
Beyond greed, fear and the iron curtain

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We examine 13 of the new markets of Eastern Europe from the time of their inception to the end of 2001. In six of those markets – Hungary, Poland, the Czech Republic, Slovenia, Russia and Estonia – we find behaviour consistent with investors following ‘quasi-rational’ strategies in the years following market inception. The results are robust to the suggestion that they are driven by market microstructure. The heuristically driven price behaviour diminishes as these markets mature and is replaced by an increasing association with market movements in major financial centres. We suggest that we have captured the way investors in new markets learn to invest.

I. Introduction

From Stettin in the Baltic to Trieste in the Adriatic, the iron curtain dividing Europe in the wasted Cold War years has been lifted.¹ We have witnessed the nations of Eastern Europe struggling with democracy after Communism, free-markets after central planning. In these early years, often seemingly as a national priority, the countries of Eastern Europe established stock markets. These markets were not emerging: they were new. ‘Emerging’ markets often seem to be merely those that have slipped from our attention. The new stock markets of Eastern Europe have come into being where previously there had been nothing. In studying markets at their creation, it is possible to clearly see phenomena which are often obscure in more mature markets.

Investors in the new markets of Eastern Europe faced considerable uncertainty. What was the true

value of the shares in which they were investing? How might such a question even be answered? Investors’ propensity to follow quasi-rational behaviour is, in part, a function of their environment. Investors are more likely to be subject to heuristics and cognitive biases when there is substantial disagreement over intrinsic values of securities (Aggarwal and Rivoli, 1990). If investors are not skilled at a task, their meta-cognitive ability will be poor and they will tend to be overconfident in their abilities (Kruger and Dunning, 1999). Overconfidence is greater for challenging tasks but it decreases as the task becomes well defined (Griffin and Tversky, 1992).

In this study, we examined stock indices from 13 Eastern European countries.² The returns of six of these indices provide evidence of positive autocorrelation in their early years. Such autocorrelation may be a function of trading frictions but our results do not appear to be influenced by such microstructure

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¹Davis (1997, Chapter 12) provides an overview of post-war European history and end of the Cold War that we recommend.

²Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia and the Ukraine. We chose the indices because they appear to have been widely followed. They are calculated in different ways and, as such, are not necessarily strictly comparable with each other. That the phenomena we document are present in a wide number of these indices suggests our findings are robust to the methodology used to calculate the indices.

Table 1. An overview of Eastern European and other stock markets

Countries	Market capitalization (\$ millions)		Market capitalization (% of GDP)		Turnover ratio (value of shares traded as a % of market capitalization)		Listed domestic companies	
	1990	2000	1990	2000	1990	2000	1990	2000
Bulgaria	–	617	–	5.7	–	9.2	–	503
Croatia	–	2742	–	12.7	–	7.4	2	64
Czech Republic	–	11 002	–	22.2	–	60.3	–	131
Estonia	–	1846	–	34.2	–	18.9	–	23
Hungary	505	12 021	1.5	33.7	6.3	90.7	21	60
Latvia	–	563	–	6.2	–	48.6	–	64
Lithuania	–	1588	–	10.7	–	14.8	–	54
Poland	144	31 279	0.2	19.1	89.7	49.9	9	225
Romania	–	1069	–	2.6	–	23.1	–	5555
Russia	244	38 922	–	18	–	36.9	13	249
Slovakia	–	742	–	3.7	–	129.8	–	838
Slovenia	–	2547	–	10.9	–	20.7	24	38
Ukraine	–	1881	–	2.9	–	19.6	–	139
India	38 567	148 064	12.2	41.3	65.9	133.6	2435	5937
Germany	355 073	1 432 190	22.2	67.8	139.3	107.5	413	933
United Kingdom	848 866	2 933 280	85.9	203.4	33.4	51.9	1701	1945
United States	3 059 434	16 635 114	53.2	181.8	53.4	123.5	6599	7651

Source: World bank – www.worldbank.org/data/wdi2001/pdfs/tab5_3.pdf (accessed on 10 April 2002).

based explanations. This leads us to conclude that behavioural biases drive the observed pattern of price behaviour. The autocorrelation we observe is consistent with behaviour expected by investors under-reacting to price sensitive information (Barberis *et al.*, 1998; Daniel *et al.*, 1998; Odean, 1998) and, or, positive feedback trading (De Long *et al.*, 1990). As markets mature, however, they are increasingly associated with major international markets. As time passes, investors may succumb to the same biases affecting the rest of us.³ We believe that this study captures the process by which such biases may be assimilated.

In this article, we outline the data we study. We discuss our data and methodology in Section II. In Section III we report our results and robustness tests. Section IV concludes the article.

II. Data and Method

Table 1 provides basic statistics for each country's stock market for the years 1990 and 2000. For comparative purposes, the statistics for the Indian (being an emerging country with a large equity market), German, the UK and the US stock

exchanges are also included. The Eastern European stock markets are very young and very small relative to international standards. Within the region, the Russian stock market was the biggest in terms of market capitalization (in US\$ millions) in 2000. However, the German stock exchange (smallest of the developed markets) was still about 35 times larger than the Russian stock exchange in the same year. With respect to market capitalization and the number of domestic companies listed on the exchanges, share markets have increased in importance for both emerging and developed countries over the decade. With the exception of Poland and Germany, the turnover ratio (value of shares traded as a percentage of market capitalization) also increased.

The daily stock market indices used in this study were obtained from datastream and are listed in Table 2. The range of data available varies from country to country. Within the emerging markets, only Hungary and Poland have daily equity price indices dating back as far as 1991. In 5 out of 13 cases, the respective stock exchanges have only started reporting a price index from 1997. For these countries, tests of stock behaviour and integration over time might not be meaningful due to the shortness of the time frame studied. The end date for all of the data series is 31 December 2001. Daily index price relatives

³ Durand and Scott (2003), using the Australian market as the basis for their analysis, argue that international stock market comovements may be driven by overreaction.

Table 2. Data series

Country	Share price index	Datastream code	Period collected
Bulgaria	BSE Sofia Lazard	BSLAZAD	31/12/97–31/12/01
Croatia	CROBEX	CTCROBE	02/01/97–31/12/01
Czech Republic	PX50	CZPX50I	06/04/94–31/12/01
Estonia	TALSE	ESTALSE	03/06/96–31/12/01
Hungary	BUX	BUXINDX	02/01/91–31/12/01
Latvia	RICI	LVRICIL	03/11/97–31/12/01
Lithuania	LITIN-G	LNLITING	01/01/96–31/12/01
Poland	WIG	POLWIGI	16/04/91–31/12/01
Romania	BET	RMBTREL	19/09/97–31/12/01
Russia	RUR	RSMTIND	01/09/94–31/12/01
Slovakia	SAX16	SXSAX12	14/09/93–31/12/01
Slovenia	SBI	SLOESBI	03/01/94–31/12/01
Ukraine	PFTS	UKRPFTS	03/11/97–31/12/01
Germany	DAX100	DAX100I	01/01/91–31/12/01
United Kingdom	FTSE100	FTSE100	01/01/91–31/12/01
United States	S&P500	S&PCOMP	01/01/91–31/12/01

(in local currency) are calculated using $(P_t - P_{t-1})/P_{t-1}$ where P_t stands for the value of the index at time t . By way of visual inspection, the data were screened and checked to detect extreme observations. These extreme observations were excluded from the data set to avoid the inclusion of potentially anomalous observations in the analysis.⁴

For the sake of brevity, summary statistics for each market for the entire period and each year are not reported in this article. In brief, the analysis suggested that changes in the indices became less volatile (as measured by the SD) over time. This is consistent with Bekaert and Harvey (1995) and Kim and Singal (2000) who argue that return volatility falls as markets become integrated with the rest of the world. Estimates of

skewness and kurtosis also fall over time. There is also *prima facie* evidence of return dependence.

Our research requires us to examine the contemporaneous and lagged relationship between the stock index returns of Eastern European and developed countries as well as the relationship between successive daily changes in stock index returns. We use a Vector Autoregression (VAR)⁵ model to allow us to estimate relationships without specifying a structural model: every endogenous variable in the system is a function of the lagged values of all of the endogenous variables.⁶ Since the starting time for the calculation of the stock indices varies from country to country, the number of endogenous variables in the VAR analysis also varies from year to year.^{7,8}

⁴Including such extreme observations in our analyses may have resulted in excessive weight being placed on this data in estimating the VAR; consequently, our analyses may have led to incorrect conclusions and misleading inferences (see Judge *et al.*, 1985, p. 825; Greene, 2003, pp. 60–61). Including such observations in an analysis such as that reported in this article may also leave open the question as to the extent that our conclusions may be driven by extreme values. We accept, however, that excluding data in a time-series should not be done lightly as it may upset the statistical properties of the analyses. To examine the robustness of the inferences we make, we also analysed the data *including* the outliers; we found that inclusion of the outliers does not affect the conclusions we reach. By way of interest, examination of the outliers we removed revealed that there were a number of cases where outliers occurred on the same date for many countries. In some cases, an extreme negative observation was often followed by (within a couple of days) an extreme positive observation and vice versa. This phenomenon is consistent with market participants overreacting to information.

⁵Durand and Scott (2003) also use daily data in a VAR analysis. While it is potentially noisy, daily data seems appropriate to capture the stimuli driving international market linkages.

⁶The approach allows us to add further variables, such as volume and foreign exchange variables, for our robustness checks. Hamilton (1994) discusses VAR.

⁷All the indices are included in the VAR analysis from 1998 onwards. Impulse response functions and variance decompositions do not add to the analysis and, consequentially, are not reported.

⁸Nonsynchronous trading poses potential difficulties in determining the reaction of security prices to information from different time periods. It also creates a model specification problem, by making it difficult to incorporate its implications into the research methodology. Most of the sample countries are located in approximately the same time zone and this implies that the nonsynchronous trading problem is minimized in our analysis. The time difference between the US and European countries, however, is too great to be overlooked. As the trading hours of the European stock markets precede those of the US these markets are unable to respond to US shocks in the same calendar day. Therefore, our VAR analyses assume that information from the US is incorporated into European stock prices with a 1-day lag.

We calculated the VARs annually but we report results country by country to allow comparison of results through the years.

III. Results

We report the VAR for each country⁹ where we find statistically significant relationships – Hungary (Appendix A), Poland, (Appendix B) Czech Republic (Appendix C), Slovenia (Appendix D), Russia (Appendix E), Estonia (Appendix F) and Croatia (Appendix G) – and we summarize the estimated 1-day lag autocorrelation coefficients and contemporaneous coefficients in Table 3.^{10,11} When data on an index is not available for the full calendar year, we conduct the analysis twice: in the first instance we include the index and calculate the VAR for those observations we have. In the second instance, where we have annotated the year with a '#', we calculate the VAR excluding the index for all the trading days available to us. Our findings are, however, robust to whichever approach is adopted.

Our results are striking. Markets are generally positively autocorrelated from their inception.¹² This is in keeping with our expectations about investor behaviour. We expected that behavioural biases would be most pronounced during such times of uncertainty and, undoubtedly, stress and this is indeed what we observe. As the time since market inception passes, the point estimate of the autocorrelation coefficient falls in most countries, suggesting that the effect of behavioural biases falls over time. Additionally, as the time since market inception passes, we see increasing positive association with either, or both, the German and US indices.

The markets appear to fall into two groups, depending on how autocorrelation changes over time. In the case of the Czech Republic, Estonia,

Hungary and Russia, the autoregressive behaviour in the stock index return series is no longer statistically significant in the later years of the sample. For Poland and Slovenia, autocorrelations are statistically significant, in the later years (even in 2001).¹³

The countries also appear to fall into two groups depending on how the association between local stock index return series and Germany and the US develops over time. For the Czech Republic, Estonia, Hungary and Russia, the contemporaneous relationships between the DAX100 are positive and statistically significant in the later years of the sample. These markets are the ones where autocorrelation is insignificant in the latter periods of the sample. In Estonia and Hungary, the year when the association between the local index and Germany becomes statistically significant coincides with the year when the autocorrelation in the local index becomes insignificant. For the Czech Republic and Russia, stock market integration precedes the cessation of autocorrelations in stock index returns. Croatia, Poland and Slovenia fall into the second group of countries. These countries do not exhibit increasing association with Germany over the sample years. Significant relationships between these markets and Germany do appear from year to year, but no patterns are apparent. Additionally, Poland and Estonia are found to have statistically significant relationships with the US in the later years of the sample.¹⁴ Only Estonia, however, is found to have significant relationships with both Germany and the US.

