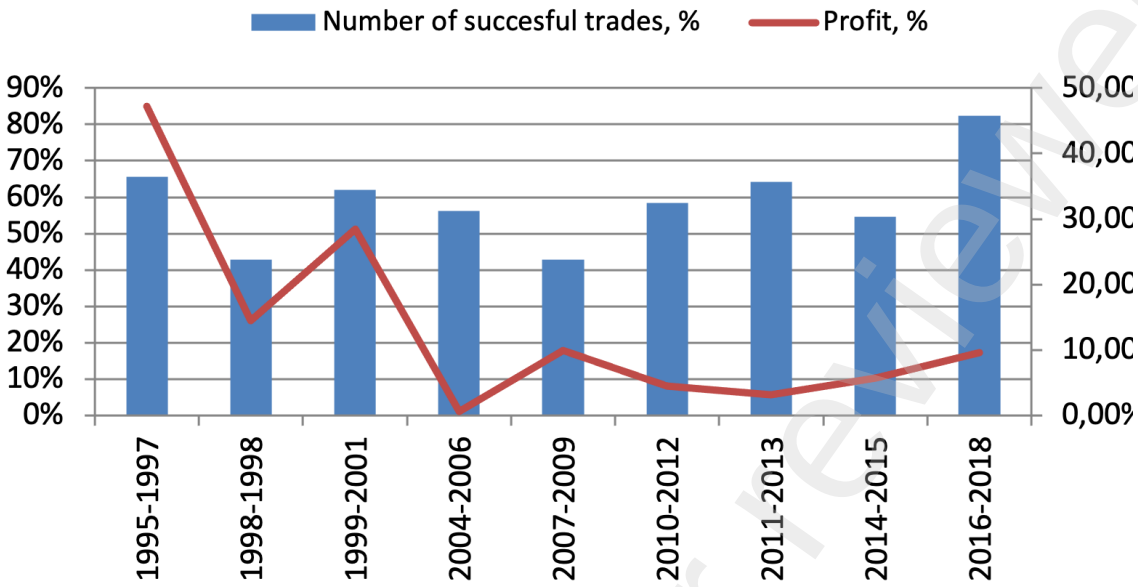
Table E.6: Regression analysis with dummy variables: results of the price effects after positive abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1998	1995-1997	0.12	9,80 (0,00)	0,0005 (0,60)	0,0142 (0,00)	confirmed
	1998-1998	0.08	1,80 (0,18)	-0,0046 (0,14)	0,0253 (0,18)	not confirmed
	1999-2001	0.07	3,43 (0,06)	0,0019 (0,06)	0,0116 (0,06)	not confirmed
2007-2009	2004-2006	0.02	0,42 (0,52)	0,0021 (0,00)	-0,0025 (0,52)	not confirmed
	2007-2009	0.02	0,34 (0,56)	0,0008 (0,42)	0,0036 (0,56)	not confirmed
	2010-2012	0.02	0,37 (0,54)	0,0009 (0,12)	0,0028 (0,54)	not confirmed
2014-2015	2011-2013	0.02	0,19 (0,66)	0,0005 (0,30)	0,0017 (0,66)	not confirmed
	2014-2015	0.01	0,02 (0,90)	-0,0007 (0,35)	0,0005 (0,90)	not confirmed
	2016-2018	0.06	2,42 (0,12)	0,0007 (0,11)	0,0049 (0,12)	not confirmed

Table E.7: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1998	1995-1997*	32	21	66%	47.26%	0.1575	1.48%	2.66	rejected
	1998-1998*	7	3	43%	14.46%	4.82%	2.07%	0.68	not rejected
	1999-2001*	21	13	62%	28.48%	9.48%	1.35%	1.57	not rejected
2007-2009	2004-2006***	16	9	56%	0.62%	0.02%	0.04%	0.11	not rejected
	2007-2009*	14	6	43%	9.95%	3.32%	0.71%	1.66	not rejected
	2010-2012*	12	7	58%	4.44%	1.48%	0.37%	0.74	not rejected
2014-2015	2011-2013*	14	9	64%	3.20%	1.06%	0.23%	0.85	not rejected
	2014-2015*	11	6	55%	5.70%	1.9%	0.52%	0.7	not rejected
	2016-2018*	17	14	82.4%	9.6%	3.20%	0.57%	2.25	rejected

Figure E.2: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI Russia during different crises



F Russia: The case of negative abnormal returns

Table F.1: Average returns for the usual days and days after negative abnormal returns: the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Usual day	Day after negative abnormal returns
1998	1995-1997	0.05%	0.43%
	1998-1998	-0.46%	2.02
	1999-2001	0.19%	2.12%
2007-2009	2004-2006	0.21%	0.20%
	2007-2009	0.08%	-0.50%
	2010-2012	0.09%	-0.09%
2014-2015	2011-2013	0.06%	-0.22%
	2014-2015	-0.09%	0.26%
	2016-2018	0.07%	-0.46%

Figure F.1: Average returns for the usual days and days after negative abnormal returns: the case of the MSCI Russia during different crises

