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Global Integration of Central and Eastern European Financial Markets – The Role of Economic Sentiments

by

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Abstract

This paper examines the importance of different economic sentiments, e.g. consumer moods, for the Central and Eastern European countries (CEECs) during the transition process. We first analyze the importance of economic confidence with respect to the CEEC's financial markets. Since the integration of formerly strongly regulated markets into global markets can also lead to an increase of the dependence of the CEECs' domestic market performance from *global* sentiments, we also investigate the relationship between global economic sentiments and domestic income and share prices. Finally, we test whether the impact of global sentiments and stock prices on domestic variables increases proportionally with the degree of integration. For these purposes, we apply a structural cointegrating VAR (CVAR) framework based upon a restricted autoregressive model which allows us to distinguish between the long-run and the short-run dynamics. For the long run we find evidence supporting relationships between sentiments, income and share prices in case of the Czech Republic. Our results for the short run suggest that economic sentiments in general are strongly influenced by share prices and income but also offer some predictive power with respect to the latter. What is more, global sentiments play an important role in particular for the CEECs' share prices and income. The significance of this link increases with economic integration.

JEL codes: E44, G15, P2

Keywords: Cointegration , European integration, financial markets, restricted autoregressive model, sentiments

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1 Introduction

With Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia 10 former communist countries joined the European Union within the last five years. Slovakia and Slovenia have already introduced the Euro in 2009 and 2007 respectively and some others are on the cusp of following them. An essential pre-condition for a successful accession to a monetary union is a successfully passed process of economic convergence (e.g. Mundell, 1961; MacKinnon, 1963). A financial market of a member country which is well integrated into the global financial market represents a key feature in this respect because it improves the stability against economic and financial vulnerability and enhances economic growth (e.g. Pagano, 1993, Schularick and Steger, 2006).

The world capital markets have become more and more integrated in the last 30 years, although some exceptions and some dispersion across countries and sectors have to be acknowledged (e.g. Bekaert and Harvey, 1995; Carrieri, Errunza and Hogan, 2007). Empirical evidence of a deeper integration of both equity and bond markets has been delivered for the Euro area (Baele and Ferrando, 2005; Beakaert; Hodrick and Zhang, 2008). Particularly just before the introduction of the Euro, the capital markets of the countries which finally entered the monetary union became more integrated, not at least due to the reduction of exchange rate volatility and the convergence of monetary policies (Fratzscher, 2002). For the Central and Eastern European countries (CEECs) a steadily enforcing integration process into global financial markets can also be observed (Chelley-Steeley, 2005, for Hungary, Poland and the Czech Republic). In these economies, the integration took place to both global and European capital markets.

When looking at capital markets, it has in the meantime become a stylized fact that asset markets are faced with over- and “under”-reactions of the market participants so that prices do not necessarily reflect their fundamental values. In the recent past it has been controversially discussed in finance literature that sentiments, i.e. market moods proxied by market surveys, affect asset prices (Baker and Wurgler, 2005, 2007; Brown and Cliff, 2005). Moreover, consumer confidence has proven to be a quite good predictor of asset prices, at least on a disaggregated level (Fisher and Statman, 2003; Lemmon and Portniaguina, 2006; Schmeling, 2009). For instance, it has been shown that consumer confidence is negatively correlated with (cumulated) asset returns in the long run.

As already mentioned, distinct progress in financial integration tends to enhance growth and offers a channel of adjustment alternative to the exchange rate. Nevertheless, non-fundamentally determined sentiments are important also in global financial markets and can therefore in principle affect prices on the domestic financial market via spillovers. If this is the case, some speak of financial contagion (Karolyi, 2003). In this paper, we are predominantly interested in effects stemming from the domestic domain. Moreover, we try to explain to which extent the domestic effects have their root in foreign influences. From this point of view, we feel legitimized to differentiate between a direct and an indirect contagion effect. For policy analysis, it is important to determine the degree to which moods influence the domestic financial market performance.

The aim of our contribution is to investigate the importance of sentiments during the transition process. We pay special attention to the question whether consumer confidence in Europe and the United States has an impact on stock markets in the CEECs since 1997. To the best of our knowledge there is no other contribution which has covered these topics before. The closest contribution to ours on the country level is the work by Jansen and Nahuis (2003) who investigated European countries over the years 1986 until 2001. However, they excluded the CEECs from their analysis. They only find a reverse causality between consumer confidence and stock prices, i.e. movements in stock prices affect consumer confidence. Their results confirm the hypothesis that moods present in the economy do not "cause" stock prices. Consequently, it appears valuable to us to assess empirically which kind of empirical pattern is valid for the CEECs.

Summing up, the literature discusses two different relationships between economic sentiment indicators and economic variables. Moreover, there is a two-directional relation among stock prices and consumer confidence. Our main aim is to model the interdependencies between sentiments, income and stock prices for the case of the CEECs. We explicitly include US and European sentiments and stock prices in order to analyze the effect of economic integration with respect to financial markets and moods of the CEECs. We extend the reach of the existing literature by setting up a structural framework of the economy.

In order to test for potential "causalities", we employ a macroeconomic approach based on the CAPM and the Fama-French Model. Taking this framework as a starting point, we investigate the CEEC stock markets on the country level. Our main variables are the stock market returns and the economic sentiment indicator. In our empirical analysis we apply the cointegrated VAR framework developed by Juselius and Johansen (1988, 1991) in two steps. First, we scrutinize the long-run relationships characterizing the individual CEEC economies. In a second step, the results established in the previous step enter a structural analysis framework which builds upon a restricted vector autoregressive model. The second part of our analysis relies on a macroeconomic model which we derive in chapter 3 while the results we obtain in the first step should be considered as slightly more general, a distinction which is typical for the works of Johansen and Juselius.

The first hypothesis we test is whether domestic economic confidence has an impact on financial markets of the CEECs or whether the causality is the other way round. The integration of formerly strongly regulated markets into global markets can also lead to a dependence of CEECs' domestic market performance from *global* sentiments. Thus, our second hypothesis refers to the relationship between global confidence and the domestic economy. In the same vein, the third hypothesis to be tested empirically is whether global sentiments and stock prices affect domestic variables proportionally with respect to the degree of economic integration. For this purpose, we evaluate whether foreign sentiments can be used to assess the vulnerability of the domestic financial market with regard to the engagement of global investors. As an add-on we also check whether these sentiment indicators can be used to predict (domestic) income in the transition countries.

The remainder of the paper is organized as follows. Chapter 2 comes up with some theoretical considerations especially with respect to the sentiment indicators which are crucial for the following analysis. Chapter 3 describes the macroeconomic framework applied. In chapter 4, we present the results of our empirical analysis which is essentially based on a restricted cointegrated vector autoregressive model (CVAR) and distinguishes between short-run and long-run dynamics as described above. Chapter 5 concludes by summarizing the results and deriving some major policy implications.

2 Economic Methodology

2.1 The economy and the role of sentiments

In a first step, a clear definition of consumer confidence and investor sentiment is required. While the terms `consumer sentiments` and `investor sentiments` are sometimes used interchangeably, a careful distinction between them is indispensable. Consumer confidence and investor sentiments are not necessarily the same (Fisher and Statman, 2000). Consumer confidence or consumer sentiment indexes are collected in order to evaluate the economic situation of households. In the case of the US, consumer confidence indexes are able to predict household spending (Carroll, Fuhrer and Wolcox, 1994; Bram and Ludvigson, 1998, Howrey, 2001) and economic growth (Matsusaka and Sbordone, 1995; Howrey, 2001) with a positive correlation. A similar relationship can also be found for European economies (Nahuis and Jansen, 2004) and the UK (Acemoglu and Scott, 1994; Easaw and Heravi, 2004).[1]

However, the corresponding channels of influence are not well established. A reasonable explanation is that consumer sentiments reflect expectations which are translated into decisions over expenditures. In contrast to the earlier results, Lemmon and Portniaguina (2006) find weak predictive power from consumer confidence indexes to economic growth with a negative correlation. They explain this negative relationship with a precautionary savings motive. An increase of the consumer confidence occurs when uncertainty about the future is low from which a reduction in (precautionary) savings follows. As a result, the present consumption increases relatively to future consumption. Consumption growth in the future will accordingly be lower due to the need to satisfy the inter-temporal budget constraint.

As is well known from the US case, consumer sentiments affect growth. Since growth also determines stock prices it is reasonable to assume that consumer sentiments have the potential to also exert an impact on stock prices. In fact, Lemmon and Portniaguina (2006) show for the USA that interdependencies between consumer confidence, stock returns (of small stocks) and macroeconomic activity started to prevail in 1977. The reason for the increasingly closer linkage between consumer confidence indexes and economic activity is generally seen in the increasing engagement of households into capital markets. A similar argument can be made with respect to transition countries. Along with the ongoing transition and growing real income per capital, the households use their savings for investing in the equity markets. Consequently, asset prices should react more sensitively to changes in consumer confidence. For European countries, such a negative interrelationship in the long run can also be found by using consumer confidence indexes (Schmeling, 2009). Moreover, based on a cross-sectional perspective on the country level, Schmeling (2009) reports that countries with less integrated markets exhibit evidence of a stronger relation between consumer confidence and stock prices.[2]

In the short run, reverse causality can be observed for aggregated market data. Jansen and Nahuis (2005) use the consumer confidence indexes published by the European Commission for a couple of European countries (before the EU enlargement) and find that stock prices tend to Granger cause consumer confidence. Stock prices can affect the macroeconomic activity via different channels. Rising stock prices imply an increase in

[1] Mehrotra and Rautava (2008) evaluate the usefulness of business sentiment indicators for forecasting developments in the Chinese real economy. Their results indicate that Chinese business sentiment indicators convey useful information about current and future developments in industrial production, retail sales and exports.

[2] In addition, he relates the argument to cultural issues.

households' wealth. If consumption depends on wealth, the households in this case boost their consumption. Similarly to the traditional wealth effect, an indirect effect arises from consumer confidence. Stock prices reflect the discounted sum of future dividends which are related to economic activity. Thus, a rise in stock prices reflects improved future economic prospects. Hence, an increase in stock prices lets forward-looking consumers feel more optimistically. As a result, an immediate effect on macroeconomic activity takes place because households spend more money on consumption. For European countries, Jansen und Nahuis (2005) find evidence that the causality between stock prices and consumer confidence is identified by this indirect channel. Along these lines, stock prices are seen as a leading indicator that accordingly affects consumer confidence.

Investor sentiments are said to reflect the market perception of professional investors. From this point of view, investor sentiments might also have irrational content. Investor sentiments indicators can also be collected by surveys. The indicator developed by Brown and Cliff (2005) draws upon the number of newsletter from which information about the market performance are extracted. Sentiments of professional investors seem to be heavily influenced by information coverage of press articles (Doms and Morin, 2004). An alternative technique is to extract a sentiment indicator from observable variables which are subject to sentiments. With such a construction it can be shown that the cross-section of returns and investor sentiments are related (Baker and Wurgler, 2006, 2007).