The detailed analyses for each country, reported in Appendices A to G, present more nuanced pictures than that possible in a summary such as Table 3. Hungary (Appendix A) is found to have statistically significant positive autocorrelation in its first lag and negative autocorrelation in its second lag. Such relationships would be consistent with overreaction: the coefficient of the second lag representing a

⁹ As noted in Section II of this article, and discussed in more detail in footnote 4, the VARs exclude the outliers we identified. As we note in footnote 4, the exclusion of the outliers did not affect the conclusions we reach.

¹⁰ We found no evidence that price changes were autocorrelated or correlated with either Germany or the US in the remaining countries studied – Bulgaria, Latvia, Lithuania, Romania, Slovakia and Ukraine. These analyses may be downloaded from the corresponding author's web site: http://www.econ.uwa.edu.au/staff/durand_robert

¹¹ Using a likelihood ratio test, the hypothesis that 2 lags are sufficient to capture the effects that variables have on each other cannot be rejected.

¹² Save for the Croatian market which we discuss below.

¹³ It is important to remember that our results need not imply 'market inefficiency'; they only indicate that the patterns we observe are consistent with behavioural theories. We cannot speculate whether the autocorrelation we observe implies that investors may have been able to earn excess returns.

¹⁴ This is consistent with standard arguments that market comovement is influenced by patterns of trading activities (Chen and Zhang, 1997) or similarity of economic fundamentals (Bracker *et al.*, 1999).

Table 3. Summary of Autoregressive Behavior and Stock Market Integration.

Index	Regressor	1991	1992	1993	1993#	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001	
BUX	BUX(-1)	-0.064 (-0.60)	0.185 (1.84)	0.478 (3.00)**	0.355 (3.97)**	0.230 (1.72)	0.250 (3.31)**	0.158 (1.81)	0.349 (3.64)**	0.342 (4.67)**	-0.288 (-1.45)	-0.070 (-0.78)	-0.096 (-1.05)	0.057 (0.81)	0.082 (1.16)	-0.053 (-0.64)	
	DAX100	0.304 (2.81)**	0.008 (0.12)	-0.085 (-0.65)	0.068 (0.77)	0.257 (1.48)	0.178 (1.52)	0.128 (1.31)	0.106 (0.58)	0.025 (0.15)	0.025 (0.15)	0.783 (2.61)**	0.364 (3.25)**	0.603 (5.85)**	0.484 (6.72)**	0.371 (6.44)**	
	S&P500	-0.004 (-0.05)	0.049 (0.58)	-0.046 (-0.16)	-0.004 (-0.03)	-0.375 (-1.48)	-0.122 (-0.93)	-0.146 (-1.30)	0.120 (0.66)	0.248 (1.82)	0.248 (1.82)	0.451 (1.22)	0.376 (2.30)**	0.111 (0.67)	0.102 (0.84)	0.170 (1.89)	0.097 (1.17)
WIG	WIG(-1)	-0.002 (-0.10)	0.011 (0.73)	-0.060 (-0.41)	0.100 (1.21)	0.324 (2.84)**	0.228 (2.64)**	0.173 (1.64)	0.245 (2.30)**	0.183 (2.31)**	0.167 (0.88)	0.294 (3.60)**	0.173 (2.4)**	0.180 (2.62)**	-0.043 (-0.54)	0.197 (2.18)**	
	DAX100	-0.073 (-0.36)	0.065 (0.50)	0.274 (0.61)	0.029 (0.11)	-0.583 (-0.90)	-0.302 (-0.68)	0.502 (2.14)**	0.066 (0.30)	0.192 (1.16)	0.192 (1.16)	0.253 (1.63)	0.143 (1.85)	0.464 (5.93)**	0.102 (1.40)	0.141 (1.86)	0.321 (-0.66)**
	S&P500	0.344 (1.47)	0.003 (0.02)	0.715 (0.81)	1.024 (2.58)**	0.175 (0.25)	-0.065 (-0.12)	0.151 (0.51)	0.398 (1.74)	0.132 (0.83)	0.132 (0.83)	0.505 (2.73)**	0.363 (3.36)**	0.393 (3.05)**	0.556 (6.93)**	0.549 (7.35)**	0.049 (0.61)
PX50	PX50(-1)					0.700 (4.27)**	0.299 (3.32)**	0.436 (5.60)**	0.363 (4.32)**	0.281 (3.90)**	0.082 (0.49)	0.358 (4.73)**	0.194 (2.79)**	0.132 (1.56)	0.056 (0.69)	0.065 (0.76)	
	DAX100					0.155 (1.03)	0.011 (0.09)	0.044 (0.66)	0.189 (2.39)**	0.020 (0.36)	-0.011 (-0.11)	0.007 (0.12)	0.418 (9.12)**	0.296 (4.19)**	0.421 (5.83)**	0.242 (3.79)**	
	S&P500					0.059 (0.32)	0.097 (0.62)	-0.127 (-1.35)	-0.013 (-0.17)	0.026 (0.49)	0.294 (2.63)**	0.136 (1.89)	0.014 (0.15)	0.014 (0.15)	-0.005 (-0.06)	0.159 (2.48)**	0.189 (1.87)
SBI	SBI(-1)					0.349 (2.57)**	0.392 (4.02)**	0.241 (3.27)**	0.293 (2.47)**	0.254 (3.02)**	0.119 (0.67)	0.498 (4.14)**	0.348 (3.90)**	0.342 (5.01)**	0.269 (3.78)**	0.229 (2.50)**	
	DAX100					0.582 (1.40)	0.313 (1.78)	-0.019 (-0.14)	0.011 (0.06)	0.012 (0.07)	-0.094 (-1.07)	-0.019 (-0.24)	0.059 (1.31)	0.059 (2.82)**	-0.014 (-0.53)	-0.004 (-0.15)	
	S&P500					-1.396 (-2.44)**	-0.573 (-2.09)**	-0.108 (-0.62)	-0.238 (-0.99)	-0.232 (-1.07)	0.015 (0.14)	0.082 (0.75)	0.085 (1.26)	0.085 (1.26)	-0.052 (-1.09)	-0.009 (-0.29)	0.055 (1.26)
RUR	RUR(-1)					0.057 (0.40)	0.284 (3.20)**	0.284 (3.20)**	0.275 (2.12)**	0.304 (3.26)**	-0.017 (-0.10)	0.212 (2.85)**	0.424 (5.01)**	0.276 (4.12)**	-0.067 (-0.75)	-0.023 (-0.31)	
	DAX100					0.424 (1.01)	0.424 (1.01)	-0.411 (-2.25)**	0.422 (1.24)	0.181 (0.81)	1.550 (5.50)**	0.570 (3.79)**	1.081 (3.86)**	0.398 (2.00)**	0.935 (6.61)**	0.495 (4.84)**	
	S&P500					-0.387 (-0.76)	0.374 (1.47)	0.374 (1.47)	0.597 (1.15)	0.360 (1.12)	-0.266 (-0.47)	0.458 (2.62)**	0.135 (0.31)	-0.111 (-0.37)	0.370 (2.50)**	0.020 (0.16)	
Talse	Talse(-1)								0.313 (2.13)**	0.313 (2.13)**	0.287 (1.50)	0.297 (2.81)**	0.169 (2.05)**	0.227 (2.81)**	0.134 (1.29)	0.100 (1.10)	
	DAX100								-0.035 (-0.21)	-0.035 (-0.21)	0.677 (0.87)	0.052 (0.16)	0.247 (1.52)	0.024 (0.30)	0.117 (2.18)**	0.118 (2.08)**	
	S&P500								0.100 (0.53)	0.100 (0.53)	0.079 (0.09)	0.043 (0.17)	0.050 (0.22)	0.227 (2.03)**	0.158 (2.43)**	0.200 (3.12)**	
Crobex	Crobex(-1)										-0.122 (-0.66)	0.054 (0.81)	-0.119 (-1.76)	-0.145 (-1.68)	0.131 (1.66)	-0.034 (-0.41)	
	DAX100										0.462 (2.46)**	0.183 (2.12)**	0.520 (4.46)**	0.134 (1.07)	0.132 (1.51)	0.127 (1.83)	
	S&P500										0.155 (0.55)	0.210 (1.90)	0.170 (0.97)	0.099 (0.67)	0.276 (2.54)**	0.057 (0.58)	

Notes: This table summarizes the results reported in appendices A to G and shows how the association between the stock index returns of Eastern European countries, their 1-day lag and the contemporaneous returns on the US and German indices changes over time. Column 1 reports the dependent variables, where the BUX, WIG, PX50, SBI, RUR, Talse, Crobex are the stock return indices of Hungary, Poland, the Czech Republic, Slovenia, Russia, Estonia and Croatia respectively. Column 2 presents the regressors, where (-1) is next to the index it represents the 1-day lagged term on the index. The DAX100 and the S&P500 are the German and US stock indices respectively. The coefficients and the (White adjusted) *t*-statistics (in parentheses) (White, 1980) of the regressors for each year are presented in columns 3 to 17. In 1993# 1994#, 1996# and 1997#, the Slovakian (SAXI6), Russian (RUR), Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis in order to increase the number of observations available.

*, ** denote statistical significance at the 5% and 1% level, respectively.

correction to the response in the first lag. Poland (Appendix B), in contrast to Hungary, is found to have statistically significant positive autocorrelation at both the first and second lag. The Czech market (Appendix C) is found to have some influences from other Eastern European markets, although no discernable pattern emerges. Similarly, the Russian market (Appendix E) is found to have some significant positive relationships with other Eastern European markets but, once again, no discernable pattern emerges. It would appear that, for our sample, the focus of investors' responses was either national or based on the major markets. There appears to be no response to stimuli from neighbouring markets. Croatia (Appendix G) provides an exception in our sample, in that it appears to have had a positive relationship with the German market in the first few years after market inception.

Our results are robust to two potential problems that may have confounded our analysis: volume and exchange rate changes. Scholes and Williams (1977), Cohen *et al.* (1979), Lo and MacKinlay (1990) and Ahn *et al.* (2002) argue that nontrading (when some shares are traded more frequently than others) contributes to the presence of autocorrelation in returns by delaying the price adjustment process. Mech (1993) and Ogden (1997) provide evidence that transaction costs bring about autocorrelation in stock index returns by slowing down the price adjustment process. On the other hand, Roll (1984) and Schultz (2000) argue that transaction costs increase the bid/ask spread, leading to negative autocorrelation in daily price changes. It may also be the case that exchange rate movements, rather than market movements, are behind the relationships we find and the conclusions we draw.

We examined these potential influences by including volume and exchange rate variations as additional endogenous variables in the VAR models.¹⁵ If our findings are affected by such variables, we hypothesized that the inclusion of these variables would result in statistically insignificant autocorrelation coefficients. We found that including these variables

resulted in minimal variations in the estimated autocorrelation coefficients and also some minor variations in our *t*-statistics. Table 4 illustrates how the inclusion of volume has minimal impact on estimated autocorrelation coefficients, *t*-statistics and associated *p*-values. Similarly, Table 5 illustrates how inclusion of exchange rates has minimal impacts on the coefficients, *t*-statistics and associated *p*-values estimated for the US and German markets. Therefore, although our results are affected by the inclusion of volume and exchange rates, the effects are trivial.

IV. Concluding Remarks

We have examined 13 new markets of Eastern Europe and, in six of those countries, found patterns of returns that are *prima facie* at odds with 'rational-expectations' models of financial markets. Given that competing explanations, such as volume, are accounted for, we argue that the behavioural explanation is the only way of accounting for the phenomena found in the range of countries we study in the early years of their markets.

In these markets' early years, we find evidence of autocorrelation consistent with theories of behavioural finance such as underreaction and, or positive feedback trading. As time passes, such autocorrelation becomes less pronounced. At the same time, markets become increasingly correlated with movements in major foreign financial markets.

