THE IMPACT OF ECONOMIC AND POLITICAL NEWS ON BEHAVIOUR OF STOCK RETURNS IN UKRAINE.

by

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Abstract

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by Vadym Moskalenko

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The paper investigates the existence of a relationship between economic and non-economic news and behavior of the Ukrainian stock market. For this purpose the two-stage ordinary least squares methodology is used. At the first stage VAR/VEC methodology is chosen to isolate economic news components of the observed macro indicators. At the second stage dummies for the main political events are added to the analysis. The estimation results show that economic and political news does influence the Ukrainian stock market returns. It is also revealed that stock returns respond more to non-monetary news while the responses to monetary news are weaker and insignificant. Though political events influence the behavior of the Ukrainian stock market return, only "good" political news has significant influence on it.

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GLOSSARY

Ask. Minimum price a seller wants to get for a stock.

Bid. Maximum price a buyer wants to pay for a stock.

Errors-in-variable problem. Problem that could arise in econometric estimation originated from the use of incorrectly measured variables.

News. Announcement of unanticipated changes in something.

Spread. Difference between the ask and the bid.

Chapter 1

INTRODUCTION

In recent years, the effects of fundamental macroeconomic news on stock returns have received considerable attention in both the financial press and the research literature of financial economics. Many questions have been raised, among them: What role do the macroeconomic news play in explaining the movements of stock prices? Do the responses of stock returns to news vary depending on business conditions or exchange rate regimes? Do positive and negative news or alternatively major and minor news cause different reaction to the stock market? Are stock returns predictable using past macroeconomic information?

Finding answers to these questions has become important for both market practitioners and academic economists. Practitioners, like analysts and firm financial managers, are possibly interested in using aggregate economic information in pricing assets in speculative markets or alternatively making decisions about future real investments. On the other hand, academics might be interested in these questions since answering them will help to identify some sources of systematic risk factors that should be priced on the stock market according to the standard economic theory. Therefore, it is not surprising that the literature on stock market predictability has evolved considerably over the last thirty years. For a long time it was thought that stock returns are not predictable, at least not in an economically significant manner. The possibility of being predicted by other observable variables seemed to be untrustworthy until the early 1980's. At the beginning tests of predictability of stock market returns were motivated by market efficiency.

Gradually, however, a series of articles has documented a small degree of predictability in stock returns based on prior information, specifically at long horizons. At first when only past returns were used to predict future returns this evidence was rather weak, but it seemed considerably stronger when other variables were brought into analysis. Among such predictive variables there are short- and long-term interest rates, yield spreads between long-term and short-term interest rates and between low- and high-quality bond yields, stock market volatility, book-to-market ratios, price-earnings ratios, dividend yields, dividend/price ratios, and more complex measures based on analysts' forecasts.

Nowadays the emergence of new equity markets in the world provides many new opportunities for investors. These markets exhibit high expected returns as well as high volatility. Their low correlations with developed countries' equity markets significantly reduce the unconditional portfolio risk of a world investor. A lot of papers in both economics and finance literature show that asset returns are influenced to some extent by economic news and important events. Moreover many articles about predictability of the returns for the purpose of tactical asset allocation reveal that emerging market returns are more likely than developed countries to be influenced by local information, local events.

The main question which I want to investigate in my research is to find out how information about macroeconomic performance of Ukraine, which is observed through various macroeconomic indicators and news, in addition with main political events, influences behavior of stock market returns in Ukraine. Another important question of my study is to reveal which impact is significant for the movements of stock returns and which is not. For the purpose of the thesis the two-stage ordinary least squares (OLS) estimation methodology used previously by Cutler et al. (1989) will be followed.

Considering the fact that during the last four years Ukraine exhibits quite high rates of economic development and growth, but quite unstable political situation, it would be very interesting to measure the influence of economic and political informational components on the Ukrainian stock market. In addition this relationship still remains largely unexplored in the emerging markets. This could be explained by the fact that emerging markets are characterized by low liquidity, and necessary indicators are relatively scarce in these markets.

The thesis will be organized as follows. The second chapter sketches a literature survey on this and related subjects. The third chapter introduces the methodology for further empirical research and data description, while the fourth one contains the empirical results and the analysis of the main findings. The final section will be for conclusions.

Chapter 2

LITERATURE REVIEW

There are various ways in which the stock market and the macroeconomy have been related in the literature. Let us first consider the effect of macroeconomic events on stock prices. One approach has been from an asset-pricing perspective in which the Arbitrage Pricing Theory (APT) was used as a framework to address the question of whether risk associated with particular macro variables is reflected in expected asset returns. The original work in this area is by Chen, Roll and Ross (1986) who applied the model to the US. Chen, Roll and Ross (1986) tested whether innovations in macroeconomic variables are significantly priced in the stock market, relying on the model of future expected cash flows to choose appropriate state variables for determining the relation between stock returns and fundamentals. They specified a five-factor model in which the maturity premium, expected and unexpected inflation, industrial production growth and default premium are significantly priced in expected returns. Li and Zuliu (1998) followed Chen, Ross and Roll in their study of the relationship between the daily percentage changes of leading US stock indices and an expanded set of macroeconomic announcements related to the equity discount rate and cash flows. They added the option of allowing stock prices to respond differently depending on the stage of business cycle, and considered the issue of whether the same macroeconomic factors have different level of influence on the stocks with large and small capitalization. One of the fundamental issues of the APT is that "news" concerning macroeconomic and financial variables contains unanticipated elements that might explain asset returns. Such "news" is either unexpected by themselves, or deal with parameters that could not be known exactly in advance but rather have some probability distribution. Hence, it is necessary to determine the expectations formation process in order to generate unanticipated components that enter into the original model. A closely-related analysis is that of the C-CAPM which concentrates on a single macro influence, the growth of aggregate consumption (Grossman and Shiller (1981)).

The direction of influence underlying the asset-pricing literature is the traditional one – from the economy to the stock market. A similar focus is found in the literature which explores the response of aggregate stock prices to the expected inflation rate. Early research studies carried out in this area are by Bodie (1976), Fama and Schwert (1977), Jaffe and Mandelker (1976) and Nelson (1976). More recent applications include those by Balduzzi (1995), Graham (1996) and Siklos and Kwok (1999). Similar studies estimated the response of the stock market to other macro variables such as those which capture monetary and fiscal policy shocks (Pearce and Roley (1985), Jain (1988), Aggarwal and Schirm (1992), and Singh (1993)). Standard stock valuation models predict that stock prices are affected by the discounted value of expected cash flows. Chen, Ross and Roll (1986) and Fama (1990) have shown real economic activity, interest rate and stock returns to be correlated. However, most of these earlier studies were focused upon the short-run relationship between stock market and financial and macro-economic variables, which may remove important information contained in the permanent component of economic activity.

In comparison to the above, Mukherjee, Naka, (1995), Cheung and Ng (1998), Maysami and Koh (2000), Nasseh and Strauss (2000) concentrate mainly on long-run relationship between stock market and the economic variables. By using the concept of cointegration, first introduced by Eangle and Granger (1987), we can investigate the empirical long run relationships between stock market indices and both measures of economic activity and financial variables. Cointegration between stock prices and economic activity can be seen to be consistent with both internal and theoretical consumption- and production-based asset pricing models. These models suggest that stock prices are related to expected future production through effect on the discounted value of changes in cash flows and dividends (Cochrane(1991)).