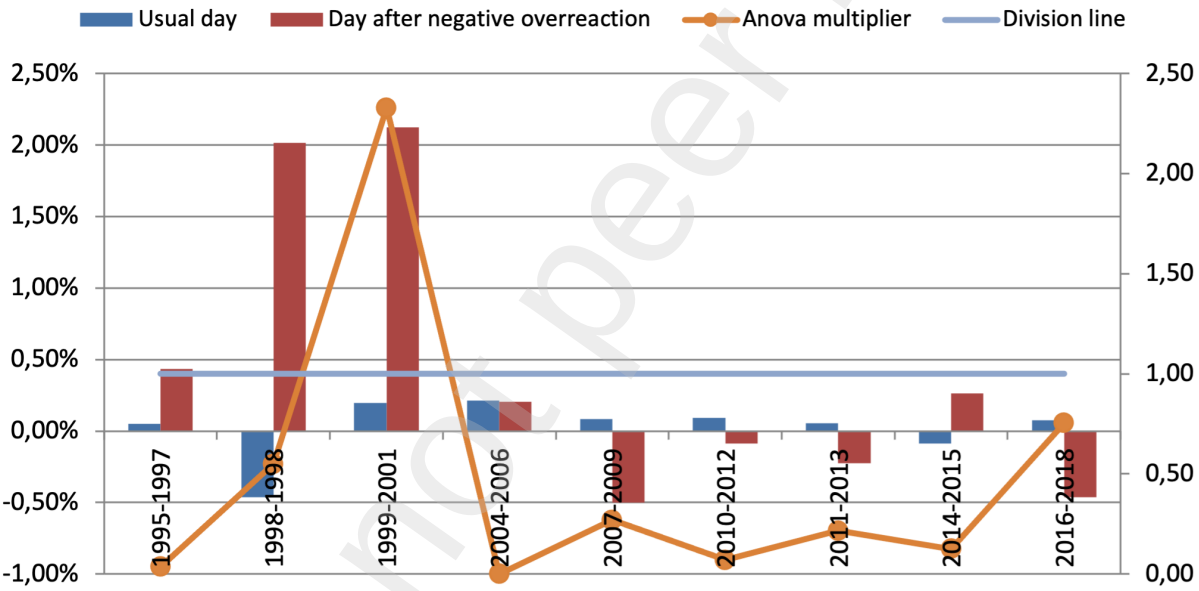


Table F.2: ANOVA test of the price effects after negative abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1998	1995-1997	0.140	0.71	3.85	not rejected	not confirmed	0.04
	1998-1998	2.13	0.15	3.88	not rejected	not confirmed	0.55
	1999-2001	8.98	0	3.85	rejected	confirmed	2.33
2007-2009	2004-2006	0	0.98	3.85	not rejected	not confirmed	0
	2007-2009	1.04	0.31	3.85	not rejected	not confirmed	0.27
	2010-2012	0.27	0.6	3.85	not rejected	not confirmed	0.07
2014-2015	2011-2013	0.83	0.36	3.85	not rejected	not confirmed	0.22
	2014-2015	0.48	0.49	3.86	not rejected	not confirmed	0.12
	2016-2018	2.91	0.09	3.85	not rejected	not confirmed	0.75

Table F.3: Mann-Whitney test of the price effects after negative abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1998	1995-1997	0.1	1	0.75	3.84	not rejected	not confirmed
	1998-1998	2.71	1	0.1	3.84	not rejected	not confirmed
	1999-2001	5.09	1	0.02	3.84	rejected	confirmed
2007-2009	2004-2006	0.27	1	0.6	3.84	not rejected	not confirmed
	2007-2009	1.35	1	0.25	3.84	not rejected	not confirmed
	2010-2012	0.16	1	0.69	3.84	not rejected	not confirmed
2014-2015	2011-2013	0.63	1	0.43	3.84	not rejected	not confirmed
	2014-2015	0.03	1	0.86	3.84	not rejected	not confirmed
	2016-2018	2.64	1	0.1	3.84	not rejected	not confirmed

Table F.4: T-test of the price effects after negative abnormal returns for the case of the MSCI Russia during different crises

1998-1998									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
1995-1997	Mean,%	0.05%	0.43%	1998-1998	-0.46%	2.01%	1999-2001	0.19%	2.12%
	Stand. Dev., %	2.48%	14.64%		4.80%	12.3%		2.80%	4.29%
	Number of values	693	8		244	10		741	20
	t-criterion	0.07			0.64			2	
	Null hypothesis	not rejected			not rejected			rejected	
	Anomaly	not confirmed			not confirmed			confirmed	
2007-2009									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2004-2006	Mean,%	0.21%	0.2%	2007-2009	0.08%	-0.5%	2010-2012	0.09%	-0.09%
	Stand. Dev., %	1.55%	3.21%		2.81%2	2.41%		1.59%	2.87%
	Number of values	743	23		745	25		747	23
	t-criterion	0.01			1.18			0.3	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
2014-2015									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2011-2013	Mean,%	0.06%	-0.22%	2014-2015	-0.09%	0.26%	2016-2018	0.07%	-0.46%
	Stand. Dev., %	1.47%	1.84%		1.77%	5.51%		1.29%	1.04%
	Number of values	744	24		495	16		748	17
	t-criterion	0.73			0.25			2.1	
	Null hypothesis	not rejected			not rejected			rejected	
	Anomaly	not confirmed			not confirmed			confirmed	

Table F.5: Modified CAR approach: results of the price effects after negative abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1998	1995-1997	0.56	9,15 (0,00)	-0,0736 (0,01)	0,0058 (0,01)	confirmed
	1998-1998	0.63	5,33 (0,05)	0,0113 (0,86)	0,0240 (0,05)	confirmed
	1999-2001	0.91	84,41 (0,00)	-0,0310 (0,34)	0,0244 (0,00)	confirmed
2007-2009	2004-2006	0.47	5,84 (0,02)	-0,02322 (0,37)	-0,0044 (0,02)	confirmed
	2007-2009	0.93	140,95 (0,00)	0,0215 (0,03)	-0,0073 (0,00)	confirmed
	2010-2012	0.19	0,79 (0,38)	0,0139 (0,45)	-0,0012 (0,38)	not confirmed
2014-2015	2011-2013	0.88	76,85 (0,00)	0,0531 (0,00)	-0,0054 (0,00)	confirmed
	2014-2015	0.28	1,275 (0,28)	0,0203 (0,37)	0,0025 (0,28)	not confirmed
	2016-2018	0.97	234,06 (0,00)	0,0097 (0,03)	-0,0059 (0,00)	not confirmed

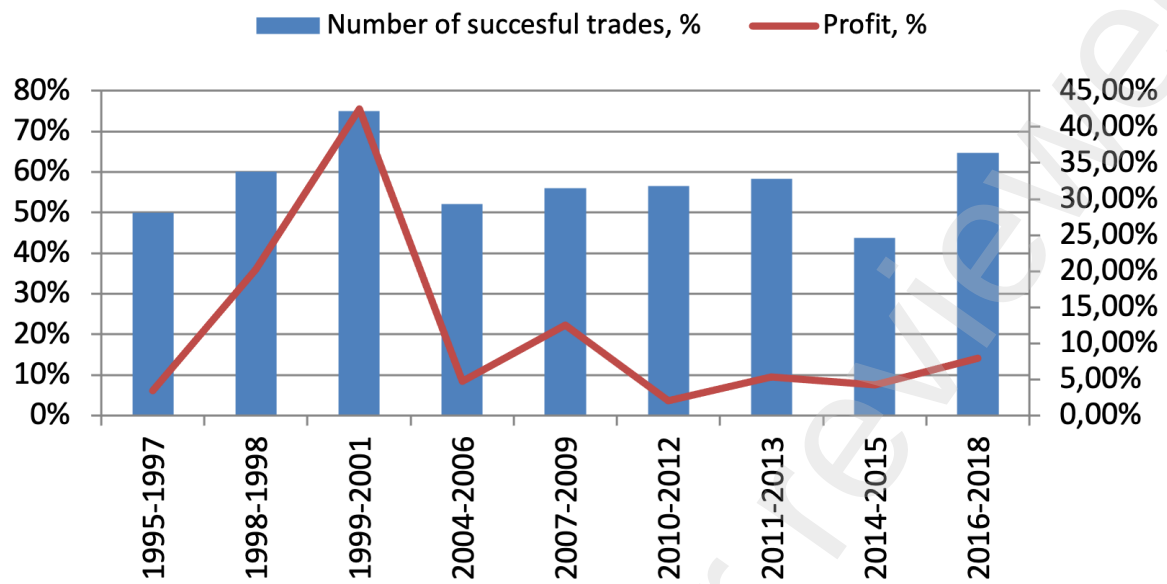
Table F.6: Regression analysis with dummy variables: results of the price effects after negative abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1998	1995-1997	0.01	0,14 (0,71)	0,0005 (0,46)	0,0038 (0,70)	not confirmed
	1998-1998	0.09	2,13 (0,14)	-0,0046 (0,17)	0,0248 (0,14)	not confirmed
	1999-2001	0.11	8,98 (0,00)	0,0019 (0,06)	0,0193 (0,00)	confirmed
2007-2009	2004-2006	0	0,0008 (0,00)	0,0021 (0,00)	-0,0001 (0,97)	not confirmed
	2007-2009	0.04	0,96 (0,33)	0,0008 (0,41)	-0,0048 (0,33)	not confirmed
	2010-2012	0.02	0,27 (0,60)	0,0009 (0,13)	-0,0018 (0,60)	not confirmed
2014-2015	2011-2013	0.03	0,83 (0,36)	0,0005 (0,30)	-0,0028 (0,36)	not confirmed
	2014-2015	0	0,01 (0,94)	-0,0008 (0,39)	0,0003 (0,94)	not confirmed
	2016-2018	0.06	2,91 (0,09)	0,0007 (0,11)	-0,0054 (0,09)	not confirmed