Similarly to consumer confidence, stock prices are positively affected by investor sentiments in the short run and negatively related in the long run. An explanation for this dynamic might be that in the short run equity prices are driven by moods in the market, i.e. optimism, which lets the market value deviate from the fundamental value. In the long run, this kind of mispricing is removed which results in negative relationships (Brown and Cliff, 2005).[3]

Although investor sentiments and consumer sentiments are more or less disparate indicators, our considerations up to this point clearly suggest that consumer confidence shares similar dynamics with respect to stock prices. Since our aim is to investigate the extent to which the CEECs' markets are subject to sentiments we feel legitimized to work with the narrower consumer confidence indexes as well as with broader economic sentiment indicators.

[3] Burdekin and Redfern (2009) examine the importance of sentiment effects on asset allocation decisions and share prices and savings deposits in mainland China and beyond.

By using the latter, the "financial situation" of the households is also embedded. All indicators employed by us are described in detail in section 4.1.

2.2 The domestic economy and foreign sentiments

All the above mentioned studies have by now only tested for the impact of domestic sentiments. However, *foreign* sentiments have the potential to have an impact also on domestic market returns which is a relevant issue with respect to the evaluation of contagion effects. The investigation of the impact of foreign sentiments on domestic assets must be related to contagion effects especially if sentiments contain irrationality (Karolyi, 2003). However, in our study we are predominantly interested in the link between domestic economic confidence and the domestic capital market in order to investigate whether the market integration establishes or enforces such a link. Contagion in our context generally occurs when foreign sentiments *directly* affect the domestic financial market. As discussed above, both investor sentiments (Brown and Cliff, 2004) and consumer sentiments (Fisher and Statman, 2000; Schmeling, 2009) predict (cumulated) asset returns with a negative long-run correlation due to the adjustment in response to a stock market overreaction.

With respect to contagion arguments it is of special interest whether domestic stock prices also react to foreign forces. Such interlinkages can work via different channels. The first one is a quite direct channel. Foreign investors are engaged in the domestic capital market and redistribute their portfolios if their perception directed to one market change. As a result, the domestic asset prices are also affected. As a second and indirect effect, the domestic market participants adjust their portfolios if they are faced with changes in foreign sentiments. If they realize that the economic situation abroad changes and if they are aware that their country is linked with the foreign economy, for instance via trade flows, they will also revise their expectations regarding the future of the domestic economy.

Typically, the sentiments of market participants of its major trading partners should be particularly important for a country. A simultaneous effect arises if the trading partners report their current perceptions or when domestic market participants extrapolate the economic situation from media reporting about the foreign economic situation. With an eye on the outlined arguments, we generally expect that the domestic sentiments are affected by foreign sentiments. From this point of view, the direct effect is the influence of foreign sentiments on domestic asset returns which, however, is not yet included using domestic sentiments.

3 The macroeconomic framework

3.1 The impact of macroeconomic variables on sentiments

We start with a closer inspection of the different sentiment indexes and their determinants. We explain consumer and economic confidence (sent) by national income (y) and stock prices (sp). Because domestic consumer confidence can also depend on confidence indicators from important trading partners we also include foreign economic confidence indexes ($sent^f$). If domestic residents invest their savings globally, the performance of foreign stock price indicators (sp^f) have an impact on domestic sentiments. Consequently, the domestic sentiments can be explained as follows:

$$sent = \mu^{sent} + \theta_2{}^{sent} sp + \theta_3{}^{sent} y + \theta_7{}^{sent} sent^f + \theta_8{}^{sent} sp^f. \qquad (1)$$

3.2 The impact of economic confidence on stock prices

Since we are dealing with aggregated data, i.e. market portfolios, we need an economic model which is able to explain market returns. Following the capital asset pricing model (CAPM), asset returns can be explained by the riskless interest rate and the market return weighted by the individual risk of the asset (covariation of asset's returns with market returns per unit market risk). Alternatively, the arbitrage pricing theory (APT) decomposes the return of an asset into the expected return of this asset and several factors which are related to firm specifics or market factors.

Fama and French (1993) filter out five common factors which very well explain individual asset and bond returns. Our aim is to look at the country level, i.e. we are interested in the market aggregates. Solnik (1974) introduces the international asset pricing theory (IAPM) in order to explain the returns of a country's market portfolio. The IAPM explains the expected (real) return of the domestic market portfolio by the risk-free (world) interest rate, the market risk premium which is equal to the difference between the expected world portfolio return and the risk-free world interest rate, and risk premia on all currencies with which the country is trading. In order to work with a tractable model for the empirical analysis we simplify the model significantly and construct a factor model which can be seen as an international variant of the Fama and French (1993) model.

We explain the expected market return, in nominal terms, by the macroeconomic variables. As a proxy of riskless borrowing we use the short-term interest rate (i). Since we look at nominal returns we also include the rate of inflation (π). Furthermore, national income can help explain the evolution of stock prices. In globally integrated markets the domestic stock prices can also depend on foreign stock prices due to contagion effects. Based upon the arguments outlined above, the sentiments have the potential to affect stock prices. But since we are also interested in contagion stemming from foreign sources, we also integrate foreign sentiments. An interesting question then is whether we are able to detect and trace some major and systematic changes in the effect of European or US variables during the transition process. The corresponding model representation is:

$$sp = \mu^{sp} + {\theta_1}^{sp}\pi + {\theta_3}^{sp}y + {\theta_4}^{sp}sent + {\theta_7}^{sp}sent^f + {\theta_8}^{sp}sp^f. \quad (2)$$

3.3 Structure of the macroeconomy

Usually, analyses of economic confidence are enacted within the framework of vector autoregressive models or vector error-correction models, dependent on the specific research interest. If the latter is more on the linkage between economic confidence and stock prices, these two indicators and, in some cases, additional explanatory variables are included. Accordingly, if the link between confidence indicators and consumption (i.e. growth) is investigated, these two indicators and further control variables are taken into account. However, the structure of the economy is mostly not modeled in this strand of literature. Hence, in this paper, we make an additional contribution to the literature. We explore the linkages between economic confidence, stock prices and national income by accounting for contagion effects within a structural model guided by important economic relationships.

Based upon a simple Phillips curve relationship, the rate of inflation depends on the money supply (M). In addition, we allow for demand side effects on prices. Since stock prices increase wealth and wealth is linked to consumption, increases domestic stock prices tend to raise domestic inflation:

$$\pi = \mu^{\pi} + {\theta_2}^{\pi}sp + {\theta_3}^{\pi}y + {\theta_5}^{\pi}M \quad (3)$$

Inflation also raises interest rates because market participants need a compensation for a loss in purchasing power. An increase in income stimulates liquidity demand and therefore contributes to a rise in the interest rate. Through the supply side, a monetary expansion lowers interest rates. Stock prices also impact on interest rates via some substitution effects. Thus, the interest rate equation which is compatible with a Taylor rule specification boils down to:

$$i = \mu^i + \theta_1{}^i\pi + \theta_2{}^i sp + \theta_3{}^i Y + \theta_5{}^i M. \qquad (4)$$

What is more, money supply (equation (5)) depends on real income, the inflation rate and stock prices. To close the model, changes in monetary policy are reflected in changes of the money supply. On this background, effects from monetary policy on interest rates can be found in equation (4), whereas the direct effects on money supply are reflected according to:

$$M = \mu^M + \theta_1{}^M\pi + \theta_2{}^M sp + \theta_3{}^M Y + \theta_6{}^M i\ . \qquad (5)$$

In order to be able to test for an effect from sentiments on income we explain income with the confidence index, stock prices and money supply:

$$y = \mu^Y + \theta_2{}^Y sp + \theta_4{}^Y sent + \theta_7{}^Y sent^f + \theta_8{}^Y sp^f \qquad (6)$$

In doing so, we are able to discriminate between sentiments and stock prices as leading indicators. Furthermore, we can test whether money is neutral with respect to real income. For sentiments and the stock prices we also draw on foreign variables because stock prices could affect income for instance via a wealth effect. Foreign sentiments have an impact also on domestic income because of their leading indicator property abroad. If they are able to forecast foreign consumption, they should also have the potential to predict domestic income via an export channel. Again, our interest in this context is to investigate whether the importance of US and, in particular, of European sentiments steadily increases during the transition process.

4 Empirical analysis

4.1 Data

Let us now turn to our data choice. As a proxy of consumer confidence for European countries we employ the Economic Sentiment Indicator (ESI) as published by the European Commission. We adhere to two different indicators, one sub-indicator which is directly linked to consumer confidence and another representing an aggregate based on various sentiment indicators. In the following, we denote the former as "consumer sentiments" and call the latter "economic sentiments". Both indicators are based upon harmonised surveys across the countries of the European Union (EU). The economic sentiment indicator consists of surveys addressed to representatives of the industry sector (manufacturing) and the services, retail trade, construction sectors and consumers while the consumer sentiment indicator only refers to the consumers. The countries under investigation are the Czech Republic, Poland, Hungary and Slovakia. Unfortunately, consumer confidence data are not available for Poland and Slovakia for the whole estimation period. Hence, we confine ourselves to the use of economic sentiments in the case of both countries. In order to capture influences from the outside of the European Union we also rely on sentiments originating from the US as the world's leading economy. On the whole, thus, we are able to estimate an array of six models based on a sample period starting from January 1997 and ending December 2008.

In the United States, two important sentiment indexes are commonly used in scientific research. The first one is the Michigan's Consumer Confidence Index (MCCI) and the second is the Conference Board's Consumer Index (CBCCI). While the MCCI comprises long-term changes and long-term expectations, the CBCCI predominantly focuses on the current situation (Bram and Ludvigson, 1998; Ludvigson, 2004). Although both indexes have predictive power for expenditures in the same direction, the CBCCI is said to have more explanatory power. When we examine the economic sentiments we draw on the CBCCI and with respect to consumer confidence we use the MCCI.

All remaining data have been taken from the OECD and International Financial statistics. As interest rates (i) we use short-term interest rates with a maturity of 3 months. Real income (y) is proxied by the production index as provided by the IMF. To match the money supply (M) we use a broad money aggregate. We employ the leading composite indexes of each country as provided by the IMF as a proxy of share prices (sp). In addition, we use the consumer price index in order to reflect the price developments and to calculate the rate of inflation (π). As usual, all variables except the interest rates and the sentiment indicators are expressed as natural logarithms. Let us now turn to our long-run analysis.