The efficient market hypothesis attributes movements in asset prices to new information that affects either the expected future cash flows or the expected discount rates at which those cash flows are capitalized, or both. According to Fama (1970), a stock market is efficient if current market prices fully and instantaneously reflect all available information. Another important aspect is that the expected or past information contains no new information, and therefore should have no effect on stock prices, since this information has already been incorporated into prevailing market prices. Hence, the implication of market efficiency is that if economic agents are careful users of available information, then stock price changes can only be due to news about, for example, macroeconomic fundamentals.

Most prior studies (e.g., see Pearce & Roley 1985; Hardouvelis 1987; Wasserfallen 1989; Sadeghi 1992; Ewing 1998; and Siklos & Anusiewicz 1998) show that stock returns primarily respond to monetary news while the responses to non-monetary news are weaker. Attempts to explain stock price changes by macroeconomic news have also been disappointing. A variety of authors including Roll (1988), Cutler, Poterba, and Summers (1989), and King, Sentana, and Wadhwani (1994) show that only one third of the stock returns can be attributed to the news about key fundamentals, at the most. On the Finnish stock market, the importance of economic news seems to be even lower compared to the large stock markets such as the U.S. (e.g., Lahti & Pylkkonen 1989; Viskari 1992; and Junttila, Larkomaa & Perttunen 1997 and references therein). The overall conclusion appears to be that monetary news (e.g., money supply or interest rate) affects stock returns while non-monetary news (e.g., industrial production or unemployment rate) has weaker effects.

Each of these studies implicitly assumes that the investor's reactions to economy-wide news are constant over different stages of the business cycle, although a more realistic model allows the investor's responses to news to vary depending on business conditions. It might be a reasonable assumption that a higher than expected industrial production during the depression is good news for the stock market since it might be a sign of the end of the depression. On the other hand, if the economy is booming, a positive "surprise" in industrial production is likely to be bad news for the stock market since it might result in fears of an overheating economy. This might possibly induce policy makers to increase interest rates. The implication of this potential asymmetry is straightforward: if the same type of news is considered good in some states and bad in others states, the estimated news effects in previous studies will be biased towards zero.

There are also studies in which the asymmetry with respect to the level of the economic activity is tested. For example, McQueen and Roley (1993) show that when the estimations are made conditional on the different stages of the business cycle, a stronger announcement effect between stock returns and economic news is evident. They found that higher than expected industrial production is good news for the stock market during a low state of economic activity, but bad news during a high state of economic activity. Similar asymmetry (with signs reversed) holds true for unemployment rate news as well. Furthermore, this business-condition asymmetry is mainly related to cash flow effect rather than a discount rate effect.

Furthermore, in the Finnish stock market data, Loflund and Nummelin (1997) tested for the potential asymmetry in the link between stock prices and industrial production during different business conditions. According to their results, forecasted industrial production growth seems to affect Finnish stock returns differently depending on the level of the current industrial production. Specifically, higher conditional production growth increases expected stock returns only when the economy is weak.

However, these aforementioned studies are almost exclusively concerned with the relationship between the aggregate stock market and macroeconomic news, while very little is known about the cross-sectional variation in this relation across various industry-sorted stocks (i.e., industry portfolios). As noted in King (1966), although the aggregate economic information is generally bound to have a market-wide impact on stock returns, the magnitude of the impact need not be the same for all stocks.

Engle and Ng (1993) detect asymmetry in stock return volatility, and they conclude that bad news (negative values of the unexpected returns) produces more volatility than good news (positive values of the unexpected returns) on the Japanese stock market. Jensen and Johnson (1995) find that stock returns following discount rate decreases are less volatile than stock returns following discount rate increases. Jensen, Johnson, and Bauman (1997) extend the analysis from aggregate stock market index into industry level and show that similar conclusions also hold for stock returns across different industry sectors. Furthermore, Gulley and Sultan (1998) find that negative values regarding the consumer confidence index have a greater effect on the Dow Jones Industrial Average than positive values. Koutmos (1999) concludes that good news (positive past returns) is more persistent in affecting a conditional mean than bad news (negative past returns) of an equal magnitude. All these results indicate that at least some kind of asymmetry is present in stock market reactions to different kinds of macroeconomic and other types of news.

An alternative to this direction of influence from the economy to the stock market is to analyze the influence of stock prices on the macroeconomy or selected macroeconomic variables. The relationship of this nature between stock prices and investment has received considerable attention. Studies of this type start with Tobin's q-theory of investment (Tobin, 1969) and also include Fischer and Merton (1984), Morck, Schleifer and Vishny (1990), Blanchard, Rhee and Summers (1993), Chirinko and Schaller (1996). In contrast to all studies above Mauro (2000) studied the correlation between output growth and lagged stock returns where the former is the dependent variable. He found that the correlation between those variables is as strong in emerging markets as in the countries with advanced economies and came to the conclusion that asset prices contain valuable information in forecasting output in emerging market economies as well. His results can be also interpreted in a different way, that emerging markets tend to show the same level of relationship between stock returns and fundamentals than developed countries are seen to observe.

The investigation of the existence of a reverse relationship between stock market behavior and economic development becomes a controversial issue when we turn to the assumption of the endogeneity of a stock market. The reason that lagged values of returns on stock portfolios would affect production levels could originate from the circular nature of the investigated relationship. The lagged values of the returns might be explained by macro variables themselves and implicitly play a role of instrumental variable in such reverse oriented investigations. Such kind of investigations would present results of a wide field of research studies concerning the link between economic activity and financial markets.

More recently empirical models without any specific theoretical structure have been applied in a more pragmatic fashion to the two-way relationship between stock prices and macroeconomic variables. The vector auto-regressive (VAR) model has been particularly popular in this area given that it can be used as a framework for formal examination of such relationships without the need to specify a theoretical framework a priori. Once estimated, the model can be used to simulate the effects of shocks in a way that is consistent with the data by the use of impulse response functions and forecast-error-variance decomposition. A relatively early application of the VAR model to the analysis of the relationship between stock prices and the macroeconomy is by Lee (1992) and more recent ones can be found in Cheung and Ng (1998) and Gjerde and Saettem (1999). Darat and Mukherjee (1987) applied a vector auto-regression model (VAR) along with Akaike's final prediction to the Indian data over 1948-1984 and found that a significant causal relationship exists between stock returns and selected macro-economic variables. Naka, Mukherjee and Tufte (1996) have analyzed relationship among selected macro-economic variables and the Indian stock market. By employing a vector error correction model, they found that domestic inflation and domestic output are the two most prominent factors influencing stock prices.

Gjerde and Saettem (1999) investigated the relationship between stock returns and macroeconomic factors in a small, open economy by applying the vector autoregressive approach to Norwegian data set over the period of 1974-1994. They found that stock returns are significantly negatively affected by real interest rate changes, while the stock market is positively affected by lagged changes in industrial production. The phenomenon of the stock returns delayed response to changes in the domestic real activity may be explained by the hypothesis that interest rates themselves rather than stock returns are associated with the changes in real activity which could lead investors to the overreaction to interest rate news. It occurs due to the widely believed positive association between high interest rates and the expansion phase of the business cycle signalling the improved cash flows and as a result more buying pressure for companies' shares.

While the VAR analysis is useful for the simulation of the effects on the endogenous variables of shocks to equation error terms, the non-theoretical nature of such models makes the interpretation of these shocks difficult.

