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ARTICLE INFO

Alex Plastun, Ahniia Havrylina, Liudmyla Sliusareva, Nataliya Strochenko and Olga Zhmaylova (2021). Daily abnormal returns and price effects in the “passion investments” market. *Investment Management and Financial Innovations*, *18*(4), 141-149. doi:10.21511/imfi.18(4).2021.13

DOI http://dx.doi.org/10.21511/imfi.18(4).2021.13

RELEASED ON Thursday, 04 November 2021

RECEIVED ON Thursday, 02 September 2021

ACCEPTED ON Monday, 01 November 2021

JOURNAL "Investment Management and Financial Innovations"

ISSN PRINT 1810-4967

ISSN ONLINE 1812-9358

PUBLISHER LLC “Consulting Publishing Company “Business Perspectives”

FOUNDER LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES **39**

NUMBER OF FIGURES **2**

NUMBER OF TABLES **8**

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

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DAILY ABNORMAL RETURNS AND PRICE EFFECTS IN THE "PASSION INVESTMENTS" MARKET

Abstract

This paper explores price effects in the "passion investments" market after days with abnormal returns. To do this, daily prices for stamps and diamonds over the periods 1999–2021 and 1989–2021 are analyzed. The following hypothesis is tested: One-day abnormal returns create stable patterns in price behavior on the next day. Statistic tests (t-test, ANOVA, Mann–Whitney U test, modified cumulative abnormal returns approach, regression analysis with dummy variables) confirm the presence of price patterns related to extreme returns: price fluctuations on the day after extreme returns are higher than returns on "normal" days. On the days after positive abnormal returns, the momentum effect is detected. Contrarian effect is typical for the days after negative abnormal returns. A trading strategy based on detected price effects showed the presence of exploitable profit opportunities. Results of this paper provide additional pieces of evidence in favor of inconsistencies between the efficient market hypothesis and practice and can be used by traders to generate extra profits in the "passion investments" market.

Keywords alternative assets, momentum effect, abnormal returns, contrarian strategy, passion investments

JEL Classification G12, G17, C63

Received on: 2nd of September, 2021
Accepted on: 1st of November, 2021
Published on: 4th of November, 2021

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Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

Pandemic and lockdowns created the never seen before situation in the financial markets. Monetary and fiscal stimulus have injected trillions of dollars into financial markets. As a result, prices in the stock markets, commodity markets, and cryptocurrency markets have increased significantly. Prices for alternative assets have demonstrated significant growth as well. For example, diamond prices have tripled since the start of the pandemic until the fall of 2021; the stamps index has doubled. Interest in alternative assets has increased, but in the academic literature, this field is relatively unexplored (compared with traditional assets).

The efficiency of the "passion investments" market (includes five wines, works of art, antique cars, colored diamonds, stamps, and other alternative assets) is not widely discussed among academicians especially in the aspect of patterns in price behavior, market anomalies, and potential of price patterns exploitation.

This paper aims to fill one of these gaps. From time-to-time prices in the financial markets tend to demonstrate abnormal returns (caused by new information arrival or market overreactions). The issue of price overreactions is widely discussed for the case of traditional assets (FOREX, stock market, commodity market) by De Bondt and Thaler (1985), Bremer and Sweeney (1991), Choi and Jayaraman (2009),

Caporale and Plastun (2020a, 2020b, 2021), etc. However, none of them has focused on the alternative assets and "passion investments" in particular.

Based on results provided by Caporale and Plastun (2020a, 2020b, 2021) price dynamics on the day after abnormal returns, as a rule, is typical and can be described as a momentum or contrarian effect. The momentum effect is observed in the emerging stock markets, oil prices, and most cryptocurrency markets. Contrarian effect is typical for the FOREX (Caporale & Plastun, 2020a), developed stock markets, gold prices (Caporale & Plastun, 2021) and Bitcoin (Caporale & Plastun, 2020b). Thus, the less efficient the market, the more time it needs to incorporate new information (markets underreact). And vice versa, more efficient markets absorb new information very fast but tend to overreact.

The "passion investments" market never has been an object of such research. Still, it is very interesting to see whether abnormal returns in this market generate specific patterns in price behavior and to find out whether these patterns can help to "beat the market" – generate abnormal profits from trading.