Table F.7: Trading simulation results of the price effects after negative abnormal returns for the case of the MSCI Russia during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1998	1995-1997**	8	4	50%	3.45%	1.15%	0.43%	0.08	not rejected
	1998-1998**	10	6	0.6	20.1%	6.71%	2.019%	0.52	not rejected
	1999-2001**	20	15	75%	42.4%	14.16%	2.12%	2.21	rejected
2007-2009	2004-2006**	23	12	52%	4.71%	1.56%	0.20%	0.31	not rejected
	2007-2009*	25	14	56%	12.52%	4.17%	0.50%	1.03	not rejected
	2010-2012*	23	13	56%	2.02%	0.68%	0.09%	0.15	not rejected
2014-2015	2011-2013*	24	14	57%	5.36%	1.78%	0.22%	0.59	not rejected
	2014-2015**	16	7	44%	4.22%	1.41%	0.26%	0.19	not rejected
	2016-2018*	17	11	65%	7.88%	2.63%	0.46%	1.84	rejected

Figure F.2: Trading simulation results of the price effects after negative abnormal returns for the case of the MSCI Russia during different crises



G Brazil: The case of positive abnormal returns

Table G.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Usual day	Day after positive abnormal returns
1999	1996-1998	0.05%	0.11%
	1999-1999	0.09%	0.94%
	2000-2002	-0.05%	-0.05%
2007-2009	2004-2006	0.23%	0.18%
	2007-2009	0.19%	0.45%
	2010-2012	0.04%	-0.09%
2014-2017	2011-2013	0.00%	0.51%
	2014-2017	0.01%	0.03%
	2018-2019	0.08%	0.80%

Figure G.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI Brazil during different crises

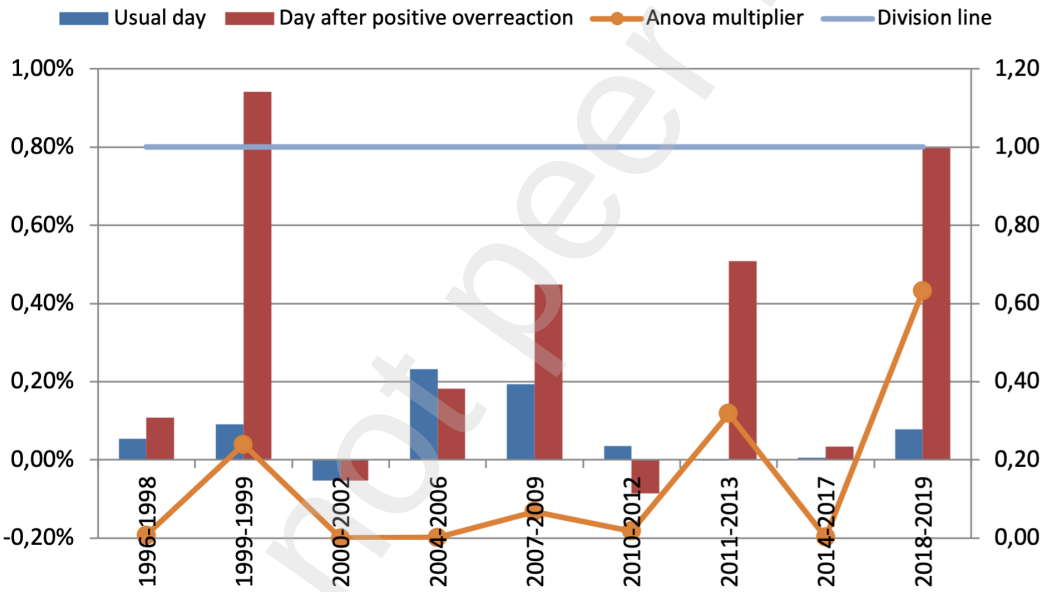


Table G.2: ANOVA test of the price effects after positive abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1999	1996-1998	0.03	0.87	3.85	not rejected	not confirmed	0.01
	1999-1999	0.93	0.34	3.88	not rejected	not confirmed	0.24
	2000-2002	0	1	3.85	not rejected	not confirmed	0
2007-2009	2004-2006	0.01	0.94	3.85	not rejected	not confirmed	0
	2007-2009	0.26	0.61	3.85	not rejected	not confirmed	0.07
	2010-2012	0.07	0.79	3.85	not rejected	not confirmed	0.02
2014-2017	2011-2013	1.23	0.27	3.85	not rejected	not confirmed	0.32
	2014-2017	0.01	0.93	3.85	not rejected	not confirmed	0
	2018-2019	2.44	0.12	3.86	not rejected	not confirmed	0.63

Table G.3: Mann-Whitney test of the price effects after positive abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1999	1996-1998	0.07	1	0.79	3.84	not rejected	not confirmed
	1999-1999	1.2	1	0.27	3.84	not rejected	not confirmed
	2000-2002	0.25	1	0.61	3.84	not rejected	not confirmed
2007-2009	2004-2006	0.04	1	0.84	3.84	not rejected	not confirmed
	2007-2009	0	1	0.99	3.84	not rejected	not confirmed
	2010-2012	0.28	1	0.59	3.84	not rejected	not confirmed
2014-2017	2011-2013	1.09	1	0.3	3.84	not rejected	not confirmed
	2014-2017	0.2	1	0.66	3.84	not rejected	not confirmed
	2018-2019	1.46	1	0.23	3.84	not rejected	not confirmed

Table G.4: T-test of the price effects after positive abnormal returns for the case of the MSCI Brazil during different crises