Recently several researches such as Baestaens et. al. (1995), Kaastra Ibeling and others (1996), Katsurelis (1998), Kamath (2002) recommended the use of Artificial Neural Network (ANN) for investigating the cointegrating relationship as well as forecasting in capital markets. In a recent study under National Stock Exchange (NSE) Research Initiative Kamath (2002) uses Artificial Neural Network to examine the relationship between macro-economic factors and the returns of individual assets observed at the Bombay Stock Exchange (BSE). More recent studies like Bhattacharya and Mukherjee (2002), Rao and Rajeswari (2000), Pethe and Karnik (2000) used advanced methods in econometrics to study the same relationship. Bhattacharya and Mukherjee (2002) tested the causal relationships between the BSE behavior and five macroeconomic variables applying the techniques of unit-root tests, cointegration and long-run Granger non-causality test. Their major findings are that there are no causal correlation between stock prices and money supply, national income and interest rate. On the other hand, they found that the index of industrial production leads the stock price and that there exists a two-way relationship between stock prices and rate of inflation. Rao and Rajeswari (2000) tried to explore the role played by a number of macroeconomic variables in influencing the stock market when reduced into a manageable number of economic factors. They tested the risk-return relationship for the 1995-2000 period using the traditional CAPM, three-factor macro economic factor model and the five-factor APT. Pethe and Karnik (2000) used unit-root, cointegration and error-correction models to test relationship between stock market behavior and some macroeconomic variables.

In spite of the view that macroeconomic factors systematically affect asset returns has attracted widespread attention and has given rise to a large body of empirical work, Shiller (1981) claimed that stocks returns are too variable to be explained only by shocks to future cash flows or plausible variations in future discount rates – there are other, non-economic, sources of movement in asset prices. Cutler, Poterba and Summers (1989) have shown that major non-economic (political) events really matter for explaining the stock market movement. Cutler, Poterba and Summers (1989) also found that publicly available macroeconomic news on fundamental values explained less than half of the variance in aggregate stock prices. Amihud and Wohl (2003) suggested that moves in stock prices reflect something other than fundamental values, as suggested by Cutler, Poterba and Summers(1989). They claimed that media attention affects the weight that the public attributes to news and the extent to which the news is incorporated into stock prices.

As can be seen, a large number of studies in the finance literature have confirmed that stock prices can be influenced to some degree by a variety of macroeconomic variables. Fewer studies considered the influence of only political events or the common influence of economic and political news on behavior of stock market prices. The majority of all studies mentioned above have looked either at the US stock market, the UK stock market or the Asian stock markets. For Ukraine such an analysis has never been done before. This will be the main difference with my research, which will concern the response of the Ukrainian stock market to the unanticipated changes in macroeconomic variables (economic news) and to the most important political events which took place mainly in Ukraine.

Chapter 3

METHODOLOGY AND DATA DESCRIPTION

In order to estimate the fraction of variation in the Ukrainian stock market returns that can be attributed to economic and non-economic news I will perform in the following way. First of all, I will estimate regressions relating different macroeconomic variables to their own history and to lagged values of other variables. This can be done by running a vector autoregression model in order to identify the unexpected component of each time series. These unexpected components (residuals) will be treated as economic news, the explanatory power of which as well as the explanatory power of non-economic news I will consider in explaining stock market movements in Ukraine.

Let us now specify the data which will be used in the process of our analysis. Considering that there is no precise economic theory which can exactly define what macroeconomic variables have the strongest relationship with the stock market, the decision about which variables should be included in the analysis is arbitrary to some extent. Therefore, for the purpose of my analysis I decided to include the following indicators which describe both real and financial conditions of the domestic economy and may influence the stock market returns:[1]

- The logarithm of industrial production (LNIPSA), measured by the index of industrial production (seasonally adjusted).

[1] The original data set for the described variables are extracted from the databases of National Bank of Ukraine for the period from 10. 1997 through 01. 2005. See descriptive statistics in Appendixes A, B.

- The logarithm of money supply (for M2 monetary aggregate: LNM2).

- The spread between the nominal short-term interest rate on deposits and the nominal short-term interest rate on credits (SPREAD).

- The logarithm of Consumer Price Index (LNCPI).

- The logarithm of Official exchange rate of UA hryvna against US dollar set by the NBU (LNER).

The variables described above, will be used at the first stage of my analysis in order to isolate the news components of each of these macroeconomic variables. Of course, for this purpose it would be better to use proxies for expected and unexpected values of macroeconomic fundamentals so that direct measures of news could be constructed, but it is impossible to find such data for Ukraine. Some researchers (Cheng, 1995) prefer to use simply first difference of the variable as a proxy for news. However, this choice needs the assumption that macroeconomic variables are random walk processes. If this assumption is satisfied, then first differences of economic variables are equivalent to unexpected values, which can be treated as unanticipated innovations. However, I decided to choose another statistical procedure in order to extract news from the observed time series. Like in many research studies (Cutler et. al. (1989), Viskari (1992)) I determined to solve this problem by using the VAR model for the news-generating process. However, this statistical procedure may also be problematic due to the errors-in-variables problem. To solve it we should assume that economic agents respond to the measured rather than the true news. Consequently, our estimation should be based on measured rather than true news.

There are also timing issues associated with the release of macroeconomic information, since most macroeconomic time series do not become available right away due to publication lags in economic statistics. Considering that the VAR process is modeled through functions of the lagged values of the variable itself, and the lagged values of other relevant variables, this problem can be easily solved.

In general, the finite p-order VAR process with n variables has the following form:

$$x_{it} = \sum_{k=1}^{p} A_{1k} x_{1t-k} + \sum_{k=1}^{p} A_{2k} x_{2t-k} + \sum_{k=1}^{p} A_{3k} x_{3t-k} \ldots + \sum_{k=1}^{p} A_{nk} x_{nt-k} + e_{it} \text{ for i=1,n} \quad (1)$$

where for the case of my model x_{it} is a (5x1) vector of variables: x_{it} = *(LNCPI, LNIPSA, LNM2, LNER, SPREAD)*$'$, A is a (5x(1+5k)) matrix, and e_{it} is a (5x1) vector of error terms $e_{it} = (e^{LNCPI}, e^{LNIPSA}, e^{LNM2}, e^{LNER}, e^{SPREAD})'$ which are assumed to be independently and identically distributed with zero mean and positive definite covariance matrix $\sum_{5*5}$. The residuals $\hat{e}_{it}$ from each of 5 equations are treated then as economic news, and will be used as explanatory variables for the stock return equation at the second stage.

Having fitted this VAR model to the data, it is important to check that the assumptions underlying the model are satisfied. Otherwise, the procedure derived may not be valid, and thus residuals would be improper estimates of news.

However, before estimation we should check for stationarity of the variables included in the model. This can be done by the standard unit root test. If some of our variables are nonstationary then a sufficient amount of differencing should be used to achieve a stationary VAR model. Nevertheless, we should be cautious when the order of integration of all variables is the same, since it is possible that the levels of the variables are cointegrated. This means that, when all variables are nonstationary in levels, but have the same order of integration, their linear combination may be stationary. If cointegration is present, then a VAR-model in differences would be misspecified because it will omit the long-run information that is contained in levels of the variables. In this case we should use the vector error correction (VEC) model instead of VAR model:[2]

$$\Delta x_t = \pi x_{t-k} + \sum_{i=1}^{k-1} \pi_i \Delta x_{t-i} + e_t \qquad (2)$$

In this formulation π_i and π provide both the short-run dynamics and the long run information contained in the data, respectively. For the case of my model specification when $0 < \text{rank}(\pi) = r < 5$, we can write matrix π as $\pi = \alpha\beta'$, where is a (5 x r) matrix of error correction parameters, and β is a (5 x r) matrix of cointegration vectors. As for the case of VAR estimation, $\hat{e}_t$ is a vector of estimated residuals which can be treated as news. They will be used as explanatory variables for the stock return equation in the second stage if cointegration is present between our macroeconomic variables.

After getting estimated residuals from the VAR (or VEC) model in the first stage, we can pass on to the second stage. At this stage we will analyze the relationship between economic and non-economic news and stock returns. Let us now specify the variables and the functional form which will be used to describe this relationship.