1. LITERATURE REVIEW

Existing literature provides a lot of results in favor of price patterns in financial markets caused by abnormal price changes. The first evidence was obtained by De Bondt and Thaler (1985), who showed that if prices in the US stock market overreact in a given period, in the next period they tend to demonstrate contrarian movement. Bremer and Sweeney (1991) used daily data and find the same: after significant negative daily returns (exceeding 10%) price usually increase on the next day averaged. Similar results were detected for the case of the FOREX (Caporale & Plastun, 2020a), commodity (Cutler et al., 1991), and cryptocurrency (Caporale & Plastun, 2020b) markets.

Alternative investment instruments (fine wine, art, diamonds, stamps, etc.) are characterized by several specific features compared with traditional ones. These features include high entry barriers and high investment risks, issues with the valuation of the assets, higher transactional costs including diligence costs and lower trading volumes, lack of data and information (Fischer & Firer, 1985). Still, they have higher returns and their Sharpe ratio outperforms significantly (Lucey & Devine, 2015).

As a result, alternative investments are widely discussed in academic papers. Cardebat and Jiao (2018) showed that stock markets have a long-term relationship with fine wine markets. Worthington and Higgs (2003) established short-term and long-term co-movements between art and stock markets. Analyzing diamonds, Auer (2014) concluded that they are weak safe haven assets and weak hedge against the stock market.

Bouri et al. (2018) found that wine performs better than the US and UK stocks, bonds, gold, and residential housing index. Masset and Weiskopf (2018) showed that during economic turmoil, wine performance diminished less than for conventional assets. Faye et al. (2015) concluded that yields generated in financial markets are reinvested in wine markets. Mei and Moses (2002) showed that art outperformed bonds and treasury bills; however, equity performed even better, considering volatility. Renneboog and Spaenjers (2013) found that art performs at the level of corporate bonds, but with higher risk, and there is a low correlation of art with other traditional assets. Dimson et al. (2015) determined that wine performs better than stamps and art, but not equities. Dimson and Spaenjers (2011) showed that the real return on British stamps since the 1990s is lower than that of equities but higher than that of bonds and bills, with risk comparable to the risk of equities. Similar results but for the US classical collectible stamps are found by Grable and Chen (2015).

Masset and Henderson (2010) suggested the presence of inefficiency in the wine market. Lean and Chong (2012) examined the monthly effect in fine wine markets and revealed that there is a May effect in Liv-ex Claret Chip and Liv-ex 100, March effect in Liv-ex 500, and June effect in Liv-ex Investable. As a result, abnormal returns can be generated by buying wine in the month with the

http://dx.doi.org/10.21511/imfi.18(4).2021.13

lowest average return and selling it in the month with the highest average return.

Erdős and Ormos (2013) rejected the random walk hypothesis and identified great positive autocorrelations in fine wine returns. The positive autocorrelation of returns is confirmed by David et al. (2013).

Bouri et al. (2017) illustrated that shock to the market is transitory and wine series tend to return to the mean; hence, they are predictable. Fernandez-Perez et al. (2019) found weak evidence of mean-reversion and strong evidence of autoregressive effects.

Scott and Yelowitz (2010) explored price anomalies in the diamonds market and found that buyers are ready to pay premiums of 18% for a diamond that is 0.5-carat rather than for a diamond that is slightly less and between 5% and 10% for a 1.0-carat diamond rather than a 0.99-carat diamond.

Despite several pieces of evidence against the efficiency of the alternative investments' markets, price effects after one-day abnormal returns are not explored yet. This paper aims to show that abnormal returns generate price patterns in the alternative investments market, which can be used to generate exploitable profit opportunities. Therefore, this analysis expands the existing literature and reveals new evidence regarding market anomalies in the alternative investments market.

2. DATA, METHODOLOGY AND HYPOTHESIS

To analyze price effects caused by abnormal returns in the "passion investments" market, daily data on two alternative assets are used: diamonds (WORLD-DS Diamonds & Gems – PRICE INDEX) and stamps (Stanley Gibbons Stamp Index) over the periods April 3, 1989–October 11, 2021, and October 11, 1999–October 11, 2021, respectively. The data sources are Stanley Gibbons Group (n.d.) and Fairfield County Diamonds (Diamond Search Engine, n.d.). The following hypothesis is tested in this paper:

H1: One-day abnormal returns create stable patterns in price behavior on the next day.

