Economics Bulletin

Volume 37, Issue 2

Stock predictability and preceding stock price changes – evidence from central and eastern european markets

Liam Ison
University of Hull

Robert Hudson
University of Hull

Abstract

This paper extends the empirical evidence on stock returns after preceding price innovations using data from Central and Eastern European (CEE) markets. In contrast to many previous papers, we find no evidence of either over-reaction effects or rational adjustments to increased risk after large preceding price movements. We do, however, see strong evidence of trends in the data with price falls(rises) of all sizes being followed by subsequent price falls(rises).

Thanks are due to Catalina Tonescu of the Bucharest Stock Exchange whom provided data for the BET, Petar Kemalov of the Bulgaria Stock Exchange who provided the values for the SOFIX and Nataša Žabkar of the Ljubjana Stock Exchange who provided the values for the SBITOP.

Citation: Liam Ison and Robert Hudson, (2017) "Stock predictability and preceding stock price changes – evidence from central and eastern european markets", *Economics Bulletin*, Volume 37, Issue 2, pages 733-740

Contact: Liam Ison - hello@liamison.com, Robert Hudson - robert.hudson@hull.ac.uk.

Submitted: March 20, 2017. **Published:** April 22, 2017.

1. Introduction:

A large number of research studies have investigated the short term reaction of stock market securities to large preceding price movements. Amini et. al. (2013) discuss over sixty studies of this type in a review of the literature. A general finding in these studies is that security returns after large price changes differ systematically from those after more moderate changes in a way that cannot be easily reconciled with efficient markets theory or simple linear models of stock returns (Amini et. al., 2010).

Despite the considerable research effort expended there is relatively little consensus about the precise nature of the expected returns post large price movements, the mechanisms causing the phenomena and any implications for returns after price movements of all sizes. This research field has suffered from inconsistent research design meaning that it is often difficult to compare the results of different studies. In particular, the definition of a large price movement has tended to be arbitrary and has varied considerably between different studies. Many studies find reversals after large price movements whether they are rises or falls. Conversely, however, a substantial number of studies note continuations of trends after large price movements (Amini et. al., 2013). These two findings are not necessarily inconsistent if the studies involved use different definitions of large price movements. A solution to this problem is to set up studies which examine expected returns after price movements of all sizes. To date, there have only been a modest number of studies of this nature. Those that have been carried out show that for the stock markets of the US, UK and Japan and for a variety of stocks in the UK market trend continuations may occur after relatively small moves and reversals after larger moves (see, Amini et. al., 2010; Atanasova. and Hudson, 2007; Hudson et. al., 2001).

In broad terms, three main types of explanations have been put forward to explain the empirical findings: those based on market microstructure effects, those based on rational market responses to risk and those based on behavioral biases. In terms of market microstructure, Cox and Peterson (1994) find that bid-ask bounce accounts for a substantial part of the reversals observed in the US market. However, many subsequent papers in various markets rule out a major influence for microstructure effects either by careful research design or by the use of institution settings where these effects will be minimal (Amini et. al., 2013). There is modest support for risk based explanations in the literature. The Uncertain Information Hypothesis (UIH) of Brown et. al. (1988) proposes that the systematic risk of stocks increases after large price movements. Given this a rational connection between risk and expected return would lead one to expect higher returns after both large price increases and large price falls. A number of studies, although far from the majority provide empirical evidence consistent with the UIH (Amini et. al., 2013). Behavioral explanations are normally linked to overreaction effects where both large price rises and falls are followed by price reversals. Many papers in the literature, on a variety of markets, do indeed find evidence of such reversals (Amini et. al., 2013).

In summary, although extensive research has been undertaken in this area, general conclusions seem rather illusive, partly due to inconsistent research design in terms of the size of large price movements being chosen in an arbitrary way which frequently differs between investigations. We see a clear need for more empirical work to address this issue. As part of this program, it is clearly informative to examine the effects in different world market settings. Early and influential studies on the phenomena focused on the US markets (for example, Brown et. al. (1988, 1993), Atkins and Dyl (1990), Bremer and Sweeney (1991), Cox and Peterson (1994), Park (1995) although subsequently a number of other world markets have received attention (Amini et. al., 2013). Studying a variety of markets is useful as it ensures that the results, taken as a whole, are not driven by particular market features such as regulation, microstructure or particular local institutions. Comparison of results across markets also enables the possibility of finding common features driven by fairly universal features such as, perhaps, attitudes to risk or behavioral traits.