1999									
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
1996-1998	Mean,%	0.05%	0.11%	1999-1999	0.09%	0.94%	2000-2002	-0.05%	-0.05%
	Stand. Dev., %	1.78%	2.75%		2.23%	4.44%		1.89%	2.25%
	Number of values	732	27		252	7		745	15
	t-criterion	0.1			0.5			0	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
2007-2009									
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2004-2006	Mean,%	0.23%	0.18%	2007-2009	0.19%3	0.45%	2010-2012	0.04%	-0.09%4
	Stand. Dev., %	1.65%	1.08%		2.53%	2.57%		1.45%	1.43%
	Number of values	757	7		732	23		752	10
	t-criterion	0.12			0.47			0.26	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
2014-2015									
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2011-2013	Mean,%	0	0.51%	2014-2017	0.01%	0.03%	2018-2019	0.08%	0.8%
	Stand. Dev., %	1.37%	1.43%		1.67%	2.05%		1.43%	1.89%
	Number of values	753	9		993	25		496	10
	t-criterion	1.06			0.07			1.19	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table G.5: Modified CAR approach: results of the price effects after positive abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1999	1996-1998	0.32	2,87 (0,10)	0,0416 (0,00)	0,0012 (0,10)	not confirmed
	1999-1999	0.9	20,23 (0,00)	-0,0612 (0,01)	0,0169 (0,01)	confirmed
	2000-2002	0.25	0,84 (0,37)	0,0249 (0,16)	-0,0017 (0,37)	not confirmed
2007-2009	2004-2006	0.66	3,77 (0,11)	0,0062 (0,44)	-0,0033 (0,11)	not confirmed
	2007-2009	0.63	14,01 (0,00)	-0,0313 (0,07)	0,0046 (0,00)	confirmed
	2010-2012	0.13	0,14 (0,72)	-0,0317 (0,02)	0,0007 (0,72)	not confirmed
2014-2017	2011-2013	0.79	11,27 (0,01)	0,0180 (0,07)	0,0052 (0,01)	confirmed
	2014-2017	0.21	1,10 (0,30)	0,0091 (0,52)	-0,0010 (0,30)	not confirmed
	2018-2019	0.85	21,35 (0,00)	0,0056 (0,53)	0,0064 (0,00)	confirmed

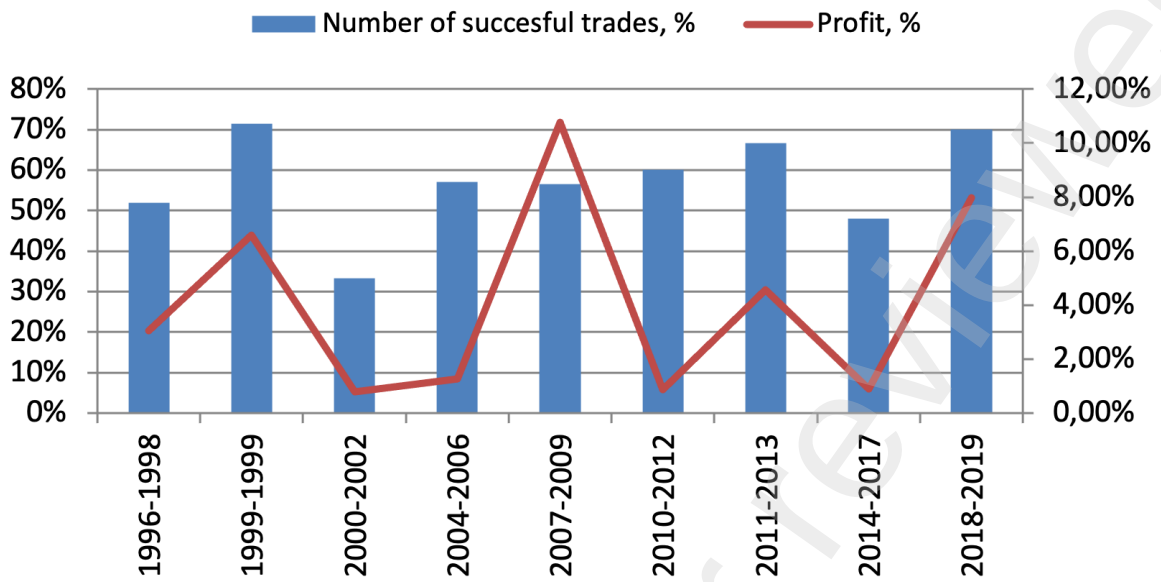
Table G.6: Regression analysis with dummy variables: results of the price effects after positive abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1999	1996-1998	0.01	0,03 (0,87)	0,0005 (0,43)	0,0006 (0,87)	not confirmed
	1999-1999	0.06	0,93 (0,33)	0,0009 (0,53)	0,0085 (0,33)	not confirmed
	2000-2002	0	0,00 (0,99)	-0,0005 (0,45)	-0,0000 (0,99)	not confirmed
2007-2009	2004-2006	0	0,01 (0,93)	0,0023 (0,00)	-0,0005 (0,93)	not confirmed
	2007-2009	0.03	0,70 (0,40)	0,0019 (0,04)	0,0046 (0,40)	not confirmed
	2010-2012	0.01	0,07 (0,79)	0,0003 (0,50)	-0,0012 (0,79)	not confirmed
2014-2017	2011-2013	0.04	1,23 (0,27)	0,0000 (0,99)	0,0051 (0,27)	not confirmed
	2014-2017	0	0,01 (0,93)	0,0001 (0,91)	0,0003 (0,93)	not confirmed
	2018-2019	0.07	2,44 (0,12)	0,0008 (0,22)	0,0072 (0,12)	not confirmed

Table G.7: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1999	1996-1998*	27	14	52%	3.04%	1.02%	0.11%3	0.21	not rejected
	1999-1999**	7	5	71%	6.59%	2.19%	0.94%	0.56	not rejected
	2000-2002***	15	5	33%	0.79%	0.26%	0.05%	0.09	not rejected
2007-2009	2004-2006*	7	4	57%	1.26%	0.42%	0.18%	0.45	not rejected
	2007-2009*	23	13	57%	10.76%	3.59%	0.47%	0.87	not rejected
	2010-2012**	10	6	60%	0.86%	0.29%	0.09%	0.19	not rejected
2014-2017	2011-2013*	9	6	67%	4.58%	1.52%	0.51%	1.07	not rejected
	2014-2017*	25	12	48%	0.90%	0.3%	0.04%	0.09	not rejected
	2018-2019*	10	7	70%	8%	2.7%	0.8%	1.33	not rejected

Figure G.2: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI Brazil during different crises



H Brazil: The case of negative abnormal returns

Table H.1: Average returns for the usual days and days after negative abnormal returns: the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Usual day	Day after negative abnormal returns
1999	1996-1998	0.05%	0.37%
	1999-1999	0.09%	-4.71%
	2000-2002	-0.05%	-0.51%
2007-2009	2004-2006	0.23%	-1.13%
	2007-2009	0.19%	1.05%
	2010-2012	0.04%	-0.25%
2014-2017	2011-2013	0.00%	-0.35%
	2014-2017	0.01%	0.39%
	2018-2019	0.08%	0.19%

Figure H.1: Average returns for the usual days and days after negative abnormal returns: the case of the MSCI Brazil during different crises