To generate comparable results with already existing ones from FOREX, commodity, and cryptocurrency markets, the methodology proposed by Caporale and Plastun (2020b) is used. It includes a preliminary analysis of price differences between the usual days and days after abnormal returns based on the average analysis, with further evaluation of the statistical significance of these differences with the use of a variety of statistical tests both parametric (*t*-tests, ANOVA) and non-parametric (Mann–Whitney U test). Additional pro/contra pieces of evidence are generated based on modified cumulative abnormal returns and regression analysis with dummy variables. As a final step, a trading simulation approach is used to show the ability of detected price effects to generate profits from trading.

Results from different technics are summarized and conclusions are based on integral effect value. Returns are calculated as follows:

$$R_i = \left(\frac{Close_i}{Close_{i-1}} - 1 \right) \cdot 100\%, \quad (1)$$

where R_i – returns on the i-th day in %, $Close_{i-1}$ – close price on the (i–1)-th day, $Close_i$ – close price on the i-th day.

Abnormal returns are calculated as proposed by Caporale and Plastun (2020b). Positive and negative abnormal returns are defined using equations 2 and 3 (respectively):

$$R_i > \left(\overline{R}_n + \delta_n \right), \quad (2)$$

$$R_i > \left(\overline{R}_n - \delta_n \right), \quad (3)$$

where $\overline{R}_n$ is the average daily returns for the period n, δ_n is the standard deviation calculated for daily returns over the period n.

Statistical tests both parametric and non-parametric test null hypothesis (*H0*): returns on usual days and on days after abnormal returns belong to one general population. If *H0* is rejected, pieces of evidence in favor of anomaly are found.

A simple regression analysis with dummy variables is implemented in the following manner:

$$R_i = \alpha_0 + \alpha_1 D_{1t} + \varepsilon_t, \quad (4)$$

where R_i is daily return in the period t, α_0 is the mean return on usual days, α_1 is the average return on a day after the day with the abnormal return, D_i is a dummy variable equal to 1 on a day after the day with abnormal return and 0 on a usual day, and ε_t is the random error term of the i^{th} day. Dummy coefficients (their sign and statistical significance) provide evidence related to anomalies caused by abnormal returns.

The modified cumulative abnormal returns approach is based on MacKinlay (1997). First abnormal returns are calculated:

$$AR_t = R_t - E(R_t), \quad (5)$$

where R_t is daily return in period t and $E(R_t)$ is the average return for the whole data set which is calculated as follows:

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

where T is the size of the data set.

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

$$CAR_i = \sum_{i=1}^{T} AR_i. \quad (7)$$

To define the presence of trends in CAR_i time regression model is used. In the case of evidence in favor of the trend in CAR_i dynamics (significant p and F values), the anomaly is confirmed.

To define whether detected price effects can be used to generate profits a trading simulation approach is used. This approach is only a proxy to real trading because it ignores transaction costs like spreads, fees to the brokers or banks, and other related costs. Nevertheless, the trading simulation approach can be informative, because the development of the Internet-trading has decreased transaction costs significantly.

Market anomaly is detected if a trading strategy based on it can generate positive total profit (the sum of results from each deal).

The result from each trade is calculated as follows:

$$\%result = \frac{100\% \cdot P_{open}}{P_{close}}, \quad (8)$$

where P_{open} – trade opening price, P_{close} – trade closing price.

To provide evidence that obtained results differ from random trading, a t-test is carried out. A rejection of the null hypothesis allows one to conclude that results belong to the different general population: Means trading strategies generate results that are different from the random ones and generated profits are not a coincidence.

3. EMPIRICAL RESULTS

The full empirical results for the positive and negative abnormal returns are provided in Appendix A. This section provides a summary of these results and their discussion.

Average analysis results are represented in Table A1. Their visual interpretation is provided in Figure 1.

As can be seen, average returns on usual days are negative and close to 0%. Which is in line with the random walk hypothesis. However, returns on days after abnormal days demonstrate a stable pattern: prices tend to increase.

The next step is to define the statistical significance of detected price differences. To do this both parametric and non-parametric tests are applied. Results are presented in Tables A2 (t-test), A3 (ANOVA analysis), and A4 (Mann–Whitney U test), and they are mixed. According to t-test and ANOVA analysis, the size of price fluctuations after the days with abnormal returns differ from those on usual days. Non-parametric tests confirm anomaly only for the case of stamps data after positive abnormal returns.