4.2 Long-run analysis: econometric methodology and results

If variables are non-stationary due to unit roots, the concept of cointegration refers to linear combinations of the variables which result in stationary long-run relationships between them. There are different ways to test for cointegration among a couple of variables. In the following, we apply the multivariate test of Johansen (1988) which draws upon the following vector autoregression representation (VAR):

$$\Delta X_t = \Pi X_{t-1} + \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_{k-1} \Delta X_{t-k-1} + \Phi D_t + \epsilon_t , \quad t = 1, \ldots , T. \qquad (7)$$

The non-stationary behavior is accounted for by a reduced rank ($r < p$) restriction of the long-run level matrices Π which can be fragmented into two $r \times p$ matrices α and β' ($\Pi = \alpha\beta'$). β' gives the coefficients of the variables for the r long-run relation while α contains the adjustment coefficients describing the reaction of each variable to disequilibria from the r long run relations given by the $r \times 1$ vector $\beta' X_{t-1}$. The deterministic components are given by the ($p \times 1$) vector ΦD_t while ϵ_t describes an independent and identically distributed error term. The expression ΦD_t also includes the constant term μ. The term $\Gamma_1 \Delta X_{t-1}$ describes the short-run dynamics of the model using p equations between current variables, lagged variables and equilibrium errors (Juselius, 2006).

In the following, we run a cointegration analysis for each country in order to identify the long-run structure of the corresponding economy. In this context, we establish the following models for the four countries under investigation:

model one: Czech Republic

$$X_1 = (sent, y, M, \pi, sp, i), \quad (8)$$

model two: Hungary

$$X_2 = (sent, y, M, \pi, sp), \quad (9)$$

model three: Poland

$$X_3 = (sent, y, M, \pi, sp, i)\text{, and} \quad (10)$$

model four: Slovakia.

$$X_4 = (sent, y, \pi, sp)\,. \quad (11)$$

As already mentioned above, there are no consumer confidence data available for Poland (PL) and Slovakia (SK) for the whole period. Hence, we confine ourselves with one setting containing economic sentiments for both countries while we estimate two configurations using both consumer and economic sentiments for Hungary and the Czech

Republic. Furthermore, no adequate time series for short-term interest rates and money supply are available for Hungary and Slovakia. So we had to exclude those variables from the corresponding relations.

We start our empirical investigation with some preliminary unit root tests, applying the Phillips-Perron test, the KPSS test and the DF-GLS test. The results of this exercise are presented in Table 1. In the first instance, we test for stationarity of the levels of the respective variables. For the PP and the DF-GLS test, a non-rejection of the null hypothesis in levels and a rejection in first differences as well as a rejection of the null hypothesis for the KPSS test let us feel legitimized to treat the first differences as I(0) variables. If a unit root is still not rejected in first differences, the variable is integrated of a higher order than one. According to our results presented in Table 1, all variables can be considered as being integrated of order one although, in cases of the consumer prices the evidence is mixed. However, after inspecting the corresponding series we decided to treat them as I(1). The reason is that some major outliers which we account for in the cointegration analysis can be observed.

- Table 1 about here -

In Tables 2 and 3 we present the results of our cointegration analysis in detail for the Czech Republic. To save space, we decided to display the results for the other countries in Tables A1 to A4 in the Appendix. In these cases the corresponding sentiment indicators do not enter the established long run relations which are described in detail below. For the specification of the model the choice of the lag is based on the presented tests for autocorrelation and ARCH-effects. According to the high skewness and kurtosis of some variables, especially the consumer price index, dummies have been included in some cases. According to Rahbek et al. (2002), the results we gain in the following are still robust under the ARCH-effects that remain in some cases.

One of the most crucial steps in the analysis is the determination of the rank, respectively the number of stationary long run relationships. To identify the number of cointegrating relations r we rely on the trace test developed by Johansen (1988). The aim of this approach is to separate the eigenvalues λ_i , $\mathrm{i} = 1 \dots . \mathrm{r}$ which correspond to stationary relations from those eigenvalues λ_i , $\mathrm{i} = \mathrm{r} + 1 \dots ., \mathrm{p}$ which belong to non-stationary eigenvectors. The test statistic of the corresponding likelihood test, the so called trace test, is given by

$$trace(r) = -T \sum_{i=r+1}^{p} \log(1 - \hat{\lambda}_i). \qquad (12)$$

Under the null hypothesis of $(p-r)$ unit roots, λ_i, $\mathrm{i} = (\mathrm{r}+1 \ldots., \mathrm{p})$ should behave like random walks and the test statistic should be small. Starting with the hypothesis of full rank we determine the rank using top bottom procedure until the null cannot be rejected (Juselius, 2006).

Except for Hungary (where the test statistic indicates a rank of one, see Tables A3 and A4 in the Appendix) all settings might be seen as a borderline case between the alternative of one or two cointegrating relations. The reason is that the p-value belonging to the short-run Bartlett correction suggests a rank of one while the p-value of the basic model cannot reject the hypothesis of 2 cointegrating relations. These results might be tracked back to the issue that we use a comparably small sample in order to establish significant long-run relations. However, after taking recursive graphs of the trace statistic and inspecting the unit roots of the compagnion matrixes (not reported) as suggested by Juselius (2006) we decided that a rank of two is an adequate choice for the Czech Republic (Model 1 and 2, see Tables 2 and 3) and for Slovakia (Model 6, see Table A1 in the Appendix) while we only establish one cointegrating relation for Poland (Model 5, Table A2 in the Appendix).

After determining the rank the Johansen approach provides the maximum likelihood estimates of the unrestricted cointegrating relations $\beta' X_{t-1}$. In cases of a rank larger than one it is necessary to impose just identifying restrictions on β in order to achieve interpretable economic relationships for the long-run structure, otherwise the cointegration vector is unique. By having an economic model at hand, further restrictions can also be implemented so that the model is over-identified. Hypothesis testing on cointegration vectors is done by specifying the s_i free varying parameters in each β vector according to the term

$$\beta = (H_1 k_1, \ldots \ldots., H_t k_t) \qquad (13)$$

with β as $(p_1 \times r)$ and k_i as a $(s_i \times 1)$ coefficient matrices and H_i as an $(p_1 \times s_i)$ design matrices. We base our hypotheses tests on a likelihood ratio procedure described in Johansen and Juselius (1990, 1992).

Running a test for weak exogeneity, we first check whether some of the variables just induce shocks to the system but do not react themselves. Based on those results and some theoretical considerations we identify the long-run structure by testing for different hypotheses.

- Tables 2 to 3 about here -

The resulting cointegrating relationships are also presented in the table of the respective configuration. For each case, the p-value of the corresponding LR-test indicates that the imposed restrictions are not rejected. A first interesting result is that important similarities between Poland and Hungary arise concerning the long-run structure of the economy. Economic sentiment indicators do not enter the respective cointegration vectors for both countries. Furthermore, both cointegrating relationships reflect the same theoretical underpinnings with share prices and income moving together in the long run and the CPI also positively related to income. For Hungary, these results hold for both configurations, i.e. independent of using economic or consumer sentiments. For Slovakia the economic sentiments should be considered as stationary around a constant according to the first cointegrating relation while the second relation for Slovakia also suggests that share prices and income are positively related in the long run.

The results gained for the Czech Republic are particular interesting as both sentiment indicators enter the corresponding long-run relations. The first cointegrating relation suggests that consumer sentiments and share prices are negatively correlated in the long run. This pattern is consistent with the view that the engagement of noise traders with correlated sentiments in asset markets has the clear potential to lead to mispricing for a couple of periods. As deviations from the fundamental values are corrected in the long run, a negative relationship between both variables arises (Lemmon and Portniaguina, 2006). As for Poland and Hungary, the CPI again plays a role in determining the long-run dynamics with being positively related to the consumer sentiments and negatively correlated with share prices.

The second relation also corresponds with theoretical suggestions with on the one hand money supply and consumer prices being positively related and on the other hand cointegration occurring between consumer confidence and income. The latter case is consistent with the view that consumer confidence indexes offer predictive power for real income respectively GDP (Howrey, 2001). We will come back to this issue within the short-run analysis in the next section. Using economic sentiments, the first relation again expresses a positive relation between sentiments and income while the second relation suggests a long-run proportionality between the monetary aggregate and the CPI.

To sum up our results gained so far: we are able to identify a long-run structure for each model. The evidence concerning the sentiment indicators is mixed. We come up with some results for the Czech Republic while the Slovakian sentiments seem to be a borderline case between I(0) and I(1). The sentiment indicators of Poland and Hungary seem to have no empirical relevance for the long-run structure given the implied restrictions. In order to ascertain further effects besides the cointegration relationship we proceed with a structural representation of the economy which we adopt for our analysis with stationary variables in the next section.

4.2 Modeling the short-run structure using Feasible Least Squares

After identifying the long-run structure, we apply a structural analysis framework which builds up on a restricted autoregressive model. The intention of this analysis is to gain further insights into short-run causalities between variables. In particular, we are interested in the role of US and European sentiments for the transition economies. We use first differences in order to achieve stationary variables. Basically, our analysis refers to the following model:

$$\Delta X_t = \alpha \begin{pmatrix} \beta' X_{t-1}^0 \\ \delta' X_{t-1}^1 \end{pmatrix} + \Theta \Delta X_{t-1} + \mu + \varepsilon_t \qquad (14)$$

The restricted coefficient matrix Θ introduces the structure outlined in equation 1 to 6 as described in section 3 by restricting the lags of the corresponding variables in the VAR to zero. By treating basically all variables as endogenous we still stick the structure of the economy established in chapter 3. The matrix Θ can then be written as:

$$\Theta = \begin{pmatrix}
\theta_1^{sent} & \theta_2^{sent} & \theta_3^{sent} & 0 & 0 & 0 & \theta_7^{sent} & \theta_8^{sent} & \theta_9^{sent} & \theta_{10}^{sent} \\
0 & \theta_2^{sp} & \theta_3^{sp} & 0 & \theta_5^{sp} & 0 & \theta_7^{sp} & \theta_8^{sp} & \theta_9^{sp} & \theta_{10}^{sp} \\
\theta_1^{y} & \theta_2^{y} & \theta_3^{y} & 0 & \theta_5^{y} & 0 & \theta_7^{y} & \theta_8^{y} & \theta_9^{y} & \theta_{10}^{y} \\
0 & \theta_2^{M} & \theta_3^{M} & \theta_4^{M} & \theta_5^{M} & \theta_6^{M} & 0 & 0 & 0 & 0 \\
0 & \theta_2^{\pi} & \theta_3^{\pi} & \theta_4^{\pi} & \theta_5^{\pi} & 0 & 0 & 0 & 0 & 0 \\
0 & \theta_2^{i} & \theta_3^{i} & \theta_4^{i} & \theta_5^{i} & \theta_6^{i} & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & \theta_7^{sentUS} & \theta_8^{sentUS} & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & \theta_7^{sentEMU} & \theta_8^{sentEMU} & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \theta_9^{spUS} & \theta_{10}^{spUS} \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \theta_9^{spEMU} & \theta_{10}^{spEMU}
\end{pmatrix} \quad (15$$

Compared to the equations in section 3, we include two more θ coefficients as we distinguish between European and the United states with respect to foreign sentiments and stock prices. The matrix α can be partitioned into a $(r \times n)$ matrix α^0 and a $(r \times m)$ matrix α^1. α^0 represents the adjustment to the established long-run relations and consequently has the same dimension as β while α^1 has the same dimension as δ. Both α^1 and δ are null matrices.