We have documented these markets at their birth and watched them as they have developed. We speculate that we provide evidence of investors' aggregate learning: investors increasingly learn to overcome their propensity to follow heuristics and respond to stimuli more representative of future economic conditions. Perhaps, however, they merely replace one heuristic for another that is similar to those utilized by investors in more mature markets.

¹⁵ We obtained volume and exchange rate series for Hungary (volume data is from 2 January 1997 and exchange rate data from 2 January 1991), Poland (volume data is from 16 April 1991 and exchange rate data from 24 October 1995), the Czech Republic (volume data is from 6 January 1994 and exchange rate data from 4 January 1994), Russia (volume data is from 1 September 1995 and exchange rate data from 24 October 1995) and Estonia (volume data is from 2 January 1997 and exchange rate data from 24 October 1995). While Russia has a number of stock exchanges, only the 'Russian trading system' (RTS) has daily volume series available. Data from Estonia is measured as 'turnover of shares'; a 'volume of shares' series was not available. Volume series were obtained from the Budapest stock exchange, Warsaw stock exchange, Prague stock exchange, the RTS and the Tallinn Stock Exchange and exchange rate data from the National Bank of Hungary, the Czech national bank and Oanda.com

Table 4. The Effect of Volume

Index Regressor	1991	1992	1993	1994	1995	1996	1996#	1997	1997#	1998	1999	2000	2001	
BUX BUX(-1)	-0.064 (-0.60)	0.185 (1.84)	0.478 (2.99)**	0.230 (1.72)	0.250 (3.31)**	0.158 (1.81)	0.349 (3.64)**	0.342 (4.67)**	-0.288 (-1.45)	-0.070 (-0.78)	-0.096 (-1.05)	0.057 (0.81)	0.082 (1.16)	-0.053 (-0.64)
BUX(-1) with VoBUX														
WIG WIG(-1)	-0.002 (-0.10)	0.011 (0.73)	-0.060 (-0.41)	0.324 (2.84)**	0.228 (2.64)**	0.173 (1.64)	0.245 (2.30)*	0.183 (2.31)*	0.167 (0.88)	0.294 (3.59)**	0.173 (2.40)*	0.180 (2.62)**	-0.043 (-0.54)	0.179 (2.18)*
WIG(-1) with VoWIG														
PX50 PX50(-1)		0.197 (1.47)	0.251 (1.27)	0.615 (3.89)**	0.258 (2.50)*	0.322 (2.96)**	0.278 (2.24)*	0.185 (2.08)*	0.059 (0.26)	0.297 (3.73)**	0.156 (1.96)*	0.178 (2.25)*	-0.088 (-1.13)	0.185 (2.15)*
PX50(-1) with VoPX50														
RUR RUR(-1)				0.706 (4.27)**	0.299 (3.32)**	0.436 (5.60)**	0.363 (4.32)**	0.281 (3.91)**	0.082 (0.49)	0.358 (4.73)**	0.194 (2.79)**	0.132 (1.56)	0.056 (0.69)	0.065 (0.76)
RUR(-1) with VoRUR														
Talse Talse(-1)				0.057 (0.40)	0.558 (4.31)**	0.418 (4.69)**	0.346 (4.33)**	0.314 (4.40)**	0.119 (0.62)	0.376 (4.80)**	0.197 (2.74)**	0.139 (1.66)	0.055 (0.66)	0.048 (0.56)
Talse(-1) with VoTalse														

Notes: This table shows how the relationship between the local index and its 1-day lag changes over time, with and without the inclusion of the local volume series in the VAR analysis. Column 1 reports the dependent variables, where the BUX, WIG, PX50, RUR and Talse are the stock return indices of Hungary, Poland, the Czech Republic, Russia and Estonia. Column 2 presents the regressors, where (-1) next to the index represents the 1-day lagged term on the index. Column 3 also shows these terms when the local volume series is included as an additional variable in the VAR analysis. VoBUX is the Hungarian volume series, VoWIG is the Polish volume series, VoPX50 is the Czech volume series, VoRUR is the Russian volume series and VoTalse is the Estonian volume series. The coefficients and the White's adjusted t-statistics (in parentheses) of the regressors for each year are presented in columns 3 to 17. In 1993# 1994#, 1996# and 1997#, the Slovakian (SAX16), Russian (RUR), Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis in order to increase the number of observations available.

Table 5. The Effect of Exchange Rates

	1991	1992	1993	1993#	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
BUX															
DAX100	0.304 (2.81)**	0.008 (0.12)	-0.085 (-0.65)	0.068 (0.77)	0.257 (1.48)	0.178 (1.52)	0.128 (1.31)	0.106 (0.58)	0.025 (0.15)	0.783 (2.61)*	0.364 (3.25)**	0.793 (7.28)**	0.603 (5.84)**	0.484 (6.72)**	0.371 (6.44)**
DAX100 with HUF/DM	0.299 (2.66)**	-0.017 (-0.26)	-0.153 (-1.29)	0.062 (0.69)	0.307 (1.53)	0.263 (2.18)*	0.099 (1.00)	0.141 (0.77)	0.054 (0.32)	1.226 (3.10)**	0.392 (2.71)**	0.919 (8.90)**	0.598 (5.64)**	0.500 (6.58)**	0.396 (5.93)**
S&P500	-0.004 (-0.05)	0.049 (0.58)	-0.046 (-0.16)	-0.004 (-0.03)	-0.375 (-1.48)	-0.122 (-0.93)	-0.146 (-1.30)	0.120 (0.66)	0.248 (1.82)	0.451 (2.22)	0.376 (2.30)*	0.111 (0.67)	0.102 (0.84)	0.170 (1.89)	0.097 (1.17)
S&P500 with HUF/USD	0.012 (0.14)	0.013 (0.16)	0.131 (0.38)	-0.011 (-0.09)	-0.546 (-1.76)	-0.181 (-1.39)	-0.134 (-1.20)	0.102 (0.54)	0.227 (1.56)	0.155 (0.29)	0.372 (1.94)	0.033 (0.23)	0.101 (0.83)	0.163 (1.73)	0.100 (1.17)
WIG															
DAX100	-0.073 (-0.36)	0.065 (0.50)	0.274 (0.61)	0.029 (0.11)	-0.583 (-0.89)	-0.302 (-0.68)	0.502 (2.14)*	0.066 (0.30)	0.192 (1.16)	0.253 (1.63)	0.143 (1.85)	0.464 (5.93)**	0.102 (1.40)	0.141 (1.86)	0.321 (4.67)**
DAX100 with PLZ/DM								0.055 (0.26)	0.192 (1.17)	0.309 (1.84)	0.140 (1.83)	0.470 (5.90)**	0.103 (1.38)	0.141 (1.84)	0.319 (4.64)**
S&P500	0.344 (1.47)	0.003 (0.02)	0.715 (0.81)	1.024 (2.58)*	0.175 (0.25)	-0.065 (-0.12)	0.151 (0.51)	0.398 (1.74)	0.132 (0.83)	0.505 (2.73)**	0.363 (3.36)**	0.393 (3.05)**	0.556 (6.93)**	0.549 (7.35)**	0.049 (0.61)
S&P500 with PLZ/USD								0.459 (2.25)*	0.166 (1.06)	0.623 (2.77)**	0.369 (3.37)**	0.404 (3.14)**	0.566 (7.00)**	0.558 (7.36)**	0.049 (0.61)
PX50															
DAX100					0.155 (1.03)	0.011 (0.09)	0.044 (0.66)	0.189 (2.38)*	0.020 (0.36)	-0.011 (-0.11)	0.007 (0.12)	0.418 (9.12)**	0.296 (4.19)**	0.421 (5.83)**	0.242 (3.79)**
DAX100 with CZK/DM					0.147 (0.95)	0.002 (0.01)	0.036 (0.54)	0.161 (2.05)*	0.027 (0.45)	-0.030 (-0.28)	-0.003 (-0.05)	0.431 (9.04)**	0.310 (4.28)**	0.416 (5.49)**	0.245 (3.94)**
S&P500					0.059 (0.32)	0.097 (0.62)	-0.127 (-1.35)	-0.013 (-0.17)	0.026 (0.49)	0.294 (2.63)*	0.136 (1.89)	0.014 (0.15)	-0.005 (-0.06)	0.189 (2.48)*	0.159 (1.87)
S&P500 with CZK/USD					0.080 (0.43)	0.125 (0.76)	-0.095 (-1.02)	-0.008 (-0.08)	0.019 (0.35)	0.343 (2.23)*	0.149 (1.89)	0.039 (0.43)	-0.037 (-0.40)	0.208 (2.73)**	0.144 (1.60)
RUR															
DAX100		0.424 (1.01)					-0.411 (-2.25)*	0.422 (1.24)	0.181 (0.81)	1.550 (5.50)**	0.570 (3.79)**	1.081 (3.86)**	0.398 (2.00)*	0.935 (6.61)**	0.495 (4.84)**
DAX100 with RUD/DM							-0.188 (-0.42)	0.445 (1.28)	0.142 (0.63)	1.572 (4.56)**	0.575 (3.78)**	1.101 (5.16)**	0.407 (2.04)*	0.928 (6.47)**	0.490 (4.71)**
S&P500					-0.387 (-0.76)		0.374 (1.47)	0.597 (1.15)	0.360 (1.12)	-0.266 (-0.46)	0.458 (2.62)**	0.135 (0.31)	-0.111 (-0.37)	0.370 (2.50)*	0.020 (0.016)
S&P500 with RUD/USD							0.328 (0.66)	0.438 (0.89)	0.331 (1.05)	-0.312 (-0.56)	0.474 (2.78)**	0.105 (0.30)	-0.106 (-0.36)	0.396 (2.70)**	0.014 (0.12)
Talse															
DAX100							-0.035 (-0.21)	-0.035 (-0.21)	0.677 (0.86)	0.677 (0.86)	0.052 (0.16)	0.247 (1.52)	0.024 (0.30)	0.117 (2.18)*	0.118 (2.08)**
DAX100 with EEK/DM							-0.037 (-0.22)	-0.037 (-0.22)	0.772 (1.06)	0.772 (1.06)	0.060 (0.19)	0.229 (1.47)	0.040 (0.49)	0.118 (2.25)*	0.128 (2.36)*
S&P500							0.100 (-0.53)	0.100 (-0.53)	0.079 (0.09)	0.079 (0.09)	0.043 (0.17)	0.050 (0.22)	0.227 (2.03)*	0.158 (2.43)**	0.200 (3.12)**
S&P500 with EEK/USD							0.117 (0.61)	0.117 (0.61)	0.274 (0.31)	0.274 (0.31)	0.046 (0.18)	0.069 (0.30)	0.260 (2.35)*	0.167 (2.56)*	0.202 (3.12)**

Notes: This table shows how the inclusion of the exchange rate series in the VAR analysis influences the contemporaneous relationship between Eastern European, U.S. and German stock index returns. Column 1 reports the dependent variables, where the BUX, WIG, PX50, RUR and Talse are the stock return indices of Hungary, Poland, and Czech Republic, Russia and Estonia respectively. Column 2 presents the regressors, where the DAX100 and S&P500 are the contemporaneous terms on the German and U.S. stock return indices. Column 3 also shows these terms when the exchange rates are included as additional variables in the VAR analysis. The exchange rates are direct quotes from the Eastern European countries perspective. HUF is the Hungarian Forint, PLZ is the Polish Zloty, CZK is the Czech Koruna, RUD is the Russian Rouble, EEK is the Estonian Kroon, DM is the Deutsch Mark and USD is the U.S. dollar. The coefficients and the White's adjusted t-statistics (in parentheses) of the regressors for each year are presented in columns 3 to 17. In 1993# 1994#, 1996# and 1997#, the Slovakian (SAX16), Russian (RUR), Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis in order to increase the number of observations available.