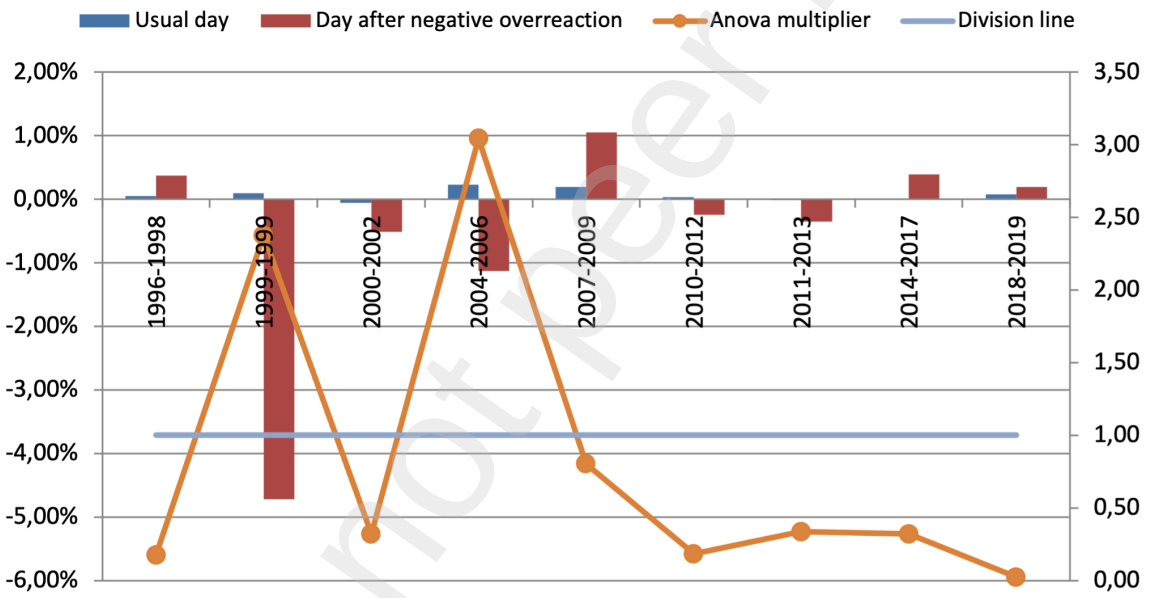


Table H.2: ANOVA test of the price effects after negative abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
1999	1996-1998	0.68	0.41	3.85	not rejected	not confirmed	0.18
	1999-1999	9.22	0	3.88	not rejected	confirmed	2.38
	2000-2002	1.24	0.27	3.85	not rejected	not confirmed	0.32
2007-2009	2004-2006	11.73	0	3.85	rejected	confirmed	3.04
	2007-2009	3.1	0.08	3.85	not rejected	not confirmed	0.8
	2010-2012	0.71	0.4	3.85	not rejected	not confirmed	0.18
2014-2017	2011-2013	1.29	0.26	3.85	not rejected	not confirmed	0.34
	2014-2017	1.23	0.27	3.85	not rejected	not confirmed	0.32
	2018-2019	0.09	0.76	3.86	not rejected	not confirmed	0.02

Table H.3: Mann-Whitney test of the price effects after negative abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
1999	1996-1998	0.38	1	0.54	3.84	not rejected	not confirmed
	1999-1999	4.40	1	0.04	3.84	rejected	confirmed
	2000-2002	0.32	1	0.56	3.84	not rejected	not confirmed
2007-2009	2004-2006	10.93	1	0	3.84	rejected	confirmed
	2007-2009	2.23	1	0.14	3.84	not rejected	not confirmed
	2010-2012	0.62	1	0.43	3.84	not rejected	not confirmed
2014-2017	2011-2013	1.87	1	0.17	3.84	not rejected	not confirmed
	2014-2017	1.52	1	0.22	3.84	not rejected	not confirmed
	2018-2019	0.31	1	0.57	3.84	not rejected	not confirmed

Table H.4: T-test of the price effects after negative abnormal returns for the case of the MSCI Brazil during different crises

1998-1998									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
1996-1998	Mean,%	0.05%	0.37%	1999-1999	0.09%	-4.71%	2000-2002	-0.05%	-0.51%
	Stand. Dev., %	1.78%	3.96%		2.23%	3.52%		1.89%	2.29%
	Number of values	732	25		252	2		745	22
	t-criterion	0.4			1.92			0.93	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
2007-2009									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2004-2006	Mean,%	0.23%	-1.129%	2007-2009	0.19%	1.05%	2010-2012	0.04%	-0.25%
	Stand. Dev., %	1.65%	2.48%		2.53%	3.52%		1.45%	2.21%
	Number of values	757	18		732	29		752	20
	t-criterion	2.31			1.3			0.56	
	Null hypothesis	rejected			not rejected			not rejected	
	Anomaly	confirmed			not confirmed			not confirmed	
2014-2017									
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2011-2013	Mean,%	0	-0.35%	2014-2017	0.01%	0.38%	2018-2019	0.08%	0.19%
	Stand. Dev., %	1.37%	1.32%		1.67%	2.62%		1.43%	1.70%
	Number of values	753	20		993	25		496	15
	t-criterion	1.18			0.73			0.26	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table H.5: Modified CAR approach: results of the price effects after negative abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1999	1996-1998	0.49	7,23 (0,01)	-0,0611 (0,00)	0,0030 (0,01)	confirmed
	1999-1999	-	-	-	-	-
	2000-2002	0.1	0,20 (0,66)	-0,0194 (0,23)	-0,0005 (0,65)	not confirmed
2007-2009	2004-2006	0.96	166,98 (0,00)	-0,0366 (0,00)	-0,0135 (0,00)	confirmed
	2007-2009	0.77	39,51 (0,00)	0,0045 (0,84)	0,0081 (0,00)	confirmed
	2010-2012	0	0,0002 (0,98)	-0,0508 (0,00)	0,0000 (0,99)	not confirmed
2014-2017	2011-2013	0.91	81,55 (0,00)	0,0163 (0,00)	-0,0036 (0,00)	confirmed
	2014-2017	0.63	15,44 (0,00)	0,0109 (0,26)	0,0025 (0,00)	confirmed
	2018-2019	0.86	38,42 (0,00)	-0,0778 (0,00)	0,0063 (0,00)	confirmed