As was mentioned above, estimated residuals from the VAR (or VEC) model will be used as explanatory variables. In addition to them I will use three dummy variables. One of them (RUS_FIN_CRIS) is responsible for the Russian financial crisis which took place on August 1998 and is believed to have influenced the Ukrainian stock market

[2] To check possible cointegration relations between variables the Johansen cointegration test is used.

considerably. Another dummy variable (POL_NEWS_POS) is responsible for the main political events which took place during the observed period and could have (in my opinion) positive impact on the behavior of stock returns in Ukraine. Among them: parliamentary and presidential elections, signing of important documents et cetera The full list of them is given in Table 1.

Table 1.

The main political events which could have positive impact on the behavior of stock returns in Ukraine
(October 1997 – January 2005)

Parliamentary elections	March 1998
O. Tkachenko was elected the Head of the Verkhovna Rada	July 1998
The 1st round of Presidential elections	October 1999
The 2nd round of Presidential elections	November 1999
Victor Yushchenko was appointed the Prime-minister of Ukraine	December 1999
Referendum on additional authorities of the President of Ukraine	April 2000
Parliamentary elections	March 2002
V. Lytvyn was elected the Head of the Verkhovna Rada	May 2002
Kuchma's speech about the necessity of changes in the Constitution of Ukraine	June 2003
Agreement on creation of the Common Economic Area was signed	September 2003
Mortgage Law came into force	January 2004
Verkhovna Rada passed the draft of the Agreement on creation of CEA	April 2004
Ruslana Lyzhychko wins Eurovision competition	May 2004
Presidential elections and "Orange" revolution	October-December 2004
Inauguration of Victor Yushchenko	January 2005

As can be seen from the table, I included parliamentary and presidential elections to the list of events which could have positive impact on behavior of the Ukrainian stock market. This can be explained by the fact that considering quite unstable political situation during the observed period public used to cherish hope for positive changes in the society: political stability, welfare improvement et cetera. Elections of the Head of the Verkhovna Rada are included to this list because these events are associated with the end of political crisis after parliamentary elections.

The last dummy variable (POL_NEWS_NEG) is used to reflect the influence of those political events which could have negative impact on the Ukrainian stock market. Among them: political scandals and conflicts, political assassinations et cetera The full list of them is given in Table 2.

Table 2.

The main political events which could have negative impact on the behavior of stock returns in Ukraine
(October 1997 – January 2005)

Assassination of Vadym Het'man (ex-Head of the NBU)	April 1998
Escape of Pavlo Lazarenko(ex-Prime-minister of Ukraine) abroad	February 1999
Death of V'yacheslav Chornovil in automobile accident	March 1999
Disappearance of Journalist H. Gongadze	September 2000
The beginning of the "Casette" scandal	November 2000
Conflict between UNA-UNSO and law-enforcement authorities	March 2001
Resignation of Victor Yushchenko and the government	April 2001
Terrorist attack on the USA	September 2001
Crash of Russian air liner Tu-154 "Tel-Aviv – Novosibirsk"	October 2001
Scandal about probable military supplies of Ukrainian radars to Iraq	April 2002
Resignation of Anatoliy Kinakh and the government	November 2002
Beginning of military operations in Iraq	March 2003
Tuzla crisis	October 2003

These data are chosen on my own from periodicals considering the importance and attention that were given by mass media.[3]

[3] The list of all main political events is given in Appendix C.

Finally, our dependent variable (EX_RET) will be the excess returns computed as simple returns expressed in differences in logs of PFTS stock index less the short-term riskless rate. For riskless rate I will use LIBOR 3-month rate, which is used by some researches as a risk-free rate of return for investors in developing countries.[4] Justification for this could be that it is a risk-free outside opportunity for the Ukrainian investors, since the default rate on such contracts is minimal. In its turn, simple stock returns are expressed in differences in logs (end-of-month values) of the PFTS index. With the major Ukrainian benchmark PFTS stock index being nothing but a portfolio of exactly 10 stocks and with shares of just 8 companies traded at the highest (first) level it is considered to be the most justifiable one. The indices are taken for the PFTS last working day of each month. [5]

Let us now turn to the functional form of the model I will estimate at the second stage. I will consider the impact of both economic and non-economic news on the Ukrainian stock market returns. In addition I want to check the significance of influence of Russian financial crisis. In this case the functional form of the model is as follows:

$$\begin{aligned} EX\_RET = \beta_0 + \beta_1 \hat{e}_t^{LNCPI} + \beta_2 \hat{e}_t^{LNIPSA} + \beta_3 \hat{e}_t^{LNM2} + \beta_4 \hat{e}_t^{LNER} + \beta_5 \hat{e}_t^{SPREAD} + \\ + \beta_6 POL\_NEWS\_POS_t + \beta_7 POL\_NEWS\_NEG_t + \beta_8 RUS\_FIN\_CRIS_t + u_t \end{aligned} \qquad (3)$$

where β_0 is intercept, $\beta_1,\ldots,\beta_5$ - are the unknown parameters, which measure the impact of economic news on stock market excess return, β_6 is a parameter, which reflects the impact of "positive" or "good" political

[4] Data on LIBOR is taken from http://www.economagic.com/libor.htm for the period from 10.1997 through 01.2005.

[5] The original data set for the simple stock returns are extracted from the databases of the First Trading Stock System (PFTS) for the period from 10.1997 through 01.2005.

events (news) on stock market excess return, β_7 is a parameter, which reflects the impact of “negative” or “bad” political events (news) on stock market excess return and β_8 reflects the impact of Russian financial crisis on stock market excess return. u_t is a stochastic disturbance term, which describes all other news plus noise that is not directly related to the pre-specified variables. It is assumed to be $u_t \sim$ i.d$(0,\sigma^2)$.

If the estimated parameter responsible for the influence of Russian financial crisis is statistically insignificant, I will try another specification in order to investigate the significance of only news components. In this case I will simply drop the dummy responsible for Russian financial crisis in order to have the following model:

$$\begin{aligned} EX\_RET &= \beta_0 + \beta_1 \hat{e}_t^{LNCPI} + \beta_2 \hat{e}_t^{LNIPSA} + \beta_3 \hat{e}_t^{LNM2} + \beta_4 \hat{e}_t^{LNER} + \beta_5 \hat{e}_t^{SPREAD} + \\ &+ \beta_6 POL\_NEWS\_POS_t + \beta_7 POL\_NEWS\_NEG_t + u_t \end{aligned} \quad (4)$$

where again β_0 is intercept, $\beta_1,\ldots,\beta_5$ - are the unknown parameters, which measure the impact of economic news on stock market excess return, β_6 is a parameter, which reflects the impact of “positive” or “good” political events (news) on stock market excess return, β_7 is a parameter, which reflects the impact of “negative” or “bad” political events (news) on stock market excess return. Similarly u_t is a stochastic disturbance term, which describes all other news plus noise that is not directly related to the pre-specified variables. It is assumed to be $u_t \sim$ i.d$(0,\sigma^2)$.