Given the foregoing we contribute to the literature by investigating several markets in Central and Eastern Europe using price movements of all sizes. To our knowledge these markets have never previously been investigated in this respect. Our findings provide fresh evidence to help to resolve the various problematic issues in this research area.

The rest of the paper is organized as follows. The data are described in section 2. Section 3 presents the empirical results, and section 4 provides conclusions.

2. Data

The Central and Eastern European indices used in the paper were the Bucharest Exchange Trading (BET) index for Romania, the BSE SOFIX index for Bulgaria and the SBITOP index for the Ljubljana Stock Exchange in Slovenia. The data was obtained from contacts at the various exchanges. The FTSE250 index from the London Stock Exchange was used for comparison purposes as the London market is one where prior price changes of all sizes have previously been examined. The investigation period is a 10 year time period from 4 January 2005 to 31 December 2015. Significantly earlier data is not available for all the indices as the BSE SOFIX started on the 20th October 2000. Table 1 shows basic descriptive data for the daily series. The BET and FTSE250 indices have shown modest rises over the period, whereas the BSE SOFIX and SBITOP indices show small price falls. The indices have similar standard deviation except for the BET index which has substantially higher standard deviation than the others.

3. Empirical Results

As discussed above, most previous studies have investigated returns after large, arbitrarily chosen, price movements. To overcome the issues with this approach we adopt an approach previously used in Amini et. al. (2010) and Hudson et. al. (2001) and classify returns into one of a number of bands covering the entire range of stock price movements.

The results of this exercise are shown in Table 2 which reports the number of price innovations in each band and the average subsequent returns for each index. Tests have been performed to test the null hypothesis that the average return on the day after an innovation in each band is equal to the average daily return of the stocks over the whole investigation period. First, a t-test is calculated using the standard deviation of the daily returns of the indices over the whole investigation period. Second, a t-test is calculated using the standard deviation of returns, on the day after an event, for events falling into the particular band under consideration, This approach adjusts for the fact that the variance of returns is not constant but is related to the magnitude of the preceding returns (see Brown et. al. (1988) and Cox and Peterson (1994)). The results of the t-tests are reported in the Table 2 and we see a mixture of significant and insignificant results. The results for the SOFIX and the SBITOP are largely significant although this is less the case for the other two markets. Whilst it is informative to report the t-statistics it is not appropriate to place undue reliance on them as they are essentially somewhat arbitrary and would generally change if the definition of the bands were changed. For example, if the bands were widened the number of observations in each band would increase and so generally would statistical significance. A more useful approach is to examine the overall patterns in the data which is done below.

To assess the results we can initially consider the largest innovations of over 3% in absolute terms. In the three CEE markets there is no indication of any over-reaction effects. For over-reaction to be evident the average return on the next day would need to be positive after a large negative drop and negative after a large price rise. The empirical evidence is completely contrary to these expectations with large negative drops followed by further drops and large rises followed by further rises. Similarly there is no evidence in these markets to support the UIH where positive returns would be expected after both large price drops and large price rises. In the UK market there might be considered to be some slight evidence supporting the UIH or overreaction after large price drops but given the lack of significance this is, at best, a tentative conclusion.

Much stronger conclusions can be made in respect of the tendency of market trends to continue after price changes of all sizes. This tendency has previously been noted in a handful of studies some of which used London Stock Exchange data. The patterns in the data strong support this observation. In the CEE markets every single innovation band relating to negative returns is followed by a negative average return on the next day. Similarly in these markets every single innovation band relating to positive returns is followed by a positive average return on the next day. This is clearly a result of considerable statistical significance[1]. The results for the UK are also very consistent with the idea that trends tend to continue with only the average returns after the very largest drops not having the same sign as the previous innovation.