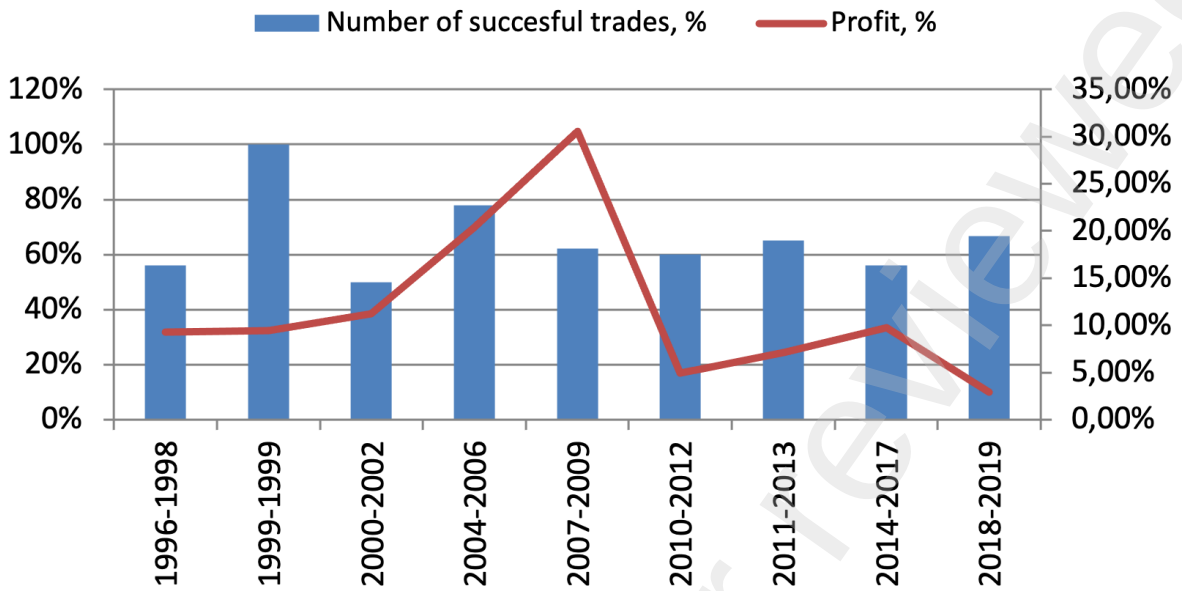
Table H.6: Regression analysis with dummy variables: results of the price effects after negative abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
1999	1996-1998	0.04	0,93 (0,33)	0,0005 (0,48)	0,0032 (0,33)	not confirmed
	1999-1999	0.19	9,21 (0,00)	0,0009 (0,51)	-0,0481 (0,00)	confirmed
	2000-2002	0.04	1,24 (0,27)	-0,0005 (0,45)	-0,0046 (0,27)	not confirmed
2007-2009	2004-2006	0.12	11,73 (0,00)	0,0023 (0,00)	-0,01364 (0,00)	confirmed
	2007-2009	0.06	2,88 (0,09)	0,0019 (0,05)	0,0074 (0,09)	not confirmed
	2010-2012	0.03	0,71 (0,40)	0,0003 (0,51)	-0,0028 (0,40)	not confirmed
2014-2017	2011-2013	0.04	1,29 (0,25)	0,0000 (0,99)	-0,0035 (0,25)	not confirmed
	2014-2017	0.03	1,23 (0,27)	0,00006 (0,91)	0,0038 (0,27)	not confirmed
	2018-2019	0.01	0,09 (0,76)	0,0008 (0,22)	0,0011 (0,76)	not confirmed

Table H.7: Trading simulation results of the price effects after negative abnormal returns for the case of the MSCI Brazil during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
1999	1996-1998**	25	14	56%	9.26	3.09%	0.37%	0.47	not rejected
	1999-1999*	2	2	100%	9.43%	3.15%	4.71%	1.89	rejected
	2000-2002*	22	11	50%	11.23%	3.74%	0.51%	1.04	not rejected
2007-2009	2004-2006*	18	14	78%	20.36%	6.79%	1.12%	1.93	rejected
	2007-2009**	29	18	62%	0.30%	10.19%	1.05%	1.61	not rejected
	2010-2012*	20	12	60%	4.92%	1.64%	0.25%	0.5	not rejected
2014-2017	2011-2013*	20	13	65%	7.069%	2.35%2	0.35%	1.2	not rejected
	2014-2017**	25	14	56%	9.71%	3.23%	0.39%	0.74	not rejected
	2018-2019**	15	10	67%	2.88%	0.96%	0.19%	0.44	not rejected

Figure H.2: Trading simulation results of the price effects after negative abnormal returns for the case of the MSCI Brazil during different crises



I China: The case of positive abnormal returns

Table I.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Usual day	Day after positive abnormal returns
2007-2009	2004-2006	0.13%	0.29%
	2007-2009	0.06%	0.25%
	2010-2012	0.04%	0.16%
2015	2012-2014	0.04%	0.28%
	2015-2015	-0.02%	0.64%
	2016-2018	0.05%	0.20%

Figure I.1: Average returns for the usual days and days after positive abnormal returns: the case of the MSCI China Index during different crises

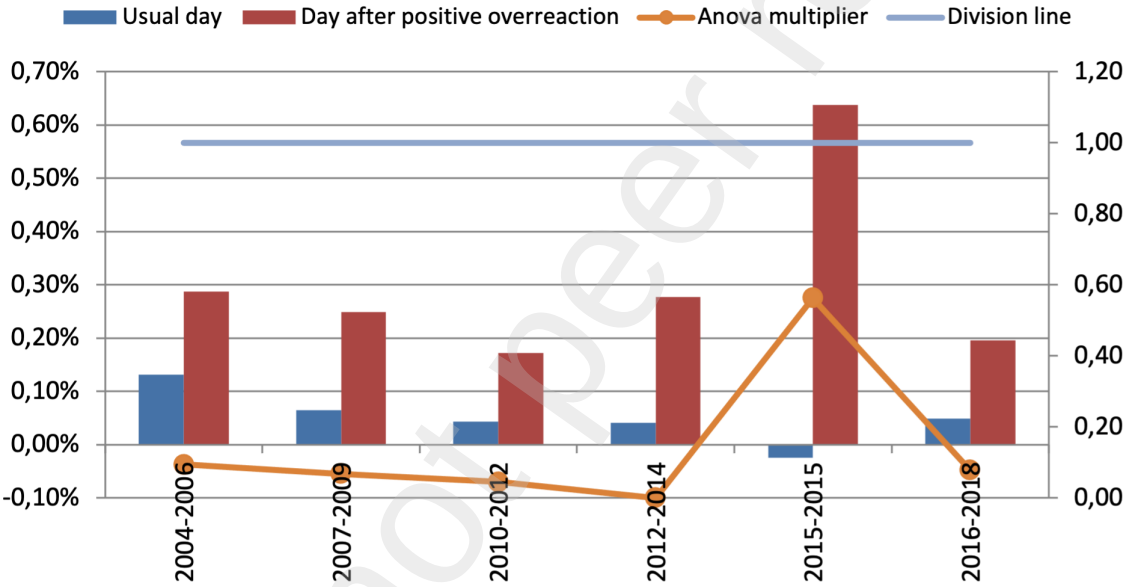


Table I.2: ANOVA test of the price effects after positive abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
2007-2009	2004-2006	0.36	0.55	3.85	not rejected	not confirmed	0.09
	2007-2009	0.26	0.61	3.85	not rejected	not confirmed	0.07
	2010-2012	0.17	0.68	3.85	not rejected	not confirmed	0.05
2015	2012-2014	1.23	0.27	3.85	not rejected	not confirmed	0
	2015-2015	2.18	0.14	3.88	not rejected	not confirmed	0.56
	2016-2018	0.3	0.57	3.85	not rejected	not confirmed	0.08