X can be partitioned into X^0 and X^1 with X^0 containing domestic variables. In order to test for contagion effects and to account for effects stemming from European or US variables during the transition process, X^1 contains sentiments and share prices of the United States and Europe.

$$X^0 = (sent \quad sp \quad y \quad M \quad \pi \quad i)' \tag{16}$$

$$X^1 = (sent^{US} \quad sent^{EMU} \quad sp^{US} \quad sp^{EMU})' \tag{17}$$

Consequently, the variables included in X^1 do not enter the cointegration relationship and do not adjust towards any long-run relationship. From the perspective of cointegration analysis, they are exogenous. The Θ matrix shows that the variables contained in X^0 affect directly only the variables considered in X^1. However, we allow for correlated error processes in order to preserve endogeneity. Consequently, the errors ϵ_t are normally distributed with zero mean and a variance-covariance matrix of $\sigma^2\Omega$ which captures the correlation structure. Thus we employ a VAR structure with restricted coefficients which we estimate with feasible generalized least squares. In cases in which variables adjust according to equilibrium errors, i.e. weak exogeneity can be rejected, we additionally include the error-correction term. Applying this methodology, we are able to distinguish between the short- and the long-run dynamics.

We start our analysis by estimating equations for each model across the whole period. In each setting we use US and European shares prices as control variables by modeling the link between both variables without including further variables. Preliminary estimation results suggested that the annual change of the CPI should still be considered as integrated of order. We therefore decided to work with the change in the annual inflation rates which actually implies a slight modification of the vector error-correction models estimated before. To shed some further light on the effects of the progressing economic integration we proceed by splitting the sample and re-estimating from January 1997 until December 2002 and from January 2003 until December 2008, respectively. We then analyze the results with respect to changes in the effect of US- and European sentiments and share prices on the transition countries. In each case we start our analysis by determining the lag order according to the Akaike information criterion (AIC) based upon the unrestricted model. As a lag of one seems to be an adequate choice for most models we decided to use exactly this configuration for each model in order to achieve comparable results.

We now provide a description of the empirical results for the full sample.[4] The corresponding results are presented in Tables 4 to 9. Each table displays the results of three configurations for specific equations. The error term resulting from our long-run analysis is denoted with ect and turns out to be significant in many cases. When interpreting our results, we predominantly draw on the equation of the sentiments, income and share prices. Since the other model equations are considered to act as control variables we do not explain the results in more detail.

- Tables 4 to 9 about here -

We start with a discussion of our estimation results based on equation one which explains the sentiment indicator(s). Our results turn out to be different for economic sentiments and consumer sentiments. The suggested theoretical factors offer less explanatory power for the consumer sentiments of Hungary and the Czech Republic. In the latter case, consumer sentiments only react to the established long-run relations (Table 4). For Hungarian consumer confidence, no respective coefficient proves to be significant (Table 7). Using economic sentiments instead, we achieve the striking result that European economic sentiments affect domestic sentiments positively in the case of each country, with ${\theta_7}^{sent}$ in equation one throughout gaining significance at the 5% level (Table 4 and Table 7). In contrast, the lagged domestic sentiments enter with a negative sign for each case except Slovakia where the corresponding parameter is insignificant (Table 7). We feel legitimized to conclude, thus, that important spillover effects from European sentiments exist.

Our empirical evidence of "causality" running from share prices to economic sentiments is rather mixed. While "causality" in this direction does not occur in the cases of Slovakia (Table 7) and Poland (Table 4), positive changes in domestic share prices result in a rise of the economic sentiment indicators for Hungary (Table 7) and the Czech Republic (Table 4). Additionally, the Czech economic sentiments are negatively related to European stock prices (Table 4).[5] From the Czech perspective, it seems as if an increase in European share prices initiates a redistribution of wealth away from domestic assets.

As a next step we try to explain changes in the share prices with reference to equation two. Here our results clearly suggest that sentiment indicators only rarely have a significant influence on share prices in the short run. Inspecting Tables 5 and 8 we find no evidence in favor of any causality running from domestic sentiments to share price. On the contrary,

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[4] Since we are predominantly interested in the explanation of sentiments, income and stock prices, we do not report the results of the respective lines 4 to 10 in equation (15). However, they are available upon request.

[5] Analogously, Jansen and Nahuis (2002) find that stock returns and changes in sentiment are positively correlated for nine countries, with Germany being the main exception due to the inclusion of atypical "years"..

global sentiments have an impact on share prices in two cases. The impact of European economic sentiments on Czech share prices is significant at a 10% significance level and, thus, borderline (Table 5). Moreover, Polish share prices are positively influenced by economic sentiments of the United States (Table 8). Turning to other factors beside sentiments, we find a positive influence of short-term interest rates on share prices for Poland and the Czech Republic (Table 5). Remember that we did not include interest rates for Hungary and Slovakia because they are not available over the whole period. Interestingly, there seem to be more contagion effects as Polish share prices are positively influenced by European share prices. In addition, the former turn out to be negatively related to changes in the money supply (Table 5). Summing up the results up to this point we conclude that there is no clear pattern concerning the link between sentiments on share prices although effects stemming from the latter case occur more frequently.

Analyzing the determinants of income, we again achieve strong empirical support in favor of the hypothesis of contagion effects running from the Euro area to the transition countries. For each country European economic sentiments have a positive impact on the income level in transition countries (Table 6 and Table 9). On the opposite, we find only find evidence for a link running from domestic sentiments to income for the case of Hungary (Table 9). Consequently, the expectations reflected by European sentiments seem to influence income in the transition economies mainly through a direct trade channel. The portfolio adjustments of foreign investors described in Section 2.2 offer another explanation of our findings. Our results also suggest that US sentiments affect Hungarian (for consumer sentiments) and Czech income negatively as suggested by the precautionary saving motive described in Section 2.1. The remaining significant influences on income again reflect the already established long-run dynamics with Polish money supply and Czech share prices positively related to income (Table 6).

For the remaining variables described in section 3.3, our estimation suggests that the change of the Polish and Hungarian inflation rate depends only on its past changes. For the Czech Republic, the results are more promising because the change in the inflation rate is now significantly affected both by the changes in income and money supply. This result suggests that the long-run link between CPI and income established by us in section 4.2. continues to hold. Changes in the Slovakian inflation rate are positively affected by its past changes and changes in share prices. Since these results reflect out theoretical considerations and the results of our long-run analysis, we feel legitimized to conclude that our framework is overall adequate.

A comparison of the results for the two subsamples (1997 until 2003 and 2003 until 2008) enables us to answer the question if *global* sentiments affect the economies of the CEECs to a higher degree with ongoing integration. We decided to include the error term in both sub-samples as the cointegrating relationship should exist permanently across the whole sample whereas the adjustment coefficient does not necessarily become significant in some cases. Our results clearly suggest that the significant effects stemming from global sentiments and stock prices have occurred more predominantly in the second sample than during the first period. European economic sentiments, for example, influence Czech, Polish and Slovakian sentiments in the second but not in the first sample (Table 4 and Table 7). The same is true for impact of European sentiments on income in the Czech Republic and Hungary (Table 6 and Table 9).

Let us now have an eye on the influence of US and European stock prices on domestic sentiments for Slovakia. In this case we find a significant impact for a limited estimation period ranging from 2003 to 2008 while we do not detect any significant effects for the first sample (Table 7). The same is valid concerning the influence of European stock prices on Hungarian stock prices (Table 8). With respect to the signs, US stock prices show a positive effect on Slovakian sentiments while European stock prices enter with a negative sign. Both results are consistent with the theoretical suggestions developed in chapter 2.1. Furthermore, Jansen and Nahuis (2003) also report different signs with respect to the link running from sentiments to stock prices.

As a last step, we exclude US sentiments and stock prices from the analysis in order to check if the results concerning linkages between European Union and transition economies are robust. Although this leads to some minor changes of the significance values of some variables, the corresponding estimations clearly suggest that our results are robust with respect to different model specifications. The same is true if we exclude the corresponding European variables instead. The results are available on request.

5. Conclusions

While some major conclusions can be drawn from our analysis there are also still some puzzles to be solved. One of them certainly concerns the choice of an adequate sentiment indicator. Our major results hold for both economic and consumer sentiments. Nevertheless, some differences with respect to, for instance, number and kind of explaining variables or their impact on other variables remain in the cases of Hungary and the Czech Republic where our analysis is based on both indicators. However, economic sentiments have a higher impact than consumer sentiments since global sentiments contain more explanatory power in these cases. With respect to the importance of sentiments for financial markets in the CEECs our results suggest that for the short run there is indeed a strong linkage, with the causality mainly running from stock prices and income to sentiments which also have an important impact on the latter case. Furthermore we also find evidence for an "inverse" long-run relationship between stock prices and consumer confidence for the case of Czech Republic.

However, the most striking result is the clear-cut evidence of a *strong influence of European sentiments on moods and income of the CEECs*. Our results for the short run even suggest that the explanatory power of global sentiments appears to be even higher than the influence of domestic sentiments. The same seems to be true for impacts of the global stock markets. This pattern is intuitively plausible in view of the sheer size of the global stock and goods markets compared to the domestic markets. From an economic point of view the question of the main channels of influence arises. Considering the fact that global sentiments even affect income of the CEECs in cases where there is no influence of domestic sentiments of these countries, a main impact seems to arise from global linkages established by the transition process and the integration of the CEECs into the world economy. Furthermore, contagion effects through economic confidence or stock prices should also play an important role.

We are also able to show that global sentiments and stock prices affect domestic variables to a higher degree when the domestic economies have undergone a significant degree of integration with global markets. This implies that the economic integration of transition countries goes hand in hand with cumulative spillover effects via changes in share prices and sentiments stemming from the European Union and the United States.