In addition, if one of the parameters, which reflect the impact of either “good” or “bad” political events (news) on stock market excess return, is also insignificant I will drop the dummy which is responsible for those political events and see whether the estimation results for new specification are better. If the estimated coefficient for POL_NEWS_POS is insignificant, this new specification will be the following:

$$EX\_RET = \beta_0 + \beta_1 \hat{e}_t^{LNCPI} + \beta_2 \hat{e}_t^{LNIPSA} + \beta_3 \hat{e}_t^{LNM2} + \beta_4 \hat{e}_t^{LNER} + \beta_5 \hat{e}_t^{SPREAD} + + \beta_6 POL\_NEWS\_NEG_t + u_t \quad (5)$$

where β_0 is intercept, $\beta_1,\ldots,\beta_5$ - are the unknown parameters, which measure the impact of economic news on stock market excess return, β_6 is a parameter, which reflects the impact of "negative" or "bad" political events (news) on stock market excess return, and u_t is a stochastic disturbance term, which describes all other news plus noise that is not directly related to pre-specified macroeconomic variables. It is assumed to be $u_t \sim$ i.d$(0,\sigma^2)$.

If the estimated coefficient for POL_NEWS_NEG is insignificant, this new specification will have following form:

$$EX\_RET = \beta_0 + \beta_1 \hat{e}_t^{LNCPI} + \beta_2 \hat{e}_t^{LNIPSA} + \beta_3 \hat{e}_t^{LNM2} + \beta_4 \hat{e}_t^{LNER} + \beta_5 \hat{e}_t^{SPREAD} + + \beta_6 POL\_NEWS\_POS_t + u_t \quad (6)$$

where β_0 is intercept, $\beta_1,\ldots,\beta_5$ - are the unknown parameters, which measure the impact of economic news on stock market excess return, β_6 is a parameter, which reflects the impact of "positive" or "good" political events (news) on stock market excess return, and u_t is a stochastic disturbance term, which describes all other news plus noise that is not directly related to pre-specified macroeconomic variables. It is assumed to be $u_t \sim$ i.d$(0,\sigma^2)$.

If all parameters, which reflect the impact of Russian financial crisis, both "good" and "bad" political events (news) on stock market excess return, are insignificant I will drop all the dummies and compare the estimation results for both specifications. The latter one will be the following:

$$EX\_RET = \beta_0 + \beta_1 \hat{e}_t^{LNCPI} + \beta_2 \hat{e}_t^{LNIPSA} + \beta_3 \hat{e}_t^{LNM2} + \beta_4 \hat{e}_t^{LNER} + \beta_5 \hat{e}_t^{SPREAD} + u_t \quad (7)$$

where again β_0 is intercept, $\beta_1,\ldots,\beta_5$ - are the unknown parameters, which measure the impact of economic news on stock market excess return, and u_t is a stochastic disturbance term, which describes all other news plus noise that is not directly related to pre-specified macroeconomic variables. It is assumed to be $u_t \sim \text{i.d}(0,\sigma^2)$.

It may also happen that in equation (3) the estimated parameter responsible for the influence of Russian financial crisis is statistically significant, but one of the parameters (or both) responsible for the impact of non-economic news on stock market excess return, is insignificant. If both estimated coefficients β_6 and β_7 in equation (3) are insignificant, we may run the following regression:

$$EX\_RET = \beta_0 + \beta_1\hat{e}_t^{LNCPI} + \beta_2\hat{e}_t^{LNIPSA} + \beta_3\hat{e}_t^{LNM2} + \beta_4\hat{e}_t^{LNER} + \beta_5\hat{e}_t^{SPREAD} + \\ + \beta_6 RUS\_FIN\_CRIS_t + u_t \quad (8)$$

If estimated coefficient β_7 in equation (3) is insignificant, we may use another specification:

$$EX\_RET = \beta_0 + \beta_1\hat{e}_t^{LNCPI} + \beta_2\hat{e}_t^{LNIPSA} + \beta_3\hat{e}_t^{LNM2} + \beta_4\hat{e}_t^{LNER} + \beta_5\hat{e}_t^{SPREAD} + \\ + \beta_6 POL\_NEWS\_POS_t + \beta_7 RUS\_FIN\_CRIS_t + u_t \quad (9)$$

Finally, if estimated coefficient β_6 in equation (3) is insignificant, we may use the following specification:

$$EX\_RET = \beta_0 + \beta_1\hat{e}_t^{LNCPI} + \beta_2\hat{e}_t^{LNIPSA} + \beta_3\hat{e}_t^{LNM2} + \beta_4\hat{e}_t^{LNER} + \beta_5\hat{e}_t^{SPREAD} + \\ + \beta_6 POL\_NEWS\_NEG_t + \beta_7 RUS\_FIN\_CRIS_t + u_t \quad (10)$$

with all notations as before.

There is also one very important thing which should be taken into account when considering the impact of Russian financial crisis on

Ukrainian stock market. There may be a structural break in the sample connected with this crisis, which may give misleading results for the whole sample regressions. This may happen if the estimated coefficient responsible for the impact of Russian financial crisis on stock market excess return is statistically insignificant and we drop the dummy responsible for the crisis. That is why if we drop this dummy we should also test our models for structural stability and decide how to cope with this problem. If there is a structural break and our dummy is insignificant one of the solutions is to estimate the models for a period after the crisis, since we have too few observations to estimate the models for a period before the crisis.

Chapter 4

ESTIMATION RESULTS

As mentioned above, before the estimation all macroeconomic variables, which were used in the analysis, need to be checked for stationarity. The ADF Unit Root Test suggests that all of the variables are non-stationary in levels, but they are stationary in first differences. Therefore, they have order of integration 1 ($x_{it} \sim I(1)$). Since all the variables have the same order of integration, they should be tested for cointegration. The Johansen cointegration tests (max-eigenvalue and trace tests) indicate 1 cointegrating equation at both 5% and 1% levels of significance.[6] This is why we can not use VAR model in first differences, since it will be misspecified because it will omit the long-run information that is contained in levels of the variables. Instead of VAR the VEC-methodology was used. In addition, Akakike Info Criterion suggests that the optimal lag length of differenced variables is 1.[7]

Having taken the estimated residuals from the vector error correction estimates, we can now pass on to the second stage of the analysis. At first, equation (3) is estimated by OLS procedure. Our estimation results can be analyzed in several ways. The significance of individual response coefficients is examined by *t*-test. In addition, the joint significance of monetary $(\hat{e}_t^{LNCPI}, \hat{e}_t^{LNM2}, \hat{e}_t^{SPREAD})$ and non-monetary $(\hat{e}_t^{LNIPSA}, \hat{e}_t^{LNER})$ news can be tested to explore whether monetary or non-monetary variables contain relevant information for the stock market. For this purpose we can use Wald test for coefficient restrictions. F-test is also used to check the joint significance of all news components. Results of estimation of equation (3) are given in Table 3.

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[6] See Appendix D for statistic.

[7] See Appendix E for statistic.

Table 3.

Estimation results

Dependent Variable: EX_RET				
Explanatory Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID_LNCPI	1.974380	1.358678	1.453163	0.1502
RESID_LNER	-0.942976	0.430636	-2.189729	0.0316
RESID_LNIPSA	-0.441020	0.752399	-0.586152	0.5595
RESID_LNM2	0.367682	0.471694	0.779494	0.4381
RESID_SPREAD	0.007444	0.004913	1.515188	0.1338
POL_NEWS_POS	0.108449	0.029883	3.629092	0.0005
POL_NEWS_NEG	-0.036542	0.033578	-1.088278	0.2799
RUS_FIN_CRIS	-0.346471	0.110965	-3.122334	0.0025
C	0.001183	0.014439	0.081948	0.9349

R-squared	0.366813	Method: Ordinary Least Squares
Adjusted R-squared	0.301027	
F-statistic	5.575872	
Prob(F-statistic)	0.000014	Sample(adjusted): 1997:12 2005:01
Durbin-Watson stat	1.729668	

As can be seen from the table, economic and non-economic news accounts jointly for a considerable fraction of excess stock return variation, though it remains quite low. Adjusted R-squared coefficient is equal approximately to 0.30, which says that economic news together with non-economic news and the dummy responsible for Russian financial crisis can explain approximately 30 percent of variation in excess stock return on the Ukrainian market. It is easy to see that an unexpected 1% increase in exchange rate lowers the excess return by 0.94%. The other macroeconomic news components have a less significant impact on excess returns. However, among them consumer price index appeared to have quite strong influence on our dependent variable. An unexpected 1% increase in consumer price index leads to approximately 1.97% increase in excess stock returns, while an unanticipated 1% increase in spread between short-term deposit and credit rates raises the excess return only by about 0.007%. Nevertheless, economic news about consumer price index as well as about industrial production and money supply are revealed to be statistically insignificant. In general, F-test suggests that we can reject the hypothesis of joint insignificance of all explanatory variables. Still Wald test shows that we can not reject the hypothesis of joint insignificance of monetary news $(\hat{e}_t^{LNCPI}, \hat{e}_t^{LNM2}, \hat{e}_t^{SPREAD})$ for the stock market returns. Table 4 provides this result:

Table 4.