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Appendix A. VAR Results for Hungary (BUX)

Year	1991	1992	1993	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
No. of observations	177	251	75	82	184	245	141	247	62	244	244	242	242	237
BUX(-1)	-0.064 (-0.60)	0.185 (1.84)	0.478 (2.99)**	0.230 (1.72)	0.250 (3.31)**	0.158 (1.81)	0.349 (3.64)**	0.342 (4.67)**	-0.288 (-1.45)	-0.070 (-0.78)	-0.096 (-1.05)	0.057 (0.81)	0.082 (1.16)	-0.053 (-0.64)
BUX(-2)	-0.017 (-0.27)	0.023 (0.28)	-0.169 (1.13)	-0.266 (-2.13)*	-0.063 (-0.61)	0.059 (0.92)	-0.197 (-2.01)*	-0.146 (-2.11)*	-0.027 (-0.13)	-0.001 (-0.02)	0.004 (0.04)	-0.088 (-1.10)	-0.046 (-0.63)	-0.166 (-2.24)*
WIG(-1)	-0.017 (-0.47)	-0.048 (-1.46)	0.013 (0.31)	0.009 (2.40)*	0.023 (1.08)	0.066 (3.01)**	-0.008 (-0.09)	0.041 (0.59)	-0.653 (-1.91)	-0.160 (-1.40)	0.150 (1.64)	0.015 (0.15)	-0.082 (-1.29)	0.077 (1.17)
WIG(-2)	0.033 (0.80)	-0.056 (-1.25)	0.033 (1.23)	-0.053 (-1.61)	0.003 (0.13)	0.018 (0.86)	-0.047 (-0.51)	0.050 (0.79)	0.112 (0.25)	-0.092 (-0.85)	-0.067 (-0.61)	0.132 (1.44)	-0.092 (-1.20)	-0.088 (-1.04)
SAX16(-1)			0.065 (0.70)	0.119 (1.76)	0.031 (1.07)	0.021 (0.33)	0.054 (0.67)	0.037 (0.54)	0.030 (0.16)	0.004 (0.05)	0.015 (0.17)	0.111 (1.51)	0.052 (0.90)	0.099 (1.81)
SAX16(-2)			-0.006 (-0.06)	0.107 (1.55)	0.029 (1.10)	0.015 (0.21)	0.105 (1.47)	0.169 (2.51)*	0.098 (0.47)	-0.203 (-1.98)*	0.038 (0.47)	0.055 (0.74)	0.070 (1.17)	0.101 (1.87)
PX50(-1)				-0.405 (-3.17)**	-0.060 (-0.70)	-0.051 (-0.76)	0.137 (0.68)	-0.130 (-0.85)	0.307 (0.95)	-0.018 (-0.15)	-0.118 (-1.07)	-0.118 (-1.52)	0.074 (0.99)	0.022 (0.28)
PX50(-2)				0.052 (0.49)	0.004 (0.06)	0.121 (1.55)	0.099 (0.50)	0.176 (1.22)	0.753 (1.49)	0.012 (0.10)	0.190 (1.48)	0.077 (0.71)	0.021 (0.24)	-0.027 (-0.35)
RUR(-1)				-0.027 (-0.78)		0.019 (0.65)	0.082 (2.16)*	0.081 (2.51)*	0.108 (0.80)	0.060 (0.83)	0.040 (1.16)	0.006 (0.15)	-0.047 (-1.18)	-0.021 (-0.48)
RUR(-2)				0.022 (0.66)		0.027 (1.07)	0.028 (0.98)	-0.028 (-0.99)	0.080 (0.71)	-0.008 (-0.15)	-0.022 (-0.60)	-0.048 (-1.43)	0.021 (0.49)	0.016 (0.43)
SBI(-1)				-0.020 (-0.50)	-0.017 (-0.56)	0.047 (1.37)	0.028 (0.53)	0.045 (1.12)	-0.664 (-1.33)	0.044 (0.72)	0.083 (0.61)	-0.113 (-0.57)	-0.050 (-0.27)	-0.014 (-0.08)
SBI(-2)				-0.046 (-1.02)	0.005 (0.16)	-0.037 (-0.91)	-0.003 (-0.05)	-0.043 (-0.93)	-0.778 (-2.0)*	-0.011 (-0.19)	0.116 (0.81)	-0.210 (-1.22)	0.082 (0.51)	0.006 (0.03)
LITIN-G(-1)							0.061 (0.62)	0.133 (1.53)	-0.028 (-0.11)	0.033 (0.41)	0.067 (0.48)	-0.259 (-1.50)	-0.005 (-0.05)	0.063 (0.55)
LITIN-G(-2)							-0.042 (-0.50)	0.071 (0.66)	0.121 (0.65)	-0.042 (-0.57)	0.063 (0.45)	-0.185 (-1.42)	-0.083 (-0.82)	0.095 (0.96)
TALSE(-1)							0.101 (1.59)		0.040 (0.79)	0.058 (1.27)	-0.008 (-0.15)	-0.019 (-0.21)	0.107 (1.42)	0.008 (0.10)
TALSE(-2)							0.005 (0.05)		0.100 (1.47)	0.086 (1.33)	0.021 (0.43)	0.089 (1.06)	-0.077 (-1.07)	0.247 (2.96)**
CROBEX(-1)									0.024 (0.17)	-0.001 (-0.02)	-0.026 (-0.32)	0.009 (0.19)	0.027 (0.50)	-0.111 (-1.78)
CROBEX(-2)									-0.343 (-1.43)	0.003 (0.04)	0.175 (2.66)**	0.061 (1.18)	-0.065 (-1.13)	0.029 (0.46)
BET(-1)									0.371 (2.24)*	0.063 (0.98)	0.063 (0.98)	0.063 (1.22)	0.025 (0.46)	-0.049 (-0.92)
BET(-2)									-0.045 (-0.29)	-0.045 (-0.29)	0.093 (1.33)	-0.139 (-2.31)*	0.045 (-0.21)	0.045 (0.82)

PFTS(-1)	-0.040	0.122	0.092	-0.015
	(-0.98)	(1.82)	(1.30)	(-1.54)
PFTS(-2)	-0.015	0.093	0.027	0.005
	(-0.40)	(1.13)	(0.38)	(0.52)
RIC(-1)	-0.194	0.041	0.005	-0.067
	(-2.25)*	(0.46)	(0.07)	(-1.16)
RIC(-2)	0.055	-0.138	0.066	0.074
	(0.67)	(-1.33)	(0.88)	(1.10)
BSE(-1)	0.018	0.141	0.117	-0.040
	(0.19)	(1.45)	(2.54)*	(-0.85)
BSE(-2)	-0.032	0.111	-0.055	-0.013
	(-0.49)	(2.20)*	(-1.20)	(-0.37)
INTERCEPT	-0.001	0.001	0.000	0.000
	(-0.56)	(0.65)	(0.20)	(0.25)
DAX100	0.793	0.603	0.484	0.371
	(7.28)**	(5.85)**	(6.72)**	(6.44)**
DAX100(-1)	0.058	0.081	0.059	-0.029
	(0.36)	(0.69)	(0.69)	(-0.40)
DAX100(-2)	0.002	0.001	0.146	0.013
	(0.01)	(0.01)	(1.79)	(0.17)
S&P500	0.111	0.102	0.170	0.097
	(0.67)	(0.84)	(1.89)	(1.17)
S&P500(-1)	-0.059	-0.093	-0.153	-0.053
	(-0.38)	(-0.73)	(-1.86)	(-0.48)
S&P500(-2)	0.223	-0.072	-0.016	-0.115
	(1.53)	(-0.59)	(-0.19)	(-1.60)
R ² adjusted	0.323	0.210	0.253	0.258
F-stat	4.63**	3.00**	3.55**	3.56**

Notes: This table presents the results for the vector autoregression (VAR) when the Hungarian stock index return series (BUX) is the dependent variable. The variables in the VAR are defined in Table 2. The 1-day and 2-day lagged terms of Eastern European countries are treated as endogenous variables. The contemporaneous and lagged terms on the stock index returns of Germany and the U.S. are treated as exogenous variables. For both endogenous and exogenous variables, the table presents, for each year, the values of the coefficients and White adjusted t-statistics (White, 1980). The table also presents the estimated values of adjusted R-squared and F-statistics for each equation. In 1993#, 1994#, 1996# and 1997#, the Slovakian (SAXI16), Russian (RUR), Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis, in order to increase the number of observations available for the VAR.

*, **, denote statistical significance at the 5% and 1% level, respectively.

Appendix B. VAR results for Poland (WIG)

Year	1991	1992	1993	1993#	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
No. of observations	177	251	75	255	82	184	245	141	247	62	244	244	242	242	237
BUX(-1)	-0.002 (-0.01)	0.098 (-0.76)	-0.408 (-0.74)	0.038 (0.18)	0.349 (0.86)	0.140 (0.50)	-0.100 (-0.38)	0.235 (1.99)*	0.289 (3.71)**	-0.112 (-0.82)	0.059 (1.07)	0.035 (0.54)	0.072 (1.50)	0.055 (0.77)	-0.017 (-0.19)
BUX(-2)	-0.003 (-0.01)	-0.044 (-0.40)	0.419 (1.24)	0.184 (0.94)	0.404 (0.96)	0.436 (1.32)	0.014 (0.09)	-0.115 (-1.07)	-0.016 (-0.19)	-0.240 (-1.87)	-0.075 (-1.18)	0.039 (0.67)	-0.047 (0.87)	-0.134 (-1.88)	-0.082 (-1.02)
WIG(-1)	-0.002 (-0.10)	0.011 (0.73)	-0.060 (-0.41)	0.100 (1.21)	0.324 (2.84)**	0.228 (2.64)**	0.173 (1.64)	0.245 (2.30)**	0.183 (2.31)**	0.167 (0.88)	0.294 (3.59)**	0.173 (2.40)*	0.180 (2.62)**	-0.043 (0.54)	0.179 (2.18)*
WIG(-2)	-0.004 (-0.28)	0.110 (1.33)	0.051 (0.37)	0.242 (2.89)**	-0.223 (-1.28)	-0.048 (-0.50)	-0.042 (-0.44)	-0.046 (-0.48)	0.012 (0.18)	-0.132 (-0.57)	-0.137 (-2.04)*	-0.079 (-1.16)	-0.064 (-0.89)	0.060 (0.88)	-0.055 (-0.74)
SAX16(-1)			-0.100 (-0.30)	0.221 (0.63)	0.164 (0.63)	0.164 (1.20)	-0.341 (-1.65)	0.034 (0.44)	0.114 (1.61)	-0.003 (-0.03)	0.066 (1.00)	0.070 (1.03)	0.139 (3.78)**	-0.016 (-0.27)	0.000 (0.00)
SAX16(-2)			0.010 (0.04)	-0.104 (-0.36)	0.090 (0.74)	0.090 (0.74)	0.166 (0.92)	0.023 (0.23)	0.011 (0.13)	-0.078 (-0.52)	0.000 (0.00)	-0.044 (-0.61)	0.007 (0.15)	-0.006 (-0.08)	0.059 (0.98)
PX50(-1)				-0.621 (-1.85)	-0.063 (-0.24)	-0.063 (-0.24)	-0.168 (-0.69)	0.101 (0.49)	0.133 (0.75)	0.318 (1.50)	0.031 (0.36)	0.028 (0.24)	0.007 (0.12)	0.061 (0.83)	-0.073 (-0.96)
PX50(-2)				0.677 (1.56)	0.140 (0.47)	0.140 (0.47)	0.122 (0.55)	-0.024 (-0.12)	-0.009 (-0.05)	0.281 (0.90)	0.204 (2.44)*	-0.022 (-0.19)	0.033 (0.47)	0.098 (1.19)	0.007 (0.08)
RUR(-1)				0.095 (0.55)	0.095 (0.55)	0.095 (0.55)	0.094 (0.93)	0.100 (1.91)	0.064 (1.72)	-0.034 (-0.37)	0.010 (0.23)	0.010 (0.42)	0.000 (0.00)	0.042 (1.15)	-0.003 (-0.07)
RUR(-2)				-0.198 (-1.47)	-0.198 (-1.47)	-0.198 (-1.47)	-0.010 (-0.10)	-0.055 (-1.24)	-0.060 (-1.89)	0.040 (0.46)	-0.022 (-0.50)	0.050 (1.86)	-0.013 (-0.57)	0.042 (1.13)	0.072 (1.58)
SBI(-1)				0.392 (1.93)	0.392 (1.93)	0.392 (1.93)	0.037 (0.36)	-0.045 (-0.56)	-0.054 (-1.06)	0.052 (0.17)	-0.005 (-0.13)	0.092 (0.61)	-0.001 (-0.01)	0.174 (0.93)	-0.135 (-0.77)
SBI(-2)				-0.328 (-2.00)*	-0.328 (-2.00)*	-0.328 (-2.00)*	-0.080 (-0.70)	0.061 (0.94)	0.015 (0.38)	-0.330 (-1.35)	0.001 (0.01)	0.013 (0.09)	-0.108 (-0.86)	-0.058 (-0.35)	-0.155 (-0.85)
LITIN-G(-1)								-0.157 (-1.44)	-0.138 (-1.76)	0.193 (1.22)	0.049 (0.82)	0.026 (0.22)	-0.058 (-0.51)	-0.030 (-0.24)	-0.012 (-0.11)
LITIN-G(-2)								0.081 (0.69)	0.056 (0.69)	0.141 (1.12)	-0.020 (-0.40)	-0.097 (-0.81)	-0.115 (-0.96)	0.085 (0.76)	0.064 (0.50)
TALSE(-1)								-0.156 (-1.92)	0.053 (1.95)	0.025 (0.87)	0.053 (1.95)	0.007 (0.16)	0.110 (1.73)	0.007 (0.07)	0.001 (0.01)
TALSE(-2)								0.155 (1.91)	0.010 (0.00)	0.010 (0.00)	0.000 (0.00)	0.000 (0.00)	-0.032 (-0.52)	-0.124 (-1.43)	0.158 (1.66)
CROBEX(-1)										-0.091 (-0.79)	-0.009 (-0.13)	0.013 (-0.25)	0.053 (1.28)	0.079 (1.40)	-0.017 (-0.23)
CROBEX(-2)										0.042 (0.32)	0.064 (1.13)	0.009 (0.17)	-0.040 (-0.96)	-0.056 (-1.00)	-0.003 (-0.03)
BET(-1)										0.056 (0.58)	0.028 (0.57)	-0.029 (-0.48)	0.028 (0.57)	-0.024 (-0.45)	0.027 (0.44)
BET(-2)										0.150 (2.00)	0.148 (2.84)**	-0.062 (-1.40)	0.093 (1.53)	-0.014 (-0.26)	-0.014 (-0.26)