To find further evidence, regression analysis with dummy variables (Table A5) and a modified CAR approach (Table A6) are used. They confirmed the presence of price effects caused by daily abnormal returns. A dummy variable (data concern the day after abnormal return) provides a statistically significant positive impact on average return. Returns

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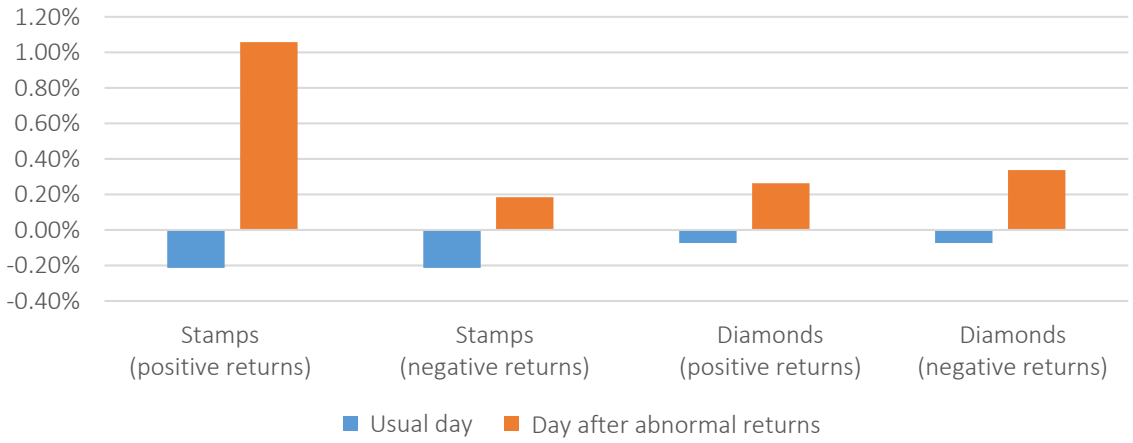

Figure 1. Visual (average) analysis of returns on ordinary days and days with abnormal returns (the case of stamps and diamonds)

on the days after abnormal return generate a trend in the cumulative abnormal returns that indicates in favor of pattern presence price behavior.

To see whether detected patterns can be exploited, a trading simulation approach is applied. The trading strategy for all of the analyzed cases is as follows: open long position right after the day of the abnormal returns and close it at the end of that day. Trading simulation results are presented in Table 1.

As can be seen in most of the cases, the number of successful trades in 3 of 4 cases is close to 50%, which is in line with the random nature of price movements. However, profits generated from trading in most of the cases differ from random trading. This evidences in favor of anomaly presence.

Visual interpretation of trading simulation results is provided in Figure 2. As can be seen, they are rather stable with the only exception: Stamps (positive returns) – in this case, the anomaly is extremely strong as well as trading opportunities.

The summary of the results is presented in Table 2.

Table 1. Results of a trading strategy based on detected price patterns

Case	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
Stamps (positive returns)	275	174	63%	292%	14.58%	1.06%	3.50	rejected
Stamps (negative returns)	207	101	49%	38%	1.92%	0.19%	0.60	not rejected
Diamonds (positive returns)	956	480	50%	252%	8.39%	0.26%	1.72	rejected*
Diamonds (negative returns)	831	410	49%	280%	9.34%	0.34%	2.11	rejected

Note: * means significant with 90%.

Table 2. Summary of results for the stamps and diamonds: The case of negative and positive returns

Case	Average analysis	Students *t*-test	ANOVA	Mann-Whitney test	Modified CAR	Regression with dummy variables	Trading simulation	Overall
Stamps (positive returns)	+	+	+	+	+	+	+	7
Stamps (negative returns)	+	–	+	–	+	+	–	4
Diamonds (positive returns)	+	+	+	–	+	+	+	6
Diamonds (negative returns)	+	+	+	–	–	+	+	5

Note: + indicates that the specific method applied managed to detect the anomaly and + shows that the presence of anomaly is not confirmed.