Tables

Table 1: Unit root tests

	Levels				First Differences			
Variable	PP Test[a]	1	DF-GLS Test[b]	KPSS Test[c]	PP Test[a]	1	DF-GLS Test[b]	KPSS Test[c]
i_{pl}	-1.354	2	-0.161	2.468***	-10.180***	2	-2.205**	0.155
i_{cz}	-1.667	7	-0.636	1.909***	-10.608***	0	-10.343***	0.142
Es_{EMU}	-0.062	0	0.752	0.527**	-5.950***	2	-2.026**	0.423*
Es_{SK}	-2.568	0	-2.618***	0.456*	-13.956***	13	-0.830	0.173
Es_{CZ}	-1.193	1	-1.843*	1.162***	12.887***	12	-0.896	0.299
Es_{Hu}	-1.204	0	-0.8647	1.184	-13.497***	11	-0.865	0.228
es_{Pl}	-2.265	0	-1.901*	0.977***	-13.710***	9	-1.338	0.094
cs_{US}	-0.164	0	-0.047	1.748***	-11.915***	0	-9.366	0.221
cs_{EMU}	-0.621	2	-0.997	0.618**	-9.660***	13	0.704	0.429*
cs_{HU}	-1.522	0	-1.198	1.018***	-11.123***	0	-10.901***	0.205
cs_{CZ}	-1.501	0	-1.462	1.793***	-11.557***	0	-7.043	0.154
sp_{CZ}	-0.390	0	-0.069	2.264***	-7.826***	4	-2.050**	0.401*
sp_{PL}	-1.078	0	-0.501	2.243***	-8.942***	13	0.308	0.159
sp_{HU}	-1.566	0	-0.298	2.464***	-9.116***	11	0.402	0.196
sp_{EMU}	-2.179	0	-0.686	0.269	-8.290***	11	-13.954	0.022
sp_{SK}	-0.390	0	-0.069	2.264***	-7.826***	4	-2.050	0.401*
sp_{US}	-2.578	0	-0.684	1.425***	-9.885***	11	-13.854	0.018
y_{CZ}	-1.183	0	-0.142	2.829***	-15.905***	8	0.416	0.148
y_{HU}	-2.351	0	0.395	2.838***	-13.528***	8	0.399	0.536**
y_{PL}	-0.901	0	0.950	2.856***	-16.682***	8	-0.078	0.111
y_{SK}	-1.294	0	-0.445	2.770***	-16.964***	9	-1.110	0.136
cpi_{SK}	-2.673*	3	2.053	2.752***	-10.259***	5	-0.789	0.411*
$cpiI_{Pl}$	-5.035***	0	3.994	2.641***	-7.950***	12	0.669	1.169***
$cpiI_{HU}$	-4.289***	0	5.541	2.872***	-8.193***	11	1.268	0.976***
$cpiI_{CZ}$	-0.900	1	2.949	2.954***	-10.463***	0	-8.544	0.066
m_{PL}	3.864	0	9.243	2.757***	-13.152***	11	0.752	1.083***
m_{CZ}	3.797	0	9.000	2.892***	-12.205***	9	-0.840	0.993***

Note: * Statistical significance at the 10% level, ** at the 5% level and *** at the 1% level. For the PP test and the DF-GLS test the series contain a unit root under the null, whereas the KPSS test assumes stationarity under the null. [a] Critical values are taken from MacKinnon (1991): 5% -2.86, 1% -3.43. [b] Critical values are given by Elliot et al. (1996): 5% -1.95, 1% -2.58. Number of lag is chosen by using the modified AIC (MAIC) by Ng and Perron (2001). Maximum lag number is chosen by Schwert (1989) criterion. [c] Critical values are given by Kwiatkowski et al. (1992): 5% 0.463, 1% 0.739. Autocovariances are weighted by the Bartlett kernel. i denotes the short-term interest rates, y real income, sp share prices, cpi consumer price index, m money supply. cs stands for consumer confidence and es for economic sentiments. CZ refers to Czech Rebublic, HU to Hungary, PL to Poland, SK to Slovakia, US to the USA and EMU to European Monetary Union.

Table 2: Cointegration analysis for the Czech Republic (economic sentiments)

Panel (a): I (1)-Analysis (Rank Test)

p-r	R	Eig. Value	Trace	Trace*	Frac95	P-Value	P-Value*
6	0	0.411	171.122	144.588	103.679	0.000	0.000
5	1	0.282	96.379	74.883	76.813	0.001	0.070
4	2	0.154	49.705	23.495	53.945	0.116	0.992
3	3	0.104	26.188	11.026	35.07	0.336	0.995
2	4	0.064	10.712	5.334	20.164	0.577	0.966
1	5	0.01	1.373	0.832	9.142	0.883	0.956

Panel (b): Cointegration vectors

	$sent$	cpi	y	M	sp	i	μ
Beta(1)		1.000		-0.531			-1.635
				(-25.393)***			(-8.456)***
Beta(2)	-0.011***		1.000			-0.019***	1.321***
	(-5.372)					(-3.610)	(2.340)

Panel (c): Test of restricted model

CHISQR(5) = 5.399 [0.369]

Panel (d): Adjustment coefficients

	$\Delta sent$	Δcpi	Δy	ΔM	Δsp	Δi
Alpha(1)	2.07	-0.067***	-0.253***	0.012	0.075	-5.007***
	(0.198)	(-3.697)	(-3.263)	(0.498)	(0.391)	(-5.054)
Alpha(2)	0.44	-0.015***	-0.055***	0.004	0.017	-1.119***
	(0.190)	(-3.631)	(-3.195)	(0.787)	(0.400)	(-5.095)

Panel (e): Test of weak exogeneity

r	DGF	5% C.V.	$sent$	cpi	y	M	sp	i
1	1	3.841	0.139	0.853	1.211	6.151	0.035	0.393
			[0.710]	[0.356]	[0.271]	[0.013]	[0.852]	[0.530]
2	2	5.991	0.215	15.687	10.788	45.068	0.130	24.230
			[0.898]	[0.000]	[0.005]	[0.000]	[0.937]	[0.000]

Panel (f): Test of exclusion

r	DGF	5% C.V.	$sent$	cpi	y	M	sp	i	μ
1	1	3.841	0.014	0.326	0.200	0.702	3.037	0.243	0.000
			[0.905]	[0.568]	[0.654]	[0.402]	[0.081]	[0.622]	[0.999]
2	2	5.991	17.008	23.317	3.417	20.998	3.185	4.674	7.733
			[0.000]	[0.000]	[0.181]	[0.000]	[0.203]	[0.097]	[0.029]

Panel (g): Tests for autocorrelation				Test for Arch			
LM (1):	ChiSgr(25)	= 23.406	[0.554]	LM (1):	ChiSgr(225)	= 261.938	[0.046]
LM (2):	ChiSgr(25)	= 21.014	[0.692]	LM (2):	ChiSgr(450)	= 497.853	[0.059]
LM (3):	ChiSgr(25)	= 28.826	[0.271]	LM (3):	ChiSgr(675)	= 706.190	[0.196]
LM (4):	ChiSgr(25)	= 28.376	[0.291]	LM (4):	ChiSgr(900)	= 924.550	[0.278]

Note: Panel (a) reports Johansen (1988, 1991) cointegration tests. Trace* and p-value* refer to Bartlett-corrected values. r denotes the cointegration rank. Panel (b) shows the estimates of the cointegration vector. Panel (c) reports the test for over-identifying restrictions which is an LR-test. Panel (d) reports the adjustment coefficients towards the long-run equilibrium. Panel (e) tests for weak exogeneity of the variables, i.e. whether they participate in the adjustment process. Panel (e) reports test on variable exclusion, i.e. whether the variable enters the cointegration vector. Panel (e) and Panel (f) are LR-tests where the tests statistics are distributed as X^2 with r degree of freedom. DGF denotes degree of freedoms. P-values are in brackets and t-statistics in parentheses. Panel (g) reports tests on autocorrelation and on heteroskedacticity. Both tests are LR-test which are distributed as X^2 with degrees of freedom in parentheses. * rejection of the null hypothesis at the 10% significance level. ** rejection of the null hypothesis at the 5% significance level. *** rejection of the null hypothesis at the 1% significance level. $sent$ denotes sentiments, cpi consumer price index, y real income, M money stock, sp stock prices and i short-term interest rates. μ is a constant term.

Table 3: Cointegration analysis for the Czech Republic (consumer confidence)

Panel (a): I (1)-Analysis (Rank Test)

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
6	0	0.399	179.750	163.336	103.679	0.000	0.000
5	1	0.345	107.382	50.860	76.813	0.000	0.828
4	2	0.126	47.342	20.983	53.945	0.175	0.998
3	3	0.1	28.287	12.131	35.07	0.231	0.989
2	4	0.079	13.316	12.363	20.164	0.347	0.425
1	5	0.012	1.659	1.362	9.142	0.835	0.885

Panel (b): Cointegration vectors

	$sent$	cpi	y	M	sp	i	μ
Beta(1)	-0.003***	1			-0.125***		-4.259***
	(-2.531)				(-3.123)		(-17.001)
Beta(2)	-0.007***	6.01***	1	-2.58***			-12.122***
	(-3.628)	(8.712)		(-9.121)			(-9.4221)

Panel (c): Test of restricted model

CHISQR(1) = 0.196 [0.658]

Panel (d): Adjustment coefficients

	$\Delta sent$	Δcpi	Δy	ΔM	Δsp	Δi
Alpha(1)	-6.578**	-0.001	0.057**	-0.043***	0.059	0.013
	(-2.012)	(-0.142)	(2.011)	(-5.317)	(0.921)	(0.897)
Alpha(2)	11.325***	-0.008	-0.08***	0.015**	-0.138**	0.038**
	(3.939)	(-1.327)	(-3.256)	(2.056)	(-2.212)	(1.815)

Panel (e): Test of weak exogeneity

r	DGF	5% C.V.	$sent$	cpi	y	M	sp	i
1	1	3.841	0.025	1.404	1.642	12.121	0.359	1.094
			[0.875]	[0.236]	[0.200]	[0.000]	[0.549]	[0.296]
2	2	5.991	12.062	7.742	8.488	50.734	0.648	18.908
			[0.002]	[0.021]	[0.014]	[0.000]	[0.723]	[0.000]

Panel (f): Test of exclusion

r	DGF	5% C.V.	$sent$	cpi	y	M	sp	i	μ
1	1	3.841	0.397	1.285	0.115	1.941	5.222	0.076	0.188
			[0.529]	[0.257]	[0.735]	[0.164]	[0.022]	[0.783]	[0.665]
2	2	5.991	6.130	38.796	1.514	25.981	6.819	0.918	25.772
			[0.047]	[0.000]	[0.469]	[0.000]	[0.033]	[0.632]	[0.000]

Panel (g): Tests for autocorrelation / Test for Arch

Tests for autocorrelation				Test for Arch			
LM(1):	ChiSqr(36)	= 93.437	[0.000]	LM(1):	ChiSqr(441)	= 626.546	[0.000]
LM(2):	ChiSqr(36)	= 57.196	[0.014]	LM(2):	ChiSqr(882)	= 1058.651	[0.000]
LM(3):	ChiSqr(36)	= 52.343	[0.038]	LM(3):	ChiSqr(1323)	= 1559.772	[0.000]
LM(4):	ChiSqr(36)	= 47.107	[0.102]	LM(4):	ChiSqr(1764)	= 1949.241	[0.001]

Note: See Table 2.