PFTS(-1)	0.006	0.133	0.025	-0.016
	(0.19)	(2.56)*	(0.31)	(-1.68)
PFTS(-2)	0.003	-0.013	-0.026	-0.011
	(0.08)	(-0.25)	(-0.31)	(-1.22)
RICI(-1)	-0.156	0.077	0.028	-0.071
	(-2.48)*	(1.03)	(0.38)	(-1.23)
RICI(-2)	0.048	-0.023	-0.001	-0.006
	(0.75)	(-0.32)	(-0.01)	(-0.08)
BSE(-1)	-0.044	-0.016	-0.078	0.030
	(-0.70)	(-0.42)	(-1.50)	(0.63)
BSE(-2)	0.063	0.076	0.062	-0.020
	(1.05)	(2.62)**	(1.68)	(-0.43)
INTERCEPT	0.000	0.000	0.000	-0.001
	(0.41)	(0.16)	(0.04)	(-0.66)
DAX100	0.464	0.102	0.141	0.321
	(5.93)**	(1.40)	(1.86)	(4.67)**
DAX100(-1)	0.057	0.118	0.067	0.035
	(0.56)	(1.61)	(0.69)	(0.50)
DAX100(-2)	-0.131	-0.068	0.069	-0.026
	(-1.35)	(-0.96)	(0.74)	(-0.33)
S&P500	0.393	0.556	0.549	0.049
	(3.05)**	(6.93)**	(7.35)**	(0.61)
S&P500(-1)	-0.248	-0.406	-0.332	-0.100
	(-2.06)*	(-4.87)**	(-3.72)**	(-0.98)
S&P500(-2)	0.081	0.091	-0.020	-0.096
	(1.25)	(1.07)	(-0.21)	(-1.12)
R ² adjusted	0.288	0.338	0.306	0.124
F-stat	4.07**	4.85**	4.32**	2.04**

Notes: This table presents the results for the vector autoregression (VAR) when the Polish stock index return series (WIG) is the dependent variable. The variables in the VAR are defined in Table 2. The 1-day and 2-day lagged terms of Eastern European countries are treated as endogenous variables. The contemporaneous and lagged terms on the stock index returns of Germany and the US are treated as exogenous variables. For both endogenous and exogenous variables, the table presents, for each year, the values of the coefficients and White adjusted *t*-statistics (White, 1980). The table also presents the estimated values of adjusted R-squared and *F*-statistics for each equation. In 1993#, 1994#, 1996# and 1997#, the Slovakian (SAX16), Russian (RUR), Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis, in order to increase the number of observations available for the VAR. *, **, denote statistical significance at the 5% and 1% level, respectively.

Appendix C. VAR results for the Czech Republic

Year	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
No. of observations	82	184	245	141	247	62	244	244	242	242	237
BUX(-1)	0.067 (0.67)	0.018 (0.18)	0.077 (1.58)	0.089 (2.76)**	0.075 (3.45)**	-0.134 (-1.43)	0.042 (1.21)	-0.072 (-1.65)	-0.012 (-0.20)	0.045 (0.63)	0.003 (0.03)
BUX(-2)	-0.058 (-0.71)	-0.015 (-0.16)	0.123 (2.40)*	-0.007 (-0.18)	0.002 (-0.08)	-0.037 (-0.43)	0.006 (0.15)	0.046 (1.12)	0.015 (0.26)	0.046 (0.60)	-0.027 (-0.34)
WIG(-1)	0.014 (0.36)	-0.034 (-1.43)	0.011 (0.61)	0.028 (0.65)	-0.006 (-0.22)	0.118 (0.96)	0.009 (0.18)	0.088 (2.18)*	0.046 (0.72)	-0.022 (-0.29)	-0.080 (-1.47)
WIG(-2)	0.026 (0.75)	0.060 (2.44)*	-0.021 (-0.86)	-0.021 (-0.60)	0.022 (0.88)	-0.035 (-0.29)	0.056 (1.03)	-0.029 (-0.68)*	0.126 (1.99)*	-0.021 (-0.30)	-0.101 (-1.27)
SAX16(-1)	0.057 (0.76)	-0.031 (-0.82)	0.017 (0.32)	-0.021 (-0.53)	-0.025 (-0.67)	0.154 (1.40)	0.063 (1.52)	0.093 (1.69)	0.005 (0.11)	0.038 (0.58)	-0.100 (-1.49)
SAX16(-2)	-0.033 (-0.39)	0.067 (1.85)	-0.023 (-0.42)	-0.044 (-1.05)	-0.021 (-0.64)	0.031 (0.29)	-0.066 (-1.13)	0.011 (0.22)	0.072 (1.54)	0.032 (0.47)	0.102 (1.73)
PX50(-1)	0.700 (4.27)**	0.299 (3.32)**	0.436 (5.60)**	0.363 (4.32)**	0.281 (3.91)**	0.082 (0.49)	0.358 (4.73)**	0.194 (2.79)**	0.132 (1.56)	0.056 (0.69)	0.065 (0.76)
PX50(-2)	-0.155 (-1.19)	0.155 (1.73)	0.014 (0.15)	0.123 (1.23)	0.177 (2.17)*	-0.046 (-0.19)	-0.126 (-2.02)*	0.062 (0.79)	-0.080 (-0.93)	-0.023 (-0.26)	-0.010 (-0.13)
RUR(-1)	0.075 (1.67)		-0.018 (-0.61)	-0.014 (-0.78)	-0.005 (-0.41)	0.100 (1.67)	0.073 (3.15)**	0.013 (-0.80)	-0.019 (-0.64)	-0.058 (-1.41)	-0.029 (-0.63)
RUR(-2)	-0.067 (-1.37)		0.037 (1.10)	-0.011 (-0.68)	-0.006 (-0.53)	0.018 (0.46)	-0.027 (-1.04)	-0.016 (-1.11)	-0.003 (-0.16)	0.010 (0.26)	0.048 (0.98)
SBI(-1)	0.022 (0.43)	-0.058 (-1.30)	0.021 (0.71)	0.047 (1.53)	0.010 (0.46)	-0.292 (-1.24)	-0.002 (-0.06)	0.013 (0.12)	-0.096 (-0.82)	0.091 (0.46)	-0.099 (-0.54)
SBI(-2)	-0.072 (-1.63)	-0.005 (-0.10)	0.109 (2.90)**	-0.038 (-1.12)	-0.022 (-1.01)	-0.117 (-0.64)	0.019 (0.62)	-0.003 (-0.04)	-0.177 (-1.21)	0.209 (1.27)	-0.221 (-1.13)
LITIN-G(-1)				0.031 (0.66)	0.022 (0.60)	-0.029 (-0.32)	-0.021 (-0.68)	0.150 (2.04)*	-0.098 (-0.89)	0.040 (0.34)	0.209 (1.64)
LITIN-G(-2)				-0.077 (-1.58)	-0.022 (-0.55)	-0.024 (-0.34)	-0.017 (-0.68)	-0.072 (-0.99)	-0.018 (-0.20)	-0.031 (-0.25)	-0.108 (-0.89)
TALSE(-1)				0.026 (0.70)		-0.020 (-1.08)	-0.022 (-1.61)	0.041 (1.63)	0.053 (-0.84)	0.130 (-1.51)	-0.111 (-1.24)
TALSE(-2)				-0.013 (-0.41)		0.072 (2.54)*	0.047 (2.19)*	0.004 (0.17)	-0.071 (-1.30)	0.027 (0.32)	0.105 (1.18)
CROBEX(-1)						-0.007 (-0.10)	0.018 (0.48)	0.019 (0.46)	0.023 (0.79)	0.032 (0.64)	-0.032 (-0.45)
CROBEX(-2)						0.128 (1.65)	0.007 (0.22)	0.032 (0.97)	0.074 (1.98)*	-0.014 (-0.27)	-0.063 (-0.87)
BET(-1)						0.117 (1.78)		0.008 (0.20)	0.028 (0.52)	0.097 (1.99)*	0.012 (0.20)
BET(-2)						0.033 (0.49)		-0.006 (-0.16)	-0.029 (-0.56)	0.009 (0.15)	0.034 (0.53)
PFTS(-1)								-0.019 (-0.98)	0.010 (0.21)	0.055 (0.62)	-0.010 (-1.10)
PFTS(-2)								-0.028 (-1.37)	0.027 (0.50)	-0.016 (-0.22)	-0.011 (-0.96)
RICI(-1)								-0.081 (-1.84)	-0.011 (-0.16)	-0.085 (-1.23)	-0.055 (-0.81)
RICI(-2)								0.093 (2.28)*	-0.130 (-1.97)*	0.025 (0.33)	-0.023 (-0.42)
BSE(-1)								-0.001 (-0.03)	-0.020 (-0.58)	-0.038 (-1.05)	0.020 (0.48)
BSE(-2)								0.040 (0.94)	0.012 (0.27)	-0.051 (-1.62)	-0.064 (-1.36)
INTERCEPT	-0.001 (-0.88)	-0.001 (-1.45)	-0.001 (-1.46)	-0.001 (-1.43)	0.000 (0.38)	0.001 (0.69)	-0.001 (-1.12)	0.000 (-0.45)	0.001 (0.74)	-0.001 (-0.71)	0.000 (-0.15)
DAX100	0.155 (1.03)	0.011 (0.09)	0.044 (0.66)	0.189 (2.38)*	0.020 (0.36)	-0.011 (-0.11)	0.007 (0.12)	0.418 (9.12)**	0.296 (4.19)**	0.421 (5.83)**	0.242 (3.79)**
DAX100(-1)	0.068 (0.46)	-0.016 (-0.16)	0.112 (1.80)	0.166 (1.62)	0.087 (1.25)	0.188 (1.47)	0.018 (0.32)	-0.053 (-0.71)	-0.030 (-0.38)	-0.006 (-0.06)	0.064 (1.06)
DAX100(-2)	-0.269 (-1.84)	-0.061 (-0.52)	0.024 (0.28)	0.009 (0.09)	0.016 (0.23)	-0.047 (-0.42)	-0.108 (-2.09)*	0.017 (0.25)	-0.121 (-1.24)	0.014 (0.14)	0.025 (0.29)