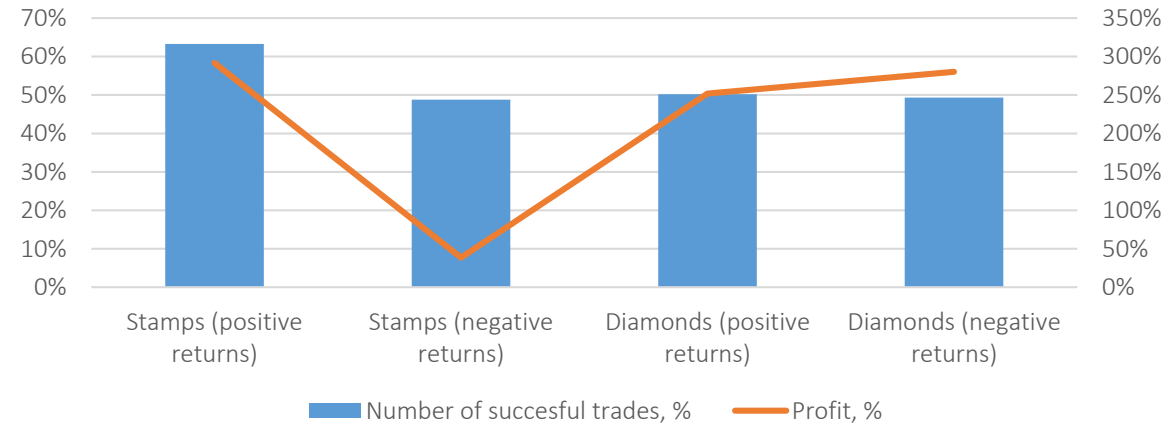

Figure 2. Visual interpretation of trading simulation results (the case of stamps and diamonds)

Based on the results from Table 2 it can be concluded that prices tend to demonstrate predictable behavior after days with abnormal returns. For the case of positive abnormal returns, it is typical for the prices to increase on the day after – it means the momentum effect is detected in both stamps and diamonds. Positive returns are observed after the days with negative abnormal returns – it means the contrarian effect is detected. Thus, markets can't absorb positive returns during only one day (underreaction) and it takes another to incorporate new information in prices. For the case of negative abnormal returns, it appears that markets react too strongly to the new information (overreact) and the next day prices tend to return to the equilibrium level. In general, these results are in line with those provided by Caporale and Plastun (2020a, 2020b, 2021).

Implications of these results are as follows. Academicians obtain additional evidence against the efficient market hypothesis: prices tend to generate patterns; there are overreactions and underreactions in price behavior. For practitioners (traders, investors), it is detected that price effects can be exploited to generate abnormal profits by using simple rules (buy after abnormal returns) in trading decisions.

CONCLUSION

This paper aims to show that abnormal returns generate price patterns in the alternative investments market, which can be used to generate exploitable profit opportunities. The following hypothesis is tested: One-day abnormal returns create stable patterns in price behavior on the next day. To do this daily data for stamps (data period October 11, 1999–October 11, 2021) and diamonds (April 03, 1989–October 11, 2021) are analyzed.

Results show that abnormal returns (both positive and negative) create specific patterns in price behavior in the "passion investments" market. After positive abnormal returns, prices for stamps and diamonds tend to increase. This is called the momentum effect in the literature. Positive returns are observed after the days with negative abnormal returns as well. This means that the contrarian effect is present.

Based on these observations it can be concluded that prices in the "passion investments" markets can't absorb positive information during the day it appears and it takes at least another day to incorporate it in prices. It means that markets underreact. The reaction of stamp and diamond prices for the negative events is excessive: price decline is too strong. As a result, on the next day prices tend to increase. In this case, the markets overreact. Therefore, further pieces of evidence in favor of overreaction and underreaction hypotheses are found.

http://dx.doi.org/10.21511/imfi.18(4).2021.13

The contribution of this paper can be divided into 2 parts. For academicians: additional inconsistencies between the efficient market hypothesis and practice are found; prices tend to generate patterns; there are overreactions and underreactions in price behavior. For practitioners (traders, investors): detected price effects can be used to generate profits from trading.