Wald test for joint significance of monetary news

Null Hypothesis: C(RESID_LNCPI)=0 C(RESID_LNM2)=0 C RESID_SPREAD)=0				
F-statistic	1.869436		Probability	**0.141768**
Chi-square	5.608308		Probability	**0.132302**

However, Table 5 shows that according to Wald test we can reject the hypothesis of joint insignificance of non-monetary news $(\hat{e}_t^{LNIPSA}, \hat{e}_t^{LNER})$ for the stock market returns:

Table 5.

Wald test for joint significance of non-monetary news

Null Hypothesis: C(RESID_LNER)=0 C(RESID_LNIPSA)=0				
F-statistic	2.580503		Probability	**0.082274**
Chi-square	5.161006		Probability	**0.075736**

In general, even considering separate insignificance of the majority of estimated parameters responsible for the impact of macroeconomic news, Wald test suggests that jointly they are significant for the behavior of Ukrainian stock market excess return. Results are reported in Table 6:

Table 6.

Wald test for joint significance of all macroeconomic news

Null Hypothesis: C(RESID_LNCPI)=0 C(RESID_LNER)=0 C(RESID_LNIPSA)=0 C(RESID_LNM2)=0 C(RESID_SPREAD)=0				
F-statistic	2.311990		Probability	**0.051855**
Chi-square	11.55995		Probability	**0.041341**

On the other hand, we have another quite interesting result. We get some unexpected signs of estimated parameters. For example, it is considered to be quite surprising if unanticipated changes in CPI are positively related to changes in stock returns. It is also supposed that industrial production and stock market returns are positively related, however, in our specification they related negatively. Similarly, we expect money supply to be negatively related to changes in stock returns, but estimation results do not prove these expectations. However, I should say that in all these cases where we get unexpected signs, the estimated parameters are statistically insignificant. That is why we can not rely on these findings in order to draw some conclusions.

Another quite interesting result is that the estimated parameters which respond for the influence of "good" and "bad" non-economic news appeared to have different significance. The estimated parameter which reflects the impact of "negative" or "bad" political events (news) on stock market excess return appeared to be statistically insignificant. On the other hand, the estimated coefficient responsible for the impact of "positive" or "good" political events (news) on stock market excess return is revealed to be statistically significant. An occurrence of some important "good" non-economic event raises the excess return by approximately 0.11%. In spite of the fact that "negative" political news appeared to be insignificant for the behavior of stock returns, Wald test shows that we can reject the hypothesis of joint insignificance of non-economic news (POL_NEWS_POS, POL_NEWS_NEG) for the stock market returns:

Table 7.

Wald test for joint significance of monetary news

Null Hypothesis: C(POL_NEWS_POS)=0 C(POL_NEWS_NEG)=0				
F-statistic	8.699350		Probability	**0.000392**
Chi-square	17.39870		Probability	**0.000167**

This means that political news do influence the behavior of the Ukrainian stock market, but only "good" political events can have significant influence on it.

In addition, Russian financial crisis also did have a significant influence on the Ukrainian stock market, since the estimated parameter responsible for the impact of this crisis is very significant. Another explanation is that the dummy variable for the Russian financial crisis incorporated also the effect of structural break which happened in August 1998. Chow breakpoint test confirms this suggestion (Table 8.):

Table 8.

Chow Breakpoint Test: 1998:08

F-statistic	1.766884	Probability	0.098438
Log likelihood ratio	15.81783	Probability	0.045063

As you can see, both of the breakpoint test statistics reject the hypothesis of no structural break in August 1998 when Russian financial crisis took place.

Let us now consider what happens when we drop the dummy variable responsible for the influence of "bad" non-economic news which was found to be statistically insignificant. In other words, we run another regression under specification (9). The estimation results for this specification are given in Table 9.

Table 9.

Estimation results

Dependent Variable: EX_RET				
Explanatory Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID_LNCPI	1.652088	1.327576	1.244440	0.2171
RESID_LNER	-0.871948	0.426164	-2.046038	0.0441
RESID_LNIPSA	-0.438678	0.753284	-0.582354	0.5620
RESID_LNM2	0.423030	0.469498	0.901026	0.3703
RESID_SPREAD	0.007903	0.004901	1.612583	0.1109
POL_NEWS_POS	0.116543	0.028977	4.021955	0.0001
RUS_FIN_CRIS	-0.335095	0.110602	-3.029726	0.0033
C	-0.006073	0.012823	-0.473597	0.6371
R-squared	0.357073			
Adjusted R-squared	0.299375	Method: Least Squares		
F-statistic	6.188606			
Prob(F-statistic)	0.000009	Sample(adjusted): 1997:12 2005:01		
Durbin-Watson stat	1.697279			

As can be seen from the table, our results are not very different from the previous ones. All insignificant changes that happened could be due the fact that all other explanatory variables incorporated the effect of the omitted variable. That is why I decided to draw the main conclusions of my thesis from the first estimation results.

Chapter 5

CONCLUSIONS

Now following the purpose of the thesis and referring to the results received empirically I can draw the main conclusions of my work.

The purpose of this work is to investigate how macroeconomic news as well as non-economic (political) news influences the behavior of monthly stock returns in Ukraine during the sample period October 1997 to January 2005. The main results are as follows. First, economic and non-economic news do influence the behavior of the Ukrainian stock market excess returns. Jointly they can explain about 30% per cent of variation in excess stock returns. Second, in Ukraine excess stock returns respond more to non-monetary news while the responses to monetary news are weaker and insignificant. Third, only "good" political events (news) have significant impact on behavior of stock returns.

Market reaction to mainly "good" news may be indicative of the fact that economic agents are more likely to revise their estimates of future returns upward than downward, or that "good" news is more informative than "bad" news. From another point of view, the fact that only positive values of news have significant effects on stock returns reveals information about the market efficiency. For example, if agents expect with equal probability the occurrence of "good" or "bad" political news, the optimal strategy for an agent is to invest in the Ukrainian stock market before these news will be announced, since "good" political news will increase excess stock returns while bad news may have no effect. If such an opportunity exists, the Ukrainian stock market can not be considered to be efficient.

From the methodological point of view one topic for the further research is to improve econometric methodology, since the use of estimated VAR or VEC residuals as proxies for economic news may have several problems. First, if the VARs or the VECs are misspecified, residuals do not accurately reflect true information. Second, in reality, the appropriate information set is much richer than the one used in my thesis. If investors operate with the larger operation set, residuals might overstate the importance of economic news.