(continued)

Appendix C. Continued

Year	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
No. of observations	82	184	245	141	247	62	244	244	242	242	237
S&P500	0.059 (0.32)	0.097 (0.62)	-0.127 (-1.35)	-0.013 (-0.17)	0.026 (0.49)	0.294 (2.63)*	0.136 (1.89)	0.014 (0.15)	-0.005 (-0.06)	0.189 (2.48)*	0.159 (1.87)
S&P500(-1)	0.383 (2.17)*	0.353 (2.37)*	0.072 (0.74)	-0.144 (-1.71)	-0.083 (-1.30)	-0.153 (-0.93)	-0.098 (-1.35)	-0.178 (-2.23)*	-0.076 (-0.82)	-0.138 (-1.59)	-0.044 (-0.38)
S&P500(-2)	0.321 (1.99)	0.086 (0.55)	-0.043 (-0.53)	0.031 (0.40)	-0.027 (-0.44)	-0.014 (-0.07)	0.056 (0.81)	0.088 (1.20)	-0.004 (-0.04)	0.076 (0.85)	-0.035 (-0.41)
R ² adjusted	0.444	0.167	0.283	0.183	0.137	0.321	0.203	0.336	0.090	0.181	0.122
F-stat	4.60**	3.30**	6.34**	2.42**	2.95**	2.11*	3.57**	4.85**	1.75*	2.66**	2.02**

Notes: This table presents the results for the vector autoregression (VAR) when the Czech stock index return series (PX50) is the dependent variable. The variables in the VAR are defined in Table 2. The 1-day and 2-day lagged terms of Eastern European countries are treated as endogenous variables. The contemporaneous and lagged terms on the stock index returns of Germany and the U.S. are treated as exogenous variables. For both endogenous and exogenous variables, the table presents, for each year, the values of the coefficients and White adjusted t-statistics (White, 1980). The table also presents the adjusted R-squares and F-statistics for each equation. In 1994#, 1996# and 1997#, the Russian (RUR), Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis, in order to increase the number of observations available for the VAR.

*, ** denote statistical significance at the 5% and 1% level, respectively.

Appendix D. VAR results for Slovenia (SBI)

Year	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
No. of observations	82	184	245	141	247	62	244	244	242	242	237
BUX(-1)	-0.208 (-0.56)	-0.281 (-1.95)	0.170 (1.55)	0.208 (2.06)*	0.040 (0.52)	-0.058 (-1.05)	0.083 (1.14)	-0.013 (-0.35)	0.038 (1.16)	-0.039 (-1.35)	-0.048 (-1.07)
BUX(-2)	0.085 (0.27)	0.186 (1.16)	0.069 (0.69)	-0.080 (-0.62)	0.019 (0.22)	-0.101 (-1.63)	0.085 (0.99)	0.008 (0.27)	0.037 (1.31)	0.032 (1.12)	0.024 (0.74)
WIG(-1)	-0.025 (-0.40)	-0.026 (-0.92)	-0.005 (-0.12)	0.032 (0.25)	-0.001 (-0.02)	0.152 (1.66)	0.039 (0.37)	-0.044 (-1.24)	-0.058 (-1.42)	0.019 (0.64)	0.008 (0.25)
WIG(-2)	-0.104 (-1.37)	-0.058 (-2.05)*	-0.019 (-0.54)	0.127 (1.28)	0.120 (1.59)	-0.110 (-1.29)	-0.135 (-0.98)	-0.001 (-0.04)	-0.035 (-0.93)	0.003 (0.11)	0.038 (1.15)
SAX16(-1)	0.127 (0.55)	0.064 (1.23)	-0.021 (-0.20)	-0.052 (-0.59)	0.005 (0.07)	0.135 (2.04)*	0.074 (0.87)	-0.042 (-1.03)	0.003 (0.14)	0.028 (1.29)	0.024 (1.08)
SAX16(-2)	0.332 (2.15)*	0.020 (0.44)	0.047 (0.45)	-0.098 (-1.08)	-0.125 (-1.41)	-0.022 (-0.28)	-0.159 (-1.82)	0.073 (1.83)	0.052 (2.28)*	0.039 (1.59)	-0.019 (-0.90)
PX50(-1)	0.181 (0.75)	0.198 (1.66)	-0.027 (-0.24)	-0.297 (-1.39)	-0.118 (-0.55)	0.156 (1.36)	0.002 (0.01)	0.039 (0.59)	0.052 (1.56)	-0.013 (-0.43)	0.034 (1.16)
PX50(-2)	-0.439 (-1.64)	-0.165 (-1.50)	-0.018 (-0.12)	-0.214 (-0.95)	-0.355 (-1.86)	0.054 (0.36)	-0.014 (-0.11)	0.006 (0.10)	-0.067 (-2.01)*	-0.009 (-0.33)	-0.027 (-0.79)
RUR(-1)	0.218 (2.48)*		0.012 (0.24)	0.003 (0.06)	-0.053 (-1.22)	0.105 (3.02)**	0.039 (0.79)	-0.009 (-0.79)	-0.027 (-2.29)*	0.015 (1.06)	-0.028 (-1.51)
RUR(-2)	-0.015 (-0.17)		-0.050 (-0.99)	0.012 (0.21)	0.082 (1.87)	-0.008 (-0.21)	-0.008 (-0.15)	0.006 (0.50)	-0.004 (-0.35)	0.025 (1.94)	-0.028 (-1.67)
SBI(-1)	0.349 (2.56)*	0.392 (4.02)**	0.241 (3.27)**	0.293 (2.47)*	0.254 (3.02)**	0.119 (0.67)	0.498 (4.14)**	0.348 (3.90)**	0.342 (5.01)**	0.269 (3.78)**	0.229 (2.50)*
SBI(-2)	-0.117 (-1.01)	-0.165 (-1.89)	-0.138 (-1.90)	-0.025 (-0.23)	-0.036 (-0.46)	-0.106 (-0.82)	-0.269 (-2.41)*	0.015 (0.17)	-0.154 (-1.82)	-0.003 (-0.05)	0.011 (0.12)
LITIN-G(-1)				0.285 (2.39)*	0.228 (2.46)*	-0.037 (-0.57)	-0.076 (-0.65)	-0.016 (-0.32)	0.025 (0.43)	0.000 (0.00)	-0.027 (-0.60)
LITIN-G(-2)				-0.013 (-0.10)	-0.036 (-0.34)	0.106 (1.58)	-0.055 (-0.73)	0.166 (2.98)**	-0.071 (-1.32)	0.050 (1.00)	0.014 (0.31)
TALSE(-1)				0.013 (0.11)		-0.004 (-0.22)	0.035 (1.16)	-0.005 (-0.26)	0.035 (1.07)	-0.079 (-2.48)*	0.006 (0.15)
TALSE(-2)				0.028 (0.26)		0.056 (3.86)**	0.064 (2.34)*	0.002 (0.11)	0.028 (0.81)	-0.053 (-1.44)	0.038 (1.13)
CROBEX(-1)						0.010 (0.24)	0.051 (0.69)	0.017 (0.59)	0.018 (0.94)	-0.005 (-0.26)	-0.020 (-0.58)

(continued)

Appendix D. Continued.

Year No. of observations	1994	1994#	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
CROBEX(-2)						0.047 (0.81)	0.087 (1.35)	-0.010 (-0.37)	0.041 (2.68)**	0.002 (0.10)	-0.012 (-0.40)
BET(-1)						-0.053 (-0.99)		-0.036 (-1.14)	0.021 (0.74)	0.006 (0.27)	-0.028 (-1.11)
BET(-2)						0.058 -1.190		0.033 (1.05)	0.005 (0.20)	0.010 (0.50)	0.010 (0.41)
PFTS(-1)								-0.012 (-0.87)	0.013 (0.40)	0.003 (0.10)	-0.007 (-1.87)
PFTS(-2)								-0.015 (-1.00)	-0.003 (-0.09)	-0.028 (-0.94)	-0.001 (-0.27)
RICI(-1)								0.030 (0.87)	0.026 (0.64)	-0.004 (-0.14)	-0.007 (-0.27)
RICI(-2)								-0.048 (-1.42)	0.025 (0.62)	-0.043 (-1.59)	0.043 (1.61)
BSE(-1)								0.014 (0.52)	0.032 (1.97)*	0.002 (-0.13)	-0.024 (-1.40)
BSE(-2)								0.017 (0.44)	-0.008 (-0.31)	0.037 (2.39)*	0.005 (0.28)
INTERCEPT	-0.001 (-0.22)	0.000 (0.35)	0.001 (0.74)	-0.001 (-0.46)	0.000 (0.20)	0.000 (0.52)	-0.001 (-0.53)	0.001 (2.04)*	0.000 (0.61)	0.000 (0.02)	0.001 (2.23)*
DAX100	0.582 (1.40)	0.313 (1.78)	-0.019 (-0.14)	0.011 (0.06)	0.012 (0.07)	-0.094 (-1.07)	-0.019 (-0.24)	0.059 (1.31)	0.119 (2.82)**	-0.014 (-0.53)	-0.004 (-0.15)
DAX100(-1)	0.472 (1.04)	0.049 (0.26)	0.209 (1.44)	0.182 (0.76)	0.051 (0.27)	-0.030 (-0.34)	0.018 (0.21)	0.017 (0.31)	-0.021 (-0.35)	0.025 (0.88)	0.002 (0.06)
DAX100(-2)	0.318 (0.81)	-0.064 (-0.29)	-0.028 (-0.22)	0.010 (0.05)	-0.244 (-1.45)	0.095 (0.91)	-0.162 (-2.02)*	0.100 (1.78)	-0.018 (-0.42)	-0.018 (-0.56)	0.001 (0.02)
S&P500	-1.396 (-2.44)*	-0.573 (-2.09)*	-0.108 (-0.62)	-0.238 (-0.99)	-0.232 (-1.07)	0.015 (0.14)	0.082 (0.75)	0.085 (1.26)	-0.052 (-1.09)	-0.009 (-0.28)	0.055 (1.26)
S&P500(-1)	-0.603 (-1.27)	-0.273 (-1.20)	-0.487 (-2.52)*	0.230 (0.88)	0.168 (0.97)	-0.300 (-2.09)*	-0.054 (-0.46)	-0.162 (-2.56)*	0.016 (0.30)	-0.032 (-0.96)	-0.007 (-0.19)
S&P500(-2)	0.132 (0.32)	0.236 (0.97)	0.003 (0.02)	0.127 (0.49)	0.282 (1.49)	0.145 (1.20)	0.181 (1.33)	-0.088 (-1.48)	-0.023 (-0.50)	-0.005 (-0.15)	-0.073 (-2.35)*
R ² adjusted	0.168	0.173	0.053	0.085	0.081	0.428	0.239	0.130	0.162	0.100	0.053
F-stat	1.91*	3.39**	1.76*	1.59	2.08**	2.76**	4.18**	2.13**	2.45**	1.84**	1.41

Notes: This table presents the results for the vector autoregression (VAR) when the Slovenian stock index return series (SBI) is the dependent variable. The variables in the VAR are defined in Table 2. The 1-day and 2-day lagged terms of Eastern European countries are treated as endogenous variables. The contemporaneous and lagged terms on the stock index returns of Germany and the U.S. are treated as exogenous variables. For both endogenous and exogenous variables, the table presents, for each year, the values of the coefficients and White adjusted t-statistics (White, 1980). The table also presents the estimated values of adjusted R-squared and F-statistics for each equation. In 1994#, 1996# and 1997#, the Russian (RUR), Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis, in order to increase the number of observations available for the VAR.

*, ** denote statistical significance at the 5% and 1% level, respectively.