Table 4: Results of the restricted error-correction model for Poland and the Czech Republic (sentiments as LHS variable)

	Czech Republic						Poland		
	Consumer Sentiments			Economic Sentiments			Economic Sentiments		
	1997-2008	1997-2003	2003 2008	1997-2008	1997-2003	2003-2008	1997-2008	1997-2003	2003-2008
$\Delta sent$									
const.	-1.143	0.540	-2.659***	3.479	-57.704**	-12.941	0.116	0.049	0.229
	(-1.072)	(0.328)	(-1.939)	(0.526)	(-2.235)	(-0.653)	(0.220)	(0.043)	(0.540)
ect_{t-1}^{1}	-14.481*	-1.576	-31.066***	2.438	10.916***	3.899	0.252	0.183	-0.020
	(-1.910)	(-0.137)	(-2.904)	(1.251)	(2.930)	(0.647)	(0.500)	(0.205)	(-0.032)
ect_{t-1}^{2}	3.004***	1.612	6.101***	14.636***	-9.592	5.909			
	(3.609)	(1.498)	(3.199)	(1.669)	(-0.608)	(0.325)			
$\Delta sent_{t-1}$	-0.093	0.006	-0.216**	-0.214***	-0.223**	-0.143	-0.133**	-0.063	-0.226**
	(-1.116)	(0.050)	(-1.869)	(-2.743)	(-2.215)	(-1.341)	(-1.693)	(-0.541)	(-2.334)
Δy_{t-1}	1.686	5.368	3.068	13.905	6.530	27.187**	35.346***	57.908***	6.974
	(0.195)	(0.542)	(0.208)	(1.507)	(0.504)	(2.229)	(2.674)	(2.633)	(0.632)
Δsp_{t-1}^{us}	-6.135	3.665	-14.612	19.504***	14.958	23.787	3.680	3.046	17.031
	(-0.606)	(0.355)	(-0.681)	(1.785)	(1.071)	(1.330)	(0.294)	(0.158)	(1.366)
Δsp_{t-1}	3.780	4.205	8.798	12.122**	5.141	25.574***	2.778	10.145	-10.287*
	(0.807)	(0.803)	(0.929)	(2.284)	(0.685)	(3.058)	(0.429)	(1.023)	(-1.708)
$\Delta sent_{t-1}^{us}$	0.030	-0.052	0.126**	-0.052	-0.260	0.028	0.009	0.148	-0.043
	(0.701)	(-0.943)	(1.978)	(-0.807)	(-1.971)	(0.454)	(0.121)	(0.758)	(-1.052)
$\Delta sent_{t-1}^{emu}$	0.188	0.316	0.557	0.571***	0.847***	0.543**	0.418**	0.288	0.692***
	(0.997)	(1.572)	(1.573)	(3.156)	(3.127)	(2.437)	(2.194)	(0.811)	(4.519)
Δsp_{t-1}^{emu}	-1.006	1.658	-24.548	-20.764**	-1.710	-51.698***	0.630	-7.731	2.448
	(-0.122)	(0.207)	(-1.208)	(-2.266)	(-0.145)	(-3.251)	(0.058)	(-0.456)	(0.230)

Note: Table reports the results of the restricted vector error-correction model outlined in the text for $\Delta sent$ as the dependent variable. * Statistical significance at the 10% level, ** at the 5% level and *** at the 1% level. i denotes the short-term interest rates, y real income, sp share prices, cpi consumer price index, m money supply. cs stands for consumer confidence and es for economic sentiments. US refers to the USA and EMU to the European Monetary Union. For Czech Republic ect^1 refers to the first and ect^2 to the second cointegration vector in Table 2 and Table 3 and for Poland ect^1 refers to the cointegration vector in Table A2.

Table 5: Results of the restricted error-correction model for Poland and the Czech Republic (stock prices as LHS variable)

	Czech Republic						Poland		
	Consumer Sentiments			Economic Sentiments			Economic Sentiments		
	1997-2008	1997-2003	2003 2008	1997-2008	1997-2003	2003-2008	1997-2008	1997-2003	2003-2008
Δsp									
constant	-0.090	-0.925**	0.556	0.035**	0.113***	0.019	0.021***	0.015	0.020
	(-0.886)	(-2.231)	(1.836)	(1.911)	(3.241)	(1.036)	(2.761)	(1.116)	(1.836)
ect_{t-1}^{1}	0.043	0.135**	-0.137	0.224**	0.773***	0.104	0.016**	0.013	0.006
	(1.446)	(2.313)	(-1.551)	(1.784)	(3.302)	(0.753)	(2.558)	(1.299)	(0.423)
ect_{t-1}^{2}	0.102	-0.334	-0.099	-0.016	-0.062***	-0.020			
	(0.749)	(-1.317)	(-0.338)	(-1.146)	(-2.856)	(-0.802)			
$\Delta sent_{t-1}$	-0.001	-0.002	-0.001	-0.001	0.000	-0.001	0.000	0.000	0.001
	(-1.032)	(-0.847)	(-0.418)	(-0.439)	(-0.181)	(-0.560)	(0.303)	(0.317)	(0.551)
Δy_{t-1}	-0.109	-0.236	0.131	-0.017	-0.120	0.161	0.183	0.263	0.014
	(-0.779)	(-1.136)	(0.694)	(-0.122)	(-0.577)	(0.823)	(1.130)	(1.052)	(0.058)
$\Delta \pi_{t-1}$	-0.008	1.294*	-0.977	-0.331	0.545	-1.044	1.054	1.197	-0.788
	(-0.014)	(1.663)	(-1.055)	(-0.561)	(0.713)	(-1.152)	(1.314)	(0.998)	(-0.597)
Δsp_{t-1}	0.358	0.205**	0.302**	0.385***	0.227**	0.352***	0.099	0.131	0.077
	(4.465)	(1.806)	(2.230)	(4.961)	(2.161)	(2.642)	(1.216)	(1.118)	(0.587)
$\Delta sent_{t-1}^{us}$	0.000	-0.003	0.000	0.000	-0.001	0.000	0.002**	0.004	0.001
	(-0.453)	(-1.456)	(-0.286)	(0.088)	(-0.988)	(0.341)	(2.062)	(1.838)	(1.031)
$\Delta sent_{t-1}^{emu}$	-0.003	-0.004	-0.005	-0.005*	0.001	-0.006	0.002	0.003	0.003
	(-1.115)	(-0.955)	(-1.268	(-1.607)	(0.175)	(-1.175)	(1.046)	(0.643)	(0.916)
Δsp_{t-1}^{us}	0.219	0.224	-0.202	0.188	0.226	-0.093	-0.294	-0.308	-0.131
	(1.042)	(0.923)	(-0.527)	(0.893)	(0.969)	(-0.238)	(-1.414)	(-1.150)	(-0.361)
Δsp_{t-1}^{emu}	0.011	0.153	0.343	0.015	0.087	0.287	0.430***	0.379	0.353
	(0.061)	(0.762)	(1.023)	(0.088)	(0.481)	(0.807)	(2.444)	(1.634)	(1.137)
Δi_{t-1}	-0.006*	-0.007**	-0.078**	-0.006*	-0.005	-0.095***	-0.024***	-0.027***	-0.038*
	(-1.968)	(-2.156)	(-2.001)	(-2.005)	(-1.405)	(-2.613)	(-4.032)	(-3.624)	(-1.688)
ΔM_{t-1}	-0.102	-0.521	-0.313	-0.189	-0.593	-0.644	-0.514*	-0.415	-0.727**
	(-0.192)	(-0.712)	(-0.404)	(-0.358)	(-0.798)	(-0.874)	(-1.813)	(-0.915)	(-2.016)

Note: Table reports the results of the restricted vector error-correction model outlined in the text for Δsp. For Czech Republic ect^1 refers to the first and ect^2 to the second cointegration vector in Table 2 and Table 3 and for Poland ect^1 refers to the cointegration vector in Table A2. For further notes see Table 4.

Table 6: Results of the restricted error-correction model for Poland and the Czech Republic (income as LHS variable)

	Czech Republic						Poland		
	Consumer Sentiments			Economic Sentiments			Economic Sentiments		
	1997-2008	1997-2003	2003 2008	1997-2008	1997-2003	2003-2008	1997-2008	1997-2003	2003-2008
ΔY									
$constant$	0.037	-0.190	0.095	-0.004	0.020	-0.007	0.010***	0.009	0.015***
	(0.697)	(-0.938)	(0.569)	(-0.405)	(1.108)	(-0.711)	(3.076)	(1.574)	(3.273)
Δect_{t-1}^1	-0.044***	-0.014	-0.085	-0.037	0.112	-0.078	0.008***	0.004	0.020***
	(-2.796)	(-0.913)	(-1.712)	(-0.555)	(0.920)	(-0.985)	(2.755)	(1.001)	(2.894)
Δect_{t-1}^2	-0.169**	-0.263**	-0.301	-0.005	-0.018	0.003			
	(-2.295)	(-2.015)	(-1.846)	(-0.738)	(-1.518)	(0.228)			
$\Delta sent_{t-1}$	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.001
	(1.414)	(0.633)	(1.232)	(1.064)	(0.115)	(0.962)	(-0.236)	(-0.762)	(0.892)
Δy_{t-1}	-0.328***	-0.432	-0.276***	-0.386***	-0.461***	-0.373***	-0.371***	-0.534***	-0.165
	(-4.442)	(-4.170)	(-2.653)	(-5.070)	(-4.253)	(-3.413)	(-4.725)	(-4.935)	(-1.523)
Δsp_{t-1}^{us}	0.101	0.023	0.155	0.093	0.018	0.237	0.022	-0.012	-0.067
	(1.169)	(0.216)	(0.992)	(1.055)	(0.160)	(1.542)	(0.319)	(-0.142)	(-0.567)
Δsp_{t-1}^{emu}	-0.052	0.037	-0.001	-0.032	0.016	-0.056	-0.024	-0.081	0.160
	(-0.701)	(0.410)	(-0.008)	(-0.437)	(0.188)	(-0.374)	(-0.385)	(-1.000)	(1.566)
Δsp_{t-1}	0.083*	0.051	0.014	0.062	0.044	0.019	0.035	0.052	-0.010
	(1.940)	(0.895)	(0.185)	(1.499)	(0.790)	(0.257)	(0.875)	(1.004)	(-0.167)
$\Delta sent_{t-1}^{us}$	-0.001**	-0.003***	-0.001	-0.001**	-0.001**	-0.001	0.000	0.001	0.000
	(-2.426)	(-3.192)	(-1.109)	(-2.219)	(-2.242)	(-1.605)	(0.615)	(1.001)	(0.034)
$\Delta sent_{t-1}^{emu}$	0.002	0.001	0.003	0.004**	0.003	0.005**	0.002**	0.000	0.000
	(1.187)	(0.675)	(1.487)	(2.233)	(1.468)	(2.051)	(2.053)	(-0.167)	(0.113)
Δi_{t-1}	0.000	0.000	0.008	0.001	0.002	0.019	-0.001	0.003	0.007
	(-0.250)	(-0.002)	(0.380)	(0.614)	(0.985)	(0.986)	(-0.254)	(0.975)	(0.666)
ΔM_{t-1}	-0.368	-0.621*	-0.715*	-0.342	-0.397	-0.456	0.306**	0.284	0.258
	(-1.331)	(-1.692)	(-1.773)	(-1.232)	(-1.052)	(-1.185)	(2.261)	(1.486)	(1.521)

Note: Table reports the results of the restricted vector error-correction model outlined in the text for ΔY. For Czech Republic ect^1 refers to the first and ect^2 to the second cointegration vector in Table 2 and Table 3 and for Poland ect^1 refers to the cointegration vector in Table A2. For further notes see Table 4.