4. Conclusions

This paper extends the empirical evidence on stock returns after preceding price innovations using data from Central and Eastern European (CEE) markets. In contrast to many previous

[1] Given the bands are essentially arbitrary it is someone questionable as to which is the most appropriate statistical test but if we apply a very conservative approach and simply test the probably of a negative(positive) return being followed by an average return of the same sign consistently in all the three CEE markets the probability of this happening by chance, according to the binomial theorem, is approximately $0.5^6 = 0.0156$ which is well under the generally accepted 5% level for significance..

papers, we find no evidence of over-reaction or rational adjustments to increased risk after large preceding price movements. We do, however, see very strong evidence of trends in the data with price falls(rises) being followed by subsequent price falls(rises) which does confirm the findings of the limited number of studies that have previously examined this. Further research can continue to seek to find robust unifying patterns in this area.

References:

Amini, S., Gebka, B., Hudson, R. and Keasey, K. (2013) "A review of the international literature on the short term predictability of stock prices conditional on large prior price changes: Microstructure, behavioral and risk related explanations" *International Review of Financial Analysis* **26**, 1-17.

Amini S., Hudson R. & Keasey K. (2010) "Stock return predictability despite low autocorrelation" *Economics Letters* Vol. **108**, Issue 1, 101-103.

Atanasova, C. and Hudson, R. (2007) "Short term overreaction, underreaction and price trend continuation in equity markets" *Proceedings of 2007 Annual Meeting of the Midwest Finance Association*.

Atkins, A. B., and Dyl, E. A., (1990) "Price Reversals, Bid-Ask Spreads, and Market Efficiency" *Journal of Financial and Quantitative Analysis* Vol. **25**, No. 4, 535 - 547.

Bremer, M., and Sweeney, R. J., (1991) "The Reversal of Large Stock-Price Decreases" *The Journal of Finance* Vol. **XLVI**, No. 2, 747 - 754.

Brown, K. C., Harlow, W. V., and Tinic, S. M., (1988) "Risk Aversion, Uncertain Information, and Market Efficiency" *Journal of Financial Economics*, **22**, 355 - 385.

Brown, K. C., Harlow, W. V. and Tinic, S. M., (1993) "The Risk and Required Return of Common Stock following Major Price Innovations" *Journal of Financial and Quantitative Analysis* Vol. **28**, No. 1, 101 - 116.

Cox, D. R., and Peterson, D. R., (1994) "Stock Returns following Large One - Day Declines: Evidence on Short - Term Reversals and Longer - Term Performance" *The Journal of Finance,* Vol. **XLIX**, No. 1, 255 - 267.

Hudson, R., Keasey, K. and Littler, K. (2001) "The risk and return of UK equities following price innovations: a case of market inefficiency?" *Applied Financial Economics* **11**(2), 187-196.

Park, I., (1995) "A Market Microstructure Explanation for Predictable Variations in Stock Returns following Large Price Changes" *Journal of Financial and Quantitative Analysis*, Vol **30**, No. 2, 241 - 256.

Table 1 – Descriptive Statistics

Index	Mean	Standard Deviation
BET (Romania)	0.02884%	0.01654379
BSE SOFIX (Bulgaria)	-0.00275%	0.01175665
SBITOP (Slovenia)	-0.00360%	0.01134271
FTSE250 (UK)	0.03969%	0.01159983