Table I.3: Mann-Whitney test of the price effects after positive abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
2007-2009	2004-2006	0.77	1	0.38	3.84	not rejected	not confirmed
	2007-2009	0.21	1	0.64	3.84	not rejected	not confirmed
	2010-2012	0	1	0.98	3.84	not rejected	not confirmed
2015	2012-2014	0.22	1	0.64	3.84	not rejected	not confirmed
	2015-2015	1.36	1	0.24	3.84	not rejected	not confirmed
	2016-2018	0.97	1	0.33	3.84	not rejected	not confirmed

Table I.4: T-test of the price effects after positive abnormal returns for the case of the MSCI China Index during different crises

					2007-2009				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2004-2006	Mean,%	0.13%	0.29%	2007-2009	0.06%	0.25%	2010-2012	0.04%	0.17%
	Stand. Dev., %	1.12%	0.88%		2.25%	2.19%		1.22%	1.06%
	Number of values	741	19		750	16		740	16
	t-criterion	0.76			0.33			0.48	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
					2007-2009				
Period	Parameter	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns	Period	Usual day	Day after positive abnormal returns
2012-2014	Mean,%	0.04%	0.28%	2015-2015	-0.02%	0.64%	2016-2018	0.05%	0.2%
	Stand. Dev., %	0.91%	1.06%		1.23%	2.18%		1.03%	0.77%
	Number of values	753	19		249	6		750	15
	t-criterion	0.96			0.74			0.73	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table I.5: Modified CAR approach: results of the price effects after positive abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
2007-2009	2004-2006	0.6	9,34 (0,00)	0,0095 (0,01)	0,0008 (0,001)	confirmed
	2007-2009	0.08	0,10 (0,76)	-0,0031 (0,83)	0,0004 (0,76)	not confirmed
	2010-2012	0.79	23,57 (0,00)	-0,0239 (0,00)	0,0030 (0,00)	confirmed
2015	2012-2014	0.89	64,61 (0,00)	-0,0172 (0,00)	0,0037 (0,00)	confirmed
	2015-2015	0.7	3,84 (0,12)	0,0098 (0,50)	0,0067 (0,12)	not confirmed
	2016-2018	0.72	14,23 (0,00)	0,00855 (0,03)	0,0014 (0,00)	confirmed

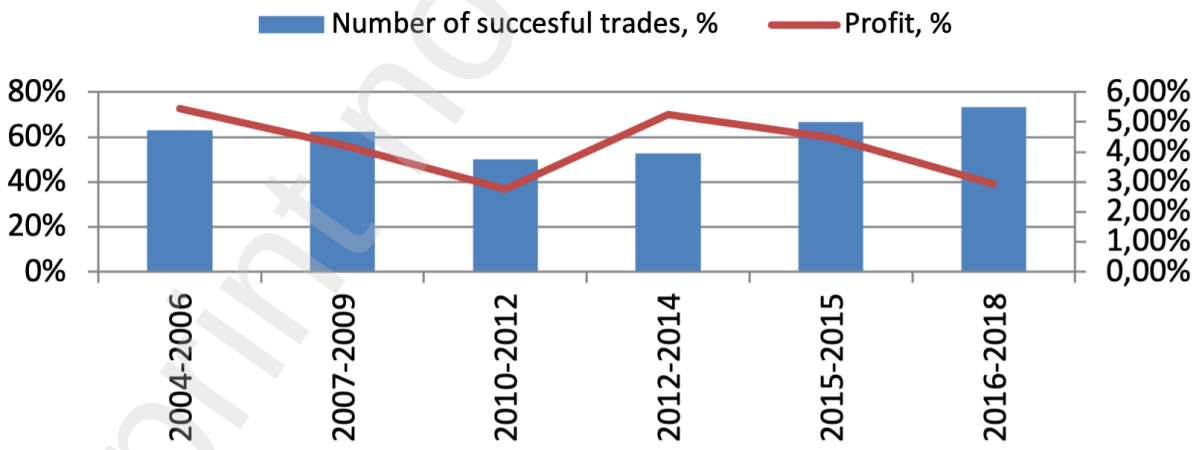
Table I.6: Regression analysis with dummy variables: results of the price effects after positive abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
2007-2009	2004-2006	0.02	0,35 (0,55)	0,0013 (0,00)	0,0015 (0,55)	not confirmed
	2007-2009	0.01	0,12 (0,73)	0,0006 (0,43)	0,0020 (0,73)	not confirmed
	2010-2012	0.01	0,17 (0,68)	0,0004 (0,29)	0,0012 (0,68)	not confirmed
2015	2012-2014	0.04	1,23 (0,27)	0,0004 (0,22)	0,0023 (0,27)	not confirmed
	2015-2015	0.09	2,18 (0,14)	-0,0002 (0,76)	0,0077 (0,14)	not confirmed
	2016-2018	0.02	0,30 (0,58)	0,0005 (0,19)	0,0015 (0,58)	not confirmed

Table I.7: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, unit	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
2007-2009	2004-2006*	19	12	63%	5.45%	1.82%	0.29%	1.42	not rejected
	2007-2009*	16	10	63%	4.22%	1.41%	0.26%	0.48	not rejected
	2010-2012*	16	8	50%	2.75%	0.91%	0.17%	0.65	not rejected
2015	2012-2014*	19	10	53%	5.26%-2	1.75%	0.28%	1.14	not rejected
	2015-2015*	6	4	67%	4.46%	4.46%	0.74%3	0.83	not rejected
	2016-2018*	15	11	73%	2.93%	0.98%	0.20%	0.99	not rejected

Figure I.2: Trading simulation results of the price effects after positive abnormal returns for the case of the MSCI China Index during different crises



J China: The case of negative abnormal returns

Table J.1: Average returns for the usual days and days after negative abnormal returns: the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Usual day	Day after negative abnormal returns
2007-2009	2004-2006	0.13%	0.12%
	2007-2009	0.06%	0.95%
	2010-2012	0.04%	-0.20%
2015	2012-2014	0.04%	0.02%
	2015-2015	-0.02%	0.95%
	2016-2018	0.05%	-0.37%

Figure J.1: Average returns for the usual days and days after negative abnormal returns: the case of the MSCI China Index during different crises