Appendix E. VAR results for Russia (RUR)

Year No. of observations	1994	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
BUX(-1)	-0.573 (-1.47)	0.002 (0.02)	-0.086 (-0.50)	0.004 (0.05)	0.469 (1.96)	0.112 (1.15)	-0.276 (-1.03)	-0.232 (-1.45)	0.134 (0.92)	-0.124 (-0.88)
BUX(-2)	0.233 (0.91)	0.025 (0.18)	-0.303 (-1.78)	-0.080 (-0.72)	-0.156 (-0.43)	-0.111 (-1.02)	0.398 (2.16)*	-0.130 (-0.73)	-0.047 (-0.29)	-0.024 (-0.18)
WIG(-1)	-0.058 (-0.74)	-0.031 (-0.57)	0.018 (0.08)	-0.195 (-1.27)	-0.826 (-2.00)	-0.176 (-1.28)	-0.254 (-1.12)	0.184 (0.97)	-0.309 (-2.12)*	-0.054 (-0.43)
WIG(-2)	-0.037 (-0.38)	0.049 (0.92)	0.098 (0.36)	0.007 (0.05)	0.204 (0.43)	0.063 (0.45)	-0.273 (-1.26)	-0.187 (-0.94)	-0.124 (-0.85)	-0.202 (-1.51)
SAX16(-1)	-0.399 (-1.48)	0.115 (0.88)	-0.068 (-0.45)	-0.230 (-1.37)	0.134 (0.44)	-0.009 (-0.06)	0.403 (2.10)*	-0.105 (-0.55)	0.154 (1.09)	-0.086 (-0.87)

(continued)

Appendix E. Continued.

Year No. of observations	1994	1995	1996	1996#	1997	1997#	1998	1999	2000	2001
SAX16(-2)	0.047 (0.17)	-0.130 (-0.89)	-0.023 (-0.14)	-0.119 (-0.87)	0.250 (0.84)	0.035 (0.29)	0.223 (1.13)	-0.002 (-0.01)	0.271 (2.52)*	-0.027 (-0.23)
PX50(-1)	0.260 (0.84)	0.201 (1.23)	0.355 (0.80)	0.308 (0.91)	0.759 (1.17)	0.110 (0.63)	-0.164 (-0.40)	-0.841 (-3.90)**	-0.164 (-0.93)	-0.098 (-0.81)
PX50(-2)	0.343 (0.94)	-0.246 (-1.35)	0.119 (0.33)	0.248 (0.84)	0.968 (1.76)	0.238 (1.48)	-0.168 (-0.42)	0.316 (1.33)	-0.139 (-0.77)	0.040 (0.03)
RUR(-1)	0.057 (0.40)	0.284 (3.20)**	0.275 (2.12)*	0.304 (3.26)**	-0.017 (-0.10)	0.212 (2.85)**	0.424 (5.01)**	0.276 (4.12)**	-0.067 (-0.75)	-0.023 (-0.31)
RUR(-2)	-0.204 (-1.37)	0.101 (1.21)	-0.105 (-0.85)	-0.108 (-1.20)	-0.089 (-0.39)	-0.006 (-0.08)	-0.050 (-0.38)	-0.027 (-0.42)	0.037 (0.42)	0.094 (-1.20)
SBI(-1)	-0.229 (-1.47)	-0.042 (-0.50)	0.181 (1.20)	0.078 (0.94)	0.418 (-0.42)	0.147 (-1.63)	0.727 (-1.86)	0.535 (-1.33)	-0.131 (-0.37)	0.015 (0.05)
SBI(-2)	0.154 (1.24)	-0.035 (-0.44)	0.107 (0.86)	0.009 (0.12)	-0.752 (-0.74)	-0.019 (-0.19)	-0.587 (-1.38)	0.028 (0.07)	0.241 (-0.77)	-0.105 (-0.35)
LITIN-G(-1)			-0.226 (-1.58)	-0.174 (-1.06)	-0.207 (-0.76)	-0.085 (-1.15)	-0.054 (-0.15)	-0.157 (-0.43)	0.247 (0.99)	-0.073 (-0.39)
LITIN-G(-2)			-0.200 (-1.15)	-0.151 (-1.15)	0.307 (0.91)	0.144 (1.38)	0.005 (0.01)	-0.447 (-1.41)	-0.356 (-1.66)	-0.073 (-0.43)
TALSE(-1)			-0.320 (-1.57)		-0.053 (-0.46)	-0.089 (-1.30)	-0.137 (-0.88)	-0.080 (-0.37)	0.026 (0.15)	-0.114 (-0.77)
TALSE(-2)			-0.061 (-0.28)		0.099 (0.96)	0.161 (1.97)	0.129 (0.97)	0.372 (1.96)	-0.033 (-0.21)	0.003 (0.02)
CROBEX(-1)					0.043 (0.16)	0.094 (0.85)	0.135 (0.71)	0.121 (1.17)	0.000 (0.00)	-0.226 (-2.33)*
CROBEX(-2)					-0.395 (-1.33)	-0.039 (-0.39)	-0.021 (-0.12)	-0.058 (-0.57)	-0.057 (-0.48)	0.109 (1.03)
BET(-1)					0.069 (0.25)		0.043 (0.25)	-0.233 (-1.48)	-0.098 (-0.90)	0.108 (1.39)
BET(-2)					0.453 (1.94)		0.135 (0.67)	0.130 (1.03)	0.028 (0.24)	0.087 (0.89)
PFTS(-1)							-0.198 (-1.97)	-0.274 (-1.78)	0.331 (2.13)*	-0.006 (-0.29)
PFTS(-2)							-0.025 (-0.19)	0.117 (0.81)	-0.043 (-0.27)	0.005 (0.41)
RICI(-1)							-0.296 (-1.54)	-0.022 (-0.10)	-0.031 (-0.21)	-0.118 (-1.20)
RICI(-2)							-0.051 (-0.24)	-0.265 (-1.15)	0.106 (0.77)	0.107 (1.16)
BSE(-1)							0.167 (0.56)	0.091 (0.91)	0.025 (0.23)	0.082 (1.44)
BSE(-2)							-0.367 (-2.39)*	0.106 (1.19)	0.011 (0.13)	-0.044 (-0.51)
INTERCEPT	0.002 (0.53)	0.000 (0.15)	0.002 (0.95)	0.003 (1.38)	0.001 (0.26)	0.001 (0.90)	-0.003 (-1.08)	0.006 (2.54)*	-0.001 (-0.41)	0.003 (1.99)*
DAX100	0.424 (1.01)	-0.411 (-2.25)*	0.422 (1.24)	0.181 (0.81)	1.550 (5.50)**	0.570 (3.79)**	1.081 (3.86)**	0.398 (2.00)*	0.935 (6.61)**	0.495 (4.84)**
DAX100(-1)	-0.343 (-0.89)	-0.091 (-0.60)	-0.282 (-0.92)	-0.367 (-1.68)	0.632 (1.31)	0.041 (0.26)	-0.409 (-1.30)	0.239 (0.89)	0.141 (0.75)	0.166 (1.64)
DAX100(-2)	-0.764 (-1.78)	-0.032 (-0.18)	0.285 (0.71)	0.332 (1.31)	0.981 (2.41)*	0.095 (0.66)	0.146 (0.45)	-0.021 (-0.08)	0.239 (1.35)	0.059 (0.50)
S&P500	-0.387 (-0.76)	0.374 (1.47)	0.597 (1.15)	0.360 (1.12)	-0.266 (-0.46)	0.458 (2.62)**	0.135 (0.31)	-0.111 (-0.37)	0.370 (2.50)*	0.020 (0.16)
S&P500(-1)	0.572 (1.12)	-0.307 (-1.07)	0.696 (1.69)	0.454 (1.73)	-0.733 (-1.16)	-0.127 (-0.77)	-0.110 (-0.23)	-0.335 (-1.24)	-0.087 (-0.47)	-0.131 (-0.86)
S&P500(-2)	-0.311 (-0.55)	-0.051 (-0.22)	0.271 (-0.73)	0.015 (-0.07)	-0.255 (-0.34)	0.103 (-0.55)	0.328 (0.68)	0.344 (1.23)	0.008 (0.04)	0.060 (-0.47)
R ² adjusted	0.050	0.099	0.087	0.099	0.326	0.254	0.225	0.112	0.206	0.130
F-stat	1.24	2.48**	1.60	2.35**	2.14*	4.44**	3.20**	1.95**	2.96**	2.10**

Notes: This table presents the results for the vector autoregression (VAR) when the Russian stock index return series (RUR) is the dependent variable. The variables in the VAR are defined in Table 2. The 1-day and 2-day lagged terms of Eastern European countries are treated as endogenous variables. The contemporaneous and lagged terms on the stock index returns of Germany and the U.S. are treated as exogenous variables. For both endogenous and exogenous variables, the table presents, for each year, the values of the coefficients and White adjusted t-statistics (White, 1980). The table also presents the estimated values of adjusted R-squared and F-statistics for each equation. In 1996# and 1997#, the Estonian (TALSE) and Romanian (BET) stock index return series are excluded from the analysis, in order to increase the number of observations available for the VAR.

*, ** denote statistical significance at the 5% and 1% level, respectively.

Appendix F. VAR results for Estonia (TALSE)