Another topic for the further research would be to include some global variables into analysis and explore the dynamics of the stock returns adjustment in the Ukrainian market to new information from international sources. This is very interesting due to international capital market integration and the liberalization of capital movements resulting national stock markets to respond to new economic and political information from international sources. This could give us some further insight about how the Ukrainian stock market responds to international economic and non-economic news.

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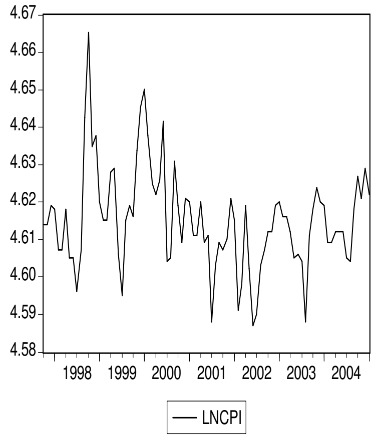
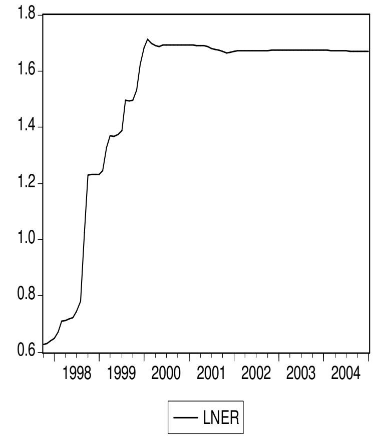
Appendix A

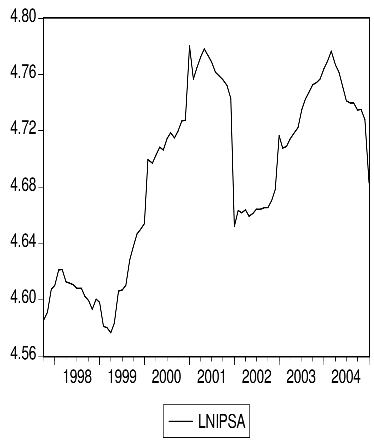
Descriptive statistics of variables

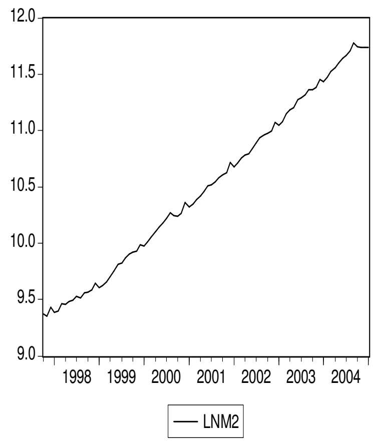
	LNCPI	LNER	LNIPSA	LNM2	SPREAD
Mean	4.615231	1.495974	4.687181	10.50826	-21.82045
Median	4.614625	1.673042	4.704298	10.48074	-20.80000
Maximum	4.665324	1.712554	4.780299	11.77544	-6.700000
Minimum	4.587006	0.626633	4.576084	9.354441	-44.60000
Std. Dev.	0.013623	0.336666	0.063423	0.752680	9.651397
Skewness	0.704891	-1.705932	-0.236646	0.102854	-0.265598
Kurtosis	4.617554	4.400912	1.655678	1.756679	2.069132
Jarque-Bera	16.88121	49.87904	7.447758	5.823262	4.211839
Probability	0.000216	0.000000	0.024140	0.054387	0.121734
Sum	406.1403	131.6457	412.4719	924.7269	-1920.200
Sum Sq. Dev.	0.016145	9.860955	0.349958	49.28789	8104.003
Observations	88	88	88	88	88

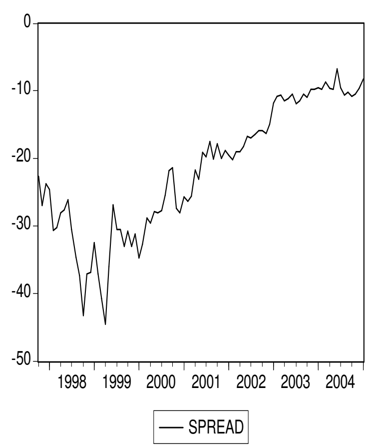
Appendix B
Descriptive graphs of the variables











Appendix C

The main political events (October 1997 – January 2005)

Parliamentary elections	March 1998
Assassination of Vadym Het'man (ex-Head of the NBU)	April 1998
O. Tkachenko was elected the Head of the Verkhovna Rada	July 1998
Escape of Pavlo Lazarenko(ex-Prime-minister of Ukraine) abroad	February 1999
Death of V'yacheslav Chornovil in automobile accident	March 1999
The 1st round of Presidential elections	October 1999
The 2nd round of Presidential elections	November 1999
Victor Yushchenko was appointed the Prime-minister of Ukraine	December 1999
Referendum on additional authorities of the President of Ukraine	April 2000
Disappearance of Journalist H. Gongadze	September 2000
The beginning of the "Casette" scandal	November 2000
Conflict between UNA-UNSO and law-enforcement authorities	March 2001
Resignation of Victor Yushchenko and the government	April 2001
Terrorist attack on the USA	September 2001
Crash of Russian air liner Tu-154 "Tel-Aviv – Novosibirsk"	October 2001
Parliamentary elections	March 2002
Scandal about probable military supplies of Ukrainian radars to Iraq	April 2002
V. Lytvyn was elected the Head of the Verkhovna Rada	May 2002
Resignation of Anatoliy Kinakh and the government	November 2002
Beginning of military operations in Iraq	March 2003
Kuchma's speech about the necessity of changes in the Constitution of Ukraine	June 2003
Agreement on creation of the Common Economic Area was signed	September 2003
Tuzla crisis	October 2003
Mortgage Law came into force	January 2004
Verkhovna Rada passed the draft of the Agreement on creation of CEA	April 2004
Ruslana Lyzhychko wins Eurovision competition	May 2004
Presidential elections and "Orange" revolution	October-December 2004
Inauguration of Victor Yushchenko	January 2005

Appendix D
Johansen Cointegration Test

Sample(adjusted): 1998:01 2005:01
Included observations: 85 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: LNCPI LNER LNIPSA LNM2 SPREAD
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.377712	85.69566	68.52	76.07
At most 1	0.243056	45.37566	47.21	54.46
At most 2	0.132108	21.70607	29.68	35.65
At most 3	0.104516	9.662592	15.41	20.04
At most 4	0.003282	0.279393	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.377712	40.32000	33.46	38.77
At most 1	0.243056	23.66959	27.07	32.24
At most 2	0.132108	12.04348	20.97	25.52
At most 3	0.104516	9.383199	14.07	18.63
At most 4	0.003282	0.279393	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNCPI	LNER	LNIPSA	LNM2	SPREAD
86.67019	-2.414929	-2.150176	-0.292716	0.028689
-66.05868	-4.416407	8.541629	5.696650	-0.475781
-68.75667	-0.233157	-9.303707	-1.126411	0.086360
-14.20047	-4.893726	21.32120	1.572488	-0.069472
27.76331	-0.952460	-17.82657	2.317505	-0.002313

Unrestricted Adjustment Coefficients (alpha):

D(LNCPI)	-0.003472	0.002393	0.002336	0.000367
D(LNER)	0.006413	0.008335	0.007224	-0.001425
D(LNIPSA)	0.000154	-0.001427	0.000690	-0.004476
D(LNM2)	-0.008940	-0.000439	-0.001584	-0.003525
D(SPREAD)	-0.203125	0.632633	-0.624119	-0.188123