Table 2 Panel 1. Results for BET and SOFIX Indices

	BET (Romania)				BSE SOFIX (Bulgaria)			
Innovation Band	Frequency of Innovation	Average return on next day			Frequency of Innovation	Average return on next day		
-3.0% > x	100	-0.19%	t-test next day var	-0.5547	53	-0.40%	t-test next day var	-0.8017
			t-test sample var	-1.3118			t-test sample var	-2.4432*
-2.5% > x >= -3.0%	35	-0.19%	t-test next day var	-0.5275	26	-0.52%	t-test next day var	-1.5534
			t-test sample var	-0.7965			t-test sample var	-2.2513*
-2.0% > *x* >= -2.5%	55	-0.74%	t-test next day var	-2.3492*	40	-0.40%	t-test next day var	-1.5642
			t-test sample var	-3.4279*			t-test sample var	-2.1137*
-1.5% > *x* >= -2.0%	104	-0.20%	t-test next day var	-1.0801	72	-0.53%	t-test next day var	-2.2919*
			t-test sample var	-1.3866			t-test sample var	-3.7782*
-1.0% > *x* >= -1.5%	168	-0.47%	t-test next day var	-3.8466*	152	-0.23%	t-test next day var	-2.1524*
			t-test sample var	-3.9067*			t-test sample var	-2.3367*
0.0% > *x* >= -1.0%	870	-0.05%	t-test next day var	-1.9345	1379	-0.07%	t-test next day var	-1.7407
			t-test sample var	-1.4298			t-test sample var	-2.1649*
1.0% > *x* >= 0.0%	894	0.09%	t-test next day var	1.7723	1425	0.03%	t-test next day var	0.8480
			t-test sample var	1.1910			t-test sample var	1.1698
1.5% > *x* >= 1.0%	201	0.32%	t-test next day var	3.0829*	161	0.35%	t-test next day var	3.0955*
			t-test sample var	2.5041*			t-test sample var	3.8252*
2.0% > *x* >= 1.5%	119	0.16%	t-test next day var	0.9328	85	0.10%	t-test next day var	0.6270
			t-test sample var	0.8450			t-test sample var	0.7669
2.5% > *x* >= 2.0%	67	0.43%	t-test next day var	1.7115	49	0.71%	t-test next day var	2.8620*
			t-test sample var	1.9949*			t-test sample var	4.2203*
3.0% > x >= 2.5%	53	0.97%	t-test next day var	3.3002*	27	1.00%	t-test next day var	2.1380*
			t-test sample var	4.1589*			t-test sample var	4.4389*
x ≥ 3.0%	90	0.42%	t-test next day var	1.2057	36	0.27%	t-test next day var	0.5141
			t-test sample var	2.2429*			t-test sample var	1.3985

Notes: * Significant at 95% confidence level

Table 2 Panel 2. Results for SBITOP and FTSE250 Indices

Innovation Band	SBITOP (Slovenia) Frequency of Innovation	Average return on next day			FTSE250 (UK) Frequency of Innovation	Average return on next day		
-3.0% > x	40	-0.18%	t-test next day var	-0.3218	39	0.38%	t-test next day var	0.9576
			t-test sample var	-1.0020			t-test sample var	1.8225
-2.5% > x >= -3.0%	18	-0.99%	t-test next day var	-1.8775	34	-0.33%	t-test next day var	-1.2077
			t-test sample var	-3.6710*			t-test sample var	-1.8434
-2.0% > *x* >= -2.5%	38	-0.27%	t-test next day var	-0.9274	52	-0.28%	t-test next day var	-1.3348
			t-test sample var	-1.4507			t-test sample var	-2.0086*
-1.5% > *x* >= -2.0%	70	-0.37%	t-test next day var	-2.1315*	100	-0.15%	t-test next day var	-1.3963
			t-test sample var	-2.6918*			t-test sample var	-1.6446
-1.0% > *x* >= -1.5%	185	-0.35%	t-test next day var	-3.7418*	146	-0.03%	t-test next day var	-0.6401
			t-test sample var	-4.1132*			t-test sample var	-0.7539
0.0% > *x* >= -1.0%	999	-0.14%	t-test next day var	-4.7186*	888	-0.01%	t-test next day var	-1.4693
			t-test sample var	-3.6744*			t-test sample var	-1.3615
1.0% > *x* >= 0.0%	1040	0.12%	t-test next day var	4.5697*	1107	0.07%	t-test next day var	1.0559
			t-test sample var	3.5385*			t-test sample var	0.9357
1.5% > *x* >= 1.0%	161	0.37%	t-test next day var	4.2193*	218	0.04%	t-test next day var	0.0671
			t-test sample var	4.1660*			t-test sample var	0.0590
2.0% > *x* >= 1.5%	95	0.32%	t-test next day var	2.5510*	89	0.34%	t-test next day var	2.3500*
			t-test sample var	2.7547*			t-test sample var	2.4136*
2.5% > *x* >= 2.0%	50	0.35%	t-test next day var	1.6763	44	0.26%	t-test next day var	1.1615
			t-test sample var	2.1862*			t-test sample var	1.2369
3.0% > x >= 2.5%	21	0.36%	t-test next day var	1.0162	27	0.50%	t-test next day var	1.5623
			t-test sample var	1.4543			t-test sample var	2.0590*
X ≥ 3.0%	21	0.48%	t-test next day var	0.8943	32	0.30%	t-test next day var	0.8746
			t-test sample var	1.9339			t-test sample var	1.2605

Notes: * Significant at 95% confidence level