Year	1996	1997	1997#	1998	1999	2000	2001	
No. of observations	141	62	244	244	242	242	237	
BUX(-1)	-0.061 (-0.98)	0.278 (0.39)	0.131 (0.77)	0.027 (0.26)	-0.045 (-0.98)	-0.045 (-0.64)	0.040 (0.66)	-0.033 (-0.44)
BUX(-2)	-0.002 (-0.02)	0.590 (1.31)	0.265 (2.00)*	-0.127 (-0.98)	0.026 (0.43)	0.031 (0.54)	0.031 (0.54)	0.095 (1.24)
WIG(-1)	0.024 (0.36)	1.363 (1.74)	0.346 (1.86)	-0.103 (-0.83)	0.208 (2.43)*	-0.013 (-0.19)	-0.013 (-0.19)	-0.001 (-0.01)
WIG(-2)	0.019 (0.25)	0.128 (0.18)	-0.082 (-0.54)	-0.033 (-0.24)	0.005 (0.06)	0.051 (0.80)	0.051 (0.80)	-0.061 (-0.99)
SAXI6(-1)	-0.127 (-1.15)	0.165 (0.24)	-0.023 (-0.13)	0.115 (0.84)	0.041 (0.32)	-0.038 (-0.77)	-0.038 (-0.77)	0.109 (1.82)
SAXI6(-2)	-0.067 (-0.67)	1.561 (2.12)*	0.249 (1.22)	0.353 (2.46)*	-0.093 (-0.93)	0.006 (0.12)	0.006 (0.12)	-0.011 (-0.21)
PX50(-1)	-0.048 (-0.26)	-1.517 (-1.48)	-0.327 (-1.73)	-0.133 (-0.60)	-0.040 (-0.40)	0.219 (3.10)**	0.219 (3.10)**	-0.042 (-0.71)
PX50(-2)	0.302 (1.61)	-0.355 (-0.33)	-0.049 (-0.21)	0.031 (0.14)	0.019 (0.25)	-0.075 (-1.15)	-0.075 (-1.15)	0.043 (0.63)
RUR(-1)	0.001 (0.03)	-0.469 (-1.35)	-0.067 (-0.69)	0.157 (2.53)*	0.028 (0.96)	-0.020 (-0.67)	-0.020 (-0.67)	-0.009 (-0.21)
RUR(-2)	-0.026 (-0.43)	0.168 (0.63)	0.069 (0.72)	0.005 (0.09)	0.000 (0.00)	0.018 (0.63)	0.018 (0.63)	-0.029 (-0.71)
SBI(-1)	-0.038 (-0.70)	-0.302 (-0.22)	0.015 (0.19)	0.139 (0.52)	0.027 (0.20)	0.118 (0.71)	0.118 (0.71)	-0.239 (-1.65)
SBI(-2)	0.000 (0.00)	1.239 (0.79)	-0.036 (-0.45)	0.292 (1.22)	0.143 (0.97)	-0.117 (-0.70)	-0.117 (-0.70)	-0.022 (-0.16)
LITIN-G(-1)	0.055 (0.53)	-1.063 (-1.77)	-0.108 (-1.01)	0.177 (0.81)	-0.143 (-1.25)	0.089 (0.66)	0.089 (0.66)	0.119 (1.34)
LITIN-G(-2)	0.142 (1.35)	0.142 (0.31)	0.165 (1.72)	-0.073 (-0.40)	-0.046 (-0.47)	0.070 (0.68)	0.070 (0.68)	-0.190 (-2.10)*
TALSE(-1)	0.313 (2.13)*	0.287 (1.49)	0.297 (2.81)**	0.169 (2.05)*	0.227 (2.81)**	0.134 (1.29)	0.134 (1.29)	0.100 (1.10)
TALSE(-2)	-0.038 (-0.40)	-0.143 (-0.57)	-0.068 (-0.41)	-0.001 (-0.01)	-0.100 (-1.25)	-0.003 (-0.04)	-0.003 (-0.04)	0.047 (0.71)
CROBEX(-1)	0.187 (0.43)	-0.187 (-0.43)	-0.208 (-1.27)	-0.136 (-1.25)	0.018 (0.39)	0.025 (0.45)	0.025 (0.45)	-0.011 (-0.21)
CROBEX(-2)	-0.258 (-0.37)	-0.258 (-0.37)	-0.023 (-0.15)	0.149 (1.36)	-0.017 (-0.43)	-0.093 (-1.97)*	-0.093 (-1.97)*	-0.107 (-1.85)
BET(-1)	0.119 (0.29)	0.119 (0.29)	0.207 (2.07)	0.207 (1.71)	-0.056 (-0.93)	0.076 (1.95)	0.030 (0.30)	0.059 (0.59)
BET(-2)	-0.200 (-0.62)	-0.200 (-0.62)	0.000 (0.00)	-0.026 (-0.27)	0.121 (2.01)*	-0.080 (-1.35)	-0.080 (-1.35)	0.024 (0.54)
PFTS(-1)	0.049 (0.91)	0.049 (0.91)	0.049 (0.91)	0.049 (0.91)	-0.059 (-0.90)	-0.050 (-0.78)	-0.050 (-0.78)	0.005 (0.70)
PFTS(-2)	-0.049 (-0.89)	-0.049 (-0.89)	-0.049 (-0.89)	-0.049 (-0.89)	-0.079 (-1.30)	0.023 (0.43)	0.023 (0.43)	-0.004 (-0.49)
RICI(-1)	0.061 (0.48)	0.061 (0.48)	0.061 (0.48)	0.061 (0.48)	0.212 (2.88)**	0.001 (0.01)	0.001 (0.01)	-0.160 (-3.32)**
RICI(-2)	-0.285 (-1.86)	-0.285 (-1.86)	-0.285 (-1.86)	-0.285 (-1.86)	-0.016 (-0.19)	-0.022 (-0.35)	-0.022 (-0.35)	0.070 (1.28)
BSE(-1)	0.064 (0.65)	0.064 (0.65)	0.064 (0.65)	0.064 (0.65)	0.028 (0.54)	0.007 (0.20)	0.007 (0.20)	-0.022 (-0.70)
BSE(-2)	-0.061 (-0.63)	-0.061 (-0.63)	-0.061 (-0.63)	-0.061 (-0.63)	0.045 (1.03)	0.007 (0.26)	0.007 (0.26)	0.038 (1.22)
INTERCEPT	0.002 (1.77)	-0.008 (-0.80)	0.001 (0.59)	-0.003 (-1.52)	0.001 (1.39)	0.000 (0.55)	0.000 (0.55)	0.001 (0.95)
DAX100	-0.035 (-0.21)	0.677 (0.86)	0.052 (0.16)	0.247 (1.52)	0.024 (0.30)	0.117 (2.18)*	0.117 (2.18)*	0.118 (2.08)*
DAX100(-1)	0.406 (2.38)*	0.045 (0.04)	-0.016 (-0.07)	0.071 (0.40)	-0.030 (-0.25)	-0.112 (-1.48)	-0.112 (-1.48)	0.160 (2.55)*
DAX100(-2)	0.126 (0.67)	1.002 (0.99)	0.139 (0.68)	-0.027 (-0.15)	-0.101 (-0.97)	0.063 (0.86)	0.063 (0.86)	0.014 (0.18)
S&P500	0.100 (0.53)	0.079 (0.09)	0.043 (0.17)	0.050 (0.22)	0.227 (2.03)*	0.158 (2.43)*	0.158 (2.43)*	0.200 (3.12)**
S&P500(-1)	-0.238 (-1.44)	-1.711 (-1.25)	-0.406 (-1.39)	-0.105 (-0.42)	-0.038 (-0.34)	-0.124 (-1.63)	-0.124 (-1.63)	-0.058 (-0.67)
S&P500(-2)	-0.149 (-0.78)	-0.940 (-0.79)	-0.232 (-0.89)	0.074 (0.32)	0.057 (0.52)	0.034 (0.54)	0.034 (0.54)	0.051 (0.81)
R ² adjusted	0.098	0.043	0.066	0.129	0.095	0.080	0.215	
F-stat.	1.69*	1.11	1.71*	2.12**	1.79**	1.65*	3.02**	

Notes: This table presents the results for the VAR when the Estonian stock index return series (TALSE) is the dependent variable. The variables in the VAR are defined in Table 2. The 1- and 2-day lagged terms of Eastern European countries are treated as endogenous variables. The contemporaneous and lagged terms on the stock index returns of Germany and the US are treated as exogenous variables. For both endogenous and exogenous variables, the table presents, for each year, the values of the coefficients and White adjusted *t*-statistics (White, 1980). The table also presents the estimated values of adjusted *R*-squared and *F*-statistics for each equation. In 1997#, the Romanian (BET) stock index return series is excluded from the analysis, in order to increase the number of observations available for the VAR. *, ** denote statistical significance at the 5% and 1% level, respectively.

Appendix G. VAR results for Croatia (CROBEX)

Year	1997					1997#					1998					1999					2000					2001				
	No. of observations	62					244					244					242					242					237			
BUX(-1)	0.324	(1.50)	0.225	(2.89)**	0.099	(1.04)	0.032	(0.34)	0.047	(0.60)	0.026	(0.30)																		
BUX(-2)	0.057	(0.35)	-0.020	(-0.27)	-0.100	(-1.03)	0.038	(0.42)	-0.132	(-1.70)	-0.022	(-0.27)																		
WIG(-1)	-0.283	(-0.73)	-0.090	(-0.99)	0.111	(1.06)	0.027	(0.21)	-0.026	(-0.37)	-0.099	(-1.23)																		
WIG(-2)	0.024	(0.10)	0.026	(0.30)	-0.085	(-0.83)	0.147	(1.14)	0.013	(0.16)	-0.108	(-1.29)																		
SAXI6(-1)	-0.296	(-1.76)	-0.198	(-2.03)*	-0.070	(-0.63)	0.045	(0.51)	0.073	(0.85)	0.019	(0.26)																		
SAXI6(-2)	0.011	(0.06)	0.078	(0.92)	0.056	(0.61)	-0.091	(-1.10)	0.185	(2.58)**	-0.167	(-2.42)*																		
PX50(-1)	0.912	(2.70)*	0.089	(0.82)	-0.039	(-0.29)	-0.200	(-1.69)	-0.062	(-0.66)	0.065	(0.69)																		
PX50(-2)	-0.080	(-0.18)	0.004	(0.04)	0.268	(1.89)	0.042	(0.35)	-0.056	(-0.73)	0.131	(1.59)																		
RUR(-1)	0.154	(1.30)	0.019	(0.39)	0.086	(2.54)*	0.090	(1.80)	0.018	(0.45)	-0.036	(-0.74)																		
RUR(-2)	-0.025	(-0.32)	-0.075	(-1.32)	0.033	(1.01)	-0.043	(-1.15)	0.041	(0.93)	-0.023	(-0.47)																		
SBI(-1)	-1.367	(-2.98)**	0.073	(1.36)	0.163	(0.82)	0.304	(1.64)	-0.107	(-0.48)	-0.127	(-0.76)																		
SBI(-2)	0.014	(0.04)	-0.039	(-0.75)	-0.219	(-1.44)	-0.132	(-0.62)	0.314	(1.61)	0.177	(1.09)																		
LITIN-G(-1)	0.152	(0.79)	0.007	(0.10)	-0.284	(-2.08)*	-0.515	(-2.71)**	0.200	(1.40)	0.091	(0.69)																		
LITIN-G(-2)	-0.084	(-0.83)	0.038	(1.23)	0.080	(0.61)	0.237	(1.12)	-0.220	(-1.88)	0.134	(0.98)																		
TALSE(-1)	0.051	(1.10)	0.066	(1.43)	0.019	(0.45)	0.191	(1.77)	0.122	(1.42)	0.078	(0.84)																		
TALSE(-2)	0.028	(0.52)	0.040	(0.88)	-0.038	(-0.70)	0.204	(2.05)*	0.110	(1.06)	-0.023	(-0.29)																		
CROBEX(-1)	-0.122	(-0.66)	0.054	(0.81)	-0.119	(-1.76)	-0.145	(-1.68)	0.131	(1.66)	-0.034	(-0.41)																		
CROBEX(-2)	0.108	(0.66)	0.201	(2.37)*	0.013	(0.17)	-0.061	(-0.89)	-0.071	(-0.90)	-0.015	(-0.19)																		
BET(-1)	0.159	(1.13)	-0.044	(-0.68)	-0.044	(-0.68)	-0.013	(-0.18)	0.022	(0.35)	0.035	(0.58)																		
BET(-2)	-0.284	(-1.99)	0.166	(2.14)*	0.166	(2.14)*	-0.041	(-0.42)	0.029	(0.38)	-0.020	(-0.40)																		
PFTS(-1)			-0.025	(-0.50)	-0.025	(-0.50)	0.030	(0.25)	0.053	(0.44)	0.003	(0.33)																		
PFTS(-2)			-0.013	(-0.31)	-0.013	(-0.31)	0.248	(2.21)*	0.190	(1.80)	0.004	(0.43)																		
RICI(-1)			0.104	(1.26)	0.104	(1.26)	0.149	(1.21)	-0.040	(-0.49)	-0.024	(-0.34)																		
RICI(-2)			0.100	(1.14)	0.100	(1.14)	-0.268	(-1.98)*	0.119	(1.24)	0.050	(0.80)																		
BSE(-1)			-0.038	(-0.79)	-0.038	(-0.79)	-0.040	(-0.76)	0.013	(0.26)	-0.052	(-1.46)																		
BSE(-2)			0.012	(0.10)	0.012	(0.10)	0.078	(0.96)	-0.061	(-1.30)	-0.031	(-0.61)																		
INTERCEPT			0.000	(-0.28)	0.000	(-0.28)	-0.002	(-1.31)	0.000	(-0.06)	0.001	(1.41)																		
DAX100	0.462	(2.46)*	0.183	(2.12)*	0.520	(4.46)**	0.134	(1.06)	0.132	(1.51)	0.127	(1.83)																		
DAX100(-1)	-0.341	(-1.25)	-0.048	(-0.49)	-0.104	(-0.79)	0.171	(1.28)	-0.183	(-1.64)	0.010	(0.13)																		
DAX100(-2)	-0.259	(-0.82)	0.041	(0.38)	-0.093	(-0.64)	-0.039	(-0.30)	0.015	(0.14)	-0.143	(-1.91)																		
S&P500	0.155	(0.55)	0.210	(1.90)	0.170	(0.97)	0.099	(0.67)	0.276	(2.54)*	0.057	(0.58)																		
S&P500(-1)	0.566	(1.41)	0.312	(2.45)*	0.218	(1.44)	0.109	(0.67)	-0.021	(-0.22)	0.166	(1.83)																		
S&P500(-2)	0.108	(0.27)	0.057	(0.41)	0.231	(1.69)	-0.181	(-1.27)	0.006	(0.06)	0.103	(1.15)																		
R ² adjusted	0.332		0.199		0.193		0.085		0.076		0.020																			
F-stat.	2.17*		3.51***		2.81***		1.70*		1.62*		1.15																			

Notes: This table presents the results for the VAR when the Croatian stock index return series (CROBEX) is the dependent variable. The variables in the VAR are defined in Table 2. The 1- and 2-day lagged terms of Eastern European countries are treated as exogenous variables. The contemporaneous and lagged terms on the stock index returns of Germany and the US are treated as exogenous variables. For both endogenous and exogenous variables, the table presents, for each year, the values of the coefficients and White adjusted t -statistics (White, 1980). The table also presents the estimated values of adjusted R -squared and F -statistics for each equation. In 1997, the Romanian (BET) stock index return series is excluded from the analysis, in order to increase the number of observations available for the VAR.

*, **, *** denote statistical significance at the 5% and 1% level, respectively.