AUTHOR CONTRIBUTIONS

Conceptualization: Liudmyla Sliusareva.
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Formal analysis: Liudmyla Sliusareva, Nataliya Strochenko, Olga Zhmaylova.
Investigation: Alex Plastun.
Methodology: Alex Plastun.
Project administration: Alex Plastun.
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Validation: Nataliya Strochenko, Olga Zhmaylova.
Visualization: Nataliya Strochenko.
Writing – original draft: Alex Plastun, Ahniia Havrylina, Liudmyla Sliusareva, Nataliya Strochenko, Olga Zhmaylova.
Writing – review & editing: Ahniia Havrylina, Olga Zhmaylova.

ACKNOWLEDGMENT

The authors gratefully acknowledge financial support from the Ministry of Education and Science of Ukraine (0121U100473).

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APPENDIX A

Table A1. Average analysis of returns on usual days and days after abnormal returns: The case of stamps and diamonds

Case	Usual day	Day after abnormal returns
Stamps (positive returns)	–0.21%	1.06%
Stamps (negative returns)	–0.21%	0.18%
Diamonds (positive returns)	–0.07%	0.26%
Diamonds (negative returns)	–0.07%	0.34%

Table A2. *T*-test

Instrument	Parameter	Usual day	Day after positive abnormal returns	Parameter	Usual day	Day after negative abnormal returns
Stamps	Mean, %	–0.21%	1.06%	Mean,%	–0.21%	0.18%
	Stand. Dev., %	2.11%	5.03%	Stand. Dev., %	2.11%	4.46%
	Number of values	2057	275	Number of values	2057	207
	t-criterion	4.14		*t*–criterion	1.27	
	Null hypothesis	rejected		Null hypothesis	not rejected	
	Anomaly	confirmed		Anomaly	not confirmed	
Diamonds	Mean,%	–0.07%	0.26%	Mean,%	–0.07%	0.34%
	Stand. Dev., %	1.93%	4.75%	Stand. Dev., %	1.93%	4.61%
	Number of values	6509	956	Number of values	6509	831
	t–criterion	2.17		*t*–criterion	2.54	
	Null hypothesis	rejected		Null hypothesis	rejected	
	Anomaly	confirmed		Anomaly	confirmed	

Table A3. ANOVA test

Case	F	*p*-value	F critical	Null hypothesis	Anomaly
Stamps (positive returns)	57.08	0.00	3.85	rejected	confirmed
Stamps (negative returns)	5.12	0.02	3.85	rejected	confirmed
Diamonds (positive returns)	15.47	0.00	3.84	rejected	confirmed
Diamonds (negative returns)	21.82	0.00	3.84	rejected	confirmed

Table A4. Mann–Whitney U test

Case	Adjusted H	d.f.	*P*-value	Critical value	Null hypothesis	Anomaly
Stamps (positive returns)	38.55	1.00	0.00	3.84	rejected	confirmed
Stamps (negative returns)	1.40	1.00	0.24	3.84	not rejected	not confirmed
Diamonds (positive returns)	3.72	1.00	0.05	3.84	not rejected	not confirmed
Diamonds (negative returns)	0.31	1.00	0.58	3.84	not rejected	not confirmed

Table A5. Regression analysis with dummy variables*

Case	Multiple *R*	*F*-test	a0	a1	Anomaly
Stamps (positive returns)	0.15	57.08 (0.00)	–0.0021 (0.00)	0.0127 (0.00)	confirmed
Stamps (negative returns)	0.05	5.12 (0.02)	–0.0021 (0.00)	0.0040 (0.02)	confirmed
Diamonds (positive returns)	0.05	15.47 (0.00)	–0.0007 (0.02)	0.0034 (0.00)	confirmed
Diamonds (negative returns)	0.05	21.82 (0.00)	–0.0007 (0.01)	0.0041 (0.00)	confirmed

Note: * *p*-values are in parentheses.

Table A6. Modified CAR approach*

Case	Multiple *R*	*F*-test	a0	a1	Anomaly
Stamps (positive returns)	0.96	3370.54 (0.00)	0.6254 (0.00)	0.0095 (0.00)	confirmed
Stamps (negative returns)	0.59	106.94 (0.00)	–0.0701 (0.00)	0.0022 (0.00)	confirmed
Diamonds (positive returns)	0.97	14305.02 (0.00)	–0.2509 (0.00)	0.0039 (0.00)	confirmed
Diamonds (negative returns)	0.01	0.06 (0.80)	3.72 (0.00)	0.0000 (0.80)	not confirmed

Note: * *p*-values are in parentheses.