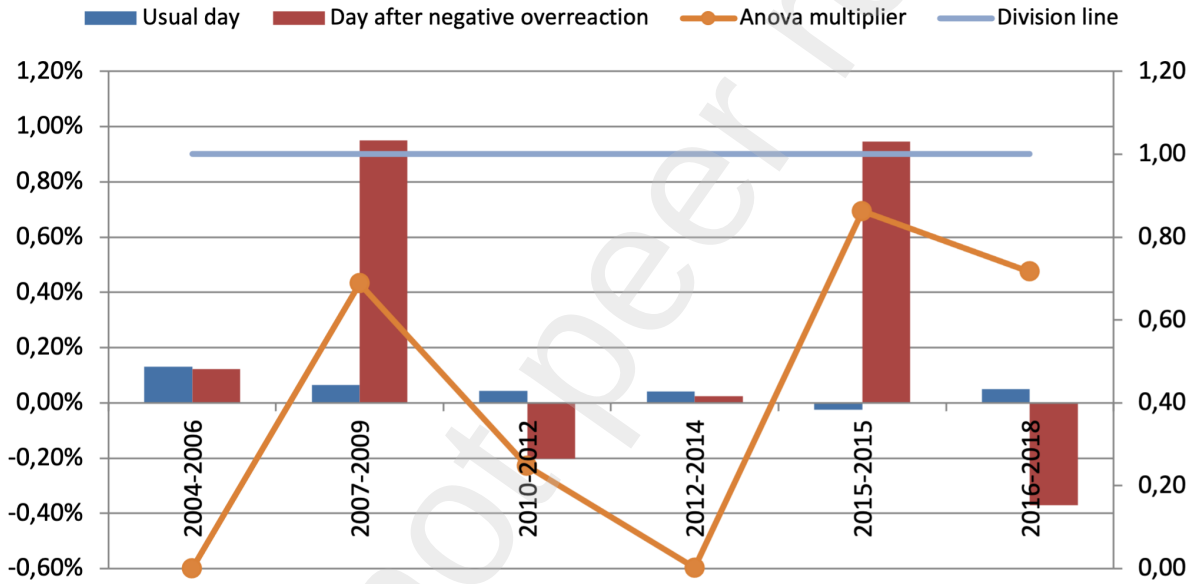


Table J.2: ANOVA test of the price effects after negative abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	F	p-value	F critical	Null hypothesis	Anomaly	Anova multiplier
2007-2009	2004-2006	0	0.97	3.85	not rejected	not confirmed	0
	2007-2009	2.65	0.1	3.85	not rejected	not confirmed	0.69
	2010-2012	0.95	0.33	3.85	not rejected	not confirmed	0.25
2015	2012-2014	0.01	0.93	3.85	not rejected	not confirmed	0
	2015-2015	3.34	0.07	3.88	not rejected	not confirmed	0.86
	2016-2018	2.76	0.1	3.85	not rejected	not confirmed	0.72

Table J.3: Mann-Whitney test of the price effects after negative abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Adjusted H	d.f.	P value	Critical value	Null hypothesis	Anomaly
2007-2009	2004-2006	0	1	0.98	3.84	not rejected	not confirmed
	2007-2009	1.3	1	0.25	3.84	not rejected	not confirmed
	2010-2012	0.73	1	0.39	3.84	not rejected	not confirmed
2015	2012-2014	0.06	1	0.81	3.84	not rejected	not confirmed
	2015-2015	1.55	1	0.21	3.84	not rejected	not confirmed
	2016-2018	3.45	1	0.06	3.84	not rejected	not confirmed

Table J.4: T-test of the price effects after negative abnormal returns for the case of the MSCI China Index during different crises

					2007-2009				
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2004-2006	Mean,%	0.13%	0.12%	2007-2009	0.06%	0.95%	2010-2012	0.04%	-0.2%
	Stand. Dev., %	1.12%	1.65%		2.25%	4.63%		1.22%	1.56%
	Number of values	741	22		750	19		740	25
	t-criterion	0.02			0.83			0.78	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	
					2007-2009				
Period	Parameter	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns	Period	Usual day	Day after negative abnormal returns
2012-2014	Mean,%	0.04%	0.02%	2015-2015	-0.02%	0.95%	2016-2018	0.05%	-0.37%
	Stand. Dev., %	0.91%	0.75%		1.23%	2.80%		1.03%	0.91%
	Number of values	753	22		249	6		750	17
	t-criterion	0.1			0.85			1.87	
	Null hypothesis	not rejected			not rejected			not rejected	
	Anomaly	not confirmed			not confirmed			not confirmed	

Table J.5: Modified CAR approach: results of the price effects after negative abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
2007-2009	2004-2006	0.28	1,79 (0,20)	-0,0319 (0,00)	0,0007 (0,19)	not confirmed
	2007-2009	0.45	4,40 (0,05)	-0,0066 (0,80)	0,0048 (0,05)	not confirmed
	2010-2012	0.56	10,62 (0,00)	0,0077 (0,35)	-0,0018 (0,00)	confirmed
2015	2012-2014	0.39	3,66 (0,07)	-0,0083 (0,00)	-0,0004 (0,07)	not confirmed
	2015-2015	0.74	4,96 (0,09)	0,0046 (0,79)	0,0095 (0,09)	not confirmed
	2016-2018	0.92	86,73 (0,00)	-0,0061 (0,16)	-0,0037 (0,00)	confirmed

Table J.6: Regression analysis with dummy variables: results of the price effects after negative abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Multiple R	F-test	a0	a1	Anomaly
2007-2009	2004-2006	0	0,00 (0,96)	0,0013 (0,00)	-0,0001 (0,96)	not confirmed
	2007-2009	0.06	2,89 (0,09)	0,0006 (0,49)	0,0078 (0,09)	not confirmed
	2010-2012	0.04	0,99 (0,32)	0,0004 (0,30)	-0,0025 (0,32)	not confirmed
2015	2012-2014	0	0,01 (0,93)	0,0004 (0,21)	-0,0001 (0,93)	not confirmed
	2015-2015	0.11	3,34 (0,07)	-0,0002 (0,77)	0,0097 (0,07)	not confirmed
	2016-2018	0.06	2,76 (0,09)	0,0005 (0,19)	-0,0042 (0,09)	not confirmed

Table J.7: Trading simulation results of the price effects after negative abnormal returns for the case of the MSCI China Index during different crises

Crisis period	Period of analysis	Number of trades, units	Number of successful trades, units	Number of successful trades, %	Profit, %	Profit % per year	Profit % per trade	t-test calculated value	t-test status
2007-2009	2004-2006**	22	13	59%	2.7%	0.9%	0.12%	0.35	not rejected
	2007-2009**	19	12	63%	18.04%	6.019%	0.95%	0.89	not rejected
	2010-2012*	25	13	52%	5.04%	1.67%	0.02%	0.64	not rejected
2015	2012-2014**	22	11	50%	0.55%	0.18%	0.02%	0.15	not rejected
	2015-2015**	6	4	67%	5.67%	1.89%	0.95%	0.83	not rejected
	2016-2018*	17	12	71%	6.3%	2.10%	0.37%	1.67	not rejected

Figure J.2: Trading simulation results of the price effects after negative abnormal returns for the case of the MSCI China Index during different crises