Table 7: Estimation results of the restricted error-correction model for Hungary and Slovakia (sentiments as LHS variable)

	Hungary						Slovakia		
	Consumer Sentiments			Economic Sentiments			Economic Sentiments		
	1997-2008	1997-2003	2003 2008	1997-2008	1997-2003	2003-2008	1997-2008	1997-2003	2003-2008
$\Delta sent$									
Constant	3.646	-0.726	-25.128	-0.457	0.866	-0.681	-1.066	-2.581	0.393
	(0.922)	(-0.098)	(-1.681)	(-0.604)	(0.722)	(-0.564)	(-0.970)	(-1.173)	(0.367)
ect_{t-1}^{1}	-3.236	1.244	20.247	-0.336	11.410	6.116	-0.145***	-0.259***	-0.092
	(-0.931)	(0.177)	(1.647)	(-0.029)	(0.790)	(0.207)	(-2.725)	(-3.251)	(-1.286)***
ect_{t-1}^{2}							-0.234	-0.678	-3.142
							(-0.102)	(-0.172)	(-1.210)
$\Delta sent_{t-1}$	0.071	-0.223**	0.259**	-0.222***	-0.269**	-0.242**	-0.122	0.086	-0.189
	(0.866)	(-2.021)	(2.237)	(-2.710)	(-2.474)	(-2.076)	(-1.466)	(0.758)	(-1.581)
Δy_{t-1}	-20.459	-17.227	-0.769	4.018	31.618	-42.685	1.595	75.058***	-26.679**
	(-1.452)	(-1.025)	(-0.037)	(0.215)	(1.626)	(-1.161)	(0.136)	(3.177)	(-2.570)
Δsp_{t-1}	0.950	-3.503	9.842	16.510**	16.567**	17.330	1.054	-21.590*	9.224
	(0.163)	(-0.523)	(1.028)	(2.238)	(2.205)	(1.165)	(0.139)	(-1.842)	(1.170)
Δsp_{t-1}^{us}	-5.464	12.924	-39.416	8.550	6.549	11.322	17.695	-11.641	76.851***
	(-0.384)	(0.789)	(-1.534)	(0.483)	(0.362)	(0.288)	(0.931)	(-0.483)	(2.777)
$\Delta sent_{t-1}^{us}$	0.036	-0.011	0.059	0.003	-0.017	-0.086	-0.067	-0.177	-0.013
	(0.591)	(-0.131)	(0.858)	(0.024)	(-0.095)	(-0.645)	(-0.614)	(-0.778)	(-0.132)
$\Delta sent_{t-1}^{emu}$	-0.017	0.447	-0.387	0.893***	1.239***	0.625	0.969***	0.451	0.936***
	(-0.068)	(1.342)	(-0.942)	(3.083)	(3.565)	(1.314)	(3.355)	(0.953)	(2.846)
Δsp_{t-1}^{emu}	10.817	-0.210	39.038	-19.229	-30.062**	7.485	-13.319	-4.644	-47.677**
	(0.899)	(-0.016)	(1.693)	(-1.268)	(-1.996)	(0.223)	(-0.900)	(-0.265)	(-2.034)

Note: Table reports the results of the restricted vector error-correction model outlined in the text for $\Delta sent$. In the case of Hungary, ect^1 refers to the first and ect^2 to the second cointegration vector in Tables A3 and A4 and for Slovakia ect^1 refers to the cointegration vector in Table A1. For further notes see Table 4.

Table 8: Estimation results for the restricted error-correction model for Hungary and the Slovakia (stock prices as LHS variable)

	Hungary						Slovakia		
	Consumer Sentiments			Economic Sentiments			Economic Sentiments		
	1997-2008	1997-2003	2003 2008	1997-2008	1997-2003	2003-2008	1997-2008	1997-2003	2003-2008
Δsp									
constant	-0.018	-0.059	0.325*	0.011	0.010	0.009	-0.013	-0.034	-0.014
	(-0.313)	(-0.439)	(1.725)	(1.206)	(0.496)	(0.835)	(-1.167)	(-1.568)	(-1.068)
ect^1_{t-1}	0.022	0.064	-0.262*	0.087	0.040	0.049	0.001	0.000	0.001
	(0.444)	(0.505)	(-1.690)	(0.678)	(0.178)	(0.197)	(1.376)	(-0.014)	(0.751)
ect^2_{t-1}							0.045*	0.055	0.067**
							(1.955)	(1.431)	(2.065)
$\Delta sent_{t-1}$	0.000	0.000	0.001	0.000	0.001	-0.001	0.000	0.000	0.003
	(0.420)	(-0.069)	(0.457)	(-0.307)	(0.766)	(-1.119)	(-0.021)	(0.306)	(1.683)
Δy_{t-1}	-0.138	-0.074	-0.279	-0.127	-0.107	-0.180	0.002	0.263	-0.192
	(-0.687)	(-0.245)	(-1.078)	(-0.602)	(-0.352)	(-0.614)	(0.013)	(1.145)	(-1.394)
$\Delta \pi_{t-1}$	-0.294	0.644	-2.811***	-0.161	0.850	-2.238**	-0.823*	-0.769	-0.134
	(-0.403)	(0.586)	(-3.089)	(-0.221)	(0.807)	(-2.229)	(-1.759)	(-1.331)	(-0.155)
Δsp_{t-1}	0.159*	0.152	0.188	0.140	0.155	0.221*	0.375**	0.239**	0.424**
	(1.902)	(1.252)	(1.549)	(1.682)	(1.313)	(1.849)	(4.950)	(2.094)	(4.299)
$\Delta sent^{us}_{t-1}$	0.001	0.002	0.001	-0.001	-0.003	0.000	-0.001	-0.001	-0.002
	(1.245)	(1.012)	(0.602)	(-0.523)	(-1.150)	(0.349)	(-0.858)	(-0.322)	(-1.322)
$\Delta sent^{emu}_{t-1}$	-0.001	0.002	-0.005	0.001	-0.002	0.004	0.001	-0.002	0.000
	(-0.229)	(0.300)	(-1.024)	(0.326)	(-0.354)	(1.027)	(0.270)	(-0.361)	(-0.061)
Δsp^{us}_{t-1}	0.182	0.354	-0.535	0.280	0.474	-0.458	-0.066	-0.109	-0.181
	(0.681)	(0.959)	(-1.365)	(1.051)	(1.312)	(-1.081)	(-0.356)	(-0.465)	(-0.529)
Δsp^{emu}_{t-1}	0.135	-0.030	0.789**	0.160	0.059	0.662*	0.155	0.140	0.333
	(0.616)	(-0.101)	(2.295)	(0.737)	(0.205)	(1.876)	(1.078)	(0.811)	(1.141)

Note: Table reports the results of the restricted vector error-correction model outlined in the text for Δsp . For Hungary ect^1 refers to the first and ect^2 to the second cointegration vector in Table A3 and A4 and for Slovakia ect^1 refers to the cointegration vector in Table A1. For further notes see Table 4.

Table 9: Results of the restricted error-correction model for Hungary and the Slovakia (income as LHS variable)

	Hungary						Slovakia		
	Consumer Sentiments			Economic Sentiments			Economic Sentiments		
	1997-2008	1997-2003	2003 2008	1997-2008	1997-2003	2003-2008	1997-2008	1997-2003	2003-2008
ΔY									
$constant$	0.042	-0.007	0.206*	0.006	0.020***	0.000	0.007	0.006	0.019*
	(1.658)	(-0.159)	(1.851)	(1.628)	(3.039)	(-0.079)	(0.968)	(0.612)	(1.927)
ect_{t-1}^1	-0.032	0.017	-0.168*	-0.013	0.124	-0.122	0.001**	0.000	0.002**
	(-1.439)	(0.398)	(-1.839)	(-0.227)	(1.541)	(-0.899)	(2.440)	(0.612)	(2.836)
ect_{t-1}^2							0.008	0.002	-0.018
							(0.517)	(0.107)	(-0.779)
$\Delta sent_{t-1}$	0.000	-0.001*	0.001	0.001*	0.000	0.001	0.000	0.000	0.003***
	(-0.557)	(-1.911)	(0.892)	(1.715)	(-0.069)	(1.652)	(0.744)	(-0.485)	(2.544)
Δy_{t-1}	-0.329***	-0.426***	-0.141	-0.348***	-0.390***	-0.258	-0.448***	-0.434***	-0.578***
	(-3.663)	(-4.099)	(-0.915)	(-3.726)	(-3.599)	(-1.517)	(-5.969)	(-3.981)	(-6.136)
Δsp_{t-1}	0.048	0.010	0.082	0.043	0.010	0.091	0.063	0.052	0.062
	(1.274)	(0.239)	(1.148)	(1.176)	(0.248)	(1.334)	(1.312)	(0.970)	(0.873)
Δsp_{t-1}^{emu}	0.024	0.049	0.031	0.010	0.062	-0.029	-0.114	-0.075	-0.201
	(0.307)	(0.571)	(0.193)	(0.127)	(0.741)	(-0.188)	(-1.252)	(-0.929)	(-0.992)
Δsp_{t-1}^{us}	0.001	-0.051	-0.045	-0.038	-0.082	-0.094	0.189	0.089	0.334
	(0.009)	(-0.497)	(-0.252)	(-0.426)	(-0.804)	(-0.531)	(1.618)	(0.804)	(1.396)
$\Delta sent_{t-1}^{us}$	-0.001**	0.000	-0.001**	-0.001	0.000	0.000	-0.001	-0.002*	-0.001
	(-2.133)	(-0.837)	(-2.561)	(-1.050)	(-0.398)	(-0.740)	(-1.026)	(-1.929)	(-0.896)
$\Delta sent_{t-1}^{emu}$	0.003*	0.002	0.004	0.004**	0.002	0.006**	0.006***	0.004*	0.004
	(1.764)	(1.035)	(1.358)	(2.591)	(0.907)	(2.613)	(3.293)	(1.845)	(1.287)

Note: Table reports the results of the restricted vector error-correction model outlined in the text for ΔY. For Hungary ect^1 refers to the first and ect^2 to the second cointegration vector in Table A3 and A4 and for Slovakia ect^1 refers to the cointegration vector in Table A1. For further notes see Table 4.