Johansen Cointegration Test

1 Cointegrating Equation(s):		Log likelihood	715.1242	
Normalized cointegrating coefficients (std.err. in parentheses)				
LNCPI	LNER	LNIPSA	LNM2	SPREAD
1.000000	-0.027863	-0.024809	-0.003377	0.000331
	(0.01215)	(0.05170)	(0.01056)	(0.00076)
Adjustment coefficients (std.err. in parentheses)				
D(LNCPI)	-0.300884			
	(0.09600)			
D(LNER)	0.555823			
	(0.30042)			
D(LNIPSA)	0.013354			
	(0.15535)			
D(LNM2)	-0.774870			
	(0.24172)			
D(SPREAD)	-17.60487			
	(23.1385)			

2 Cointegrating Equation(s):		Log likelihood	726.9590	
Normalized cointegrating coefficients (std.err. in parentheses)				
LNCPI	LNER	LNIPSA	LNM2	SPREAD
1.000000	0.000000	-0.055548	-0.027752	0.002352
		(0.03876)	(0.00622)	(0.00048)
0.000000	1.000000	-1.103207	-0.874784	0.072545
		(0.95583)	(0.15332)	(0.01195)
Adjustment coefficients (std.err. in parentheses)				
D(LNCPI)	-0.458991	-0.002187		
	(0.11678)	(0.00539)		
D(LNER)	0.005222	-0.052298		
	(0.36246)	(0.01674)		
D(LNIPSA)	0.107594	0.005928		
	(0.19448)	(0.00898)		
D(LNM2)	-0.745886	0.023528		
	(0.30388)	(0.01404)		
D(SPREAD)	-59.39579	-2.303434		
	(27.9518)	(1.29110)		

3 Cointegrating Equation(s):		Log likelihood	732.9807	
Normalized cointegrating coefficients (std.err. in parentheses)				
LNCPI	LNER	LNIPSA	LNM2	SPREAD
1.000000	0.000000	0.000000	-0.014307	0.001252
			(0.00634)	(0.00052)
0.000000	1.000000	0.000000	-0.607768	0.050694
			(0.17002)	(0.01405)
0.000000	0.000000	1.000000	0.242036	-0.019806
			(0.09119)	(0.00754)

Adjustment coefficients (std.err. in parentheses)

D(LNCPI)	-0.619611	-0.002731	0.006174
	(0.13352)	(0.00522)	(0.01328)
D(LNER)	-0.491508	-0.053982	-0.009809
	(0.41450)	(0.01621)	(0.04121)
D(LNIPSA)	0.060173	0.005768	-0.018934
	(0.22972)	(0.00898)	(0.02284)
D(LNM2)	-0.637007	0.023898	0.030209
	(0.35852)	(0.01402)	(0.03565)
D(SPREAD)	-16.48346	-2.157916	11.64709
	(31.6819)	(1.23896)	(3.15012)

4 Cointegrating Equation(s): Log likelihood 737.6723

Normalized cointegrating coefficients (std.err. in parentheses)

LNCPI	LNER	LNIPSA	LNM2	SPREAD
1.000000	0.000000	0.000000	0.000000	-5.62E-05
				(0.00031)
0.000000	1.000000	0.000000	0.000000	-0.004885
				(0.00928)
0.000000	0.000000	1.000000	0.000000	0.002327
				(0.00233)
0.000000	0.000000	0.000000	1.000000	-0.091449
				(0.01089)

Adjustment coefficients (std.err. in parentheses)

D(LNCPI)	-0.624826	-0.004528	0.014004	0.012597
	(0.13421)	(0.00727)	(0.02575)	(0.00624)
D(LNER)	-0.471271	-0.047008	-0.040194	0.035226
	(0.41645)	(0.02257)	(0.07991)	(0.01935)
D(LNIPSA)	0.123739	0.027673	-0.114373	-0.015988
	(0.22091)	(0.01197)	(0.04239)	(0.01026)
D(LNM2)	-0.586954	0.041147	-0.044943	-0.003641
	(0.35670)	(0.01933)	(0.06844)	(0.01657)
D(SPREAD)	-13.81202	-1.237294	7.636085	4.070541
	(31.7456)	(1.72015)	(6.09147)	(1.47502)

Appendix E

Vector Error Correction Estimates

Sample(adjusted): 1997:12 2005:01
Included observations: 86 after adjusting endpoints
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1				
LNCPI(-1)	1.000000				
LNER(-1)	0.007094 (0.00995) [0.71262]				
LNIPSA(-1)	-0.059134 (0.04446) [-1.33007]				
LNM2(-1)	-0.011857 (0.00831) [-1.42602]				
SPREAD(-1)	0.001041 (0.00058) [1.78097]				
C	-4.201135				
Error Correction:	**D(LNCPI)**	**D(LNER)**	**D(LNIPSA)**	**D(LNM2)**	**D(SPREAD)**
CointEq1	-0.638499 (0.11118) [-5.74311]	-0.580906 (0.36297) [-1.60041]	0.242947 (0.17587) [1.38141]	-0.312581 (0.29222) [-1.06968]	54.44374 (29.1763) [1.86602]
D(LNCPI(-1))	0.112118 (0.10598) [1.05789]	0.306975 (0.34601) [0.88718]	-0.121993 (0.16765) [-0.72766]	-0.649230 (0.27857) [-2.33061]	-7.514793 (27.8131) [-0.27019]
D(LNER(-1))	0.091201 (0.03659) [2.49231]	0.528018 (0.11947) [4.41966]	-0.027740 (0.05789) [-0.47921]	0.038455 (0.09618) [0.39982]	-19.82516 (9.60323) [-2.06443]
D(LNIPSA(-1))	0.114272 (0.07555) [1.51252]	0.025110 (0.24666) [0.10180]	-0.000573 (0.11951) [-0.00479]	0.075094 (0.19858) [0.37815]	21.76742 (19.8270) [1.09787]
D(LNM2(-1))	0.016746 (0.03956) [0.42330]	-0.207767 (0.12916) [-1.60858]	0.044869 (0.06258) [0.71696]	-0.274296 (0.10399) [-2.63785]	20.93679 (10.3823) [2.01659]

Appendix E (cont'd)

Vector Error Correction Estimates

D(SPREAD(-1))	-0.000388	-0.001311	-0.000772	-0.001900	-0.237806
	(0.00047)	(0.00152)	(0.00074)	(0.00122)	(0.12226)
	[-0.83379]	[-0.86171]	[-1.04706]	[-1.55166]	[-1.94506]
C	-0.001624	0.011492	0.000308	0.035102	-0.116028
	(0.00156)	(0.00508)	(0.00246)	(0.00409)	(0.40833)
	[-1.04346]	[2.26217]	[0.12518]	[8.58288]	[-0.28415]
R-squared	0.374825	0.322914	0.029988	0.230074	0.108931
Adj. R-squared	0.327343	0.271490	-0.043684	0.171599	0.041255
Sum sq. resids	0.008155	0.086921	0.020406	0.056337	561.6143
S.E. equation	0.010160	0.033170	0.016072	0.026705	2.666279
F-statistic	7.894095	6.279420	0.407051	3.934548	1.609593
Log likelihood	276.3027	174.5468	236.8612	193.1933	-202.7168
Akaike AIC	-6.262853	-3.896437	-5.345608	-4.330078	4.877136
Schwarz SC	-6.063080	-3.696665	-5.145836	-4.130305	5.076908
Mean dependent	9.18E-05	0.012065	0.001068	0.027740	0.218605
S.D. dependent	0.012388	0.038862	0.015732	0.029340	2.723039
Determinant Residual Covariance		9.45E-14			
Log Likelihood		697.6677			
Log Likelihood (d.f. adjusted)		679.4143			
Akaike Information Criteria		-14.87010			
Schwarz Criteria		-13.72854			