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Appendix

Table A1: Cointegration analysis for Slovakia (economic sentiments)

Panel (a): I (1)-Analysis (Rank Test)

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.255	79.815	70.492	53.945	0.000	0.001
3	1	0.127	38.688	27.970	35.070	0.019	0.246
2	2	0.082	19.650	3.002	20.164	0.059	0.998
1	3	0.053	7.601	2.417	9.142	0.1	0.697

Panel (b): Cointegration vectors

	$sent$	cpi	y	sp	μ
Beta(1)	1				-108.081***
					(-62.589)
Beta(2)			1	-0.513***	-1.394**
				(-4.651)	(-2.314)

Panel (c): Test of restricted model

CHISQR(3) = 5.329 [0.149]

Panel (d): Adjustment coefficients

	$\Delta sent$	Δcpi	Δy	Δsp
Alpha(1)	-0.178***	0.001***	0.001***	0.001
	(-2.735)	(-3.278)	(3.158)	(1.621)
Alpha(2)	-2.472*	0.005**	0.012	0.032**
	(-1.686)	(2.045)	(1.304)	(2.266)

Panel (e): Test of weak exogeneity

r	DGF	5% C.V.	$sent$	cpi	y	sp
1	1	3.841	2.125	18.491	5.816	1.061
			[0.145]	[0.000]	[0.016]	[0.303]
2	2	5.991	2.965	23.372	6.779	5.971
			[0.227]	[0.000]	[0.034]	[0.051]

Panel (f): Test of exclusion

r	DGF	5% C.V.	$sent$	cpi	y	sp	μ
1	1	3.841	13.994	3.706	2.318	0.077	6.055
			[0.000]	[0.054]	[0.128]	[0.781]	[0.014]
2	2	5.991	18.234	5.238	2.336	3.253	8.014
			[0.000]	[0.073]	[0.311]	[0.197]	[0.018]

Panel (g): Tests for autocorrelation				Test for Arch			
LM(1):	ChiSqr(16)	= 21.506	[0.160]	LM(1):	ChiSqr(100)	= 209.581	[0.000]
LM(2):	ChiSqr(16)	= 9.315	[0.900]	LM(2):	ChiSqr(200)	= 310.681	[0.000]
LM(3):	ChiSqr(16)	= 26.546	[0.047]	LM(3):	ChiSqr(300)	= 413.485	[0.000]
LM(4):	ChiSqr(16)	= 22.126	[0.139]	LM(4):	ChiSqr(400)	= 540.464	[0.000]

Note: See Table 2.

Table A2: Cointegration analysis for Poland (economic sentiments)

Panel (a): I (1)-Analysis (Rank Test)

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
6	0	0.330	149.188	100.393	103.679	0.000	0.082
5	1	0.240	93.047	58.037	76.813	0.001	0.562
4	2	0.151	54.678	27.937	53.945	0.043	0.950
3	3	0.097	31.756	16.982	35.07	0.112	0.881
2	4	0.07	17.415	5.263	20.164	0.119	0.968
1	5	0.05	7.181	4.871	9.142	0.12	0.308

Panel (b): Cointegration vectors

	$sent$	cpi	y	M	sp	i	μ
Beta(1)		5.329***	-6.708***		1	-0.104***	-3.714***
		(4.791)	(-11.015)			(-5.903)	(-0.974)

Panel (c): Test of restricted model

CHISQR(2) = 1.291 [0.524]

Panel (d): Adjustment coefficients

	$\Delta sent$	Δcpi	Δy	ΔM	Δsp	Δi
Alpha(1)	0.201	-0.003***	0.01**	-0.012***	0.041***	0.202*
	(0.359)	(-3.522)	(2.448)	(-4.472)	(3.075)	(1.906)

Panel (e): Test of weak exogeneity

r	DGF	5% C.V.	$sent$	cpi	y	M	sp	i
1	1	3.841	0.029	6.588	3.395	7.830	6.194	3.125
			[0.866]	[0.010]	[0.065]	[0.005]	[0.013]	[0.077]
2	2	5.991	0.666	9.018	14.245	20.491	6.469	6.846
			[0.717]	[0.011]	[0.001]	[0.000]	[0.039]	[0.033]

Panel (f): Test of exclusion

r	DGF	5% C.V.	$sent$	cpi	y	M	sp	i	μ
1	1	3.841	0.948	3.402	7.253	0.716	1.816	10.136	1.262
			[0.330]	[0.065]	[0.007]	[0.397]	[0.178]	[0.001]	[0.261]
2	2	5.991	0.954	4.175	13.059	1.504	10.003	25.537	3.650
			[0.621]	[0.124]	[0.001]	[0.471]	[0.007]	[0.000]	[0.161]

Panel (g): Tests for autocorrelation					Test for Arch			
LM(1):	ChiSqr(36)	=	49.500	[0.066]	LM(1):	ChiSqr(441)	= 465.023	[0.207]
LM(2):	ChiSqr(36)	=	50.805	[0.052]	LM(2):	ChiSqr(882)	= 974.922	[0.016]
LM(3):	ChiSqr(36)	=	32.652	[0.629]	LM(3):	ChiSqr(1323)	= 1522.447	[0.000]
LM(4):	ChiSqr(36)	=	30.160	[0.742]	LM(4):	ChiSqr(1764)	= 1977.951	[0.000]

Note: See Table 2.

Table A3: Cointegration analysis for Hungary (economic sentiments)

Panel (a): I (1)-Analysis (Rank Test)

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.334	86.257	77.567	53.945	0.000	0.000
3	1	0.104	29.006	18.827	35.070	0.201	0.794
2	2	0.057	13.487	5.929	20.164	0.334	0.945
1	3	0.036	5.232	1.705	9.142	0.268	0.827

Panel (b): Cointegration vectors

	$sent$	cpi	y	sp	μ
Beta(1)		1	-0.869***	0.043**	-1.054***
			(-20.924)	(2.262)	(-11.548)

Panel (c): Test of restricted model

CHISQR(1) = 1.766 [0.184]

Panel (d): Adjustment coefficients

	$\Delta sent$	Δcpi	Δy	Δsp
Alpha(1)	2.353	-0.08***	-0.121**	-0.086
	(0.219)	(-7.816)	(-2.341)	(-0.598)

Panel (e): Test of weak exogeneity

r	DGF	5% C.V.	$sent$	cpi	y	sp
1	1	3.841	0.001	40.825	2.749	0.623
			[0.979]	[0.000]	[0.097]	[0.430]
2	2	5.991	1.480	47.059	8.618	0.822
			[0.477]	[0.000]	[0.013]	[0.663]

Panel (f): Test of exclusion

r	DGF	5% C.V.	$sent$	cpi	y	sp	μ
1	1	3.841	1.766	24.478	20.238	4.927	22.839
			[0.184]	[0.000]	[0.000]	[0.026]	[0.000]
2	2	5.991	8.396	27.623	24.215	11.060	28.955
			[0.015]	[0.000]	[0.000]	[0.004]	[0.000]

Panel (g): Tests for autocorrelation				Test for Arch			
LM(1):	ChiSqr(16)	= 9.025	[0.912]	LM(1):	ChiSqr(100)	= 111.596	[0.201]
LM(2):	ChiSqr(16)	= 17.409	[0.360]	LM(2):	ChiSqr(200)	= 222.791	[0.129]
LM(3):	ChiSqr(16)	= 12.715	[0.693]	LM(3):	ChiSqr(300)	= 345.990	[0.035]
LM(4):	ChiSqr(16)	= 8.844	[0.920]	LM(4):	ChiSqr(400)	= 491.144	[0.001]

Note: See Table 2.

Table A4: Cointegration analysis for Hungary (consumer sentiments)

Panel (a): I (1)-Analysis (Rank Test)

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.335	81.015	72.299	53.945	0.000	0.000
3	1	0.087	23.588	13.534	35.070	0.494	0.974
2	2	0.051	10.735	4.898	20.164	0.575	0.978
1	3	0.024	3.373	2.611	9.142	0.524	0.66

Panel (b): Cointegration vectors

	$sent$	cpi	y	sp	μ
Beta(1)		1	-0.859***	0.039**	-1.068***
			(-21.039)	(2.147)	(-11.915)

Panel (c): Test of restricted model

CHISQR(1) = 0.170 [0.681]

Panel (d): Adjustment coefficients

	$\Delta sent$	Δcpi	Δy	Δsp
Alpha(1)	-1.055	-0.082***	-0.113**	-0.081
	(-0.117)	(-7.899)	(-2.126)	(-0.560)

Panel (e): Test of weak exogeneity

r	DGF	5% C.V.	$sent$	cpi	y	sp
1	1	3.841	0.060	43.792	3.379	0.326
			[0.806]	[0.000]	[0.066]	[0.568]
2	2	5.991	2.282	46.079	6.750	0.393
			[0.319]	[0.000]	[0.034]	[0.822]

Panel (f): Test of exclusion

r	DGF	5% C.V.	$sent$	cpi	y	sp	μ
1	1	3.841	0.170	23.872	18.756	3.272	35.880
			[0.681]	[0.000]	[0.000]	[0.070]	[0.000]
2	2	5.991	4.888	24.536	618.828	6.764	36.600
			[0.087]	[0.000]	[0.000]	[0.034]	[0.000]

Panel (g): Tests for autocorrelation / Test for Arch

Panel (g): Tests for autocorrelation				Test for Arch			
LM(1):	ChiSqr(16)	= 7.297	[0.967]	LM(1):	ChiSqr(100)	= 75.761	[0.966]
LM(2):	ChiSqr(16)	= 17.973	[0.325]	LM(2):	ChiSqr(200)	= 220.881	[0.149]
LM(3):	ChiSqr(16)	= 7.259	[0.968]	LM(3):	ChiSqr(300)	= 325.633	[0.148]
LM(4):	ChiSqr(16)	= 6.951	[0.974]	LM(4):	ChiSqr(400)	= 484.095	[0.002]

Note: See Table 2.